

Common pitfalls identified in the design submissions of highway structures:

Design checking	
Self-weight of concrete	The self-weight of concrete being adopted does not tally with that specified in Clause 3.3(2) of Structures Design Manual for Highways and Railways (SDMHR).
Crack width	Failure to demonstrate whether the sum of thermal crack width and flexural crack width does not exceed the design crack width (ref. Clause 5.5 of the SDMHR).
Nominal cover	The nominal cover for concrete members does not comply with Clause 5.4.2 of SDMHR.
Seismic Actions	- Insufficient substantiation on the assumption of ground types as per Table 3.1 of BS EN 1998-1. - The adopted damping ratio for lift tower design is not in line with Clause 4.1.3 of BS EN 1998-2 for the proposed structure (e.g. steel or reinforced concrete).
Anchorage length	The checking of anchorage length as shown on the drawing is not in compliance with Eurocode 2 and SDMHR, in particular in design with proprietary product, not adopting the concrete strength as stipulated in SDMHR Table 5.1.
Design loadings	
Thermal actions due to climate change effects	Temperature effect has not taken account of the latest requirements arising from climate change effects as per Table 3.17 of SDMHR.
Accidental loading due to vehicular impact on superstructure and foot/cycle track bridge support	- Impact on superstructure according to Clause 3.6.2.3 and Table 3.27 of SDMHR has not been considered in the design. - Inappropriate adoption of minimum forces for robustness for accidental actions on foot/cycle track bridge support. The designer should review

	whether barrier fence shall be provided and the lift tower shall be designed to resist collision load according to Clause 12.15.1(5) and Table 3.25 of the SDMHR.
Horizontal earth pressure due to surcharge arising from vehicular traffic	The derivation of the surcharge arising from vehicular traffic is not in accordance with the relevant standards (e.g. Geoguide & PD6694-1).
Dynamic models of pedestrian loads	For design of footbridge, the dynamic models of pedestrian loads have not been considered according to Clause 3.7.3.3 of SDMHR.
Unclear or wrong loading input	The assumption/input of the loading transferred from superstructure to the foundation in the design model is inappropriate. (e.g. lift tower loadings are acting as four point loads onto the pile cap instead of continuous loading transferred from lift shaft walls).
Foundation	
Distribution of vertical load and lateral load for a pile group adopting both mini-piles and shear piles	• Failure to demonstrate that the lateral load is carried by shear piles instead of mini-piles. • The shear piles are not adequately embedded into the pile cap to ensure the compatibility of rotation and displacement between the pile cap and the shear piles.
Information for the foundation	Pile loading schedule is not included in the drawings.
Effect of proposed foundation to the adjacent existing foundation	The additional loading arising from the stepping effect of adjacent existing foundation has not been taken into account in the design of the proposed foundation.
Minimum cover	A desirable minimum cover of 1.5m is not provided to pile caps and footings of highway structures to facilitate the installation of future utilities as set forth in Clause 10.1.5 of SDMHR.

Differential settlement	Assessment on differential settlement separately for each support taking into account the foundation type, loading intensity and subsoil condition is missing.
Design checking for the foundation	• For stability check of foundation, unless otherwise agreed with maintenance party, the top 1.5m soil cover has been taken into account as counterweight to check against flotation. • The checking of bearing capacity of the footing design is not in accordance with Clause 3.2.1.3 of the GEO Publication No. 1/2006. • Failure to adopt submerged unit weight of the soil in the calculation of ultimate bearing capacity when the design groundwater level is higher than the base of the foundation. • Inappropriate values, not according to relevant standards (e.g. GEO Publication No. 1/2006), of factors of safety against sliding, uplift and overturning failure are adopted in the design. • Failure to provide sufficient justification to demonstrate how the passive resistance could be mobilised according to Clause 6.2.2 of Geoguide 1. • For design of rock socketed piles, failure to demonstrate that there is sufficient anchorage resistance limited by rock cone and soil mass according to the relevant standards (e.g. Code of Practice for Foundations).
Others	
Headroom	The maintained headroom for highway structure over carriageways and hard strips or shoulders is not in accordance with the headroom requirements as set forth in Table

	13.1 of SDMHR.
Parapets	For structures not exclusively used as vehicular bridges, the design of bridge parapet cannot meet the relevant requirements as set forth in Clause 11.4.3 of SDMHR.

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