



**SRI MAYAPUR
CHANDRODAYA MANDIR**
Temple of the Vedic Planetarium

Cushman & Wakefield Report

Pujari Floor

August, 2019



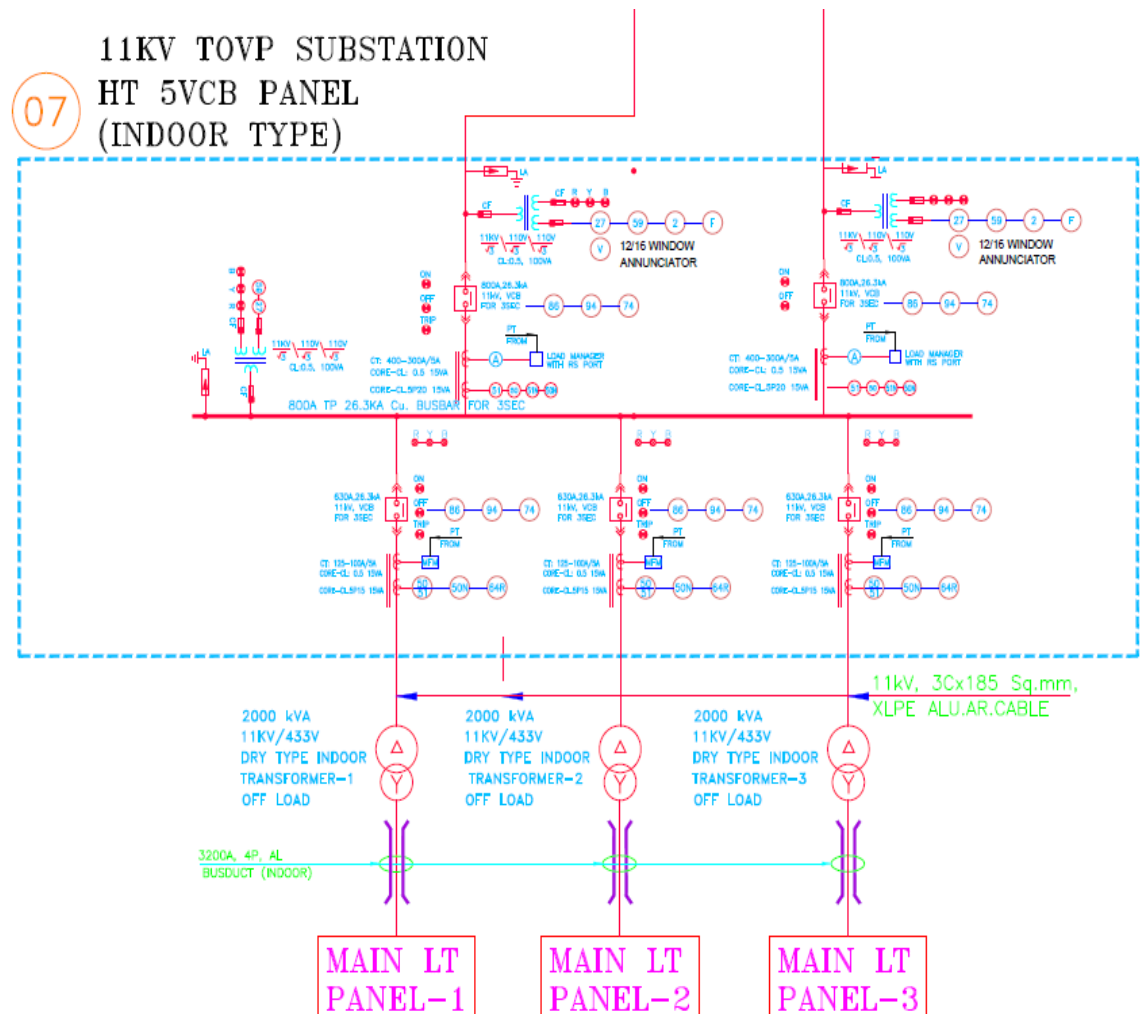
Project of the International Society for Krishna Consciousness
Founder-Acharya: His Divine Grace A.C. Bhaktivedanta Swami Prabhupada

TOVP Pujari Floor Report – Cushman & Wakefield

The following Report covers a wide range of construction, MEPF (mechanical, electrical, plumbing and fire-prevention), HVAC (air-conditioning), and other work now being implemented on the pujari floor.

