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## **2 SCOPE OF WORKS**

### **2.1 General**

2.1.1 The Contractor shall be solely and fully responsible to ensure that the actual extent and nature of the Works in this Contract are understood.

2.1.2 The scope of Works for the Contract is described in the Authority's Requirements. It shall include but is not limited to the following:

- a) Design, construction, and completion of an underground Civil Defence (CD) station with three (3) entrances, including all civil, structural, architectural, plumbing, drainage, sanitary, fire hydrant system, ventilation shafts, cooling tower, reinstatement works and other associated structures and facilities;
- b) Design, coordination and construction of provisions for future development above CR206 and all associated requirements necessary for integration with future development;
- c) Design, coordination, construction, and completion of two underpasses underneath Clementi Road;
- d) Removal of underground obstructions, foundations and structures of covered linkway, foundations and structures of boundary walls, sewer manhole, foundations for culverts, and their temporary and permanent replacement unless specified otherwise;
- e) Design, construction, and completion of Bored tunnels towards CR205 King Albert Park Station, including launch shaft at CR206;
- f) Supply of one (1) Earth Pressure Balance (EPB) type TBM including one (1) additional shield;
- g) Dismantling and removal of the TBM along the completed tunnels, and carrying out refurbishment, re-equipment, restoring and full testing of the TBM to ensure its readiness for subsequent tunnel drive after completion of the first drive;

- h) Coordinate with CR205 contractor at the tunnel docking interface for access. Design and conduct ground improvement for TBM dock in at CR205. The Contractor has to co-ordinate with the relevant parties to ensure the necessary works are completed before the TBM reaches the CR205 interface. The Contractor shall refer to **Clause 7** of the Particular Specification for the details of the interface requirements with CR205 and CR206 contractor;
- i) Interface with bored tunnel from CR207 and provide site access for ground improvement works for CR207's TBM docking at the west end of Maju Station;
- j) Provision of ground improvement works including but not limited to fissure grouting, to facilitate the safe construction of the station and tunnels including launching at Launching shaft and breaking through at CR205;
- k) Removal of existing Pedestrian Overhead Bridge above station footprint, its associated lifts, Electrical and Mechanical (E&M) services and structures including all footing(s), foundation, retaining wall, ramp, staircase and obstructions for the construction of the Works. **Provide an at-grade signalized pedestrian crossing for safe and barrier free access at all times and install temporary covered linkway to connect the signalized crossing** to the nearest bus stops and adjacent buildings/structure and **provide umbrellas** during rainy days to facilitate the pedestrian crossing;
- l) Remove and replace the existing SIM/SUSS canopy shelter connecting the existing POB to SUSS. Design the new canopy to ensure a seamless connection;
- m) Provision of tunnel drainage system collecting seepage including all necessary sumps and installation of water handling equipment;
- n) Design and construction of first stage trackbed concrete in trainways for all structures within the contract boundary;
- o) The Contractor shall refer to and comply with requirements as stipulated in Particular Specifications **Clause 9.31.5** and **Appendix AE** and design the station with security features in accordance to the requirements of the Authority and Ministry of Home Affairs (MHA). The Contractor shall seek approval of the design from the Authority and MHA.

- p) The Contractor shall design the ventilation shaft structures and perform the Computational Fluid Dynamic Analysis (CFD) simulations in accordance with **Clause 10.17** of the Particular Specification;
- q) Coordination, supply, installation and fixing of all penetrations, openings, sleeves and other provision for all the SWC services in stations and tunnels, including sumps pits;
- r) Surveys, ground treatment, settlement risk analysis, settlement prediction, preventative and corrective actions, all in relation to ground movements as detailed in **Clause 14** of the Particular Specification;
- s) The Contractor shall design, plan, divert, and reinstate utilities affected by or required for their construction works. The diversion and reinstatement of such utilities are subject to Utility Agencies' approval.
- t) Permanent diversion of existing utilities, sewers, drains and box culverts as stated in **Appendix Z**.
- u) Engage Environmental Consultant to carry out detailed Project Environmental Study (PES) and Environmental Impact Study (EIS) to assess the impact of the Works, and to propose mitigation measures to avoid adverse biodiversity/environmental impact to the surrounding area caused by the proposed Works. The Contractor shall obtain the approval from NParks, NEA, all other relevant authorities, the Engineer and engage relevant nature groups and environmentalists on the proposed mitigation measures prior to commencement of the Works. The Contractor shall refer to **Clauses 13** and **23** of the Particular Specification for details;
- v) Design, supply, installation, testing, and commissioning of electrical and mechanical systems as detailed in **Clause 11** of the Particular Specification;
- w) Design, implementation, construction and reinstatement of the temporary traffic diversion schemes and provision of temporary roads and associated facilities;
- x) Design and implement all Temporary Traffic Management (TTM) diversion schemes based on the Contractor's proposed construction methods including associated Traffic Impact Assessments (TIA) studies where based on prevailing standards and codes of practice;

