**WATERPROOFING POLICY**

| Policy No. | Version No | Issued by | Date | Reviewed by |
|---|---|---|---|---|
| STR 6 | | Structural Design | 05/01/2011 | |
| STR 6 | 4 | Structural Design | 29/04/2015 | COO |
| STR 6 | 5 | Structural Design | 24/11/2021 | HOD – Design<br>Head, Lodha Quality Assurance<br>Procurement – Civil Category Head |

1. Structural design to issue BOQ, specifications and typical details for waterproofing (WP), separately for sub-structure, super-structure and podiums to Central Procurement (CPT).
2. WP material specifications shall be decided by the structural design based on concrete substrate design conditions (tensile strains and stresses) and the exposure conditions.
3. Super-structure WP BOQ shall include a sketch showing wet areas on typical floor demarcated in colour code based on type of specified material(s). A sample sketch is attached for reference.
4. Thickness of toilet slabs shall be minimum 150mm for all the new buildings for which formwork shell drawings are not yet finalized. For the ongoing buildings, rebar shall be in 2 layers – spacing not to exceed 150mm both ways top and bottom for toilet slab thicknesses 125mm and above. For slab thicknesses < 125mm, rebar in single layer if specified, the bar spacing shall be 150mm both ways or as per drawing whichever is less. Sites shall make the amendment to rebar with immediate effect.
5. Podium waterproofing BOQ shall show representative section of podium covering WP scheme and all typical features viz., planters, soft-scape, up-stands, block walls, water bodies, hard scape, screed, drain locations etc. A sample sketch is attached for reference.
6. BOQ contains applicable standard typical details (a complete list of details is attached here) for reference of vendors.
7. Structural Design shall issue the WP - Scheme, BOQ, and Technical Specifications to Site, Arch, MEP, QA, and CPT for their review and comments. Post review, if required, QA to organize a work-shop with all stakeholders (Site, CPT, Arch, Structure, MEP, QA) to discuss and finalize. Structural Design shall re-issue the final WP - Scheme, BOQ, and Technical Specifications to CPT.
8. CPT shall issue the final tender documents (BOQ, Structural & Architectural drawings) to waterproofing vendors.
9. BOQ, specifications and details issued by CPT should be checked and verified by vendor. Vendor can propose improvements (if any) to the details provided without degrading the specifications. The same need to be discussed with structural design and QA for a final conclusion.
10. Vendor shall prepare and submit their Technical details along with proposed WP scheme, products, and compliance form and the same shall be approved by structural design.
11. Approved scheme, typical details, compliance form, and materials shall be part of the work order (WO) and not to be changed under any circumstances without the prior approval by structural design.
12. On award of work, vendor shall submit method statement (vendor MS) in compliance with WO for execution works for approval of the site quality team.
13. Before starting any waterproofing work item vendor shall satisfy himself with quantities, line items, as agreed in the WO and if there is any variation in the *quantity and scope* he need to raise RFI for approval prior to initiation of each work item.

14. CM team in consultation with COO need to seek the approval for RFIs from DCO *duly providing the necessary justification* for the additional scope and the variation in the quantities. Site shall raise CRN after getting the approval from DCO. Any additional work or changes to the specifications if executed without raising prior RFI, cost shall be from CM contingency.
15. There will be one mock-up at site (for one WO) to be done with the agreed products to verify the specified minimum coating /membrane thicknesses and performance. Site QC team to carryout third party lab test on the material in the presence of Lodha QA. Site QC team shall check and approve the mock-up.
16. Change order management if any shall be done as per the existing Lodha policies.

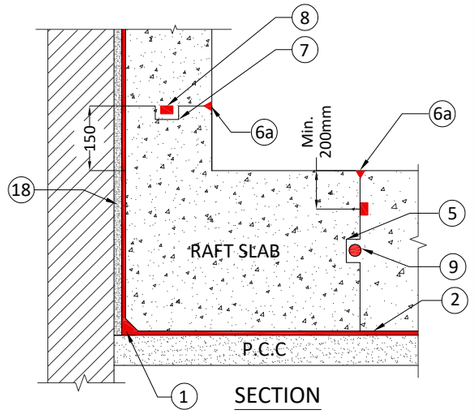
Annexures:

1. Waterproofing Details Sub-structure
2. Waterproofing Details Super-structure
3. Waterproofing Details Podium and Misc
4. Sketch - Podium Features
5. Sketch - Typical Floor Wet Areas
6. Vendor Compliance Form

SUB STRUCTURE WITH BASEMENT

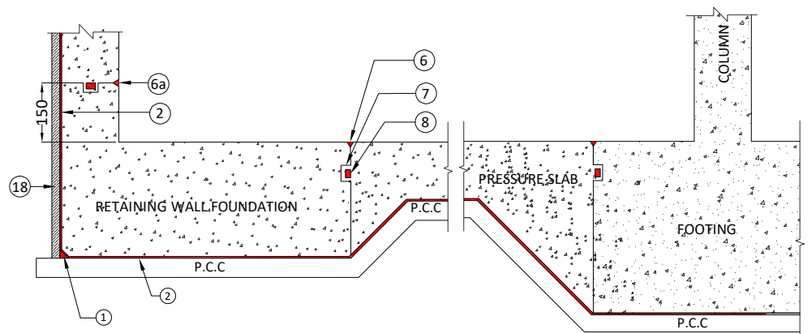
Annexure 1 : Waterproofing Details Sub-Structure

## PILED RAFT/RAFT (HDPE MEMBRANE)



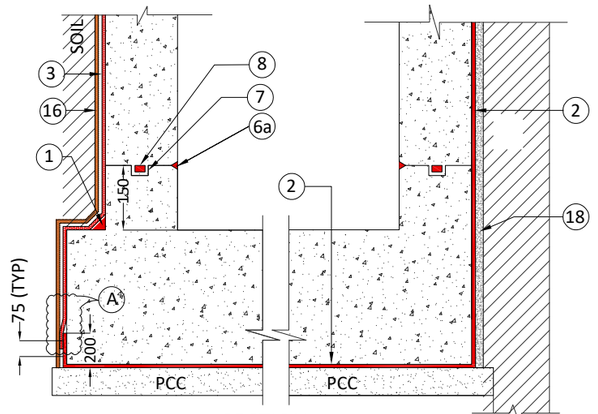

SECTION

## ISOLATED FOUNDATIONS WITH PRESSURE SLAB (HDPE MEMBRANE)




SECTION

## LIFT PITS (HDPE MEMBRANE)




SECTION

1. Angle fillet 50mm with Polymer modified mortar.
2. Self-adhesive HDPE membrane.
3. SBS modified bituminous membrane.
4. HDPE Sealed tape.
5. Ply shutter with shear key + Injection hoses for grouting foam and chemical.
   OR
   Hyrib + Injection hoses for grouting foam and chemical.

