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, geotechnical, architectural, plumbing, drainage, sewerage, 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 and all other interface activities 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 (POB) 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, prior to the removal of existing POB;

l) Remove and replace the existing SIM/SUSS canopy shelter connecting the existing POB to SUSS and other associated structures. 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.

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, buildings and nearby ecologically sensitive site;

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 and muck pit 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 initial drive.

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;

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;

lll) 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);

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 and nearby ecologically sensitive site 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;

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

hhhhh) Investigate, identify and divert all utilities and services located within the area of proposed Entrance 2 worksite for his works. The Contractor shall coordinate with SIM and identify a feasible corridor for the permanent diversion of services and utilities that serve SIM. The Contractor shall ensure no disruption to services and utilities during his diversion works;

iiiii) The Contractor shall design and construct a high covered pedestrian crossing connecting Entrance 2 across SIM access road. The Contractor shall carry out traffic survey and impact assessment on the existing traffic and pedestrian flow to determine the type of pedestrian crossing to be provided. The Contractor shall coordinate with and obtain approval from the Authority's Traffic Schemes Design Development (TSDD) and other relevant authorities for design of the pedestrian crossing proposed. The Contractor is deemed to have included all necessary civil works in his Contract price inclusive of the incorporation of horizontal and vertical gradient tie-in for access road to SIM, cycling path, landscaping and adjacent private properties structures/facilities if required.

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 and included 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.

2.1.5 The Contractor shall be responsible to carry out all associated checks and studies on damage assessment of nearby structures that are affected by his ERSS or GBW design as per requirements in the LTA Civil Design Criteria. The Contractor shall ensure he provides all necessary measures to ensure the integrity and stability of all structures are not compromised by his proposed ERSS or GBW design at his own cost.

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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.

2.5.3 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 Station and Tunnels 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.