ELECTRICAL SYSTEM DESCRIPTION

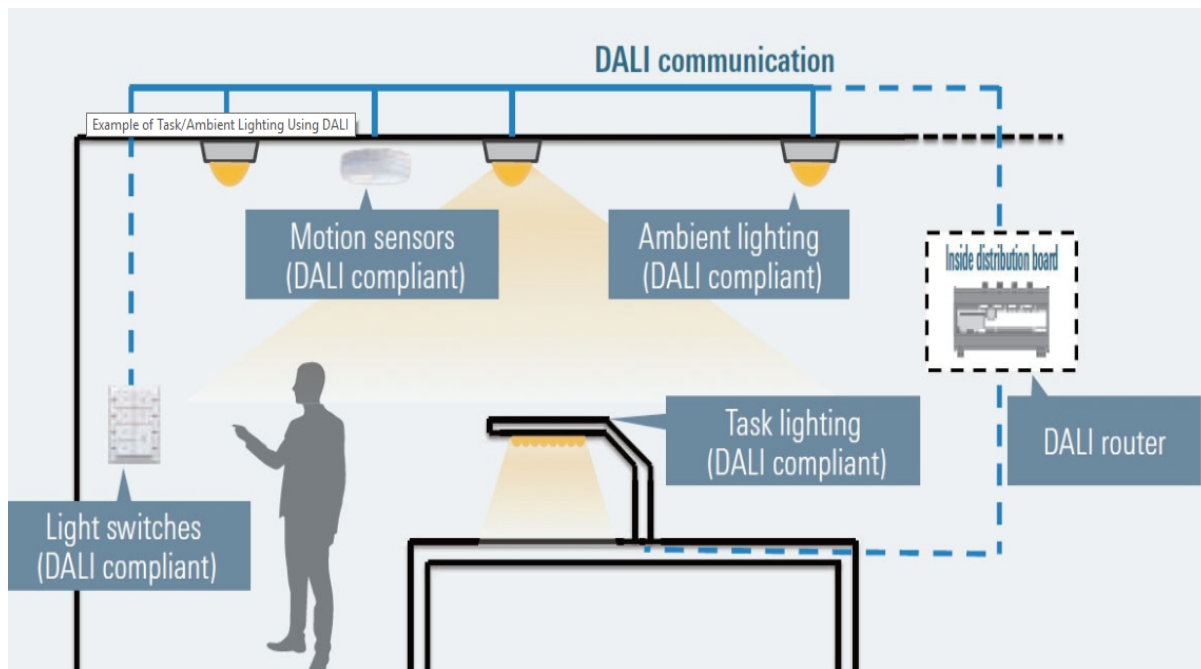
- Electrical distribution system is designed based on the anticipated Demand Load approx. 3.5MVA which includes Planetarium wing. A separate 11KV sub-station to be installed in the Utility Building-01 with 3Nos of 2MVA dry type transformer with OLTC. 11KV RMU to be installed with 02 Nos of incomer will be set up from proposed ISKCON 33KV sub-station. Power from the Main LT Panel, Utility building-01 to the Temple shall be distributed through underground built up trench with suitably sized LT armored cables.



- 4Nos of 1500KVA DG Set is proposed for 100% load back up which will be also installed at Utility Building-01. DG's shall be placed in an acoustically enclosed room with each DG having independent flue pipe which shall be taken through a dedicated shaft till terrace. DG synch panel shall have PLC logic and the logic will be set to operate the DG's as per the requirement

LIGHT MANAGEMENT SYSTEM

- Lighting Management System is proposed for lighting control based on the occupancy to save power and optimum utilization.
- 20% of lighting load shall be backed up with UPS supply with 15min battery backup.
- Light fittings are tunable and human centric.