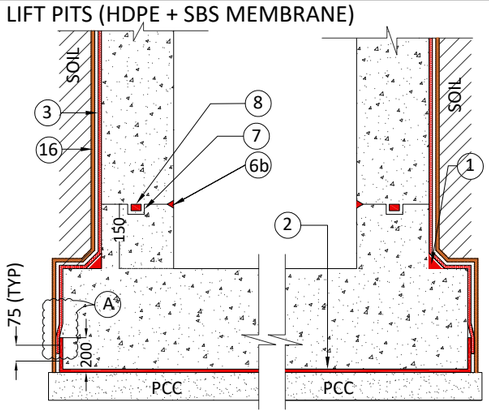
6a V groove + Epoxy Sealant.

6b V groove + Non shrink grout (GP2, CNS50) Or Equivalent.

7. Notch (75x50mm).
8. Swellable bar/Hydro Swell.
9. Injection hose.
10. Non shrink grout (GP2, CNS50) Or Equivalent.
11. Epoxy grout (10mm thick).
12. Twin sided self adhesive bituminous tape.
13. PU Membrane.
14. Protection screed.
15. Coal Tar Epoxy (single coat).
16. Protection Board/Dimple Board.
17. Crystalline admixture mixed concrete (0.8 to 1% by weight of cement).
18. Levelled Surface.
19. Integral Crystalline Water proofing coating.

