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4. CONTRACTOR'S TEAM QUALIFICATIONS

4.1 ORGANISATION CHART

- 4.1.1 The Contractor shall submit an organization chart of the Contractor's proposed project team within one (1) month from Award of the Contract for the Engineer's acceptance. The Contractor's proposed organization chart submitted during Tender shall be adhered to. Any deviations from proposed organization chart submitted during Tender shall be subjected to Engineer's acceptance. The lines of reporting and responsibilities of all the key personnel and how they are to be supported shall be clearly identified in the organization chart.
- 4.1.2 Any proposed changes in key personnel / composition of the various professional disciplines shall be submitted to the Engineer for acceptance and the approved organization chart to be updated promptly. The Engineer reserves the right to require the Contractor to substitute the proposed appointed consultants.
- 4.1.3 The Contractor shall submit resource planning information monthly for the whole for the duration of the Contract.
- 4.1.4 The Contractor shall submit curriculum vitae (CV) with photos of the management, key positions for architectural and engineering personnel, including Professional Engineers (PEs) and Qualified Persons (QPs) involved in the design and supervision of the Works, to the Engineer for acceptance.
- 4.1.5 The Contractor shall employ adequate numbers and suitable levels of competent staff with relevant work experience to provide the required level of expertise, subject to the Engineer's acceptance, to complete the Works in a safe and professional manner. These requirements shall also apply in the event the Contractor has to engage staff to carry out shift works.

4.2 KEY PERSONNEL AND THEIR QUALIFICATIONS

- 4.2.1 Key personnel engaged by the Contractor to carry out the Works within this Contract shall be based full time on Site and exclusively for the project unless otherwise stated.

- 4.2.2 The Contractor shall note that all personnel listed under Clause 4.2.3 are full time and shall only be permitted to perform a single role/appointment unless otherwise accepted by the Engineer. All personnel shall not be deployed in other projects. As part of the transition towards competency-based procurement, BCA has launched accreditation schemes under the Skills Framework for Built Environment for Project Management, Construction Management, Quantity Surveyor, Facilities Management and Digital Delivery Management. Accredited personnel can be proposed to the Engineer for acceptance if such personnel fits into the positions described below. However, in the event there are discrepancies in terms of qualifications between BCA's accreditation schemes and what are prescribed below, the more onerous shall apply.
- 4.2.3 The key project staff shall include but not be limited to the following:

POSITION	QUALIFICATIONS
Project Director	<p>Minimum 15 years of engineering experience with Degree in Civil Engineering recognised by the PE Board or qualification acceptable to the Commissioner of Building Control as eligible for application as a Resident Engineer or recognised Degree in the relevant field subject to the acceptance of the Engineer, and at least 10 years of experience in managing civil and infrastructure design and construction teams for projects of similar scale, complexity and nature of work.</p> <p>The Project Director shall be dedicated to work in one contract only and he shall not be involved in another rail project.</p>
Project Manager	<p>Minimum 12 years of engineering experience with Degree in Civil Engineering recognised by the PE Board or qualification acceptable to the Commissioner of Building Control as eligible for application as a Resident Engineer or Recognised Degree in the relevant field subject to the acceptance of the Engineer, and at least 8 years of experience in managing civil and infrastructure design and construction teams for projects of similar scale, complexity and nature of work.</p>
Construction Manager	<p>Minimum 10 years of engineering experience with Degree in Civil Engineering recognised by the PE Board or qualification acceptable to the Commissioner of Building Control as eligible for application as a Resident Engineer or Recognised Degree in the relevant field subject to the acceptance of the Engineer, and at least 5 years of experience in managing civil and infrastructure construction work for projects of similar scale, complexity and nature of work.</p>
Design Manager	<p>Minimum 12 years of engineering experience with Degree in Civil Engineering recognised by the PE Board or qualification acceptable to the Commissioner of Building Control as eligible for application as a Resident Engineer or recognised Degree in the relevant field subject to the acceptance of the Engineer, and at least 8 years of experience in the design of civil and infrastructure project structures for projects of similar scale, complexity and nature of work.</p>