- Electrical Power will be distributed through rising mains from Pujari Floor to the above floors.
- Power to be distributed from Floor Electrical panel through lighting and power DB which are located in lift lobby and Electrical room.
- Universal power socket is given for versatile usages.
- Few wall mounted fan point is given to maintain the air circulation in case of AC system break down.
- All critical power such as IT equipment, Security System devices etc will be through UPS.
- Zero Halogen Low Smoke [ZHLS] type wire and flexible cable is used to protect from fire and environment.
- MS type for all exposed conduits & PVC for all concealed conduits is used.

FIRE FIGHTING & SECURITY SYSTEM

Fire Fighting and Security System is designed as per the guideline mentioned in the provisional fire NOC given by the local Fire & Emergency Services Department, NBC, NFPA and Engineering design standard. Following systems are proposed to install.

- Fire Protection system – Pumps, Internal/external hydrant and Sprinklers
- Addressable Smoke detection system
- Public Address system.

- Fire extinguisher.
- Fire exit signage's & Evacuation maps.
- Access Control System.
- CCTV system.
- Rodent repellent system
- Water leak detection system
- Aspiration smoke detection system
- Gas Suppression system – NOVEC 1230 (for UPS room)
- Pre-action system (for Dome areas)

FIRE PROTECTION SYSTEM

A pressurized water base sprinkler system is designed to extinguish the fire throughout the floors. Water storage tank, pumping system, pipe network is installed for this pressurize system.

- As required by local fire norms, 3Lakh liter fire water tank has been proposed at Utility floor and 2nos 25K liter overhead tank proposed at terrace level.
- 4-way fire brigade inlet shall be provided on the external wall of the property near the main entrance. These shall comprise of 4 Nos. 63 mm dia male outlets capable of directly feeding the ring mains through non return valves and 2-way fire brigade connected directly to filling the fire storage tanks and another 2-way fire brigade would be connected to sprinkler ring main
- Electrical pump shall provide adequate flow to cater the requirement of system. Diesel engine driven fire pumps shall be provided for ensuring operation & performance of the system in case of total electrical power failure. Jockey pumps shall compensate for pressure drop and line leakage in the hydrant and sprinkler installation.
- Suction from tank to be connected to individual pumps via foot valve arrangements. The electric fire pumps, diesel engine driven fire pumps and the jockey pumps shall all draw from this suction header.
- The ring main shall remain pressurized at all times and Jockey pumps shall make up minor line losses. Automation required to make the system fully functional shall be provided.
- Total 8 nos of risers considered, each riser shall be provided with 150 dia sprinkler riser, 150dia hydrant riser and 100 dia sprinkler drain
- Terrace tank with Booster pump arrangements would be connected to hydrant riser at terrace level
- GI 'C' class pipes as per IS 1239 & IS 3589 shall be provided throughout the temple.
- External hydrants main shall be provided all around the Temple. The hydrants shall be controlled by a cast iron sluice valve. Hydrants shall have instantaneous type 63mm dia outlets. The hydrants shall be single outlet with inbuilt PRV, CI duck foot bend and flanged adaptor riser or required height to bring the hydrant to correct level above ground.