- y) Design and reinstate affected roads based on prevailing standards and codes of practice e.g. Street Works Proposals relating to Development Works or construct new roads, roadside facilities and street furniture including upgrades to at grade road system where applicable including provision of controlled right turns at traffic light junctions using Red-Amber-Green arrow signals and necessary improvement measures. Where modifications to junctions are required, the Contractor shall carry out traffic simulation analysis accordingly and propose improvements where necessary;
- z) Design, construction, maintenance and subsequently removal of the temporary covered linkways;
- aa) Reinstatement of the affected canopy(s) and commissioning all the required E&M services to the satisfaction of SUSS and SIM and no worse off than the existing conditions;
- bb) Provision of attendances and coordination with the utility agencies and the advance utilities contractor to facilitate the diversion of existing utility service by the Authority in accordance with **Clause 16** of the Particular Specification;
- cc) Design and construction of all temporary works required for the completion of the Works including but not limited to the ERSS wall systems inclusive of struts, walers, runner beams, bracings, kingposts, temporary retaining walls, temporary slopes, temporary traffic diversions, temporary traffic diversion decking and the required support systems, temporary traffic safety measures inclusive of temporary collision barriers required, temporary drainage systems, ground treatments and other temporary elements that are required for the completion of the Works and all other associated works within this Contract. The Contractor shall also be responsible for the removal of all temporary works upon completion of the Works;
- dd) Design, coordinate, and construct temporary and permanent diversion of all affected existing utilities, sewers, drains and box culverts etc. The Contractor shall be responsible for supporting and protecting the utilities that may be affected by the Works, including any diversion required by the Utility Agencies;
- ee) Design and construction, including all necessary liaison and coordination, provisions for interface with the adjacent Contract CR205 and CR207, and with the relevant agencies who have works within or in the vicinity of the project boundaries and work space areas of CR206;

- ff) Design, construction and removal of all formwork, falsework, temporary staging or scaffolding, temporary construction accesses and construction decking;
- gg) Additional soil and site investigation (SI) works as necessary for the design and construction of the Works and to determine the nature of the site and the foundations of the surrounding infrastructure, utilities, facilities and buildings;
- hh) The Contractor shall conduct necessary tests required for the structural assessment of adjacent structures affected by the Works, including protection measures, repairs, structural strengthening details and reinstatement works etc;
- ii) Make necessary provisions for the safeguarding of the MRT Structures, Services and Systems including all necessary temporary works and provisions in compliance with the Code of Practice for Railway Protection;
- jj) Design and installation of all ground improvement zones as required;
- kk) Design, supply, erection, maintenance and dismantling of noise barriers and equivalent noise control and/or monitoring measures during the execution of the Works as required under the Contract. The noise barrier requirements as shown on the Authority's Drawings and **Appendix A** of the General Specification are indicative only. Any additional design and installation arising from site conditions shall be deemed included in the Contract Price;
- ll) The Contractor shall design, construct, maintain and subsequently remove the full noise enclosures with roof, including provisions for mechanical and electrical services, for the whole of the launch shaft and gantry crane working area, to shield the noise generated from the tunnelling works. The full noise enclosure shall be installed before the start of the initial drive of the TBM, and to be designed for multiple dismantling and reassembling of the TBM for the subsequent tunnel drive. The Contractor shall refer to **Appendix A** of the General Specification for full noise enclosure requirements for the launch shaft. The full acoustic enclosure shall be completed prior the commencement of the first EPB TBM's initial drive.

