Fire Hydrant System Design & Deployment for IRIDM Campus

1. Hydraulic Coverage Planning

According to NBC & IS norms:

- No point on the campus should be more than 50 meters from a hydrant.
- Install hydrants every 100 meters along internal roads and near critical infrastructure.

2. Zonal Layout Approach

Zone	Risk Type	Hydrant Requirement
Admin Building, Hostels, Mess	High occupancy, electrical load	Internal & external hydrants at every 100 m, with wet risers inside multi-storey buildings
Tunnels & Railway Tracks	Confined, complex evacuation	External hydrants near both tunnel ends, fire hose boxes at tunnel entrances
Buildings Under Construction	Temporary high fire risk	Temporary mobile hydrants + water tankers; mandatory fire watch
11kV Substation	High electrical hazard	External hydrant with CO_2 extinguishing units; clearly marked access for fire tender
Accident Simulation Zone	Controlled burning/fire risk	Dual hydrants: one fixed near the zone, one mobile/tanker-based
Man-made Forest / Barren Land	Vegetation fires	External hydrants on perimeter roads + long-range hoses; ground-cleared buffer zones (min. 10m)
Man-made Pond	Emergency water source	Install suction pump points connected to hydrant system for backup supply
General Road Network	Circulation and accessibility	Hydrants every 100 meters on both sides of main roads

3. Water Supply & Pressure System

Design Basis:

- Underground fire water tank: Minimum 1,00,000 liters capacity (expandable based on

area/occupancy).
- Main Fire Pump: Electric (≥2280 LPM @ 7 kg/cm^2)
- Standby Diesel Pump
- Jockey Pump for pressure maintenance
- Hydrant piping to use galvanized iron or MS pipes with red color coding

Consider connecting it to the man-made pond as a secondary reservoir, with filtration for firefighting compatibility.

4. Internal Hydrant Points

Applicable to: Hostels, Admin block, Canteen
Install wet risers with:
- Landing valve
- Hose reel
- 30m hose
- Branch pipe with nozzle
- Located near staircases and exits

5. Special Zones: Additional Notes

- Rail Tunnel Entrances: Add weatherproof hydrants and enclosed cabinets with hose reels.
- Forest Area: Place water mist fire extinguishers at the entry and install fire watch towers or camera systems if possible.
- Construction Zones: Make firewatch mandatory, with 24/7 mobile fire tankers on standby during welding, gas cutting, etc.

6. Maintenance & Inspection Plan

- Monthly: Pressure check, valve greasing, signage visibility
- Quarterly: Full-flow test from at least one hydrant in each zone
- Annual: Pump system load test and mock drill involving external fire services

7. Emergency Evacuation Route Markings

In order to ensure visibility and guidance during blackouts or nighttime evacuations:
- All emergency evacuation routes shall be marked using fluorescent or photoluminescent (glow-in-the-dark) tape along walls and floors.
- Staircases, exit paths, and emergency doors shall include low-level lighting strips or glow markers to guide individuals safely.
- Signage such as 'EXIT' or directional arrows shall be visible in complete darkness and comply with IS 9457 or equivalent safety codes.
- Regular checks will be conducted to ensure all luminous materials are intact and effective.

8. Automatic Sprinkler System

To ensure rapid response to indoor fires in high-risk and high-occupancy buildings, an Automatic Sprinkler System shall be installed in the IRIDM campus in the following areas:
- Admin Block
- Hostels
- Canteen/Mess Area
- Simulation Control Rooms

System Type:
- Wet Pipe Sprinkler System (pipes remain filled with water, activated by heat-sensitive sprinkler heads)

Design Highlights:
- Sprinkler heads rated for activation at 68°C
- Coverage of 12–16 m^2 per sprinkler head, based on room layout
- Grid-based or sidewall head layout depending on ceiling type and room geometry
- Flow requirement: Approx. 960 LPM for design scenario (12 heads operating simultaneously)
- Fire water tank reserve: Minimum 60,000 liters dedicated for sprinkler operations

Pump System:
- Main electric pump (1000 LPM @ 3.5 bar)
- Jockey pump for pressure maintenance
- Standby diesel pump for redundancy

Alarm & Control:
- Flow switch activation triggers local fire alarm and visual indicators
- Optional BMS integration for centralized alerting

Maintenance:
- Monthly: Visual inspection and valve checks
- Quarterly: Flow and pressure tests
- Yearly: Full inspection of sprinkler heads, pipes, and control valves