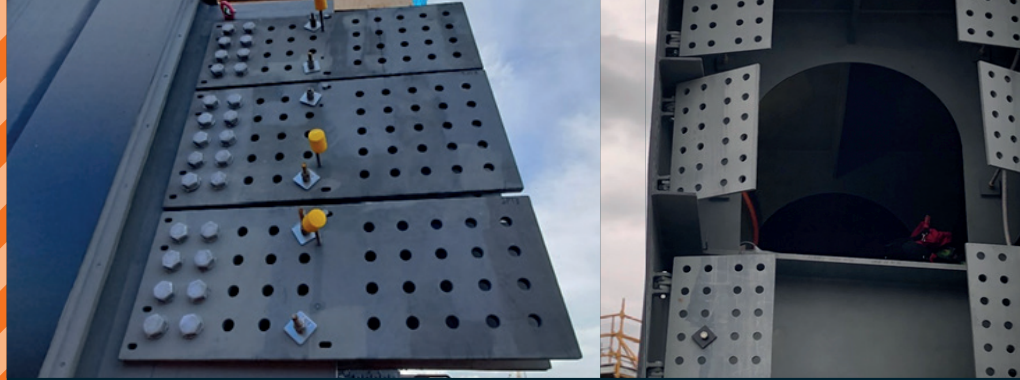


SAFER METHODS FOR SPLICING STEEL PORTALS AND GIRDERS

CPBJH implemented improved steel splicing methodologies that eliminated the manual handling of splice plates during splicing and the need to access a restricted space within portals.

Splice plates were pre-attached to girders and portals prior to lifting using methods including hinged splice plates, Z bars holding splice plates in position and adjustable splice plates with nut keeper plates.

Pre-attachment of splice plates eliminates the need for manual placement during splicing. Nut keeper plates eliminated the need to access a restricted space within the portal.



Splice plates waiting for next portal to be spliced into it (left), Splice plates hinged in ready for girder splicing works (right)

The Situation

On the West Gate Tunnel Project, there are more than 6,800 splice plates across 10 bridges and portals. Splice plates connect a girder or portal longitudinally to the next and have holes which bolts are passed through. On larger girders, these splice plates can weight up to 400kg. Traditionally, splice plates are lifted into position by a crane at the same time as the girder is lifted into position. Splice plates are manually maneuvered during the lift to complete the girder splices.

Conventional bolting techniques for splicing steel require installing the bolt and nut at the same time. In the case of the portals, this requires access to the restricted space inside the portal to insert and tension bolts on both sides of the splice.

The Solution

Manually handling larger splice plates on several bridges was eliminated during the design phase by adopting a hinge plate system. A temporary works design was adopted for other bridges, utilising Z bars to hold the plates in place during lifting. Both options allowed for plates to be pre attached on the ground prior to lifting, eliminating risks associated with manually handling during the lift.

Early design risk assessments identified the restricted access inside the portals. A temporary works design was developed in response whereby the splice plates were adjustable and could splay apart and back together. Nuts were held in position using a keeper plate inside the portal ready for the incoming portal, eliminating the need to access restricted space inside suspended 200-350t steel girders.

Benefits and learnings

The benefits of the pre-attached splice plate approach extended beyond the elimination of manual handling of plates during the lift and the need to access restricted areas. Splices are aligned faster and without requiring another crane. Only the main crane is required to lift the girder therefore eliminating interfaces between cranes and the risk of multiple crane's movements during the lift. The focus can be maintained on aligning beams and splice plates.

During installation, the rigging crew identified a further improvement to the methodology for some of the more complex joints. Steel brackets were introduced to support external steel plates that would otherwise be hinged, where these mirrored internally hinged plates.

Cost benefits

- Efficiency improvements achieved during splicing activity
- Reduced crane equipment and labour costs.

DRAFT

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