- mm) Comprehensive pre-construction and post-construction condition survey of existing structures, existing drainage, utilities and properties within the zone of influence of the Works. Works shall include any interim and permanent repair works to existing structures and properties affected during the course of construction;
- nn) Backfill or levelling worksites with close turfing to levels as required to the satisfaction of the Engineer and handing over to the relevant authorities (refer **Clause 7** of the Particular Specification);
- oo) Landscaping and external works, relocation and reinstatement or new works including bus shelters, taxi stands, passenger pick-up/drop-off (PUDO) points, bicycle parks footpaths, drainage systems, covered linkway facilities and cycling paths, park connectors, turfing, and other affected commuter facilities and the associated works according to Authority's Requirements, unless stated otherwise or 'By Others';
- pp) Design, construction and completion of permanent covered linkway, including vertical trellis with landscaping where applicable;
- qq) Design, supply and install uPVC ducts with draw wires and uPVC ducts warning tile, foundations, mounting facilities, cabling ducts crossings, connection points or openings for temporary and permanent public lighting, traffic lights, variable message sign (VMS) and flashing beacons for zebra crossings for permanent and temporary diversion of traffic;
- rr) Design, supply, install, operate, and maintain Temporary Traffic Monitoring System which includes the Portable Variable Message Sign Sub-System (PVMSSS) and Surveillance Camera Sub-System (SCSS), as stipulated in **Particular Specifications Appendix AH**;
- ss) Provide temporary replacement of all affected accesses, covered linkways, driveways, footpaths, gates, carpark dropdown barriers, boundary walls, fencing, carparks, cycling paths, bicycle parking, guard house, and other facilities of any adjacent development/properties including its maintenance, removal and final reinstatement;
- tt) Carry out the relocation, protection and reinstatement of utilities and facilities affected by the Works with the approval from relevant agencies and property owners including but is not limited to Singapore Land Authority (SLA), Urban Redevelopment Authority (URA), NParks, etc;

- uu) Interface with Advance Utilities Contractor, PUB DTSS Contractor, Ki Residences developer, MINDEF/DSTA Maju Camp, SIM/SUSS in accordance with **Clause 7** of the Particular Specification
- vv) The Contractor shall note that the existing 600mm diameter pumping main run across the proposed underpass structures. The pumping main will be decommissioned by PUB DTSS Contractor upon completion of the DTSS 2.1m diameter link sewer. The Contractor shall liaise with and co-ordinate with PUB DTSS Contractor on the decommissioning works
- ww) Prior to the underpass construction works, the Contractor shall coordinate, verify and ensure that the existing 600mm diameter pumping main has been decommissioned and properly sealed off to his satisfaction
- xx) In the event the existing 600mm diameter pumping main has not been decommissioned in time for his Works, the Contractor shall design and divert the existing 600mm diameter pumping main subject to approval from relevant agencies. All cost and time is deemed to be included in the Contract Price.
- yy) Carry out earthworks including necessary site clearances, grubbing and preparation of the site, removal and disposal of all debris, transportation and disposal of all excavated materials, backfilling, protection of exposed earth surfaces and other related works as required by the Works;
- zz) Carry out controlled rock blasting or chemical splitting and removal;
- aaa) Design, construction, maintenance and sequent demolition of Authority's Site Office located at CR206 in accordance with **Clause 5** of the Particular Specification. The Contractor shall also make all necessary arrangements for handing over to relevant authorities and land owner;
- bbb) Design, supply and installation of waterproofing system to all structures including all entrance structures, subways, ventilation shaft structures, interfaces and all other subsurface structures;
- ccc) Design, coordinate, supply and construct architectural works/finishes and associated works including commuter facilities and external architectural works/finishes in accordance with **Clauses 10, 24 and 25** of the Particular Specification, unless stated otherwise;



- ddd) Procure and subsequently manage the Architectural works sub-contractor whose works are under the Architectural Provisional Sum;
- eee) Design, coordination, supply and installation of all ironmongery and associated accessories;
- fff) Design, supply, installation, testing and commissioning of all signage including station, tunnel, pedestrian, cyclist, road and traffic signage;
- ggg) Design, coordination, supply, installation, testing and commissioning of water services, irrigation system, fire hydrant system, sewerage and sanitary, plumbing works, station and tunnel drainage, sump pumping systems and all pumping systems for the station and tunnels. The Authority will appoint a SWC for the supply and installation of Water Handling Equipment (WHE) for station and tunnels;
- hhh) Provision of seepage holding tank(s) as required for water seepage and tunnel washing;
- iii) Design, coordination, supply, installation, testing, and commissioning of Platform Touch Voltage Membrane protection system and equipotential bonding;
- jjj) Design, coordination, supply, installation, testing, and commissioning of earthing system including earth mat in accordance to the Civil Design Criteria (CDC). The design shall be submitted to the Engineer for acceptance before taking delivery and installation of the earthing system;
- kkk) Design, coordination, supply, and installation of cable containment/cable support system for earthing cables. The design shall be submitted to the Engineer for acceptance before delivery and installation of the cable containment;
- III) Design, coordination, supply, installation, testing, and commissioning of stray current corrosion protection electrodes, insulating sleeves and pipe spool at Public Utilities Board (PUB) meter. The Contractor shall ensure that the stray current corrosion protection electrodes are installed and tested prior to the commencement of Track Related Installation Programme (TRIP);

