PART 1 – GENERAL

1.01 SUMMARY

A. **Section Includes:** Furnishing of all labour, materials, services and equipment necessary for the supply and installation of waterproofing systems (as described in the BOQ) to concrete substrates, above-grade, on either dry or wet side of substrates, as indicated on drawing and as specified herein.

1.02 REFERENCES

A. **Applicable Standards:** The following standards are referenced herein.
   1. American Society for Testing Materials (ASTM)
   2. Army Corps of Engineers (CRD)
   3. NSF International (NSF)
   4. Bureau of Indian Standard (IS) - 2720

1.03 SYSTEM DESCRIPTION

A. **“Catalytic” In-depth Crystalline Waterproofing:** Blend of portland cement, fine treated silica sand and active proprietary chemicals. When mixed with water (or a flexibilizer) and applied as a coating layer, the active chemicals in the coating layer penetrate the concrete substrate and cause a catalytic reaction which generates a non-soluble crystalline formation of dendritic fibers deep within the pores and capillary tracts of concrete. This process causes concrete to become permanently sealed against the penetration of liquids from any direction. Two product versions of “Catalytic” In-depth Crystalline Waterproofing are available, i.e. Cementitious and Flexible-Matrix. The Flexible-Matrix version is preferred over the Cementitious version, due to its elongation characteristics and additional virtue of forming a membranous barrier around the concrete to which it is applied.

B. **Membrane Waterproofing:**

   (1) **Pre-fabricated APP/SBS Modified Polyester Re-inforced Bituminous Membrane:** having UV resistance, underground ground-chemical resistance, high melting points, flexible and elastic with high adhesive strength. The membrane shall be reinforced with a layer of non-woven polyester fabric of minimum 180 g/sqm or composite reinforcement of minimum of 175 g/sqm and reinforced with glass fibre grill of 8 g/sqm. The upper surface is finished with calibrated granules of 1 mm, pressed mechanically into the bitumen. The under surface is finished with a polyethylene foil of 12 micron thickness. The total membrane thickness is 4mm and minimum weight 4.2 to 4.5 kg/m² including coating with compatible primer of bituminous base and torch application with overlap of 70 - 100 mm wherever required. The reinforcement provided shall be
able to withstand the traffic flow density and shall include necessary protection layer of either
colour slates / granules / 18 mm thick thermocole / aluminium foil as approved by consultants, etc.

2) Liquid-applied, Water-Based, Elastomeric Polyurethane Membrane: having UV
resistance, underground ground-chemical resistance, high melting points, flexible and elastic with
high adhesive strength. The membrane shall be reinforced with a layer of non-woven polyester
fabric of minimum 40 g/sqm. The upper surface shall be finished with 8-12 sieve quartz sand
which shall be sprinkled on to the final wet layer of the liquid applied membrane, to provide
‘keying’ to the subsequent protective cementitious layer of concrete screed / plaster as specified
in the BOQ. The total membrane thickness shall be as specified by the manufacturer’s technical
literature but not less that 1.5 mm and shall be applied in 3 coats.

C. Acrylic Polymer-Modified Flexible Cementitious Membrane / Coating: having UV resistance,
underground ground-chemical resistance, high melting points, flexible and elastic with high
adhesive strength. The membrane shall be reinforced with a layer of non-woven polyester
fabric of minimum 30 g/sqm. The Acrylic Polymer-Modified Flexible Cementitious Membrane / Coating
shall be protected with a subsequent protective cementitious layer of concrete screed / plaster in
thickness as specified in the BOQ. The total coating thickness shall be as specified by the
manufacturer’s technical literature but not less that 1.5 mm and shall be applied in 2 - 3 coats.

1.04 SYSTEM PERFORMANCE REQUIREMENTS

A. Testing Requirements: The waterproofing systems shall be tested in accordance with the following
standards and conditions, and the testing results shall meet or exceed the performance
requirements as specified herein.

B. Independent Laboratory: Testing shall be performed by an independent laboratory meeting the
requirements of ASTM E 329-95 and certified by the United States Bureau of Standards. Testing
laboratory shall obtain all concrete samples and waterproofing product samples.

C. Permeability: Independent testing shall be performed according to U.S. Army Corps of Engineers
CRD-C48-73 “Permeability of Concrete”.
   1. Concrete samples (treated and untreated) to have design strength of 13.8 Mpa and thickness
      of 50 mm. No. admixtures permitted.
   2. Coatings / Membranes to have maximum thickness as specified in this document / in the BOQ.
   3. Samples to be pressure tested to 1.2 Mpa (123.4 m head of water).
   4. Treated samples shall exhibit no measurable leakage.

E. Chemical Resistance: Independent testing shall be performed according to ASTM C 267-77
“Chemical Resistance of Mortars” and ASTM C 39-86 “Compressive Strength of Cylindrical
Concrete Specimens”.

