SCIRT
Rebuilding Infrastructure

Detailed Design Report

Project :	Edgeware Road (RD and SW)
SCIRT Number :	10944
Document Number :	10944-DE-GE-RP-0001
Design Team :	Blue
Revision :	1
Date :	29/11/2012

Document Control

	Name	Date
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Appendices

Revision History

Revision	Date	Name	Brief Description
1	19/11/2012	Richard Gould / Kiran Patel	Approved for issue

Abbreviations

Abbreviation	Description
AADT	Average Annual Daily Traffic
AC	Asbestos cement
CCC	Christchurch City Council
CCTV	Close circuit television
CI	Cast iron
CLS	Concrete lined steel
CRC	Canterbury Regional Council (ECan)
CWW	Master Defects Register Reference
ECan	Environment Canterbury
EQ	Earthquake
EW	Earthenware
HDPE	High-density polyethylene
IDS	Christchurch City Council Infrastructure Design Standard
IMSA	Interim Management Services Agreement
JV	Joint Venture
MDR	Master Defects Register
NAASRA	National Association of Australia State Road Authorities
NAP	Network and Asset Planning of the Christchurch City Council
PE	Polyethylene
RAMM	Road Assessment and Maintenance Management (database)
RCRRJ	Reinforced concrete rubber ring joint
SWC	Surface Water Channel
VPD	Vehicles per day

1 Overview

1.1 Extent of Work

The package of works includes road restoration and stormwater replacement and repair for the entire length of Edgeware Road from Springfield Road to Hills Road, matching into carriageways and storm water infrastructure on each side street. Carriageway, kerbs, and thresholds damaged by wastewater or water supply contracts down side streets are excluded from the extent of works in this package.

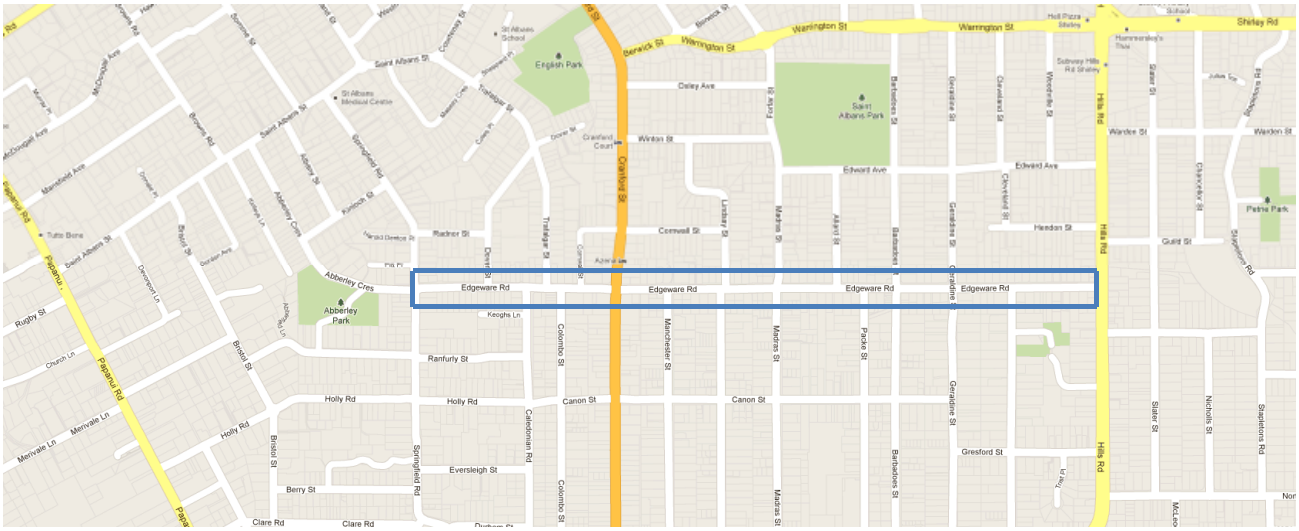

Figure 1 Location Plan

Edgeware Road from Springfield Road to Cranford Street has been zoned Green TC2 and Green TC3 from Cranford Street to Hills Road.

The nature of proposed work is consistent with the Concept Design report (42178407/2410-722/Rev A) prepared for IRMO, with a rebuild proposed between Cranford Street and Allard Street and restoration works towards the outer extents.

Edgeware Road is a Collector Road and bus route for the entire length.

There are three notable trees located at 101,164 and 177 Edgeware Road.

There are a number of commercial businesses scattered along Edgeware Road but generally centralised between Cranford Street and Caledonian Road.

1.2 Communication Records

The following communications have occurred during detailed design:

23/08/2012

Onsite discussions with Rob McGusty on recommended pavement design.

Outcomes included:

- Saving existing kerb and channel sections between Cranford Street and Madras Street
- To involve Bruce Steven with Carriageway and trench design issues

06/09/2012

Site visit with Bruce Steven to confirm Pavement design. Determine why the main trunk wastewater trench has failed.

Outcomes included:

- To hoe, mill and stabilise existing pavement south of the centreline of Edgeware Road from Springfield Road to Cranford Street and from Allard Street to Hills Road
- Hills Road intersection to be reconstructed as part of PS7 catchment works

14/09/2012

Meeting with Jamie Campbell, Allen Ingles. To accelerate the delivery of detailed design between Madras Street and Barbadoes Street.

19/09/2012

A detailed design risk and constructability workshop was held on 19 September 2012, attended by all interested parties.

A Risk Register has been developed during detailed design in consultation with asset owners, the delivery team and other key parties. This is included in Appendix D.

Further discussions following the risk management meeting between Chris Mance and Allen Ingles concluded with the following outcomes to be included in the detailed design:

- Main trunk sewer does not appear to have suffered significant damage beyond that repaired between Madras and Allard Streets.
- Trench construction/compaction is the likely cause of settlement along the trench alignment. Ongoing investigation of trench settlement at a number of locations, including Edgeware Road, is currently occurring.
- Wastewater work to be done at the Edgware Road and Colombo intersection as part of a separate contract

21/09/2012

- Discussion with Steve McNeil to remove grass near bus stop outside property 135 Edgeware Road

15/11/2012

- Phone call from Mark Foster, City Care verbally giving the extents of coal tar from preliminary results
- Agreed pavement design with Bruce Steven

1.3 Supporting Documents

Drawings - Refer to Appendix A for the Drawing Register

Bill of Quantities (Rebuild and RAMM) - Refer to Appendix C

Risk Register – Refer to Appendix D

Concept Design Report – 42178407/2410-722/Rev A

2 Stormwater Rebuild

The stormwater system along Edgeware Road consist of a 825mm diameter concrete main from Dover Street to Manchester Street where it discharges into St Albans Creek via a direct connection to a 1200mm diameter culvert under Edgeware Road. Runoff is conveyed to the stormwater main via a system of bubble up sumps, kerb and channel flows, and smaller diameter branches extending off Edgeware Road. Branches off Edgeware Road have not been assessed as part of this project.

The stormwater system west of Manchester Street is not as extensive and is also composed of bubble up sump systems to short piped outfalls to St Albans Creek at various locations. The Creek, which flows through private properties around Edgeware Road as sections of timber lined channel, eventually joins with Dudley Creek west of Hills Road.

2.1 Concept Design

A formal concept design for stormwater was not undertaken for this project as it followed on from an IRMO generated work package.

2.2 Detailed Design

Condition assessment of the stormwater assets along Edgeware Road by CCTV had not been completed at the Concept Design stage.

The Pipe Damage Assessment Tool (PDAT) was used to indicate the damage the stormwater system may have sustained. However the total length of PDAT pipe replacement forecast for the 825mm diameter stormwater main was excessive, due to lower accuracies for larger diameter pipes. Therefore PDAT assessment was not used as a basis for detailed design.

CCTV assessment of the stormwater network along Edgeware Road was undertaken at the detailed design stage. The conditional assessment of the pipe assets shows the 825mm diameter main along Edgeware Road is in a satisfactory condition, with no replacement or repair work required. Some smaller diameter branch connections to the 825mm stormwater main have been assessed as requiring replacement or repair.

The intent of the detailed design is to replace/repair stormwater assets identified by CCTV conditional assessment, along existing alignments. Additional stormwater assets have been included to integrate drainage for the new road design.

2.2.1 Land Settlement:

Land settlement has been fairly uniform across most of the catchment (300-350mm). Some areas along Edgeware Road have settled to a greater extent, between Madras Street and Allard Street; and Champion Street and Hills Road where relative settlement has been greater than 500mm compared to most of Edgeware Road.

Stormwater reticulation is not extensive in these areas and most assets have not been greatly affected. However bubble up systems within the road corridor will be replaced due to a combination of asset damage and new road design levels.

2.2.2 Diameter 825mm Stormwater Main:

An 825mm RC diameter stormwater main is located within the northern shoulder of Edgeware Road. The length of the main is approximately 420m from Dover Street to Manchester Street where it outlets to St Albans Creek through a direct culvert connection under Edgeware Road.

The contributing catchment is mainly composed of: L2 Residential (inner suburban zone); some Local and District Business Zones; and some Open Spaces zone consisting of recreational and sporting parks. The total catchment area is in the order of 20 ha at the upstream end (Dover Street); and increases to approximately 29 ha up to the Manchester Street outlet.

2.2.2.1 Hydraulic Capacity

The 825mm diameter pipe was originally designed to a grade of 1:500. The capacity of the stormwater main is therefore most influenced by outlet conditions in St Albans Creek due to the shallow grade of the pipe alignment. St Albans Creek is also influenced by backwater effects from Dudley Creek further downstream.

Hydraulic modelling of Dudley Creek and its effect on St Albans Creek is currently being carried out as a separate work package by CCC. Any hydraulic improvements to St Albans Creek and Dudley Creek have not been considered in this report.

Hydraulic analysis of the 825mm main was carried out using a static backwater profile and assuming full flow through the network. The capacity of the 825mm diameter stormwater main was calculated to be adequate for a storm event up to the 50% AEP. In higher rainfall events the 825mm stormwater main will become surcharged, resulting in limited or no drainage from the smaller diameter sump connections.

The amended CCC Infrastructure Design Standards requires the primary system to cater for rainfall events up to the 20% AEP. The existing stormwater network from Dover Street to the Manchester Street culvert outlet will not achieve this level of service, due to the limited hydraulic grade available but would not have met these criteria prior to the earthquakes.

Given the relative settlement has been uniform over the majority of the catchment, the level of service is not deemed to have changed as a result of the earthquakes which is in line with the IRTSG requirements to restore levels of service that were provided prior to September 2010.

2.2.2.2 Flood Risk Areas

Low lying areas between Colombo Street and Sherborne Street will be prone to inundation during high rainfall events. The area is zoned as Local and District Business Zones (B1 and B2); and has had a history of flood complaints pre September 2010 due to sump blockages.

Discussion with local business owners have indicated that ponding over the footpath has occurred but has drained away once the sumps have been unblocked. It is therefore proposed to replace the single sumps with double sumps within this area to provide protection against sump blockages.

Sections of Cornwall Street near the Edgeware Road end are within a sag location, and therefore may also be prone to ponding during high rainfall events when the 825mm stormwater main is surcharged.

2.3 Design Standards

The design, unless stated otherwise, complies with the following standards:

- Infrastructure Recovery Technical Standards and Guidelines (IRTSG) version 2.2 (June 2012)
- CCC Infrastructure Design Standards including earthquake amendments up to February 2012
- CCC Construction Standard Specifications including earthquake amendments up to February 2012
- CCC Waterways, Wetlands and Drainage Guidelines (WWDG).

2.4 Design Calculations and Assumptions

The Rational Method calculation has been used to determine the runoff from the catchments. Rainfall intensity and runoff coefficients have been obtained from the Waterways and Wetlands Drainage Guide (WWDG).

Hydraulic calculations have used the Colebrook White and Darcy Weisbach equations for full pipe conditions. Part full pipe flow has been assessed using the Manning's equation. Pipe roughness values have been selected from the WWDG.

No allowance has been made for pipe obstructions or silting up of the pipe cross section.

2.5 Operation and Maintenance Implications

The design has minimal impact on pre-existing operation and maintenance requirements. In summary:

- Pipes renewed in on-grade locations where the existing grade was not capable of achieving self-cleaning velocity will still require periodic maintenance to prevent the pipe from silting up.
- Drowned pipes, particularly road crossings between sumps being renewed will still require periodic cleaning of the sumps to prevent the pipe from silting up

2.6 Betterment

No Betterment has been identified for the stormwater rebuild in this project.

3 Road Rebuild

3.1 Concept Design

The extent of work consists of approximately 1.55 km of rebuild and restoration work along Edgeware Road but excluding side streets. This road suffered variable damage as a result of the seismic events since September 2010.

The Concept Design carried under IRMO considered only one option which has generally been adopted for the detailed design as follows:

- Replace the existing damaged kerb and channel and footpath
- Carry out full depth reconstruction along the line of the northern relief wastewater line
- Reconstruct the carriageway between kerbs from Cranford Street to Allard Street and immediately east of Geraldine Street

3.2 Design Standards

The design has been prepared in accordance with:

- CCC IDS – 2010 including earthquake amendments up to February 2012
- CCC CSS Parts 1 to 6 – 2010 including earthquake amendments up to February 2012
- Infrastructure Recovery Technical Standards and Guidelines (IRTSG) version 1.4, February 2012
- Austroads Part 3 – Geometric Design
- Austroads 4a – Unsignalised and Signalised Intersections
- MOTSAM Parts I & II
- Austroads Pavement Design Manual – 2004, TNZ Supplement to the 2004 Austroads Pavement Design Guide - 2007
- AS/NZ1428.4:2002 / RTS 14 Guidelines for facilities for blind and vision-impaired pedestrians

The detailed design does not include any departures from these standards.

3.3 Design Calculations and Assumptions

Table 1 shows the design treatment methods selected for the length of Edgeware Road.

Chainage	Treatment
0-462	Restoration except stormwater, tactile pavers, roadmarking and signage
462-824	Rebuild
824-963	Emergency Rebuild
963-1540	Restoration except stormwater, roadmarking and signage

Table 1 - Proposed road treatment

3.3.1 Horizontal Alignment

The horizontal alignment has been designed to match the existing alignment and comprises of a number of straight elements.

3.3.2 Vertical Alignment

The vertical alignment of the kerb and channel replacements have been designed to meet the CCC IDS minimum grade of 1 in 500 where possible or to allow the replacement kerb and channel to tie in to undamaged sections of kerb and channel.

Much of the carriageway of Edgeware Road between Cranford Street and Allard Street is to be rebuilt and in order to comply with CCC CSS cross falls, the vertical alignment of the centreline has been lowered by approximately 150mm between Cranford Street and Madras Street and then generally follows the existing vertical alignment (pre-emergency work) between Madras Street and Allard Street.

3.3.3 Cross Sections

The existing carriageway is variable in width and will be maintained along the full length of Edgeware Road. Carriageway crossfalls are generally consistent with CCC IDS requirements and varies between 2.5% and 4.5%.

Footpath cross falls of 2.0% to 4.5% have been included in the design with isolated exceptions of 1% near Allard Street to match into slumped land (#163 and 164 Edgeware Road)

Driveway cross fall has been designed to 2% to 7%. Where vertical grades of driveways exceed 7%, the area of work has been extended beyond the boundary to prevent scraping.

Berm grades vary typically between 0% and 6% to tie into new and existing path levels.

3.3.4 Intersections

The kerb radii at all intersections have been retained.

Tactile pavers have been included at following intersections:

- Cranford/Sherborne
- Madras Street
- Lindsay Street
- Bishop Street
- Packe Street
- Springfield Road
- Allard Street

3.3.5 Pavement

3.3.5.1 Site Conditions

The existing pavement depth, condition and subgrade parameters have been determined from SCALA penetrometer, borehole, pavement test pit investigations and laboratory analysis of samples taken in the field in August 2011 and November 2012.

The location of the test pit investigations is shown on Drawing RD004.

Table 2 summarises the existing pavement structure and subgrade conditions.