POSITION	QUALIFICATIONS
Coordination Manager	<p>Minimum 8 years of engineering experience with a recognised Engineering Degree, and at least 5 years of experience in managing Civil & Structure, Architectural and/or E&M Building Services works for projects of similar scale, complexity and nature of work.</p> <p>Experienced in managing interfaces for design and construction of transit projects; having full understanding of the design and approval process as well as BCA TFP/TOP process.</p> <p>The Coordination Manager shall take charge of all coordination works of civil, structural, architectural and SWCs; manage project coordination / interface relating to civil/structural, architectural and E&M.</p>
Project Coordinator (Architecture)	Minimum 5 years of experience after tertiary education in relevant architectural field in the construction supervision of architectural works for projects of similar scale, complexity and nature of work.
Project Coordinator (Civil/ Structural)	Minimum 5 years of experience after tertiary education in relevant field in the construction supervision of civil and structural works for projects of similar scale, complexity and nature of work.
Project Coordinator (E&M)	Minimum 5 years of experience after tertiary education in relevant field in the construction supervision of E&M building services works for projects of similar scale, complexity and nature of work.
Senior Engineer (Civil/ Structural)	Minimum 8 years of engineering experience with Degree in Civil Engineering recognised by the PE Board or qualification acceptable to the Commissioner of Building Control as eligible for application as a Resident Engineer or recognised Degree in the relevant field subject to the acceptance of the Engineer, and at least 5 years of experience in the construction supervision for projects of similar scale, complexity and nature of work.

POSITION	QUALIFICATIONS
Senior Engineer (Electrical/ Mechanical)	Minimum 8 years of engineering experience with recognised Degree in relevant field, and at least 5 years of experience in the construction supervision of E&M work for projects of similar scale, complexity and nature of work.
Senior Engineer (Geotechnical)	Minimum 8 years of geotechnical engineering experience with Degree in Civil Engineering recognised by the PE Board or qualification acceptable to the Commissioner of Building Control as eligible for application as a Resident Engineer or recognised Degree in the relevant field subject to the acceptance of the Engineer, and at least 5 years of experience in the design and construction supervision of geotechnical work for projects of similar scale, complexity and nature of work.
Quality Assurance/ Quality Control (QA/QC) Engineer	Minimum 5 years of experience in concrete technology, inspection, quality control and quality assurance procedures related to the production of high quality pre-cast reinforced concrete products.
Registered Surveyor (Part-time)	Registered under the Land Surveyors Act, with working experience relevant to the scope of works of the Contract.
Resident Surveyor	Diploma in Land Surveying and with 8 years of working experience relevant to the scope of works of Contract.
Senior Public Relations Officer	Please refer to qualification requirement as specified in General Specification.
Quality Management Representative	Minimum 5 years of relevant engineering experience for projects of similar scale, complexity and nature of work.
Workplace Safety and Health Officers (WSHO)	Please refer to qualification requirement as specified in Appendix A of General Specification. The Contractor shall provide WSHO who have tunnelling experience to supervise tunnelling works.

POSITION	QUALIFICATIONS
Workplace Safety and Health Coordinators (WSHC)	Please refer to qualification requirement as specified in Appendix A of General Specification. The Contractor shall provide WSHC who have tunnelling experience to supervise tunnelling works.
Environmental Control Officer (ECO)	Please refer to qualification requirement as specified in Appendix A of General Specification.
Licensed Electrical Worker	Minimum 3 years of relevant experience.
Licensed Cable Detection Worker (Part-time)	Minimum of 3 years of relevant experience.
Lifting Engineer	Please refer to qualification requirement as specified in Appendix A of General Specification.
Utility Engineer	Minimum 5 years of engineering experience in the relevant field, and at least 2 years of experience in the coordination with utility agencies for projects of similar scale, complexity and nature of work.
Design for Safety Professional (DfS Professional)/ Risk Management Facilitator (RMF)	Please refer to qualification requirement as specified in Appendix A of General Specification.
Planning and Programming Engineer	Minimum 5 years of experience in construction planning and programme coordination for infrastructure projects. Competent in the use of Primavera or any other stipulated scheduling software to develop, track and monitor the programme.