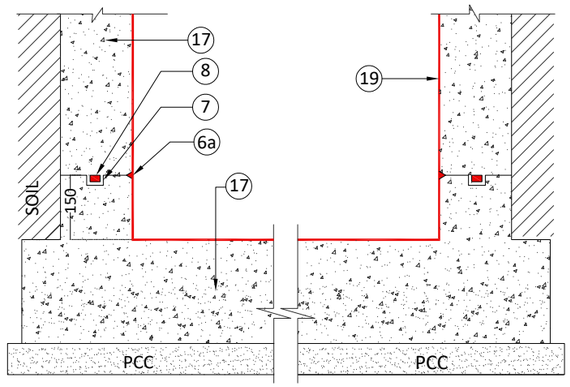
SUBSTRUCTURE WITHOUT BASEMENT

## LIFT PITS (HDPE + SBS MEMBRANE)



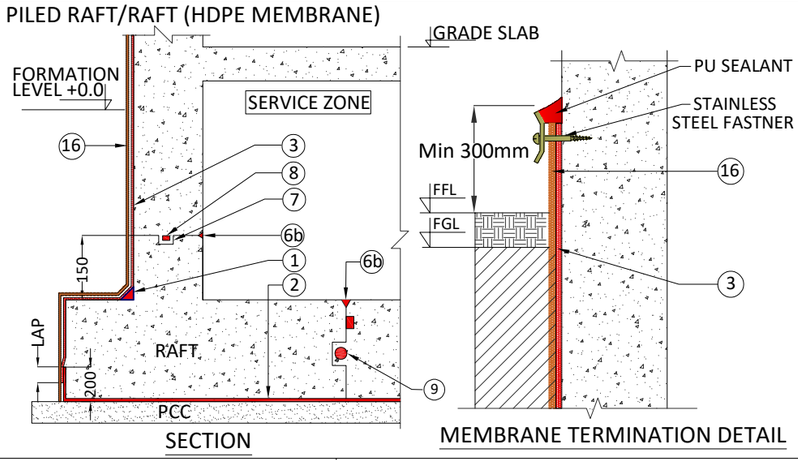

SECTION

## LIFT PITS (CRYSTALLINE)




SECTION

## PILED RAFT/RAFT (HDPE MEMBRANE)

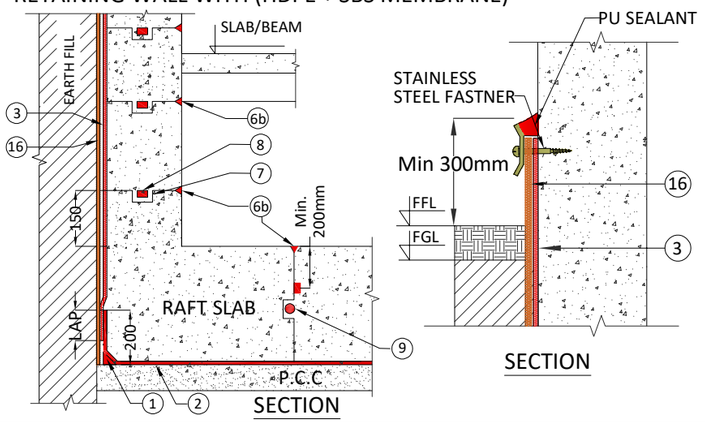



SECTION




MEMBRANE TERMINATION DETAIL

## RETAINING WALL WITH (HDPE + SBS MEMBRANE)

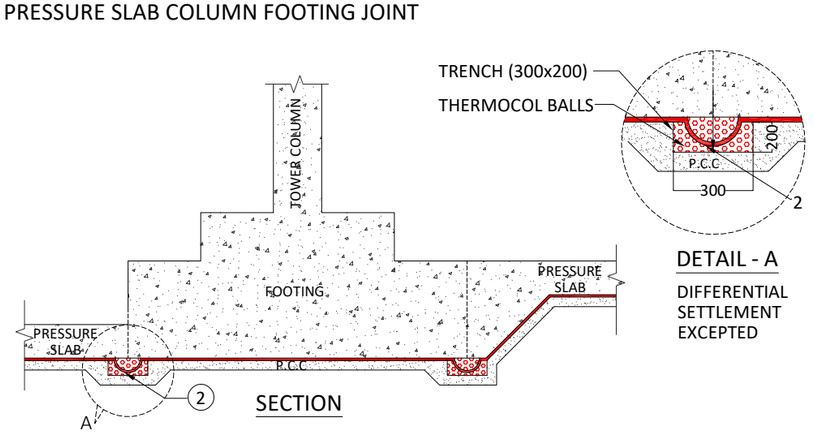



SECTION




SECTION

## PRESSURE SLAB COLUMN FOOTING JOINT



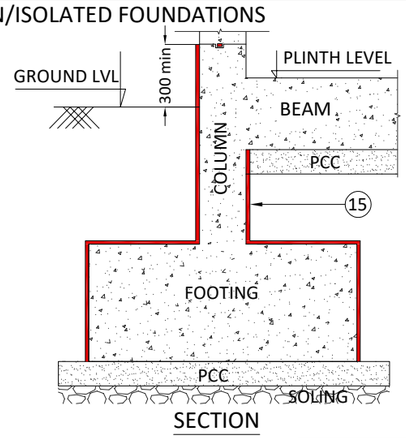

SECTION




DETAIL - A

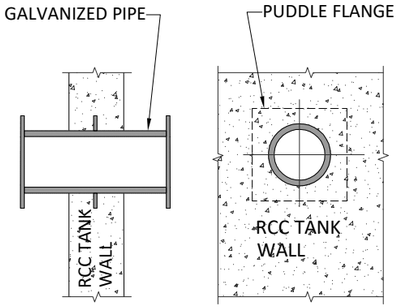
DIFFERENTIAL SETTLEMENT EXCEPTED

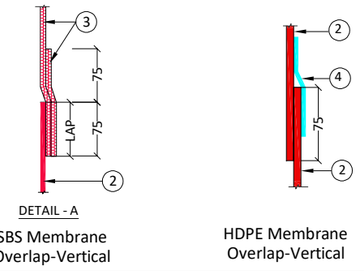
## OPEN/ISOLATED FOUNDATIONS



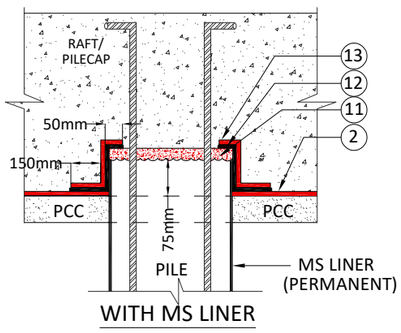

SECTION

## SLEEVES IN RCC TANK/RETAINING WALL

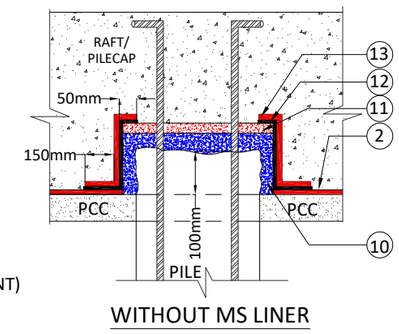



## PILE HEAD TREATMENT WITH HDPE MEMBRANE

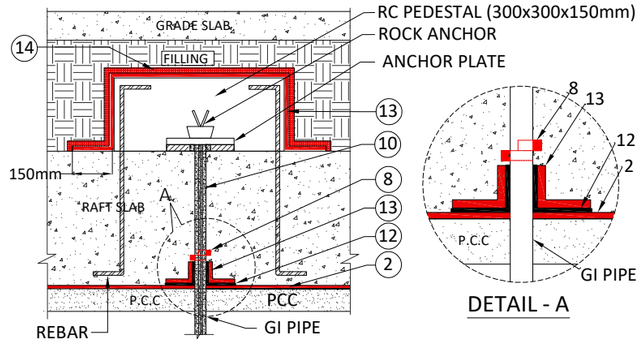



WITH MS LINER




WITHOUT MS LINER

## ACTIVE ROCK ANCHOR TREATMENT WITH HDPE MEMBRANE

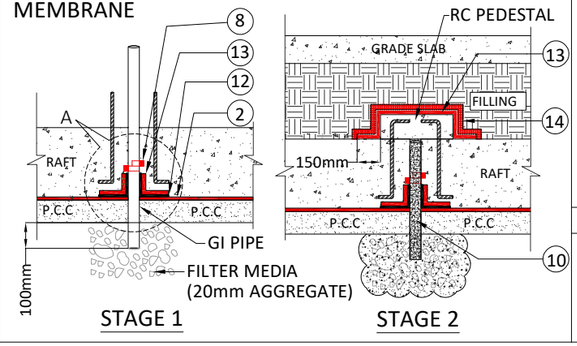






DETAIL - A

## PRESSURE RELEASE PIPE TREATMENT WITH HDPE MEMBRANE




STAGE 1

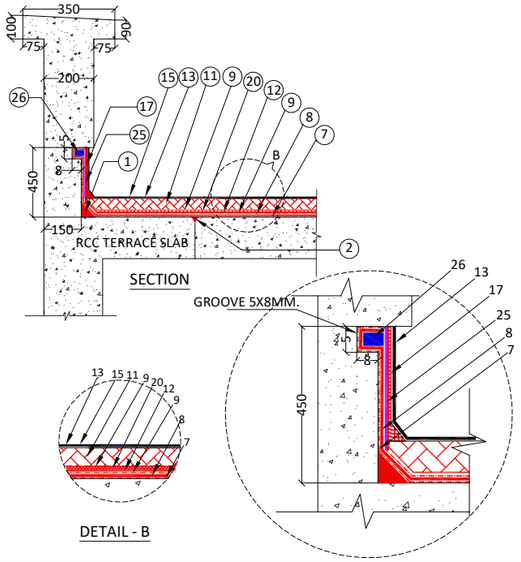
STAGE 2

## WATERPROOFING GENERAL DETAILS

NOTE :

- THE DETAILS PROVIDED ARE INDICATIVE.
- VENDOR NEED TO SUBMIT THE WATERPROOFING DETAIL DRAWING & METHOD STATEMENT FOR CLIENT APPROVAL.