Chainage	Pavement Depth including surfacing (mm)	Inferred CBR
520 (approx. 70m east of Cranford St)	400	3.25
560	350	5
574	550	9.5
620	250	5
720	630	<2
750	400	6.5
840	500	5
900	700	6
1000	700	4
1040	520	n/a*
1240	530	n/a*

1320	740	n/a*
1420	570	<2
1500	470	6.5

Table 2 – Pavement Test Pit Data

*Not available due to high water table

Assumptions:

- The extent of peat material around Lindsay Street and Manchester Street was assumed.

Refer to Appendix F for the pavement investigation data and pavement design details.

3.3.5.2 Pavement Design

The Pavement Treatment Decision Tree (SCIRT, September 2012) has been used to establish pavement reconstruction depths for all local roads.

The range of CBR values obtained from the field testing show that the design pavement depth will vary from 100mm to 600mm.

The finished road surface shall comprise of a 2 coat grade 4/6 chip seal, with the exception of AC surfacing throughout the length of restoration areas and at intersections.

3.3.5.3 Coal Tar

Coal tar has been identified between Cranford Street and Manchester Street between chainage 462 and 585. The specification outlines the treatment and or disposal methodology when handling Coal Tar and must be strictly adhered to. Where coal tar has been noted in the test pit analysis, the proposal is to encapsulate it into the pavement rebuild areas as additional pavement depth. This may be either as a uniformly laid 50 mm subbase layer, or by blending the coal tar with virgin material to reduce the PAH concentration to an acceptable level (<100 mg/kg).

Refer to Drawing RD 4000 for the typical construction treatment.

3.4 Operation and Maintenance Implications

Roads requiring reconstruction have a pavement design life of 50 years and 80 years for the kerb and channels. Maintenance of the chip seal surfaces will be required as part of the reseal programme.

Roads that have been repaired (stabilised and patched) will likely require renewal before the reconstructed sections.

3.5 Betterment

No betterment has been included in the design. The design has been carried out to meet current standards.

4 Project Summary

4.1 Project Risks

This project is relatively low risk project, however a number of risks have been identified and rated in the detailed design risk register. Refer to Appendix D.

Other SCIRT projects that have a project boundary overlap are summarised in the table below:-

Project No.	Project	Current Gateway	Delivery Team
10457	Purchas & Madras (Bealey - Edgeware)	6	Downer
10344	Edgeware Road - Emergency Works	6	MacDow
10881	Northern Relief Sewer Repairs	2	
10536	Edgeware Rd - WW	7	MacDow
10994	North West Trunk Sewers (WW)	2	
10935	Colombo Street Wastewater Upgrade and Repair (WW)	4	
10805	Madras Street Road, Storm Water & Water Supply Repairs	7	Fletcher Construction
10810	PS7 Catchment Phase 1 Waste Water Renewal	6	Fletcher Construction
10811	PS7 Catchment Phase 1 RD SW WS Repair & Renewal	2	Fletcher Construction
10581	Catchment Study - PS7 (10810, 10811, 10812, 10813, 10814, 10815, 10816, 10817)	7	

Table 3 – Summary of projects near the Edgeware Road project

4.2 Specification

The specification is the *CCC Construction Standards Specification (CSS)* including post- earthquake amendments as documented in the Infrastructure Recovery Technical Standards and Guidelines (IRSTG), version 2.2, 11 June 2012.

This should be read in conjunction with the Project Specific Specification, included in Appendix B:

- Location of the pedestrian cut downs
- Installation of tactile paving

4.3 Consents / Easements

The SCIRT RMA team has been consulted regarding Historic Places Trust and Resource Management Act consent requirements. Construction work within this catchment will be covered by global consents already held by SCIRT. The following global consents are to be adhered to:

- Global Archaeology Authority Consent – Christchurch City (2012-321EQ)
- Global Dewatering Discharge Consent (CRC121310)
- Global Groundwater Abstraction (CRC121311)
- Global Tree Consent (RMA92019127)
- Global Waterways Consent (CRC100750, CRC100748, CRC100749)

4.3.1 Hail Sites

Edgeware Road between Caledonian Road and Manchester Street has been identified as potentially having contaminated soils and groundwater, with tanks located at the BP Service station and behind the supermarket.

These areas were identified from the HAIL maps that were developed in a citywide study of potentially contaminated land undertaken by Tonkin and Taylor.

4.3.2 Protected Trees

There are 3 Notable trees located at 101, 164, and 177 Edgeware Road and Subdivisional trees are located at 88a and 237 Edgeware Road.

Hand Digging will be required within 10m of the trees during construction.

4.3.3 Archaeological Areas

There are no recorded Archaeological sites within the extent of works.

4.4 Stakeholders

The following groups have been identified as stakeholders in this project:

- NZTA
- CCC
- Local Iwi (Ngai Tahu)
- Local residents and businesses
- Utilities – David Bain
- Owner Representatives

Roading	- Steve McNeill
Water supply	- John Noonan
Stormwater	- Paul Dickson

4.5 Safety in Design

The design has been carried out in accordance with the CCC IDS and other design guides as identified in sections 3.2, 4.2 and 5.2. No specific safety issues or alternate construction methodologies have been identified for the design and construction of this project.

4.6 Peer Review

An independent Peer Review was not required for this project.

4.7 Landscape and Trees

No landscaping included in the design.

Tree protection required as above.

4.8 Early Contractor Involvement (ECI)

MACDOW has been identified as the ECI for this catchment. MACDOW has been consulted throughout the concept and detailed design process, particularly the Risk Workshop.

4.9 Utilities

The design has been developed with consideration of existing services, both in terms of clashes and to identify potential temporary works requirements. A Utilities Design Approval form was submitted to all utilities providers during the detail design process and any potential clashes identified.

The services known to exist within the area of works include:

- Telecom (Chorus) underground and overhead cables, and
- Orion overhead and underground electricity lines
- Telstra Clear overhead and underground lines
- Christchurch City Council stormwater, wastewater and water reticulation

Street lighting currently exists on power poles and these existing power poles may also carry telecom and Telstra Clear lines. These poles are located within local streets being fully or partially reconstructed and a detailed assessment of the street lighting has not been undertaken to date. Similarly, some power poles and wire crossings may no longer achieve the required clearance to ground; with a compounding effect where the design road reconstruction levels may be raised slightly above existing ground. Due to the effect of earthquake and ground movement it is likely the utility operator will elect to relocate, reinstate or remove power poles. Utilities will need to be consulted by the Delivery team project coordinator to ensure street lighting and pole remedial works are carried out prior to or in conjunction with the construction work.

Utility companies have been made aware of the works proposed and it is up to the utilities providers to determine whether the rebuild works will impact on the utilities performance. As the detailed design plans will only be available at the end of the design phase, the delivery team project coordinator will have to manage this part of the consultation process.

Andy Cullen from Enable has also been in contact to discuss possible corridors for ducting.

4.10 Sustainability

Where possible, the existing pavement material will be been reused/ overlaid, kerb and channels retained, signs reused, stormwater drainage retained and repaired, and coal tar road formation layers encapsulated within the new pavement. The Construction Standard Specification (CSS) allows for the use of recycled material in the pavement layers.

4.11 Innovation

No notable innovations have been proposed in this project.

A

Appendix A Drawing Register

DRAWING REGISTER

CAD FILES: J:\10944 Edgeware Road Springfield to Hills (RD,SW)

DRAWING No. NNNNN-PH-DC-DT-NNnn	DRAWING TITLE	DRAWING No.	STATUS	LATEST REVISION	PDF UPLOADED?	DISCIPLINE	NOTES
Full drawing number	Full drawing title	Short No.	Select option	A, B, 1 etc	Yes or No	Select option	
10944-DE-GE-DG-0001	EDGEWARE ROAD RECONSTRUCTION COVER PAGE	GE0001	FOR APPROVAL		No	GE General	
10944-DE-GE-DG-0002	EDGEWARE ROAD RECONSTRUCTION GENERAL NOTES	GE0002	FOR APPROVAL	2	No	GE General	
10944-DE-RD-DG-0003	EDGEWARE ROAD RECONSTRUCTION DRAWING KEY PLAN & RAMM DATA	RD0003	FOR APPROVAL	1	No	GE General	
10944-DE-RD-DG-0004	EDGEWARE ROAD RECONSTRUCTION BENCHMARK & BOREHOLE LOCATION PLAN	RD0004	FOR APPROVAL	1	No	RD Roads	
10944-DE-RD-DG-2001	EDGEWARE ROAD RECONSTRUCTION ROADING (REBUILD) PLAN & LONG SECTION DIST 790.00 TO 91	RD2001	FOR APPROVAL	2	No	RD Roads	
10944-DE-RD-DG-2002	EDGEWARE ROAD RECONSTRUCTION ROADING (REBUILD) PLAN & LONG SECTION DIST 910.00 TO 10	RD2002	FOR APPROVAL	2	No	RD Roads	
10944-DE-RD-DG-2003	EDGEWARE ROAD RECONSTRUCTION ROADING (REBUILD) PLAN & LONG SECTION DIST 430.00 TO 55	RD2003	FOR APPROVAL	1	No	RD Roads	
10944-DE-RD-DG-2004	EDGEWARE ROAD RECONSTRUCTION ROADING (REBUILD) PLAN & LONG SECTION DIST 550.00 TO 67	RD2004	FOR APPROVAL	1	No	RD Roads	
10944-DE-RD-DG-2005	EDGEWARE ROAD RECONSTRUCTION ROADING (REBUILD) PLAN & LONG SECTION DIST 670.00 TO 79	RD2005	FOR APPROVAL	1	No	RD Roads	
10944-DE-RD-DG-2006	EDGEWARE ROAD RECONSTRUCTION ROADING (RAMM) LONG SECTION	RD2006	FOR APPROVAL	1	No	RD Roads	
10944-DE-RD-DG-3001	EDGEWARE ROAD RECONSTRUCTION ROADING (REBUILD) CROSS SECTIONS DIST 760.00 TO 850.00	RD3001	FOR APPROVAL	2	No	RD Roads	
10944-DE-RD-DG-3002	EDGEWARE ROAD RECONSTRUCTION ROADING (REBUILD) CROSS SECTIONS DIST 869.00 TO 964.00	RD3002	FOR APPROVAL	2	No	RD Roads	
10944-DE-RD-DG-3003	EDGEWARE ROAD RECONSTRUCTION ROADING (REBUILD) CROSS SECTIONS DIST 462.00 TO 580.00	RD3003	FOR APPROVAL	1	No	RD Roads	
10944-DE-RD-DG-3004	EDGEWARE ROAD RECONSTRUCTION ROADING (REBUILD) CROSS SECTIONS DIST 600.00 TO 740.00	RD3004	FOR APPROVAL	1	No	RD Roads	
10944-DE-RD-DG-3005	EDGEWARE ROAD RECONSTRUCTION ROADING (RAMM) CROSS SECTIONS DIST. 12.00 TO 220.00	RD3005	FOR APPROVAL	1	No	RD Roads	
10944-DE-RD-DG-3006	EDGEWARE ROAD RECONSTRUCTION ROADING (RAMM) CROSS SECTIONS DIST 240.00 TO 451.00	RD3006	FOR APPROVAL	1	No	RD Roads	
10944-DE-RD-DG-3007	EDGEWARE ROAD RECONSTRUCTION ROADING (RAMM) CROSS SECTIONS DIST. 980 TO 1087.00	RD3007	FOR APPROVAL	1	No	RD Roads	
10944-DE-RD-DG-3008	EDGEWARE ROAD RECONSTRUCTION ROADING (RAMM) CROSS SECTIONS DIST. 1100.00 TO 1240.00	RD3008	FOR APPROVAL	1	No	RD Roads	
10944-DE-RD-DG-3009	EDGEWARE ROAD RECONSTRUCTION ROADING (RAMM) CROSS SECTIONS DIST. 1260.00 TO 1380.00	RD3009	FOR APPROVAL	1	No	RD Roads	
10944-DE-RD-DG-3010	EDGEWARE ROAD RECONSTRUCTION ROADING (RAMM) CROSS SECTIONS DIST 1400.00 TO 1530.00	RD3010	FOR APPROVAL	1	No	RD Roads	
10944-DE-RD-DG-4001	EDGEWARE ROAD RECONSTRUCTION ROADING TYPICAL CROSS SECTION	RD4001	FOR APPROVAL	2	No	RD Roads	
10944-DE-RD-DG-4101	EDGEWARE ROAD RECONSTRUCTION ROAD MARKINGS AND SIGNAGE PLAN SHEET 1	RD4101	FOR APPROVAL	1	No	RD Roads	
10944-DE-RD-DG-4102	EDGEWARE ROAD RECONSTRUCTION ROAD MARKINGS AND SIGNAGE PLAN SHEET 2	RD4102	FOR APPROVAL	1	No	RD Roads	
10944-DE-RD-DG-4103	EDGEWARE ROAD RECONSTRUCTION ROAD MARKINGS AND SIGNAGE PLAN SHEET 3	RD4103	FOR APPROVAL	1	No	RD Roads	
10944-DE-RD-DG-4104	EDGEWARE ROAD RECONSTRUCTION ROAD MARKINGS AND SIGNAGE PLAN SHEET 4	RD4104	FOR APPROVAL	1	No	RD Roads	
10944-DE-RD-DG-4105	EDGEWARE ROAD RECONSTRUCTION ROAD MARKINGS AND SIGNAGE PLAN SHEET 5	RD4105	FOR APPROVAL	1	No	RD Roads	
10944-DE-SW-DG-2001	EDGEWARE ROAD RECONSTRUCTION STORMWATER LONGITUDINAL SECTION SHEET 1	SW2001	FOR APPROVAL	2	No	RD Roads	
10944-DE-SW-DG-2002	EDGEWARE ROAD RECONSTRUCTION STORMWATER LONGITUDINAL SECTION SHEET 2	SW2002	FOR APPROVAL	1	No	RD Roads	
10944-DE-SW-DG-2003	EDGEWARE ROAD RECONSTRUCTION STORMWATER LONGITUDINAL SECTION SHEET 3	SW2003	FOR APPROVAL	1	No	RD Roads	
10944-DE-SW-DG-2004	EDGEWARE ROAD RECONSTRUCTION STORMWATER LONGITUDINAL SECTION SHEET 4	SW2004	FOR APPROVAL	1	No	RD Roads	
10944-DE-SW-DG-2005	EDGEWARE ROAD RECONSTRUCTION STORMWATER LONGITUDINAL SECTION SHEET 5	SW2005	FOR APPROVAL	1	No	RD Roads	
10944-DE-SW-DG-2006	EDGEWARE ROAD RECONSTRUCTION STORMWATER LONGITUDINAL SECTION SHEET 6	SW2006	FOR APPROVAL	1	No	RD Roads	
10944-DE-SW-DG-2007	EDGEWARE ROAD RECONSTRUCTION STORMWATER LONGITUDINAL SECTION SHEET 7	SW2007	FOR APPROVAL	1	No	RD Roads	
10944-DE-SW-DG-4001	EDGEWARE ROAD RECONSTRUCTION STORMWATER DETAILS	SW4001	FOR APPROVAL	1	No	RD Roads	

B

Appendix B Specification

3 Waters and Road Work Specification

Project :	Edgeware Road (RD and SW)
SCIRT Number :	10944
Document Number :	10944-DE-GE-SP-0001
Design Team :	Blue
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Contents

Revision History

Revision	Date	Name	Brief Description
1	19/11/2012	Richard Gould	Approved for issue

1 General

1.1 Scope

This specification applies to the construction of approximately 500 m of road rebuild, 1000 m of road restoration and 200 m of stormwater.

1.2 Codes & Standards

Carry out all work in accordance with the latest version of the Christchurch City Council's Construction Standard Specification (CSS) including any earthquake amendments.

