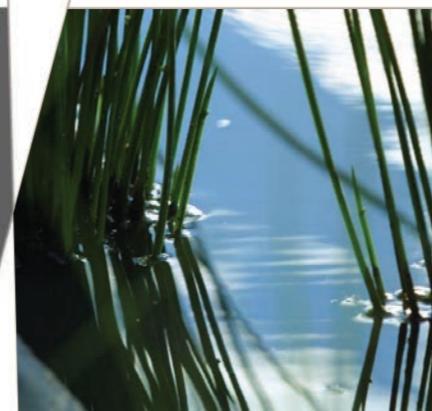


## Appendix 4 - Visual Inspection of Retaining Walls Report



Prepared for  
Town of Cottesloe  
27 July 2016



CW933000-ST-R001  
Visual Inspection of Retaining Walls Along Cottesloe Foreshore

## Contact Information

**Cardno (WA) Pty Ltd**  
**Trading as Cardno**  
ABN 77 009 119 000  
  
11 Harvest Terrace, West Perth WA 6005  
  
Telephone: 08 9273 3888  
Facsimile: 08 9486 8664  
International: +61 8 9273 3888  
  
wa@cardno.com.au  
www.cardno.com

Author(s):  
Nico Kusnadi  
*Senior Structural Engineer*

Approved By:  
Conor Vaughan  
*Lead Structural Engineer*

## Document Information

Prepared for	Town of Cottesloe
Project Name	Visual Inspection of Retaining Walls Along Cottesloe Foreshore
Site Name	Cottesloe Foreshore
Project No.	CW933000
Document Title	CW933000-ST-R001
Discipline Code	Structural
Document Type	Report
Document Sequence	R001
Date	27 July 2016
Revision Number	A

## Document History

Revision	Date	Description of Revision	Prepared by:	Reviewed by:
A	29/06/16	Internal Review	N Kusnadi	C Vaughan

© Cardno. Copyright in the whole and every part of this document belongs to Cardno and may not be used, sold, transferred, copied or reproduced in whole or in part in any manner or form or in or on any media to any person other than by agreement with Cardno.

This document is produced by Cardno solely for the benefit and use by the client in accordance with the terms of the engagement. Cardno does not and shall not assume any responsibility or liability whatsoever to any third party arising out of any use or reliance by any third party on the content of this document.



## Executive Summary

The Town of Cottesloe have engaged Cardno to prepare a foreshore redevelopment plan for Cottesloe.

An inspection of the current condition of the terrace retaining walls along the Cottesloe Foreshore, nearby Indiana Tea House, has been carried out. The requirement of this inspection and report is to ascertain the structural condition of the terrace and identify repair works that shall be considered during detailed design.

It was observed that all stone retaining walls (RW1-RW4, RW6-RW8) were generally in good and stable conditions. Shrinkage cracks were observed on the mortar joints between the stone, however in general, the mortar is still firmly intact to the stone. It is recommended that the mortar joints are inspected, and any loose parts are removed and patched with repair mortar.

Vertical crack along the height of the wall were observed at some location. Though it seems that those cracks were not excessive, and have been addressed on previous repairs, it is recommended that they should be kept under observation to identify further movement.

The concrete retaining wall RW5 was generally in good condition. Shrinkage cracks were observed along the height of the wall at regular intervals. Exposed reinforcement was observed at some location. This reinforcement is badly corroded and need to be replaced, and covered.

The galvanised steel railings at the carpark area are generally in good condition. Corrosion was observed at the joints between the post and horizontal railing. Some connection points between the post and horizontal railing were missing, and are a hazard. It is recommended that the missing connections are reinstated, and corrosion protection applied to the railing.



## Table of Contents

<b>1</b>	<b>Introduction</b>	<b>1</b>
1.1	Introduction	1
1.2	Scope of Works	1
1.3	Location	1
<b>2</b>	<b>Observations</b>	<b>2</b>
<b>3</b>	<b>Conclusion and Recommendations</b>	<b>10</b>

## 1 Introduction

### 1.1 Introduction

At the request of the Town of Cottesloe an inspection of the current condition of the retaining walls along the Cottesloe Foreshore, nearby Indiana Tea House was carried out by Nico Kusnadi of Cardno.