- mmm) Design, supply, coordination, installation, and testing of temporary and permanent lifting and pulling facilities (e.g. overhead runway beams, eye bolts, lifting hooks, pulling hooks, lifting beams and chain blocks) including submission of valid MOM lifting appliance certificates with PE endorsement to the Engineer prior to equipment delivery and handover to the operators;
- nnn) Coordinate with the System-wide Contractors (SWCs) to provide recesses, openings, cast-in items, etc. for housing of E&M system and E&M services equipment. Coordinate with SWCs to provide multi-cable transit (MCT) as per CD Shelter Requirement.
- ooo) Installation of tunnel brackets, inserts and supports in station trainway and tunnels, supplied by SWCs, including Temporary Tunnel Ventilation System (TTVS);
- ppp) Provision of temporary access openings from ground level, including sealing up and making good after use, for SWC delivery of material, plant and equipment to the trainway and other areas of the station and tunnels;
- qqq) Provision of temporary sleeves and accesses from ground to track level for trackwork concreting including sealing up and making good after use;
- rrr) Design, construction and completion of manholes, inspection chambers, sump pits and chambers pits and laying of services pipes and ducts leading to the station and tunnels as shown on plumbing and drainage, E&M and utilities drawings, which include sewer, watermain and telecom, etc. All relevant submission and approval charges imposed by the respective agencies shall be borne by the Contractor;
- sss) Design, construction, completion and handover of commuter facilities including, but not limited to, bus-shelters, First-Last-Mile (FLM) schemes (e.g. footpaths, cycling paths and covered linkways, taxi-stands, pick-up/drop-off (PUDO) points, rain shelters, bicycle parks, OG boxes, advertising panels/signage), and all associated civil and architectural works and relevant building services (e.g. power, lighting and lightning protection and testing and commissioning). The Contractor shall provide services of the PE and Licensed Electrical Worker (LEW) of appropriate grade for the design, provision, construction, supervision, testing and commissioning of E&M works. Refer to **Appendix AN** of the Particular Specification for the requirements on the provision of FLM;

- ttt) Design and construction of bicycle parks and handover of bicycle parks to the relevant maintenance party;
- uuu) Design and provide the required civil provisions for the PV (Photovoltaic) System at all station's entrances and at-grade structures including RC and metal roofs. The Contractor shall coordinate with the Authority's E&M Consultant and SWC on the PV System requirements. The Contractor shall ensure that the station's design arising from the PV system complies with the latest prevailing Code of Practice for Fire Precautions in Rapid Transit Systems (CPFPRTS);
- vvv) Design and provide green roofs at the station's entrances;
- www) Coordinate with Singapore Civil Defence Force (SCDF) for the provision and/or relocation of the public and private fire hydrants to locations acceptable by SCDF;
- xxx) Installation of cast-in channel for platform screen door (PSD) supplied by SWC using the survey control points with respect to the design track centre line. The Contractor shall carry out his own independent survey to verify the as-built of the design track centre line. The Contractor shall coordinate with the Trackwork SWC and PSD SWC to inspect the track centre line to their satisfaction before casting of the channel to meet the tolerance of the installation of PSD;
- yyy) Provision of facilities for the Authority's Enhanced Security contractor in accordance with **Clause 13** of the Particular Specification;
- zzz) Subsequent to the issuance of a Temporary Fire Permit (TFP), the Fire Protection System will be armed. The Contractor shall provide the necessary trained manpower which may be part of his security personnel to man the Fire Detection/Protection System in order to monitor the fire safety of the related tunnel sections/stations 24 hours daily and to activate SCDF when necessary;
- aaaa) The Contractor shall design, coordinate and carry out reinstatement works and commuters' facilities within areas of affected by his Works in accordance with the relevant authorities' requirements. The Contractor shall carry out a precondition survey of all existing facilities to record their existing condition for purpose of permanent reinstatement. Both soft and hard copies of the survey report shall be submitted to the Engineer and property owner. The Contractor shall be fully responsible for the reinstatement, including design and consultation, coordination, construction and handover to the property owners' acceptance;