The following standards shall also apply:

AS/NZS 3725:2007 – Design for installation of buried concrete pipes

NZTA B/5:2008 – Specification for In-situ Stabilisation of Modified Pavement Layers

SCIRT Modified Christchurch City Council Transport and Green Space Units Maintenance Technical Specification (TS) (See modified specification Appendix B3)

AS/NZ1428.4:2002 and RTS 14 – Installation of tactile pavers

1.3 Hold Points

The critical hold points which must be inspected by the Designer before work can proceed are as follows:

Roading

- Confirmation of depth of existing pavement metal is equivalent to design assumptions
- Confirmation of CBR reading of the subgrade is in excess of assumed design values
- Location of the Pedestrian Cut Downs (confirmation of location prior to concrete kerb being poured)
- Installation of Tactile Pavers (confirmation of layout prior to the installation)

Following hold points are to be included within the Delivery Team's ITP

- Inspection of the milled surface for AC mill and fill sections
- Inspection of the aggregate surface prior to the material being cement modified
- Pre-paving and/or pre-seal inspections

1.4 Traffic Signal Detectors

Further to CSS Part 1 Clause 25 "Traffic Signal Loops", the Delivery Team must notify the Christchurch City Council's Transportation and Green Space Traffic Systems Team (ph. 9418620) prior to commencing work within 50 m of the traffic signals.

When the kerb and channel has been completed the Delivery Team is to notify the Traffic Systems Team at least 72 hours prior to the sealing of the footpath to enable the installation of the loop feeder ducts and toby boxes to be carried out.

1.5 Coal Tar

Coal Tar is a bi-product of the coal gasification process. It is extremely high PAH content and is known to have been used in the construction of a large number of Christchurch roads up until the early 1980's. Coal tar has a strong "petroleum" type odour and can cause significant skin irritations.

In the event that Coal Tar is exposed during excavation the Delivery Team must cease work in the affected areas immediately and contact the Project Co-ordinator

Coal Tar has been identified within the top 150 mm carriageway layer between Cranford Street and Manchester Street and will be encapsulated within this section of carriageway

CCC have an agreement with ECAN that when material with a confirmed presence of PAHs in excess of 100mg/kg threshold is going to be disturbed as part of the rebuild activities, the material is to be encapsulated in clean aggregate onsite .In addition , the presence of coal tar is to be recorded in the RAMM database.

2 Water Supply, Wastewater and Stormwater

2.1 Pressure Test (utility drainage pressure pipelines)

Further to Clause 14.3 of CSS Part 3 – Utility Drainage:

The test pressure shall be 30 kPa.

2.2 Pressure Test (water supply)

Further to Clause 17 of CSS Part 4 – Water Supply:

The test pressure shall be30 kPa.

2.3 Sterilisation of New Water Mains

Further to Clause 15.2 and 15.3, CSS Part 4 – Water Supply,

Cooperate with City Care's staff rather than directly with the Council's staff sterilising each new section of new main and taking samples from each section of new sterilised main for bacteriological testing (contact SCIRT Project Co-ordinator 7 days prior to the requirement for sterilisation).

2.4 Trench Base Testing

During excavation the trench base shall be tested at every pipe along the trench. The target minimum trench base soil strength is 50 kPa for at least 900 mm below the trench base as determined by Scala Penetrometer readings of no more than 70 mm/blow.

This is critical to ensure the structural integrity of the pipeline.

2.5 Backfill

Backfill shall be CCC AP65 with two or more broken faces.

2.6 Acceptance Criteria for Embedment and Backfill

Test pipe embedment compaction every pipe length by Nuclear Densometer taken half way between the trench wall and the side of the pipe (both sides) in no more than 300 mm layers, including tests at the pipe springline level and on top of the embedment material.

Nuclear Densometer testing can be replaced with calibrated (against Nuclear Densometer) Clegg Hammer testing at 10 m intervals between the Nuclear Densometer testing. Nuclear Densometer testing shall be undertaken at least every 50 m along the trench. Note: Calibrate the Clegg Hammer against the Nuclear Densometer every 50 m along the trench.

Determine the Maximum Dry Density through Laboratory Testing prior to works commencing. The Laboratory shall be IANZ Accredited. MDD test results from the material supplier may be submitted provided these are tested by an IANZ Accredited Laboratory.

Compacted backfill shall have a minimum dry density of 2,100 kg/m3 with 95% of readings exceeding 2,150 kg/m3, as measured by Nuclear Densometer in backscatter mode.

Undertake the trench backfill compaction testing by Nuclear Densometer (full height of trench) in 500 mm layers at 15 m intervals at the pipe centre line along the trench.

2.7 Acceptance Criteria for the Surface Restoration over Trenches

Further to Clause 11.6 of CSS: Part 6: - Roads, the method of measurement of acceptance shall be:

By Nuclear Densometer for trenches narrower than 1.0 m in carriageways

Prior to sealing, the basecourse shall have a minimum dry density of 2,100 kg/m3 with 95% of readings exceeding 2,150 kg/m3, as measured by Nuclear Densometer in backscatter mode at 15 m intervals along the trench.

By Benkelman Beam for trenches wider than 1.0 m in carriageways

Prior to sealing, the pavement shall meet the following deflection criteria, as measured by the Benkelman Beam:

Street	95 %ile	Maximum
	1.6 mm	2.0 mm
Edgeware Road and side Streets	1.6 mm	2.0 mm

By Clegg Hammer for trenches in the berm or under footpaths

Prior to sealing, the basecourse at any point on the pavement shall have a minimum Clegg Impact Value of 35 in the carriageway, right of way or commercial crossing, or 25 in other areas.

Prior to berm restoration, the surface shall have a minimum Clegg Impact Value of 20.

Asphaltic Concrete Surfacing

Further to Clause 17.0 of CSS: Part 6: - Roads:

Use asphaltic concrete for all intersection resurfacing.

Paver lay all asphaltic concrete on areas wider than 2 m.

Core samples of the asphaltic concrete surfacing must be taken and tested to confirm compliance with the performance criteria. The frequency of testing shall be 2 samples per 500 m of trench restoration.

The bitumen penetration grade for the CCC AC16 in this Project is to be 80/100.

2.8 (New Project Specific Clauses)

Any clauses relating to Water Supply, Wastewater and Stormwater that are new and specific to this project are listed below the line.

[There are no new and specific clauses relating to Water Supply, Wastewater and Stormwater

3 Road Work

3.1 Acceptance Criteria for the pavement and repair structure

Further to Clause 11.4 Basecourse of CSS: Part 6: – Roads, the amended NAASRA Counts for this reconstructed carriageway is to be (excluding intersections, platforms and road humps):

Road	Average	Maximum
Edgeware Road and side streets	60 mm/km	80 mm/km

See also the requirements of Clause 11.7, CSS: Part 6.

Further to Clause 11.6 of CSS: Part 6: - Roads, the method of measurement of acceptance for the pavement, repair structure and trench backfill is to be:

By Clegg Hammer

Prior to sealing the basecourse/trench backfill must, at any point on the pavement/backfill surface, have a minimum Clegg Impact Value of 35 in the carriageway, right of way or commercial crossing or 25 in other areas.

By Nuclear Densometer

Prior to sealing the basecourse/trench backfill must have a minimum dry density of 2,100 kg/m3 with 95% of readings exceeding 2,150 kg/m3, as measured by Nuclear Densometer in backscatter mode.

By Benkelman Beam

Prior to sealing, the pavement must meet the following deflection criteria, as measured by the Benkelman Beam.

For this project the deflection criteria to be used are:

Road	95 %ile	Maximum
Edgeware Road and side streets	1.6 mm	2.0 mm

Asphaltic Concrete Surfacing

Further to Clause 17.0 of CSS: Part 6: - Roads:

(a) 2 core samples of the asphaltic concrete surfacing at each intersection must be taken and tested to confirm compliance with the performance criteria.

(b) The bitumen penetration grade for the CCC AC16 in this Project is to be 80/100.

3.2 Geotextile

Further to clause 13.0, CSS: Part 6: – Laying of Geotextiles and Geogrids.

1.	Strength Class Requirement for Geotextile (elongation ≥ 30%)	Class C
2.	Soil type for Filtration Class	Cohesive
3.	Filtration Class Requirement for Geotextile (elongation ≥ 30%)	Class 2

3.3 Localised Repair Work

Localised repairs to the carriageway, kerb and channel and footpaths shall be carried out in accordance with the SCIRT Modified Christchurch City Council Transport and Green Space Units Maintenance Technical Specification (TS).

3.4 In-situ Stabilisation of Modified Pavement Layers

In-situ stabilisation shall be in accordance with NZTA B/5:2008.

All plant shall be supplied and operated so that it will uniformly spread, or add, the stabilising agent, and thoroughly mix the additive to the specified depth with the in-situ material.

Stabilising and spreading plant shall be purpose-built by a manufacturer having a demonstrable track record and manufacturing history for the equipment used. Plant and equipment not meeting this requirement shall not be allowed on site.

Make up aggregate shall be spread and compacted prior to the hoeing operation to ensure that there is sufficient material available to achieve the required finished levels as indicated on the drawings.

The stabilising agent is Type GP cement and shall be applied at a rate of 1.5% by dry weight.

The depth of mixing is to be 150 mm below the finished surface level.

In areas where the depth of makeup aggregate is greater than 100 mm but less than 150 mm, the depth of mixing shall be increased to 200 mm.

In areas where the depth of makeup aggregate is greater than 150 mm the area shall be hoed to a minimum depth of 100 mm without the addition of a stabilizing agent and compacted. Compaction of these areas shall be to NZTA B/2 requirements prior to the application of the final layer of make-up aggregate.

The intent is that the existing surface layers are broken up and the bituminous material is distributed throughout the aggregate materials.

The maximum time period, from mixing of the materials to primary compaction of the stabilised layer, shall be two (2) hours

3.5 (New Project Specific Clauses)

Any clauses relating to Roading that are new and specific to this project are listed below the line.

[There are no new and specific clauses relating to Roading for this project.]

C

Appendix C Bill of Quantities

BILL OF QUANTITIES

EDGEWARE ROAD STORMWATER

WORK PACKAGE NUMBER: 10944

STORMWATER MODULE

ITEM	DESCRIPTION	Dover Street QUANTITY	Bishop Street QUANTITY	Lindsy Street QUANTITY	Packe Street QUANTITY	Champion Street QUANTITY	Colombo Street QUANTITY	Edgeware Road QUANTITY	Total Quantity QUANTITY	UNIT
		Brought forward:	ought forward:	ought forward:	rought forward:	ought forward:	ought forward:	ought forward:		
	4. STORMWATER ITEMS									
A.	**DRAINAGE**									
4.1	**Stormwater Pipe Installation**									
(a)(i)	225 mm diameter RCRR Class "4".				25			18	42.73	m
(a)(ii)	225 mm diameter RCRR Class "2".	16	9				7	23	54.19	m
(b) (i)	300 mm diameter RCRR Class "2".							86	86.18	m
(b) (ii)	300 mm diameter RCRR Class "4".							28	27.82	m
(c) (i)	375 mm diameter RCRR Class "4".			16					16.29	m
(c) (ii)	375 mm diameter RCRR Class "2".								0	m
(d)	450 mm diameter RCRR Class "4".							7	7.00	
4.2	**Pipe Protection and Haunching**									
(a)	Concrete surround for 225 mm diameter pipe (to detail SD 331) - reinforced.							23	22.80	m
(b)	Concrete surround for 300 mm diameter RCRR (to detail SD 331).							86	86.18	m
										m
(c)	Concrete surround for 225 mm diameter RCRR (to detail SD 342/B).		9		25			12	45.44	m
(d)	Concrete surround for 300 mm diameter RCRR (to detail SD 342/B).							4	3.65	m
										m
4.5 (a)	Direct entry connection for 225mm diameter pipe into existing 825mm diameter stormwater pipe (to detail 2 DRG SW4001).							1	1	each
4.5 (b)	Direct entry connection for 300mm diameter pipe into existing 825mm diameter stormwater pipe (to detail SD 361).								0	each
	Manholes									
4.11	Standard manholes - unvented (to details SD 302 or 303).								0	each
(i)	1050mm diameter									
4.21	Break into existing manhole and make good per side (to detail SD 341).							9	9	each
	Structures									
4.28	Break into existing structure and make good per side (to detail SD 341).	2	1				1	1	5	each
4.29	**Support of Services Crossing the Excavation**									
(a)	Telecommunications.									
(i)	Ducts/cables.		2					8	10	each
(ii)	Fibre optic cables.									each
(b)	Power.									
(i)	Cables and ducts.	3		1	1		2	6	13	each
(ii)	33 kV and 66 kV.								0	each
(c)	Gasmains.									
(i)	Below 150 mm diameter.									each
(ii)	Above 150 mm diameter.						2			each
(d)	Sanitary sewer laterals.							2	2	m
(e)	Sanitary sewer mains.									
(i)	150mm.				1			2	3	each
(ii)	+ 225mm.									each
(f)	Stormwater mains.									
(i)	+450 mm.									each
(ii)	+ 1200mm.									each
(g)	Watermains.									
(i)	40 mm to 100 mm diameter.							1	1	each
(ii)	Above 100 mm diameter.				1			5	6	each
4.30	Potholing for services as directed.								0	each
4.31	Supply and install testing junctions (if ordered).									each
4.32	**Backfilling**									
(a)	CCC AP65.								0	m^3

Carried forward:

STORMWATER MODULE											
		Dover Street	Bishop Street	Lindsy Street	Packe Street	Champion Street	Colombo Street	Edgeware Road		Total Quantity	
ITEM	DESCRIPTION	QUANTITY	QUANTITY	QUANTITY	QUANTITY	QUANTITY	QUANTITY	QUANTITY		QUANTITY	UNIT
(b)	TNZ M/4:AP40/CCC RCC M/4: AP40.									0	m^3
(c)	TNZ M/4:AP20.										m^3
(d)	CCC Stabilised AP40.										m^3
(e)	CCC Stabilised AP20.										m^3
(f)	Lime Stabilised AP20.										m^3
(g)	Sand.										m^3
(h)	Foam Concrete.										m^3
(i)	Stiff flowable mix.										m^3
(j)	Firm mix.										m^3
(k)	Lime stabilised backfill.										m^3
	Installation of Geotextiles										
4.35	Soft raft foundation raft (to detail SD 344 Sheet 3).	6	7	13	20		3	129		178	m
4.41	**Restoration**										
(a)	Supply and place Type C2 AC16 as SD101 to the prepared trench in the carriageway.										
i.	Materials	7		16	20			5		48	m
ii.	Labour	7		16	20			5		48	m
(b)	Supply and place Type F1 AC10 as SD101 to the prepared trench in the foothpath.										
i.	Materials	16	9				7			32	m
ii.	Labour	16	9				7				m
(c)	Supply and place 100mm topsoil as per Type F3 on SD101 to the prepared trench within grassed berm										
i.	Materials				7			14		21	m
ii.	Labour				7			14		21	m
(f)	Standard concrete kerb and flat channel to SD601 as reinstatement behind sumps and over trenches	9		11			2	38		60	m
4.43	**Miscellaneous**										
(a)	Remove and backfill redundant 225 RC pipes.							25			m
(b)	Break out and remove to waste exisitng single sumps and backfill with AP65.							2			LS
(d)	CIPP patch repair										
(i)	225mm diameter RC					1		2		3	each
(e)	CIPP patch relining										
(i)	225mm diameter RC							3		3	m
(ii)	300mm diameter RC									0	m
B.	**SUMPS**										
4.46(a)	Single sumps (to detail SD 325).				2		1	2		5	each
(b)	Single sumps cast over existing DN 225 mm line									0	each
(c)	Double side entry sumps (to detail SD 321).							1		1	each
(e)	Double sumps (to detail SD 325).							12		12	each
4.49	Break into existing sump and make good per side (to detail SD341).			1				2		3	each
4.50	connect 300mm sump lead to existing pipe end outlet directly to 1200m culvert (to detail SD 361).							1		1	LS
E.	**DAYWORKS**										
	(Refer NZS 3910 clause 9.4)										
4.61	**Labour**										
(a)	Labourer.										hrs
(b)	Working Foreman.										hrs
(c)	Plant Operator.										hrs

