

PRINCIPLES AND STANDARDS FOR FLOOD PROTECTION OF UNDERGROUND RAPID TRANSIT SYSTEM

The Underground Rapid Transit System must be stringently protected against flood risks. The salient principles and standards of protection to be complied are outlined below:-

(A) STRINGENT CATCHMENT SEGREGATION

[segregating the Underground Rapid Transit System from surface catchments and runoffs]

- absolutely minimise the storm catchments of the Underground Rapid Transit System (such as by means of profile designs and roofing), and channel all at-grade and above-grade runoffs (eg. that from the roofs) into surface drains segregated from the underground facilities.
- segregate the Underground Rapid Transit stations and tunnels by means of integrated water-tight barriers of at least 1metre above flood and ground levels.
- all ingress and egresses to the Underground Rapid Transit System (including pedestrian/traffic linkages and ventilation/services openings) are to be built with a segregation threshold of at least 1metre above flood and ground levels.

(B) FAIL-SAFE PUMPED DRAINAGE FACILITIES

[for removal of any water ingress that cannot be cut-off owing to constraints inherent in the Underground Rapid Transit System's interface with the surface tracks and linkages]

- install an active pumping capacity equivalent to the 100-year return storm intensity corresponding to the time of concentration of the storm catchment (excluding the internal infiltration route of the tunnel surface) as determined from the Code of Practice on Surface Water Drainage, capped at 280 mm/hour for a typical 10-minute concentration duration.
- provide duplicated standby pumping facilities.
- install standby fuel generators for uninterrupted operation of the pumping facilities.
- construct pump sumps with an active operational storage capacity of 280mm (for 6-hour inflow) where sumps are accessible during train operations or 530mm (for 24-hour inflow) where sumps are inaccessible during train operations.
- institute a well-regulated maintenance and operation procedure for the pumped drainage facilities.

(C) DEVELOPMENT CONTROL OF ALL CONNECTED DEVELOPMENTS

[such that the same principles and standards of flood protection in (A) & (B) above are applied to all developments/facilities with existing/proposed linkages to the Underground Rapid Transit System]

- carry out advanced, comprehensive planning of all proposed linkages to the Underground Rapid Transit System.
- implement the same flood protection safeguards mentioned above for all such developments.

(D) OPERATIONAL AND MANAGEMENT CONTROL

[to ensure continued functioning and safeguarding of the protection measures implemented under (A), (B) & (C)]

- have in place a comprehensive map/database of the overall underground networks with linkages to the Underground Rapid Transit System.
- subject all building and development planning (including Addition & Alteration and reconstruction) of such linked developments/facilities to the vetting and control of the Land Transport Authority.
- institute stringent operational and management measures to be undertaken by the owners of the linked developments/facilities under the supervision of Land Transport Authority.