CONSTRUCTION INDUSTRY COUNCIL
建造業議會

Temporary Works FORUM

Reference Material

Temporary Works Management Plan

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Hong Kong Temporary Works Forum (HK-TWf) and
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FOREWORD

Temporary works are construction elements needed to facilitate the installation and erection of permanent works. They are required for almost every construction project. However, the particulars of temporary works and the way they should be controlled and managed are often not adequately understood by the personnel involved in the works. This lack of understanding can often lead to failures of temporary structures during construction and dismantling, causing major accidents that result in serious injury and fatalities, damage to adjacent property and works and delays to the project.

It is crucial to put the process of control and management of temporary works in perspective, and document the procedure in a plan, to ensure that the personnel involved in the works are fully aware of their responsibilities in the management mechanism.

A Temporary Works Management Plan (TWMP) has been prepared and is given in this document. The aims of the Plan are to promote awareness and knowledge of the importance of managing temporary works, improve the contractors' management arrangement of temporary works, enhance the competence of those engaged in temporary works management and design, and help reduce accidents arising from temporary works failures.

The Plan was prepared by the Working Group on Control and Management of Temporary Works of the Hong Kong Temporary Works Forum (HK-TWf) in collaboration with the CIC. The Plan presents a recommended good practice procedure for the design and control of temporary works in Hong Kong construction projects. The intended scope of application is geared towards civil, geotechnical/site formation, building and foundation projects. However, it can also be applied to Mechanical & Electrical (M&E) and Architectural Builders Works & Finishes (ABWF) projects that include components of temporary works. The Plan is applicable to both public and private projects involving temporary works[1], though only designations of

[1] For private development projects, the division of responsibility between AP/RSE/RGE and RC for temporary works and the working procedures are categorised into three cases, namely Case 1, Case 2 and Case 3 as outlined in the Code of Practice for Site Supervision 2009 (2024 Edition) (Supervision Code) (BD, 2024). The AP, RSE, RGE and RC have been conferred statutory duties under the Buildings Ordinance to supervise the carrying out of the building works and street works, and their TCP should carry out such inspections and duties according to the supervision plans and inspection checklist prepared by them. Typical inspection items for TCP relating to temporary works are provided in Tables 5.1 to 5.4 of the Supervision Code.
For Case 1, the approved/prescribed plans stipulate the temporary works, and the sequence of construction or method statements are shown on the approved/prescribed plans. Both the AP/RSE/RGE and the RC have their own responsibilities to supervise the carrying out of the works in accordance with the approved/prescribed plans and the Buildings Ordinance and its subsidiary regulations.
For Case 2, the temporary works, the sequence of construction or method statements are not required to be shown on the prescribed plans and the works have no effect on the permanent structures by way of overstressing or overloading. The RC should prepare plans and construction drawings (include all necessary construction details and specifications of the temporary works, sequence of construction, method statements, details of precautionary and protective measures) with design justifications (include design calculations of the temporary works and the assessment on the effects on the permanent structures, the adjoining buildings and lands) for the temporary works. The RC has the sole responsibility of ensuring the integrity of the temporary works and that the carrying out of temporary works should be safe and should not endanger the workers on site, the public and adjoining buildings. For temporary works providing support to a tower crane, additional requirements in the Supervision Code should also be followed.

the responsible persons in public projects in the control and management of temporary works are referred to in this document.

The need for submission of a TWMP for acceptance in public projects is gathering momentum and has now been specified in most government project contracts. Contractors may consider making use of this document as a basis for setting up a systematic robust control framework to manage the risks in temporary works within their construction projects. Clients may consider encouraging the use of this document as a standard of best practice in their projects.

Copies of a draft version of this document have been circulated amongst industry members of the HK-TWf (including contractors and consultants) and to local professional bodies, clients and government departments, including Development Bureau, Buildings Department, Labour Department and Housing Department. Many individuals and organisations have made useful comments, which have been taken into account in finalising this publication. All contributions are gratefully acknowledged.

Practitioners are encouraged to send comments at any time to the CIC on the contents of this publication, so that improvements can be made in future revisions (please refer to the Feedback Form given at the back of this document).

Industry Development
Construction Industry Council

Chairman
Working Group on Control and Management of Temporary Works
Hong Kong Temporary Works Forum

For Case 3, the temporary works, the sequence of construction or method statements are not required to be shown on the prescribed plans, but the works may have effect on the permanent structures by way of overstressing or overloading. The RC should prepare plans and construction drawings with design justifications for the temporary works. The RC should also appoint a person whose qualification and experience are not inferior to a TCP of grade T5 (T5 Person) to certify these documents, which are to be submitted to the RSE/RGE 21 days before the commencement of works. Upon completion of the temporary works, the T5 Person should personally inspect and sign a completion certificate and submit the certificate to the RSE for acknowledgement and record within 7 days after the completion of the works. The RSE/RGE may require the RC to submit further information to substantiate the effect of the temporary works on the permanent structures, adjoining buildings and lands as necessary. Upon verifying that the safety and integrity of the permanent structures, adjoining buildings and lands will not be adversely affected by the temporary works, the RSE/RGE should give a written permission to the RC for carrying out the works. The RC has the sole responsibility of ensuring the integrity of the temporary works and that the carrying out of temporary works should be safe and should not endanger the workers on site, the public and adjoining buildings. For temporary works providing support to a tower crane, additional requirements in the Supervision Code should also be followed.

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CONSTRUCTION INDUSTRY COUNCIL 建造業議會

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PREFACE

The Construction Industry Council (CIC) is committed to seeking continuous improvement in all aspects of the construction industry in Hong Kong. To achieve this aim, the CIC forms Committees, Task Forces and other forums to review specific areas of work with the intention of producing Alerts, Reference Materials, Guidelines and Codes of Conduct to assist participants in the industry to strive for excellence.

The CIC appreciates that some improvements and practices can be implemented immediately whilst others may take more time for implementation. It is for this reason that four separate categories of publication have been adopted, the purposes of which are given as follows:

Alerts	The Alerts are reminders in the form of brief leaflets produced quickly to draw the immediate attention of relevant stakeholders to the need to follow some good practices or to implement some preventive measures in relation to the construction industry.
Reference Materials	The Reference Materials provide standards or methodologies generally adopted and regarded by the industry as good practices. The CIC recommends the adoption of the standards or methodologies given in the Reference Materials by industry stakeholders where appropriate.
Guidelines	The Guidelines provide information and guidance on particular topics relevant to the construction industry. The CIC expects all industry stakeholders to adopt the recommendations set out in the Guidelines where applicable.
Codes of Conduct	The Codes of Conduct set out the principles that all relevant industry participants should follow. Under the Construction Industry Council (Cap 587), the CIC is tasked to formulate codes of conduct and enforce such codes. The CIC may take necessary actions to ensure compliance with the codes.

This publication belongs to the category of Reference Materials and provides standards or methodologies generally adopted and regarded by the industry as good practices.

To allow us to further enhance this publication, we encourage you to share your feedback with us, after you have read this publication. Please take a moment to fill out the Feedback Form attached to this publication and send it back to us. With our joint efforts, we believe our construction industry will develop further and will continue to prosper in the years to come.

ABBREVIATIONS

AP	Authorized Person
CDM	Construction Design and Management
CM	Construction Manager
CMS	Construction Method Statement
CoP	Code of Practice
CR	Contractor's Representative
DfS	Design for Safety
EM	Engineering Manager
GI	Ground Investigation
ICE	Independent Checking Engineer
ITP	Inspection and Testing Plan
LPMit	Landslip Prevention and Mitigation
RC	Registered Contractor
RFC	Released for Construction
RGE	Registered Geotechnical Engineer
RPE	Registered Professional Engineer
RSE	Registered Structural Engineer
TCP	Technically Competent Person
TW	Temporary Works
TWC	Temporary Works Coordinator
TWD	Temporary Works Designer
TWMP	Temporary Works Management Plan
TWS	Temporary Works Supervisor

1. OBJECTIVE

This Plan provides a framework of project controls for the purpose of minimising the risk of temporary works (TW) failure throughout the TW lifecycle. The objective is to set out procedures for controlling the planning, design, construction and removal of temporary works, such that the potential for serious or fatal injury is identified, mitigated and eliminated.

The TW lifecycle can be extended back in time during the permanent works design where design decisions directly impact safe methods of construction. However, the scope of this TW procedure purposefully focuses on the TW processes after the permanent works design has already been finalised.

This TW procedure has been produced to show the way the Design for Safety (DfS) process for temporary works is achieved with cross-reference made to the following publications:

(i) Guidance Notes on Construction Design and Management (ETWB, 2006)[2];
(ii) Guidance Notes of Design for Safety (DEVB, 2016)[3]; and
(iii) Reference Materials on the Design for Safety Management System for the Hong Kong Construction Industry (CIC, 2022)[4].

DfS for temporary works is basically a process in which safety is enshrined in the design process at the onset to ensure that the temporary works so designed can be constructed, used and removed in the safest possible manner. This is achieved by first preparing schematic temporary works solutions showing the method and sequence of construction, followed by an evaluation[5] of the options among the project team to arrive at the safest and the most appropriate option that has no adverse impact on life and properties and the permanent works being/to be constructed, before proceeding to the detailed design.

It is noted that the duties of proprietors/employers of workplaces to ensure, so far as reasonably practicable, the safety and health of all the persons employed are prescribed in Section 6A of the Factories and Industrial Undertakings Ordinance (Cap. 59) and Section 6 of the Occupational Safety and Health Ordinance (Cap. 509). The duties, among others, include the provision and maintenance of safe plant

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[2] https://www.devb.gov.hk/filemanager/en/content_29/CDM-Guidance%20Notes.pdf
[3] https://www.devb.gov.hk/filemanager/en/content_29/Design_for_Safety_Guidance_Notes.pdf
[4] https://www.cic.hk/files/page/51/CIC%20DfS%20-%20Reference%20Materials.pdf
[5] The evaluation should take into account of the feasibility of risk reduction through alternative designs with respect to contractual requirement, cost and time considerations. The evaluation process should continue throughout all stages of design development, including during procurement and award of contracts to subcontractors where relevant.
The DfS process should be reviewed continuously throughout the evaluation stage, even after the design has been completed, and whenever there is a change in circumstances, such as changes in the method or sequence of construction, erection/installation, access, maintenance, removal/dismantling, etc. In the DfS process, designers, contractor and subcontractors should continuously question and identify further safety risks, and where appropriate, implement changes and improvements to mitigate the risks. As examples, the DfS process should be re-assessed when: (i) the design is completed before the subcontractors come on board who may have different skillset, different preferred technology and potentially different construction technology as compared with the original design intent/assumptions; or (ii) existing constraints disappear or new constraints arise (e.g. programme, interfacing works, or other external factors) such that existing residual risks can be eliminated or new residual risks arise. In such circumstances, a revised design brief or a design change request should be issued, as needed.

and systems of work as well as the provision of such information, instruction, training and supervision to persons employed by him.

This document does not replace or substitute any design or construction standards nor any project-specific and legal requirements.

2. SCOPE OF PROCEDURE

This Plan is applicable to all TW regardless of complexity other than those described in Section 3. When imposing this Plan, project teams may consider supplementing the procedure with project-specific requirements. However, such project-specific requirements should not be less onerous than the minimum procedures specified in this Plan, nor should they depart from the underlying objectives to achieve safe TW outcomes.

Electronic document management systems are implemented in most construction projects. It is recommended to tailor such systems to facilitate the implementation of the TW control framework in this Plan. A design package number associated with the TW documents, including drawings, sketches, TW forms, etc., should be provided to make it easy to locate all relevant documents in a given TW design package. Establishing document linkages between the TW forms and associated drawings / documents will greatly enhance traceability and ease of use for end users.

3. EXEMPTIONS OF PROCEDURE

3.1 Worker Access Scaffolds

If worker access scaffolds, including access stairways and access platforms, are constructed for the purpose of worker access only, with a maximum controlled allowable loading of 1.5 kPa or 2 kN point load, they are exempt from this procedure provided that they are duly checked and certified safe by a competent person using Form 5[6] in accordance with the Construction Sites (Safety) Regulations (Cap. 59I).

The exemption shall not apply to:

(i) worker access scaffolds subjected to a loading greater than the normal worker access loading (max. 1.5 kPa), including scaffolds supporting formwork / falsework for concreting, scaffolds supporting material stockpiles or scaffolds supporting construction plant or equipment;
(ii) scaffolds subjected to loading from public pedestrian traffic; and
(iii) non-typical or high-risk scaffolds used for worker access only with unusually large unsupported span or cantilever, unique connection details or requiring special design consideration.

[6] https://www.labour.gov.hk/text_alternative/pdf/eng/CSSR-F5.pdf

3.2 Plant and Equipment

This procedure does not apply to proprietary plant and equipment. However, this procedure does apply to all temporary structures that provide support to such equipment.

3.3 Lifting Appliances and Lifting Gear

This procedure does not apply to proprietary lifting appliances and lifting gear. However, special purpose temporary lifting frames and storage racks shall be subjected to the full application of this procedure. An example would be a purpose-designed lifting frame attached to a building for lifting E&M equipment, but not including elements that form part of the rigging gear.

3.4 Tunnelling / Mining

This procedure does not apply to temporary works associated with tunnelling or mining processes. Temporary works procedures for such processes should be specifically addressed as part of project-specific tunnelling control procedure document.

3.5 Landslip Prevention and Mitigation Works and Ground Investigation Works

This procedure does not apply to temporary works associated with Landslip Prevention and Mitigation (LPMit) and Ground Investigation (GI) works. Most of the temporary works involved in the LPMit and GI works are scaffolding works for access and erection of working platforms, lifting of small-scale plant and equipment onto the platforms and minor formworks, which are exempted from this procedure. Temporary works procedures for LPMit and GI works should be addressed as part of the project-specific control procedure document.