- For each external fire hydrant two numbers of 63mm dia. 15 m long controlled percolation hose pipe with GM male and female instantaneous type couplings machine wound with copper wire, GM branch pipe with nozzle shall be provided.
- Internal hydrant shall be provided on each landing and other locations as required by NBC with double headed GM landing valve with 100mm dia inlet, with inbuilt PRV, shut off valves having cast iron wheels. Landing valve shall have flanged inlet and instantaneous type outlets.
- Internal standpipe fire hydrant system shall be provided with Double headed hydrant valve RRL hose of 4X15mtrs & first aid hose reels 36.5mtrs length, complete with instantaneous pattern short gunmetal pipe in the Complex.
- Automatic sprinkler system is considered to be the most effective and economical way to apply water from fixed systems. It is designed to act upon a fire at a pre-determined temperature by means of water spray. It could either extinguish the fire or control its spread. The extinguishing mechanism of sprinkler water spray includes combustible materials to prevent further fire spread and displacement of combustible vapor and oxygen by steam. The sensitivity of a sprinkler glass bulb varies and is identified by different color.
- For sprinklers, 8 Nos of 150dia tap-off shall be provided at each floor.
- Sprinkler network considered for Pendent and Upright Sprinklers from sprinkler tap off with valves, pressure gauge and flow switch. Sprinklers are proposed for above and below false ceilings.
- Sprinklers for below ceiling shall be quick response concealed type.
- All are conventional Quick response sprinklers are used. Temperature from (93°, 79°, 74° and 68°) considered.
- Quick response upright sprinkler with temperature of 68° shall be considered for all floors above false ceiling.
- Quick response upright sprinkler with temperature of 93° shall be considered for Pump room.
- Extended coverage Quick response concealed sprinkler with temperature of 68° shall be considered for all floors below false ceiling.
- Quick response Pendent sprinkler with temperature of 79° shall be considered for **Kitchen/Preparation areas.**
- Extended coverage Quick Response Side wall sprinkler shall be considered for all Ventilation shaft areas and DOME base.
- Note, sprinklers are not proposed in **Electrical rooms, UPS/ Battery rooms.**
- Pendent sprinklers will be fixed by using suitable **Flexible hose pipes** with fittings.

SMOKE DETECTION & ALARM SYSTEM

The purpose of a fire alarm system is to provide an early warning, allowing occupant's time to react and evacuate and to provide a faster Security / Fire Department response.

System Proposed

- **Analogue addressable** type fire detection and alarm system shall be provided for complete temple floor. System consisting with Main equipment like, Fire alarm panel, Multi sensor detectors, devices like control modules, relay modules, fault isolation modules, notifying devices like, manual call points & Hooter cum strobes, cables etc.
- Beam detector considered wherever the height exceeds more than 10 meter, such as dome area.
- Analogue addressable intelligent Multi sensor multi-level sensitivity type, which shall be suitable for different application like smoke / heat shall be considered for all areas in above and below false ceiling, also false floor wherever more than 450 mm in depth
- Kitchen/Preparation area, Mechanical maintenance room, Electrical room and Pump room would be provided with Heat detectors
- High temperature Heat detector considered for Altars and kitchen
- All above ceiling detectors are provided with response indicators.
- The Fire Alarm Panel will be integrated with the Access Control System to open all the Access Controlled Doors, Close fire dampers automatically in an event of Fire and trip the AHU's.
- Addressable Input Modules will be used to monitor sprinkler flow switches, Fire exit Panic bar door monitoring, water leak detection system, Gas suppression system monitoring, Aspiration smoke detection system, Pre action system etc.
- Addressable Manual Call Points/Pull Station shall be provided at all exit routes such Stair case entries, walk ways (coverage of 30mtrs distance)
- Directional sounders considered for Staircase areas. Sounders cum strobe will be located in all temple areas, Critical rooms and toilets etc.
- Graphical user interface considered and BacNet card considered for BMS integration

FIRE EXTINGUISHER SYSTEM

A fire extinguisher is an active fire protection device used to extinguish or control small fires, often in emergency situations. It is not intended for use on an out-of-control fire, such as one which has reached the ceiling, endangers the user (i.e. no escape route, smoke, and explosion hazard, etc.), or otherwise requires the expertise of a fire department. Typically, a fire extinguisher consists of a hand-held cylindrical pressure vessel containing an agent which can be discharged to extinguish a fire. There are different types of Extinguishers available in different size /capacity, which can use for different applications.

