(i) the Contractor shall work with all relevant agencies/authorities, stakeholders and the Authority to carry out integration simulation studies, as well as to confirm and provide the necessary provisions for integration with the future development to confirm the entrance design and ensure that there is no adverse impact between the future development and the station operations and functions.

(ii) the Contractor shall design the entrance and at-grade structure façades and finishes, such that it has the flexibility to be replaced by the future developer to integrate with the façade of the future development.

10.2.3.2 Entrance 1

(a) Entrance 1 is located at the fringe of Clementi Forest and is expected to interface/ integrate with a future development.

(b) Entrance 1 is designed to integrate and connect seamlessly with a bus shelter, pick-up/drop-Off (PUDO) and taxi stand via covered linkways. An integrated covered walkway shall be provided for connection to the adjacent future development.

(c) The architectural treatment and design for Entrance 1 shall include a green roof as well as a landscaped space around the entrance to blend in more seamlessly with the natural surroundings.

(d) Entrance 1 shall be integrated with the proposed bicycle park along with greenery and shading elements to soften the hardscape. The Contractor shall consult the relevant authorities/agencies and the Authority to finalise the design and provision.

10.2.3.3 Entrance 2

(a) Entrance 2 is located adjacent to SIM’s main entrance.

(b) A new PUDO shall be provided along Clementi Road as shown in the tender drawings. The PUDO shall be designed to provide direct and sheltered barrier-free access to SIM/ SUSS.

(c) Entrance 2 shall be designed to connect seamlessly to the existing bus shelter and the new PUDO via covered linkways. It shall also allow for direct and sheltered barrier-free access to SIM Blk A at the driveway/ fire engine access level.

(d) Entrance 2 shall connect seamlessly to the high covered linkway across SIM main vehicular access along Clementi Road.

10.2.3.4 Entrance 3

(a) Entrance 3 is located in front of Maju Camp, near the junction of Clementi Road and Brookvale Drive.

(b) Entrance 3 is designed to integrate with covered linkways extending to Brookvale Drive and Maju Drive. The covered linkways shall also connect to the covered linkway provided by Maju Camp. The Contractor shall work with the Authority and relevant agencies to confirm the location/ interface of the covered linkway connection.

(c) Entrance 3 shall be integrated with the proposed bicycle park along with greenery and shading elements to soften the hardscape. The Contractor shall consult the relevant authorities/agencies and the Authority to finalise the design and provision.

10.2.3.5 At-Grade Structures

(a) An ancillary structure consisting of a set of cooling towers, ventilation shafts, exit staircases and M&E rooms is located along the fringe of Clementi Forest.

(b) The at-grade structures shall be designed to provide an integrated covered walkway for connection to the adjacent future development.

10.2.4 Main Station Box

10.2.4.1 The station box is mainly located under Clementi Road and partially within a future development site. A future development is expected to be constructed above the station within the development plot. The Contractor shall take this into consideration and make the necessary provision in his station underground roof design to meet the Authority's requirements. He shall also liaise with URA and all other relevant authorities/agencies to finalise the design to comply with the requirements stated in **Appendix BH** and **Clause 7** of the Particular Specifications.

10.2.4.2 The columns and struts in the public area are exposed and are to be designed with fair-faced concrete finish. A recessed profile shall be provided on the structure surface to allow for surface mounting of services and ceiling mounted components/fixtures. The Contractor shall construct the concrete elements according to the intended features in **Appendix BL** of the Particular Specifications.

10.2.4.3 All materials and workmanship for the finishes of the exposed structural elements shall be in strict accordance with BS8110: Part 1: 1997, Section 6 or the latest Eurocode equivalent and LTA Civil and Architectural M&W Specifications. The standards on the type and quality of finishes for these concrete elements shall be “Type C” in “Special Class” finish in accordance to 6.2.7.2 and 6.2.7.2 of BS8110: Part 1: 1997 or the latest Eurocode equivalent to the Engineer’s acceptance.

10.2.4.4 NOT IN USE

KNOCK-OUT PANEL (KOP)

10.2.4.5 B1 Subway Level

(a) B1 Subway Level shall provide an underground link between Entrances and to the B2 non-ticketed concourse area. The subway link between Entrances 1 and 2 shall be designed to provide 24-hour underground pedestrian connection across Clementi Road. Security shutters shall be provided to define the boundary and enable the non-accessible areas to be locked shut after operating hours.

(b) KOP minimum 6m clear width by 5m clear height are provided at B1 level to allow for future underground connections to the surrounding future developments as shown in the tender drawing. The requirements of the KOPs shall be coordinated with the agencies and stakeholders. Notwithstanding the KOPs shown in the tender drawings and/or listed in the Particular Specification are the minimum requirements, the Contractor shall work with the Authority, relevant agencies / stakeholders to confirm the requirements for the KOPs.

(c) CR16 station is a Civil Defence (CD) station. CD doors and PT doors shall be provided in compliance with all prevailing CD requirements.

(d) Maintenance access, safety line and fall arrest system shall be provided in accordance with statutory and stakeholders' requirements.

10.2.4.6 B2 Concourse Level

(a) The voids around the escalators and staircases are provided to create visual connections between the concourse and platform levels.

(b) The Contractor shall coordinate the station interior design with the Authority's In-house designer to incorporate and make provisions for installation of air circulation fans/cooling system to achieve the internal thermal comfort requirements.