4. TW CHALLENGES

The challenges that implementation of a TW lifecycle faces that could have an impact on health and safety at work include human[7], organisational and technical factors.

The human factors that could inevitably influence health and safety at work include the following, among others:

- lack of design and understanding of the tasks in accordance with ergonomic principles to take into account of the limitations and strengths in human performance
- mismatches between job requirements and people's capabilities
- lack of an understanding of the individuals carrying out the tasks, and their proficiency, as well as the work environment in which they operate

[7] Human factors refer to environmental, organizational and job factors, and human and individual characteristics, which influence behaviour at work in a way which can affect health and safety. The three interrelated aspects of the job, the individual, and the organization should be considered in the human factors (HSE, 1999).

Project teams should always aspire to consider all possible human factors in a TW lifecycle. However, it is recognised that there are limitations in achieving this aspiration.

The organizational factors commonly arise from the misunderstanding and miscommunication among project team members or unauthorised shortcuts used, such as:

- lack of good teamwork between multiple project stakeholders, including clients, supervising engineers, contractors, subcontractors, designers, checkers, etc.
- unrealistic timeframes or insufficient time provided for TW design and checking
- inadequate knowledge or communication of construction sequence, methodology, loading, etc., prior to the commencement of design
- failure of designers to understand or accommodate construction difficulties
- construction teams failing to understand underlying engineering design requirements
- inadequate understanding of the construction programme relative to design deliverables
- inflexibility in the design and construction process to check and change assumptions or to modify assumptions should they change
- construction teams overly optimistic expectations for change
- underlying mistrust and/or lack of respect for individuals empowered under the TW procedure
- overly unrealistic expectations of individuals empowered under the TW procedure to enforce standards resulting in impasse or stalemate of criterion to proceed
- deviation from designed safe working methods, sequence or procedures due to failure of frontline construction personnel to understand the rationale behind
- workers of different trades working the same area not understanding the safety risks posed by their work to workers in other trades or personnel with other duties such as site supervision
- decisions made on the basis of short-term objectives without fully understanding the over-riding TW lifecycle objectives

TW dynamics are in constant flux from the planning and design stages through to the construction and dismantling stages of the TW lifecycle. The technical factors arising from the TW dynamics, which inevitably influence safe or unsafe TW outcomes, include but are not limited to the following:

- lack of design of temporary works
- lack of project specific risk assessment
- lack of detailed construction method statement or sequence
- lack of safety precautionary measures
- lack of coordination of work among subcontractors
- inadequate competent safety supervision personnel in supervising, monitoring, checking and controlling full-time the safety-critical processes which could lead to serious injury or fatality
- temporary works built from experience rather than an engineered solution
- unforeseen obstructions and or unpredictable or unforeseen constraints
- changes in construction programme, including complexities introduced when interfacing with other construction activities
- variations in project requirements
- short-term changes in the interim stages of the temporary works erection / dismantling resulting in unforeseen changes in load path or increments in loading
- staff turnover and loss of historical perspective

- differences in opinion on TW methodology amongst various project stakeholders
- subcontractor capabilities and past experience on specialist construction methods
- over reliance on competence and experience of workers and supervisors without adequate supervision and control
- changes in construction equipment or construction material
- additional loadings on temporary works not assumed in the design

The TW procedure and framework of project controls contained herein provide a tool to manage the TW lifecycle and introduces mechanisms that trigger necessary actions by responsible persons.

It should be noted that the procedure alone is insufficient to achieve successful and safe TW outcomes and manage such dynamic complexities in the planning and execution of TW because it is not possible to foresee every eventuality during a given TW lifecycle, and the TW challenges faced can easily be underestimated due to loss of clarity in the original TW objectives. There is added complexity due to multiple overlapping of TW lifecycles interacting with each other.

The following should be taken into due consideration in the implementation of the TW procedure in order to achieve better and safe outcomes:

(i) consider adequately the above human, organisational and technical factors that could affect the implementation of the TW lifecycle and make adequate provisions in the tender preparation and at the beginning of the TW lifecycle in the construction contract to deal with such factors;
(ii) promote awareness of project team members via TW training, policies and culture change of the overall TW lifecycle objectives to ensure that they will not be overwhelmed by the short-term decisions during the day-to-day construction activities;
(iii) encourage designers to foresee and examine carefully adverse constructability issues downstream of their TW design and construction teams to allow sufficient time and provide greater input during the earlier planning and design stages of TW;
(iv) increase awareness of the project team of the value and importance of pre-emptive upstream action;
(v) encourage all individual responsible persons to recognise the needs of others and contribute to the TW lifecycle both upstream and downstream of their own direct involvement;
(vi) provide training to project team members to ensure that they understand the underlying TW lifecycle objectives; and
(vii) engage sufficiently competent and experienced responsible persons in the control and management of the TWMP who have the initiative to take action and respond to dynamic changes.

5. PARTIES INFLUENCING TEMPORARY WORKS

5.1 Client / Owner

Client/ owner should note the complicated process/ procedure involved in TW, and the catastrophic consequence that it could bring should a TW failure occur. They should allocate sufficient resources, including budget and time for implementing the TW process/ procedure, and in the design, supervision and construction of TW to achieve the DfS objective.

5.2 Project Architect

Architectural design is beyond the scope of the TWMP. Notwithstanding, Project Architects should be aware of the likely temporary works methods required of their architectural scheme, communicate any additional risks likely to be introduced as a result of any unusual architectural features in their design, etc.

Project Architects should also be in communication with the Client/ Owner advising them of the potential additional TW risks of any unusual architectural features being specified by the Client/ Owner which should be factored into architectural decision making.

5.3 Permanent Works Designer

Permanent works designers need to eliminate, reduce or control the risks in their design (ETWB, 2006) Where it is not possible to eliminate the risks, they should provide information on the significant residual risks that could not be designed out to the contractors and other designers who could be affected by those residual risks. Permanent works designers are expected to:

(i) understand how the structure can be constructed and the requirement for temporary works;
(ii) determine if, by altering or supplementing the permanent works design in some way (so far as is reasonably practicable), risks arising from construction, use or dismantling of temporary works can be eliminated or reduced; and
(iii) consider what useful information should be passed on to the contractor (i.e. the pre-construction information).

Although this procedure does not cover permanent works design, it is recommended that temporary works and construction method specialists are engaged in the early stages of the design development of the permanent works. The consideration of temporary works during the early design stage of permanent works would enhance the safety of construction, buildability, as well as the safety of the maintenance works to be carried out at a later stage. In areas where there is a high risk in the temporary conditions or temporary works, permanent and temporary works designers could then consider at the early stage the heightened risk profile and work together to develop a better scheme which will produce lesser risks.

During the tendering of the construction contract or during contract implementation, or when the temporary works are under review at any of the stages, if it is found that safety risks could be mitigated through amendments or alternative arrangements of the permanent works design, then these should be raised to the Permanent Works Designer and/or the client. Though at that juncture, it may be too late or not feasible to change, this will help in the continuous improvement and education of DfS.

During construction stage, if the works designer is appointed as a RSE or RGE under the Buildings Ordinance for private development projects, the designer should be responsible to give permission to the RC for carrying out Case 3 TW under the Supervision Code for ensuring the Case 3 TW will not impose any adverse effect on the permanent structures, adjoining buildings and lands, or the geotechnical elements of the permanent structures/lands.

5.4 Contractor

Contractors, who have the overall responsibility for the erection, installation, construction, maintenance or demolition of the TW, need to:

(i) ensure that a proper TW management plan, as that described in this document, is in place for the works;
(ii) employ suitably qualified, experienced and competent personnel for the works (see Section 7); and
(iii) actively coordinate with respective subcontractors, check and ensure that the personnel involved in the TW including the subcontractors, are conversant with the works procedure as that detailed in the TW management plan (see Section 8), and that the works procedure are strictly followed.

5.5 Subcontractor

Subcontractors, who are responsible for carrying out the specific parts of the TW activities, need to:

(i) understand the works procedure given in the TWMP and the importance to work closely with the contractor to follow the works procedure as specified;
(ii) participate actively in the systematic review of the sequence and method, identification of the risks inherent in the TW construction, as well as those from adjacent activities, and proposal of measures to avoid those hazards;
(iii) check and ensure that the personnel involved in the TW are conversant with the works procedures as detailed in the TWMP; and
(iv) provide input in the preparation of Construction Method Statement and Risk Assessment.

6. RISK CATEGORIES OF TEMPORARY WORK

Depending on the size and complexity of the design and works arrangement, the risk to life and any other risks in case of the TW failure, three risk categories can be assigned to the TW, as follows:

- Risk Category A for Major/Complex Temporary Works[8]
- Risk Category B for Medium/Significant Temporary Works
- Risk Category C for Minor/Simple Temporary Works

Based on the above risk category, the level of engineering design input, and the qualified person for the design, checking and inspection of the works can be determined, as shown in Table A1 of Appendix A. The risk categories are "live" and subject to change depending on site situations, change and recent safety incidents, etc.

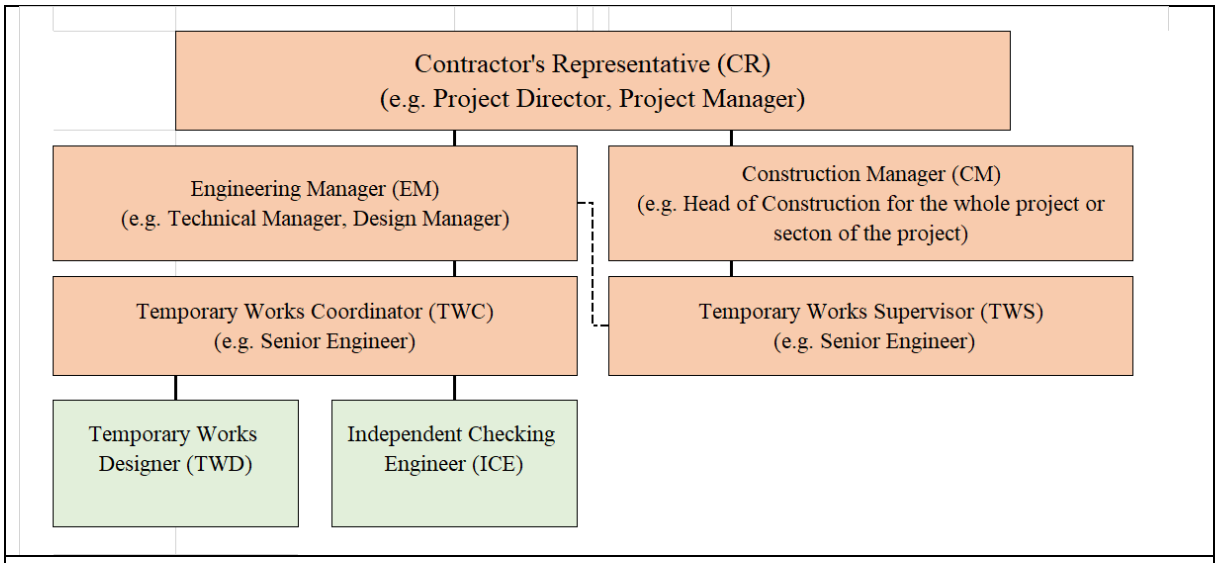
Typical examples of each type of TW risk category are provided in Table A2 of Appendix A for reference. This is to be used for guidance only.

[8] The temporary works providing support to a tower crane is a typical Risk Category A TW. The additional requirements given in the Code of Practice for Site Supervision 2009 (2024 Edition) (BD, 2024) in respect of this special type of TW should be followed.

7. RESPONSIBLE PERSONS IN CONTROL AND MANAGEMENT OF TEMPORARY WORKS

7.1 Organisation

The responsible persons in the control and management of this Plan are Contractor's Representative (CR), Engineering Manager (EM), Construction Manager (CM), Temporary Works Coordinator (TWC), Temporary Works Supervisor (TWS), Temporary Works Designer (TWD) and Independent Checking Engineer (ICE), as shown in Figure 1.



Key: ———— Direct reporting; – – – – Technical reporting

Figure 1 – Responsible Persons in Control and Management of Temporary Works

On large scale contracts with multiple areas of control, there may be more than one person appointed into the above roles with clarification of scope of responsibility within an area management plan. On smaller scale contracts, the roles of EM+TWC could be combined as one role and/or the CM+TWS could also be combined as one role. In any combination of roles, responsible individual's decisions regarding compliance of the TW procedure must be based on safety and quality only and not on achieving the construction programme.

7.2 Contractor's Representative

The Contractor's Representative (CR):

(i) is the most senior person on site within the contractor's organisation. In private projects, the CR should be the authorized signatory of the RC who should bear the statutory duties of supervision of works under the Buildings Ordinance;

(ii) has overall jurisdiction and responsibility to promulgate policies which ensure the implementation of this TW procedure which he does by allocating sufficient time and competent resources for completion and checking of all identified TW at the planning, construction, use and removal stages;

(iii) is responsible for appointing the EM, CM, TWSs, TWCs, TWDs and ICEs, and ensuring that they have the right capability and capacity to fulfil the requirements for these roles;

(iv) provides adequate support and delegation of authority to the EM, CM, TWS and TWC in accordance with this procedure to ensure the independence and objectivity required of their respective roles;
(v) in the event of differences in opinion on the appropriate TW solution to achieve the DfS objectives, to take responsibility for deciding amongst available TW design alternatives offered by the TWD prior to detailed design based on a holistic and balanced evaluation of competing decision-making criteria;
(vi) will take appropriate disciplinary action including replacing resources where non-compliance with the TW procedure is observed;
(vii) ensures clear policies are promulgated amongst the project team of the importance of this TW procedure;
(viii) when requested, is responsible for supporting the enforcement duties of the EM / CM/ TWS(s) / TWC(s) regarding TW compliance on site; and
(ix) is fully responsible for safety and shall lead and be in overall control, take timely actions on the work of others, and make decisions to ensure safety.

