

EastLink Precast Bridges

CMIC 06

Construction Materials Industry Conference



Presenters:

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Agenda



- Introduction to EastLink
- Precast Planning
- Detailed Design
- Precast Facility
- Precast Production
- Construction
- Examples of Eastlink Bridges



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Introduction



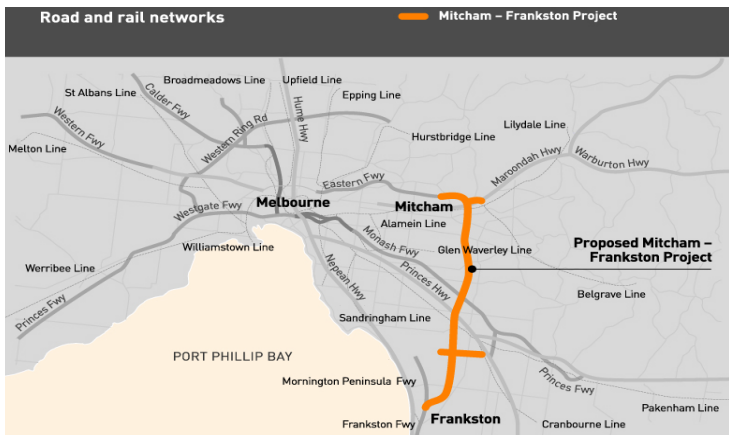
- EastLink: largest urban infrastructure project in Australia
- \$2.5 billion, 45 km toll road project
- PB and Hyder Joint Venture
- 71 of 84 bridges in original scope
- Currently under construction



Introduction cont'd



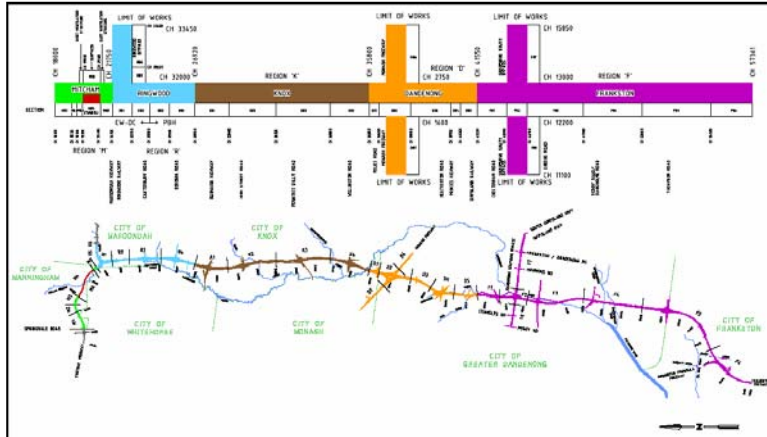
- 45 km toll road from Mitcham to Frankston



Introduction cont'd



- 71 Bridges over 5 regions



Precast Planning



- Standard Precast Units
 - Super-T to AS5100 profile



Detailed Design

- Standard Precast Units
 - 1800mm Deep Super-T Beams
 - Can span up to 38m long and weigh over 80 tonnes
 - Reduced the number of spans required for each bridge



Precast Planning

- Standard Precast Units
 - Precast Pier & Crosshead
 - Construction close to moving traffic
 - Reduce site costs



Precast Planning



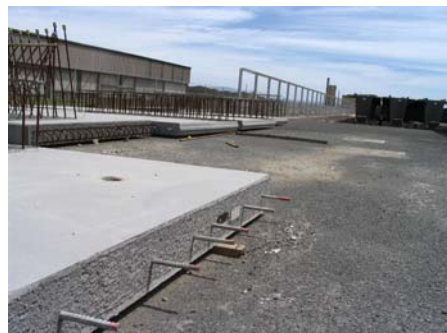
- Standard Precast Units
 - Barrier Unit



Precast Planning



- Standard Precast Units
 - Wingwalls and Fenderwalls



Precast Planning



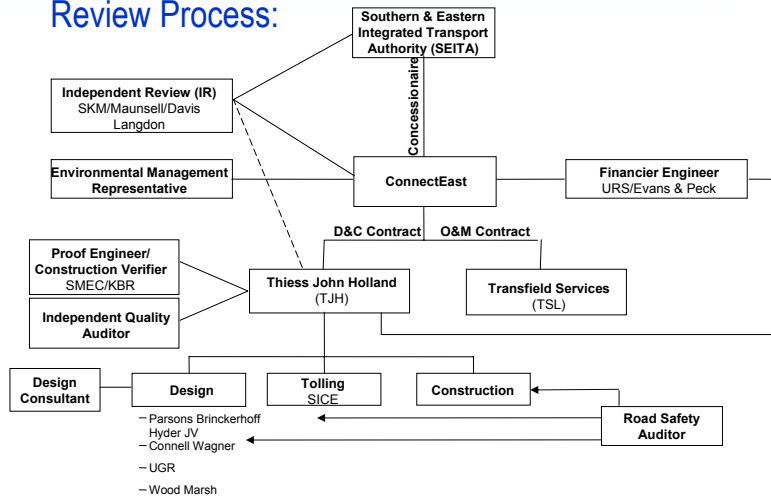
- Standard Precast Units
 - Noise Wall Panels