(c) The B2 Concourse level shall provide an un-ticketed corridor to connect both ends of the station.

(d) Knock-out panels (KOP) with minimum 6m clear width by 5m clear height shall be provided for a future underground ticketed interchange connection.

(e) The corridor for the future underground ticketed interchange connection shall be incorporated in the station design. For the opening year, the said corridor can be cordoned off, with the necessary provisions for inspections and maintenance access.

10.2.4.7 B3 Platform Level

(a) The platform shall be designed to cater for a 8-car train system for the ultimate year and 6-car train operation for the opening year.

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(b) For the opening year 6-car train operations, demountable partitions shall be provided to cordon off the unused spaces in platform area without affecting the pedestrian circulation and emergency evacuation requirements.

(c) The platform shall be column free along the platform edge as well as the passenger circulation areas.

(d) Over-Track Exhaust Duct (OTED), Saccardo Nozzle at the station trackway and Under Platform Air Supply (UPAS) duct at underplatform level shall be provided for Tunnel Ventilation System. The Contractor shall co-ordinate the details of the provisions with Authority's In-house designer for Tunnel Ventilation System.

(e) The Contractor shall ensure that the structural gauge requirements including vehicle throw and construction tolerance are incorporated at the station platform level. The drawing requirements will be provided to the Contractor after award.

(f) The Contractor shall coordinate the station interior design with the Authority's In-house Designers to incorporate and make provisions for installation of air circulation fans/cooling system to achieve the internal thermal comfort requirements.

10.2.5 Civil Defence (CD) Shelter

10.2.5.1 This station shall be designed as a CD shelter station. The Contractor shall refer to Clause 19 and Appendix AL of the Particular Specification

10.3 BCA Environmental Sustainability Code Green Mark (GM) Submission

10.3.1 The Contractor shall comply with the requirements of the BCA Green Mark for Transit Stations and specify appropriate means to achieve Green Mark Platinum rating for all Stations.

10.4 BCA Universal Design

10.4.1 The Contractor shall comply with the requirements stated in Clause 9 of Particular Specifications.

10.5 BCA Accessibility Code

10.5.1 The Contractor shall design and construct the station, including areas surrounding the station within the contract boundaries to fully comply with the prevailing BCA Code on Accessibility in the Built Environment.

10.5.2 All costs associated with complying with the Accessibility Code including any inspection or approval costs shall be deemed included in the Contract Price.

10.6 Ventilation Shafts, Cooling Towers, Make-Up Water Tanks, Condensing Units, Exhaust Fans and Exposed Plant Areas

10.6.1 The ventilation shafts, cooling towers, make-up water tanks, condensing units, exhaust fans and other exposed plant areas shall meet the requirements of the Contractor's specialist sub-contractor's design for efficient operation. The design of the equipment, enclosures, louvers etc. shall provide adequate screening and complement the station design intent. Access for maintenance shall be provided. The Contractor shall develop the design of enclosures to ensure required ventilation is provided whilst maintaining visual and acoustic screening.

10.6.2 The design shall comply with all relevant authorities' requirements for noise, setbacks, screening, natural ventilation, health and control of legionella bacteria. The Contractor's QP shall make noise report submissions to obtain approval from the relevant authorities where required.

10.7 Submissions to Relevant Authorities

10.7.1 The Contractor shall liaise with URA and other relevant statutory authorities to obtain Provisional Permission, Written Permission and Building Plan approvals for all works, as well as all other approvals required for Temporary Fire Permit (TFP) / Fire Safety Certificate (FSC) and Temporary Occupation Permit (TOP) / Certificate of Statutory Completion (CSC). Any amendment submissions deemed necessary during the course of the project and all costs associated therewith are deemed to be included in the Contract Price.

10.7.13 Where deemed necessary by the Contractor and accepted by the Engineer, phased TFP/ TOP are to be implemented. Consultation with BCA and SCDF shall be carried out to ensure phased TFP and phased TOP are agreeable by the approving authorities notwithstanding the acceptance of the Engineer. All time and costs to carry out all necessary submissions and inspections to facilitate the phased TFP/TOPs shall be deemed to be included in the Contract Price.

10.8 Legal boundaries

10.8.1 In designing the station, all parts of any rooms shall be designed within the legal boundaries of the station land, with consideration to nearby structures. For surface structures whereby the Authority will create rights on private land, rooms/facilities which are non-essential to railway operation shall not be designed on private land. Examples of rooms/facilities which are not essential to railway operation are toilets, ticket office, store room, CD provisions, A/C system for public spaces, etc. Such rooms/facilities shall be designed within the legal boundary of the station.

10.9 Architectural Design Objectives

10.9.1 The Architectural Design Concept is included in **Appendix BL** of the Particular Specification which indicates the station design theme. The Contractor shall develop the Architectural Design Concept in detail or propose alternative options to achieve the design theme.

10.9.2 The proposed station design should include design features as an integrated part of the station design to give it a unique identity. The Contractor shall designate within the station design a dedicated and prominent space, or spaces, for station art works, which may also serve as a station design feature.

10.9.3 The station design shall be clear, user-friendly, convenient and safe. The Contractor shall provide a high quality design which holistically integrates structural, E&M, operations, maintenance, safety and security requirements.