STORMWATER MODULE											
		Dover Street	Bishop Street	Lindsy Street	Packe Street	Champion Street	Colombo Street	Edgeware Road		Total Quantity	
ITEM	DESCRIPTION	QUANTITY	QUANTITY	QUANTITY	QUANTITY	QUANTITY	QUANTITY	QUANTITY		QUANTITY	UNIT
(d)	Tradesman.										hrs
(e)	Truck Driver.										hrs
(f)	Arborist (for pruning or root cutting).										hrs
4.62	**Plant (excluding labour)**										
(a)	Excavator < 2 tonne.										hrs
(b)	Excavator 2 to 4 tonne.										hrs
(c)	Excavator > 4 tonne.										hrs
(d)	Loader < $1m^3$.										hrs
(e)	Loader > $1m^3$.										hrs
(f)	Truck < $8m^3$.										hrs
(g)	Truck > $8m^3$.										hrs
(h)	Water cart (5000 litres).										hrs
(i)	Cherry Picker.										hrs
F.	**TRAFFIC CONTROL, ETC**										
4.63	**Temporary Traffic Control**										
(a)	Installation and removal.										LS
(b)	Traffic management.										days
4.64	**Supply and display notice boards.**										
(a)	Pre-construction.										LS
(b)	Construction.										LS

Carried forward:

BILL OF QUANTITIES

EDGEWARE ROAD

WORK PACKAGE NUMBER: 10944

TRANSPORT MODULE

ITEM	DESCRIPTION	Stage 1 EDGEWARE ROAD QUANTITY	Total Quantity QUANTITY	UNIT
	1. TRANSPORT ITEMS			
A.	**KERB AND CHANNEL**			
1.1	Break out and dispose of old kerbs and channels, culvert crossings, sumps, stormwater pipes,mountable kerbs etc.	740	740	m
	Kerbs and Channels Etc			
	Note: Kerb and channel rates shall include sweeping the kerb and channel at six weekly intervals over the Defects Liability period.			
1.7	New kerb and flat channel (to detail SD 601), including 230mm compacted depth CCC AP65 sub-basecourse below and 300 mm behind face of kerb (to detail SD 625).	650	650	m
1.8	New kerb and flat channel only (to detail SD 601) poured on commercial crossing beam and/or concrete surround.	50	50	m
1.10	New kerb and flat channel - hand-boxed and poured (to detail SD 601), including 230 mm compacted depth of CCC AP65 sub-basecourse below and 300 mm behind face of kerb (to detail SD 625).	10	10	m
1.20	Vehicle cutdowns to detail SD 611 and pedestrian cutdowns to detail SD 613 (extra over item 1.7 and 1.8).	180	180	m
1.21	Extra 75 mm depth concrete base with 2- D12 bars for kerb and channel at bus stops.	30	30	m
	Kerb Repairs			
1.25	Kerb only repairs	6	6	m
1.26	Kerb and channel repairs	6	6	m
1.31	**Property Drains and Associated Structures**			
(a)	uPVC stormwater pipe installation, including supply of backfill.			
(i)	100 mm diameter (Pipe Class SN10).	156	156	m
(b)	Saddle in property drains to new stormwater pipes.			
(i)	100 mm diameter.	4	4	each

126	Y					
127	Y	(c)	Concrete protection if ordered (to detail SD342 - Type E).			
128	Y	(i)	100 mm diameter	10	10	m
	y					
131	Y	1.32	100 mm diameter kerb entry adaptors (to detail SD 605).	50	50	each
132	Y					
	Y	1.33(a)	225 x 125 mm Inspection Box Type A (to detail SD 378), excluding kerb entry adaptors.	50	50	each
133						
134	Y					
	Y	(b)	225 x 125 mm Inspection Box Type B (to detail SD 378), excluding saddle in to stormwater pipe.	4	4	each
135						
136	Y					
263	Y	**D.**	**PATHS**			
264	Y					
265	Y		**Bituminous Material Removal**			
266	Y					
267	Y	1.49	Scarify and remove existing bituminous surfacing.	47	47	m^3
	Y		Note: - quantity calculated from 1565 m2 an estimated average depth of 30mm. - balance of excavation included in New Footpath, Residential Vehicle Crossing, Commercial Vehicle Crossing, Cycleway, Cobblestones, Berm items.			
268						
269	Y					
285	Y	1.52(a)	**New Footpath** construction excluding asphaltic concrete (to detail SD 607).	977	977	m^2
286	Y					
287	Y	(b)	Asphaltic concrete (to detail SD 607).	977	977	m^2
288	Y					
	Y	1.53(a)	**Residential Vehicle Crossing** construction excluding asphaltic concrete (to detail SD 607).	460	460	m^2
289						
290	Y					
291	Y	(b)	Asphaltic concrete (to detail SD 607).	460	460	m^2
292	Y					
303	y		**Installation of Tactile Pavers in Footpaths**			
304	y					
305	y	1.57	Supply and lay 300mm x 300mm light yellow precast concrete tactile pavers.	381	381	each
306	y					
307	y		**Note:** For supply of tactile Pavers contact Dunedin Precast Concrete Ph (03) 477-2254 **or** Viblock - Christchurch Phone (03) 343-0394			
308	y					
321	y	1.59	**Alterations to Driveways** to match existing driveway and to mate in with the design back of path level.			
322	y					
323	y	(a)	Property No 154			
324	y		Asphaltic driveway construction (to detail SD 608). Rate to include sawcutting.	4	4	m^2
325	y					
326	y	(b)	Property No 156			
327	y		Asphaltic driveway construction (to detail SD 608). Rate to include sawcutting.	4	4	m^2
328	y					
329	y	(c)	Property No 158			
330	y		Asphaltic driveway construction (to detail SD 608). Rate to include sawcutting.	4	4	m^2
331	y					
332	y	(e)	Property No 160			
333	y		Concrete driveway construction (to detail SD 608). Rate to include sawcutting.	4	4	m^2

334	y					
335	y	(f)	Property No 159			
336	y		Concrete driveway construction (to detail SD 608). Rate to include sawcutting.	4	4	m^2
337	y					
338	y	(g)	Property No 163			
339	y		Shingle driveway to match existing construction (to detail SD 608).	8	8	m^2
	y					
	y	(g)	Property No 257A			
	y		Concrete driveway construction (to detail SD 608). Rate to include sawcutting.	4	4	m^2
	y					
343	Y	1.61	**Footpath Resurfacing**			
344	Y					
345	Y	(a)	Sawcutting (if ordered) - for AC less than 50 mm in total depth.	60	60	m
346	Y					
361	y	1.62	**Battens**			
362	y					
363	y	(a)	For path repairs and new berms.	10	10	m
364	y					
365	y	(b)	For existing berms.	40	40	m
366	y					
367	y	1.63	Relocate bus stop or traffic sign posts to immediately behind kerb.	4	4	each
382	Y	**E.**	**LAWNS**			
383	Y					
390	Y	1.67	**New Grassed Berms**			
391	Y					
392	Y	(a)	Unsuitable foundations - seal and road metal 75 mm - 225 mm below finished level, if required to meet design requirements and agreed by the Engineer.	15	15	m^3
393	Y					
394	Y	(b)	Extra filling under grassed berms, supply, place and lightly compact.			
395	Y					
396	y	(i)	First class topsoil.	15	15	m^3
403	Y	(c)	Hydroseeded berms with 75 mm of topsoil, including establishment (to detail SD 201).	545	545	m^2
404	Y					
405	y	1.68	**Repair of Existing Grassed Berms (Lawn)**			
406	y					
407	y	(a)	Preparation including spraying with herbicide, cultivation, sowing and establishment.	20	20	m^2
408	y					
409	y	(b)	Extra topsoil to reshape berm - supply, place etc.	1	1	m^3
410	y					
451	Y	**G.**	**TRAFFIC RESTRAINTS** See plan RD4001			
452	Y					
453	Y		**Medians**			
454	Y					
455	Y	1.76	Mountable kerb blocks or 150 mm high insitu mountable kerbs on existing surface (to detail SD 603).	22	22	m
460	Y					
461	Y	1.79	Construct median island nosing (shaping and concrete infill).			
462	Y					
463	Y	(a)	Standard (approx. 0.1 m^3).	2	2	each
464	Y					
481	Y		**Pressed Concrete Surfacing in Traffic Island**			

482	Y					
		1.82	Excavate to subgrade level (approximately 150 mm below finished level), supply and lay 75 mm compacted depth CCC SAP20 or TNZ M/4:AP20,			
	Y		supply and construct 75 mm depth 20 MPa "Autumn Tone" coloured concrete with stretcher bond pattern pressed in. Sawcuts in concrete to	12	12	m^2
483			be maximum 4m spacing.			
484	Y					
	Y	**J.**	**ROAD SHOULDERS**			
628						
629	Y					
630	Y	1.111	Saw cut existing pavement prior to excavation.	110	110	m
631	Y					
632	Y	(a)	Chip seal carriageway.	72	72	m
633	Y					
634	Y	(b)	Asphaltic concrete (AC) carriageway.			
635	Y	(i)	For AC less than 50 mm in total depth.	5	5	m
636	Y	(ii)	For total depth of AC 50-100 mm.	20	20	m
655	Y					
	Y	1.115	**Road Shoulder Reconstruction/ Restoration - AC Surfacing**			
656						
657	Y					
658	Y	(a)	**Bituminous Material Removal**			
659	Y					
	Y		Scarify and remove existing bituminous surfacing.	2	2	m^3
660						
661	Y					
			Note: - quantity calculated from area of 25 m^2 x estimated average depth of 80mm.			
	Y		- balance of excavation included in New Footpath, Residential Vehicle Crossing, Commercial Vehicle Crossing, Cycleway, Cobblestones, Berm items.			
662						
663	Y					
664	Y	(b)	Excavation to subgrade.	25	25	m^2
665	Y					
		(c)	Supply and lay strength class C, filtration class 2			
	Y		geotextile (to detail SD 625). Includes area under	42	42	m^2
666			kerb and channel.			
667	Y					
		(d)	Supply and construction of CCC AP65 sub-base			
	Y		metalcourse to compacted depth of 300 mm,	25	25	m^2
668			excluding under kerb and channel.			
669	Y					
		(e)	Supply and construction of TNZ M/4:AP40 or			
	Y		CCC RCC M/4: AP40 basecourse to compacted	25	25	m^2
670			depth of 100 mm.			
671	Y					
		(f)	Supply and construction of 50 mm compacted			
	Y		depth CCC AC16 (bitumen 80/100). For this	25	25	m^2
672			Contract 2 core samples shall be tested at each intersection.			
677	Y					
678	Y	1.116	**Bandaging. At Madras street**	25	25	m
679	Y					
	y	1.117	**Road Shoulder Reconstruction/ Restoration - Chip Seal Surfacing**			
680						
681	y					
682	y	(a)	**Bituminous Material Removal**			
683	y					
	Y		Scarify and remove existing bituminous surfacing.	3	3	m^3
684						
685	Y					

	Y		**Note:** - quantity calculated from area of 85 m^2 x estimated average depth of 30 mm. - balance of excavation included in New Footpath, Residential Vehicle Crossing, Commercial Vehicle Crossing, Cycleway, Cobblestones, Berm items.			
686						
687	Y					
688	Y	(b)	Excavation to subgrade.	67	67	m^2
689	Y					
		(c)	Supply and lay strength class **C**, filtration class 2			
	Y		geotextile (to detail SD 625). Includes area under	113	113	m^2
690			kerb and channel.			
691	Y					
		(d)	Supply and construction of CCC AP65 sub-base			
	Y		metalcourse to compacted depth of 300mm,	67	67	m^2
692			excluding under kerb and channel.			
693	Y					
		(e)	Supply and construction of TNZ M/4:AP40 or			
	Y		CCC RCC M/4: AP40 basecourse to compacted	67	67	m^2
694			depth of 100mm.			
695	Y					
		1.118	**First Coat Sealing** (2 coats - Grade 4 and 6			
	Y		chip). Overlap chip seal 100 mm onto existing	90	90	m^2
696			carriageway.			
697	Y					
		K.	**CARRIAGEWAY CONSTRUCTION**			
	Y					
700						
701	Y					
716	Y	1.120	**Saw Cutting**			
717	Y					
718	Y	(a)	Chip seal carriageway.	65	65	m
719	Y					
720	Y	(b)	Asphaltic concrete AC carriageway.			
722	Y	(ii)	For total depth of AC 50-100 mm.	40	40	m
724	Y					
731	Y		**Bituminous Material Removal**			
732	Y					
		1.121	Scarify and remove existing bituminous surfacing			
733	Y			160	160	m^3
			Note: - quantity calculated from area of 4000 m2 an estimated average depth of 40 mm.			
	Y		- balance of excavation included in New Footpath, Residential Vehicle Crossing, Commercial Vehicle Crossing, Cycleway, Cobblestones, Berm items.			
734						
741	Y	1.123	**General Excavation** to subgrade			
742	Y					
743	Y	(a)	**Cut to Waste**.	2,400	2,400	m^3
753	Y					
754	Y		**Carriageway Construction**			
755	Y					
		1.124	Supply and lay strength class D, filtration class 2			
	Y		geotextile (to detail SD 625). Includes area	5,300	5,300	m^2
			under kerb and channel.No Geotextile between			
756			chainage 710 and 807			
757	Y					
		1.125				
	Y		Supply and construction of CCC AP65 sub-base			
758			metalcourse, excluding under kerb and channel.			
759	Y	(a)	to compacted depth of 300mm	1,975	1,975	m^2
760	Y	(b)	to compacted depth of 400mm	1,476	1,476	m^2
761	Y	(c)	to compacted depth of 500mm	1,420	1,420	m^2
762	Y					
		1.126	Supply and construction of TNZ M/4:AP40 or			
	Y		CCC RCC M/4: AP40 basecourse to compacted	6,000	6,000	m^2
763			depth of 100 mm.			

