1 GENERAL

1.1 CROSS REFERENCES

General
Conform to the Preliminaries.
Conform to the Environmental Management section of the Invitation to Tender document.

Related worksections
Conform to associated worksections as follows:
- Concrete finishes.
- Concrete in situ.
- Concrete reinforcement.

1.2 STANDARD

General
Formwork design and construction: To AS 3610.

2 QUALITY

2.1 INSPECTION

Hold points

Witness points
Give sufficient notice so that inspection may be made of the following:
- Completed formwork before concrete placing.
- Evaluation of the finish.
- Used formwork, after cleaning and before reuse.

2.2 SAMPLES

Formwork test panels for surface finish, classes 1, 2 and 3 for horizontal, vertical and curved surfaces, as required by Architect.

2.3 SUBMISSIONS

Design
Calculations: Submit calculations by a qualified structural engineer experienced in formwork design to show that allowable concrete stresses will not be exceeded if
- formwork procedures or loadings differ from the information included in the project documentation;
- project documentation does not include formwork shoring or stripping procedures or allowable loadings from stacked materials; or
- props above a floor do not coincide with the props below.

Certification: Submit certification by a qualified structural engineer experienced in formwork design for verifying conformance of the design.

Execution proposals
Certification: Submit certification by a qualified structural engineer experienced in formwork design and construction for verifying conformance of the completed formwork.

Documentation: Submit formwork shop drawings including details of proposed form linings, form facings, release agents and, where applicable, reuse of formwork. Submit details of support propping required for construction loads which exceed design loads for concrete of that age.

Reshoring: If intended, submit proposals.

Slip formwork: Show on formwork drawings the method of lifting the forms during construction and the sequence method and the average rate of movement. Demonstrate that the proposed average rate will permit the production of concrete of the specified quality and surface.

Stripping multi-storey suspended work: If the requirements of AS 3610 cannot be met, or if shores are not concentric floor to floor, submit formwork documentation with reference to loads and concrete properties.

Stripping single storey suspended work: If the requirements of AS 3610 cannot be met, give notice.

Surface repair method: Before commencing repairs, submit the proposed method.
TIVOLI CARPARK SITE DEVELOPMENT, 218-242 LITTLE COLLINS STREET, MELBOURNE
CONTRACT NUMBER 59/3/8228A CONCRETE FORMWORK

Tests
Void formers: Submit test certificates to confirm that the formers comply with the following requirements, under laboratory conditions, when placed on damp sand and loaded with a mass of wet concrete equal to at least the mass of the beams or slabs they are required to support:
- Additional deflection between initial set and 7 days does not exceed span/400.
- Collapse and loss of load carrying capacity will occur not more than 48 hours after flooding with water, creating a void at least 60% of the original depth of the void former.
- Deflection during placing and compaction of the concrete is less than the span of the beam or slab divided by 1000.

3 EXECUTION

3.1 MATERIALS AND COMPONENTS
Form linings and facings
To be compatible with finishes applied to concrete.

Lost formwork
Not to contain timber or chlorides and not to impair the structural performance of the concrete members.

Release agents
To be compatible with applied finishes to concrete and the contact surfaces.

Void formers
To be unwaxed cardboard or fibreboard, collapsible on absorption of moisture.

3.2 FORMWORK
General
Design and construct formwork so that the concrete, when cast in the forms, will have the required dimensions, shape, profile, location and surface finish. Allow for dimensional changes, deflections and cambers resulting from the application of prestressing forces (if any), applied loads, temperature changes and concrete shrinkage and creep.

Openings: In vertical forms provide form openings or removable panels for inspection and cleaning, at the base of columns, walls and deep beams. For thin walls and columns, provide access hatches for placing concrete.

Cleaning
Before placing concrete, remove free water, dust, debris and stains from the forms and the formed space.

Corners
Work above ground: Chamfer at re-entrant angles, and fillet at corners.
- Face of bevel 25 mm.

Embedments
Fix embedments through formwork to prevent movement, or loss of slurry or concrete, during concrete placement.

Release agents
Before placing reinforcement, apply a release agent to form linings and facings. Do not coat the reinforcement and construction joints with release agent. Do not allow the release agent to “puddle”.

Steel linings
Clean off any rust and apply rust inhibiting agent prior to re-use.

3.3 DIMENSIONAL TOLERANCES
Dimensional tolerances
Plumb of elements ≥ 8 m high: In accordance with AS 3610 and AS 3600
Position: Construct formwork so that finished concrete is in conformance with the Position tolerances table and the Dimensional tolerances schedule.

<table>
<thead>
<tr>
<th>Surface finish class to AS 3610</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Permissible deviation from designed position (mm)</td>
<td>10</td>
<td>15</td>
<td>20</td>
<td>25</td>
<td>40</td>
</tr>
</tbody>
</table>

3.4 FORMED SURFACE FINISH
General
Conform to the Formed surfaces schedule.
As required by Architect.
Visually important surfaces
For concrete of surface finish classes 1, 2 or 3, set out the formwork to give a regular arrangement of panels, joints, bolt holes, and similar visible elements in the formed surface. Form 45° bevels, 25 mm on the face on corners and angles.

3.5 FORM TIE BOLTS
Bolt hole filling
Durability: Provide material with durability and colour matching the concrete.
Recessed filling: Fill or plug the hole to 6 mm below the surface.

Cover
Position formwork tie bolts left in the concrete so that the tie does not project to within 50 mm of finished surface.

Removable bolts
Remove the bolts without causing damage to the concrete.

3.6 VOID FORMERS
General
Cast designated suspended ground floor slabs and beams on void formers. Keep void formers dry until use, place them on a firm level surface, cover with a waterproof membrane, and place reinforcement and concrete with minimum delay.

3.7 STEEL DECKING
Installation
Welding: Fix sheeting to structural steel supports with puddle welds, or with welded shear studs in composite construction.

3.8 STRIPPING AND REMOVAL
Formwork removal
Extent: Remove formwork, other than steel reinforcement decking, including formwork in concealed locations.
Timing: Do not disturb forms until concrete is hard enough to withstand it. Do not remove formwork until concrete is strong enough to support loads without unacceptable deflection.

Loading before stripping
Do not erect masonry walls or other permanent loading on the structure while it is still supported by formwork.

Stripping of formwork
General: To AS 3600 where it is more stringent than AS 3610.
Multi-storey work: Provide for stripping without disturbing props supporting succeeding floors.
Post-tensioned concrete: Do not remove form supports supporting post-tensioned concrete members until sufficient prestress has been added to support the loads.

3.9 BACKPROPPING
Refer to structural drawings.
Submit computations and proposed procedure for review, prior to implementation.