10.9.4 The Contractor shall ensure the design of the station is optimised and to avoid creating unusable and leftover spaces.

10.9.5 Efficient and Flexible Planning shall be obtained via the following:

(a) Minimum station footprint;

(b) Economy of construction;

(c) Ease of maintenance; and

(d) Minimise impact of structures into public spaces and neighbouring buildings and development sites.

10.9.6 The station design shall allow for flexibility. Where entrances or other at-grade structures are within future development lots or where there are constraints on site, the entrance shall be designed to allow it to be reconfigured without affecting the overall station planning.

10.9.7 Where integration with future development is expected, the design of the station, entrances and/or at-grade structures shall be designed to allow for full or partial integration. The Contractor shall work with the Authority to consult all relevant agencies/stakeholders to confirm the integration requirements.

10.9.8 The design shall be closely coordinated with that of the respective surrounding developments. Station design including entrances, ventilations shafts, exits and/or firemen's staircases and cooling towers etc., are to be compact and integrated where possible.

10.9.9 The Contractor shall coordinate with the Authority's In-house designer and SWCs and relevant authorities for the effective distribution and placement of cooling towers where applicable taking into account their impact on the urban environment and possible relocation into future developments.

10.9.10 The bulk and massing of the at-grade structures are to be minimized and wherever possible, all vent shaft transfers must be accommodated below ground.

10.9.11 All at-grade E&M plant equipment and ventilation shafts shall be screened from view. The screening shall be an integrated design element of the overall at-grade structure and wherever possible, all ventilation openings shall avoid facing the developments.

10.9.12 The Contractor shall work with all Interfacing Contractors/Parties to conduct and ensure that the Computational Fluid Dynamic (CFD) analysis takes into account the aesthetics and performance of the proposed screenings.

S/N	Line-wide Feature	Description of Feature
4	Bulkhead above Platform Screen Doors (PSDs)	The Contractor shall develop the details of the bulkhead above the platform screen doors. The lighting above the PSDs shall be continuous to highlight the entire non-lit PSD signage, without casting any dark spots or shadows on the signage. The mounting of signages, services, lighting, fittings and fixtures on the bulkhead above the PSD shall adopt line-wide consistency.
5	Fare Equipment Room (FER)/ Fare Equipment Closet (FEC)/ Ticketing Machiness	The Contractor shall develop the backdrop of FER/ ticketing machines which shall be coordinated with signage, modules and datum of the wall cladding panels.
6	Lifts serving platform and concourse	The lifts including the lift shafts and its structural support design, lift car interior, all visible control panels, lanterns and maintenance access panels, and ceiling profile around the lifts shall adopt a line-wide consistency. There shall be no exposed structures or services in between the levels that would be visible from within the glass lift. The Contractor shall work with the SWC for developing of this line-wide feature.
7	Public Toilets and Amenities	The Contractor shall develop the standard principles of layout configuration; provisions, mounting and fixing details of the fittings and sanitary ware and finishes. This applies to all public toilets and amenities as required by BCA's latest prevailing Code on Accessibility.

S/N	Line-wide Feature	Description of Feature
8	Handrails and Balustrades	The Contractor shall develop the standard design of all handrails and balustrades for public areas and for enclosed fire escape staircases.
9	Public Seating	The Contractor shall develop the standard design of the public seating. The Contractor shall develop the principles of placement of the seating in relation to the platform layout. The seating design shall allow for modular installation and shall enable flexibility for future re-location with minimal implications to the finishes
10	Barriers around bicycle parking area	The Contractor shall develop the standard design of the barrier enclosing bicycle parking areas.
11	Barriers at maintenance service ledges around escalator/stairwells at station entrances	The Contractor shall develop the standard design of barriers around maintenance service ledges, including the service gates to restrict public access to the service ledges.

10.11 Design Considerations

10.11.1 The architectural design considerations provided shall be followed by the Contractor in developing the design.

10.11.2 Station Design Integration with External Surroundings

10.11.2.1 The Contractor shall appoint suitably trained and experienced transit station designers, urban designers and landscape architectural professionals to successfully integrate the Station with the surrounding area. Refer to **Clause 4** of the Particular Specification on “Contractor’s Team Qualifications”.

10.11.2.2 Due consideration shall be given to the following issues:

(a) Need for safe and suitable access for maintenance; and

(b) Relative height/massing/form with respect to the existing facilities and surrounding environment.

10.11.3 Replacement/Reinstatement of Affected Facilities

10.11.3.1 The Contractor shall reinstate the facilities that are affected by the Works. Where the affected facilities cannot be reinstated in the original location, the Contactor shall liaise with relevant stakeholders, authorities and agencies and obtain approvals to provide equivalent or better replacement facilities at alternative sites at his costs.

10.11.3.2 The Contractor shall coordinate with relevant authorities, agencies and parties to design and reinstate affected facilities due to the station construction works. The reinstatement works shall include provision of barrier free accessibility between the station exit and adjacent development. The Contractor shall liaise with all authority, agencies and relevant parties on their requirements for all the reinstatement works.

10.11.3.3 The Contractor shall comply with the requirements of **Clauses 7** and **12** and any other relevant provisions of the Particular Specification.