7.3 Engineering Manager

The Engineering Manager (EM):

(i) has sufficient seniority and competence to manage overall TW design and compliance for the project including overall implementation of this TW procedure; for large-scale projects involving complex Risk Category A and B TW, 10 years' experience is a recommended minimum requirement; for small-scale projects, this role may be covered by a TWC with 7 years' experience;
(ii) has sufficient knowledge and experience in the design of TW for the project and is responsible to provide effective co-ordination between designers and construction teams to achieve optimised and safe TW solutions;
(iii) proactively explores proposals and work in progress to identify real and potential risks such that threats and potential disruption to safe and efficient working are eliminated;
(iv) proactively participates in task reviews to evaluate and reach consensus amongst alternative TW design options offered by the TWD to achieve the DfS objectives, and if unable to reach consensus to defer to the CR to make a clear decision;
(v) has overall accountability for the timely delivery of the optimised and safe TW design solutions in line with the construction programme by encouraging and fostering teamwork, empathy and understanding from designers, construction teams, and all other stakeholders involved in the TW lifecycle;
(vi) is a good facilitator who encourages discussion and seeks consensus among different parties involved in temporary works design, checking and construction;
(vii) is a planner and forward thinker who allows sufficient time in the temporary works process for parties to exercise and discharge their duties (Notes: He will remind the project team the need to make decisions to ensure smooth progression of deliverables in a timely and controlled manner.);
(viii) is responsible for supporting the enforcement duties of the TWC(s) regarding TW compliance on site; and
(ix) shall possess qualification of appropriate stream of membership of HKIE or equivalent standard.

7.4 Construction Manager

The Construction Manager (CM):

(i) in the organisation is the head of construction for the whole project or where the project is divided into sections by geography or discipline the head of construction for that section;
(ii) is of suitable experience to take responsibility for the implementation of the TW construction on site for the nature and complexity of the TW for which he is responsible;
(iii) shall nominate the TWS(s) (ensuring all TWS(s) have the required experience in accordance with Section 7.5), by seeking agreement and appointment by the CR;
(iv) proactively participates in task reviews to evaluate and reach consensus amongst alternative TW design options offered by the TWD to achieve the DfS objectives, and if unable to reach consensus to refer the case to the CR for a clear decision;
(v) is responsible for supporting the enforcement duties of the TWS(s) regarding TW compliance on site;
(vi) is responsible for the overall development of the Construction Method Statement (CMS) and ensuring the TW are constructed, monitored, inspected, checked, maintained and dismantled safely and in accordance with the CMS; and
(vii) shall possess qualification of appropriate stream of membership of HKIE or equivalent standard.

7.5 Temporary Works Supervisor

The Temporary Works Supervisor (TWS):

(i) is based full time on site and reports directly to the CM but with functional reporting to the EM on engineering matters; dependent on the size of the project, multiple TWSs may be required on a single project with appointments made on an area or discipline basis;
(ii) is nominated by the CM and appointed by the CR;
(iii) is of sufficient calibre and competence to take responsibility for detailed implementation of TW construction on site for the nature and complexity of the TW for which he is responsible; for Risk Category A and B TW, 7 years' relevant construction experience is recommended as a minimum requirement;
(iv) is the responsible site person assisting the CM for the safe delivery of all aspects of TW execution including procurement, quality control, erection, use and dismantling of elements of TW whilst ensuring the safety of all of those working on or adjacent to these operations;
(v) shall prepare the construction method statement based on the TW design drawings under the supervision and direction of the CM;
(vi) has the authority and responsibility to stop the work if it is not being carried out satisfactorily or not in compliance with approved construction method statement, and ensures suitable rectification measures are implemented prior to restarting unsafe works;
(vii) has sufficient experience to determine, make decisions and give direction regarding the preferred construction methodology that will result in an optimised and safe TW solution;
(viii) proactively participates in task reviews to evaluate and reach consensus amongst alternative TW design options offered by the TWD to achieve the DfS objectives, and if unable to reach consensus, to refer the case to the CR for a clear decision;

(ix) is intimately aligned with the TW construction programme but also has sufficient awareness and initiative for the timeframe for the overall TW lifecycle including TW planning and design stages;
(x) recognises the need and co-operates with the TWC during the planning and design stages to provide necessary information, responds to designer's queries and makes timely decisions prior to site execution;
(xi) shall have received appropriate training and qualification of university graduate of appropriate stream of engineering or equivalent standard; and
(xii) is fully aware of his responsibilities under this procedure.

7.6 Temporary Works Coordinator

The Temporary Works Coordinator (TWC):

(i) is based full time on site and reports to the EM;
(ii) has sufficient experience in the relevant nature and complexity of TW for which he is responsible; for Risk Category A and B TW, 7 years' relevant experience is a recommended minimum requirement;
(iii) assists the EM to coordinate the planning and design stages of the TW lifecycle including the effective co-ordination between designers and construction teams to achieve optimised and safe TW solutions;
(iv) proactively participates in task reviews to evaluate and reach consensus amongst alternative TW design options offered by the TWD to achieve the DfS objectives, and if unable to reach consensus to refer the case to the CR for a clear decision;
(v) is responsible for monitoring the erection, use, maintenance and dismantling of temporary works in accordance with the approved design drawings and procedures;
(vi) has a role that provides an additional (as opposed to alternate) layer of protection to that of the TWS's direct responsibility for the safe execution of all aspects of the works; his/her decisions on the acceptability of the temporary works must be based on safety and quality only and not on achieving the construction programme;
(vii) has the authority and responsibility to stop the work if it is not being carried out satisfactorily or not in compliance with approved construction method;
(viii) may not be an expert in technical details behind the temporary works design although he must have a fundamental understanding of the major design constraints;
(ix) shall have personal attributes to stand up to pressure and take an independent view to ensure work can progress safely;
(x) takes initiative to question and to challenge things that do not seem quite right;
(xi) is reasoned and aware of the realities and practicalities of design and construction but does not turn a blind eye and will action on non-compliances;
(xii) shall have received appropriate training and qualification of university graduate of appropriate stream of engineering or equivalent standard; and
(xiii) is fully aware of his/her responsibilities under this procedure.

7.7 Temporary Works Designer

The Temporary Works Designer (TWD):

(i) has sufficient competence and experience in temporary works design which is commensurate with the nature and complexity of TW design for which he is responsible to deliver; for Risk Category A and B TW, the TWD is normally a reputable engineering design consulting firm[9] or specialist subcontractor; for Risk Category C TW, the TWD can be a qualified engineer of appropriate stream of membership of HKIE or equivalent or a competent design engineer with relevant working experience;
(ii) is aware of buildability limitations and is flexible to suit the needs of the construction team;
(iii) considers the safety of the temporary works, the hazards checklist and conducts risk assessment when evaluating and choosing amongst alternative methods of construction;
(iv) as part of the TW design process, will initiate task reviews in consultation with the TWC, TWS, EM and CM by presenting available alternatives to achieve the DfS objectives to ensure the works can be constructed, used and removed in the safest possible manner, and to incorporate the agreed task review outcome into the TW design;
(v) recognises when changes are necessary throughout the TW lifecycle and shall modify the design or detailing to suit revised site conditions, site requirements and/or suggestions to improve buildability; and
(vi) is fully aware of his/her responsibilities under this TW procedure.

7.8 Independent Checking Engineer

When preparing the plan with regards to the role of ICE, the requirements of both public and private projects in Hong Kong have been benchmarked to ensure alignment with the overall principle of engagement of ICE. The qualification and experience of an ICE should be not inferior to a TCP of grade T5, which are on a par with that of T5 Person for Case 3 TW under the Code of Practice of Site Supervision 2009 (2024 Edition) for ensuring the Case 3 TW will not impose an adverse effect on the permanent structures, adjoining buildings and lands. TWD and ICE, including their employing companies where applicable, should be independent from each other and have no holding, subsidiary, employer/employee or any other relationship. For Case 2 TW, the engagement of a T5 Person is not required statutorily.

In TW Design, the primary responsibility rests with the TWD to ensure that the TW design complies with the statutory and contractual obligations. The ICE provides additional assurance of the TW design compliance. The requirement for an ICE to check the TW Design is usually specified by the Client under the main contract and Clients may impose requirements for ICE qualifications, ICE professional indemnity insurance, etc., to match their own expectations. For projects where an ICE is not specified by the Client under the main contract or no T5 Person for TW is required statutorily, if the TWD is an

[9] These include firms which are member firms of the Association of Consulting Engineers of Hong Kong, The Association of Registered Engineering Consultants Limited, etc. In this connection, the firm should assign its employee whose qualification and experience be not inferior to a TCP of grade T5 for the tasks.

external consultant employed by the Contractor and the TW Design is checked and signed off by an appropriately qualified person (e.g. an RSE/RGE/RPE with relevant experience in the TW design being endorsed), then the requirement for an additional ICE check would be optional under this plan. In all cases, the underlying principle which must be achieved is that the TW design should be reviewed and checked by an ICE or appropriately qualified person (e.g. an RSE/RGE/RPE), and documented and signed (e.g. ICE certificate and/or endorsement on the TW drawings).

It should be noted the choice to omit an additional ICE check should be well considered with respect to the complexity of the design and competency of the TWD.

In TW Construction, the primary responsibility for ensuring compliance with TW construction rests with the TWS and TWC. The requirement for an ICE to check the as-built TW construction is usually specified by the Client under the main contract and Clients may impose requirements for ICE qualifications, ICE professional indemnity insurance, additional frequency of inspections, etc., to match their own expectations. For projects where an ICE is not specified by the Client under the main contract, the requirement for an additional ICE check would be optional under this plan. It should be noted that the choice to omit additional ICE check should be well considered with respect to the experience and competency of the TWS and TWC.

The ICE:

(i) has sufficient competence and experience in TW design which is commensurate with the nature and complexity of TW design for which he is responsible; for Risk Category A and B TW, the ICE shall be a reputable engineering design consulting firm[10] independent of the TWD; for Category C TW, the ICE can be a registered professional engineer (civil, structural or geotechnical as appropriate) with relevant working experience who is independent of the TWD, unless otherwise specified by the Client;
(ii) is responsible for checking and reviewing all designs, checking the risk assessment, and endorsing them when satisfied;
(iii) when required, shall carry out site inspection of the as-built works and confirm construction in accordance with the design drawings and specifications which provides an additional (as opposed to alternate) layer of protection to that of the TWS and TWC roles in ensuring TW compliance; and (Notes: This will not change the responsibility of the TWS and TWC to carry out their own checking to verify as-built compliance of the temporary works to both the design and the material and workmanship requirements.);
(iv) shall ensure that the person carrying out the site inspection on his/her behalf (in the case that he/she personally is not present) meets the minimum qualification requirements; and
(v) is fully aware of his/her responsibilities under this TW procedure.

[10] These include firms which are member firms of the Association of Consulting Engineers of Hong Kong, The Association of Registered Engineering Consultants Limited, etc. In this connection, the firm should assign its employee whose qualification and experience be not inferior to a TCP of grade T5 for the tasks.

8. TEMPORARY WORKS PROCEDURE

8.1 Temporary Works Lifecycle

The TW lifecycle follows the workflow shown in Figure 2. It begins with the planning of works and allocation of risk to the works, followed by design and verification of the design, procurement of materials and construction, and finally verification of the as-builts and safe removal. This lifecycle forms an integral part of the TW procedure and significantly influences the safe day-to-day activities and tasks on construction sites.

Achieving optimised TW solutions with safe outcomes should be a straightforward process if the above TW flowchart is followed whilst giving due consideration to the underlying TW objectives. Default in execution of duties in any step above can give rise to failure in the TW lifecycle. However, divergence from the above flowchart during day-to-day construction activities is not an uncommon occurrence, and often arises due to the overly long timeframe over which the TW lifecycle occurs, which can be measured in months or even years. It is a natural human tendency to focus on short-term objectives, often losing sight of the overall TW objectives, and this often gives rise to misunderstanding, miscommunication and unauthorised shortcuts. The failures in the above TW lifecycle can lead to many injuries and fatalities within the construction industry.

A flowchart illustrating the DfS process in TW making reference to the sections presented below is given in Appendix B.

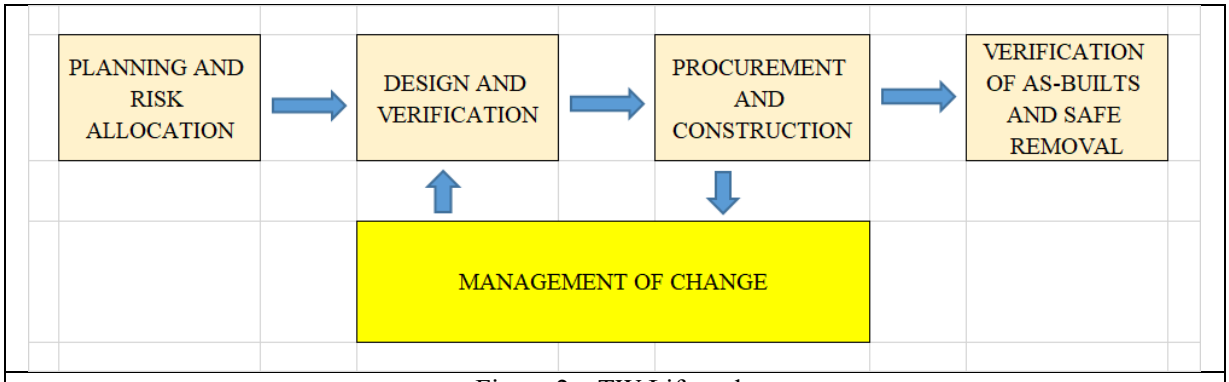


Figure 2 – TW Lifecycle

8.2 Planning and Risk Allocation

8.2.1 Appointment of Qualified Persons

ACTION	BY
As early as practically possible after the contract has been awarded, CR shall appoint a sufficient number of qualified persons to the roles of EM, CM, TWS and TWC who meet the required accountabilities and competencies described in Section 7, using Form T0 (Appointment of Qualified Persons), as that given in Appendix C. The CR shall periodically review the sufficiency of resources throughout the project duration to adequately support the TW needs of the project.	CR

Form T0 is a live document to be maintained current and up to date throughout the life of the project. The form shall be acknowledged and endorsed by the appointee.

