A. **ADMINISTRATION**

1. **Drawings**
   On award of a contract and after receipt of all architectural, plumbing and structural drawings pertaining to plumbing installations, prepare a schedule of drawings which shall contain following details:
   - Title of drawing.
   - Proposed date of submission.
   - History of revisions with dates.
   - Specific notes for construction, if any.
   - A note whether the drawing is approved or pending approval.

   This schedule is made to keep track of drawings required and to monitor its status including submission, revision(s) and approval. It may be revised periodically when fresh architectural drawings are issued.

   All drawings shall be in standard sizes (A-0, A-1, A-2 etc). The title block on the drawing shall contain following minimum information:
   - Name of the project.
   - Names of Client, Architect, Consultant(s), Contractor.
   - Drawing number.
   - Title of the drawing.
   - Date of submission.
   - Scale.
   - Revision number(s) and revision notes.
   - Legend.
   - General notes, if any.
   - Specification notes, if any.

2. **Construction Schedule**
   A construction schedule shall be prepared based on the target dates given by the client/consultant.

   All efforts shall be made to adhere to this schedule. It will be reviewed weekly and revised if any delays occur due to unforeseen and unavoidable circumstances, keeping in mind the final date of completion.

3. **Materials**
   A ‘Material Proposals’ schedule shall be submitted to the Client / Consultant giving details of materials, manufacturer’s name, technical details etc. Once these are approved, procurement will begin and a “Material procurement schedule” will be submitted.

   Total care shall be taken to ensure that the materials that finally arrive at site meet all requirements of specifications and the bill of quantities, for which the store-keeper and site engineer should be responsible.
4 **Workmen**
Adequate workforce shall be deployed at all times to meet the approved construction schedule. The workforce shall be suitably augmented as demanded by actual site conditions.

5 **Project Management**
Site staff will be organised as per an ‘Organisation Chart’ issued at the beginning of the Project. Any revisions to the site organization will be duly recorded and intimated to the Project Managers.

Weekly site meetings shall be attended by a senior member of the contractor’s team. There should be periodic visits by the Executive Management.

Any deviation from approved working drawings made by site instructions by the Client / Consultant shall be indicated in the ‘As Installed’ drawings to be issued at the end of the project. These instructions will have to be formally confirmed before the required changes or deviations are implemented. Time or cost implications, if any, shall be brought to the client’s notice subsequently.

- The site engineers shall co-ordinate with agencies handling other services such as electrical, HVAC, Interiors etc as and when required.
- A strict quality control programme should be implemented and all efforts must be made to achieve and maintain a high degree of workmanship.

6 **Safety Plan**
A safety plan shall also be submitted prior to commencement of work. Due care shall be taken as regards all the safety aspects of the works. Relevant PPE (Personal Protective Equipment) shall be used by all personnel working on the installation.

B. **INSTALLATION**
Given below are method statements for general plumbing installations. This may need to be modified in specific cases depending on the nature of the installations.

1 **Excavation of trenches**
1.1 Mark layout of the pipeline and obtain approval from the Client’s representative. Barricade sides of trenches to be excavated.

1.2 Start excavation works (Using manual labour or an excavator machine). Ensure that the width does not exceed the maximum specified.
1.3 Use a leveling instrument to make depth markings all along the length of the excavation. In certain situations, it may not be practical to use a leveling instrument in a plumbing or sewerage installation. In such cases, a tube level could be used.

1.4 Allow for deeper excavations to accommodate the PCC base of inspection chambers and at collars/joints of pipes.

1.5 Additional care should be exercised for excavations deeper than 1.5m, especially in loose soils. Arrangements should be made for shoring the sides of trenches.

1.6 Care should be taken that excess excavations are always avoided. If in doubt, excavate less and take out the extra depth in the next stage. Filled in soil invariably settles taking the pipe with it, disturbing alignments.