10.12.8 All maintenance and equipment access hatches and covers, including access doors to all ducts and risers and double slabs in the public areas shall be designed and finished to integrate and match with the station architectural finishes. Access panels shall be minimised in public areas through combining access points where feasible; where necessary full panels to be made operable with minimal difference in panel size and joints with architectural wall finish sizes and joints to facilitate use as a panel door. Access hatches shall be coordinated fully to match with floor finish sizes and joints.

10.12.9 Aluminium Composite Panels are not allowed in any area of the station.

10.13 Materials and Workmanship Specification for Architectural Works [M&W Specification (Architectural)]

10.13.1 Reference shall be made to the Materials & Workmanship (M&W) Specification for the requirements of architectural finishes and components of the Contract.

10.13.2 The Contractor shall expand the M&W Specification (Architectural) to create a complete set of specifications to fully cover the architectural works required for the Contractor's proposed design to the acceptance of the Engineer. Where amendments to the specifications are deemed necessary, the Contractor shall highlight to the Engineer, provide and incorporate the amendments to the specifications, subject to acceptance.

10.13.3 The Contractor shall prepare his Architectural drawings in conjunction with the M&W Specification (Architectural) to be submitted to the Engineer for review and acceptance as a mutually coordinated package for the architectural works.

10.14 Lighting Design

10.14.1 The Authority has engaged lighting consultant under Contract CR2007 (CR2007) to carry out lighting design for the stations. The Authority will engage separate SWC for the procurement and installation of lighting. The Contractor and his Architect shall lead the coordination with CR2007 / the Authority's In-house Designers and SWC to develop the lighting design for the stations, commuter facilities, landscape area, bicycle parking areas and all above ground structures. The detailed scope of works is enumerated below:

(a) The overall lighting design shall tie in with the overall architectural design intention. The Contractor's Architect and CR2007/the Authority's In-house Designers and SWC shall jointly conduct regular design workshops to review the lighting design and jointly present the overall lighting scheme at forums such as ADRP, Design Presentations, Reviews, Workshops and other forums, as requested by the Authority.

(b) The Contractor shall coordinate with CR2007/ the Authority's In-house Designers and SWC and make provisions for the installation of LED lighting integrated with handrails/balustrade.

(c) The lighting design shall adhere with the overall station design requirements, including but not limited to maintenance, aesthetic integration, security requirements, etc.

(d) The Contractor and his Architect shall lead the coordination with CR2007/ the Authority's In-house Designers and SWC to ensure that the luminaries and interfacing of the lighting fixtures with the finishes is seamless with the station design. All associated equipment, e.g. drivers, and their access points, are to be accessible and fully integrated with the overall design.

(e) The Contractor and his Architect shall work with CR2007/ the Authority's In-house Designers and SWC to coordinate on the position and location for all light fittings and peripherals that are installed in the public, non-public areas and outside plant and equipment rooms. Interfacing details of the luminaires to the mounting surfaces shall be submitted to the Engineer for acceptance. Light fittings 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.

(f) The lighting strategy shall consider sustainability and energy efficiency to meet with Green Mark Platinum standard certification. Purely decorative lighting shall be avoided.

(g) The Contractor and his Architect and CR2007/ the Authority's In-house Designers and SWC shall jointly coordinate with the lighting design and maintenance strategy with LTA RAOM and the Operators. The lighting design shall ensure and demonstrate the ease of access for replacement and maintenance of the lighting fixtures.

(h) CR2007/ the Authority's In-house Designers and SWC shall calculate luminance levels for the proposed station lighting design. The results of the calculation and proposals are to be submitted to the Engineer for acceptance. The luminance levels shall comply with the Authority's Design Criteria.

(i) The Contractor and his Architect shall make amendments to his documents and drawings to accommodate any Authority approved changes that arise from such co-ordination.

(j) Upon installation, the CR2007/ the Authority's In-house Designers and SWC shall undertake readings and required simulations to measure and validate the required lighting levels and desired lighting effects and compliance with the Authority's requirements. Where the required levels and intended lighting effects are not met, the Contractor and his Architect shall coordinate and work with CR2007/ the Authority's In-house Designers and SWC to propose and carry out remedial measures to modify the lighting scheme until the required measurements and effects are met.

10.14.2 The lighting design developed shall also consider functionality efficiency and easy access for maintenance.

10.14.3 Light fittings shall be reachable and located at maximum height of 4.5m from finished floor level.

10.14.4 Light fittings directly above escalators and staircases are not allowed.

10.14.5 Minimum 800mm wide ledges shall be provided around escalators and staircases wells at exit level to provide access for maintenance. Balustrades shall be provided around the maintenance service ledges for protection from falling, with securable swing gates to restrict public access.

10.14.6 Light fittings shall be wall-mounted on the sides of staircases and escalators. This will ensure easy access to the light fittings for maintenance.

10.15 Acoustic Design

10.15.1 The Contractor shall ensure that the architectural design of the station incorporates all the necessary acoustic requirements in accordance with the Authority's Design Criteria.

10.16.4 The environmental building analysis shall include but not limited to bioclimatic analysis, sun-path analysis, wind analysis, solar radiation and insolation analysis, daylight and glare analysis, energy modelling, weather protection, shadow projections, rain penetration, building orientation, natural and mechanical ventilation strategies, landscaping/ greening layouts, etc.

10.16.5 The Contractor shall utilise the outputs/ results/ metrics of the environment building analysis for the architectural design to determine that the station design adequately addresses/ respond to site specific local climatic conditions and demands.