764	Y					
767	Y					
		1.128	**First Coat Sealing** (2 coats - Grade 4 and 6 chip). Overlap chip seal 100 mm onto existing carriageway.	5,675	5,675	m^2
	Y					
768						
769	Y					
		1.129	Membrane single coat chipseal (Grade 4 chip). Overlap chipseal 100 mm onto existing carriageway.	735	735	m^2
	Y					
770						
771	Y					
		1.130	**Asphaltic Concrete surfacing CCCAC16** (bitumen 80/100). Compacted depth 50 mm.	735	735	m^2
772	Y					
		1.114	**Milling** out of existing Asphalt surfacing (50 mm depth)	255	255	m^2
773	Y					
	Y					
774	Y	1.116	**Bandaging**	20	20	m
784	Y					
785	Y	1.135	**NAASRA Testing -** by Contractor.		1	LS
792	Y					
793	Y		**Surface Boxes**			
794	Y					
		1.138	Adjustment of surface boxes or structures to mate in with new surface levels, make good new surface, etc.			
	Y					
795						
796	Y					
		(a)	Manholes to requirements of CSS Part 3 Clause 16.0. Note: See Plans RD2001 -RD2005 . Contractor to inspect manholes and determine type before pricing.			
	Y					
797						
		(i)	MH12910 - lower 60mm approximately (unvented)	1	1	each
798	Y					
		(ii)	MH6 - lower 140 mm approximately (vented).	1	1	each
799	Y					
		(iii)	MH3 - lower 175 mm approximately (vented).	1	1	each
800	Y					
		(iv)	MH12871 - lower 170mm approximately (unvented).	1	1	each
801	Y					
		(v)	MH12907 - lower 140mm approximately (unvented).	1	1	each
802	y					
		(vi)	MH12908 - lower 115 mm approximately (unvented).	1	1	each
803	y					
		(vii)	MH12905- lower 100mm approximately (vented).	1	1	each
804	Y					
		(viii)	MH12904 - lower 45mm approximately (unvented).	1	1	each
805	Y					
		(ix)	MH14803- lower 115mm approximately (unvented).	1	1	each
	Y					
		(x)	MH33034- lower 115mm approximately (unvented).	1	1	each
	Y					
		(xi)	MH14799 - raise 45mm approximately (unvented).	1	1	each
806	y					
		(xii)	MH14798- raise 100mm approximately (unvented).Currently under construction	1	1	each
807	y					
		(xiii)	MH14795- lower 135mm approximately (unvented).Currently under construction	1	1	each
808	Y					
		(xiv)	MH28284- raise 50mm approximately (unvented).Currently under construction	1	1	each
	Y					
		(xv)	MH14793- raise 50mm approximately (unvented).Currently under construction	1	1	each
	Y					
		(xvi)	MH14792- raise 100mm approximately (unvented).	1	1	each
	y					
		(xvii)	MH14794- lower 35mm approximately (unvented).	1	1	each
	y					
809	Y	(b)	Fire hydrant boxes.	10	10	each
810	Y					
811	Y	(c)	Sluice valve boxes.	10	10	each
812	Y					

897	Y	**N.**	**ROAD MARKING**			
898	Y					
899	Y		**Lanes**			
900	Y					
901	Y	1.149	100 mm white.	866	866	m
902	y					
903	y	1.150	Lanelines - 100 mm white 3m stripe, 7m gap.	531	531	m
906	y					
907	y	1.152	Right turn bay chevron complete including arrow and no passing lines.	1	1	each
908	y					
909	y	1.153	No Passing lines - 100 mm yellow continuous.	106	106	m
910	y					
911	y	1.154	Advance No Passing lines - 100 mm yellow 13m stripe 7m gap.	85	85	m
912	y					
917	y	1.157	No Stopping - 100 mm yellow 1m stripe 1m gap.	20	20	m
918	Y					
919	Y	1.158	No Stopping - 100 mm yellow 1m stripe 2m gap (for lengths over 10m).	385	385	m
924	Y					
925	Y	1.161	**Limit Lines/Holding Lines**			
927	Y	(a)	Stop - 300 mm wide yellow continuous.	9	9	m
928	Y					
929	Y	(b)	Give Way/Signals - 300 mm wide white continuous.	52	52	m
934	Y					
935	Y		**Symbols**			
936	Y					
937	Y	1.164	Give Way triangle symbol.	1	1	each
938	Y					
947	Y	(d)	Shared turn.	7	7	each
948	Y					
955	y	1.169	Pedestrian diamond.	2	2	each
956	y					
957	y	1.70	Pedestrian - white (to detail SD 661).	5	5	each
961	y	1.171	Stop - 100 mm white 2.4m high.	1	1	each
962	y					
982	Y					
983	Y	1.174	**Surface Boxes**			
984	Y					
985	Y	(a)(i)	Fire hydrant boxes	10	10	each
987	Y					
988	Y	(b)	Sluice valve boxes	10	10	each
1022	y	**O.**	**PERMANENT TRAFFIC SIGNS**			
1023	y					
1024	Y	1.181	**Regulatory General signs, including posts**			
1025	Y					
1032	y	(d)	RG17 Keep Left 800 mm high (to detail SD 635). Reinstate existing sign.	2	2	each
1033	y					
1118	y	**P.**	**STREET FURNITURE/PEDESTRIAN FEATURES see plan RD4001**			
1119	y					
1156	Y	1.199	**Holding rail** (to detail SD 635). Holding rail to be 0.9m wide.	2	2	each
1157	Y					
1346	y		**BUS STOP SIGNS**			
1347	y					
1348	Y	1.226	Recover,store and reinstate Metro bus stop sign blades	4	4	each

	Repair Type	Units	Estimated Claim Quantity	Comments
1	CR01a Digout repair with Seal	m2	7716.6	
2	CR01b Pvment Digout repair with AC	m2	171	
3	CR02a Scarify and Reshape with Seal	m2	576.8	> 400 m2
4	CR03 Pvment Mill & Mix	m2	414.4	
5	CR04a Basecourse Stablisation (Cement) Chip Seal	m2	9668.2	> 400 m2
6	CR04a Basecourse Stablisation (Cement) Chip Seal	m2	505.3	1 repair patch
7	CR04b Basecourse Stabilisation (Cement) AC	m2	1107.1	> 400 m2
8	CR04b Basecourse Stabilisation (Cement) AC	m2	573.9	< 400 m2
9	CR05a Trench Restoration CCC Type C(i) with Seal	m2	2211	
10	CR05b Trench Restoration CSS Type C(i) with AC	m2	867	
11	CR07b Overlay Including Texturising Seal Coat	m2	45	
12	CR09 Pothole repair	each	4	
13	KR01a Kerb & Channel	m	1275.5	6 sections
14	KR01a Kerb & Channel (less than 10m)	m	45	10 sections
15	KR02 Kerb and channel repair	m	1	
16	KR03 Kerb Only	m	3	
17	KR06 Commercial Crossing Beam	m	8	
18	KR11 Frame and Grate Replace	each	2	
19	FR01 Fpth Digout	m2	1361.5	
20	FR02 Fpth Strip and AC	m2	142	
21	FR09a Installation of new tactile pavers	each	59	
22	FR11 Kerb adaptor	each	2	
23	XR01 Manhole adjustment	each	3	
24	XR02 Cutdown manholes	each	1	
25	XR06a Berm Renewal	m2	384.4	
26	XR06b Landscape Area Renewal	m3	12	

D

Appendix D Risk Register

PROJECT RISK REGISTER

Project Title	Edgeware Road
SCIRT Number	**10944**
Date	19-Sep-12
Project Stage	**Detailed Design**
Delivery Team Project Manager	
Lead Designer	Richard Gould
Attendees	Rex Hopkins, Kani Bristed, Johno Fletcher, Chris Nordstrom, Peter Wehrmann, Steve McNeill, John Walter, Allen Ingles, Kiran Patel, Sarah FitzGerald, Richard Milson, John Walter, Chris Mance, Pete Wehrmann
Apologies	Michelle Flanagan, Rod Whearty, Mike Southby, Graeme Tiltman, Tim Cronin, Pual Dickosn, Colin Hey, David Bain, Sean Coles,

	Threat		Opportunity	
Extreme	351 to 100000		-351 to -100000	
Very High	201 to 350		-201 to -350	
High	71 to 200		-71 to -200	
Moderate	31 to 70		-31 to -70	
Low	4 to 30		-4 to -30	
Negligible	1 to 3		1 to -3	

No	Subject	Risk Description	Status	Owner of the Risk	Consequence of risk	Consequence	Rating (C)	Likelihood	Rating (L)	Score = C x L and colour rating		Controls or Mitigation		Current update
58														
59														
60														
61														
47	Consents	notable trees on Edgeware Road - consent condtions	Live	Delivery Team Project Manager	Damage to Notable trees	Threat - Environment - Limited but medium-term negative effects - Minor	10	Probability - 20 - 50% - Quite Common	4	40		3 notable trees have been identified and one group of subdivisional trees present standard consents apply.Highlighted to delivery team in report		The Rimu tree at 164 Edgeware Road has been identified to be protected the other two at 177 and 101 are either in an area of restoration or far enough from the street frontage to not be affected .Note the Rimu tree has had a lot of land damage around the root base the contractors environmental wing have been advised to protect the tree
13	Constructability	Carriageway fails due to the collapsing of the main trunk sewer	Live	Delivery Team Project Manager	Future rework to repair carriageway	Threat - Cost - + $10k to $100k - Minor	10	Probability - 20 - 50% - Quite Common	4	40		Allen Ingles and Chris Mance to determine approach to the main trunk line trench restoration a tempoary trench restoration detail has been put forward as part of the detailed design		
17	Delivery	Working in areas with high ground water levels and springs	Live	Delivery Team Project Manager	Delayed programme	Threat - Time - Weeks - Minor	10	Probability - 20 - 50% - Quite Common	4	40		Construction methodology to include provision for dewatering plant, trench shielding etc. to control groundwater flow within works area		High water table has been identified between Madras Street and Hills Road
11	Constructability	Roads are closed or sufficiently reduced in level of service to cause major disruption to motorists or residents	Live	Delivery Team Project Manager	Frustrated residents , business owners and commuters	Threat - Image / Reputation - Local Media Cover - Minor	10	Probability - 20 - 50% - Quite Common	4	40		Robust TMP put in place with an emergency plan on stand by to ensure rapid reinstatement should the road be needed. Appropriate access to properties and for emergency vehicles to be maintained.		Emergency works implemented to open up section between Madras and Allard Street.Residents have been notified
18	Delivery	Additional services are encountered or services are discovered in different positions to those expected causing work delays.	Live	Delivery Team Project Manager	Delayed programme	Threat - Time - Weeks - Minor	10	Probability - 20 - 50% - Quite Common	4	40		Potholing or surveying services in critical locations.Thorough liaison with utilities		Stormwater lines have been potholed as part of Early Contractor Involement
42	Water supply	associated streets - water supply jobs, side streets	Closed	Delivery Team Project Manager	Delayed programme	Threat - Time - Weeks - Minor	10	Probability - 20 - 50% - Quite Common	4	40		all water supply work is complete in Edgeware road and side streets		
51	Time	logical order of works could interfere with construction programme	Live	Delivery Team Project Manager	Delayed programme	Threat - Time - Weeks - Minor	10	Probability - 20 - 50% - Quite Common	4	40		Contractor to consider outstanding wastewater work and RAMM verse Rebuild work		
19	Delivery	Community complaints from plant noise and/or location of temporary works plant	Live	Delivery Team Project Manager	Residents and business owners use political means to stop works.Complaints sent to Scirt	Threat - Image / Reputation - Local Media Cover - Minor	10	Probability - 20 - 50% - Quite Common	4	40		Appropriate plant to be used, with best practice noise attenuation measures included. Due consideration to be given to the location of temporary plant		Residents notified of pending work
27	Scope / Standards	Changes in scope result in time delays and increased cost	Live	Asset owner	Delayed programme	Threat - Time - Weeks - Minor	10	Probability - 20 - 50% - Quite Common	4	40		Scope to be agreed and approved at Concept Design stage with Asset Owner buy-in		Wastewater changes if any relating to the main trunk sewer are to be communicated in advance to the delivery team
38	Stakeholders	poor public perception due to patchwork	Live	Delivery Team Project Manager	Disgruntled residents	Threat - Image / Reputation - Local Media Cover - Minor	10	Probability - 20 - 50% - Quite Common	4	40		Works constructed in terms of NZTA required standards		
43	Stakeholders	traffic - bus route and shopping area traffic	Live	Delivery Team Project Manager	Disgruntled residents	Threat - Image / Reputation - Local Media Cover - Minor	10	Probability - 20 - 50% - Quite Common	4	40		Communication needed with bus companies		
8	Consents	Need to dispose of contaminated land and water if encountered around the Cranford Street intersection (Petrol station) a HAIL site.	Live	Delivery Team Project Manager	Extra cost in removing contaminated material.Environmental threat	Threat - Environment - Limited but medium-term negative effects - Minor	10	Probability - 20 - 50% - Quite Common	4	40		Possible disposal sites to be located in advance. Delivery Team to adhere to Global Consent requirements		
23	Geotechnical	Soil/groundwater different to that expected/assumed in design	Live	Delivery Team Project Manager	Re design	Threat - Cost - + $10k to $100k - Minor	10	Probability - 20 - 50% - Quite Common	4	40		Contingency allowance to be included, with assumptions identified in Design Report. Consider the adequacy of the ground investigation undertaken, ensure TOC team has geotechnical information that is available.		Extra borelogs received nov 2012 have given more certainty of ground conditions between Cranford Street and Madras Street

No	Subject	Risk Description	Status	Owner of the Risk	Consequence of risk	Consequence	Rating (C)	Likelihood	Rating (L)	Score = C x L and colour rating		Controls or Mitigation		Current update
	Community	Edgeware Residents business owners only sees the disruption caused by the project over a long period of time.	Live	Communications team	Residents and business owners use political means to stop works	Threat - Time - Weeks - Minor	10	Probability - 10 - 20% - Unlikely	3	30		Start work notice SCIRT Communications Plan to advise public appropriately.		Business owners have expressed an interest in works not happening around busy retail trading times
4	Community	Edgeware Residents and Business owners question why works are being undertaken in areas where works were recently completed (such as emergency works)	Live	Communications team	Residents and business owners use political means to stop works	Threat - Image / Reputation - Local Media Cover - Minor	10	Probability - 10 - 20% - Unlikely	3	30		Start work notice SCIRT Communications Plan to advise public appropriately.		We are accelerating roading works between Madras Street and Allard Street
5	Community	Edgeware business owners disrupted by works during periods of peak retail trading	Live	Communications team	Residents and business owners use political means to stop works	Threat - Image / Reputation - Local Media Cover - Minor	10	Probability - 10 - 20% - Unlikely	3	30		Works will be programmed during quite retail trading activity		Business owners have expressed an interest in works not happening around busy retail trading times
14	Constructability	Stormwater joint breakages lead to infrastructure failure	Live	Delivery Team Project Manager	Future rework to repair carriageway	Threat - Cost - + $10k to $100k - Minor	10	Probability - 10 - 20% - Unlikely	3	30		Identify CCTV breakages and arrange repair		CCTV has been done
15	Constructability	future relining of the main trunk sewer damages new infrastructure around colombo street intersection	Live	Delivery Team Project Manager	Rework affected AC areas	Threat - Cost - + $10k to $100k - Minor	10	Probability - 10 - 20% - Unlikely	3	30		Asset owner looks at the timing of relining the main trunk sewer before Carriageway/ trench restoration occurs		Contractor to do asphaltic concrete surfacing after the main trunk sewer alignment works is finished
16	Cost	Incorrect quantities included in Bill of Quantities	Live	Delivery Team Project Manager	inaccurate TOC	Threat - Cost - + $10k to $100k - Minor	10	Probability - 10 - 20% - Unlikely	3	30		Contingency allowance to be included, with assumptions identified in Design Report.		Quantities peer reveiwed
30	Utilities	Existing utilities are damaged during construction	Live	Delivery Team Project Manager	Delayed programme	Threat - Cost - + $10k to $100k - Minor	10	Probability - 10 - 20% - Unlikely	3	30		Discussions with utility providers regarding isolation of services and repair processes.		
34	Geotechnical	shallow geotech assessment -potential for road surface bridging voids	Live	Delivery Team Project Manager	Future rework to repair carriageway	Threat - Cost - + $10k to $100k - Minor	10	Probability - 10 - 20% - Unlikely	3	30		Onsite inspections required by the contractor in particular around the main trunk trench		
46	Stormwater	St Albans Creek culverts condition - may need replacing	Live	Delivery Team Project Manager	Culvert failure	Threat - Cost - + $10k to $100k - Minor	10	Probability - 10 - 20% - Unlikely	3	30		Phil Wilkins and Kiran Patel have assesed culvert strength		No damage reported of culverts
50	Stormwater	tie in with stormwater design at private property boundary	Live	Delivery Team Project Manager	flooding of property	Threat - Cost - + $10k to $100k - Minor	10	Probability - 10 - 20% - Unlikely	3	30		Extra levels have been taken		levels taken near allard street slumped land
1	Archaeology / Heritage / iwi	Archaeological and Heritage requirements in particular around the St Albans stream not identified until late in project.	Live	Delivery Team Project Manager	Delayed programme	Threat - Time - Weeks - Minor	10	Probability - 10 - 20% - Unlikely	3	30		Early identification of archaeological and cultural features within the project area through review of information on GIS, and appropriate liaison with Historic Places Trust. Any issues or concerns to be discussed with SCIRT Lead Planner.		No Archaelogical sites identiied on GIS
2	Archaeology / Heritage / iwi	Iwi interests not identified until late in project.	Live	Delivery Team Project Manager	Delayed programme	Threat - Time - Weeks - Minor	10	Probability - 10 - 20% - Unlikely	3	30		Identify any areas of iwi interest indicated on GIS within Project area. Liaise with SCIRT Planner for any identified areas.		No Archaelogical sites identiied on GIS
24	Input data	Levels given in construction drawings are not able to be achieved due to survey tolerances at time of design resulting in pipe grades not being met	Live	Delivery Team Project Manager	Re design	Threat - Time - Weeks - Minor	10	Probability - 10 - 20% - Unlikely	3	30		Benchmarks to be installed for Contractor use and resurvey of key tie in points.		Contractor to check all levels and benchmarks prior to construtionBenchmarks supplied as at September 2012 for detailed design
25	Land and private property	Landowner does not allow access onto their land	Live	Delivery Team Project Manager	Delayed programme	Threat - Time - Weeks - Minor	10	Probability - 10 - 20% - Unlikely	3	30		No issues with property owners		
6	Consents	Statutory (RMA) Consent requirements not identified until late in project	Live	Delivery Team Project Manager	Delayed programme	Threat - Time - Weeks - Minor	10	Probability - 1 - 10% - Unusual	2	20		Early identification and confirmation of required consents. Early liaison with SCIRT Lead Planner.		Global consents cover Civil works
21	Earthquakes	Earthquake movements or liquefaction	Live	Delivery Team Project Manager	Delayed programme	Threat - Time - Weeks - Minor	10	Probability - 1 - 10% - Unusual	2	20		Works to be constructed as efficiently as possible without compromising quality or long term performance.		
29	Stormwater	Stormwater pipes temporarily out of use during construction resulting in localised flooding as stormwater cannot drain away	Live	Delivery Team Project Manager	flooded properties	Threat - Image / Reputation - Local Media Cover - Minor	10	Probability - 1 - 10% - Unusual	2	20		Provision for over pumping in serious rainfall events where roads and/or properties may flood significantly		
39	Betterment	Betterment - chance to link up piping direct to outfall	Live	Delivery Team Project Manager	Costly betterment	Threat - Cost - + $10k to $100k - Minor	10	Probability - 1 - 10% - Unusual	2	20				
57	Stakeholders	expectation that road could be narrowed at Hills Road end by resident	Live	Asset owner	Change of scope of works and redesign	Threat - Image / Reputation - Local Media Cover - Minor	10	Probability - 1 - 10% - Unusual	2	20		Asset owners have agreed to maintain existing carriageway widths		
52	Coordination	Hills Road potential project coordination	Live	Delivery Team Project Manager	rework	Threat - Cost - + $0 to $10k - Negligible	1	Probability - > 50% - Likely	5	5		work in with PS7 and stop short of intersection		Working in with Stephen McKenzie Hills Road designer
37	Constructability	varying asphalt thickness can impact on reconstruction methodology	Live	Delivery Team Project Manager	Extra excavation required	Threat - Cost - + $0 to $10k - Negligible	1	Probability - 20 - 50% - Quite Common	4	4		Make safe areas may have higer than normal ac thicknesses contractor to take into consideration while doing the TOC		
48	Sustainability	opprtunity for sustainability- using stabilsation around business areas	Live	Delivery Team Project Manager	Time saving and enhanced reputation	Opportunity - Time - Months - Medium	-40	Probability - > 50% - Likely	5	-200		We are stabilising insitu the road pavement for two thirds of this project outside businesses		Saves time and impact on the business owners