Following type of extinguishers are considered for the proposed area.

- Clean Agent type extinguishers are considered for all critical rooms like Electrical, UPS/Battery, Pump room etc

- Portable 6 KG ABC type fire extinguisher is considered for floor areas.
- Portable 6 litre K type wet chemical extinguishers considered for Kitchen/Preparation areas.
- Portable 9 litre Water CO2 type extinguishers considered near all Fire exit staircases.
- Trolley type Mechanical foam extinguishers considered for utility building DG & Transformer rooms.

PUBLIC ADDRESS SYSTEM

- Public address system comprises speakers located on temple floors, museums, inside the closed rooms / Toilets, service rooms like electrical, ups room, Pump rooms, Maintenance room etc, & connected to a floor selector-switching console.
- Ceiling speakers considered for false ceiling areas in all floors, Horn speakers considered for Parikrama area.
- The floor selector-switching console is interconnected to an amplifier of suitable wattage and a microphone. The console / amplifier and microphone are installed in suitable Rack close to the fire alarm control panel. (Museum 1 BMS room)
- In the event of actuation of any detector or manual call point on a particular floor, the pre – recorded message generated by Fire alarm panel will be announced through Speakers OR the fire marshal / security personnel can select the affected zone by operating the particular zone selection switch on the switching console for manual announcements
- PA system is interfaced with the fire alarm system for automatic announcement using Modules.

CCTV SYSTEM (CLOSED CIRCUIT TELEVISION)

- IP based dome, PTZ camera, fish eye cameras shall be considered.
- NVR's shall be located in Museum 1-BMS room.
- Video management system considered
- Recording shall be @ 15fps with motion sensing for 30 days & over writable.
- All necessary software's for functionality of CCTV system shall be considered.
- Wiring for Cameras proposed with CAT6 POE cables.
- All cameras shall be POE based. (Power on Ethernet). POE switches shall be placed in all floors to reach the cameras within 90mtrs.

RODENT REPELLANT SYSTEM

- Rodent Repellers are electronic transmitters of high frequency sound waves (well above the 20 KHz frequency which is the upper limit of the hearing range of the human ear)
- They emit intensive sound at high decibel levels (sound pressure) that is audible and painful to pests, but is inaudible and harmless to humans. The pests will usually leave the area being protected by ultrasound. They do not get killed.
- Rodent repellent system considered for following areas,
- Considered for UPS room all voids (above ceiling, below floor and room void), Server room, BMS room and Kitchen areas

WATER LEAK DETECTION SYSTEM

- Water Leak Detection system would be provided in the UPS/Battery room, Kalash base and Pujari floor electrical room to provide alarms in case of any Water leaks.
- This system consists of a Tape as well as sensing cable running across the periphery of the room. The tape as well as sensing cable is connected to a module and the module connected with WLD panel. When the tape as well as sensing cable comes in contact with the water the panel raises an alarm.
- The panel will be soft integrated with the BMS via RS485 / integrated with Fire alarm panel using modules
- Sounders shall be provided for indication

ASPIRATION SMOKE DETECTION SYSTEM

- **UPS/Battery room, Main Dome and Side domes** would be provided with Aspiration smoke detection system for very early detection and warning.
- This system consists of a PVC piping running in the room with a number of sampling holes. Air is drawn through these holes by a central unit and analysed for any combustion products.
- The Smoke detection system is integrated with the fire alarm system using addressable input modules.
- This system would also be soft integrated with the BMS/ integrated with Fire alarm panel using modules

GAS SUPPRESSION SYSTEM & KITCHEN HOOD SUPPRESSION SYSTEM

- Server room would be provided with Gas based Fire suppression system. This would help to suppress fire in critical rooms without damaging the equipment placed in the critical rooms.
- The gas will be NOVEC at 25 bar pressure and 4 to 6 bar at nozzle during release. The system will be designed to meet the requirements of NFPA 2003.
- The detectors will be cross zoned for double verification and a signal is sent from the Fire Alarm Panel to the gas release module/ panel. The gas release panel will operate a solenoid valve after the chosen time delay and the gas is discharged.
- There is a provision in the Gas release panel to release the gas manually in an event of emergency.
- The fault, fire status of the gas release panel & gas discharge status will be monitored by the fire alarm system through addressable input modules.
- Kitchen hood suppression system considered for preparation area kitchen hoods as per the final kitchen layout.
- GAS detection system considered for LPG gas lines.
- Panel suppression system would be provided for all electrical panels.

