FORMWORK AND FALSEWORK

PURPOSE AND SCOPE

The Primary Standard details the FSR controls and minimum requirements to eliminate or minimise risks from the erection, use and dismantling of formwork and falsework at Laing O'Rourke workplaces:

- Formwork is the surface of the form and framing used to contain and shape wet concrete until it is self-supporting.
- Falsework is the temporary structure used to support a permanent structure, material, plant, equipment and people until the construction of the permanent structure has advanced to the stage where it is self-supporting.

This document is Mandatory and must be achieved across all Laing O'Rourke Workplaces. Where alternative controls are implemented, these must be approved through the FSR/HSEMS Requirement Dispensation process.

Refer also to **iGMS – Temporary Works Procedure** (internal Laing O'Rourke access only) and **iGMS – Temporary Works Classification and Control Measures** (internal Laing O'Rourke access only) for design, inspection and management of temporary works including formwork and falsework.

1.0 FSR CONTROLS

- Only construct falsework and medium / high-risk formwork from designs that are Issued for Construction and authorised by the Temporary Works Coordinator.
- A documented method and sequence for assembling and dismantling formwork and falsework must address fall and penetration protection, access, egress, and emergency response needs.
- Inspect all formwork and falsework materials, equipment, and components before use, and remove any defective items from service.
- Only set up concrete boom pumps in locations with a valid Permit to Load.
- Obtain a Permit to Load before applying any load to falsework or medium / high-risk formwork.
- Design changes must be approved by the Temporary Works Designer, reinspected, and the Permit to Load renewed.
- Prevent persons and objects from falling from elevated formwork and falsework by incorporating edge protection, containment sheeting, gap covers, or deflector shields.
- Establish exclusion zones beneath formwork during concrete placement using physical barricades, signage, access approval procedures, and contact details for the responsible person.

2.0 REQUIREMENTS

- Works are erected in accordance with all relevant drawings and specifications.
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- Point loading of formwork decks is managed in line with design.
- Proprietary systems are not mixed and matched unless approved by the designer.
- Safe access/egress is maintained to the formwork decks and for erection and stripping.
- Fall prevention is maintained at the leading edges of formwork.

- No drop stripping.
- Exclusion zones to be in place when working near the live edge, stripping formwork, dismantling falsework and underneath the working deck during live concrete pours.
- Safe methodology for moving/relocating formwork components and table form.

2.1 FORMWORK DESIGN AND DOCUMENTATION

- Formwork is sufficiently designed as being able to safely withstand all expected loads and comply with AS 3610, project and regulatory requirements. All these requirements shall be incorporated into the formwork documentation.
- Formwork is constructed and erected in accordance with a specified design determined and documented by a qualified formwork designer/engineer.
- Formwork assembled from proprietary components shall be used in accordance with the manufacturer's specifications which are to be stated in the formwork documentation.
- The formwork design shall consider the project requirements such as:
  - Design registration of prefabricated formwork in jurisdictions where this is required (NSW and NT)
  - Minimum formwork stripping times and stripping procedures
  - Any limitations on the magnitude and locations of stacked materials and minimum concrete strength to be achieved prior to the stacking of materials, which is to be at least 4Kpa
  - Requirements for the minimum number of levels of support relative to the type of formwork, timing and sequence of its use, and the anticipated time between construction of subsequent floors
  - Limitations on the use of the permanent structure for the restraint of formwork
  - Details of and information on the effect of any post-tensioning procedures on the formwork and any special procedures to be adopted in the stripping of formwork
  - Sequence of placement of concrete (if critical)
  - Requirements for propping of any composite construction
  - Design loads for the permanent structure
  - Information about the foundation which is relevant to the design of the footings for the formwork assembly.
- Formwork documentation shall consist of drawings, specifications, manufacturer's details and associated documents that describe the formwork assembly to be erected. All formwork shall have documentation that includes and details the following:
  - Plans, elevations and sections sufficient to depict the general arrangement of the formwork and to identify and locate all members and components, including bracing
  - Details sufficient to fully describe important or unusual features in the design
  - References to documentation for proprietary items
  - The areas of the floors designed to carry stacked loads
  - Sequence and method of concrete placement and minimum elapsed time between adjacent placements
  - Design assumptions, including as appropriate; Horizontal impact, wind loads and loads from stacked materials
  - Footing design assumptions, such as foundation material description, safe bearing value, limitations etc.

- Documentation for the use of proprietary items in formwork structures shall include and conform with:
  - Drawings or pictorial representation which clearly identifies the item to which it refers
  - Adequate information to fully describe its intended use
  - Safe working load capacities.
- There shall be a documented process for the stripping of formwork and placement of back propping in accordance with requirements specified by the site/formwork design engineer, and there is a specified design for back propping determined and documented by the site/formwork design engineer.
- This Primary Standard, as well as any relevant site-specific information is to be provided to the formwork designer and contractor as a condition and terms of any contract to erect and construct formwork.
- Copies of formwork documentation shall be provided to Laing O'Rourke site management and kept in site offices.