POSITION	QUALIFICATIONS
Traffic Engineer/ Consultant (Part-time)	Minimum 8 years of working experience in the design and/or construction of road or transportation projects and trained in the field of Road and Transportation Engineering.

4.2.4 The tunnel key personnel shall include:

POSITION	QUALIFICATIONS
Tunnel Manager	Minimum 12 years of tunnelling experience after tertiary education with recognised Degree in the relevant field, and at least 10 years of experience in managing tunnelling works of similar scale, complexity and ground condition.
Tunnel E&M Manager	Minimum 12 years of engineering experience with recognised Degree in the relevant field, and at least 10 years of experience in managing tunnelling E&M works of similar scale, complexity and nature of work.
Deputy Tunnel Manager	Minimum 10 years of tunnelling experience after tertiary education in relevant field, with at least 8 years of experience in managing tunnelling works of similar scale, complexity and ground condition.
Senior Tunnel Engineer	Minimum 8 years of engineering experience after tertiary education in relevant field, with at least 5 years of experience in construction supervision of tunnelling works of similar scale, complexity and nature of work.
Tunnel Engineer	Minimum 5 years of engineering experience after tertiary education in relevant field, with at least 3 years of experience in construction supervision of tunnelling works of similar scale, complexity and nature of work.
Tunnel Foremen	Minimum 10 years of experience in in the tunnelling supervision for projects of similar scale, complexity and nature of work.
Tunnel Geologist	Minimum 5 years of experience after tertiary education as tunnel geologist, with knowledge on face mapping and muck reconciliation. This personnel shall be medically fit for compressed air works.

POSITION	QUALIFICATIONS
TBM Operator	Minimum 5 years of experience in similar TBM operation.

4.2.5 The key BIM staff shall include but not be limited to the following:

POSITION	QUALIFICATIONS
BIM Manager	<p>Degree or Diploma in Electrical, Mechanical or Building Services, Architectural or Structural Engineering with at least 8 years of working experience in construction, design, BIM modelling, BIM implementation management and / or coordination (services).</p> <p>Conversant in using one of the BIM coordination software such as Navisworks Manage, Solibri Office, VRCollab, Navigator, etc. for clash detection analysis.</p> <p>Conversant in using any of the 4D BIM and 5D BIM software such as Navisworks Manage, Solibri Office, Synchro Pro, Fuzor, CostX, Cubicost, etc. for both 4D BIM and 5D BIM related deliverables.</p> <p>Formally trained in BCA Academy's Specialist Diploma in Building Information Modelling (BIM) with any BIM authoring software certification certified by software vendor's authorised training provider. A certified Digital Delivery Lead would be an advantage.</p> <p>Preferably with at least 6 years of BIM experience as a BIM Manager role in project related BIM management and / or services coordination in a design engineering or construction firm for a large project and has completed one full project cycle at design phase or construction phase.</p>

POSITION	QUALIFICATIONS
BIM Coordinators	<p>Degree or Diploma in Electrical, Mechanical or Building Services, Architectural or Structural Engineering with at least 6 years of working experience in construction, design, BIM modelling, BIM implementation management and / or coordination (services).</p> <p>Conversant in using one of the BIM coordination software such as Navisworks Manage, Solibri Office, VRCollab, Navigator, etc. for clash detection analysis.</p> <p>Formally trained in BCA Academy's Specialist Diploma in Building Information Modelling (BIM) or BCA Academy's BIM Management certification with any BIM authoring software certification certified by software vendor's authorised training provider. A certified Digital Delivery Specialist would be an advantage.</p> <p>Preferably with at least 5 years of BIM experience as a BIM Coordinator role in project related BIM management and modelling or services coordination in a design engineering or construction firm for a large project and has completed one full project cycle at design phase or construction phase.</p> <p>The BIM Coordinators shall be trained for each respective discipline for Architecture, Civil & Structure and M&E Services.</p> <p>The BIM Coordinator Architectural shall be the lead coordinator for all disciplines, including SWCs.</p>