CR and EM shall appoint a sufficient number of qualified and competent TWD and ICE (via consultancy agreements or otherwise) to deliver and verify safe and optimised TW designs for the project.	**CR** **EM**

Form T0 shall be used when individuals to the role of TWD or ICE for Risk Category C TW are appointed. The form shall be acknowledged and endorsed by the appointee. The appointee is the person engaged.

8.2.2 Training

ACTION	BY
EM shall circulate the TW procedure to all appointed persons who shall read and understand their respective accountabilities and responsibilities.	**EM** + All
EM shall provide training to all appointed CM, TWS, TWC, TWD and ICE, and the relevant frontline staff, in particular the frontline safety supervisors appointed, to ensure that they are fully aware of their responsibilities in accordance with this TW procedure, and keep detailed records of the training provided.	**EM** + TWC

8.2.3 Allocation of Risk Categories and Temporary Works Master Schedule

ACTION	BY
EM and TWC shall review all the TW required for the project and assign the risk category to the TW, following the criteria given in Section 6.	**EM** **TWC**

In the instance where there are significant risks to life (with potential for loss of life and/or limb or other serious injury), or indeed any other significant risks (with potential for significant damage to constructed and public facilities), the risk category should be determined accordingly, and a higher risk category selected as appropriate. For example, for a typical 2 m deep cofferdam (normally risk category C, as shown in Table A2) which has the risk of undermining adjacent sensitive structures with impact to the public, it may need to be re-classified as risk category A.

EM and TWC shall prepare the Master Schedule, which gives information of all the envisaged design packages identified across the entire project, and for each TW item, the risk category, the qualified persons for the design and checking, delivery date for each design package, etc. Form T1 (Master Schedule), as that shown in Appendix C, shall be used. The following fields and columns should be included in Form T1 as a minimum:

(i) a unique and systematic T1 package number for each TW design package to facilitate auditing and traceability (Notes: The number can be grouped geographically by area within the project but there should be flexibility to add future packages if identified later.);
(ii) risk categories applicable to each item of TW (see Appendix A); and

(iii) allocation of TWS, TWC, TWD, and ICE for each TW design package (Notes: The competence of the appointed responsible persons for each package must be commensurate with the respective risk category applied.).

The following fields and columns in Form T1 may be omitted if they can be audit traceable against unique T1 package numbers via other project systems (e.g. separate tracking schedules and / or electronic document management systems):

(i) the required approval date with adequate provision in the programme for design, approval, procurement and construction; and
(ii) tracking register of T2, T3 and T4 forms, as those given in Appendix C.

EM and TWC shall maintain and update the information in the Master Schedule, including addition of any newly identified TW design packages, throughout the project and the responsible persons for respective TW design packages shall be notified promptly of the update.	**EM** **TWC**

If a separate project document control system is not used, then TWC (with administrative support) shall also use Form T1 to track and trace the status of T2, T3 and T4 forms associated with any given package.

8.2.4 Kick-off Meeting and Regular Review Meetings

ACTION	BY
EM shall hold a TW kick-off meeting at project commencement inviting CR, CM, TWS, TWC and TWD to discuss and agree on the risk categories, responsible persons, and the required delivery dates for each TW design package listed in the T1, especially the urgent packages required for project mobilisation.	**EM** + CR CM TWS TWC TWD
Thereafter, TW regular review meetings shall be held periodically to review the TW design progress during the remainder of the project. The TW regular review meetings shall be attended by EM, TWC and TWD (meeting frequency to suit the project requirements). Where the design delivery requires input from CM, TWS or others in the construction team or subcontractors, they shall also be invited to attend, where appropriate.	**EM** + TWC TWD + CM TWS

8.3 Design and Verification

8.3.1 Design Brief and Package-specific Workshop

ACTION	BY
The aspects to be considered in a temporary works design include (i) safety, (ii) site logistics; (iii) sequence of works; (iv) method of construction; and (v) selection and use of appropriate technology.	

ACTION	BY
The temporary works design should be based on an agreed design brief. A design brief is a formal document prepared for each item of temporary works to convey the design requirements of the temporary works to the designer, with the design standards, design assumptions (including the method and sequence of construction), and the data and information sources clearly stated. It should include all relevant and sufficient data and information to facilitate the design. A guidance on the type of information that should be included in a design brief is given in Appendix D.	
TWS, under the supervision of CM, and in collaboration with TWC, shall prepare and issue Form T2 Design Brief, as that shown in Appendix C, to convey the requirements of the design to TWD. The Information provided in Form T2 should be unambiguous and as complete as possible to ensure the TW design will meet the expectations of the construction team. In all cases, the design brief must include: (i) provision of adequate access, working space, etc., to all work faces throughout the TW erection and dismantling process; (ii) proposed installation / erection / removal methodology including the method for the removal of the TW off-site; (iii) provision of detailed construction procedure with safety precautionary measures; and (iv) ensuring all fatal and major risks have been fully identified so they will be eliminated in the design.	**TWS** **CM** + TWC
For specific design packages where TWD already has sufficient information to proceed the design (e.g. detailed design following a tender design) and no additional requirements from TWS and TWC are needed, then Form T2 may not be needed, and the design may proceed without a T2. In this case, sign off from EM/CM is required during the regular review meetings and clearly identified on the T1 Master schedule.	
For Risk Category A/B TW design packages, EM and TWC shall hold focussed package-specific TW workshops to communicate requirements of the Form T2, brainstorm risks and clarify any queries therein. CM and TWS and other key members from the construction team and/or subcontractors shall attend to agree on the content of the T2. The objectives of the workshops are to: (i) identify specific TW risks to be eliminated in the design that are likely to arise throughout the full life usage of the TW covering all phases of erection, use and dismantling; and (ii) evaluate the likelihood and consequence of unforeseen scenarios (e.g. unforeseen underground obstructions, uncertainty in interfacing construction sequence, etc.) and any particular scenarios for change that should be accommodated in the design. Notes: If multiple scenarios are to be considered, this should be made clear in Form T2 as designers will by default, design for a single scenario.	**EM** **TWC** + CM TWS TWD

ACTION	BY
TWS under the supervision of CM shall revise, update and re-issue Form T2, if there are changes in the design requirements during the design development stage. In cases where major change is required in the design drawings, but the drawings have already been certified and released for construction, a new T2 (with new T2 document no.) should be issued. Notes: T3 forms should NOT be issued to change designs during the initial design development stage of the TW lifecycle. Only update of the T2 is needed.	**TWS** **CM** + TWC + TWD

8.3.2 *Task Review Workshop*

ACTION	BY
TWD, upon receiving Form T2, shall prepare alternative TW design options to address the following competing objectives: (i) DfS objectives to ensure the works can be installed, used and removed in the safest possible manner; and (ii) optimization objectives of the contractor, in terms of cost, materials, reuse, method and programme. After preparing schematic concepts of available alternative TW design solutions, TWD shall coordinate with TWC to arrange a task review with the contractor's project-based team.	**TWD**
TWC shall arrange and participate in the task review workshop to agree and reach consensus on the appropriate TW design solution amongst the options presented by TWD considering a balanced view of competing DfS objectives and TW optimisation objectives. During the task review workshop, the Hazard Checklists[11] are to be referred to as a guide to prompt discussion on the different potential safety hazards and mitigation measures. The Hazard Checklists are useful as an aid but are no substitute for experience and judgement by competent professionals and competent safety personnel. Sample Hazard Checklists are given in Appendix E.	**TWC** + TWD TWS EM CM + CR

[11] Hazard Checklists should be used as an aid in the identification of hazards and subsequent measures to eliminate or mitigate such hazards. They are a useful guide when carrying out systematic risk assessment. They are however not a substitute for experience and judgement, and when carrying out task review workshops and task specific risk assessments, suitably competent and experienced individuals should be involved.
Hazard Checklists should be based on common high potential risks, as well as specific hazards which may be the focus of the industry as a whole or from recent accident investigations and statistics. Ideally, Hazard Checklists should be maintained at corporate level and shared among industry partners (See Guidance Notes on Construction Design Management and Design for Safety (ETWB, 2006)).

ACTION	BY

Human factors should also be addressed in the task review workshop. The following should be considered (see Appendix 5 of Guidance Notes of Design for Safety (DEVB, 2016)) :

(i) design of job to match known strengths and limitations of person or team doing it;
(ii) selection of individuals matched to the needs of the job; and
(iii) definition of role and responsibility of management within the organization for all aspects of work and work design.

Holding a task review workshop prior to proceeding to the TWD detailed design is intended to minimise the chances of abortive design work. In the event that consensus cannot be reached amongst the project team, CR shall make the ultimate decision on the appropriate TW design solution amongst the available options.

TWS shall record the outcome of the task review workshop in Form T2, which is to be endorsed by TWS or CM to indicate clear decision to TWD on the appropriate TW design solution taking into account the competing DfS objectives and TW optimisation objectives. — **TWS / CM / EM**

In the case that the TW design solution is obvious, and options are not required; or circumstances where TWS expressly requests a particular TW design solution without the need for a task review workshop, TWS should provide an indication in Form T2 that a task review workshop is not required. To formalise this step, sign off must be obtained from EM/CM during the regular review meetings. In the case of urgency, ad hoc meetings should be held for sign off.

8.3.3 Design and Risk Assessment

ACTION	BY

TWD shall prepare the TW design according to details given in Form T2 and the task review outcome addressing the following: — **TWD**

(i) provision of adequate access, working space, etc., to all work faces throughout the erection and dismantling process;
(ii) coordinated installation, maintenance and removal methodology including the method for the removal of the TW off-site;
(iii) provision of detailed construction procedure with safety precautionary measures; and
(iv) fatal and major risks and their elimination in the design meeting the DfS objective.

Risks shall be mitigated as far as possible by TWD during the detailed design process. Residual design risks shall be identified on drawings in concise and easily understandable terms clearly stating contingencies and actions to be taken in the event of the risk becoming evident.

ACTION	BY
EM and TWC shall circulate the draft design development drawings to CM, TWS and other key members from the construction team and/or subcontractors, and coordinate the process of review, comment and update of the design until the TW design sufficiently satisfies the requirements of Form T2.	**EM** **TWC** + CM TWS TWD

8.3.4 Design Review, Approval and Certification

ACTION	BY
TWC shall ensure all designs are checked in accordance with the requirements of this TW procedure by the appointed ICE. TWC shall coordinate circulation of the design to relevant parties for input/comment and to ICE for comment and agreement. TWC shall keep TWS informed of design revisions which occur during the review stage to ensure the construction team are kept informed and aware.	**TWC** + TWD TWS
ICE shall review, comment and when the design is found satisfactory, certify the design. ICE shall chop each certified design drawing.	**ICE**

Notes: For projects where an ICE is not specified by the Client under the main contract or no T5 Person for TW is required statutorily, if the TWD is an external consultant employed by the Contractor and the TW Design is checked and signed off by an appropriately qualified person (e.g. an RSE/RGE/RPE with relevant experience in the TW design being endorsed), then the requirement for an additional ICE check would be optional under this plan.

Notes: There may be other contract requirements for the design to be approved by the Client, the Engineer or other Government Authorities. However, in no case should approval by the Client or Engineer or other Government Authority relieve any of the persons identified under this TW procedure from their responsibility to comply with this TW procedure.

8.3.5 Drawings Released for Construction

ACTION	BY
TWC shall chop and sign each ICE certified drawing or sketch as "Released for Construction" (RFC) and distribute them to all relevant departments. The risk category of TW that has been allocated and the date should be clearly indicated in the RFC chop.	**TWC**

8.4 Procurement and Construction

8.4.1 Procurement

ACTION	BY
In the situation a subcontractor is required to carry out the works and not yet procured during this stage, potential subcontractors should respond during the procurement process to the residual risks noted by the TWD, and other high potential risks noted in the subcontract documents. The response to these risks should form part of the subcontractor	**TWS**

ACTION	BY

assessment process. During the procurement process, potential subcontractors should also be given the opportunity to suggest design safety enhancements where applicable.

TWS shall ensure all materials (whether new or used) comply with the design requirements at the time they are used. TWS shall consult TWC, if there is doubt, in particular in situation where specialist subcontractors engaged to carry out the works wish to propose changes to the sequence, construction method, or material sizes / composition.

Notes: Any request for change after the design certification by ICE, including substitution or relaxation in materials or change in construction sequence or methodology, must be referred to TWD using Form T3 (see Section 8.5.1).