E

Appendix E Design and Review Certificates

SCIRT
Rebuilding Infrastructure

Stronger Christchurch Infrastructure Rebuild Team

1 Magdala Place, Middleton
PO Box 9341, Tower Junction, Christchurch 8149

SCIRT Design Certificate

Infrastructure Rebuild

ISSUED BY: STRONGER CHRISTCHURCH INFRASTRUCTURE REBUILD TEAM (SCIRT)

TO: CHRISTCHURCH CITY COUNCIL

IN RESPECT OF:

Edgeware Road (RD & SW) **(SCIRT #10944)**

(Project Nr & Address)

AT:

Edgeware, Christchurch

(Description)

SCIRT has been engaged by CHRISTCHURCH CITY COUNCIL to provide design services in respect of the infrastructure rebuild described above. I have the qualifications and experience relevant to this project as set out herein and have been responsible for the design of the subject works.

I Graeme Tiltman (Designer) on behalf of SCIRT confirm that the design is to current good engineering practice, and that it satisfies the requirements of the Infrastructure Recovery Technical Standards and Guidelines.

SCIRT holds a current policy of professional indemnity insurance of no less than $500,000 (Minimum amount of insurance shall be commensurate with the current amounts recommended by IPENZ, ACENZ, TNZ, INGENIUM.)

Qualifications and experience

BSc, MHKIE, MICE, MIPENZ, CEng (UK)

Date: 29/11/12.

(Name & Signature of Designer)

F

Appendix F Calculations and Supporting Information

City Care Ltd Laboratory, 205 Springs Road, Christchurch 8042, New Zealand Phone 03 941 7616 Fax 03 941 7618 Web www.citycare.co.nz

BOREHOLE REPORT

Lab Reference: 0651 / 11

Client: MacDow Fletcher Joint Venture
Contact Name: Mr T Cherkasov

Subject: Edgeware Road
(Cranford Street to Barbadoes Street)

Client's Instructions: To perform Scala Penetrometer Tests at selected sites on Earthquake Damaged Road.

Findings:

Scala Penetrometer Tests
Six sites were selected at 100 metre intervals.
The existing depth of construction ranged from 400 to 700mm.
The inferred CBR of the layer directly beneath the construction varied from less than 2 to 9½.
A very high water table was found at Boreholes 4, 5, and 6.
See attached sheets for details.

Date of Issue: 22 August 2011

Laboratory Manager:
(T. O'Regan)

Checked By:

Edgeware Road

BOREHOLE NUMBER: 4

BOREHOLE LOCATION: 387 metres East of centreline of Cranford Street,
7.0 metres South of centreline, Outside House No. 150

TESTED BY: M. Foster, C. Gould **DATE OF TEST:** 19 August 2011
TEST METHODS: RLB / 2 : 1994, RLB / 4 : 1994, NZS 4402:1986 Test 2.1

LOG OF BORE

Depth of Layer (mm)	Classification / Description
0 – 40	Asphaltic Concrete
40 – 130	Old Construction (AP 40 heavily contaminated with Sand)
130 – 260	Old Construction (AP 65 heavily contaminated with Sand)
260 – 500	Old Construction (Pit Run)
500 +	Sand
Note: Found Water Table at 450mm	

SCALA PENETRATION AND INFERRED CBR

Depth (mm)	Scala Penetration (mm per blow)	Inferred CBR *	Classification / Description
50			AC
100			
150			
200			
250			Construction
300			
350			
400			
450			(water table)
500			
550	38	5	Sand
600			
650			
700			
750	58	3	
800			
850			
900			
950			
1000			
1050			
1100	30	6	
1150			
1200			
1250			
1300			
1350			
1400	18	12.	
1450			
1500			
1550			
1600			
1650			

** CBR values inferred from Austroads Pavement Design APRG Report 21*

Checked By: M. Foster

Lab Reference: 0651 / 11

Edgeware Road

BOREHOLE NUMBER: 5

BOREHOLE LOCATION: 449 metres East of centreline of Cranford Street,
3.0 metres North of centreline, Outside House No. 159

TESTED BY: M. Foster, C. Gould **DATE OF TEST:** 19 August 2011
TEST METHODS: RLB / 2 : 1994, RLB / 4 : 1994, NZS 4402:1986 Test 2.1

LOG OF BORE

Depth of Layer (mm)	Classification / Description
0 – 130	New Road Repair (Chip Seal over CAP 20)
130 – 160	Chip Seal Layer
160 – 260	Old Construction (Dirty AP 40)
260 – 700	Old Construction (Pit Run)
700 +	Silty Sand
Note: Found Water Table at 650mm	

SCALA PENETRATION AND INFERRED CBR

Depth (mm)	Scala Penetration (mm per blow)	Inferred CBR *	Classification / Description
50			New Repair
100			
150			
200			Construction
250			
300			
350			
400			
450			
500			
550			
600			(water table)
650			
700			Silty Sand
750			
800	30	6	
850			
900			
950	85	2	
1000			
1050			
1100	33	5½	
1150			
1200			
1250			
1300			
1350			
1400	17	12½	
1450			
1500			
1550			
1600	24	8	
1650			
1700			
1750			
1800			

** CBR values inferred from Austroads Pavement Design APRG Report 21*

Checked By: M. Foster

Edgeware Road

BOREHOLE NUMBER: 6

BOREHOLE LOCATION: 545 metres East of centreline of Cranford Street,
2.0 metres South of centreline, Outside House No. 180

TESTED BY: M. Foster, C. Gould **DATE OF TEST:** 19 August 2011
TEST METHODS: RLB / 2 : 1994, RLB / 4 : 1994, NZS 4402:1986 Test 2.1

LOG OF BORE

Depth of Layer (mm)	Classification / Description
0 – 110	New Road Repair (Chip Seal over CAP 20)
110 - 150	Asphaltic Concrete
150 – 250	Old Construction (Dirty AP 40)
250 – 700	Old Construction (Pit Run)
700 +	Silty Sand
Note: Water Table found at 550mm	

SCALA PENETRATION AND INFERRED CBR

Depth (mm)	Scala Penetration (mm per blow)	Inferred CBR *	Classification / Description
50			
100			New Repair
150			AC
200			
250			
300			
350			Construction
400			
450			
500			
550			(water table)
600			
650			
700			
750	44	4	Silty Sand
800			
850			
900			
950	27	7	
1000			
1050			
1100			
1150			
1200	28	7	
1250			
1300			
1350			
1400			
1450			
1500	28	7	
1550			
1600			
1650			

** CBR values inferred from Austroads Pavement Design APRG Report 21*

Checked By: M. Foster

Edgeware Road

BOREHOLE NUMBER: 1

BOREHOLE LOCATION: 63 metres East of centreline of Cranford Street,
2.0 metres North of centreline, Outside House No. 93

TESTED BY: M. Foster, C. Gould **DATE OF TEST:** 19 August 2011
TEST METHODS: RLB / 2 : 1994, RLB / 4 : 1994, NZS 4402:1986 Test 2.1

LOG OF BORE

Depth of Layer (mm)	Classification / Description
0 - 60	New Road Repair (Chip Seal over CAP 20)
60 - 100	Asphaltic Concrete Layer
100 - 130	Macadam (Contains Coal Tar)
130 - 230	Old Construction (AP 40 heavily contaminated with silt)
230 - 400	Old Construction (AP 65 heavily contaminated with silt)
400 +	Blue Clayey Silt with some aggregate

SCALA PENETRATION AND INFERRED CBR

Depth (mm)	Scala Penetration (mm per blow)	Inferred CBR *	Classification / Description
50			new repair
100			AC, macadam
150			
200			
250			
300			Construction
350			
400			
450			
500	30	6	Blue Clay / Silt
550			
600			
650	54	3 1/4	
700			
750			
800			
850			
900	30	6	
950			
1000			
1050			
1100			
1150			
1200	16	13	
1250			
1300			
1350	13	16	
1400			
1450			
1500	14	15	
1550			
1600			
1650			

** CBR values inferred from Austroads Pavement Design APRG Report 21*

Checked By: _____

Edgeware Road

BOREHOLE NUMBER: 2

BOREHOLE LOCATION: 163 metres East of centreline of Cranford Street,
2.5 metres South of centreline, Outside House No. 513 Manchester Street

TESTED BY: M. Foster, C. Gould **DATE OF TEST:** 19 August 2011
TEST METHODS: RLB / 2 : 1994, RLB / 4 : 1994, NZS 4402:1986 Test 2.1

LOG OF BORE

Depth of Layer (mm)	Classification / Description
0 - 180	New Road Repair (Chip Seal over CAP 20)
180 - 250	Layer Chipseal over Emulsion Mix
250 - 350	Old Construction (AP 40 heavily contaminated with silt)
350 - 550	Old Construction (AP 65 heavily contaminated with silt)
550 +	Sand

SCALA PENETRATION AND INFERRED CBR

Depth (mm)	Scala Penetration (mm per blow)	Inferred CBR *	Classification / Description
50			new repair
100			
150			
200			
250			Seal, E-mix
300			Construction
350			
400			
450			
500			
550			
600			Sand
650	22	9½	
700			
750			
800	19	12	
850			
900			
950			
1000	24	8	
1050			
1100			
1150			
1200	33	5½	
1250			
1300			
1350			
1400			
1450			
1500	32	6	
1550			
1600			
1650			
1700			
1750			

** CBR values inferred from Austroads Pavement Design APRG Report 21*

Checked By: M. Foster

Edgeware Road

Lab Reference: 0651 / 11

BOREHOLE NUMBER: 3

BOREHOLE LOCATION: 269 metres East of centreline of Cranford Street,
2.5 metres North of centreline, Outside House No. 127

TESTED BY: M. Foster, C. Gould **DATE OF TEST:** 19 August 2011
TEST METHODS: RLB / 2 : 1994, RLB / 4 : 1994, NZS 4402:1986 Test 2.1

LOG OF BORE

Depth of Layer (mm)	Classification / Description
0 – 50	New Road Repair (Chip Seal over CAP 20)
50 - 70	Chip Seal Layer
70 – 250	Old Construction (Clean AP 40)
250 – 630	Old Construction (Clean Pit Run)
630 +	Peat (Layer of Filter Cloth at 630mm)

SCALA PENETRATION AND INFERRED CBR

Depth (mm)	Scala Penetration (mm per blow)	Inferred CBR *	Classification / Description
50			New Repair
100			
150			
200			
250			
300			Construction
350			
400			
450			
500			
550			
600			
650			
700	150	< 2	Peat
750			
800			
850	46	4	
900			
950			
1000			
1050			
1100	28	7	
1150			
1200			
1250			
1300			
1350	15	14	
1400			
1450			
1500	23	9	
1550			
1600			
1650			
1700			
1750			

** CBR values inferred from Austroads Pavement Design APRG Report 21*

Checked By: M. Foster

Borehole No. 2

Borehole 2: Construction

Borehole 2: Borehole

Borehole No. 3

Borehole 3: Construction

Borehole 3: Borehole

Checked By: _____

Borehole No. 4

Borehole 4: Construction

Borehole 4: Borehole

Borehole No. 5

Borehole 5: Construction

Borehole 5: Borehole

Checked By: _____

citycare

Borehole No.6

Borehole 6: Construction

Borehole 6: Construction

Borehole 6: Borehole

Checked By: _____

Borehole No. 1

Borehole 1: Construction

Borehole 1: Construction

Borehole 1: Borehole

Checked By: _____

city care
City Care Ltd Laboratory, 205 Springs Road, Christchurch 8042
T: 03 941 7616 F: 03 941 7618 www.citycare.co.nz

Borehole Report –117 Edgeware Road
(Edgeware Road, Springfield to Hills)

Lab Reference: 2040 / 12d

CLIENT: Stronger Christchurch Infrastructure Rebuild Team
CONTACT NAME: Mr B. Stevens
LOCATION: 62 metres West of centreline of Lindsay Street, 4 metres North of centreline outside No 117

SAMPLED BY: L Sim, S Burgess **DATE OF SAMPLE:** 7 November 2012
TESTED BY: L Sim, S Burgess **DATE OF TEST:** 9 November 2012
TEST METHODS: RLB / 2: 2004, RLB / 4 : 2012, NZS 4402:1986 Test 2.1 (Test site selected by Client)

LOG OF BORE

Depth of Layer (mm)	Moisture Content (%)	Sand Content (%)	Silt Content (%)	Clay Content (%)	Classification / Description
0-50					Chipseal
50-130					Macadam
130-240					Construction (AP40 & silt)
240-810	21	50	38	12	Silty Sand (contains organic material)
810-1290	29	26	48	26	Sandy Silt
1290-2010	30	44	48	8	Sandy Silt

SCALA PENETRATION AND INFERRED CBR

Depth (mm)	Scala Penetration (mm / blow)	Inferred CBR *	Classification / Description
50			Chipseal
100			Macadam
150			
200			Construction (AP40 & silt)
250			
300	36	5	Silty Sand (organics)
350			
400			
450			
500	31	6	
550			
600			
650	50	3.5	
700			
750			
800			
850			
900	42	4.5	Sandy Silt
950			
1000			
1050	35	5.5	
1100			
1150			
1200			
1250	24	8	Sandy Silt
1300			
1350			
1400			
1450			
1500			
1550			
1600			

