PRECAST CONCRETE

PURPOSE AND SCOPE

The Primary Standard details the FSR controls and minimum requirements to eliminate or minimise risks from work involving precast concrete.

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.

1.0 FSR CONTROLS

- Fabricate and install precast concrete elements only in accordance with an approved and certified engineering design.
- Store precast elements on level, stable ground with appropriate supports, in accordance with the certified temporary works design.
- Develop and implement a documented safe system of erection for all precast and propping elements, reviewed and approved by a competent engineer before lifting or installation begins.
- Temporary supports must not be removed until approved by the Temporary Works Coordinator and authorised via a Permit to Unload.
- Obtain documented approval from the design engineer before making any changes to precast element or support system designs.
- The Crane Appointed Person, Crane Supervisor or delegate must verify that the lifting clutch is compatible with the cast-in lifting point before each lift.
- Access to precast erection zones is restricted to authorised personnel using physical barriers and signage.
- Verify and record concrete test results and the Certificate of Compliance (Birth Certificate) to confirm conformance with design requirements before lifting.
- Install physical barriers to protect propping systems from impact by mobile plant.
- Inspect props in accordance with the inspection frequency and method specified in the approved design.
- The Temporary Works Coordinator or Supervisor must inspect brace supports before use and throughout construction to confirm compliance with design documents.

2.0 REQUIREMENTS

- Safe Installation of concrete elements.
- Inspection programme in place to monitor temporary panel support systems and temporary barriers.
- Concrete strength test results are checked for conformance to design prior to lifting and propping.
- Lifting operations conducted as per lifting operations plan and schedule of common lifts after a detailed lift study is prepared.
- Deadman screw anchors / rock anchors are regularly inspected for damage, uplift or lateral movement.

- Inspection programme is in place to monitor panel support systems and temporary barriers to be managed by the Temporary Works Coordinator**. Tilt Up and Precast Concrete Checklist** is in use. Inspections shall take place on a regular basis and after events such as high winds or impact that may cause instability in the support system - in these instance additional exclusion zones may be required.
- SWMS must be in place for work involving concrete elements including:
  - Storage
  - Propping Plan (must be designed and signed off by structural engineer including brace supports e.g. screw anchors, deadman footings, etc.)
  - Stripping methodology (must be designed and signed off by a competent engineer)
    - **Tilt Up and Precast Concrete Checklist** completed prior to removal of temporary works
  - Lifting gear and backup slings o Components & certifications
  - Cranage - positioning, load distribution, point loading, capacity and radius restrictions
  - Pre-cast (formwork, pouring concrete, hazardous substances, and petrol-powered tools)
  - Change Management requirements
    - Design changes are reviewed and approved in writing by the designer
    - TW Coordinator has ensured that the TW designer has reviewed the changes (verified through discussion)
    - Where changes have been made, they have been managed as per **Temporary Works Procedure.**
- Tilt-up is an engineering system, and design must be done by an engineer specialising in tilt-up and cannot be changed in the field without the approval of the Engineer.
- All variations from the design, relating both to the panel and support system must be checked by the Engineer and either be: o Certified by the engineer as being acceptable (i.e. complying with AS 3850) in writing, if the engineer can verify this is the case, or o Altered in accordance with the engineer's written directions so as to comply with AS 3850, within a time frame specified by the Engineer.
- Prior to removing temporary bracing from the panels, a competent person is to inspect the building to ensure that all permanent structural members and brackets have been attached to the panels in accordance with the engineer's instructions. A sign off procedure should be implemented to verify that this has been done.
- In Western Australia, tilt-up work must be notified to the Commissioner at least 10 days before a panel is cast. The design, transport, erection, bracing and fixing must be carried out in accordance with AS 3850. The work must be directly supervised by a person who has completed an approved tilt-up course (see mandatory training p4). All relevant documentation must be kept at the worksite.