1. Concrete samples (treated and untreated) to have design strength of 27.6 Mpa. No admixtures permitted.
2. Coatings / Membranes to have maximum thickness as specified in this document / in the BOQ.
3. Untreated and treated specimens to be immersed for a minimum of 84 days in following chemical solutions: hydrochloric acid (3.5 pH), brake fluid, transformer oil, ethylene glycol, toluene, caustic soda.
4. Treated specimens shall exhibit no detrimental effects after exposure.

F. Potable Water Approval: Independent testing shall be performed according to NSF Standard 61 and approval for use of waterproofing material on structures holding portable water shall be evidenced NSF certification.

1.05 SUBMITTALS

A. General: Submit listed submittals in accordance with conditions of the Contract and with Division 1 Submittals Procedures Section.

B. Product Data: Submit product data, including manufacturer’s specifications, installation instructions, and general recommendations for waterproofing applications. Also include manufacturer’s certification or other data substantiating that products comply with requirements of Contract Documents.

C. Test Reports: Submit for acceptance, complete test reports from approved independent testing laboratories certifying that waterproofing system conforms to performance characteristics and testing requirements specified herein.

D. Manufacturer’s Certification: Provide certificates signed by manufacturer or manufacturer’s representative certifying that the materials to be installed comply in all respects with the requirements of this specification, and that the specialized executing waterproofing agency is qualified and approved to install the materials in accordance with manufacturer’s product data.

E. Manufacturer’s Field Report: Provide copy of report from manufacturer’s representative confirming that the surfaces to which waterproofing material is to be applied are in a condition suitable to receive same.

1.06 QUALITY ASSURANCE

A. Manufacturer: Provide products of manufacturer with no less than 20 years experience in manufacturing the waterproofing materials offered by them for the required work. Manufacturers that cannot provide the performance test data specified herein will not be considered for the project.
B. **Specialised Executing Waterproofing Agency:** Specialised Executing Waterproofing Agency shall be experienced in the installation of the offered waterproofing materials as demonstrated by previous successful installation, and shall be approved by the manufacturer in writing.

C. **Pre-Installation Conference:** Prior to installation of waterproofing, conduct meeting with waterproofing agency, Architect/Engineer, owner’s representative, and waterproofing manufacturer’s representative to verify and review the following:
   1. Project requirements for waterproofing as set out in Contract Documents.
   2. Manufacturer’s product data including application instruction.
   3. Substrate conditions, and procedures for substrate preparation and waterproofing installation.

D. **Technical Consultation:** The waterproofing manufacturer’s representative shall provide technical consultation on waterproofing application.

### 1.07 DELIVERY, STORAGE

A. **Delivery:** Deliver packaged waterproofing materials to project site in original undamaged / unopened containers / pallets, with manufacturer’s labels and seals intact. Shall be approved by the PM. Material delivered shall be accompanied by manufacturer’s certificate for quality parameters and date of manufacture / expiry.

B. **Storage:** Material shall be stored in dry, well ventilated and covered storage.

### 1.08 PROJECT CONDITIONS

A. **Compliance:** Comply with manufacturer’s product data regarding condition of substrate to receive waterproofing, weather conditions before and during installation, and protection of the installed waterproofing system.

### 1.09 GUARANTEE

A. **Manufacturer’s Guarantee:** Manufacturer Shall provide standard product guarantee executed by authorized company official. Term of guarantee shall be 15 years from Date of Substantial Completion.

B. **Guarantee of the Specialised Executing Waterproofing Agency:** The specialized Executing Waterproofing Agency shall guarantee the waterproofing installation against defects caused by faulty workmanship or materials for a period of 15 years from Date of Substantial Completion. The guarantee will cover the surfaces treated and will blind the agency to repair, at his expense, any and all leaks through the treated surfaces which are not due to structural weaknesses or other causes beyond applicator’s control such as fire, earthquake, tornado and hurricane. The guarantee shall read as follows.
C. **Guarantee**: The agency guarantees that, upon completion of the work, surfaces treated with offered waterproofing material will be and will remain free from water leakage resulting from defective workmanship or materials for a period of 15 years from Date of Substantial Completion. In the event that water leakage occurs within the guarantee period from such causes, the agency shall, at its sole expense, repair, replace or otherwise correct such defective workmanship or materials. Agency shall not be liable for consequential damages and the agency's liability shall be limited to repair, replacement or correcting of defective workmanship or materials. Agency shall have no responsibility with respect to water leakage or other defects caused by structural failure or movement of the structure, or any other causes beyond the Agency's control.

