Sydney Opera House Trust

Sydney Opera House - Vehicle Access & Pedestrian Safety Project

Structural Engineers Report

June 2010

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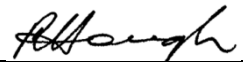
		Signature			
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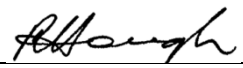
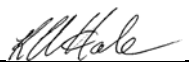
		Signature			
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Contents

1 Description of the works

The VAPS (Vehicle and Pedestrian Safety) project consists of five sectors from a structural perspective.

These being:

1. The access ramp
2. The main dock, truck turning area and garbage area
3. Tunnel to new temporary scenery lift
4. Tunnel to existing lift 12 and new lifts 21/22
5. Exhaust tunnel to eastern board walk

The impact of each one of these sectors of work on the fabric and structure of the Sydney Opera House is outlined below.

2 The Access Ramp

The ramp is about 140m long of which about 40m is open drive structure, 75m cut and cover and about 25m in hard rock tunnel. The ramp commences about 20m east of the Macquarie St. roundabout directly adjacent the Tarpeian Wall rock face and ends essentially at the foot of the main forecourt stairs at a depth of about 16m. It essentially exists through and under the forecourt. As such it has no direct impact on the structure of the Sydney Opera House apart from tunnelling under the foundation beam for the monumental stairs. This tunnelling operation is likely to be technically feasible and will require the adoption of techniques which minimize movements to the stair foundations.

3 The Main Dock, Truck Turning Area and Garbage Area

This is the major component of the project. The principal dock and garbage area is about 46m N-S and about 28m E-W. The truck turning area is located to the SE of the main area and is roughly 15m N-S and 25m E-W. This area is located essentially under the roadway below the monumental stairs commencing just north of the stair foundation and extending to a line representing the face of the building adjacent the stage door entrance. This results in the majority of the dock being under roadway however an area about 9m by 20m is located under basements below Central Passage and the main entry steps to the Concert Hall.

Concept schemes have been developed showing proposed new structures for roof, walls and floor structures to the sections of dock, turning area, and garbage area under both the roadway and the footprint of the building proper. These proposed new structures are capable of being designed and constructed to satisfactorily support all existing elements of the Sydney Opera House and can be built in a manner that is unlikely to result in unacceptable movements to the existing structure and fabric of the Sydney Opera House.

4 Tunnel to New Temporary Scenery Lift

The scenery lift tunnel is 6.3m wide and 5.4m high. It commences at the north-east side of the dock and extends for 32m to the north with an invert depth about 10m below existing walls and footings. Provided tunnel construction techniques are adopted that meet suitable limits for displacement of the existing ground, the tunnel works should not lead to any distress to the existing structure or fabric of the Sydney Opera House.

5 Tunnel to Existing Lift 12 and Lifts 22/23

The lift 12/22/23 tunnel is about 4.5m wide and 4.3m high. It commences at on the north-west side of the dock. It extends 8m to the north, then turns west for 6m forming a lobby for lifts 22/23 and a stair, then extends 42m to the north, to lift 12 which is extended down to serve this tunnel level. The tunnel has an invert depth about 10m below existing walls and footings walls. Provided tunnel construction techniques are adopted that meet suitable limits for displacement of the existing ground, the tunnel works should not lead to any distress to the existing structure or fabric of the Sydney Opera House.

6 Exhaust Tunnel to Eastern Broadwalk

Fresh air for ventilation of the dock and tunnels is drawn through penetrations in the level +12 slab at its southern end underneath the sloping monumental stairs. It is intended that exhaust air is to be discharged into the undercroft space under the broadwalk to the east side of the Opera House. It is proposed to discharge air from the plant room via an exhaust air tunnel which extends at high level from the NE corner of the tunnel area and extends17m to the southern end of the broadwalk undercroft. This tunnel will be cut and cover and is essentially outside the envelope of the existing structure. The construction of this tunnel is not likely to affect the structural integrity of the Sydney Opera House.