2.1 STORAGE AND ERECTION DOCUMENTATION

- The erection documentation prepared by the engineer should cover every aspect of the erection process, including the:
  - Erection sequence and rigging arrangements for concrete items
  - Orientation (position relative to each other) of the concrete elements
  - Configuration, type and size of erection braces and, where applicable, strong-backs, knee braces and cross-bracing
  - Set out, type and size of cast-in anchors for lifting and bracing concrete elements (designed and certified by an engineer)
  - Bracing details including vertical and horizontal set-out dimensions from base of panels (designed and certified by an engineer)

  - Requirements for erection brace supports (footings, deadman blocks or slabs including slab propping details if required) and brace fixings details to supports
  - Concrete strength of the brace supports (including slabs) at the time of erection
  - Levelling shims details for erection
  - Permanent fixing details between panels and to supporting structure
  - Requirements for grouting including strength to be achieved prior to removing braces.
- The precast elements storage design will be in place and will ensure the:
  - Platform for storing and handling precast has adequate bearing capacity
  - Terrain and slope have been considered
  - Props and/or dunnage timber are designed for the precast panels to be stored in a fundamentally stable condition.

Refer to the relevant jurisdiction Code of Practice for more information on:

- Structural design
- Design for handling, storage and transport
- Structural connections and temporary supports
- Handling and storage
- Lifting inserts
- Erection
- Cast in fixings
- Loading
- Suction
- Impact
- Wind

2.2 DESIGN OF PRECAST AND TILT-UP CONCRETE SYSTEMS

- All temporary works designs are presented on engineering drawings which include wet signatures of the designer and checker. If drawings are not signed, a Design Check Certificate is provided.
- The requirement for panels to be inspected for damage prior to acceptance for use is included in the Temporary Works Control Register.
- The requirements for safe transport and on-site storage of panels are part of the design (orientation, dunnage, protection etc).
- All designs will consider panel mass, connection types and location, wind loading and concrete strength, lifting, bracing requirements and protection for braces from impact by plant and vehicles.

For more information on design of precast and tilt-up systems refer to **HSE Information Design of Precast and Tilt-Up Concrete Systems**.

3.0 ROLES AND RESPONSIBILITIES

Table 1 Precast and tilt-up concrete management roles and responsibilities

ROLE	RESPONSIBILITIES
COMPETENT PERSONS	Information, training and instruction relating to hazards, risks and controls must be provided to people carrying out or supervising tilt-up or precast concrete work. Training should include: • Induction into the National Code of Practice and AS 3850 • Identification of the hazards associated with the use of plant and equipment and the manufacture, transport, storage, erection and demolition of concrete elements • Emergency procedures • SWMS for concrete element construction work. • The Western Australia Work Health and Safety Regulations include mandatory training for anyone involved in tilt-up or precast concrete construction or manufacture to have completed a WorkSafe approved course from the construction training package CPCCCM1007A Carry Out Tilt-Up Work Safely or CPCCCM2011A Carry Out Tilt-Up Work Safely.
PROJECT/WORKPLACE LEADER	• Appoints a Temporary Works Coordinator to oversee the precast/tilt-up concrete works.
SUPERVISOR	• Ensures works are carried out in accordance with the SWMS and the designed erection sequence is followed as per engineer's design. • The Western Australia Work Health and Safety Regulations include Regulations include mandatory training for people who directly supervise tilt-up work or the manufacture of concrete panels in the WorkSafe approved course from the construction training package CPCCBC4022A Supervise Tilt-Up Work.
TEMPORARY WORKS COORDINATOR	• Reviews the design of the precast/tilt-up system for adequacy • Coordinates the inspection programme of the support systems and barriers • Maintains details of the design and inspections on the Temporary Works Register.

4.0 REGULATIONS AND CODES

Key Regulations, Codes and Guidelines are as follows:

- Work Health and Safety Regulation 2011 (QLD, ACT), 2012 (SA) and 2017 (NSW, NT); Part 3.1 (regs 32–38), Division 3.2.1 (reg 39), Division 6.3.2 (regs 299–303)
- Work Health and Safety (General) Regulations 2022 (WA) Part 6.3 Division 4 Tilt Up Concrete and Precast Elements
- Occupational Health and Safety Regulations 2017 (VIC); Part 3.5, Plant.
- National Code of Practice for Precast Tilt-Up and Concrete Elements in Building Construction
- Industry Standard (VIC Code) Precast and Tilt-up Concrete for Buildings
- QLD Tilt-up and Pre-Cast Construction Code of Practice
- AS 3850 Tilt-Up Concrete Construction.

5.0 ADDITIONAL INFORMATION

For additional information, see:

- HSE Information Sheet Design of Precast and Tilt-Up Concrete Systems.

6.0 PLANS, FORMS AND TEMPLATES

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

- Tilt up and Precast Concrete Checklist