- bbbb) The Contractor shall carry out and make provisions for all other works and services necessary, ancillary or related to the Completion of the Whole of the Works (CWW) in accordance with the Authority's Requirements and relevant authorities' requirements;
- cccc) The Contractor shall be responsible for the design, submissions and obtaining the necessary approvals for all the Works from the Engineer and relevant authorities/agencies;
- dddd) Notwithstanding provisions to the contract, the Contractor shall engage and provide all necessary Professional Engineers (PE), and Qualified Persons (QP) required to complete the Works. In particular, the Contractor shall provide:
- QP (Design)
  - QP (Geotechnical)
  - QP (Architecture)
  - QP (Electrical)
  - QP (Mechanical)
  - QP Consultant
  - Design for Safety Professional
  - QP / PE / LEW / Licensed plumber for supervision of water services, sanitary, sewerage and drainage systems, electrical, and mechanical services for the Works
  - Qualified Erosion Control Professional (QECP)
  - QP/PE/LEW/Licensed plumber for supervision of water services, sanitary, sewerage and drainage systems, electrical, and mechanical services for the Contractor's scope of Works
  - Qualified Erosion Control Professional (QECP)
- eeee) The Contractor shall ensure that all requirements in relation to the Civil Defence Status are complied with based on the Civil Defence Technical Requirement (CDTR) of **Appendix AL** of the Particular Specification;

- ffff) The Contractor shall carry out pre- and post-construction condition survey of existing structures and properties within the zone of influence of the Works as identified in **Appendix E** of the Particular Specification and produce the associated visual inspection reports;
- gggg) The Contractor shall carry out impact assessments and settlement analyses of the adjacent structures and utilities based on his Works, detailed construction method and Temporary Works design for the Works;
- hhhh) The Contractor shall design, build, operate, and maintain a ground water control system, including but not limited to recharge wells to control the groundwater drawdown and relief wells to control the hydraulic uplift. The minimum requirements for recharge wells are shown in the Authority's Drawings. The Contractor shall note that additional installations may be required at stakeholder properties arising from site conditions or as requested by the Engineer. The Contractor shall take full responsibility for the provision of the groundwater control system and all associated costs including all water usage, and/or utility charges, design, supply, installation, operation, maintenance, removal, and any additional installations required shall be deemed included in the Contract Price;
- iiii) The Contractor shall plan, interpret and analyse instrumentation monitoring readings, propose and implement necessary preventive, rectification, strengthening and protective measures to safeguard the existing structures in the vicinity of the Works;
- jjjj) The Contractor shall engage an arborist to carry out the survey and identification of all existing trees in the vicinity of the Works including trees affected by the Works. The arborist shall also propose protection measures to prevent trees within the worksite from uprooting;
- kkkk) The Contractor shall carry out topographical survey for the Works;
- llll) The Contractor shall carry out preservation, protection, maintenance and repair of existing trees / shrubs not marked for felling but within the works area, pruning of affected trees / shrubs, transplanting of affected trees to any locations within Singapore, felling and removal of trees / shrubs affected by the Works with the approval of NParks and/or any relevant parties and acceptance of the Engineer. Trees shall only be removed immediately prior to commencement of the works in that particular area;

- mmmm) The Contractor shall coordinate with and provide safe access and attendance to Interfacing Contractors;
- nnnn) The Contractor shall plan and complete the Works so as to meet the keydates in **Appendix B** of the Particular Specification. All necessary controlling and mitigating measures are to be implemented by the Contractor to ensure that all the key dates are met;
- oooo) The Contractor shall coordinate with the SWCs and provide recesses, openings, cast-in items etc. for housing of E&M system and E&M services equipment;
- pppp) The Contractor shall coordinate with the SWCs and provide facilities for safe access for delivery and installation of E&M systems and services equipment. The Contractor's design shall allow for the equipment loading along the delivery/replacement routes and Contractor shall design and install lifting hooks and beam, etc.;
- qqqq) The Contractor shall provide all necessary attendance, including coordination with all relevant parties for all inspections as required, submit all necessary documentation, etc, to facilitate the QPs and Registered Inspectors (RI) in obtaining TFP(s) and Temporary Occupation Permit(s) (TOP) and Certificate of Statutory Completion (CSC), Green Mark, buildability, handover inspections etc.;
- rrrr) The Contractor shall provide all necessary attendance to the Qualified Person (Supervision) (QP(S)), Accredited Checker (AC) and Registered Inspectors (RI) such as provision of drawings, calculations and other documents required by QP(S), AC and RI to carry out their statutory and contractual duties;
- ssss) The Contractor shall obtain TOP and Fire Safety Certificate (in advance of Commencement of Trial Operation) and obtain a Certificate of Statutory Completion. The Contractor shall provide all necessary services including co-ordination with other parties, preparation and submission of as-built architectural plans, as-built structural plans and as-built foundation records to the Building and Construction Authority, the Authority and the Operator. The Contractor and his QP (Architectural)/ QP(D) shall lead and co-ordinate the process;