- 4.2.6 The Contractor shall provide a design team including but not be limited to the following key staff:

POSITION	QUALIFICATIONS
QP(Design)	Professional status with recognised Degree in relevant field and minimum 10 years of experience in the design and construction supervision for projects of similar scale, complexity and nature of work.
QP(Geo)	Professional status with recognised Degree in relevant field and minimum 10 years of experience in the design and construction supervision for projects of similar scale, complexity and nature of work.
PE (Electrical) / PE (Mechanical)	Professional status with recognised Degree in relevant field and minimum 10 years of experience in the design and construction supervision of E&M building services for projects of similar scale, complexity and nature of work.
Geotechnical Team Leader	Minimum 8 years of geotechnical engineering experience with recognised Degree in relevant field and at least 5 years of experience in the design for projects of similar scale, complexity and nature of work.
Civil/Structural Team Leader	Minimum 8 years of engineering experience with recognised Degree in relevant field and at least 5 years of experience in the design for projects of similar scale, complexity and nature of work.
E & M Team Leader	Minimum 8 years of E&M building services engineering experience with recognised Degree in relevant field and at least 5 years of experience in the design of E&M building services, projects of similar scale, complexity and nature of work.
Senior Rail Alignment Engineer	<p>Minimum of 8 years of rail alignment design experience after tertiary education. Extensive relevant job experience in alignment design (plain line, switch & crossing and clearance analysis) of railway track infrastructure projects is required.</p> <p>Expertise in the use of rail track design software will be necessary. A demonstrated ability to develop and design 3D track alignments for railway or mass rapid transit system. Demonstrate competency on modelling ability in GIS and BIM is preferred.</p>

POSITION	QUALIFICATIONS
	Good knowledge of railway operation practices, permanent way and systems (e.g. drainage, trackform, train power supply system and etc.) is preferred.

4.2.7 The Contractor shall provide architectural team including but not be limited to the following key staff:

POSITION	QUALIFICATIONS
QP (Architecture)	Professional status with Recognised Degree in relevant field and minimum 10 years of experience as an Architect QP in the design, construction, and supervision for projects of similar scale, complexity and nature of work.
Architectural Team Leader	Minimum 10 years of architectural work experience with relevant professional Recognised Degree in relevant field, and at least 5 years of architectural work experience in the design for Rail projects of similar scale, complexity and nature of work in local context.
Senior Architect	Minimum 8 years of architectural work experience with relevant professional Degree and at least 5 years of architectural work experience in the design and construction supervision for projects of similar scale, complexity, and nature of work.
Resident Architect	Minimum 8 years of architectural experience with Recognised Degree in relevant field, and at least 5 years of experience in construction supervision for projects of similar scale and complexity in local context. The Resident Architect shall be dedicated full time on site commencing six (6) months before BSC and until CWW is obtained.
Resident Technical Officer (Architecture)	Minimum 8 years of architectural experience with Recognised Diploma in relevant field, and at least 5 years of experience in construction supervision for projects of similar scale and complexity in local context. The Resident Technical Officers (Architecture) shall be dedicated full time on site commencing six (6) months before BSC and until CWW is obtained.

