

WARRINGAH MALL, BROOKVALE

Structural Report
for Section 96 –
Application
Condamine Street

Prepared for **Westfield
Design and Construction**
November 2014

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1 Introduction

The project comprises of the proposed upgrade works for the Warringah Mall shopping Centre, including augmentation of the existing stormwater system for extreme storm and flood events. The main component of these works is a set of new culverts approximately 600m in length.

The section of the upgrade works in the vicinity of Condamine Street includes lowering of the base slab of the two middle culverts under the street by approximately 1.0m, as well as corresponding sections of the inlet and outlet areas at each end of the two culverts. The works on the upstream end (collection/mixing chamber C6) are part of the reconstruction of this structure due to the proposed sewer repositioning along the Condamine Street boundary.

This report presents the major risks identified during the structural concept design for the above works and has been prepared to support the Section 96 Application (DA2008/1742). It is to be read in conjunction with the following reports and plans:

- > Concept Drainage Augmentation Works For Section 96 Application By Cardno (NSW/ACT);
- > Concept Drainage Augmentation Works, Drawings W4548-100 Series for DA & W4548-400 for Section 96 by Cardno (NSW/ACT);
- > Concept Drainage Augmentation Works, Stage 1 Expansion Works, Drawings W4548-200 Series for DA & W4548-300 Series for Section 96 by Cardno (NSW/ACT);
- > Warringah Mall Flood Impact Assessment, Final Report, December 2008 by Cardno Willing (NSW);
- > Cardno letter dated 05 November 2014 Stormwater Management Deferred Commencement Condition No.1 DA2008/1742 at Warringah Mall – Section 96 Application;
- > Douglas Partners Report on Geotechnical investigation: Proposed Culvert Modification, Condamine Street, Brookvale, Project No. 71015.22, dated February 2014
- > Stormwater Management Plan and Stormwater Report for Section 96 Application – Warringah Mall, Brookvale, dated 05 November 2014

2 Concept Drainage Augmentation Works

The proposed construction of two additional culverts under Condamine Street poses major challenges in terms of traffic management and construction sequencing. Consequently consideration has been given to a modification of the proposed works in the vicinity of Condamine Street to allow the hydraulic capacity of the Condamine Street culverts to be increased without disrupting Condamine Street.

It is proposed to reconstruct Chamber C6 and lower the invert level of the two central box culverts by 1.0m together with the lowering of the apron slab at the outlet also by 1.0m. Due to the lowering of the culverts and the sewer diversion works, the reconstruction of Chamber C6 is required.

The existing gross pollutant trap (GPT) to the south of Condamine Street which treats flows from the existing culverts will not be impacted by the works.

The proposed culvert lowering that cross Condamine Street will need to be constructed in accordance with the RMS' requirements for works within their road reserve. Preliminary construction methodology and staging sketches have been prepared; refer to the Stormwater Management Plan for details.

The augmentation works to the Condamine Street are proposed to include:

- > the reconstruction of Chamber C6
- > the lowering of the invert level of the two central culverts by 1.0m
- > the lowering of existing concrete apron slab for the two central culverts by 1.0m

All proposed works will make a smooth connection with existing levels.

3 Structural Risk Assessment

The major risks identified during the structural concept design for the proposed upgrade works at Warringah Mall Shopping Centre including augmentation of the existing stormwater system for extreme storm and flood events have been provided in Table 1. The table also includes corresponding mitigation strategies and procedures for risks identified:

Table 1 Structural Risk Assessment

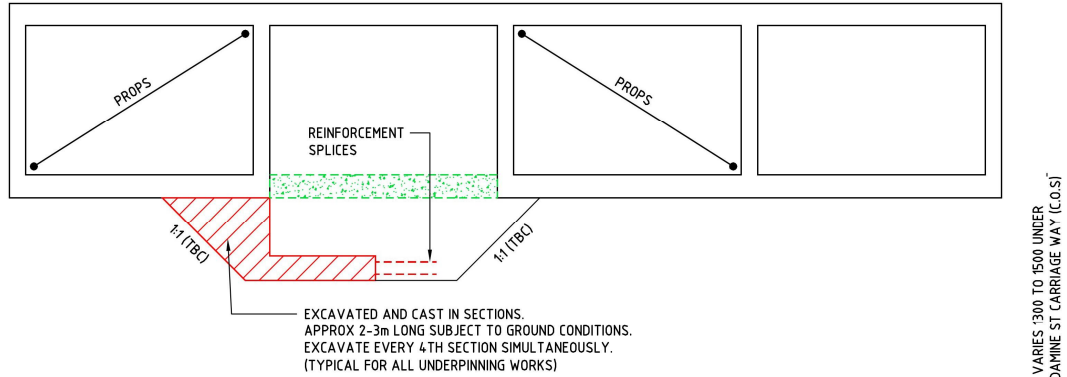
Item	Risk identified	Risk mitigation strategy/procedure	
		During Design Phase	During Construction Phase
1	Unknown conditions and details of the existing culverts under Condamine Street.	Carry out site investigation to confirm condition of culverts and prepare dilapidation report; expose reinforcement in walls and slabs to confirm details where possible, and for inaccessible areas assume nominal reinforcement.	Monitor movements/deflections of the existing structure as the works proceed. Install additional props as required.
2	Limited geotechnical investigations due to site constraints.	Carry out sensitivity analysis for the worst case site conditions and prepare contingency design for these conditions.	Geotechnical Engineer to carry out inspections as the works progress to confirm how the exposed ground conditions correlate with the initial site investigation exposed ground conditions and the design parameters recommended in the Geotechnical report .
3	Stormwater flows during the lowering of the base slab of the two middle culverts under Condamine Street.	Carry out detailed design of the structural elements suitable for staged construction and minimal closure of the outlet culverts and rerouting of the existing flows.	Implement flood monitoring and early alarm procedure to allow for evacuation of personnel and equipment in anticipation of storm events with rainfalls heavier than the temporary reduced outlet capacity.
4	Limited information on existing services that may be affected by the excavation during lowering of the base slab of the two middle culverts under Condamine Street (in particular a fibre optic cable under the eastern footpath).	Carry out further site investigations, including potholing either side of the culverts and either side of Condamine Street, to confirm depth and other details, and timeously identify any potential clashes with the proposed works.	Clearly mark and protect existing services as required on site, including using hand-held equipment for works in critical areas.
5	Settlement of existing culverts during lowering of the base slab of the two middle culverts, and reflected settlement of Condamine Street pavement above.	Carry out detailed design of propping requirements during staged construction (limited lengths/sections as per ST2-STR-SK21 in Appendix1), and in accordance with the findings and recommendations of the Geotechnical report; existing culvert deflections due to the proposed works to be kept to a minimum; allow for ground improvements in areas of base slab with temporarily increased bearing pressures.	Implement monitoring and reporting procedures as required by the relevant Authorities, including correlation between the design and observed movements.
6	Risk of collapse of sides of excavation and/or horizontal movement of shoring wall for excavations adjacent to existing structures and services.	Design shoring wall (secant pile wall) with sufficient stiffness to provide adequate lateral support and minimise horizontal deflection.	Implement monitoring and reporting procedures as required by the relevant Authorities, including correlation between the design and observed movements.
7	Stormwater flows during the reconstruction of chamber C6.	Carry out detailed design of the structural elements suitable for staged construction, and minimal closure of the outlet culverts and rerouting of the existing flows.	Implement flood monitoring and early alarm procedure to allow for evacuation of personnel and equipment in anticipation of storm events with rainfalls heavier than the temporary reduced outlet capacity.