PRE-ACTION SYSTEM

Pre-action is provided in the dome area to extinguish fire in case of emergency.

- A Double Interlock Electric/Pneumatic Release Pre-action system shall be provided for All 3 domes inside the dome cavity and below the dome (only 3 rows above the chandelier)
- The method of release of the deluge valve priming water pressure shall be by an electric solenoid valve and a pneumatic actuator.
- Electric solenoid valve will open upon activation of the electrical supplemental detection system.
- Pneumatic actuator shall open upon activation of a sprinkler head on the sprinkler system.
- The system riser shall be equipped with a rubber seated check valve downstream of the deluge valve and prior to the supervisory air connection. The pre-action system shall be provided with all necessary appurtenances to complete the system.
- Dry Type Upright sprinkler considered for dome cavity and dry type pendent sprinkler for below the dome.
- Upon activation of cross zone detectors, the pre-action panel will receive the signal and allow the water inside the pipes and the sprinkler bulb will burst once the temperature reaches 141 deg.

HVAC WORKS (air conditioning)

Following parameters have been considered to design the AC system.

OUTDOOR DESIGN CONDITIONS:

The outdoor design conditions for various months have been considered as follows:

Sno	Description	Summer	Monsoon	Winter
1	Dry bulb temp	42.2 degC	32.2 degC	11.1 degC
2	Wet bulb temp	25.6 degC	28.3 degC	6.7 degC
3	Relative humidity	26%	85%	50%

INDOOR DESIGN CONDITIONS:

Indoor design conditions for Ventilation/Air-Conditioning spaces shall be as follows

SNO	DESCRIPTION	TEMPLE FLOOR, M1 2 3 & T1 FLOORS	PUJARI FLOOR	BMS & UPS ROOMS
1	Dry Bulb temp - Deg C	26 ± 1	23 ± 1	23 ± 1
2	Relative Humidity	No control	around 60%	around 60%

NOISE LEVEL DESIGN CRITERIA:

Sound and vibration control is required for both equipment and duct system, as well as in the selection of diffusers and grilles. The design of the air conditioning system shall be as under: -

- Public Circulation Corridors - NC 40 to 45
- Temple areas - NC 45 to 50

Pujari Floor Air Conditioning

VRF system with floor mounting AHU is proposed at Pujari floor and capacity of entire system is 242HP Out Door Unit Capacity & 196 TR Indoor Unit Capacity for comfort floor AC. Considered 68 HP x 3Nos +38 HP x 1No VRF Out door units & 55 TR x 3 Nos + 30 TR x1No floor mounted AHUs for same.

Centralized VRV system:

- VRV system, it is basically entire air conditioning system shall be with Variable Refrigerant Volume system (VRV System). For Better operational power & cost savings, we have proposed with the Centralized VRV System considering the operational savings of the system. Complete Pujari floor will be Air conditioned through the dedicated Air Handling Units & same Connected to Common Outdoor Unit located at next to Gas bank area.
- Total Capacity required as per load calculations will be around **242HP (excluding critical rooms)**

MECHANICAL VENTILATION

- All toilets have been considered with mechanical exhaust system with 16 Air Changes / Hour of air circulation as per ASHRAE Standards.
- Lift well and lobby will be pressurized to ensure smoke free escape during fire / emergency with Louvers.
- Kitchen area is mechanically ventilated with dedicated exhaust & fresh air fans.
- Pump Room has been considered with mechanical exhaust system with 12 Air Changes / Hour of air circulation as per ASHRAE Standards.
- Exhaust fan of suitable capacity shall be located at the terrace/same floor level of each building.
- Electrical Room has been considered with mechanical exhaust system with 12 Air Changes / Hour of air circulation as per ASHRAE Standards.
- DG Room has been considered with mechanical exhaust system considering 45-60CFM/KVA.
- Fresh air is drawn through louvers on DG room facade wall.