- tttt) The Contractor shall comply with the requirements/conditions of Master Plan Committee (MPC) and to prepare submission plans to regularise the railway area and road reserve, if changes to the approved railway area and road reserve are necessary as a result of the Contractor's design development or if instructed by the Engineer;
- uuuu) The Contractor shall design and secure approval from URA for any incidental spaces in stations or created as a result of excavation work. Any sealed space shall be either backfilled or opened up to the adjacent area or treated in accordance with the Authority's requirements to facilitate ease of maintenance;
- vvvv) Installation of Overhead Conductor Rail (OCR) shall be under the scope of OCR Contractor. The Contractor shall coordinate with OCR Contractor on the requirement and provide all necessary information including the longitudinal cross-section and re-bar details of the station box etc. to facilitate the OCR Contractor in the design and installation of OCR;
- www) The Contractor shall prepare a Co-ordinated Installation Programme (CIP) and all other scheduling requirements as stated in the General Specification;
- xxxx) The Contractor shall coordinate with SWCs and ensure that the designated routes are adequate for the delivery and future replacement/ removal of the E&M equipment for the MRT.
- yyyy) The Contractor shall prepare Preliminary, Pre-Final, Final and Updated Final Design, As-Built, Asset Information and Coordinated Combined Services Models (CCSM) using BIM software, and provision of BIM facilities as required by **Clause 21** of the Particular Specification;
- zzzz) The Contractor shall coordinate with the E&M System-wide Interfacing Parties and comply with the requirements of BCA Green Mark. The Contractor shall incorporate in his design to achieve a minimum BCA Green Mark Platinum Rating Certification. The Contractor shall submit his design for both BCA Green Mark compliance and BCA Green Mark Certification. The cost for both BCA Green Mark compliance and BCA Green Mark Certification shall be deemed included in the Contract Price;

- aaaaa) The Contractor shall attend regular Work Train meetings to liaise with the Works Train office to apply the necessary permits to work and/or access within the trackways and defined areas once these are handed over to the Trackwork contractor. The Contractor shall provide attendance for the TFP, TOP, Civil Defence Notice of Acceptance (CD NOA), CSC inspections, handing over to the Operator and all related inspections by the authorities. The Contractor shall apply and obtain permits from Works Train for the access to the trainway and defined areas for these inspections;
- bbbbb) The Contractor shall provide support to the Authority for Public Relations matters as per requirements in the **Clause 37** of the General Specification;
- ccccc) The Contractor shall adopt BIM and implement BIM processes in providing and delivering the design services;
- ddddd) The Contractor shall develop the Asset Information Model (AIM) as stipulated in the BIM specification;
- eeeee) The Contractor shall provide all relevant documentation and information required in **Clause 10** of the Particular Specification as part of LTA cycling path gazetting and bicycle park geo-fencing requirements; and
- fffff) The Contractor shall complete all other works and services necessary, ancillary or related to CWW of the Works in accordance with the Authority's Requirements.
- ggggg) All public staircases shall have lighting integrated in child's railing handle. The Contractor shall provide railing handle with channels to mount and secure the recessed LED light fittings. Railing handle shall have removable cover plate at cable connection point to each LED light fitting. The Contractor shall provide balustrade with removable cover plate for cable routing to the LED drivers located remotely from the staircases. Space provision shall be provided to conceal the remote LED drivers. The Contractor shall coordinate with the SWCs on the above requirements.

2.1.3 The brief description of the Works included in this Contract given above is for guidance only. The Contractor shall be solely and fully responsible to investigate and ensure that the actual extent and nature of the Works in this Contract are understood prior to the submission of his Tender.



- 2.1.4 The Contractor shall complete all other works and services necessary, ancillary or related to the CWW in accordance with the Authority's Requirements.

## **2.2 Instrumentation and Monitoring Works**

- 2.2.1 The Authority will engage a specialist Instrumentation and Monitoring Contractor (IMC). The Contractor shall refer to **Clause 14** of the Particular Specification for the requirement.