8.4.2 Subcontractor Review Workshop

ACTION	BY
Following award of each subcontract and before commencement of associated works, it is a good practice that the construction team and other relevant parties organise a workshop with the subcontractors to systematically review the sequence and method, identify the risks inherent in the TW construction, as well as those from adjacent activities, and then devise measures to avoid those hazards. The Hazard Checklists (see Section 8.3.2) should be used as an aid to this systematic review although again it is stressed that these cannot replace experience and judgement, and appropriate competent personnel should be involved in the risk assessment process, in particular those who will be carrying out the works. The outcome of this workshop would contribute to the preparation of the Construction Method Statement and Risk Assessment. It is also encouraged at this workshop that the subcontractor is asked if they have any suggestions for design amendment which could result in reducing risk to the works. Any feasible suggestions should then be the subject of a task review workshop to determine whether a Form T2 should be raised to amend the design. In the case that subcontractors are on board during the development of the design then it is expected that subcontractors, as appropriate, would participate in the task review workshop as described in Section 8.3.2.	**TWS** **CM**

8.4.3 Construction Method Statement

ACTION	BY
TWS under the supervision of CM shall prepare a safe Construction Method Statement (CMS) that is consistent and compatible with the Released for Construction (RFC) design drawings, highlighting the residual risks identified by the permanent works designer at the permanent works design stage, including contingencies and actions to be taken in the event of the risk becoming evident. The Safety Officer should be consulted on the CMS for any safety precautionary measures required for the works, e.g. the requirements for PPE in erecting, using and dismantling of the TW.	**TWS** **CM**

ACTION	BY
EM and TWC shall review the CMS and check that it complies with the RFC design drawings.	**EM TWC**

8.4.4 Inspection and Test Plan

ACTION	BY
TWS shall prepare a comprehensive task-specific Inspection and Test Plan (ITP) indicating the hold points[12] required during the installation, erection and dismantling of the TW, frequency of inspections (including those required under the Supervision Plans, responsible personnel, required records and acceptance criteria). Hold points are particularly needed for the following: (i) after completion of TW installation/erection and prior to loading; (ii) prior to each interim stage of loading or change of loading where the loads are applied in stages or repetitive cycles (e.g. strutted cofferdam, climbing form for high rise structures, segment launching girders, or other partial TW construction with loading applied in stages); (iii) after partially completing "critical elements" of TW installation/erection where further construction works will otherwise obscure inspection of the as-built condition (e.g. critical structural connections for which future access will be impeded by the completed TW installation/erection); (iv) falsework supporting reinforced concrete construction (in this case, two-stage hold points shall be implemented: the first sign-off prior to the commencement of rebar fixing and the second sign-off prior to concreting); (v) checking of temporary supports for dismantling of the TW (only if Form T4 is required); and (vi) other specified hold point specified by TWD in the drawings.	**TWS**
EM and TWC shall review the hold points identified in the ITP and coordinate with the TWS to update the ITP where necessary to ensure it is consistent and compatible with the design expectation and this procedure. If there is any uncertainty, EM and TWC shall seek clarification from TWD to check whether the ITP reflects controls and the needs for some particular hold points, etc.	**EM TWC** + TWD

8.4.5 Site Works

ACTION	BY
TWS shall proceed the work on site only after the RFC drawings have been received.	**TWS**
TWS shall review the quality and type of TW materials delivered against the requirements, and if in any doubt, separate them to avoid unintended use until resolved. For any uncertainties relevant to the design, TWS shall refer the case to TWC for assessment and coordination with TWD for comment.	

[12] At hold point, work cannot proceed further without the signing off by TWS and TWC in Form T4.

ACTION	BY
TWS shall brief the construction team, including the foremen, subcontractors, and other relevant staff on the agreed methods for access, installation and removal, the risks identified and the engineering aspects of the design highlighting those areas that are critical to the safety and performance of the TW. TWS shall ensure daily activities are planned and implemented to identify, evaluate and control any new risks arising at each and every work shift using daily control mechanisms such as task specific reviews and risk assessments coordinated with the installation crews. TWS shall check and ensure all plant, vehicles, lifting appliances or equipment used in the TW erection, operation and dismantling are operated by competent persons in accordance with pre-planned and safe construction method statements.	**TWS**

8.4.6 Site Inspections/Checking

ACTION	BY
TWS shall carry out inspections/checking as specified in the CMS and ITP. In addition to the hold point inspections, TWS shall carry out formal inspections at least once in a week when the temporary works are in service to ensure they remain compliant. Notes: The inspections shall be recorded and retained in the TW file. The defects identified shall be reported to TWC, rectified and re-tested/inspected, in compliance with the design.	**TWS**
TWS shall conduct inspections of temporary works, in particular falsework and scaffolds, immediately after adverse weather conditions, such as heavy rain, high winds, etc., and record the inspection details in the TW file. TWS, in collaboration with TWC, shall conduct regular site checks to identify if there is any TW that is being used on site but not registered in the Master Schedule or not yet properly designed, and take appropriate action to prohibit the use of un-registered TW.	**TWS**

8.5 Management of Change

8.5.1 Design Change and Changes During Construction

ACTION	BY
In case of a need for design change[13] during the works after the RFC drawings have been issued, TWS shall initiate the design change process as soon as the change is identified. Form T3 (Design Change), as that given in Appendix C, shall be used. TWS shall prepare Form T3 and issue it to TWC for follow-up checking and coordination.	**TWS** + TWC

[13] The design change could be due to (i) unforeseen circumstances or obstructions; (ii) construction carried out not in accordance with the design; changes in construction sequence or methods; or (iv) any other divergence from the RFC drawings

	ACTION	BY

The change should not proceed on site until the Form T3 has been confirmed. The risk category of the Form T3 shall usually match that in Form T1. However, in exceptional circumstances, when approved by EM, the T3 risk category may be lower (or higher) than that in T1.

Notes: Changes to the temporary works design should only be accepted only after a risk assessment, including consideration of human factors (see Section 8.3.2), and a review of the safety and compatibility with the initial design have been made, and involvement of TWD and ICE is needed in this respect.

TWC shall review the completeness of Form T3, and once satisfied, coordinate the process of checking, review, commenting and certification of Form T3 amongst TWD and ICE as well as ensuring: — **TWC** + TWD ICE + EM TWS CM

(i) TWS is satisfied with the proposed solution to address the change; and
(ii) CMS and ITP for the works are reviewed and updated (as required) to reflect the change.

If TWD or ICE does not agree to modify the design, then EM and TWC shall work with TWD and ICE to develop solutions that are mutually acceptable with TWS and CM.

TWD shall review the proposed change contained in Form T3 and deliver the proposed design solution to address the change. The proposed design solution shall be documented by either of the following methods: — **TWD**

(i) attaching the proposed design solution, in form of hand mark-up on the drawings and/or supplementary sketches, notes and details, to Form T3 and endorsing Form T3 for onward ICE verification and countersigning; or
(ii) revising the original design drawings and issuing an amendment design submission for review, checking and approval (in this case, Form T3 will lapse and become redundant after the change has been incorporated into the revised RFC drawings).

Notes: There is no strict guidance on the method to be adopted. Simple changes are usually best addressed via T3 whilst more complex comprehensive changes are better addressed by amendment drawings.

ICE shall review and comment the proposed design solution, and when satisfied, certify Form T3. ICE shall chop every page of the certified Form T3, and the relevant sketched / marked-up plans. — **ICE**

Notes: For projects where an ICE is not specified by the Client under the main contract or no T5 Person for TW is required statutorily, if the TWD is an external consultant employed by the Contractor and the TW Design is checked and signed off by an appropriately qualified person (e.g. an RSE/RGE/RPE with relevant experience in the TW design being

ACTION	BY
endorsed), then the requirement for an additional ICE check would be optional under this plan.	

8.5.2 Form T3 Released for Construction

ACTION	BY
TWC shall put the chop "Released for Construction" (RFC) on the front page of the ICE certified Form T3, with the risk category of the temporary works and the date clearly marked.	**TWC**
TWC shall chop every page of the ICE certified Form T3, showing clearly the Form T3 ref. no. and total number of pages. TWC shall then distribute the RFC Form T3 to those who require them. The completed RFC Form T3 will be treated in a similar manner to the approved RFC drawings.	**TWC**
TWC shall check that the concerned parties are notified appropriately of the design change and issue the RFC Form T3, using the project electronic document control system or distributing the hard copy with a notification chop on the affected drawings.	**TWC**

8.6 Verification of As-builts and Safe Removal

8.6.1 Temporary Works Installation / Erection and Permit to Load

ACTION	BY
TWS shall inspect and check the TW during installation/erection at the required hold points identified in the ITP (Section 8.4.4) including any necessary testing on the materials and connections to ensure they are constructed in accordance with the RFC drawings and RFC Form T3(s) and bring up any matters of concern to TWC/EM and CM, as necessary.	**TWS**
TWC shall keep abreast of the progress of the TW construction on site by: (i) communicating with TWS and the construction team; (ii) visiting the site during the critical stages of the TW installation/erection; (iii) carrying out inspections in advance of the hold points for new TW construction activities or when a new subcontractor or other new staff are employed on site; (iv) engaging TWS and other responsible persons in the construction team including, where appropriate, the subcontractors in face-to-face discussion to understand their concerns and convey to them the critical TW design assumptions, TW knowledge, critical elements of the TW under construction (e.g. critical connection details, major TW load path, etc.); and (v) forewarning the construction team of the elements of the TW including the testing requirements to ensure the construction quality that will be closely scrutinized during the inspection for the Permit to Load to ensure that the TW installation/erection standards are met.	**TWC** + TWS
TWS shall initiate the Permit to Load application when the TW construction or a stage of the TW construction is substantially completed and is ready for loading. Form T4 (Permit to Load/Remove) shall be used.	**TWS**

ACTION	BY
TWS shall check that the completed TW are constructed in accordance with the RFC TW drawings and RFC Form T3(s) (if any) and **visualise the forthcoming changes in the load path (both vertical and lateral loads) through the as-built TW structure and foundation and pay particular attention to the critical elements of the as-built TW construction**. When satisfied, TWS shall endorse Form T4 and issue it to TWC for checking. If there are elements of the as-constructed TW that TWS is not satisfied, TWS shall communicate with the responsible persons within the construction team and/or subcontractors to rectify the TW. Notes: Where appropriate, TWS shall raise Form T3 in accordance with Section 8.5.1, if the identified deficiencies cannot be rectified in accordance with the RFC design.	**TWS**
TWC (and ICE where required) shall, upon receipt of Form T4, check the completed TW are constructed in accordance with the RFC TW drawings and RFC Form T3(s) (if any), and **visualise the forthcoming changes in load path (both vertical and lateral loads) through the as-built TW structure and foundation and pay particular attention to the critical elements of the as-built TW construction**. When satisfied, TWC (and ICE where required) shall endorse Form T4 and keep the records properly in a centralised filing system. If there are element of the as-constructed TW that TWC (and ICE where required) is not satisfied, TWC shall communicate with TWS and the construction team and/or subcontractors to rectify the TW. Notes: For projects where an ICE is not specified by the Client under the main contract or no T5 Person for TW is required statutorily, the requirement for an ICE check of the as-built TW construction would be optional under this plan. Notes: In some cases, it may be necessary to impose an expiry date on Form T4 beyond which a new Form T4 is needed, and the TW shall be re-inspected. Some examples are: (i) TW subjected to corrosive environments over a very long lifespan; (ii) falsework scaffolds with removable tube and fitting bracing where the bracing may be inadvertently removed over time; or (iii) interfacing activities which could potentially cause instability of the as-built TW (e.g. demolition of adjacent structures which may be supporting TW lateral loads).	**TWC** + **ICE** (required if specified in the contract and for Risk Cat A only)
TWS shall proceed loading of the TW and/or the next stage of construction only after Form T4 has been approved. TWS shall display and maintain a hard copy of the approved Form T4 on the TW (unless this is impractical).	**TWS**

8.6.2 Permit to Remove and Temporary Works Dismantling

ACTION	BY
TWS shall identify whether a Permit to Remove is required based on the following rules:	**TWS**

Permit Required	Permit Not Required
TW are still loaded at the time of removal and the removal will result in a change in	TW are no longer loaded at the time of removal and the removal will not result in

ACTION		BY
load path to other structures (e.g. soffit formwork, excavation struts).	a change in load path to other structures (e.g. wall and column formwork, temporary decks).	
Certain criteria or conditions need to be satisfied before TW removal as stated in the design drawing.		

TWS shall initiate the Permit to Remove application, if it is required, before the TW is removed. Form T4 (Permit to Loads/Remove) shall be used. TWS shall **visualise the forthcoming changes in load path (both vertical and lateral loads) and pay particular attention to the adequacy and stability of other structures during and after removal of the TW structure**. If there are elements of the forthcoming TW removal that TWS is not satisfied, TWS shall communicate with the responsible persons within the construction team and/or subcontractors to rectify the situation. When satisfied, TWS shall endorse Form T4 and issue it to TWC for further checking. **TWS**

TWC shall, upon receipt of Form T4, check that the TW are ready for removal. TWC shall **visualise the forthcoming changes in load path (both vertical and lateral loads) and pay particular attention to the adequacy and stability of other structures during and after removal of the TW structure**. If there are elements of the forthcoming TW removal that TWC is not satisfied, TWC shall communicate with TWS and the construction team and/or subcontractors to rectify the situation. When satisfied, TWC shall endorse Form T4, and keep the records in the centralised filing system. **TWS**

Notes: The TW dismantling process covers removal of the TW off-site, including the disassembling/dismantling the TW into small components to facilitate the removal, if needed.