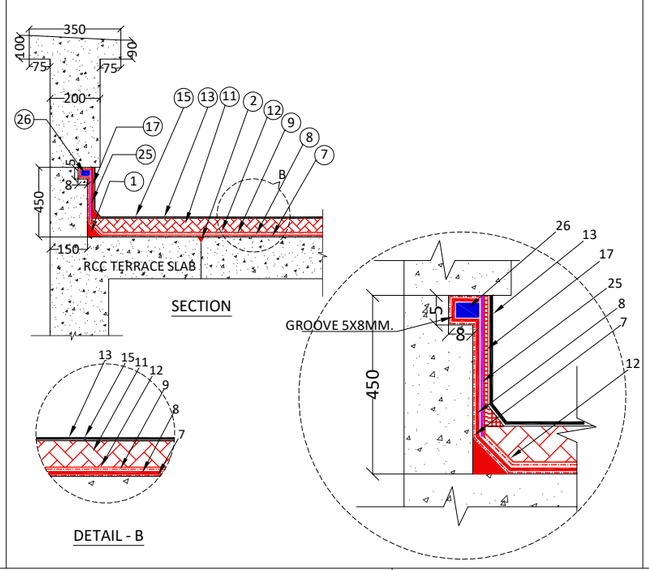
## TERRACE WITH INSULATION




DETAIL - B

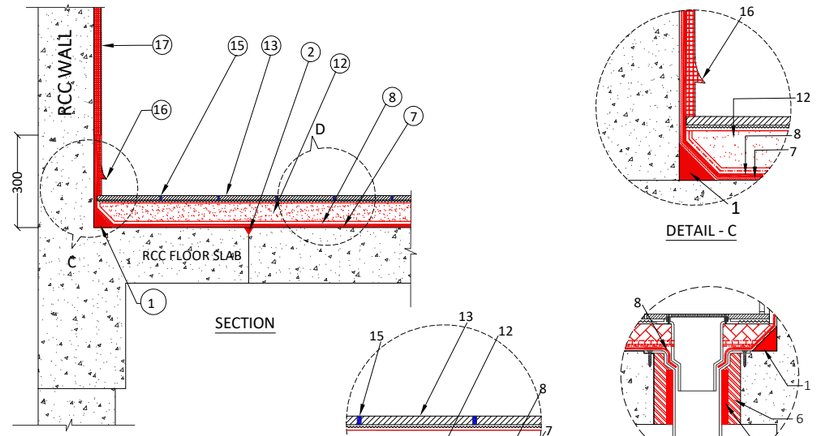
DETAIL - B

## TERRACE




DETAIL - B

## COVERED FLOOR AREAS- MECHANICAL, FIRE CHECK AND REFUGE FLOORS.




DETAIL - D



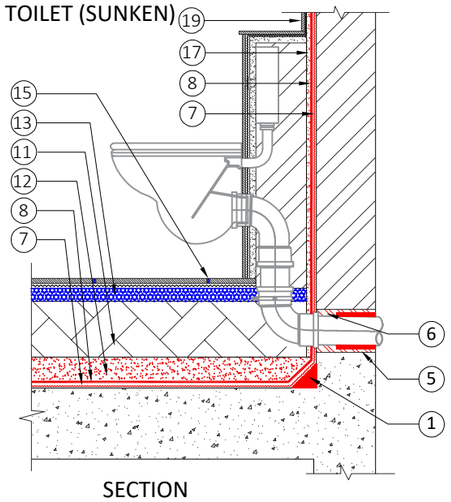

DETAIL - C



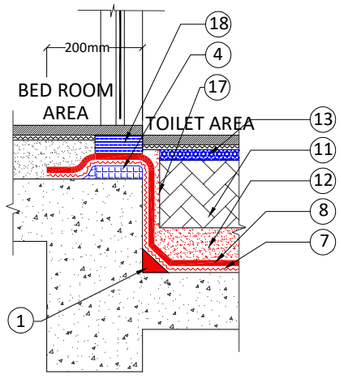

DETAIL AT DRAINAGE SLEEVE

1. Angle fillet 25/50mm with polymer modified mortar.
2. V groove + Epoxy Sealant at CJ.
3. Drip mould (10x10mm).
4. Threshold (Micro concrete filling - 30mm thick).
5. Twin sided self adhesive bituminous tape around pipe.
6. Cement Mortar 1:4
7. WP Primer.
8. WP Layer
9. Geotextile for protection of WP Layer.
10. Chicken mesh 22 gauge
11. Brickbat/AAC coba as per slope on slab.
12. Protection screed.
13. Cement sand bed (1:6) + cement slurry + China Moziac Chips/Tiles.
14. Tile adhesive + tiles.
15. Sealing of tile joints with cement grout.
16. Drip mould in plaster.
17. Plaster with waterproofing compound.
18. Epoxy adhesive.
19. Wall tiles with cement paste/adhesive.
20. Insulation Foam thickness as per design .
21. Anti-root membrane (if needed) for the spector.
22. Soil fill on Drain cell + Geotextile membrane.
23. Cement Mortar (1:4) with WP admixture.
24. Brick.
25. Epoxy + Sand Sprinkling.
26. PU Sealant.

## TOILET (SUNKEN)

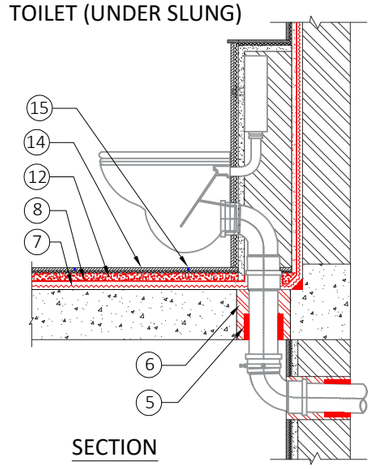



SECTION

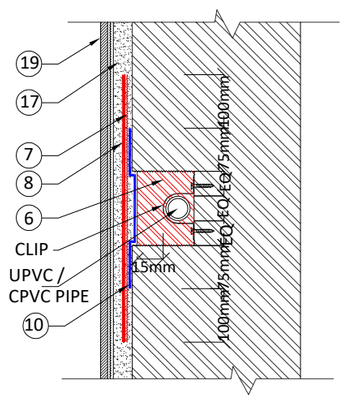



SECTION AT THRESHOLD

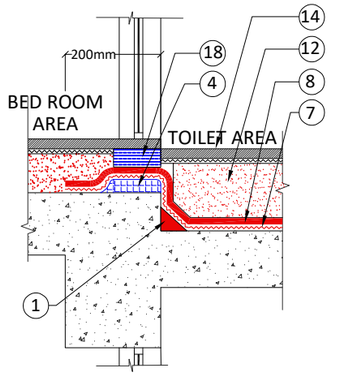
## TOILET (UNDER SLUNG)