(continued see above)

*CBR values inferred from Austroads Pavement Design APRG Report 21

Issue Date: 13 November 2012 **Issued By:** _____ **Checked By:** _____

(M Foster, Senior Laboratory Technician)

117 Edgeware Road

Lab Reference: 2040 /12d

Issue Date: 13 November 2012 **Issued By:** **Checked By:**

(M Foster, Senior Laboratory Technician)

TNZ M/4 : 2006 AP40
TEST REPORT

Project :	**Material Investigation**
Location :	**117 Edgeware Road**
Client :	**City Care Laboratory**
Contractor :	**Not Advised**
Sampled by :	**City Care Laboratory**
Date sampled :	**8 November 2012**
Sampling method :	**Not Advised**
Sample description :	**NZTA M4 AP40**
Sample condition :	**Damp as Received**
Source :	**Insitu**

Project No :	**6-JCITY.12/006LC**
Lab Ref No :	**8676**
Client Ref No :	**2040/12d**

Particle Size Distribution

Sieve Size (mm)	Percentage Passing Sample	Limits
63.0	-	100 - 100
37.5	**100**	100 - 100
19.0	**92**	66 - 81
9.5	**60**	43 - 57
4.75	**39**	28 - 43
2.36	**31**	19 - 33
1.18	**26**	12 - 25
0.600	**23**	7 - 19
0.300	**19**	3 - 14
0.150	**12**	0 - 10
0.075	**8**	0 - 7

% passing the finest sieve is obtained by difference

Grading Shape Control

Fraction (mm)	% Within Fraction Sample	Limits
19.0 - 4.75	**53**	28 - 48
9.5 - 2.36	**29**	14 - 34
4.75 - 1.18	**13**	7 - 27
2.36 - 0.600	**8**	6 - 22
1.18 - 0.300	**7**	5 - 19
0.600 - 0.150	**11**	2 - 14

Crushing Resistance

% Fines @ Spec. Load	-	%
Specification	-	%
Crushing Resistance	-	kN
Nom Aggregate Size	-	mm
Specified Load	-	kN

Broken Faces Content of Aggregate

Fraction (mm)	Percentage by Weight Sample	Lower Limit
37.5 - 19.0	**65**	70
19.0 - 9.5	**55**	70
9.5 - 4.75	**54**	70

Plasticity Index

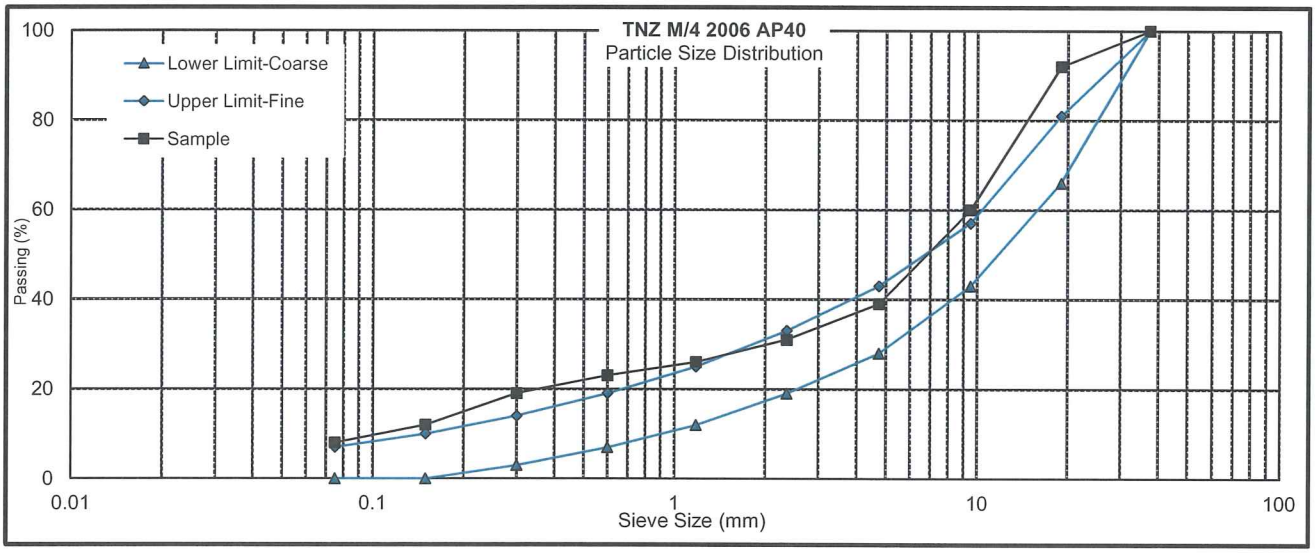
Sample PI	-
Specification	<= 5

Clay Index

Sample CI	-
Specification	<= 3

Sand Equivalent (Air Dried, Mechanical Shaking)

Sample SE	-
Specified	>= 40



Test Methods

Particle Size Distribution	NZS 4407 : 1991 : Test 3.8.1
Broken Faces Content of Aggregate	NZS 4407 : 1991 : Test 3.14

Date tested : 12 November 2012
Date reported : 12 November 2012

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.
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IANZ Approved Signatory

Designation : *Senior Civil Engineering Technician*
Date : 12 November 2012

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T: 03 941 7616 **F:** 03 941 7618 **www.citycare.co.nz**

Borehole Report – 196 Edgeware Road
(Edgeware Road, Springfield to Hills)

Lab Reference: 2040 / 12f

CLIENT: Stronger Christchurch Infrastructure Rebuild Team
CONTACT NAME: Mr B. Stevens
LOCATION: 47 metres East of centreline of Barbadoes Street, 4 metres South of centreline outside No 196

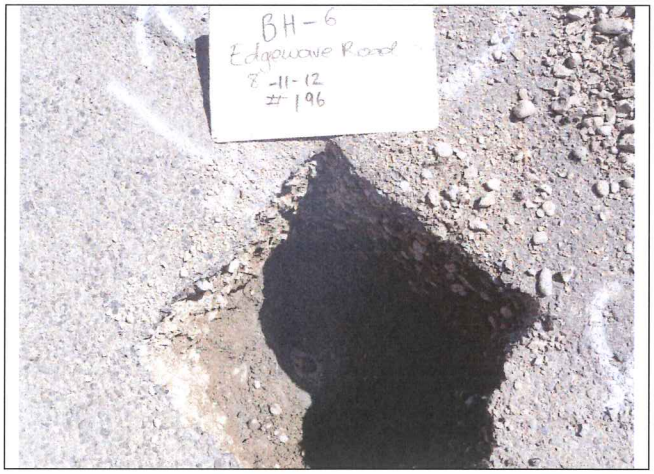
SAMPLED BY: C Gould, S Burgess **DATE OF SAMPLE:** 8 November 2012
TESTED BY: L Sim, S Burgess **DATE OF TEST:** 9 November 2012
TEST METHODS: RLB / 2: 2004, RLB / 4 : 2012, NZS 4402:1986 Test 2.1 (Test site selected by Client)

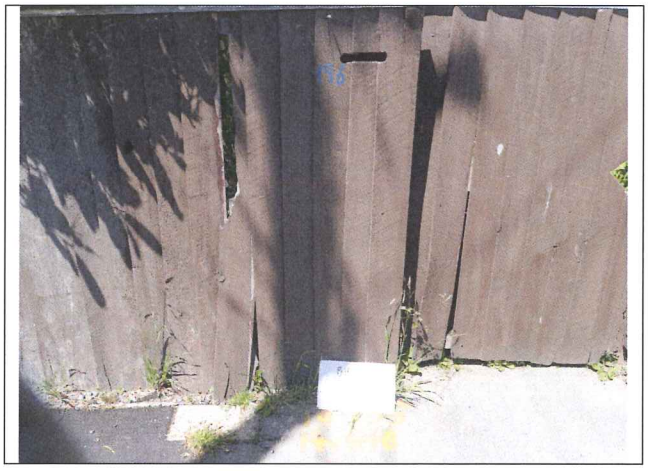
LOG OF BORE

Depth of Layer (mm)	Moisture Content (%)	Sand Content (%)	Silt Content (%)	Clay Content (%)	Classification / Description
0-20					Chipseal
20-200					Construction (AP40)
200-520					Construction (Pit Run)
					Water table at 460mm

Issue Date: 13 November 2012 **Issued By:** **Checked By:**
(M Foster, Senior Laboratory Technician)

196 Edgeware Road





Issue Date: 13 November 2012 **Issued By:** **Checked By:**

(M Foster, Senior Laboratory Technician)

TNZ M/4 : 2006 AP40
TEST REPORT

Project :	**Material Investigation**
Location :	**196 Edgeware Road**
Client :	**City Care Laboratory**
Contractor :	**Not Advised**
Sampled by :	**City Care Laboratory**
Date sampled :	**8 November 2012**
Sampling method :	**Not Advised**
Sample description :	**NZTA M4 AP40**
Sample condition :	**Damp as Received**
Source :	**Insitu**

Project No :	**6-JCITY.12/006LC**
Lab Ref No :	**8678**
Client Ref No :	**2040/12f**

Particle Size Distribution

Sieve Size (mm)	Percentage Passing Sample	Limits
63.0	-	100 - 100
37.5	**100**	100 - 100
19.0	**84**	66 - 81
9.5	**49**	43 - 57
4.75	**33**	28 - 43
2.36	**25**	19 - 33
1.18	**20**	12 - 25
0.600	**17**	7 - 19
0.300	**13**	3 - 14
0.150	**8**	0 - 10
0.075	**5**	0 - 7

% passing the finest sieve is obtained by difference

Grading Shape Control

Fraction (mm)	% Within Fraction Sample	Limits
19.0 - 4.75	**51**	28 - 48
9.5 - 2.36	**24**	14 - 34
4.75 - 1.18	**13**	7 - 27
2.36 - 0.600	**8**	6 - 22
1.18 - 0.300	**7**	5 - 19
0.600 - 0.150	**9**	2 - 14

Crushing Resistance

% Fines @ Spec. Load	-	%
Specification	-	%
Crushing Resistance	-	kN
Nom Aggregate Size	-	mm
Specified Load	-	kN

Broken Faces Content of Aggregate

Fraction (mm)	Percentage by Weight Sample	Lower Limit
37.5 - 19.0	**69**	70
19.0 - 9.5	**61**	70
9.5 - 4.75	**58**	70

Plasticity Index

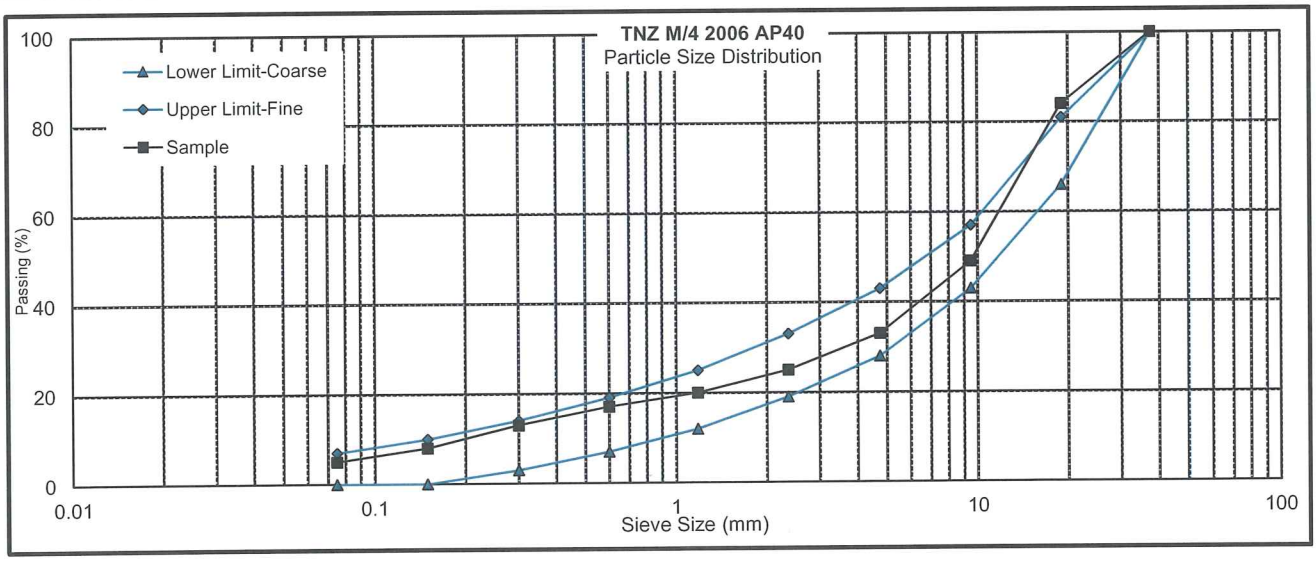
Sample PI	-
Specification	<= 5

Clay Index

Sample CI	-
Specification	<= 3

Sand Equivalent (Air Dried, Mechanical Shaking)

Sample SE	-
Specified	>= 40



Test Methods

Particle Size Distribution	NZS 4407 : 1991 : Test 3.8.1
Broken Faces Content of Aggregate	NZS 4407 : 1991 : Test 3.14

Date tested : 12 November 2012
Date reported : 12 November 2012

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IANZ Approved Signatory

Designation : *Senior Civil Engineering Technician*
Date : 12 November 2012

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Borehole Report –218 Edgeware Road
(Edgeware Road, Springfield to Hills)

Lab Reference: 2040 / 12g

CLIENT: Stronger Christchurch Infrastructure Rebuild Team
CONTACT NAME: Mr B. Stevens
LOCATION: 25 metres East of centreline of Geraldine Street, 5 metres South of centreline outside No 218

SAMPLED BY: C Gould, S Burgess
TESTED BY: L Sim, S Burgess
DATE OF SAMPLE: 7 November 2012
DATE OF TEST: 9 November 2012
TEST METHODS: RLB / 2: 2004, RLB / 4 : 2012, NZS 4402:1986 Test 2.1 (Test site selected by Client)

LOG OF BORE

Depth of Layer (mm)	Moisture Content (%)	Sand Content (%)	Silt Content (%)	Clay Content (%)	Classification / Description
0-30					Chipseal
30-150					Construction (AP40)
150-530					Construction (Pit Run)
					Water table at 420mm

Issue Date: 13 November 2012 **Issued By:** _____ **Checked By:** _____

(M Foster, Senior Laboratory Technician)

218 Edgeware Road

NB: Photos labelled incorrectly

Issue Date: 13 November 2012 **Issued By:** _____ **Checked By:** _____

(M Foster, Senior Laboratory Technician)

CCC AP65
TEST REPORT

Project :	**Material Investigation**
Location :	**218 Edgeware Road**
Client :	**City Care Laboratory**
Contractor :	**Not Advised**
Sampled by :	**City Care Laboratory**
Date sampled :	**8 November 2012**
Sampling method :	**Not Advised**
Sample description :	**NZTA M4 AP40**
Sample condition :	**Damp as Received**
Source :	**Insitu**

Project No :	**6-JCITY.12/006LC**
Lab Ref No :	**8679**
Client Ref No :	**2040/12g**

Particle Size Distribution

Sieve Size (mm)	Percentage Passing		
	Sample	Lower Limit - Coarse	Upper Limit - Fine
63.0	**100**	100	100
37.5	**99**	60	90
19.0	**74**	45	65
9.5	**36**	30	50
4.75	**24**	20	40
2.36	**19**	10	28
1.18	**16**	7	22
0.6	**15**	5	16
0.425	-	4	14
0.300	**12**	4	12
0.150	**7**	3	8
0.075	**5**	3	6

% passing the finest sieve is obtained by difference

Crushing Resistance

% Fines @ Spec. Load	-	%
Specification	-	%
Crushing Resistance	-	kN
Nom Aggregate Size	-	mm
Specified Load	-	kN