--- end of TW Lifecycle –

BIBLIOGRAPHY

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APPENDIX A – TEMPORARY WORKS RISK CATEGORIES

TABLE A1 – Determination of Qualified Persons According to TW Risk Category

Risk Category	TW Complexity	TW Designer	ICE Verification	TW Site Inspection and T4 Sign Off
A	MAJOR / COMPLEX	TWD is normally a reputable and competent engineering design consulting firm or specialist subcontractor^	ICE is normally a reputable and competent engineering design consulting firm^ independent of TWD (no holding, subsidiary, employer/employee or any other relationship)	TWC (and ICE - required only if specified in the contract)
B	MEDIUM/ SIGNIFICANT			TWC
C	MINOR / SIMPLE	TWD can be a qualified engineer of appropriate stream of membership of HKIE or equivalent or a competent design engineer with relevant working experience	ICE can be a RPE (civil/ structural/ geotechnical) with relevant working experience independent of TWD	TWC

^ Reputable and competent engineering design consulting firm include firms which are member firms of the Association of Consulting Engineers of Hong Kong, The Association of Registered Engineering Consultants Limited, etc. In this connection, the firm or specialist subcontractor should assign its employee whose qualification and experience be not inferior to a TCP of grade T5 for the tasks.

TABLE A2 – Risk Category Typical Examples

Typical TW	Examples		
	Risk Category A	Risk Category B	Risk Category C
	MAJOR / COMPLEX	MEDIUM / SIGNIFICANT	MINOR / SIMPLE
General	1. Tower crane bases and other support (e.g. wall ties) 2. Propping of existing structures 3. Bridge erection schemes 4. Batching Plant 5. Any works adjacent to operational railways	6. Warehouses / sheds 7. Temporary site compound facilities 8. Noise enclosures / Temporary roofs	9. Reinforcement stability checks 10. Minor temporary site compound facilities
Falsework / Formwork	11. Complex falseworks systems or any proprietary falsework system > 20m high 12. Falsework supporting inclined loads 13. Mechanised formwork systems 14. Single sided formwork > 6m high 15. Inclined formwork systems (except minor stairs/cranked beams) 16. Suspended scaffolds / platforms	17. Any proprietary falsework system 10m-20m high (or >2 storeys) 18. Any proprietary falsework system supporting > 1.4m thick slab 19. Scaffold supporting loading platforms (>5kPa) 20. Working platform (>5kPa) 21. Cantilever scaffold (>0.9m) and 'bridge over' scaffolds > 3m using proprietary system 22. Double sided formwork > 3m high 23. Single sided formwork 3-6m high 24. Column forms > 10m high 25. Complex back-propping systems	26. Any proprietary falsework system < 10m high (or 2 storeys) 27. Table forms or repetitive formwork systems 28. Scaffold supporting loading platforms (>1.5kPa and < 5kPa) 29. General duty working platform (>1.5kPa and < 5kPa) 30. 'Bridge over' scaffolds using proprietary system < 3m 31. Column forms < 10m high 32. Double sided formwork > 0.4m and < 3m high 33. Single sided formwork > 0.4m and < 3m high 34. Scaffolding access on slopes 35. Weather retaining scaffold structure or subject to high wind loads 36. Simple back-propping systems
Platforms / Ramps / Covers	37. Traffic Decks and vehicle parapets 38. Working platforms for plant / cranes / piling rigs 39. Barging points / Marine loading ramps 40. Steelwork platforms supporting mobile / crawler cranes 41. Temporary steelwork structures over public areas	42. Earth platforms and ramps (on sloping sites) for construction traffic or crawler crane	43. Small span platforms with light loading 44. Drilling rig shallow platforms 45. Covers to protect utilities / openings 46. Earth platforms for cranes < 120T
Excavation and Lateral Support	47. Ground support schemes > 4.5m deep 48. Strutted excavations > 4.5m deep 49. Excavations with complex strutting schemes 50. Excavations adjacent to sensitive structures 51. Excavations with strutting imposing high loads on other structures	52. Ground support schemes 2.5m – 4.5m deep (Note 1) 53. Strutted excavations 2.5m – 4.5m deep 54. Open cut excavations > 4.5m deep 55. Major temporary support to utilities suspended over excavations	56. Ground support schemes < 2.5m deep 57. Strutted excavations <2.5m deep 58. Open cut excavations 1.2m - 4.5m deep 59. (Open cut < 1.2m are exempt unless adjacent to slope or sensitive receivers) 60. Vertical blinding < 3m deep 61. Minor temporary support to utilities suspended over excavations
Geotechnical/ Site Formation	62. Deep dewatering and re-charge schemes 63. Loading on existing sea walls 64. Ground improvement schemes 65. Pipe jacking	66. Pump test design reviews 67. Pile load tests 68. Ground support for mobile crane outriggers	69. Earth haul roads / platforms < 3m high
Hoardings / Fences / Barriers	70. Catch fans over public areas 71. Catch fans adjacent to operational railways 72. Vehicle parapets	73. Hoardings / fences > 3m high 74. Catch fans over site area	75. Hoardings / fences < 3m high 76. Internal hoardings / partitions 77. Non-proprietary edge protection systems / fences / gates
Lifting / Falling Objects	78. Heaving lifting and hoisting schemes > 25T 79. Jacking or underpinning schemes	80. Temporary lifting and hoisting systems (5-25T) 81. Man cages / general lifting receptacles / cages 82. Hoists 83. Complex lifting frame with complex CoG 84. Complex lifeline systems	85. Temporary lifting and hoisting systems (<5T) 86. Simple life line systems 87. Scaffolding / tower lifting
Mechanical Works	88. Temporary Ventilation Systems	89. Support frames for E&M equipment lifts	90. Temporary drainage systems and diversions 91. Temporary support of miscellaneous temp. E&M equipment (<1T)
Note:	1. The depth of the ground support scheme is changed from 2 m to 2.5 m to tie in with the requirements given in BD (2012) that ELS plans will be required to be submitted to BD for approval where the excavation works to be carried out are deeper than 2.5 m and greater than 5 m in length.		

APPENDIX B – FLOWCHART FOR DESIGN FOR SAFETY PROCESS

Ref.	Temp. Works Mgt. Plan	Parties involved		Output
		Lead	Support	
8.2.3	Risk Categories and Temporary Works Master Schedule	**EM**	TWC	T1
8.2.4	Kick-off Meeting Regular Review Meetings	**EM**	CR CM TWC TWS TWD	T1 Update
8.3.1	Design Brief	**TWS**	CM TWC	T2 Safety criteria
8.3.1	Package-specific Workshop Cat. A/B Temp. works	**EM**	TWC CM TWS TWD	Brainstorming hazard & impacts Alternative design solutions
8.3.2	Task Review Workshop Cat A/B/C Temp. Works	**TWC**	TWD TWS EM CM CR Subcontractor (?)	Detailed risk assesment Detailed mitigation measures using hazard checklists TW design solution
8.3.3	Design and Risk Assessment (Iterative process)	**TWD**	EM TWC CM TWS TWD	Final design Identified risks
8.4.1	Procurement	**TWS**	Subcontractor (Tendering)	Response of subcontractors to identified risks taken into account in tender assessment
8.4.2	Subcontractor Review Workshop	**TWS**	CM Subcontractor	Risk mitigation measures, design alternatives and suggestions for Method Statement
8.4.3 8.4.4	Construction Method Statement ITP	**TWS**	CM EM TWC TWD	Method Statement and ITP
8.5	Management of Change	**TWS**	TWC TWD ICE EM TWS CM	T3

APPENDIX C – SAMPLE TEMPORARY WORKS FORMS

Form T0 (Appointment of Qualified Persons)

Form T1 (Master Schedule)

Form T2 (Design Brief)

Form T3 (Design Change)

Form T4 (Permit to Load/Remove)

CONSTRUCTION INDUSTRY COUNCIL 建造業議會

Temporary Works FORUM

T0 APPOINTMENT OF QUALIFIED PERSONS

Job No.:	J584	Project:	Contract No. MRE855 Mountain Rail Extension, Peak Station and Eastern Approach Tunnels

Details of Appointee	Name	Years of Experience	Other Relevant Qualifications / Evidence of Experience (e.g. attach CV)
	Adam Ho	9	see attached CV

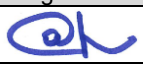
Appointment to the position of		Responsible Person		Accountabilities and Competencies
	☐	TW Engineering Manager	EM	• has sufficient seniority and competence to manage overall TW design and compliance for the project including overall implementation of this TW procedure; for large scale projects involving complex Category A and B TW, 10 years' experience is a minimum requirement; for small scale projects, this role may be covered by a TWC with 7 years' experience • has sufficient knowledge and experience in the design of TW for the project and is responsible to provide effective co-ordination between designers and construction teams to achieve optimised and safe TW solutions
	☐	TW Construction Manager	CM	• is based full time on site and responsible for the overall development of the Construction Method Statement • has sufficient seniority with competencies and sufficient years of experience commensurate with the scale and complexity of temporary works to be constructed
	☒	TW Supervisor	TWS	• is based full time on site and reports directly to the CR but with functional reporting to the EM on engineering matters • is of sufficient calibre and competence to take responsibility for detailed implementation of TW construction on site for the nature and complexity of the TW for which he is responsible; for Category A and B TW, 7 years relevant construction experience is a minimum requirement;
	☐	TW Coordinator	TWC	• is based full time on site and reports to the EM • has sufficient experience in the relevant nature and complexity of TW for which he is responsible; for Category A and B TW, 7 years relevant experience is a minimum requirement
	☐	TW Designer	TWD	• has sufficient design competence and design experience which is commensurate with the nature and complexity of TW design for which he is responsible to deliver; for Category A and B TW, the TWD is normally a reputable engineering design consulting firm or specialist subcontractor; for Category C TW, the TWD can be a qualified engineer of appropriate stream of membership of HKIE or equivalent or a competent design engineer with relevant working experience
	☐	Independent Checking Engineer	ICE	• has sufficient design competence and design experience which is commensurate with the nature and complexity of TW design for which he is responsible to verify and certify; for Category A and B TW, the ICE is normally a reputable engineering design consulting firm independent of the TWD; for Category C TW, the ICE can be a registered professional engineer (civil, structural or geotechnical as appropriate) with relevant working experience independent of TWD
	NOTE: Please refer to Section 7 for elaboration of required accountabilities and competencies for Responsible Persons.			

Permitted Temporary Works Risk Categories				
	☐	Risk Categories (specify which risk categories)	A	☐
			B	☐
			C	☐
	NOTE: Responsible Persons shall only be appointed as responsible for TW risk categories for which they are competent.			

Permitted Types of Temporary Works Covered by Appointee						
	☐	All Types of Temporary Works				
	OR	(specify below limitations on Temporary Works coverage) *NOTE: Refer Appendix B Table B2 for typical Types of Temporary Works*				
	☐	Limited Types of Temporary Works	☐	Falsework / Formwork	☐	Lifting / Falling Objects
			☐	Platforms / Ramps / Covers	☐	Mechanical Works
			☐	Excavation and Lateral Support	☒	Other (specify below)
			☐	Geotechnical		
			☐	Hoardings / Fences / Barriers		
	NOTE: Responsible Persons shall only be appointed as responsible for types of TW for which they are competent.					

Additional Training Needs	Safety Leadership Training, Scaffold Appreciation Course

Nominated and Appointed by CR	Contractor's Representative	Signature	Date
	Thomas Li		6 Mar 2017

Agreed and Endorsed by Appointee	The above appointment is agreed by me. I have read the TW procedure and fully understand my accountabilities under the procedure.		
	Appointee	Signature	Date
	Adam Ho		6 Mar 2017

CONSTRUCTION INDUSTRY COUNCIL 建造業議會

Temporary Works FORUM

T1 MASTER SCHEDULE

Job No.:	J584	Project:	Contract No. MRE855 Mountain Rail Extension, Peak Station and Eastern Approach Tunnels