SECTION

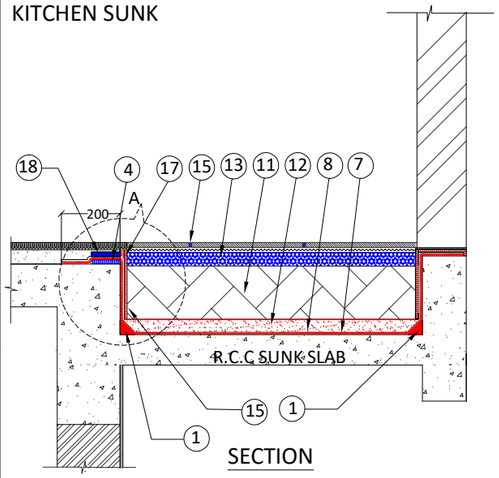



TREATMENT FOR CHISELING IN BLOCKWORK

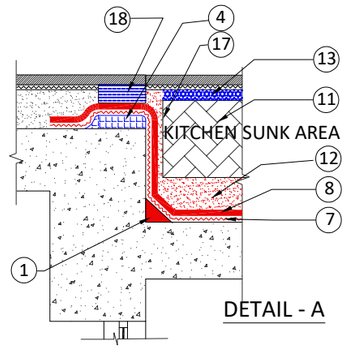



SECTION AT THRESHOLD

## KITCHEN SUNK

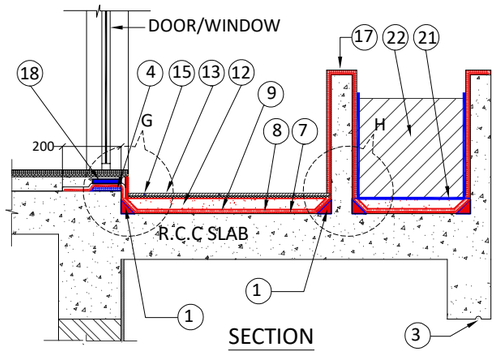



SECTION

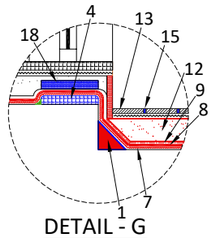



DETAIL - A

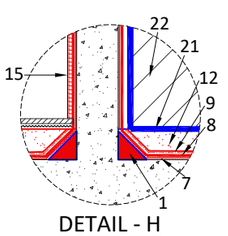
## BALCONY WITH FLOWER BED




SECTION

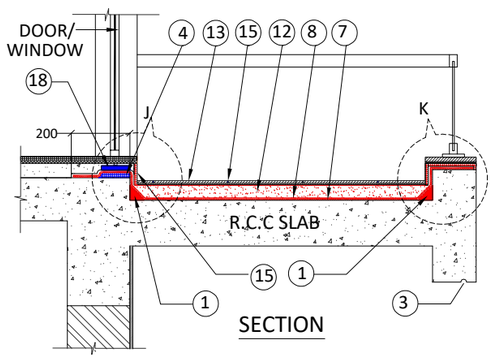



DETAIL - G

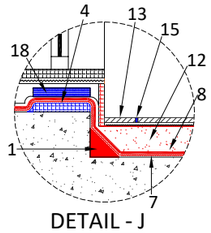



DETAIL - H

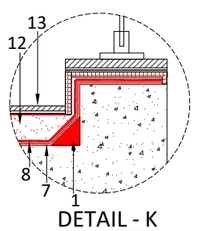
## KITCHEN, UTILITY, BALCONY WITHOUT FLOWER BED




SECTION

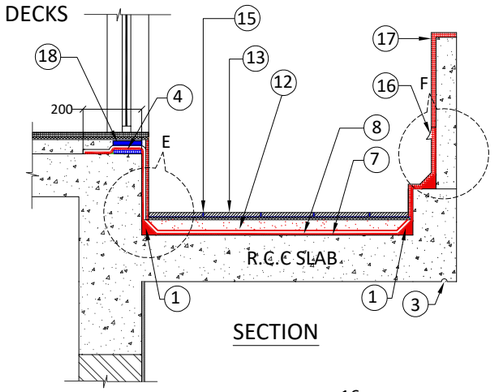



DETAIL - J

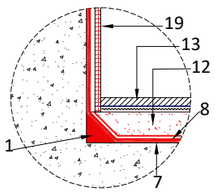



DETAIL - K

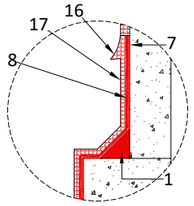
## DECKS




SECTION

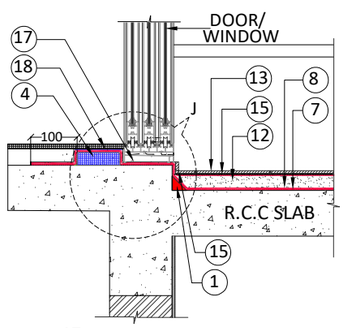


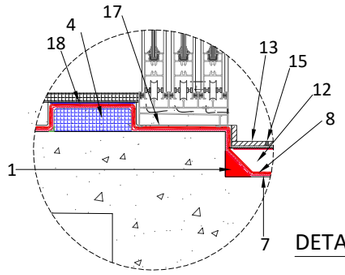

DETAIL - E




DETAIL - F

## THRESHOLD / WINDOW AT DECK



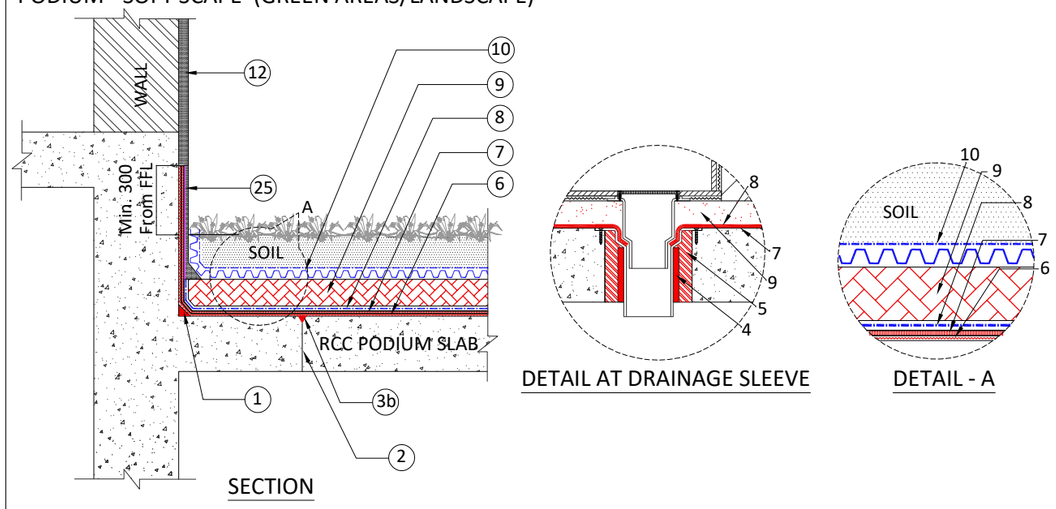

DETAIL - J

## WATERPROOFING GENERAL DETAILS

NOTE :

- THE DETAILS PROVIDED ARE INDICATIVE.
- VENDOR NEED TO SUBMIT THE WATERPROOFING DETAIL DRAWING & METHOD STATEMENT FOR CLIENT APPROVAL.