**PART 2 – PRODUCTS**

**2.01 MATERIALS**

A. **Acceptable Manufacturers (in alphabetical order):**
   
   Euclid Chemical Co., USA ; Valli Zabban S.P.A, Italy ; Zenex Construction Chemicals Inc., USA ; OR their Indian Licensees

B. **Acceptable Proprietary Products (in alphabetical order):** The accepted waterproofing materials are as follows:

<table>
<thead>
<tr>
<th>For Euclid Chemical Co., USA</th>
<th>For VALLI ZABBAN, Italy</th>
<th>For ZENEX, USA</th>
</tr>
</thead>
<tbody>
<tr>
<td>2. Speed Plug</td>
<td>2. Monogum</td>
<td>2. ZUPA Aquathon</td>
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<td>3. ZUPA Aquathon 60</td>
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<td>4. ZUPA Hydro-Tight</td>
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<td>5. ZUPA Plastifect-PU</td>
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<td>6. ZUPA Santulan</td>
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C. **Acceptable Specialised Executing Waterproofing Agencies (in alphabetical order):** The Specialised Executing Waterproofing Agencies shall mandatorily be ISO 9000 quality management certified and the following Agency is acceptable:

   IPWT Corporation, H.O. at Mumbai ; Ph : 022-25559191, 25505766 ; Fax : 022-25559132 ; email : gfcho@vsnl.com / ipwt.tammsmumbai@gmail.com ; Branch Offices at : Ahmedabad, New Delhi, Bangalore, Chennai, Kolkata, Hyderabad, Pune, Nagpur, Nashik

D. **Substitutions:** No substitutions permitted.

E. **Source Quality:** Obtain proprietary waterproofing products directly from the manufacturer.
F. Other Civil Materials related with waterproofing: Cement, screened river sand, brick-bats, aggregates, integral waterproofing compounds, etc. required for screeds, protective toppings and plasters shall conform to the pertaining IS standards (IS 269, IS 8112, IS 13286, IS 383, IS 2645, IS 12118 and IS 3495). The Consultants / PM shall demand the conformance of these materials from the Specialised Executing Waterproofing Agencies / civil contractor from time to time and they shall have to produce test reports / documents to prove the conformance of these materials with their applicable standards, without any argument.

2.02 MIXES

A. General: Mix waterproofing material as specified by the Manufacturer. Follow exact instructions as mentioned in the respective technical literature. Mix waterproofing material in quantities that can be applied within 20 to 30 minutes from time of mixing.

B. Application:
   (1) Liquid applied coatings / membranes: by brush, spray, squeegee or trowel
   (2) Pre-Fabricated Membranes: by priming and torching

PART 3 – EXECUTION

3.01 EXAMINATION

A. Site Visit: Prior to waterproofing installation, arrange visit to project site with waterproofing manufacturer’s representative. Representative shall inspect and certify that concrete surfaces are in acceptable condition to receive waterproofing treatment.

B. Verification of Substrates: Verify that concrete surfaces are sound and clean, and that form release agents and materials used to cure the concrete are compatible with waterproofing treatment.

C. Examination for Defects: Examine surfaces to be waterproofed for form tie holes and structural defects such as honeycombing, rock pockets, faulty construction joints and cracks. Such defects to be repaired in accordance to manufacturer’s product data and 3.02 below.

3.02 PREPARATION

A. Concrete Finish: Concrete surfaces to receive waterproofing treatment shall be free from scale, excess form oil, laitance, curing compounds and foreign matter. Horizontal surfaces shall have a rough wood float, smooth or broom finish, as required by the waterproofing material manufacturer.
B. **Surface Preparation:** Smooth surfaces (e.g. where steel forms are used) or surfaces covered with excess form oil or other contaminants shall be washed, lightly sandblasted, waterblasted, or acid etched with muriatic acid (as necessary) to provide a clean absorbent surface. Surfaces to be acid-etched shall be saturated with water prior to application of acid.

C. **Repair of Defects:** Surface defects shall be repaired in accordance with manufacturer’s instructions as follows:

1. **Form Tie Holes, Construction Joints, cracks:** Chip our defective areas in a ‘U’ shaped slot 25 mm wide and a minimum of 25 mm deep. Clean slot of debris and dust. Soak area with water and remove excess surface water. Apply a polymer modified cementitious bonding coat of approved material to the slot. Then fill cavity with a non-shrink, waterproof, cementitious grout / mortar, while the bonding coat is tacky. Compress tightly into cavity using pneumatic packer or block and hammer. Where the concrete is defective, do injection grouting with high pressure (140 psi) grouting machine using cement admixed with non-shrink grouting admixture.

2. **Rock Pockets, Honeycombing or Other Defective Concrete:** Rout out defective areas to sound concrete. Remove loose materials and saturate with water. Remove excess surface water and apply a polymer modified cementitious bonding coat of approved material to the area. While the bonding coat is still tacky, fill cavity to surface level with non-shrink grout. Where the concrete is defective, do injection grouting with high pressure (140 psi) grouting machine using cement admixed with non-shrink grouting admixture.