1.7 Ensure that excavated earth is always stored away from the edge of the trench.

2 **External piping – Water supply**

2.1 Mark pipe lines in ground according to working drawing and provide barricading.

2.2 Excavate trenches to required depths as per working drawings.

2.3 Prepare base of trench for laying pipes, as per technical specifications.

2.4 Lay the pipes on the prepared base and support them at adequate intervals.

2.5 Test the pipes for leaks under pressure in the presence of client’s representative and maintain a ‘test certificate’ duly signed by the representatives of the client and contractor.

2.6 Coat the pipes with the specified anti-corrosive treatment (if metal pipes are used).

2.7 Provide encasement with sand/granular material, if specified.

2.8 Backfill trenches in layers including compaction.

3 **External piping - Sewerage & Storm water**

3.1 Mark pipe lines in ground according to working drawings.

3.2 Excavate trenches to required depths with proper barricading.

3.3 Prepare base for laying pipes.
3.4 Lay pipes according to specified gradient.

3.5 Perform hydraulic/smoke test and obtain certification form client’s representative.

3.6 Provide encasement with concrete / sand/ granular material, as specified.

3.7 Backfill trenches in layers including compaction.

4 **Shaft Piping**

4.1 Mark for pipes on the plastered shaft walls according to details in the working drawings. Ensure that the plastering is completed as it will be almost impossible to plaster walls after the pipes are in place.

4.2 Fix brackets as per details shown on the working drawings. A clear gap of 25 to 50mm shall be maintained between pipe and wall surface.

4.3 Clamp pipe assemblies on to the brackets. Make sure the pipes are in ‘line’ (horizontal runs) or in ‘plumb’ (vertical stacks). Where expansion / contraction will be a concern, ensure that pipes are not rigidly held to brackets.

4.4 Make cut-outs on the shaft walls for branch pipes at locations shown on the drawings.

4.5 Insert sleeves wherever required. Ensure that annular space in sleeves is not more than 25mm. Annular space shall be filled with yarn and flexible sealant after installation of pipe through the sleeve.

4.6 Provide branches on the pipe assembly for connections to internal pipework. Provide isolating valves on water supply pipes at locations shown on working drawings; at easily reachable heights.

4.7 Test the pipes for leaks under specified pressure for the specified duration.

4.8 Tests must be witnessed and approved by client’s representative.

4.9 Paint the pipes as per approved colour code and provide identification labels where called for.

4.10 Take measurement of pipes installed. A representative of client must be present and should acknowledge the records.

4.11 Terminate soil, waste and vent pipes with vent cowls at specified heights above terrace level. Ensure that vent cowls are not terminated within one meter (horizontally and vertically) from any window openings.
4.12 Terminate water supply risers with automotive air vents (with isolating valves) and down pipes with drain plug/drain valve – all as per drawings. Ensure that water supply pipework would be self-venting and self-draining.

4.13 Connect the soil stack(s) to inspection chamber(s) at ground level.

4.14 Connect waste stacks(s) to the gully trap(s) at ground level. Connect the gully trap(s) to the inspection chamber(s).

5 **Pipes in wall chases**

5.1 Make sure that walls are at least rough-plastered and finish levels are marked by the civil contractor. If proper cladding levels are not marked, the pipes could be too deep or too shallow inside. Pipes deep in the wall will require use of extension nipples at faucets. Wall flanges of concealed stop cocks, concealed shower mixer etc will not fit-in correctly.

5.2 Mark pipe lines on walls as shown on the working drawing.

5.3 Chase the walls to required depth using a chasing machine.

5.4 Assemble piping starting from branch left in shaft and install in the wall chase with clamps. Use pre-fabricated assemblies wherever possible.

5.5 Locate fixture outlets according to working drawing and tile-module drawings. Title modules shall be marked on walls by the civil contractor.

5.6 Plug all openings and test the pipework for leaks under specified pressure and for required duration. Test should be witnessed and approved by authorized personnel.

5.7 Apply anti-corrosive coating or wrapping on the pipe, as specified (if metal pipes are used). Ensure that the tested pipe joints are not disturbed.