10.16.6 Should the outputs/ metrics not be met, the Contractor shall present his findings to the Engineer including any recommendations for guidance from the Engineer. Should the Authority require additional mitigation design work, revised analysis, reports and presentation, they shall be undertaken by the Contractor and presented to the Engineer for the acceptance at no additional cost.

10.16.7 NOT IN USE

10.17 At-grade Structures

10.17.1 The proposed ventilation shaft structures are for reference. The Contactor shall design the ventilation shaft structure with the following considerations:

(a) No increase in the station footprint and minimise the impact to the station layout.

(b) The Contractor shall ensure that the spacing / sizes when designing the ventilation shaft structures and station entrances are minimised. Taking full consideration of any wind effects or external influences on airflow/smoke circulation, there shall be no re-circulation of air/ smoke between the ventilation shaft openings and between the ventilation shaft openings and station entrances during any fire emergency.

(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 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 Contactor 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.

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 bespoke camera poles, bespoke shared mounting brackets, etc. for security and surveillance coverage of the station, entrances and its surrounding shall deem to be 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.

10.20.9 The Contractor shall be subject to the Official Secrets Act. The Contractor shall not disclose or release to any person, entity or otherwise deal with the same in any manner whatsoever without the written consent of the Authority, as all information relating to this project shall vest in and be the absolute property of the Authority. The Contractor shall safeguard any information collected and return and/or delete all information collected/processed at the end of the contract in accordance with the Authority's instructions.

10.20.10 Any security measures that have potential impact to commuter flow (such as Transit Security Booth, security screening, etc.) shall be included in the Contractor's pedestrian modelling analysis. The Contractor shall make reference to the Passenger and Commuter Flow as stated in **Clause 10.8.5** of the Particular Specification. The Contractor shall take into consideration security requirements as imposed by the Authority in the design. The Contractor shall address the requirements and propose various protection and mitigation measures for the Authority's acceptance. A list of these security requirements is listed in **Appendix AE** of the Particular Specification. The Contractor shall prepare the Security Design Plan in consultation with the Authority, taking into account the security requirements. Any variations from the Contractor shall be endorsed by a Qualified Persons (QP)/ Security & Blast (S&B) Consultant Contractor and submitted for acceptance by the Authority with costs arising from the submission borne by the Contractor.

10.21 Ancillary Facilities

10.21.1 The Contractor shall coordinate and provide all facilities required for the installation by others for Automated Teller Machines (ATMs), shops, vending machines, SAM, public phone booths, commercial signage, etc. within the boundary of the station. The Contractor shall incorporate into the design structural lintels for the future installation of security shutters at shop fronts. The Engineer shall advise prior to handover any required temporary hoarding or other installation at shop areas. The Contractor's QP shall ensure that authority compliance can be achieved based on the Engineer's handover requirements.

10.21.2 The Contractor's design for letter boxes at the station and shall make allowance for the future integration of all retail unit letter boxes. Unless otherwise directed by the Engineer the Contractor shall obtain postal addresses from IRAS for the station and shops, and to obtain SingPost approval for the station letterbox assembly including letter boxes for station, shops and returned mail.

B8 Windows and associated aluminium and glazing works including associated frame, purpose-built structural supports (if any), fixings and the like.

B9 Weatherproof air intake and exhaust duct grills at façade.

(c) INTERIOR ENCLOSURES

C1 Operable cladding and/or partitions (including demountable panels as maintenance access hatches that is part of or to match the operable cladding/partition system) provision to wet area sealed space, cavity wall and for CD usage, including ironmongery and permanent cam locks.

C2 Non fire-rated glass partitions and non-fire-rated glass doors.

C3 Wall/column finishes including their proprietary fixing e.g. hooks, brackets, pins (excluding wall structural system or any support system for the finishes). Including cladding of doors and access hatches in public spaces that is part of or to match wall/column finishes system.

C4 Acoustic treatment to walls.

C5 Wall rendering and plastering (except where necessary to meet fire resistance requirements).

C6 Glazing and cladding work to lift shafts (structural works, sub-frames, clamps are by the Contractor).

C7 Non fire-rated fixed and movable partitions.

(d) FLOORS

D1 Floor finishes including associated finishes to movement control joints and skirtings.

D2 Screeding for floor finishes.

D3 Floor gratings and covers.

D4 Floor trap covers.

F5 Roller shutters and manual operation system, closet, collapsible gates, emergency gates and grilles, excluding fire shutters.

F6 Hardware and lock sets for the items above.

F7 Letter boxes with labels or word imprints.

F8 Fixed furniture and seating.

(g) SPECIAL CONSTRUCTION AND OTHERS

G1 Removable railings along platform edge.

G2 Louvers and dummy air-conditioning grilles.

G3 Sanitary fixtures and wares, electrical cable to isolator/fuse units and associated accessories.

G4 Non-Statutory signage (listed in **Appendix G** of the Particular Specifications, TSM Volume 1, Part B, Items 5-9)

G5 Bicycle parking racks and barricade enclosure.

G6 Exit floor mat.

G7 Painting to wall and ceiling.

G8 Housings and cabinets (including ironmongery and permanent cam locks) for E&M equipment within the public area.