## **2.3 Qualified Person (Design) (QP(D))**

- 2.3.1 The Contractor shall engage all the required QP(D) for the design of all disciplines including Architectural, Civil and Structural, Geotechnical, Electrical and Mechanical works as required for all necessary statutory approvals and permits for the Works.

- 2.3.2 The Contractor's QP(D) shall liaise with the QP(S) to resolve all technical issues to the satisfaction of the QP(S) and to the acceptance of the Engineer. The Contractor is not entitled to any time extension and/or cost for complying with the QP(S)'s requirements and any delay in the resolution of the technical issues. The Contractor shall ensure his QP(D) or QP(Geotechnical) where applicable is responsible for civil and structure, geotechnical design, rail alignment check that all CDC, Materials & Workmanship Specification for Civil & Structural Works are complied with.

- 2.3.3 The Contractor and his QP(D) shall attend meetings with the BCA and other agencies on design and/or construction matters relating to the Works.

- 2.3.4 The Contractor shall coordinate with the E&M System-Wide Interfacing Parties and comply with the requirements of BCA Green Mark. The Contractor shall incorporate in his design to achieve a minimum BCA Green Mark certification. The Contractor shall submit his design for both BCA Green Mark compliance and BCA Green Mark Certification. The cost for both BCA Green Mark compliance and BCA Green Mark Certification shall be deemed included in the Contract Price.

## **2.4 Qualified Person (Supervision) (QP(S)) – Civil**

- 2.4.1 The Authority will appoint under a separate contract a QP(S) as required by the Building Control Act and Building Control Regulations. However, the Contractor shall engage his own QP / PE / LEW / Licensed Plumber for supervision of water services, sanitary works, sewerage and drainage systems, and electrical and mechanical services.

- 2.4.2 Notwithstanding the above appointment, nothing in this clause shall limit or absolve the Contractor's duties and responsibilities in the areas of design and supervision during the execution of the Works as required under the Contract and **Clause 16.1** of the Conditions of Contract specifically.
- 2.4.3 The Contractor shall provide access and support to the QP(S) and his team to carry out their duties.
- 2.4.4 Prior to the commencement of the Permanent and Temporary Works, the Contractor shall prepare plans, drawings, and all necessary design calculations of the Permanent and Temporary Works and submit them to the QP(S) and the Engineer for acceptance. Notwithstanding the submission sets requirements stipulated in the General Specification, the Contractor shall submit two (2) additional sets of all approved drawings directly to the QP(S).
- 2.4.5 The Contractor shall use BIM software to produce shop drawings to identify clashes and use it for construction on site. The Contractor shall furnish the relevant BIM model for QP(S) prior site inspection. The Contractor shall take note that any Request for Inspection (RFI) put forward to the QP(S) may have to be submitted through the internet/WiFi directly to the QP(S) and his team. The Contractor shall submit his RFI together with all necessary documentation online and QP(S) shall grant his approval online after the inspection with conditions for the Contractor to comply.
- 2.4.6 The Contractor and his QP(D) shall liaise with the QP(S) to resolve all site related and technical issues to the satisfaction of the QP(S) and to the acceptance of the Engineer. The Contractor is not entitled to any time extension and/or cost for any delay in the resolution of the site related and technical issues.
- 2.5 Qualified Person for Architectural, Specialist and Proprietary Works [QP(Architecture)]**
- 2.5.1 The Contractor shall engage his own QP to carry out the design, statutory submissions, and supervision of all architectural, specialist and proprietary works, including fixtures, as required under BCA Regulations and **Clause 9** of the Particular Specification.
- 2.5.2 The QP(Architecture) shall be the same QP to carry out both the design and supervision of the Works. He shall be supported by Senior Architect, Resident Architect and Resident Technical Officer (Architecture). The Contractor shall ensure appropriate continuous Architectural services from inception and until the end of the Defects Liability Period.

2.5.3 The QP(D) for architectural works is required to appoint at least one (1) Project Coordinator (Architecture) with two Resident Architects and two Resident Technical Officers providing site supervision for all the architectural works and fire safety works (fire safety measures) from commencement of architectural works till CWW. Project Coordinator (Architecture) shall work closely with the Authority's architects in reviewing and recommending approval of all architectural mock up and material sample submission, as well as architectural works on site to the Engineer's acceptance.