T1 Package No.	TW Package Description	TW Risk Cat	TWD	ICE	TWC	TWS	Date Design Required	Related T2	Related T3	Related T4
A	Contract Wide TW Packages									
A01	TW Geological Drawings	A	Consultant 1	ICE 1	Cecilia Singh	Paul Green	-	n/a	-	-
A02	Contract Wide ELS General Notes & Details	A	Consultant 1	ICE 1	Adam Ho	-	-	n/a	T3-0008	-
A03	Instrumentation and Monitoring Drawings	A	Consultant 1	ICE 1	Cecilia Singh	Kai Tak Chan	20 Mar 17	n/a	T3-0005	-
B	Site Establishment									
B01	Works Area Plans & Site Utilisation Plans	C	Site Eng Team	CK Hau	Cecilia Singh	Andrew Pang	13 Mar 17	T2-0001		-
B02	Project Site Office	B	Specialist Subcon 1	ICE 1	Cecilia Singh	Andrew Pang	13 Mar 17	T2-0003		T4-0001
B03	Hoarding / Fencing	C	Specialist Subcon 2	ICE 1	Cecilia Singh	Andrew Pang	20 Mar 17	T2-0002		T4-0002
B04	Project Signboard	C	Specialist Subcon 2	ICE 1	Cecilia Singh	Andrew Pang	20 Mar 17	T2-0005		T4-0019
C	Station									
C01	ELS & Strutting - Station	A	Consultant 1	ICE 1	Adam Ho	James Steel	1 May 17	T2-0009	T3-0003 T3-0007 T3-0013 T3-0018	T4-0012 T4-0014
C02	ELS & Strutting – Entrance A+B	A	Consultant 1	ICE 1	Adam Ho	James Steel	18 Dec 17	T2-0017		
C03	Construction Decking - Station	A	Consultant 1	ICE 1	Adam Ho	James Steel	11 Sep 17	T2-0012	T3-0014 T3-0019	T4-0020
C04	Temporary Underpinning of Footbridge	A	Consultant 1	ICE 1	Adam Ho	James Steel	17 Apr 17	T2-0007 T2-0015	T3-0012	T4-0006
C05	Settlement Reducing Pretreatment Grouting	A	Specialist Subcon 3	ICE 1	Cecilia Singh	Paul Green	24 Apr 17	T2-0008		T4-0010
C06	Formwork - Station In-Situ Walls	B	Specialist Subcon 4	ICE 1	Adam Ho	James Steel	16 Apr 18			
C07	Steel Shutters - Station Column Moulds	B	Specialist Subcon 4	ICE 1	Adam Ho	James Steel	16 Apr 18			
C08	Formwork & Falsework - Station Slabs	B	Specialist Subcon 4	ICE 1	Adam Ho	James Steel	21 May 18			
C09	Formwork & Falsework – In-situ Staircases	B	Specialist Subcon 4	ICE 1	Adam Ho	James Steel	4 Jun 18			
D	Approach Tunnels									
D01	Demolition – Hay Road Flyover	A	Specialist Subcon 5	ICE 1	Tom West	Rachel Wong	31 Mar 17	T2-0004	T3-0001 T3-0002 T3-0004	T4-0003 T4-0005 T4-0008
D02	Temporary Worker Access Footbridge – Hay Road Flyover	C	Site Eng Team	CK Hau	Tom West	Rachel Wong	31 Mar 17	T2-0006		T4-0004
D03	D-Wall Guide wall	C	Specialist Subcon 3	ICE 1	Cecilia Singh	Paul Green	10 Jul 17	T2-0011		T4-0015 T4-0016 T4-0018
D04	ELS & Strutting – Approach Tunnels	A	Consultant 2	ICE 1	Tom West	Rachel Wong	10 Jul 17	T2-0013	T3-0006 T3-0009 T3-0010 T3-0011 T3-0017	T4-0011 T4-0012
D05	ELS – Shallow Utility Diversions	C	Site Eng Team	CK Hau	Tom West	Rachel Wong	12 Jun 17	T2-0012	T3-0008	T4-0007 T4-0009
D06	ELS – Box Culvert Diversion	B	Consultant 2	ICE 1	Tom West	Rachel Wong	28 Aug 17	T2-0014	T3-0015 T3-0016	
D07	Traffic Decking - Tunnels	A	Consultant 2	ICE 1	Tom West	Rachel Wong	20 Nov 17	T2-0016		
D08	Construction Decking - Tunnels	A	Consultant 2	ICE 1	Tom West	Rachel Wong	22 Jan 18	T2-0018		
D09	Formwork – Tunnel In-Situ Walls	B	Specialist Subcon 4	ICE 1	Tom West	Rachel Wong	23 Jul 18			
D10	Formwork & Falsework – Tunnel Roof Slab	B	Specialist Subcon 4	ICE 1	Tom West	Rachel Wong	17 Sep 18			
E	Traffic									
E01	TTM1 – Hay Road Flyover Demolition	A	Consultant 3	ICE 2	Cecilia Singh	Andrew Pang	20 Mar 17	n/a		n/a
E02	TTM2A – Stack Street Stage A	A	Consultant 3	ICE 2	Cecilia Singh	Andrew Pang	15 May 17	n/a		n/a
E03	TTM2B – Stack Street Stage B	A	Consultant 3	ICE 2	Cecilia Singh	Andrew Pang	13 Nov 17	n/a		n/a
E02	TTM3 – Box Culvert Diversion	A	Consultant 3	ICE 2	Cecilia Singh	Andrew Pang	7 Aug 17	n/a		n/a
E04	TTM4 – Entrance A+B	A	Consultant 3	ICE 2	Cecilia Singh	Andrew Pang	18 Dec 17	n/a		n/a

Note: As stated in Section 8.2.3, these fields and columns below may be omitted from the T1 if they can be audit traceable against unique T1 package numbers via other project systems (e.g. separate tracking schedules and or electronic document management systems).

CONSTRUCTION INDUSTRY COUNCIL 建造業議會

Temporary Works FORUM

T2 DESIGN BRIEF

Job No.:	J584	Project:	Contract No. MRE855 Mountain Rail Extension, Peak Station and Eastern Approach Tunnels

T1 Ref.No.	D06	Design Package	ELS – Box Culvert Diversion	Design Brief No.	**T2-0014**

Brief Description of the Works to be Designed

Please deliver the ELS design for the box culvert diversion following the tender scheme but with changes as follows:

- construction sequence to be amended to suit revised TTM3 sequence (details attached) as well as the revised construction sequence of interfacing contract MRE854 which will now excavate after MRE855 instead of before
- take into account the attached updated information

Are the Following Major Risks Applicable?

Working at height	Heavy lifting	Plant movement	Working over water	Confined space	Working near live services	Seasonal constraints
☒ yes ☐ no	☐ yes ☒ no	☒ yes ☐ no	☐ yes ☒ no	☐ yes ☒ no	☐ yes ☒ no	☐ yes ☒ no

Mitigation Measures to Address Risks

- for the vertical bracing restraint, the designer is requested to specifically develop a safe solution to avoid the need for workers to use cherry pickers or scaffold at the upper connection and instead adopt bolted connection which can be accessed by workers from the S1 strut.

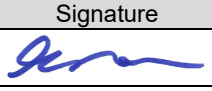
Information Attached to Facilitate the Design

	Documents / Information	Attached	Not Applicable	Remark
A	Construction Method	☒	☐	
B	Risk Information	☐	☒	same as tender
C	Loading Criteria	☐	☒	same as tender
D	Relevant Boreholes / Trial Pits	☒	☐	New GI boreholes attached
E	Other Ground Information	☐	☒	same as tender
F	Survey / Ground Levels	☒	☐	see attached survey
G	Utilities Information	☒	☐	see attached as-built survey
H	Materials	☒	☐	please reuse steel as per attached
I	As-Built Record Drawings	☐	☒	unchanged since tender
J	Other Relevant Drawings	☐	☒	
K	TTM Information	☒	☐	attached updated TTM proposal
L	Others (specify)	☐	☒	

NOTE: All information necessary to enable TWD to produce the design without need to request further details must be included.

Initiated by TWS	Temporary Works Supervisor	Signature	Date
	Rachel Wong		11 Jun 2017

Temporary Works Risk Category			Design allocated to	Consultant 2	Required design delivery date	31 Jul 2017	Working days notice given	10
	A	☐						
	B	☒						
	C	☐						

Reviewed and Issued by TWC	Temporary Works Coordinator	Signature	Date
	Tom West		13 Jun 2017

Received and acknowledged by TWD	Temporary Works Designer	Signature	Date
	James Chan (Consultant 2)		14 Jul 2017

Task Review Workshop Outcome	TWD to prepare available TW options which address competing DfS objectives and TW optimisation objectives and hold a task review workshop with the Contractor's project team. The agreed TW option is as follows:	Task Review Workshop Date
		27 Jul 2017
	It was agreed to adopt Option 2 presented by the TWD (attached for reference)	

Agreed by TWS or CM	Temporary Works Supervisor or Construction Manager	Signature	Date
	Rachel Wong		27 Jul 2017

CONSTRUCTION INDUSTRY COUNCIL 建造業議會

Temporary Works FORUM

T3 DESIGN CHANGE

Job No.:	J584	Project:	Contract No. MRE855 Mountain Rail Extension, Peak Station and Eastern Approach Tunnels

T1 Ref.No.	D06	Design Package	ELS – Box Culvert Diversion	Change No.	**T3-0016**
Location	TTM2 Stage B at Site Area WA6a				
Element of Works	Strut Layer 2 Knee Brace				
Details of Proposed Change	Due to the change in TTM2 Stage A and B, the extent of temporary Box Culvert Diversion completed during Stage A now clashes with the Stage B knee brace. The designer is requested to adjust the knee brace to avoid clash with completed Stage A temp culvert diversion structure				

RELEASED FOR CONSTRUCTION
批准作建造用途
T1 No.: D06 Risk Cat. 風險類別: B
(signature)
TWC: Tom West Date: 20/9/2017

Design Drawings Affected	Drawings / Sketches Released for Construction	Drawing / Sketch No.	Rev	Drawing / Sketch No.	Rev
		MRE855/EAT/CON2/TW/3001	C		
		MRE855/EAT/CON2/TW/3004	A		

Initiated by TWS or TWD	Temp Works Supervisor or Designer	Signature	Date
	Rachel Wong		11 Sep 2017

T3 Risk Category			Reason for Change	Obstruction caused by completed temp culvert structure during TTM2 Stage A
	A	☐		
	B	☒		
	C	☐		

Change to be endorsed by	TWD	☒	ICE	☒	Required design delivery date	18 Sep 2017

Issued by TWC	Temporary Works Coordinator	Signature	Date
	Tom West		13 Sep 2017

Reviewed / Approved by TWD			Designer's Remarks (if any)	
	Approved	☒		Checked and found satisfactory.
	Rejected	☐		

Change Agreed by TWD	Temporary Works Designer	Signature	Date
	James Chan (Consultant 2)		18 Sep 2017

Reviewed / Approved by ICE			ICE's Remarks (if any)	
	Approved	☒		The proposed change is found satisfactory. ICE CERTIFIED (ICE Chop)
	Rejected	☐		

Change Certified by ICE	Independent Checking Engineer	Signature	Date
	William Tsang (ICE1)		19 Sep 2017

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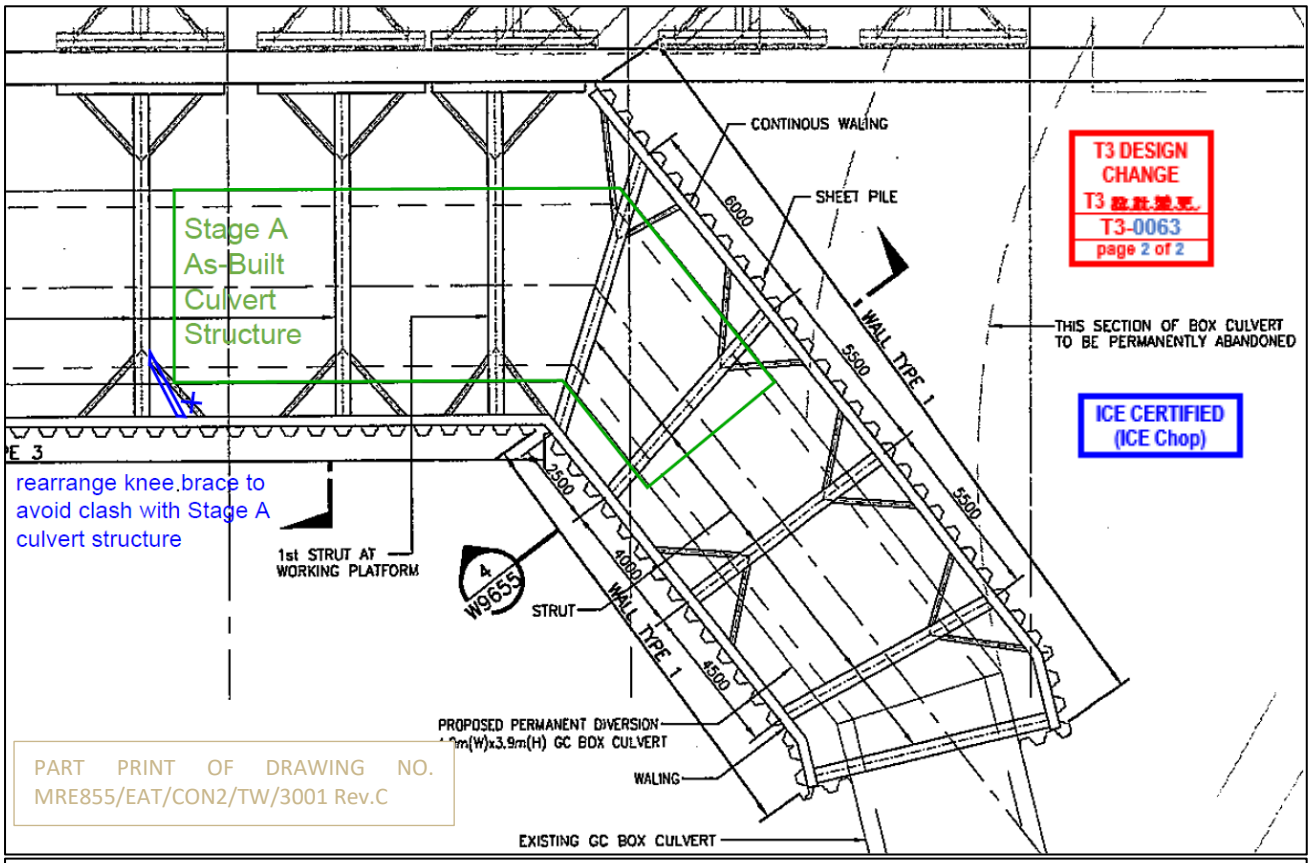
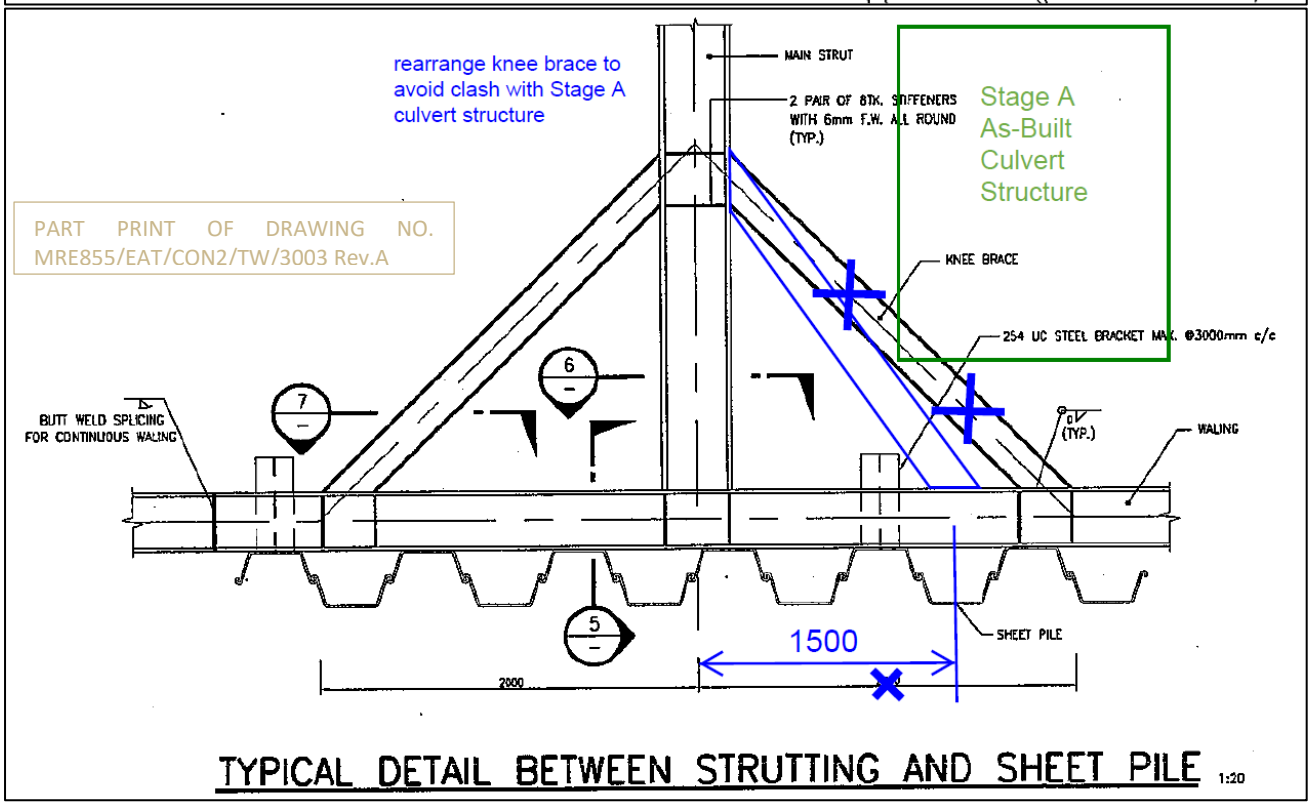
Temporary Works FORUM