PHE WORKS (Public Health Engineering)

Water Distribution System

- Water Supply from Municipal/Bore well supply/Tanker is connected to Fire water storage and the overflow is taken to Domestic Raw water storage Sump.
- From Domestic Raw water sump, after suitable treatment the treated water shall be stored in the treated water sump located next to the Raw water storage sump.
- Distribution of Water Supply from Domestic overhead tank to various fixtures in all floors is by gravity system. Domestic water is used for all the purposes like hand wash basins, water closet, Urinal, health faucet, Shower, pantry sink etc.
- Landscape irrigation – provision for the booster pump shall be made in the STP electrical panel. The landscape pumps shall be in the scope of landscape consultant.
- The requirement of distribution system may be classified as Functional and hydraulic. The sizing of the entire distribution network is based on the simultaneous use of fixture units' demand. Individual toilets will be provided with main control valve for isolation and maintenance of the same.
- Air release valve and water hammer arrester shall be provided as per requirement of the design.
- The distribution system is worked on the principle of continuous flow of water to ensure required minimum residual pressure of 1 Kg/cms at top most floors & limit the maximum

residual pressure less than 2.8Kg/cms at the lower floors. Since the possibility of all taps being open at the same time is very remote a simultaneous demand factor is applied to work out the probable flow.

- Main Underground water storage tank and pump room housing, water treatment plant, transfer pumps shall be proposed in the utility floor. Treated water from the main UG tank shall be pumped to the Overhead Tank. All inlets, outlets, washouts, vents, ball cocks, overflows control valves and all such other piping connections including level indicator shall be provided for all water storage tanks.
- Full way gate valves of approved make shall be provided as close to the underground tank as practicable on every outlet pipe from the storage tank, except the overflow pipe. Overflow and vent pipes shall terminate with mosquito proof grating.
- The overflow pipe shall be so placed as to allow the discharge of water being readily seen. The overflow pipe shall be of size as indicated. A stop valve shall also be provided in the inlet water connection to the tank. The outlet pipes shall be fixed approximately 50mm above the bottom of the tank towards which the floor of the tank is sloping. A separate clean outlet at tank bottom slab level to be provided to enable the tank to be nearly emptied for cleaning.
- The pipe sizing shall be based on fixture unit calculation as per UPCI. Velocity for risers will be up to 2.1m/sec for up to 65mm dia pipe, for 80mm & above pipe dia & horizontal piping it shall be 2.4m/sec.
- Water meters shall be provided in identified areas for domestic water consumption recording for efficient monitoring and assessment. Head losses through water meter shall be accounted for in water distributions calculations.
- Color coding for domestic and irrigation water supply piping shall be ensured for clear identification of the piping.

Water Type & Treatment

Water treatment plant shall be provided in accordance with IS 10500-2012 and the various requirements of use. The various types / quality of water and their water treatment plant are as follows:

Domestic Water: Water sourced from the tube well shall be passed through basic water treatment plant comprising of Pressure Sand filters, activated carbon filters, Softeners and UV Units(if require). Further specialized treatment if required, may be provided based on the water analysis report. Water shall be used for domestic usage in toilets (wash basin, Shower, health faucet, water closet, Urinal), Kitchen, water body makeup, filter back wash and other

areas where direct human contact / use is envisaged. Water softener shall be customized to ensure water hardness in accordance to drinking water Standards.

Drinking Water: RO unit of 5000 litres/hour x 3 nos with RO Storage tank of 10000 litres x 3 nos is planned in the utility floor from which water will be supplied to all drinking water points.

