

- (c) The Contractor shall perform and submit Computational Fluid Dynamic Analysis (CFD) simulations endorsed by a registered fire safety engineer to demonstrate that the proposed design will not result in air/smoke recirculation between the ventilation shaft openings and re-circulation of air/smoke into the station entrances. The Contractor shall interface with M&E Consultant C2007 and the Authority to discuss and agree on the CFD input parameters and passing criteria. The results shall be incorporated in the Fire and Life Safety report. The routing of the vent shafts when seen from above ground should be as small as possible, with as much of the routing being beneath ground and concealed from view as is achievable, to the Engineer's acceptance.
 - (d) Maximum pressure drop of the ventilation shafts including louvres shall be less than 150 Pa for VE/VS and 300 Pa for TV and the Contractor shall ensure the aspect ratio throughout the ventilation shafts is close to unity and where possible limit the number of bends in the ventilation shaft so as not to exceed 2-3 bends. Each bend shall not be of acute angles or less than 90 degrees. The Contractor shall submit the pressure drop calculations for the ventilation shafts (VE/VS/TV) to the Engineer for acceptance.
 - (e) For top-discharge vent shafts, the Contractor shall ensure requirements for drainage and CD Shelter are met with within the design.
 - (f) The Contractor shall study the ventilation structure design and configuration, and provide alternative proposals to meet requirements stated in **Appendix BH** of the Particular Specification and obtain all necessary statutory/agency approvals.
- 10.17.2 The Contractor shall liaise with all relevant authorities on the location, massing and architectural treatment of ventilation shafts, cooling towers, make-up water tanks, thermal energy storage tanks, condenser units and exposed plant areas.
- 10.17.3 In determining the sizes, locations and orientation of the ventilation shafts, cooling towers, make-up water tanks, thermal energy storage tanks, condenser units, battery rooms and exposed plant areas, the Contractor shall work and liaise closely and comply with the requirements from the Authority's Design Criteria and the Authority's In-house designers.

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- 10.20.5 The Contractor shall ensure that Closed-Circuit Television (CCTV) camera locations form part of a rational/ effective and cohesive integrated design strategy. Camera positions in the public areas shall be integrated with cladding design and where unable to be mounted at joints or in recess ceiling bands, to be centred or otherwise evenly spaced on panels. Where VSS design requires clustering of cameras, the Contractor is to review options and provide for shared mounting brackets including bespoke at his cost designed supports to minimise poles (at his cost); all for review and acceptance by the Engineer. This also applies to camera coverage outside of the station; not limited to entrances, new camera poles (at his cost) and installation at linkways. The Contractor, their Landscape Designer and the Communications System Contractor are to liaise with NParks and the Engineer to coordinate external works, planting and VSS coverage. All costs for the provision of shared mounting brackets, floor mounted totem poles and foundations, etc for security and surveillance coverage of the station, entrances and its surrounding shall be deemed included in the Contract Price.
- 10.20.6 Each member of the Contractor's team working on the project, depending on his/her level of access to sensitive information in relation to the project, shall be required to undergo the necessary security clearances by the Authority and/or other relevant agencies before being allowed to commence work on the project. The Authority and/or other relevant agencies reserves the right to deny the security clearance without explanation.
- 10.20.7 The Contractor is expected to attend relevant meetings and/or present its findings as required by the Authority, furnish documentation and information pertaining to the security assessments and solutions proposed. This shall include meetings with and information requests by the Authority and/or other relevant agencies.
- 10.20.8 Should the Engineer not accept any of the submissions prepared by the Contractor, the Contractor shall make the necessary revisions, undertake further analyses or provide additional information as required. These additions and/or amendments shall then be consolidated and incorporated into a fresh submission that shall be prepared and re-submitted for acceptance.