T3 DESIGN CHANGE

Job No.:	J584	Project:	Contract No. MRE855 Mountain Rail Extension, Peak Station and Eastern Approach Tunnels





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Temporary Works FORUM

T4 PERMIT TO LOAD / REMOVE

Job No.:	J584	Project:	Contract No. MRE855 Mountain Rail Extension, Peak Station and Eastern Approach Tunnels

T1 Ref.No.	C03	Design Package	Construction Decking - Station	Permit No.	**T4-0020**
Location	Construction Decking – Station				
Element of Works	Construction Deck B at Eastern Portion of WA6a				
Extent of Operation and Construction Activity	Partially completed construction deck B as demarcated in the attached markup plan.				

Constructed in accordance with documents

Drawings / Sketches Released for Construction

Drawing / Sketch No.	Rev	Drawing / Sketch No.	Rev
MRE855/EAT/CON1/TW/6101	C		
MRE855/EAT/CON1/TW/6111	B		
MRE855/EAT/CON1/TW/6112	C		
MRE855/EAT/CON1/TW/6121	A		
MRE855/EAT/CON1/TW/6122	A		

T3 Design Changes

T3 No.	T3 No.	T3 No.	T3 No.
T3-0014			
T3-0019			

Other Reference Documents: Construction Method Statement for Construction Decking (Station)

Permit to Load Initiated by TWS

The above temporary works have been checked by me and as far as I can ascertain they are in accordance with the documents listed above.

Temp Works Supervisor	Signature	Date
James Steel		28 Sep 2017

Permit to Remove Initiated by TWS (if required)

Permit to Remove Required? Yes ☐ No ☒

NOTE: Required only if the Temporary Works are still loaded during removal.

The above temporary works have been checked by me and may be safely removed.

Temp Works Supervisor	Signature	Date

Permit to Load endorsed by TWC

TWC remarks (if any)	Permit Valid Until Date
Checked and found satisfactory	n/a

The above temporary works have been checked by me and as far as I can ascertain they are in accordance with the documents listed above.

Temporary Works Coordinator	Signature	Date
Adam Ho		2 Oct 2017

Permit to Remove endorsed by TWC (if required)

The above temporary works have been checked by me and may be safely removed.

Temporary Works Coordinator	Signature	Date

Permit to Load Certified by ICE (required if specified in the contract and for Risk Cat A only)

ICE remarks (if any)	
Checked and found satisfactory	ICE CERTIFIED (ICE Chop)

The above temporary works have been checked by me and as far as I can ascertain they are in accordance with the documents listed above.

Independent Checking Engineer	Signature	Date
William Tsang (ICE1)		2 Oct 2017

APPENDIX D – GUIDANCE ON DESIGN BRIEF

The following indicates the type of information that might be included in a design brief:

(i) appropriate drawings of the permanent works
(ii) appropriate clauses from the specification for the permanent works
(iii) statement of any requirement to design the temporary works in accordance with a particular standard or guidance document
(iv) information on any significant risk associated with the design of the permanent works
(v) programme for the construction of the permanent works
(vi) programme for the various phases of the design, design check, any external approvals, procurement, erection and removal of the temporary works
(vii) requirements for access onto, under, or around the permanent works
(viii) requirements for access for erection, maintenance, use and dismantling of the temporary works and for other site activities
(ix) any requirements for public access, for example a requirement to keep a public footpath open
(x) method for erection, maintenance and dismantling and arrangement for the removal of the dismantled TW off-site
(xi) equipment and materials available for use in the temporary works
(xii) equipment loading information
(xiii) proposals for any moving and re-use of temporary works
(xiv) environmental information such as the location and topography of the site
(xv) site investigation data and reports relating to the areas under and adjacent to the foundations of the temporary works; this should include information on all underground and over-head services
(xvi) any limitations on the staged construction of the works due to positioning of construction joints, sequence of separate pours, rate of successive pours, timing of post-tensioning and removal of supports
(xvii) loads that may be induced in the temporary works by permanent works that have been completed, such as the application of staged post-tensioning, load re-distribution and any movements of significance including any settlements or deflections that can be anticipated from the permanent works as load is progressively increased
(xviii) any limitations stated by the designer of the permanent works on the position and extent of loads imposed by the temporary works onto elements of the permanent works which have been constructed such as loads imposed by successive floors of multi-storey construction onto lower floors or loading of permanent foundations required to support the temporary works
(xix) any limitations on the positioning of loads from temporary works over underground services or adjacent to excavations or retaining walls forming part of the permanent works
(xx) proposals for the protection of the temporary works, including its foundations, against disturbance or impact
(xxi) limitations imposed by various authorities in relation to working within or adjacent to railways, highways, watercourses, etc.
(xxii) details of obstructions that might preclude or influence the position of the temporary works

APPENDIX E – SAMPLE HAZARD CHECKLISTS

These hazard checklists are to be used as a guide and prompt for the identification of potential safety hazards and the associated mitigation measures where applicable. The lists are not exhaustive and appropriate experienced personnel should be involved in the systematic risk assessment process.

	GENERAL HAZARDS	Findings			Remarks
No.	**Description**	**Yes**	**No**	**N/A**	
1.	**Working at height**				
1.1	Is there any working at height required to construct the designed works?	x			
1.2	Can the design be revised to reduce/eliminate working at height?	x			Modular units will be used, and the assembly works will be carried out on ground
1.3	Can provisions to mitigate working at height hazards be included in the design? e.g. Edge protection measure detailed in design.	x			Edge protection measures will be included
1.4	Is it reasonable to mandate specific methods to carry out Working at Height? e.g. MEWP	x			
2.	**Heavy lifting**				
2.1	Has due consideration been given to the crane size and site layout to allow lifting of heavy materials?	x			Lifting plan will be prepared
2.2	Has consideration been given to lifting methods and whether pre-installed lifting points could be designed?	x			Lifting methods will be specified in the lifting plan
2.3	Is it necessary to design dismantling procedures and lifting points?			x	
2.4	Is there any strengthening of ground required for heavy lifting cranes?			x	
2.5	Any out of balance loading requiring lifting frames?	x			Lifting frame will be designed and details will be specified in the lifting plan
3.	**Plant movement**				
3.1	Does the design works create any risk of being hit by moving plant?		x		
3.2	Should haul roads and access ways be included in the design?	x			
3.3	Does the design support realistic plant numbers to achieve the programme?	x			
4.	**Working over water**				
4.1	Can working over water be realistically eliminated?			x	
4.2	Should access provisions be designed to mitigate working over water risk?			x	

	GENERAL HAZARDS	Findings			Remarks
No.	**Description**	**Yes**	**No**	**N/A**	
5.	**Confined space**			x	
5.1	Are there any elements of the design which will require confined space working?			x	
5.2	Is it practical to adopt prefabricated modules to avoid confined space working?			x	
5.3	Can alternate designs be implemented to reduce confined space working?			x	
6.	**Working near live services**				
6.1	Can alternate design eliminate risk of working adjacent to live services?			x	
6.2	Is diversion of live services feasible?			x	
6.3	Is there any resequencing of works that may reduce risk?			x	
7.	**Seasonal constraints that may increase hazard exposure**				
7.1	Are any of the works subject to increased wind loading due to typhoon constraints?			x	
7.2	Are any of the works subject to increase water inflows or water table level due to wet season constraints?			x	
7.3	Does the design need to be reconsidered or special warnings added in case of change in assumption of seasonal working time?			x	
8.	Falling objects				
8.1	Does the work sequence create any risk of falling objects?	x			
8.2	Should the temporary works be provided with interim support during the work process?	x			The temporary work will be suspended by crane in the work process

	SPECIFIC HAZARDS (High risk and/or common occurrence)	Findings			Remarks
No.	**Description**	**Yes**	**No**	**N/A**	
1.	**Use of anchors in design**				
1.1	Is the most appropriate form of anchor specified? Are cast in anchors feasible?			x	
1.2	Does a quality procedure need to be mandated?			x	
2.	**Manual handling**				
2.1	Has due consideration been given to the weight of materials that may be used in the construction?	x			
2.2	Any design initiatives can be introduced?	x			Use of lighter materials will be included in the design
3.	**Hot work**				
3.1	Is it feasible to minimize hot work in the design?	x			Bolt and nut connection will be used
3.2	Can safety provisions be designed where hot work will occur with other trades?	x			The works will be closely monitored and co-ordinated by a full-time site supervision personnel
4.	**Temporary support of reinforcement during fixing**				
4.1	Can reinforced concrete design be rationalized to avoid deep sections?			x	
4.2	Should reinforcement support be designed and shown on drawing?			x	
5.	**Work sequence**				
5.1	Is the sequence of works assumed in the design complicated? Can it be simplified?	x			The work sequence will be reviewed with the subcontractor
6.	**Specific design risk**				
6.1	Is there any design risk that may be outside the recognition of the Contractor? e.g. Assumptions on ground conditions		x		
6.2	Has this been specified clearly in the design?	x			
7.	**Residual loads/locked in stress**				
7.1	Are there any residual loads or locked in stress in the temporary works that the contractor needs to be aware of during dismantling?			x	
7.2	Are dismantling procedures obvious to the Contractor or should these be designed?			x	
8.	**TW Stability during Interim stages of erection**				
8.1	Have interim stages of TW Erection been considered and will partially constructed TW be unstable?			x	

	SPECIFIC HAZARDS (High risk and/or common occurrence)	Findings			Remarks
No.	Description	Yes	No	N/A	
8.2	Does the TW design need to specify and clarify necessary interim stages of temporary support?			x	

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Temporary Works FORUM

Feedback Form

Temporary Works Management Plan (September 2025)

Thank you for reading this publication. To help us improve our future versions, we would appreciate your suggestions/feedback on the publication.

(Please put a " ✓ " in the appropriate box)

1. As a whole, I feel that this publication is:	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
Informative	❑	❑	❑	❑	❑
Comprehensive	❑	❑	❑	❑	❑
Useful	❑	❑	❑	❑	❑
Practical	❑	❑	❑	❑	❑
2. Does this publication enable you to understand more about the managemment of temporary works?	Yes		No		No Comment
	❑		❑		❑
3. Have you made reference to this publication in your work?	Quite Often		Sometimes		Never
	❑		❑		❑
4. To what extent have you incorporated the recommendations of this publication in your work?	Most		Some		None
	❑		❑		❑
5. Overall, how would you rate this publication?	Excellent	Very Good	Satisfactory	Fair	Poor
	❑	❑	❑	❑	❑
6. Other comments and suggestions (please specify and use separate sheets if necessary).					

Personal Particulars (optional):*

Name: Mr. / Mrs./ Ms./ Dr./ Prof./ Ir / Sr ^

Company: _____

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Address: _____

E-mail: _____

* The personal data collected will be used only for this survey. Your data will be kept confidential and dealt with only by the Construction Industry Council.

^ Circle the appropriate option.

Please send this feedback form to：

CIC, Contruction Safety-Industrial Development; Email: enquiry@cic.hk; Address: 38/F, COS Building, 56 Tsun Yip Street, Kwun Tong, Kowloon; Fax no.: (852) 2100 9090.

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Temporary Works FORUM

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