Detailed Design



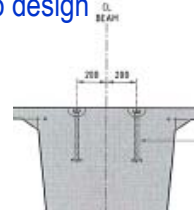
Review Process:



Detailed Design



- Standardised approach used in design
- Details of connections of precast critical to design
- Lifting of precast incorporated in design
- Inclusion of Urban Design features
- Safety in design was considered
- Value Engineering process continued during detailed design



Detailed Design



- Super – T beams
 - PBHyder designed 58 Super-T bridges



Detailed Design



- Super – T beam Design involved:

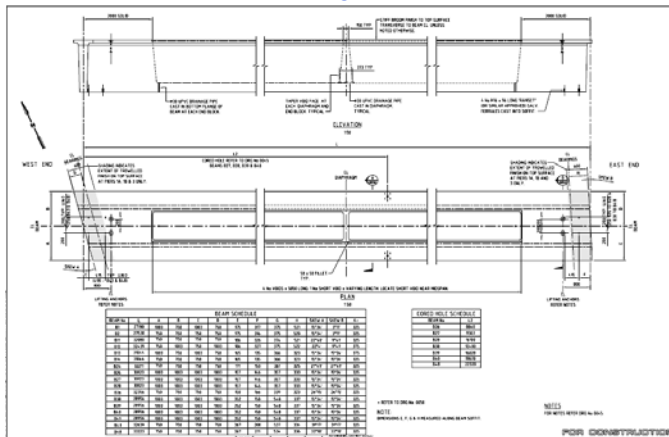


- » Standardising Super-T beam sizes to ensure 24 hour 'turn – around' in production
- » Allowing for long periods of storage before erection
- » Using integral abutments for bridges giving greater tolerance during erection

Detailed Design

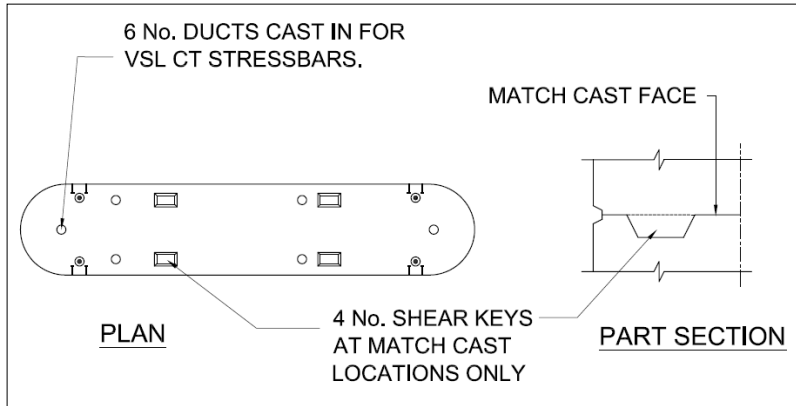


- Super – T beam Design



Detailed Design

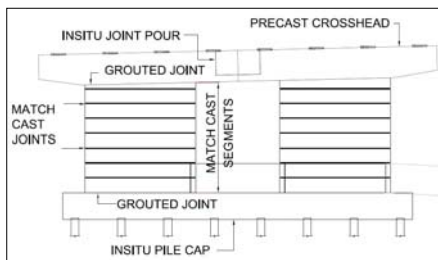
- Precast Segmental Pier Design



Detailed Design

- Precast Segmental Pier Design

Detailing incorporating Urban Design features



Pier construction with falsework

Detailed Design

- Precast Wing Walls



Wingwall Lifted into place



Abutment beam poured



Insitu concrete fenderwall poured connecting to wingwall

Detailed Design

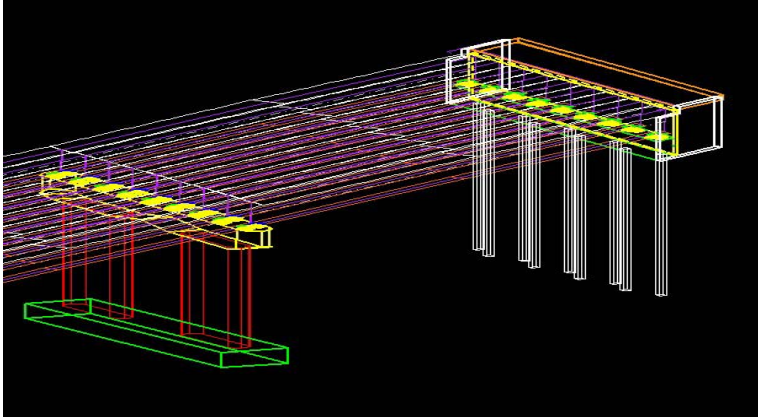
- Barriers

- Designed for High and Medium Containment Levels (High – 1000 kN)
- Connection using stitch joint to deck and pin joint for continuity
- Incorporating Urban Design patterning