## PODIUM - SOFT SCAPE (GREEN AREAS/LANDSCAPE)




SECTION

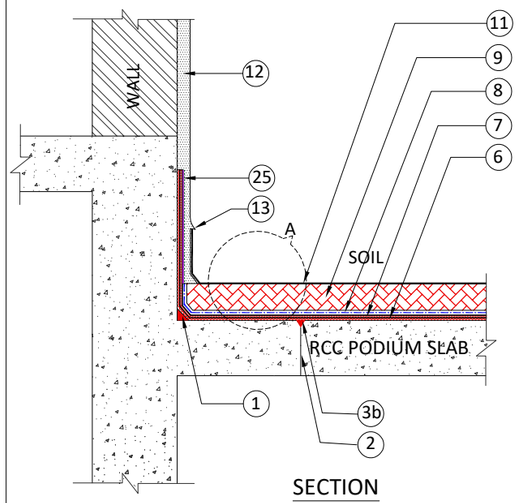



DETAIL AT DRAINAGE SLEEVE

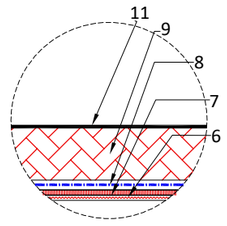



DETAIL - A

## PODIUM TOP - HARD SCAPE

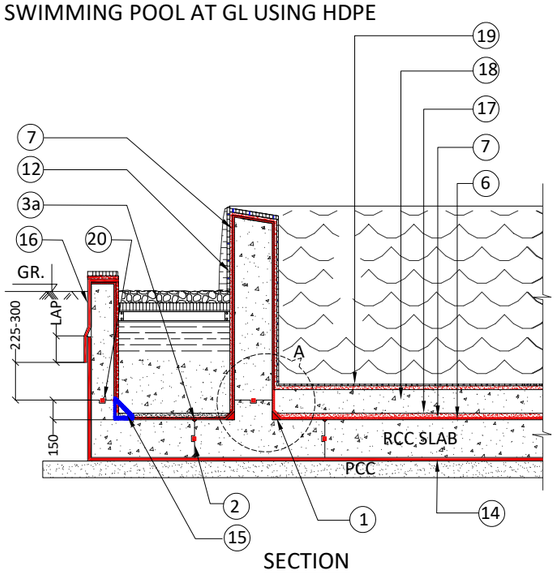



SECTION

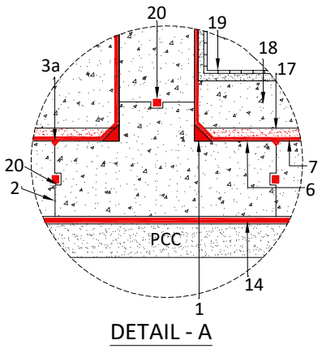



DETAIL - A

## SWIMMING POOL AT GL USING HDPE

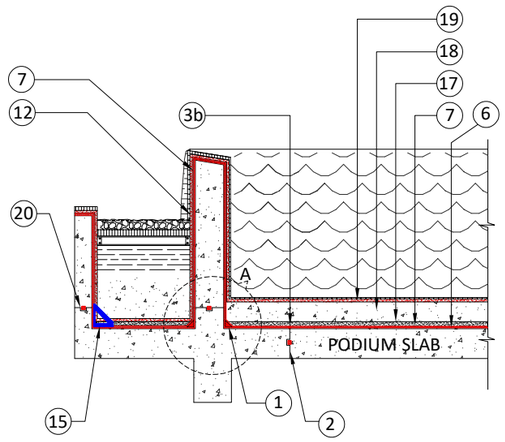



SECTION

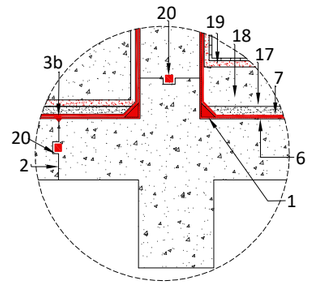



DETAIL - A

## JACUZZI, WATER BODIES, SWIMMING POOLS OVER PODIUM

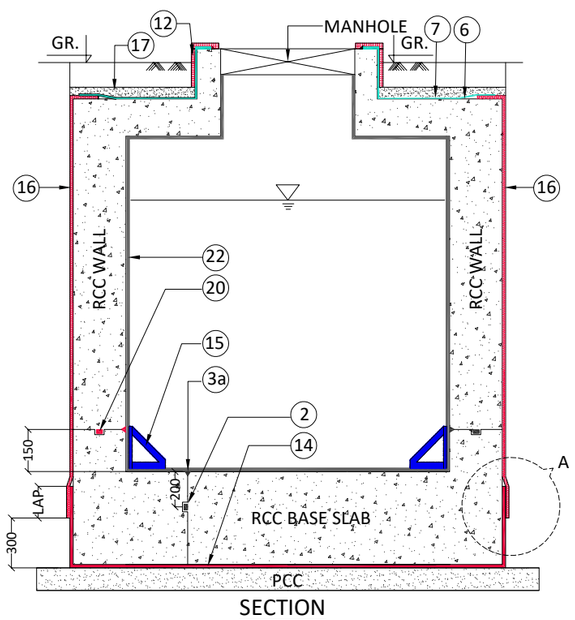



SECTION

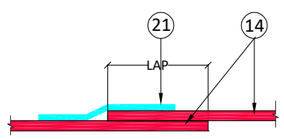



DETAIL - A

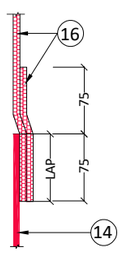
## UG TANK/STP (HDPE AND SBS MEMBRANE)




SECTION

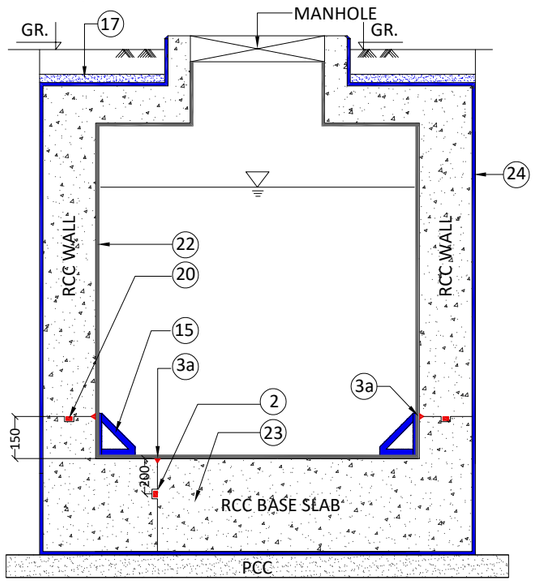



Membrane Overlap Horizontal
(One lap joint in entire height)