- 4.2.8 The Contractor shall provide an Environmental team including but not limited to the following key staff with their role defined in the EMMP (**Appendix BD** and **Appendix BE**) and **Clause 23** of the Particular Specification:

POSITION	QUALIFICATIONS
Environmental Consultant (for environmental protection)	<p>At least 10 years of relevant professional experience in developing/conducting EMMP for similar or larger construction projects.</p> <p>Has experience in conducting stakeholder engagement (e.g. with various Agencies, Nature Groups, etc.) as well as setting up and/or evaluating data from camera traps for biodiversity and other environmental monitoring (water, air, noise, vibration) devices.</p>
Environmental Manager (for environmental protection)	<p>At least 5 years of relevant professional experience in conducting EMMP for similar or larger construction projects.</p> <p>A registered ECO with at least 5 years of relevant professional experience in environmental monitoring and auditing works for similar or larger construction projects.</p>
Arborist	<p>International Society of Arboriculture (ISA)-certified.</p> <p>Has previous work experience in developments of similar size or complexity.</p> <p>At least 10 years of professional experience in conducting Environmental Monitoring & Management Planning for arboriculture in local or regional tropical forests with relevant track records.</p>
Arboriculture Contractor	<p>Valid certifications for the following:</p> <ul style="list-style-type: none"> Basic tree climbing certification by CUGE or equivalent WSH-approved training organisation Operation of chainsaw for ground work (LS-MT-103E-1) Chainsaw safety and maintenance (LS-MT-102E-1) Perform formative pruning of young trees (LS-MT-114E-1) Provide Arboriculture support on site (LS-MT-116E-1) Workplace safety and health – operators (ES-WSH-101G-1) Respond to Emergency (LS-HM-208E-1)

POSITION	QUALIFICATIONS
	<p>Perform advance rigging and climbing techniques (LS-HM-308S-1)</p> <p>Perform aerial tree access and aerial rescue skills (LS-HM-204S-1)</p> <p>Implement and apply appropriate risk and safety management to sector practices (LS-BP-301S-1)</p> <p>Prepare risk assessment report (LS-HM-406S-1)</p> <p>Operate and work from an elevated work platform (CUGE-ARB-3501)</p>
Flora Specialist	Qualified Flora Specialist with at least 5 years of experience implementing Flora Management Plans at construction sites.
Ecologist	<p>Degree (or equivalent) in ecology-related fields.</p> <p>At least 5 years of experience implementing EMMP at construction sites.</p> <p>At least 2 valid certifications of the following:</p> <p>Animal Management Professional Certification Programme (PCP) – Basic Module (CUGE-PCP-7006A)</p> <p>Animal Management PCP – Intermediate Elective Module – Mammals (CUGE-PCTP-7006C)</p> <p>Animal Management PCP – Intermediate Elective Module – Reptiles (CUGE-PCP-7006B)</p>
Wildlife Management Contractors	<p>At least 5 years of experience carrying out animal rescue, trapping and transport of large fauna.</p> <p>At least 1 veterinary professional with 5 years of experience within the team.</p> <p>Listed under NParks' public register for certified wildlife management contractors.</p>

- 4.2.9 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 until the end of Defects Liability Period.
- 4.2.10 The QP(Design) shall prepare and endorse on the design of all structural elements of the Works (both temporary and permanent) including structural components relating to the architectural works such as cladding, balustrades/railings, lift frames, structural connections, etc. The QP(Design) shall carry out and obtain all necessary approvals from the BCA and other relevant authorities.
- 4.2.11 The Contractor shall make allowance in his Contract Price for the engagement of PE(Geo) to carry out the geotechnical related designs in compliance with the Building Control Regulations and necessary co-ordination with the Authority's AC(Geo).
- 4.2.12 Professional Status means a Corporate Member of a recognised institution whose function is to regulate professional standards, which are comparable with the standards of established professional bodies in Singapore. The institution shall be acceptable to the Engineer.
- 4.2.13 The appointment of the QP(Design) shall be subject to the Engineer's acceptance. Regardless of any prior acceptance, if the Engineer considers the performance of the QP(Design) to be unsatisfactory, the Contractor shall propose a replacement at his own expense for the acceptance of the Engineer.
- 4.2.14 The Contractor shall appoint the relevant consultants, such as the Landscape Consultant-cum-Arborist, Environmental Consultant, Green Mark Accredited Professional, Acoustic & AV Consultant, Fire/Life Safety Consultant, Pedestrian/Commuter Modeller etc., to facilitate his design and construction of architectural works, including landscaping to achieve the requirements of the Contract and to the satisfaction of the Engineer and the relevant authorities.
- 4.2.15 The consultant to be engaged by the Contractor shall have experience in underground rapid transit system infrastructure design.