2.5.4 The QP(Architecture) shall periodically inspect the Works on site to satisfy his statutory duties under the Building Control Act and Fire Safety Act respectively. He shall sign off the Certificate of Supervision for the architectural works and Fire Safety Works (Fire Safety Measures) for the Facility Building which is required for the application for and to obtain TFP or TOP. The QP to supervise the architectural works and fire safety works (fire safety measures) shall be the same person as the QP who prepared and endorsed the submission plans of the Works.

## **2.6 Accredited Checker (AC)**

2.6.1 Without absolving the Contractor's design duties and responsibilities under Contract in general and **Clause 9.5** of the Conditions of Contract specifically, the Authority will appoint under a separate contract, an AC as required by the Building Control Act and the Building Control Regulations to check the Temporary and Permanent Works.

2.6.2 The Contractor shall prepare Approval In Principle (AIP) documents, plans, drawings and all necessary design calculations of Temporary and Permanent Works and submit them to the AC for checking at each stage of the design as indicated in **Appendix I** of the General Specification. The Contractor and his QP(D) shall liaise with the AC to resolve all technical issues expeditiously to the satisfaction of the AC. The Contractor is not entitled to any time extension and/or cost for complying to the AC's requirements and any delay in the resolution of the technical issues.

- 2.6.3 The AC will carry out checks on the Contractor's design up to the stage of submission and approval of the design by BCA, up to and inclusive of TOP and CSC. Subsequently to this, the Contractor shall pay for any checking services required from the AC for changes made by the Contractor under any amendment submissions to BCA up to and inclusive of TOP and CSC. The additional checking services required of the AC payable by the Contractor shall include submissions of changes to the Temporary and Permanent Works made by the QP(D) to BCA. Changes include any amendments or changes to any designs, plans or concepts, additional designs, plans or concepts drawn up, created or made by the Contractor. The additional checking services shall be paid for by the Authority and recovered from the Contractor inclusive of 15% administrative fees.

## **2.7 Registered Inspectors (RI)**

- 2.7.1 RIs will be engaged by the Authority for both Architectural and E&M Works in compliance with the Fire Safety Act. The Contractor shall provide all attendances required by the RIs.
- 2.7.2 Additional works required as a result of the RI inspections shall be deemed included in the Contract Price. Additional fire safety works required arising from RI inspections to comply with Code of Practice for Fire Precautions in Rapid Transit Systems and requirements of the SCDF shall be deemed included in the Contract Price. Any additional fire safety works required shall not provide a basis for claim for time extension or additional costs and expenses.
- 2.7.3 The Contractor shall be responsible for obtaining all the necessary permits and certificates of occupation. The Contractor shall also ensure that all necessary reports are submitted to SCDF to secure the Fire Safety Certificate for the Authority.
- 2.7.4 The Contractor and his QP(D) shall liaise with the RI to resolve all issues expeditiously to the satisfaction of the RI. The Contractor is not entitled to any time extension and/or cost for complying to the RI's requirements and any delay in the resolution of the issues.
- 2.7.5 The Contractor shall submit hardcopy and softcopy of the relevant documents including as-built drawings to SCDF and obtain timely approval.

**2.8 Landscape Consultant cum Arborist**

- 2.8.1 The Contractor shall engage a Landscape Consultant cum Arborist to coordinate with the relevant authorities such as NParks, on the requirements for landscape, streetscape works and planting requirements around the station.
- 2.8.2 The Contractor shall design, construct and install all associated works, including planting strips, irrigation system, lighting, etc. as coordinated by the Landscape Consultant cum Arborist and as directed by NParks.
- 2.8.3 The Contractor shall submit Arborist reports as and when required by the relevant authorities.

**2.9 Licensed Electrical Worker (LEW) for Temporary Power Supply Installations**

- 2.9.1 The Contractor shall engage an engineer grade LEW to carry out and endorse the design, installation, testing and commissioning of all temporary power supply pertaining to this Contract.
- 2.9.2 All design, installation, testing and commissioning works of the temporary power supply installation shall be carried out and endorsed by the LEW.
- 2.9.3 The LEW shall witness all Factory Acceptance Test (FAT) and Site Acceptance Test (SAT) of the temporary power supply equipment. Reports for the FAT and SAT shall be duly endorsed by the LEW.
- 2.9.4 The LEW shall formulate the necessary maintenance plan and checklist to carry out regular inspection on all the temporary power supply installation monthly. Inspection report shall be prepared and submitted to the Authority after each inspection, highlighting any non-conformity and all rectification works necessary including those that require immediate action by the Contractor. All maintenance records shall be duly endorsed by the LEW.