NORTHROP

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November 13th, 2020

SY201496-SL20-A

Timothy Chee
Ethos Urban
173 Sussex St
Sydney NSW 2000

Dear Timothy,

RE: Rail Signage Site 20

Woodville Rd, Granville (southern side) – Bridge Mounted

Structural Feasibility Statement

Northrop Engineers have been engaged to undertake a desktop review of the above structure. The existing railway overpass structure along the east/west railway corridor above Woodville road has been assessed in order to determine the structural feasibility of installing new signage on the existing bridge. The investigation was based primarily aerial and ground photographs of the site, as well as a site survey. The available documentation is listed below. For detailed design, architectural drawings, survey plans and geotechnical investigation may be required.

The assessment was done based on the following existing drawings provided by Sydney Trains;

- *Preliminary Assessment* provided by Ethos Urban dated 03/08/2020
- *Draft Site Plan_Granville* by Ethos Urban dated
- *19526detail* by C.M.S. Surveyors PTY LTD
- Existing Structural Drawings (listed in Appendix A on following pages) by SKM

As per the Preliminary Assessment provided by Ethos Urban dated 03 August 2020, the signage is proposed to be a digital signage. The screen dead loads have not yet been provided by Ethos Urban but based on our prior experience with LED signage these are typically in the order of 55 kg/m^2. The signage at the above site is in the order of 13.5m wide x 3.3m high, making the overall weight of the LED signage approximately 2.5 tonnes each. This weight excludes additional fixings / supporting steelwork, access walkways etc. The total weight of the entire signage element, including structure will be in the order of 3.5 tonnes each.

The signage on the southern side of the bridge is proposed to cantilever approximately 4m out over the southbound traffic lanes.

Structural Description

The existing structure is a rail bridge suspended over a roadway constructed in circa 2008. The deck structure consists of precast concrete planks spanning between concrete abutments and pier support at midspan. The total bridge span is approximately 24m. There are small hob walls on the bridge to retain the rail ballast. On the south side, a service pipe is fixed to the side of the hob.

Northrop assumes that the design live loads are approximately equivalent to the design loads in the bridge code AS5100. The available as-built drawings do not confirm the design live loads. For the purposes of our assessment, we have assumed that the design live loads are equivalent to current standard rail loading for passenger trains (type 300LA) which is approximately 22 tonnes per linear metre for each track. Refer to AS5100 clause 9.2 for loading conditions. Note that ultimate state design for rail loading includes relatively high load and dynamic factors, and that the train line has tracks in both directions (3 total).

Feasibility of Additional Loading

Due to the limited depth of the bridge deck, it does not appear to have the residual capacity to support the additional load of the proposed signage. With no solid side walls, the bridge is also not currently supporting any significant wind loading.

It may be possible to support the proposed signages with supplementary structural steelwork.

In the case of the northern signage, this supplementary steelwork may feasibly be affixed to the existing concrete abutments and to the existing concrete pier in the middle of the bridge.

In the case of the southern signage, the existing bridge is unlikely to be able to support the cantilevered signage. Supplementary steelwork may feasibly be affixed to the existing concrete pier in the middle of the bridge and to a new foundation beyond the existing retaining wall on the eastern side to provide vertical support. Further analysis of the retaining wall is required to determine the depth of a new foundation.

All connections to the existing will need to be coordinated with the appropriate rail authorities, who Northrop assumes are the owners of these assets.

The loads imposed by the proposed signage onto the existing concrete abutment and concrete pier are expected to be significantly less than the original design load. Northrop have not undertaken detailed analysis of the abutment and piers, however in our professional opinion we anticipate that the loads applied will be allowable considering the likely capacity of the existing structures.

In summary, in our professional opinion, the existing bridge deck structure is unlikely to be able to support the signage loads., however it may be possible to support the proposed signage with structural steel frames fixed to the existing concrete abutments and concrete piers with an additional foundation supporting the southern signage.

Recommendations

Based on our understanding of the structure to date and the above discussed loads, we see no reason why the existing abutment and pier support could not support the additional loads imposed by the new northern signage, subject to the signage additionally being supported by a structural steel frame.

The southern signage will require greater analysis and possibly require an extra support at the eastern side due signages' orientation to oncoming traffic. This assessment is subject to further engineering design and the following recommendations;

- Site investigations will be required prior to detailed design including concrete scanning to determine reinforcement quantum and location.

- Further structural engineering needs to be undertaken for complete engineering analysis of the existing structure and design of the proposed sign framing and connections. A full set of as-built structural drawings will be required for this analysis.
- Confirmation on the ownership of the land beyond the retaining wall east of the bridge and analysis of the retaining wall for additional surcharge

This letter is intended to provide structural feasibility advice only and does not constitute a structural engineering approval. Signage details are yet to be determined, and further work is required to provide structural analysis and approval for construction.

Yours faithfully,

Brendan Blake
Structural Engineer
BE (Civil), Dip Eng Prac

ON BEHALF OF NORTHROP CONSULTING ENGINEERS

Isabel Duffy
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APPENDIX A

List of existing structural drawings by Department of Railwats NSW, Way and Works Branch, dated 7th November 1966

- 191-113
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