5.8 Insulate hot water pipes with the specified material. **Note:** Wherever possible, pipes may be pre-insulated/pre-wrapped, leaving joints, prior to installation in the wall chase.

5.9 Close the wall chases with cement mortar. If site conditions require a depth of more than 100mm to be chased, it is advisable to use a suitable mesh while plastering and ‘making good’.

6 **Pipes in sunken floor or suspended in ceiling (Drainage)**

6.1 Make sure that base water-proofing of toilet floors is completed.

6.2 Locate and mark positions of soil and waste outlets. Make core drills where
necessary.

6.3 Assemble pipe headers and connect them to branches left in the shaft for this purpose. Pre-fabricate wherever possible.

6.4 Make sure that pipes are in proper slope and are supported adequately. Always ensure that the spacing of supports is as per specifications. Ensure that floor traps are installed in level (not tilted) so that the water seal is not diminished.

6.5 Test the pipes and attend to leaks, if any.

6.6 Supervise the filling of sunken floors by civil contractor so that the alignment and slope of drainage pipes are not disturbed. It is in the plumbing contractor’s interest to ensure that water proofing of the core drills is done and tested.

6.7 Keep all open ends plugged to prevent ingress of construction debris.

7 Sanitary fixtures & CP fittings

7.1 Flush the installed pipework (water supply and drainage) to remove debris or blockages, if any.

7.2 Install sanitary fixtures, faucets and washroom accessories. Use screws with nylon washers to fix vitreous chinaware and PTFE tape for installation of faucets to pipework.

7.3 Check CP fittings for leaks and firmness. Refit them if necessary. Ensure that proper tools are used. They must not make scratches or any other kind of damages on the chrome plated fixtures.

7.4 Commission the toilets in the presence of the client’s engineer.

7.5 Handover the toilets formally using the forms provided for the purpose.

8 Disinfection

The water distribution system should be thoroughly disinfected before being put to use. The following simple procedures will ensure satisfactory results:

- Flush and clean water tank(s) and distribution pipework with potable water to remove dirt and any foreign matter.

- Fill the tank(s) with water mixed with chlorine solution at the rate of 50 parts per million. Retain chlorinated water in the system allowing the chlorine to spread throughout pipework.

- Open the farthest draw-off points or drain plug/valve to draw water. Repeat the procedure till odour of chlorine is felt at all locations when
checked at random.

- Drain out chlorinated water and fill the system with potable water.

C. **DOCUMENTATION**

1 **As-Installed Drawings**

1.1 Mark changes made from the working drawings; if any. These records should be maintained from time to time during progress of work.

1.2 Prepare ‘As-Installed’ drawings. This is an essential requirement often ignored. After the construction team leaves the project site, it would be impossible to identify pipe routings etc without these drawings.

1.3 Hand them over to the client with specified number of hard and soft copies.

2 **Operation & Maintenance Manuals**

The O & M manuals should contain following minimum information:

2.1 A brief description about the project and the installations carried out.

2.2 Schedule of mechanical / electrical equipment installed.

2.3 Schedule of sanitary fixtures installed.

2.4 Schedule of as-fitted drawings.

2.5 Manufacturer’s operation & maintenance manuals and any warranties issued by manufacturers.

2.6 List of recommended spare parts.

2.7 Notes / recommendations on preventive and remedial maintenance works.

2.8 List of manufacturers with their local contact details.

2.9 Technical catalogues of important products used on the installations.

2.10 Reports / certificates of all tests conducted during progress of work and any commissioning reports.

3 **Virtual completion certificate**

On handling over the as-fitted drawings and O&M manuals, a joint site visit shall be arranged with the client’s representative to ensure all works are completed to their satisfaction and obtain a certificate to that extent. Date of this certificate will be the start date of Defects Liability Period.

A detailed checklist shall be prepared for each activity as listed above and
acknowledgements may be taken from the supervising agency.