10.25.9 Exclusions from the Architectural Provision Sum:

10.25.9.1 The following list is not exhaustive and only includes those items where additional clarity is deemed necessary to define the scope of the items excluded from the Provisional Sum for Architectural Works. The following list of items are not included in the APS and are deemed included in the Contract Price:

X1 External waterproofing of structures.

X2 Waterproofing of internal slabs.

X36 Fire Stops.

X37 Trees felling and transplanting, treatment to existing trees affected by the Works such as propping, supporting, pruning of the roots etc.

X38 Ironmongery, temporary cylinders (for locking during construction), hinges, hasp and staples to gates, airtight sealing gasket, mechanical seals around doors, painting and all necessary hardware to all clad and non-clad permanent doors, wall and floor access hatches and glass doors.

X39 All statutory and operational signages.

X40 Painting to all structural steelwork.

X41 Maintenance access equipment, ceiling gantry rail and maintenance gantries over voids.

X42 Equipotential bonding for all items.

X43 Green roof, landscape and irrigation system.

X44 Security Grilles/shutter.

X45 Fair-faced concrete.

10.26 NOT IN USE

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10.27 Ironmongery

10.27.1 The Contractor shall design, supply and install all ironmongery including temporary cylinders as identified in **Table 10.1** below for securing all doors during the construction period and for handover to the operator. The Contractor shall be responsible for the fitness and function of the temporary cylinders up to the installation of the master key cylinders and dummy cylinders by the SWC for permanent cylinders. The Contractor shall also be responsible to provide protection to the installed doors and all ironmongery until the completion and handover of the station.

10.27.2 The Contractor shall engage the ironmongery supplier together with the door supplier. The two parties shall work together as a combined unit to ensure the selection of ironmongery directly matches the performance requirements of the doors. The full set of ironmongery samples as well as working samples of the main locksets shall be submitted for approval together with the working samples for the different types of door. The door supplier shall install all their own doors while the ironmongery supplier shall install all their own ironmongery. The Certificate of Conformity (COC) and labelling of the doors together with their ironmongery shall be submitted by the door supplier after a joint verification by both parties as to the correct functioning and installation of the doors and ironmongery.

10.27.3 Permanent cam locks wherever necessary including for all cladding doors and hatches shall be installed by the Civil Contractor/the APS Contractor, whichever party provides the cladding doors/ hatches. Such locks shall be grouped by type of door and issued with a common key by group (e.g. one key for all seepage drain access cladding panels) apart from emergency access locks with break-glass such as for extinguisher and hose reel cabinets. Such cam locks shall have both individual keys per lock to be included in the break-glass and a common key for the operator.

10.27.4 For cladding doors and hatches secured with cam locks, a common permanent lock for all doors and hatches not for CD usage shall be installed by the Civil Contractor/ the APS Contractor. For CD usage, a common lock in accordance to CD requirements shall be installed by the APS Contractor.

10.27.5 The Contractor shall co-ordinate the position and location of all Access Management System (AMS) locks and peripherals with the AMS Contractor. The AMS locks shall be supplied by the AMS contractor and installed by the Contractor for all doors under the Contractor's scope as identified in **Table 10.1** below. Interfacing details of the walls and doors/ door frames and fire door approvals incorporating the AMS shall be submitted to the Engineer for acceptance.

10.27.6 The Contractor shall supply and install temporary cylinders for securing all doors during the construction period and for hand-over to the operator. Subsequent to hand-over the temporary cylinders can be returned to the Contractor upon installation of the system wide master key cylinders. The Contractor shall be responsible for the fitness and function of the temporary cylinders up to the installation of the master key cylinders. The Contractor shall also be responsible and shall provide protection to the installed doors until the completion and handover of the station.

10.27.7 The Authority engage a SWC for the System-wide supply and installation of master key cylinders for all permanent doors and hatches before hand over to the operator. The Contractor shall liaise and co-ordinate with the SWC for the SWC to install the permanent cylinders for all permanent doors and hatches. Upon installation of the master key cylinders by SWC, all temporary cylinders shall be returned to the Contractor.

10.27.10 The Contractor shall provide and submit the proposed ironmongery schedules in the format to be stipulated by the Engineer for acceptance. These schedules and summary shall be made ready and submitted to the Engineer for review. The Contractor shall update the schedules diligently and shall provide as-built schedules upon the Substantial Completion of the whole of the Works.

10.28 Platform Screen Doors (PSDs) including End Return Doors (ERD)

10.28.1 The Contractor shall liaise/co-ordinate with PSD SWC on all aspects of safety precautions/requirements (eg: touch voltage and the like) that the Contractor must provide for and take into account when designing and constructing (including all insulation tests) the architectural finishes in the vicinity of the platform screen doors and ERD.

10.29 Automatic Fare Collection (AFC) Gates and Top-Up Kiosk (TUK) Requirements.

10.29.1 The SWC (AFC Contractor) shall supply and install the AFC equipment (such as AFC gates, Station Computers (SC), Passenger Service Machines (PSM) and ticketing kiosks). The Contractor shall liaise and co-ordinate with the AFC contractor on all aspects of the requirements for the supply and installation of the AFC equipment.

10.29.2 The Contractor shall verify at each design stage that the number of AFC gates and any emergency gates (if any) required to comply with the CPFPRTS exit requirements and advise the Engineer of any mitigation proposals.