4 References

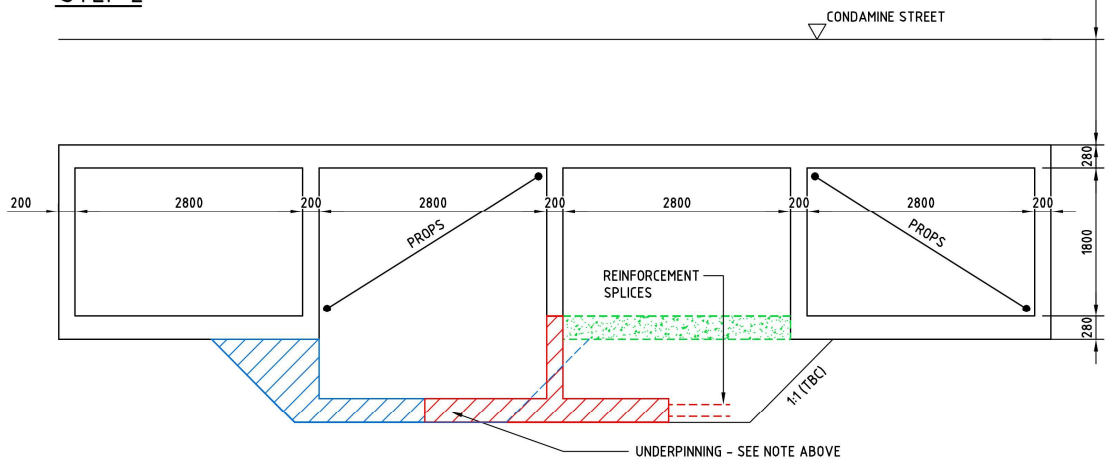
- > Cardno (NSW/ACT), Concept Drainage Augmentation Works, Drawings W4548-100 Series
- > Cardno (NSW/ACT), Concept Drainage Augmentation Works, Stage 1 Expansion Works, Drawings W4548-200 Series
- > Cardno Willing (NSW), Warringah Mall Flood Impact Assessment, Final Report, December 2008, Job W4548
- > Hyder Consulting, Warringah Mall Stormwater Condition Report, Project Code NS00376, noted as Preliminary Only
- > Cardno (NSW/ACT), Concept Drainage Augmentation Works, Stage 1 Expansion Works, Section 96 Application Drawings W4548-300 Series
- > Cardno (NSW/ACT), Concept Drainage Augmentation Works, Section 96 Application, Drawings W4548-400 Series

5 APPENDIX 1 – Staging Drawing ST2 – STR – SK21

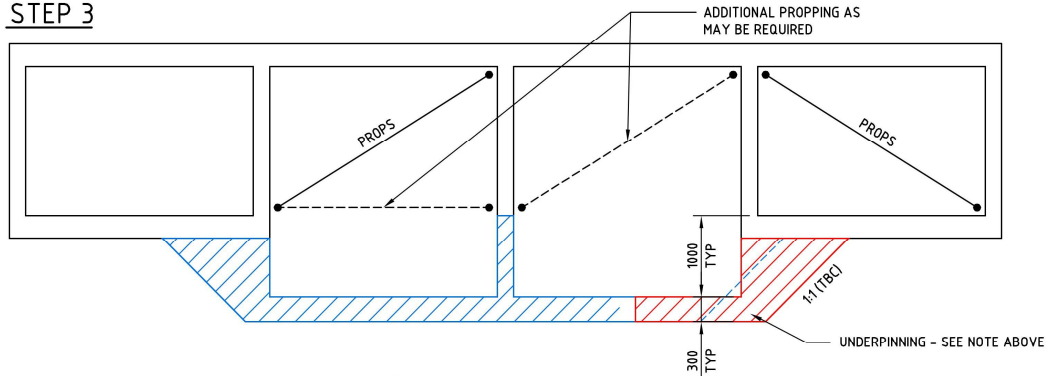
STEP 1



STEP 2



STEP 3



PROPOSED ENLARGEMENT OF EXISTING CULVERTS UNDER CONDAMINE STREET
SCALE 1:50

LEGEND	
	DEMOLITION
	CONCRETING
	WORKS COMPLETED IN PREVIOUS STEPS

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		Project: WARRINGAH MALL STORMWATER UPGRADE CULVERT STAGE 2	Job No: NA89914004 Sheet Size: A3 FULL SIZE
Drawing: PROPOSED ENLARGEMENT OF EXISTING CULVERTS UNDER CONDAMINE STREET		Drawing No: ST2-STR-SK21	Issue No: 1