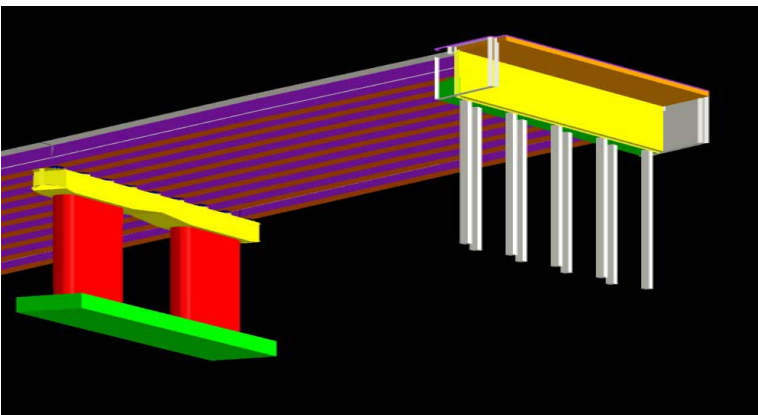
Detailed Design

- Precast Components designed using 3D CAD



Detailed Design

- Precast Components designed using 3D CAD



Precast Facility



- Site selected in Morwell with following benefits:
 - Using an established Plant (Di Fabro)
 - Availability of Labour
 - Close to concrete supplier and other resources
 - Established Transport Routes to Eastlink



Precast Facility



- Steel Super-T Moulds
 - Fabricated in China
 - 750 – 2 beam capacity mould
 - 1350 – 2 beam capacity mould
 - 1500 – 2 beam capacity mould
 - 1800 – 1 beam capacity mould



Precast Facility



Flat Beds for Wingwalls & Fenderwalls

Precast Facility



Standard Precast Pier Mould

Precast Facility

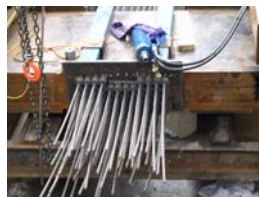


Barrier moulds designed for 'upside down' casting

Precast Production



- Super-T Beams
 - Radiant Heat curing
 - 24 Hour turn-around
 - Double stacking



Precast Production

- Barriers
 - Standard lengths to maximise output
 - Developing a Pin Connection Detail



Precast Production

- Noise Walls
 - Post & Panel Wall units cast vertically in Battery Moulds
 - 'Rock Face' template for cantilever walls



Construction

- Transportation

Super-T beams:

- 87 tonnes
- 40 m long
- Transport study undertaken



Construction

- Lifting
- 500 tonne crane 'Snow White' purchased specifically for project



Construction

- Lifting
 - Flexibility in lifting (end – to – end)



Construction

- Installation
 - Placement & Levelling
 - Connected by Stitch Joints, Bolted Connections or Stressed anchors



Additional Structures



- Other Precast Elements include:
 - Noise walls
 - Precast soil wall facing
 - Humedeck units
 - Culverts and Pits



EastLink Bridges



- 17 EastLink bridges over local roads
 - EastLink over Railway Parade
 - 38m spans, 1800mm deep Super-T beams



EastLink Bridges



- 16 EastLink bridges over waterways
 - Bored piles and columns at pier



EastLink Bridges Monash Interchange



- 3rd largest interchange in Southern Hemisphere
- Nine bridges

EastLink N/B Entry Ramp
128m, 4 span "Trouser Leg"
bifurcation for multiple access



Aerial view of
interchange
Under construction



EastLink Bridges Monash Interchange (cont)



EastLink S/B Entry Ramp
over EastLink
1800mm Super-Ts
Continuous pier
diaphragm



EastLink S/B Exit Loop over
EastLink S/B Entry Ramp
240m, six span curved
2200mm deep steel trough

Construction Progress



Construction Progress (cont.)



Construction Progress (cont.)



Construction Progress (cont.)



Monash Interchange Bridges 4I and 4B 15



Princes Highway Interchange 18

Construction Progress (cont.)



Looking North from Mile Creek Bridge 25



Cheltenham Road Bridge 26

TJH / PBHyder



Thank You