DETAIL - A
Membrane Overlap
Vertical

## UG TANK/STP (CRYSTALLINE)




SECTION

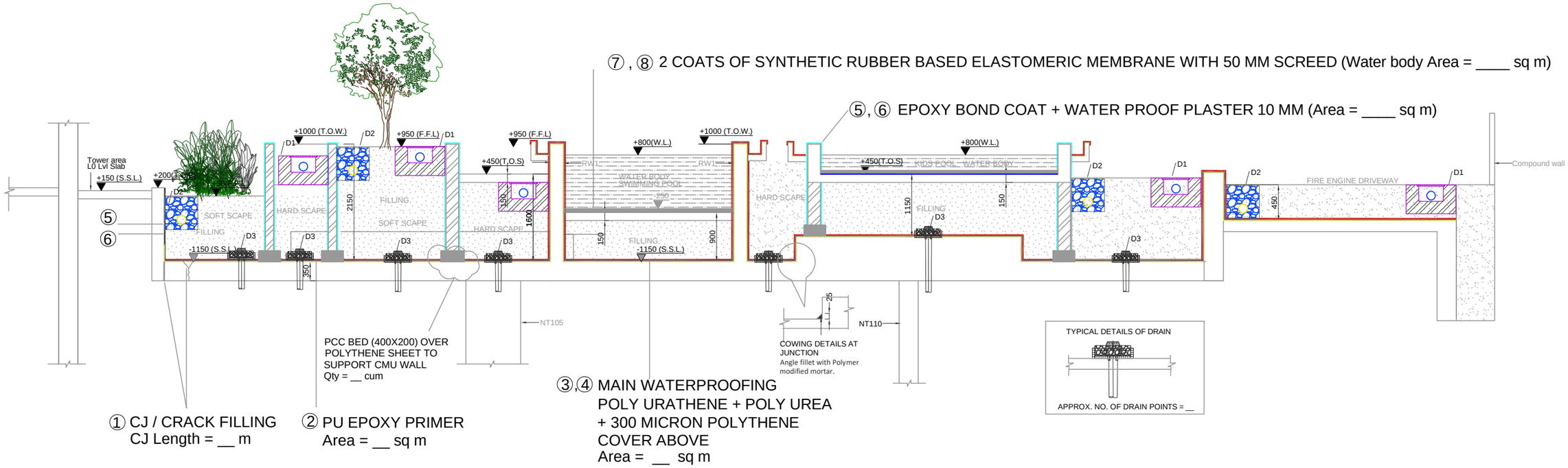
1. Angle fillet 50mm with polymer modified mortar.
2. Ply shutter/Hyrib + pressure grouting of joint.
3a. V groove + Epoxy Sealant.
3b. V groove + non shrink grout (GP2, CNS50) Or Equivalent.
4. Twin sided self adhesive bituminous tape.
5. Non shrink grout (GP2, CNS50).
6. Waterproof Primer.
7. PU membrane.
8. Geotextile membrane.
9. Brickbat/AAC coba/screed as per slope on slab (1:100).
10. Drain cell + Geotextile membrane + Soil fill.
11. Cement sand bed (1:8) + cement slurry + China Moziac Chips/Tiles.
12. Waterproof plaster.
13. Drip mould in plaster.
14. Self adhesive HDPE membrane.
15. Properly prepared hanging shutter- either tied to rebar in the beginning & cast simultaneously or cast within a time gap of 12 hours (to avoid cold joint) .
16. SBS membrane - 2 to 4mm thick.
17. Protection screed as per slope on slab (1:100).
18. Filling to accommodate MEP Pipes.
19. Tile adhesive + tiles.
20. Notch (75x50mm) + Swellable Bar/Hydro Swell.
21. HDPE Sealed tape.
22. Permare EP for STP/Permare EPW or cementetious WP with food grade coat for UGT.
23. Crystalline admixture mixed concrete (0.8-1% by weight of cement).
24. Coal Tar Epoxy coating (100 microns in 2 coats).
25. Epoxy + Sand Sprinkling.

## WATERPROOFING GENERAL DETAILS

NOTE :

- THE DETAILS PROVIDED ARE INDICATIVE.
- VENDOR NEED TO SUBMIT THE WATERPROOFING DETAIL DRAWING & METHOD STATEMENT FOR CLIENT APPROVAL.

# Schematic Representation Of Various Sectional Features, Drainage arrangement and waterproofing system




**Waterproofing Scheme** (Note - below description may very from project to project)

PU membrane (poly urethane + poly urea) over the podium slabs + pool RCC walls
Thick Polythene sheet over PU membrane
Drain board 32 mm as per landscape. Design thickness to be confirmed
PCC band on polythene sheet to support CMU walls
Anti root treatments for CMU walls quantity = _____ sq m
CMU walls to be treated with epoxy bond coat + waterproof Plaster 10mm

**Drainage Scheme**

D1 Surface drains (pipe networks with catch basins)
D2 Perforated pipe network (subsurface drainage at 400mm below soil top)
D3 Drain points in the supporting RCC slab to collect water percolated to the bottom soil layers
D4 Drain board is laid over polythene sheet to facilitate drainage
D5 Drain slopes to make the flow towards drain points

**Soil fill Quantities**

| **Soft scape** | Area sq m | Ht m | Volume |
|---|---|---|---|
| 400 mm Depth | _____ | 0.4 | _____ cum |
| 1150 mm | _____ | 1.15 | _____ |
| 1800 mm | _____ | 1.05 | _____ |
| 1900 mm | _____ | 1.9 | _____ |
| | Total | | _____ cum |