### 3.03 APPLICATION

A. **Construction Joints:** Apply cementitious bonding material in slurry form to joint surfaces between concrete pours, just prior to pouring fresh concrete. Moisten surfaces prior to the bonding coat application. Where joint surfaces are not accessible prior to pouring new concrete, consult manufacturer for application procedure.

B. **Coves (vata):** Make a minimum 4 inch (diagonal) cove / vata at all 90° interfaces in concrete surfaces where waterproofing is carried out, without fail.

C. **Surface Application:** After repairs, surface preparation, treatment of construction joints, cracks, honeycombs, tie-holes, etc., have been completed in accordance with manufacturer’s product data and as specified herein, apply / provide the waterproofing material as specified in the manufacturer’s technical and application data sheet to concrete surfaces. Application rates, thicknesses and locations shall be as indicated in the drawing. When brushing, work slurry well into surface of the concrete, filling surface pores and hairline cracks. When spraying, hold nozzle close enough to ensure that slurry is forced into pores and hairline cracks. When torching, uniformly burn the surface when overlapping, to ensure that the membrane adheres uniformly.
D. **Sandwich (Topping) Application:** When treated structural slabs are to receive a concrete or other topping, place the topping only after the initial curing period of the material being used, is completed. Lightly pre-water when rapid drying conditions exist.

### 3.04 CURING

**A. General:**
For cementitious materials: Begin curing as soon as the applied waterproofing material has hardened sufficiently so as not to be damaged by a fine spray. Cure the treatment with water as per the manufacturer’s instructions. In warm climates, more-than-normal curing duration may be necessary to prevent excessive drying of coating.

For liquid applied membranes / Pre-fabricated membranes: natural air curing for duration as described in the manufacturer’s technical data sheet.

**B. Air Circulation:** Do not lay plastic sheeting directly on the waterproofing coating as air contact is required for proper curing. If poor circulation exists in treated areas, it may be necessary to provide fans or blown air to aid in curing of waterproofing treatment.

**C. Water-holding Structures:** For concrete water-holding structures such as swimming pools, reservoirs, water treatment tanks and wet wells, cure the waterproofing system for a minimum of three days and then allow the waterproofing system to set for 7 days before filling structure with liquid. For structures holding hot or corrosive liquids, cure waterproofing treatment for three days and allow to set for 15 days before filling.

**D. Protection:** During the curing period, protect the treated surfaces from damage by wind, sun, rain and temperatures below 20°C. If plastic sheeting is used for protection, it must be raised off the waterproofing coating to allow sufficient air circulation.

### 3.05 INTERFACE WITH OTHER MATERIALS

**A. Backfilling:** Do not backfill for 36 hours after application. If backfill takes place within seven days after application, then backfill material shall be moist so as not to draw moisture from waterproof coating.

**B. Paint, Epoxy or Similar Coatings:** Do not apply paint or other coatings until waterproofing treatment has cured and set for a minimum of 21 days. Before applying or coating, neutralize treated surface by dampening with water and then washing waterproofed surface with 15% (HCL) muriatic acid, diluted in a ratio of one part acid to four parts water by volume. Flush acid off treated concrete surfaces.
C. **Grout, Cement Parge Coat, Plaster or Stucco:** Because the waterproof coating forms a relatively smooth surface and the resulting waterproof coating reduces the suction characteristics of the concrete, it may be necessary to use a suitable bonding agent for proper bonding of cementitious systems (IPS, screeds, plaster, etc.), if they are applied.

D. **Responsibility to Ensure Compatibility:** The respective manufacturers’ must confirm in writing regarding compatibility of their waterproofing treatments with other coatings, plaster, stuccos, tiles or other surface-applied materials. It shall be the responsibility of the manufacturer / installer of the waterproofing material to take whatever measures are necessary, including testing, to ensure acceptance by or adhesion to their waterproofing system.

### 3.06 FIELD QUALITY CONTROL

A. **Observation:** Do not conceal installed waterproofing system before it has been observed by Architect/Engineer, waterproofing manufacturer’s representative and other designated entities.

B. **Flood Testing:**
   1. Perform flood test on completed waterproofing installation for a minimum of 72 hours before placement of other construction.
   2. Plug or dam drains and fill area with water to a depth of at least 100 mm.
   3. If leaks are discovered, make repairs and repeat tests until no leaks are observed.

### 3.07 CLEANING AND PROTECTION

A. **Cleaning:** Clean spillage and soiling from adjacent surfaces using approximate cleaning agents and procedures.

B. **Protection:** Take measures to protect completed waterproofing system from damage immediately after application. Do not permit traffic on unprotected coating or membrane.