4.3 MANPOWER PRODUCTIVITY REQUIREMENTS

4.3.1 General

- 4.3.1.1 The Contractor's attention is drawn to on-going efforts by the Government to restructure Singapore's economy to become more productive and to reduce the dependence on foreign workers. This will encompass further tightening of foreign manpower and adopting mechanization and game-changing technologies to improve construction

productivity. Policy changes regarding the hiring and retaining of better skilled workers will also remain a key priority.

- 4.3.1.2 In addition, the Contractor is to expect increases in foreign workers levy, changes in Dependency Ratio Ceilings (DRC) ratios resulting in decreased Man Year Entitlements (MYEs), restrictions on Work permits/S-Pass/Employment Pass quotas, mandating a minimum proportion of higher skilled workers to be hired at firm level, and upgrading of experienced workers, etc. The Contractor is not entitled to claim for additional payment or delays arising from complying with changed conditions related to such policies. The Contractor shall be deemed to have allowed for such risks in his Tender.
- 4.3.1.3 As part of the Government's efforts to drive productivity improvements, the Contractor shall note the MOM's directive towards raising the quality and skill levels of the workforce and the tightening of labour requirements.
- 4.3.1.4 The Contractor shall comply with the requirements for the engagement of skilled manpower throughout the progress of the Works as stated in this Clause. All costs incurred by the Contractor as a result of its compliance with this Clause shall be deemed included in the Contract Price.

- 4.3.1.5 The Contractor shall, upon approval from the MOM, submit the allocation of Man-Year Entitlement (MYE) for the Contract to the Engineer. The Contractor shall also include their MYE utilization plan as part of their monthly progress report submission and update the utilization plan on a monthly basis. The utilisation plan shall be inclusive of the sub-contractors' manpower for the Contract.
- 4.3.1.6 Any subsequent addition of MYE (either through Works Variations in the Contract instructed by the Engineer or through the Contractor's own application via the MYE Waiver route) shall also be immediately updated and reflected in the revised MYE utilization plan.
- 4.3.1.7 For the purpose of this Clause, reinforced concrete (RC) works ("RC Works") shall refer to cast in-situ RC Permanent Works for the station and cut and cover sections only, and shall exclude diaphragm walls, foundation elements (such as bored piles, barrettes etc.) and all other Temporary Works (such as secant pile walls, contiguous bored pile walls etc.) that are designed to be left-in.
- 4.3.1.8 Notwithstanding Clauses above, the RC Works shall also extend to cast in-situ skin walls and RC strutting elements such as RC walers, struts, deck slabs, etc.
- 4.3.1.9 The Contractor shall also monitor the productivity of RC Works based on trade-level productivity indicators for RC Works (e.g. m³/man-hour for concreting, kg/man-hour for steel reinforcement, m²/man-hour for formwork, etc.) and submit the data to the Engineer on a monthly basis as part of their monthly progress report submission throughout the period of RC Works.
- 4.3.2 Minimum Manpower Requirements - Reinforced Concrete Works
- 4.3.2.1 The Contractor warrants and undertakes that all workers for RC Works including steel bar fixers, carpenters, formwork/falsework workers and concretors etc. ("RC workers") are in compliance with all requirements issued by MOM.
- 4.3.2.2 All RC workers shall be identifiable with the biometric system or equivalent for manpower data collection. The information of RC workers recorded in the biometric system shall be inclusive of but not limited to workers bio-data, trade type, permit type, skills registration classification (i.e. Higher-Skilled workers (R1) or Basic Skilled workers (R2) as defined by MOM) and working hours.
- 4.3.2.3 Three (3) months prior to the commencement of RC Works, the Contractor shall submit up-to-date details of all RC workers employed by the Contractor to the Engineer. These details shall be inclusive of but not limited to worker's bio-data, period of employment in Singapore, skills

registration classification and proof of registration under the BCA CoreTrade or Multi-skilling schemes, if any.