### 1.2 Scope of Works

The Town of Cottesloe has engaged Cardno to prepare a foreshore redevelopment plan for Cottesloe. The requirement of this report is to ascertain the structural condition of the terrace and identify repair works that shall be considered during detailed design.

The scope of the report is to:

- carry out a visual inspection;
- provide a report on the condition of the terrace retaining walls;
- provide recommendations for maintenance/repair;

This report has been based on our visual assessment of the retaining walls. No demolition or opening up works were undertaken to expose concealed structure. No construction drawings of the retaining walls have been made available. No calculations have been carried out of the structure.

### 1.3 Location

The location of the retaining walls inspected is identified in Fig 1-1.



Figure 1-1 Indiana Tea House Cottesloe

## 2 Observations

Fig. 2-1 and 2-2 show the walls inspected with the walls identity.

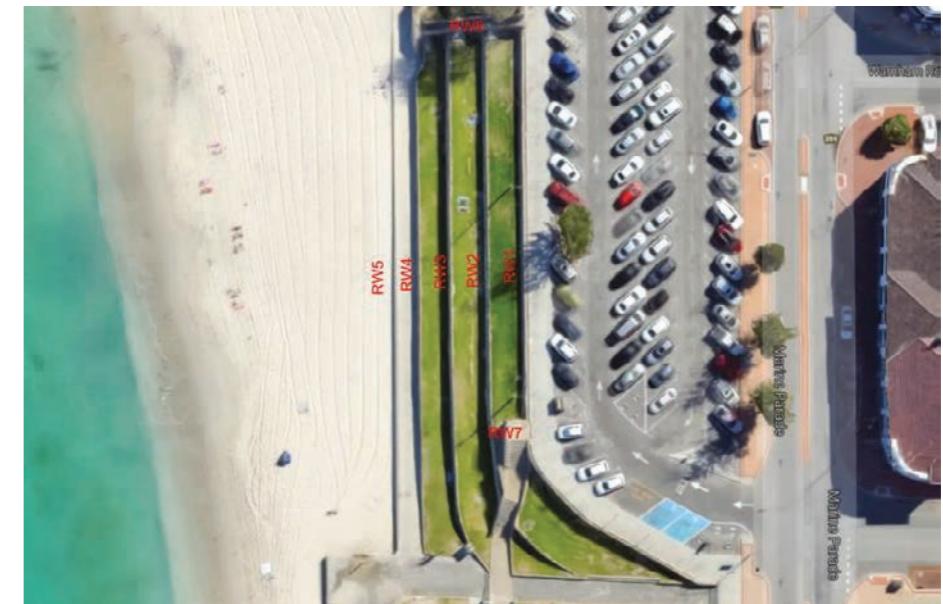


Figure 2-1 North Side Retaining Walls

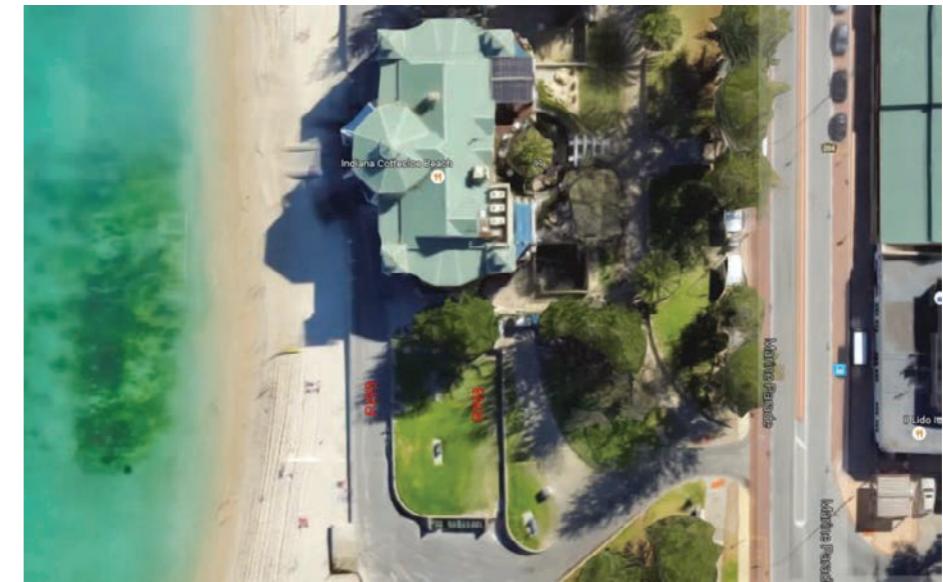


Figure 2-2 South Side Retaining Walls

All retaining walls, except RW5, are stone retaining walls. RW5 is concrete retaining wall.

