Cut and Cover Tunnels – Big Culvert or Complex Structure?

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Abstract:

The scale of local infrastructure projects is rapidly growing, where cut and cover tunnels are now larger than ever. Traditionally cut and cover structures have been classified as 'simple structures' or 'big culverts,' however, in recent projects we are seeing cut and cover spans exceeding 15 metres, challenging this classification.

This paper explores the design challenges faced on the North East Link (NEL) Project at the Bulleen Cut & Cover structure. This structure is a crucial element in Victoria's largest road project in history, playing an essential role in connecting the Eastern Freeway and the M80 Ring Road.

The Bulleen Cut & Cover structure is a 625-meter long, top-down, single-pass wall system, with diaphragm walls and barrettes extending to depths in excess of 25 metres. With widths ranging from 47 to 57 metres, and design floodwater design levels 18 metres above the roof level, this structure has pushed the boundaries of cut-and-cover design, presenting complex design challenges.

Key areas addressed in this paper include:

- **Headwall Design (SEM tunnel interface):** Suitable diaphragm wall panel arrangements to form an appropriate headwall design that interfaces with a mined tunnel. Various shaped panels, including kinked, L-shape, and straight panels, are discussed.
- **Base Slab Investigations:** Examination of multiple base slab designs, including inclined/curved slabs and flat slabs with micropile options.
- **Diaphragm Wall to Slab Connections:** Highlighted are the benefits of localised thickenings at connections to ensure adequate capacity between diaphragm walls and slab elements.

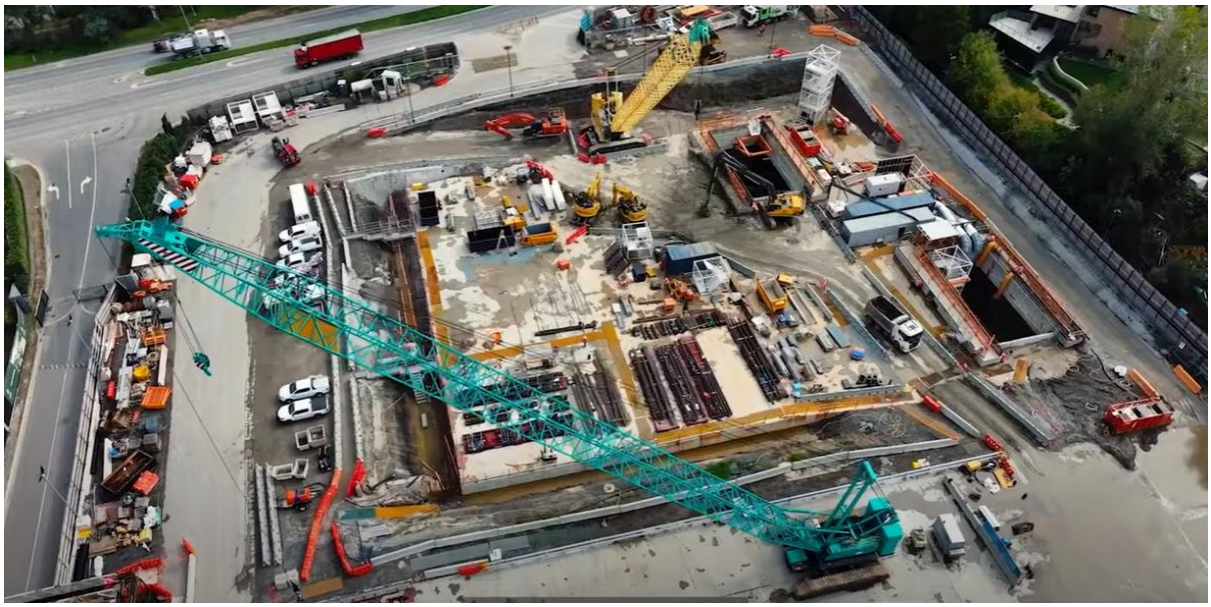

Image 1 – Bulleen Cut and Cover tunnel roof slab at SEM portal (Source: North East Link, Zoning in on SEM tunnelling - YouTube)