10.29.3 The figures below are AFC gate and ticketing kiosk minimum guideline/quantity for the station. In addition, the design shall allow for future provisions. The Contractor shall review with the Authority in conjunction with the pedestrian modelling study to finalise the number of AFC gates and ticketing kiosks.

	AFC gate minimum guideline	
	Number of aisles	Future provision
Main Fare line	7 normal + 2 wide aisle	Extend to cover the full fare line as much as possible
Remote Fare line	4 normal + 1 wide aisle	

	Ticketing Kiosk Minimum Quantity	
	TUK	Future provision for TUK
Main Fare line (station with two or more fare line)	2	1
Remote Fare line (station with two or more fare line)	1	1
Single Fare line	2	1

10.29.4 To allow installation of additional AFC gates for future expansion, the underfloor trunking shall be extended to cover the full fare line subject to physical constraints on site.

10.29.5 The underfloor trunking including the cable upstands/junction box of AFC equipment (ticketing kiosk and AFC gate) shall be provided by the AFC contractor. The AFC gate mounting plinth shall be provided by the Contractor. The Contractor shall liaise and co-ordinate with the AFC contactor on all aspect of the requirement to enable the AFC contractor to install the underfloor trunking/upstands/junction box.

10.29.6 The number of AFC gates is dependent on the aisle configuration, e.g. eight (8) aisles in a single group requires nine (9) AFC gates. If divided into two (2) groups of four (4) aisles, then a total of ten (10) AFC gates are needed.

10.29.7 The AFC contractor shall supply and install the AFC Emergency Stop Switch (AFC ESS), PSM and SC in the station's Passenger Service Centre (PSC). The Contractor shall liaise and co-ordinate with the AFC contractor on all aspects of the requirements for the supply and installation of the AFC ESS, PSM and SC in the PSC.

10.29.8 The AFC contractor shall supply and install the AFC Network Equipment into the station's Fare Equipment Room (FER) or Fare Equipment Closet (FEC) at a location near to the AFC equipment. The Contractor shall liaise and co-ordinate with the AFC contractor on all aspects of the requirements for the supply and installation of the AFC network equipment in the FER or FEC.

10.29.9 The AFC contractor shall supply and install the AFC Distribution Box (DB) at the station's AFC DB Closet at a location near to the AFC equipment. The Contractor shall liaise and co-ordinate with the AFC contractor on all aspects of the requirements for the supply and installation of the AFC DB in the AFC DB Closet.

10.30 Layout Provision for Public Address System

10.30.1 The Contractor shall propose a speaker layout for the PA systems in the station to Communications System SWC in a timely manner to enable Communications System SWC to proceed with the STIPA verification. The Contractor shall ensure that the reverberation times (RT60) at 1 KHz shall not exceed 1.8 seconds in any public area. In areas where the ceiling height is lower than 5m, the target reverberation time (RT60) at 1 kHz shall be less than 1.6 seconds. The speaker layout shall provide a minimum STIPA level of 0.5 in at least 75% of each public area (zone) of coverage. For the remaining 25% of each area, the STIPA level shall not fall below 0.45 and shall not be concentrated in one location but shall be distributed throughout the area of coverage. The Contractor and the Communications System SWC shall produce a joint agreement to confirm this.

10.30.2 The Contractor shall co-ordinate on the position and location for all devices and peripherals that are installed in the public and non-public areas outside plant and equipment rooms. The Contractor and Communications System SWC shall produce a joint agreement on the co-ordinated information.

10.31 Passenger Service Centre (PSC) and Station Master Room (SMR)

10.31.1 The Authority will call tender for a System Wide Contractor (SWC) for the supply and installation of the PSC and SMR.

10.35.7 The Contractor shall coordinate with the relevant authorities to determine the final extent and details of the FLM covered linkways. The Contractor shall secure approval for their proposals, and if necessary, shall enhance the proposals as required to secure all necessary approvals from relevant authorities and departments of the Authority. All such additional provisions are deemed included in the Contract Price.

10.35.8 The Contractor shall obtain necessary approvals or letter of no objection from all relevant LTA departments involved. Once all comments have been cleared and approvals obtained from each department, the Contractor shall submit a set of drawings to LTA Commuter Infrastructure department together with other departments' approvals for their review. Finally, Contractor will submit Commuter Facilities drawings and departments' approvals to the Engineer for final acceptance.

10.35.9 Commuter facilities namely bus stops, taxi stands pick-up/drop off points (PUDO) and at grade bicycle parking, shall be provided close to the station, connected to the nearest entrances with typically 3.6m width covered link ways. High covered shelters shall be provided over the bus, taxi bays, PUDO and access roads to developments. The contractor shall propose a suitable interface between covered linkways of varying widths to allow a smooth flow of pedestrian and cyclist movement.

10.35.9.1 The land-take requirements for First-and-Last-Mile (FLM) programme, road realignment, station entrances and working area required for construction have been pre-consulted with Urban Redevelopment Authority (URA), and other authorities. The extent of construction and layouts has been provided to the relevant authority agencies. The Contractor shall undertake further liaison, submissions and coordination to finalise the land take requirement with all relevant authorities and stakeholders. This includes reviewing sub-standard commuter infrastructure (including footpath, cycling path and covered linkway) to achieve the required standard where possible. Proposed changes / improvements shall be achieved within the approved road reserve. Any changes would require the regularisation of the approved road reserve from the previous FPA.