4.3.2.4 The Contractor shall ensure that:

- (a) a minimum of **55%** of all RC workers employed by the Contractor have at least four (4) years of relevant working experience in the construction sector in Singapore; and
- (b) a minimum of **30%** of all RC workers employed by the Contractor are Higher-Skilled workers (R1) as defined by MOM.

4.3.2.5 Within one (1) month after the acceptance of the baseline programme by the Engineer, the Contractor shall submit a detailed monthly Manpower Resource Histogram (MRH) for RC Works based on the accepted baseline programme for the Engineer's acceptance. The MRH shall include the average RC workers per day on a monthly basis throughout the period of RC Works.

4.3.2.6 The Engineer shall conduct assessments at the following four (4) stages, based on the accepted MRH for RC Works, to determine compliance with **Clause 4.3.2.4**:

Assessment	% Completion of RC Works
Stage 1	25%
Stage 2	50%
Stage 3	75%
Stage 4	100%

4.3.2.7 Notwithstanding **Clause 4.3.2.6** above, the Engineer may conduct regular audits from time to time to ensure compliance with **Clause 4.3.2.4**.

4.3.2.8 If the Contractor fails to comply with the requirements specified in **Clause 4.3.2.4**, the Authority shall be entitled to deduct the following amount(s) in **Tables 4.3a** and **4.3b** as assessed by the Engineer from any monies due, or to become due to the Contractor under the Contract. Such deductions shall not relieve the Contractor from his obligations to complete the Works or from any other of his obligations and liabilities under the Contract.

Percentage of RC workers with at least four (4) years of relevant working experience in Singapore	Amount to be deducted
50% ≤ No. of RC workers < 55%	\$22,500 per stage
45% ≤ No. of RC workers < 50%	\$45,000 per stage
No. of RC workers < 45%	\$67,500 per stage

Table 4.3a :- Amount to be Deducted Due to Non-Compliance of **Clause 4.3.2.4 (a)**

Percentage of R1 RC workers	Amount to be deducted
25% ≤ R1 RC workers <30%	\$45,000 per stage
20% ≤ R1 RC workers <25%	\$90,000 per stage
R1 RC workers <20%	\$135,000 per stage

Table 4.3b :- Amount to be Deducted Due to Non-Compliance of **Clause 4.3.2.4 (b)**

- 4.3.2.9 Any failure or delay by the Authority in deducting any amounts under **Clause 4.3.2.8** or the Engineer in making the assessment for deductions under **Clause 4.3.2.8** shall not be construed as a waiver of the requirements under **Clause 4.3.2.4**.
- 4.3.3 Skills Reassessment/Training for Basic Skilled (R2) Workers
- 4.3.3.0 RC workers who are Basic Skilled workers (R2) as defined by MOM, shall be sent for mandatory skills reassessment / training every two (2) years. The skills reassessment / training shall be conducted by the BCA Academy or appointed training and testing centres (ATTCs). For more information on skills reassessment / training and ATTCs, the Contractor may refer to the BCA CoreTrade website. The Contractor shall submit an update to the Engineer on a monthly basis the details of the RC workers who are sent for the skills reassessment/training.
- 4.3.3.1 The Engineer reserves the right to request the Contractor to remove any Basic Skilled workers (R2) who fail to fulfil the requirements stipulated in **Clause 4.3.3.0**.
- 4.3.4 Deductions from Contract Price
- 4.3.4.1 In the event the Contractor does not meet the requirements as specified in **Clauses 4.3.2.4** the Engineer shall, in writing, inform the Contractor of the total sum of deductions at each assessment stage as specified in

Clause 4.3.2.6. The total sum of deductions at each assessment stage shall be deducted from the Contractor's interim payment.