2.2 IMPLEMENTATION ON-SITE

- A qualified engineer or qualified geotechnical engineer shall determine the supporting ground or structure capacity to withstand loads imposed by the formwork assembly. Such loading capacity shall be specified in project documentation.
- Project documentation including drawings, specifications and associated documents that describe the permanent structure to be constructed. Any matters associated with the formwork construction, concrete placement, or formwork removal is to be provided to the formwork designer for consideration and incorporation within the design of the formwork to be constructed.
- Formwork is defined as High-Risk Construction and a Safe Work Method Statement (SWMS) based on the risk assessment and methodology must be in place, communicated to and signed off by all people carrying out and supervising the work.
- A detailed risk assessment is to be carried out prior to the erection/dismantle of formwork. The risk assessment is to address but not limited to:
  - Formwork collapse (before, during and after placement of concrete)
  - Falls from height, slips and trips, falling objects
  - Noise, dust, environmental conditions, manual tasks, housekeeping
  - Electrical contact, hazardous substances.
- The contractor shall provide and maintain safe means of access to the work area in accordance with the relevant legislative requirements.
- During formwork erection and dismantling there may be the risk of a fall from the edges of formwork frames. Formwork methods that are selected should consider elimination of the risk of fall (e.g. use of hydraulic table forms). Where this is not possible, it will be necessary to install edge protection on the frames as they are erected and dismantled. Many conventional formwork frames consist of diagonal braces that cross in the middle. While these braces are not considered to be suitable edge protection for a completed formwork deck, they may provide reasonable fall protection during frame erection and dismantling when engineered guardrails are also fitted to the frame, and the area within the frame is fully decked.

- Inspection and certification from the formwork contractor's engineer shall be obtained to certify specific conformance with the below, subsequent to each inspection and provided in accordance with this formwork standard, prior to placement of concrete. The inspection shall ensure:
  - The formwork assembly:
    - Complies with requirements of the formwork documentation and project documentation
    - Has been erected in compliance with the requirements of Clause 4.4.3 of AS 3610 (minimum practical eccentricities)
    - Is adequately braced.
  - All materials and components used in the formwork assembly are in accordance with documentation for proprietary items and Clauses 5.3.4 and 5.3.5 of AS 3610.
- Any variation in the formwork structure or assembly erected on the project from that specified in formwork documentation shall be referred to the formwork designer for design analysis. An amended design undertaken with a revised certification given taking account of the amended design.
- While concrete is being placed, the formwork contractor shall provide continuous supervision of the formwork assembly and concrete placement. This shall include establishing in advance, a method of communication between the supervising personnel and the placing crews. If any failure, undue settlement, or distortion of the formwork develops, appropriate adjustments shall be promptly made, components strengthened, and work stopped where necessary.
- Stripping is to be undertaken in accordance with project documentation. A prestart briefing will be held for form workers engaged in such activity outlining the relevant specifications of the project documentation.
- Back propping is to be erected in accordance with formwork documentation.
- Inspection of back propping to ensure integrity is maintained, shall be incorporated within regular safety inspection regimes on-site by Laing O'Rourke supervisory personnel, including reference to the applicable formwork documentation and a "Statement of Conformity" issued by the formwork contractors design engineer.

3.0 ROLES AND RESPONSIBILITIES

ROLE	RESPONSIBILITIES
CONTRACT ADMINISTRATOR	• Ensure that the formwork designers and contractors are provided with this Primary Standard at the tender stage of a contract to ensure such provisions are accounted for. The Primary Standard must also be incorporated as a provision within any contract agreement for any formwork on the project.
FORMWORK CONTRACTOR	• Ensure that it provides a suitably qualified site/formwork design engineer (as defined in AS 3610 section 1.5.1) to verify and be responsible for ensuring the formwork design and documentation conforms with AS 3610, the completed formwork conforms with the formwork documentation and As 3610, and established minimum standards prior to placement of concrete.
FORMWORK CONTRACTOR SUPERVISOR	• Ensures that formwork is progressively erected and constructed in accordance with the supplied formwork documentation.

4.0 REGULATIONS, CODES AND STANDARDS

Key Regulations, Codes of Practice and Guidelines are as follows:

- Work Health and Safety Regulation 2011 (QLD, ACT), 2012 (SA),2017 (NSW, NT) and WA (2022) Chapter 6 Construction Work, Chapter 5 Plant and Structures
- Occupational Health and Safety Regulations 2017 (VIC), Part 5.1 – Construction
- Workplace Health and Safety Queensland Formwork Code of Practice 2006
- ACT, QLD, NSW Work Health and Safety (Formwork) Code of Practice
- SafeWork Australia Formwork and Falsework Guidance Material
- AS 3610 Formwork for Concrete.

5.0 ADDITIONAL INFORMATION

For additional information see:

- iGMS Temporary Works (internal Laing O'Rourke access only).
- iGMS Temporary Works Classification and Control Measures (internal Laing O'Rourke access only).

6.0 PLANS, FORMS AND TEMPLATES

For relevant plans, forms and templates see the Laing O'Rourke HSEMS at www.lorhsems.com.

- Deck Control Sheet
- Falsework Checklist