10.35.9.2 Bicycle parking

(a) The bicycle lots shown in the Authority's drawings are for reference only. The Contractor shall develop the design to provide a total of 550 nos. of bicycle parking lots within the Railway Area for CR16.

(b) If the total number of bicycle lots provided within Railway Area do not meet LTA AMG's bicycle parking provision requirement, the Contractor shall design and construct the remaining lots at the additional land, that are on state land within/adjoining to the railway area/RRL, which would be secured by the Authority in order to meet the numbers of bicycle lots required, with the Contractor's assistance in preparing the MPC submission. The design and construction of the bicycle lots and the areas, whether these are on state land within/adjoining to the railway area/RRL or otherwise shall be deemed included in the Contract Price. The Contractor shall submit the proposed bicycle parking layout for approval by the relevant agencies and the acceptance of the Engineer. The Contractor shall handover the bicycle lots to the relevant maintenance party.

(c) The Contractor shall consult and make the necessary submissions to LTA's Active Mobility Group (AMG) and Public Transport Safety (PTS) to comply with their requirements and obtain their acceptance.

(d) The Contractor shall work with LTA AMG, the relevant authority agencies to ensure that the overall bicycle parking provision is sufficient to serve the location and the surrounding developments.

(e) The Contractor shall conform to LTA AMG's requirements on the U Bar types of bicycle rack to be used at each exit; all such provisions shall be deemed included in the Contract Price.

(f) The Contractor shall furnish details and arrange for the fabrication and installation of the unique QR code sticker/plate as part of the geo-fencing requirement to LTA_AMU_Registry@lta.gov.sg, two (2) months before completion of bicycle parking lots in public areas.

(g) Bicycle parking directional signage and bicycle parking maps shall be installed within station boundary to direct cyclists to bicycle parking locations. The Contractor shall refer to **Appendix AP** of the Particular Specification on the requirements of the bicycle parking directional signage and bicycle parking maps (design and dimensions subjected to changes). The Contractor shall take reference to Authority's latest design of signage and maps.

S/No	Mock-ups	Quantity/Extent
10	Coordinated bulkhead above platform screen doors	1 set of mock-up showing the coordinated services above the platform screen doors, including lighting, signage, CCTV, speakers, diffusers, etc
11	Privacy Screen	1 set of mock-up
12	Signage including integrated service pole	1 no. per type
13	Platform Seats	1 no. per type

10.39 Provision of Art-in-Transit Programme

10.39.1 This Clause is for the provision of Art-in-Transit Programme by the Contractor.

10.39.2 The Contractor shall liaise, coordinate and provide all necessary provisions for interfacing with the Authority for the details of all aspects of Art in Transit Programme Works. Thereafter, the supply, fabrication, delivery, installation and construction of the same, shall be via an Artwork sub-contract to be prepared and called by the Contractor in accordance with the Authority's Requirements.

10.39.2A The Engineer will issue an Engineer's Instruction to the Contractor for the procurement and installation of the Artwork after Contract award when the artist's artwork design has been finalized and accepted. The Contractor shall ensure procurement of the final product is in accordance with the artist's original intent. The Contractor shall incorporate the coordination, finalization of the artworks, procurement and completion of the artworks in his programme of works. All coordination, attendance, programming and interfacing works are deemed included in the Contract Price.

10.39.3 The Contractor is required to enter into Sub-Contract(s) with the successful Artwork tenderer(s).

10.39.4 The artwork shall be integrated as part of the station design, within the architectural detailing and finishes. The Contractor shall:

(a) Designate within the station design a dedicated and prominent space, or spaces, for station artworks;

(b) Coordinate, attend meetings and work with the station artists and curators appointed by the Authority, and integrate the approved artworks into the station architectural finishes as appropriate;

(c) Coordinate the artwork with the architectural design and selection of materials and finishes;

(d) Provide all necessary technical information including but not limited to adequacy of proposed materials, installation details, loading requirements and shall highlight any deficiency to be mitigated for the successful implementation of the approved artworks;

(e) Provide budgetary estimates for the station artworks at various milestones; i.e. Concept, Design Development and Final Artwork, to ensure artworks are within the allocated budget prior to tender calling;

(f) Provide tender documentation, including technical specifications for calling of Artwork sub-contract including the production, fabrication and installation of the artworks;

(g) Implement the production, fabrication and installation of the artwork to the acceptance of the Engineer; and

(h) Ensure the artwork is installed according to the approved design.

10.39.5 The design of artwork shall be carried out by the artist(s) appointed by the Authority. The Artwork sub-contractor shall produce the artwork in the medium to be advised by the Authority.

10.39.6 The Artwork sub-contractor shall produce shop drawings, material samples and mock-ups of the artwork for Artist's and the Engineer's acceptance prior to production, fabrication and installation. The samples and mock-ups shall show the texture, colour, material, quality of the final product and fixing method. The samples shall consist of three (3) nos. of 300x300mm panels, and the mock-ups shall consist of two (2) nos. of full-size panels (actual size subject to acceptance by the Engineer) or as appropriate. The production, fabrication and installation of the artwork shall be carried out by the Artwork sub-contractor.

10.39.7 The warranty for the artwork shall be consistent with the warranty for the architectural finishes, subject to a minimum period of ten (10) years.