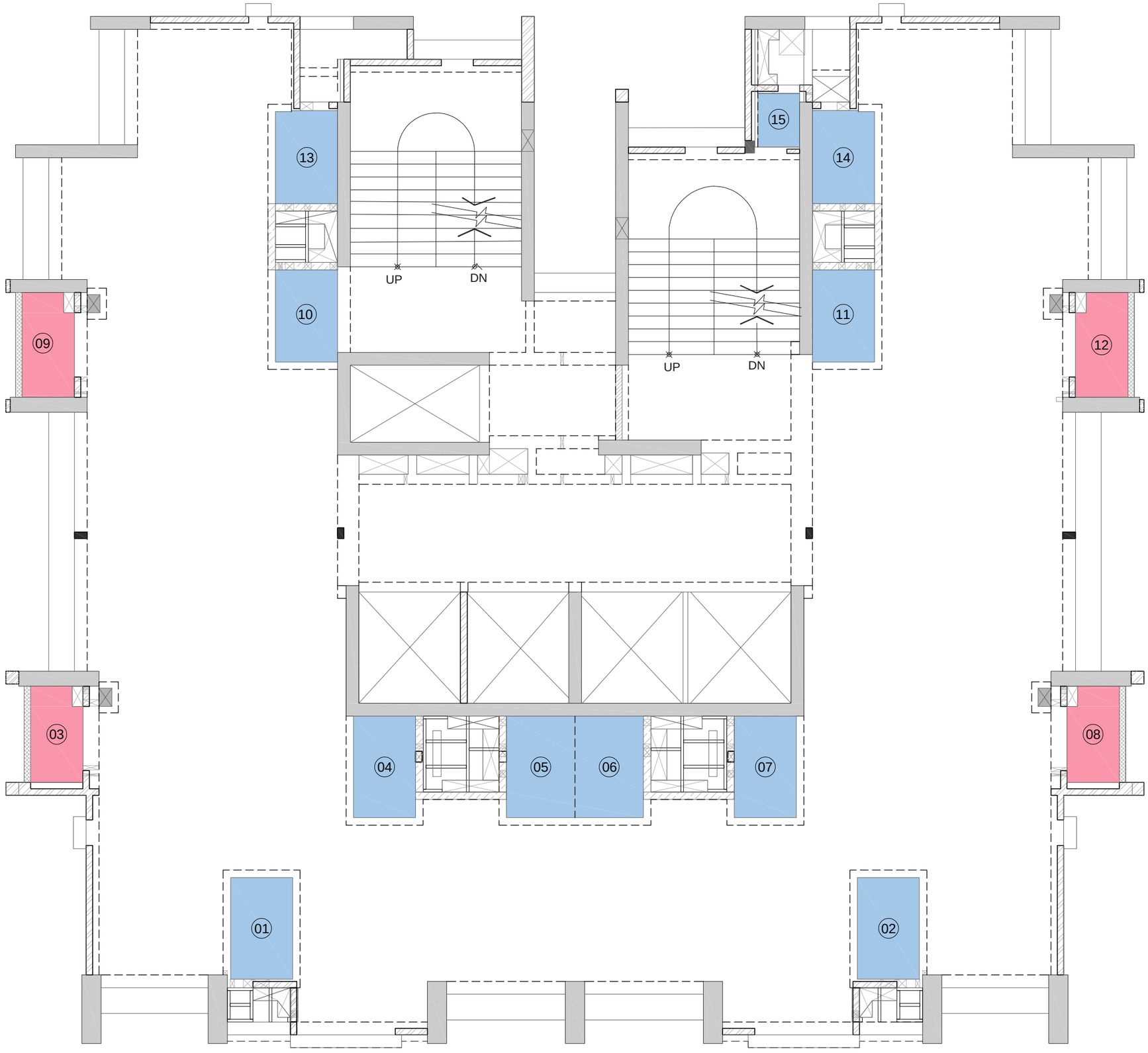
| **Hardscape** | Area sq m | Ht m | Volume |
|---|---|---|---|
| 1150 mm Depth | _____ | 1.15 | _____ cum |
| 1800 mm | _____ | 1.8 | _____ |
| 1900 mm | _____ | 1.9 | _____ |
| 1050 mm | _____ | 1.05 | _____ |
| | Total | | _____ cum |

Water bodies
Refer standard details in other projects, light points, plumbing points in concrete walls, LED with location of drivers (watertight pit needed)

Note Refer to MEP drawings for drainage scheme, the details here are only indicative.

**BOQ Summary (approximate quantities)**

| **S.No.** | **Item** | **Quantity** |
|---|---|---|
| 1 | Screed in water bodies | _____ cum |
| | Screed for drain slopes | _____ cum |
| | PCC below cmu walls | _____ cum |
| | LW block filling in water bodies | _____ cum |
| 2 | Waterproofing Area statement | |
| | Podium developement area (Horizontal) | |
| | Softscaper area | _____ sq m |
| | Waterbody | _____ |
| | Hardscape Area | _____ |
| | Total | _____ sq m |
| | Vertical area (walls) | |
| | Heights (mm) | |
| | RCC walls 1750mm | _____ sq m |
| | SW Pool wall 1350mm | _____ sq m |
| | CMU wall 1300mm | _____ sq m |
| | CMU wall 850mm | _____ sq m |
| | CMU wall 800mm | _____ sq m |
| | Total | _____ sq m |
| 3 | CJ length in slab | _____ m |
| 4 | Cowing length (Angle Fillet) | _____ m |
| 5 | Constrution joint - Swllable bar | _____ m |
| 6 | Drain Outlets | _____ Nos |




| WET AREAS FOR WATERPROOFING | | | |
|---|---|---|---|
| WET AREA NO. | SUNK (MM) | SLAB THK. (MM) | REMARK |
| 01 | 50 | 175 | |
| 02 | 50 | 175 | |
| 03 | 125 | 175 | EXPOSED |
| 04 | 50 | 175 | |
| 05 | 50 | 175 | |
| 06 | 50 | 175 | |
| 07 | 50 | 175 | |
| 08 | 125 | 175 | EXPOSED |
| 09 | 125 | 175 | EXPOSED |
| 10 | 50 | 175 | |
| 11 | 50 | 175 | |
| 12 | 125 | 175 | EXPOSED |
| 13 | 50 | 175 | |
| 14 | 50 | 175 | |
| 15 | 50 | 175 | |

TYPICAL FLOOR (WET AREAS)

(SCALE 1:100)

**Annexure 6 - Vendor Complince Form**

Compliance Form to be filled by WP vendors with quotation and technical details

| SNo | Item | Sub Item | Work | Expected details from Vendor | Vendors Remarks/input |
|---|---|---|---|---|---|
| 1 | Toilet | Surface Preparation | Cleaning | Eqipments/methods | |
| | | | Shrinkage Cracks/Cracks | Material and Consumption | |
| | | | Angle Fillet | Size and material | |
| | | | Treatement of Const joint | Method (size of opening and filling material) | |
| | | | Chased area (groove for concealed plumbing) | Material and Consumption | |
| 2 | | WP Treatement | Primer | DFT, Consumption in Lit/sqm | |
| | | | WP layers | DFT, Consumption in Lit/sqm,Mock up approval, | |
| | | | WP Mat for Toilet | Elongation/Tensile Strength/Crack Bridging/Adhesion | |
| | | | WP Mat for Refuge | Elongation/Tensile Strength/Crack Bridging/Adhesion | |
| | | | Bond coat on vertical surface | material details (if applicable) | |
| | | | Horizontal Protection | Material proportion, and thickness | |
| | | | Vertical Protection | Material proportion, and thickness | |
| 3 | Kitchen - Sunken | WP Treatement | LW Filling | Material proportion for base layer and gap filling | |
| | | | | Material proportion for top layer and thickness | |
| 4 | Terrace | Surface Preparation | Cleaning | Eqipments/methods | |
| | | | Angle Fillet | Size and material | |
| | | | Treatement of Const joint | Method (size of opening and filling material) | |
| | | | WP layer | DFT, Consumption in Lit/sqm,Mock up approval, | |
| | | | WP Mat for Terrace | Elongation/Tensile Strength/Crack Bridging/Adhesion | |
| | | | Separation Layer | Thickness (GSM) and over laping | |
| | | | PU termination | Groove in parapet / Drip Mould and size of groove | |
| | | | Horizontal Protection | Material proportion, and thickness | |
| | | | Vertical Protection | Material proportion, and thickness | |
| | | | LW Filling | Material proportion for base layer and gap filling | |
| | | | | Material proportion for top layer and thickness | |