The photos of observations from our inspection are outlined in Table 2-1 below.



**Table 2-1 Retaining Wall Observations**

Typical shrinkage crack on the face of mortar joints between stone.	
Vertical Crack on RW1, near Southern stair	



Spalling and loose mortar on top of RW2.

Spalling and loose mortar on top of RW2.	
5mm – 7mm crack on RW3	



Vertical Crack at the corner of RW4



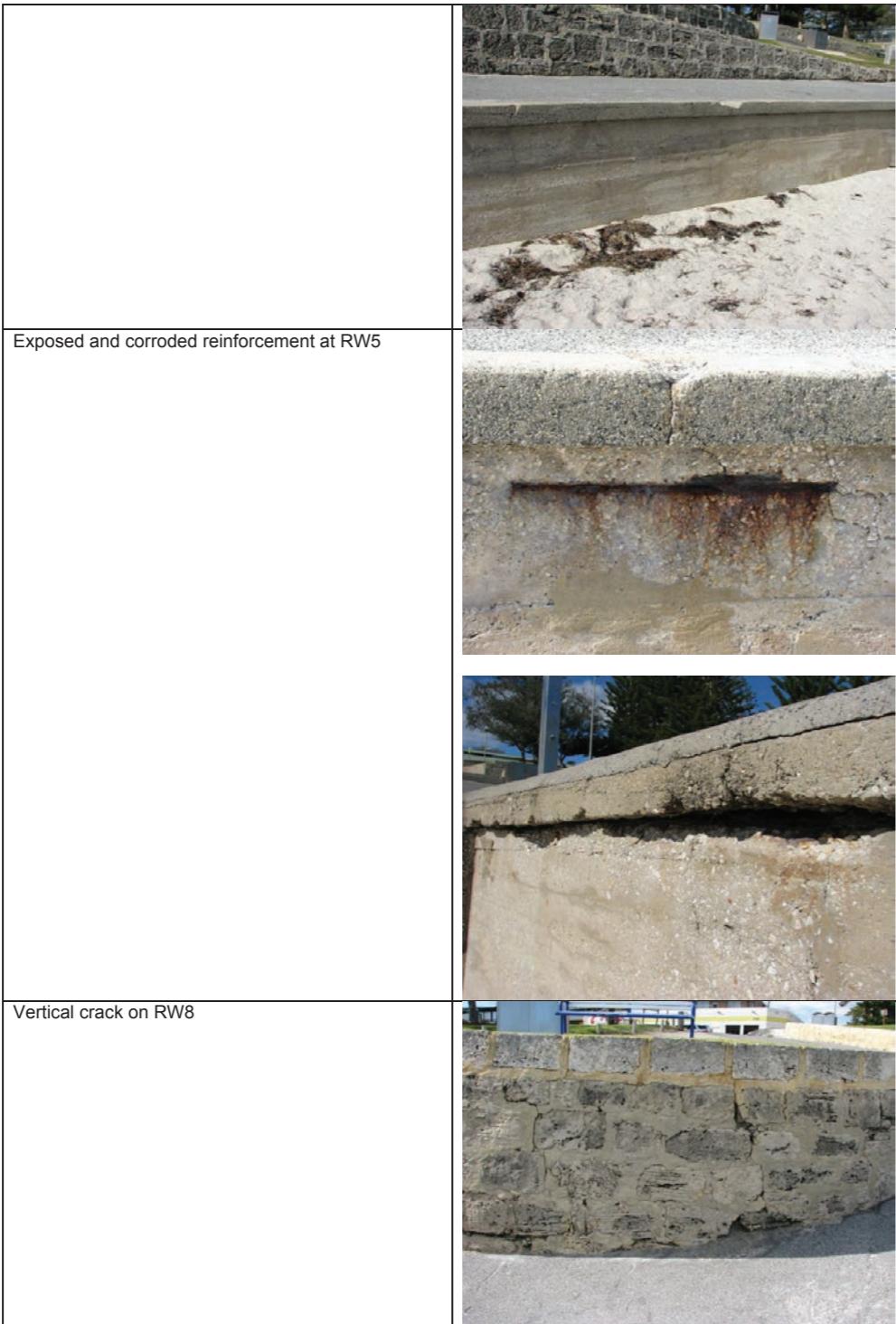
Vertical crack at RW6

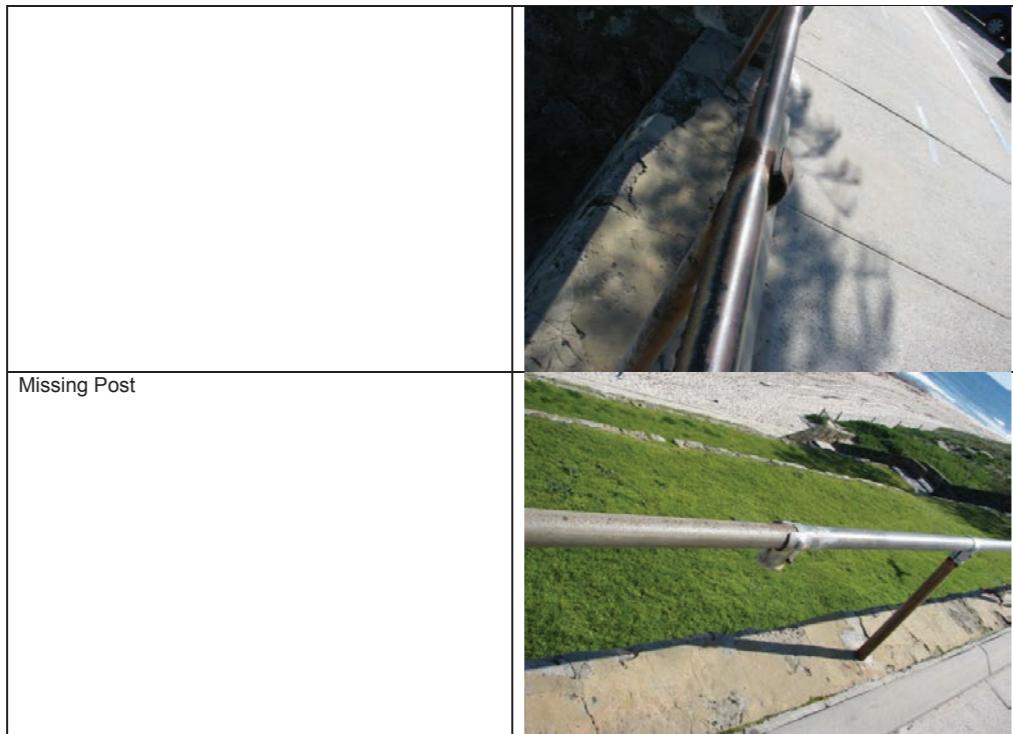


Vertical Crack through RW7, near the corner with RW1. We believe that those cracks were caused by soil pressure at the back of retaining wall. It seems that those cracks have been observed previously, and the steel cantilever columns have been installed to prevent further movement of the wall.



Typical Shrinkage crack on concrete retaining wall RW5





### 3 Conclusion and Recommendations

A visual inspection of the retaining walls and carpark railing have been carried out.

It was observed that all stone retaining walls (RW1-RW4, RW6-RW8) were generally in good and stable conditions. Shrinkage cracks were observed on the mortar joints between the stone, however in general, the mortar is still firmly intact to the stone. It is recommended that the mortar joints are inspected, and any loose parts are removed and patched with repair mortar.

Vertical crack along the height of the wall were observed at some location. Though it seems that those cracks were not excessive, and have been addressed on previous repairs, it is recommended that they should be kept under observation to identify further movement.

The concrete retaining wall RW5 was generally in good condition. Shrinkage cracks were observed along the height of the wall at regular intervals. Exposed reinforcement was observed at some location. This reinforcement is badly corroded and need to be replaced, and covered.

The galvanised steel railings at the carpark area are generally in good condition. Corrosion was observed at the joints between the post and horizontal railing. Some connection points between the post and horizontal railing were missing, and are a hazard. It is recommended that the missing connections are reinstated, and corrosion protection applied to the railing.



104  
Mudurup Rocks with Structures on the Headland c.1900, Photo from Town of Cottesloe Collection, The Grove Library