Flushing Water: Flushing water shall be tapped from the domestic water supply pipe itself.

Water Storage

Centralized Fire water and domestic water storage tank is planned with common raw water tank and separate treated water tank.

The water storage sump shall be provided with three compartments to store static storage for firefighting works, raw water and treated water

The Underground water storage is designed for 1.5 days requirement where in 0.75 day storage shall be raw water and 0.75 day storage shall be treated water to store in underground tanks to meet the domestic requirements.

The municipal/bore well/tanker water from main shall be supplied through SS pipeline connected to the fire static tank, from where it overflows to raw water tank, which will prevent stagnation. From the raw water sump, it is pumped through a water treatment plant and stored in the treated water sump.

Separate overhead tanks are proposed. One-day storage shall be provided for overhead tank at terrace level.

Each reserve is independent and comprise of:

- Inlet controlled by float valve
- Emergency supply delivered from outside through valve
- Drain at lowest point and bypass to allow for cleaning
- Level monitors with ball valve
- External digital level indicator
- Vent with anti-mosquito grill
- Low voltage illumination
- Access for maintenance (Manhole and ladders)

The Treated water from DSTP is collected in a collection sump of STP and then will be pumped to Landscape Irrigation works.

It is proposed to have minimum of 2.5 Day Storage based on the demand worked out based on reduced Water demand by considering Low flow sanitary fixtures

Raw Water Tank – 60.0 Cu.M

Treated Water Tank – 55.0 Cu.M

Hot Water Tank – 15.0 Cu.M

Over Head Tank-domestic – 2 x 44 cu.M

Over head tank Fire water tank-2x27 Cu.M

CIVIL & INTERIORS

The Civil & Interior works for Pujari floor has started from the month of July. It will begin with the Toilet work following with pest control work in all the rooms, POP work on walls with paint.

Plaster of Paris

Saint Gobain India Gypsum's Plaster of Paris is been used for preparing the wall surface. POP punning is been provided and applied over the newly plastered surface to prepare the surface even and smooth and to be made ready to take on paint/wall paper. First, all final markings such as vertical alignment is been fixed. All embedded items especially electrical conduit is been checked to ensure it has been properly installed and duly inspected by the Electrical QC prior to plastering. POP is been manually applied on the prepared surface and the surface is then finished with wooden or steel float and level any undulations on the surface.

Pest Control works

Termites easily seek entry into masonry foundations and work their way up through voids in the masonry and enter the building at ground and upper floors. To arrest the movement of termites through the masonry wall, holes are drilled at downward angle in the masonry wall and chemical emulsion is been squirt into the holes to soak the masonry. Critical points such as wall corners and door and window frame joints are treated with pest control. The treated holes will then be sealed. The pest control treatment is been done as per the specifications mentioned by Pest Control India.

Water proofing and Brick Bat Coba

Water proofing and Brick Bat Coba Work is been going on at the toilets situated at the Pujari floor. The toilet floor surface is been thoroughly cleaned with wire brush and made free from dust, grease and loose material. Water proofing chemical is mixed with cement and applied on the floor surface in two coats along with the wall surface upto 300 mm to avoid any possibility of leakage. It is allowed to dry for about 6 hours after which ponding test is conducted for 24 hours to check any leakages. If there are any leakages then the surface will be once again treated for water proofing. After that, bricks used for coba are soaked in water for 24 hours and placed and grouted with cement mortar and top surface mixed with water proofing compound is applied over it and finished.

CURRENT ACTIVITIES IN PUJARI FLOOR

S.no	Activity	Location
1	Water proofing, Brick bat coba & PCC works	Toilets- B, C & E
2	POP works	Festival room, Room, Dresses, PT jewellery, RM jewellery
3	Granite cutting work for window sill & door jambs	Pujari room (Mock-up)
4	Ceiling supporting work	Pujari room (Mock-up)
5	Pest control works	Pujari floor