NORTHROP

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October 12,2020

SY201496-SL04-B

Gareth Bird
Ethos Urban
173 Sussex St
Sydney NSW 2000

Dear Gareth,

RE: Rail Signage Site 04

Rhodes, Homebush Bay Drive (North) – Mono-pole

Structural Feasibility Statement

Northrop Engineers have been engaged to carry out a structural feasibility assessment for the proposed mono-pole sign at the Homebush Bay Drive (North).

The investigation was based primarily on aerial and ground photographs of the site as well as a preliminary geotechnical assessment complete by Douglas Partners (dated 14 July 2020, no. R.001.DftA). For detailed design, architectural drawings, survey plans and a further geotechnical investigation will be required.

Based on correspondence from Ethos Urban, the type of signage proposed at this site is an LED electronic display with associated electrical services and a structural steel walkway for maintenance. The screen dead loads have not yet been provided by Ethos Urban, however based on our prior experience with signage these are typically in the order of 55 kg/m^2.

In accordance with the Advertising Asset Development document provided by Sydney Trains, the minimum dimensions for the proposed signage are given as 13.0m wide x 3.5m high. For the purposes of the desktop review of the above site we have assumed that the monopole will support a signage of these minimum dimensions. The following discussion relates to these initial design assumptions.

Based on the above, the overall weight of a LED signage is approximately 2.5 tonnes. 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 10 tonnes.

Site Description

The site is located adjacent to the train track where the rail line crosses Homebush Bay Drive. The proposed sign location is at the top of a steep embankment to the edge of the rail line next to a 3m wide asphalt footpath. A concrete block retaining wall runs underneath the edge of the footpath parallel to the embankment. In order to support the mono-pole, piles will need to be located at the top of this embankment and be drilled to below the base of the retaining wall and embankment. A geotechnical engineer will be required to assess the impacts of the piling rig on top of the embankment and retaining wall. Refer to the geotechnical report for further information on foundation options and associated risks.

The site level is below that of Homebush Bay Drive which the sign is proposed to service, therefore the sign will need to be substantially tall to achieve minimum clearances. This required height will be further discussed in the structural requirements below.

Structural Requirements

Given the above signage tonnage, the self-weight of the required steelwork will be in the order of 10 tonnes.

The wind loads for the site are as follows:

- Importance Level = 2
- Design Life = 25 years
- Region = A2
- Regional Wind Speed V = 43 m/s
- Terrain Category = TC3
- Terrain Multiplier $M_{z,cat}$ = 0.83
- Site Wind Speed = 35.7 m/s

The overturning moment due to wind actions will be in the order of 750kNm, resulting in an approximate resultant tension force of 350kN per pile (for a four-pile system with pile cap) which is to be resolved via piles, for which there are two options:

- Bored piers would need to be socketed into rock approximately 2m
- Screw piles to be designed by subcontractor for provided loads
  - Depending on the findings of a geotechnical investigation, screw piles may not be feasible with these loads - screw pile contractor to confirm

Regardless of the adopted pile option, a minimum of 4 piles will be required to account for the unbalanced loads. As such, a pile cap at minimum 1m deep will be required to transfer the loads from the mono-pole to the piles.

It is noted that in order to for the sign to service Homebush Bay Drive as proposed, the height of the pole will likely be in excess of 10m. This will require a supporting steel circular hollow section in the order of 800mm diameter. This size is based on the pole being located central to the sign. Eccentric loads will result in a larger steel pole.

Recommendations

Based on our understanding of the proposed signage and site, we see no reason why a cantilevered signage on a supporting mono-pole structure could not be used subject to further engineering design and the following recommendations;

- A geotechnical engineer will need to be engaged to investigate the ground conditions at the site including the soil profile, allowable bearing pressures, site reactivity and groundwater level. This investigation can typically be undertaken during the detailed design phase and should include borehole testing.
- A site survey and architectural plan is necessary to understand the levels and geometry of the site and the required height of the structure.

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

Yours faithfully,

Brendan Blake
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BE Civil with Architecture Hons. MIEAust CPEng NER

ON BEHALF OF NORTHROP CONSULTING ENGINEERS