4.3.4.2 The percentage computation carried out at the assessment stages are shown in the following working examples.

Working Examples (Computation at 25% Completion of RC Works)**Computation for RC workers with at least four (4) years of relevant working experience in Singapore**

The planned average number of RC workers deployed per day based on the accepted Manpower Resource Histogram (MRH). <i>Refer to Figure A</i>	= 36
The actual average number of RC workers with at least four (4) years of relevant working experience deployed on site per day based on the data retrieved from the Biometric System. <i>Refer to Figure B.</i>	= 24.6
Percentage of actual RC workers with at least four (4) years of relevant working experience in Singapore deployed on site per day	$= 24.6 / 36 \times 100\%$ $= 68.3\%$
<i>As the minimum requirement of 55% is met, there shall be no deduction.</i>	

Working Examples (Computation at 25% Completion of RC Works)**Computation for R1 RC workers**

The planned average number of RC workers deployed per day based on the accepted Manpower Resource Histogram (MRH). <i>Refer to Figure A.</i>	= 36
The actual average number of R1 RC workers deployed on site per day based on the data retrieved from the Biometric System. <i>Refer to Figure C.</i>	= 4.4
Percentage of actual R1 RC workers deployed on site per day	$= 4.4 / 36 \times 100\%$ $= 12.2\%$
<i>As the minimum requirement of 30% is not met, the amount of \$135,000 as per Table 4.3b shall be deducted.</i>	

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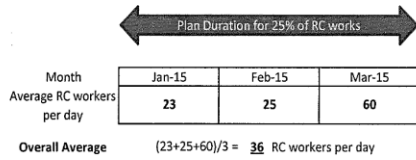


Figure A

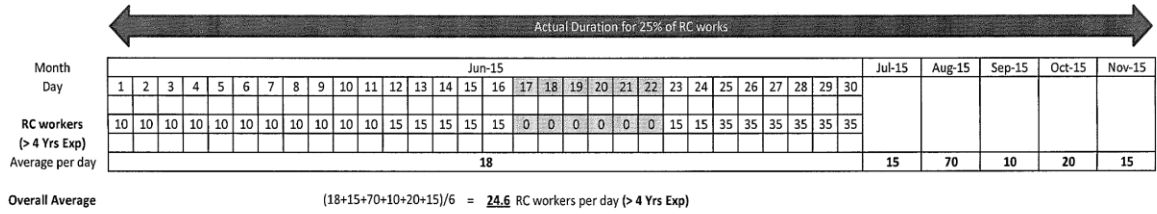


Figure B

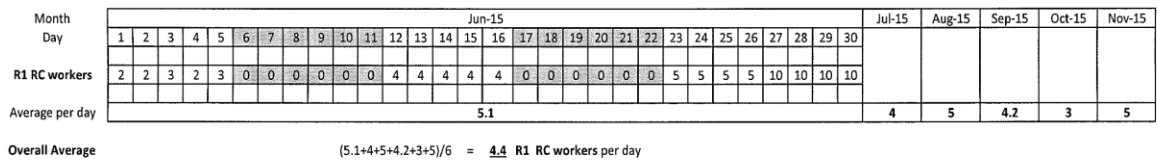


Figure C

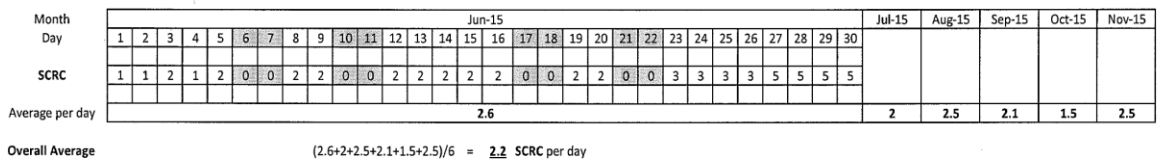


Figure D

Note : For days where there are no RC Works, they will be excluded from the average calculation.