Broken Faces Content of Aggregate

Fraction (mm)	Percentage by Weight	
	Sample	Lower Limit
65.0 - 37.5	-	-
37.5 - 19.0	**61**	-
19.0 - 9.5	**58**	-
9.5 - 4.75	**69**	-

Plasticity Index

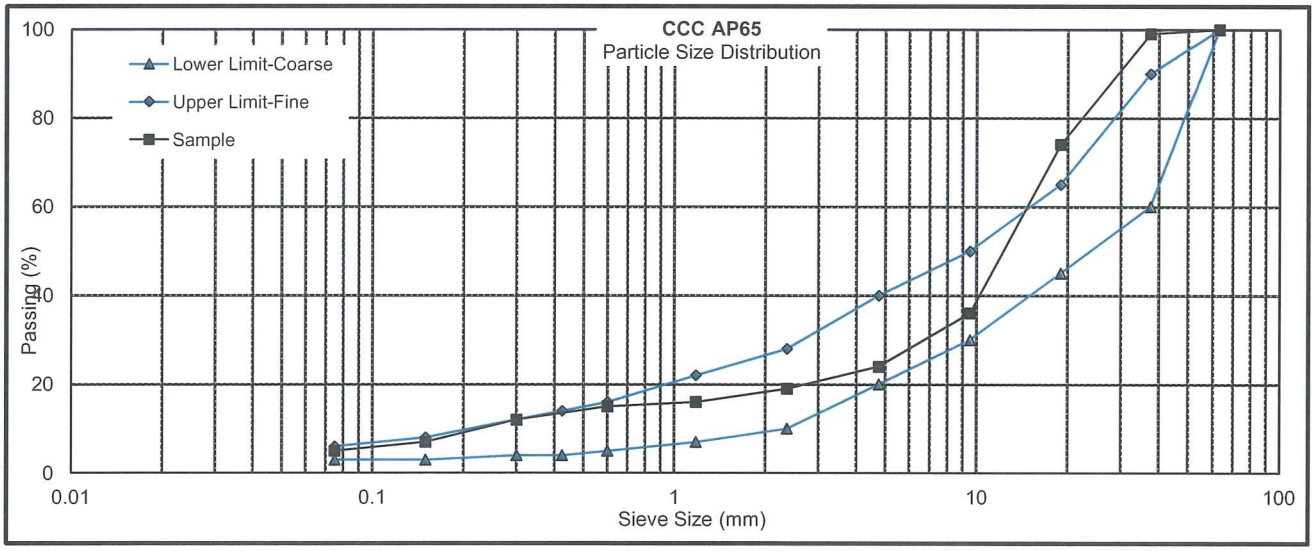
Sample PI	-
Specification	<= 5

Clay Index

Sample CI	-
Specification	<= 3

Sand Equivalent (Air Dried, Mechanical Shaking)

Sample SE	-
Specified	>= 40



Test Methods

Particle Size Distribution	NZS 4407 : 1991 : Test 3.8.1
Broken Faces Content of Aggregate	NZS 4407 : 1991 : Test 3.14

Date tested : 9 November 2012
Date reported : 12 November 2012

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Borehole Report –230 Edgeware Road
(Edgeware Road, Springfield to Hills)

Lab Reference: 2040 / 12h

CLIENT: Stronger Christchurch Infrastructure Rebuild Team
CONTACT NAME: Mr B. Stevens
LOCATION: 31 metres West of centreline of Champion Street, 4 metres South of centreline outside No 230

SAMPLED BY: L Sim, S Burgess
TESTED BY: L Sim, S Burgess
TEST METHODS: RLB / 2: 2004, RLB / 4 : 2012, NZS 4402:1986 Test 2.1 (Test site selected by Client)
DATE OF SAMPLE: 7 November 2012
DATE OF TEST: 9 November 2012

LOG OF BORE

Depth of Layer (mm)	Moisture Content (%)	Sand Content (%)	Silt Content (%)	Clay Content (%)	Classification / Description
0-30					Chipseal
30-160					Construction (AP40)
160-740					Construction (Pit Run)
					Water table found at 430mm

Issue Date: 13 November 2012 **Issued By:** _____ **Checked By:** _____

(M Foster, Senior Laboratory Technician)

TNZ M/4 : 2006 AP40
TEST REPORT

Project :	**Material Investigation**
Location :	**230 Edgeware Road**
Client :	**City Care Laboratory**
Contractor :	**Not Advised**
Sampled by :	**City Care Laboratory**
Date sampled :	**8 November 2012**
Sampling method :	**Not Advised**
Sample description :	**NZTA M4 AP40**
Sample condition :	**Damp as Received**
Source :	**Insitu**

Project No :	**6-JCITY.12/006LC**
Lab Ref No :	**8680**
Client Ref No :	**2040/12h**

Particle Size Distribution

Sieve Size (mm)	Percentage Passing Sample	Limits
63.0	-	100 - 100
37.5	**100**	100 - 100
19.0	**86**	66 - 81
9.5	**51**	43 - 57
4.75	**35**	28 - 43
2.36	**26**	19 - 33
1.18	**22**	12 - 25
0.600	**19**	7 - 19
0.300	**15**	3 - 14
0.150	**10**	0 - 10
0.075	**7**	0 - 7

% passing the finest sieve is obtained by difference

Grading Shape Control

Fraction (mm)	% Within Fraction Sample	Limits
19.0 - 4.75	**51**	28 - 48
9.5 - 2.36	**25**	14 - 34
4.75 - 1.18	**13**	7 - 27
2.36 - 0.600	**7**	6 - 22
1.18 - 0.300	**7**	5 - 19
0.600 - 0.150	**9**	2 - 14

Crushing Resistance

% Fines @ Spec. Load	-	%
Specification	-	%
Crushing Resistance	-	kN
Nom Aggregate Size	-	mm
Specified Load	-	kN

Broken Faces Content of Aggregate

Fraction (mm)	Percentage by Weight Sample	Lower Limit
37.5 - 19.0	**62**	70
19.0 - 9.5	**65**	70
9.5 - 4.75	**53**	70

Plasticity Index

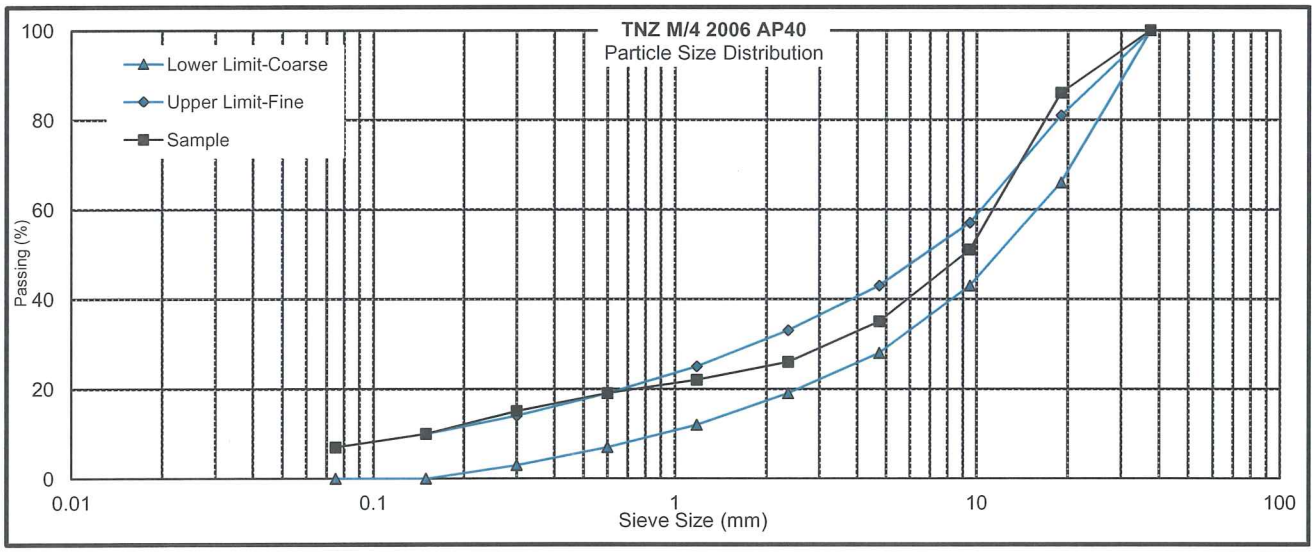
Sample PI	-
Specification	<= 5

Clay Index

Sample CI	-
Specification	<= 3

Sand Equivalent (Air Dried, Mechanical Shaking)

Sample SE	-
Specified	>= 40



Test Methods

Particle Size Distribution	NZS 4407 : 1991 : Test 3.8.1
Broken Faces Content of Aggregate	NZS 4407 : 1991 : Test 3.14

Date tested : 12 November 2012
Date reported : 12 November 2012

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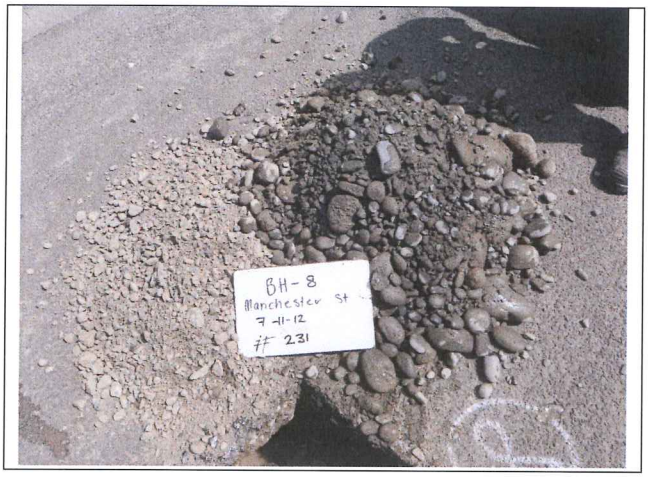
230 Edgeware Road



NB: Photos labelled incorrectly

Issue Date: 13 November 2012 **Issued By:** _____ **Checked By:** _____

(M Foster, Senior Laboratory Technician)

City Care Ltd Laboratory, 205 Springs Road, Christchurch 8042
T: 03 941 7616 F: 03 941 7618 www.citycare.co.nz

Borehole Report –251 Edgeware Road
(Edgeware Road, Springfield to Hills)

Lab Reference: 2040 / 12

CLIENT: Stronger Christchurch Infrastructure Rebuild Team
CONTACT NAME: Mr B. Stevens
LOCATION: 124 metres West of centreline of Hills Road, 5 metres North of centreline outside No 251

SAMPLED BY: L Sim, S Burgess **DATE OF SAMPLE:** 8 November 2012
TESTED BY: L Sim, S Burgess **DATE OF TEST:** 9 November 2012
TEST METHODS: RLB / 2: 2004, RLB / 4 : 2012, NZS 4402:1986 Test 2.1 (Test site selected by Client)

LOG OF BORE

Depth of Layer (mm)	Moisture Content (%)	Sand Content (%)	Silt Content (%)	Clay Content (%)	Classification / Description
0-40					Chipseal
40-170					Construction (AP40)
170-570					Construction (Pit Run)
570-1000	27	96	4	0	Sand
					Water table found at 1000mm

SCALA PENETRATION AND INFERRED CBR

Depth (mm)	Scala Penetration (mm / blow)	Inferred CBR *	Classification / Description
50			Chipseal
100			Construction (AP40)
150			
200			
250			Construction (Pit Run)
300			
350			
400			
450			
500			
550			
600			
650			Sand
700			
750	310	<2	
800			
850			
900			
950			
1000			
1050	53	3.5	Water Table
1100			
1150			
1200	55	3	
1250			
1300	40	4.5	
1350			
1400	27	7	
1450			
1500			
1550			
1600			(continued see above)

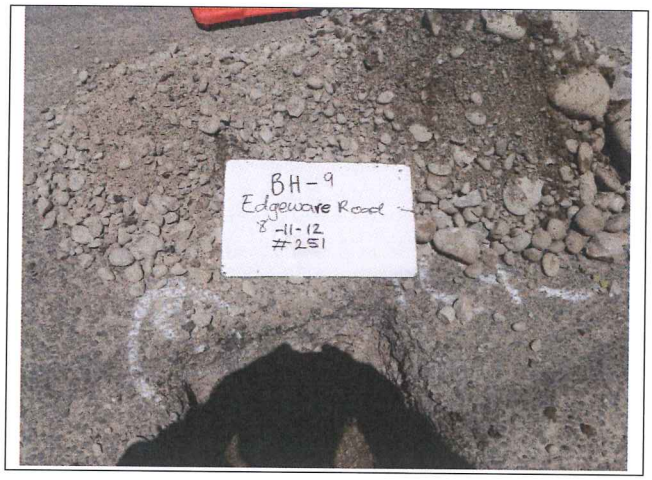
*CBR values inferred from Austroads Pavement Design APRG Report 21

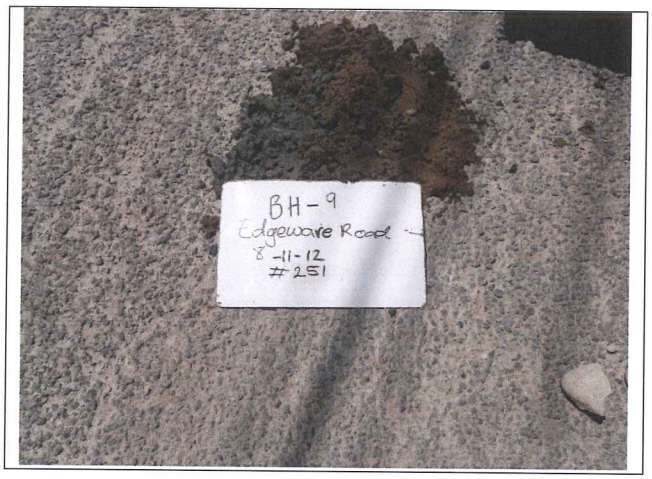
Issue Date: 13 November 2012 **Issued By:** _____ **Checked By:** _____

(M Foster, Senior Laboratory Technician)

251 Edgeware Road

Lab Reference: 2040 /12i





Issue Date: 13 November 2012 **Issued By:** **Checked By:**

(M Foster, Senior Laboratory Technician)

TNZ M/4 : 2006 AP40
TEST REPORT

Project :	**Material Investigation**
Location :	**251 Edgeware Road**
Client :	**City Care Laboratory**
Contractor :	**Not Advised**
Sampled by :	**City Care Laboratory**
Date sampled :	**8 November 2012**
Sampling method :	**Not Advised**
Sample description :	**NZTA M4 AP40**
Sample condition :	**Damp as Received**
Source :	**Insitu**

Project No :	**6-JCITY.12/006LC**
Lab Ref No :	**8681**
Client Ref No :	**2040/12i**

Particle Size Distribution

Sieve Size (mm)	Percentage Passing Sample	Limits
63.0	-	100 - 100
37.5	**100**	100 - 100
19.0	**87**	66 - 81
9.5	**52**	43 - 57
4.75	**34**	28 - 43
2.36	**24**	19 - 33
1.18	**19**	12 - 25
0.600	**16**	7 - 19
0.300	**13**	3 - 14
0.150	**8**	0 - 10
0.075	**6**	0 - 7

% passing the finest sieve is obtained by difference

Grading Shape Control

Fraction (mm)	% Within Fraction Sample	Limits
19.0 - 4.75	**53**	28 - 48
9.5 - 2.36	**28**	14 - 34
4.75 - 1.18	**15**	7 - 27
2.36 - 0.600	**8**	6 - 22
1.18 - 0.300	**6**	5 - 19
0.600 - 0.150	**8**	2 - 14

Crushing Resistance

% Fines @ Spec. Load	-	%
Specification	-	%
Crushing Resistance	-	kN
Nom Aggregate Size	-	mm
Specified Load	-	kN

Broken Faces Content of Aggregate

Fraction (mm)	Percentage by Weight Sample	Lower Limit
37.5 - 19.0	**64**	70
19.0 - 9.5	**64**	70
9.5 - 4.75	**69**	70

Plasticity Index

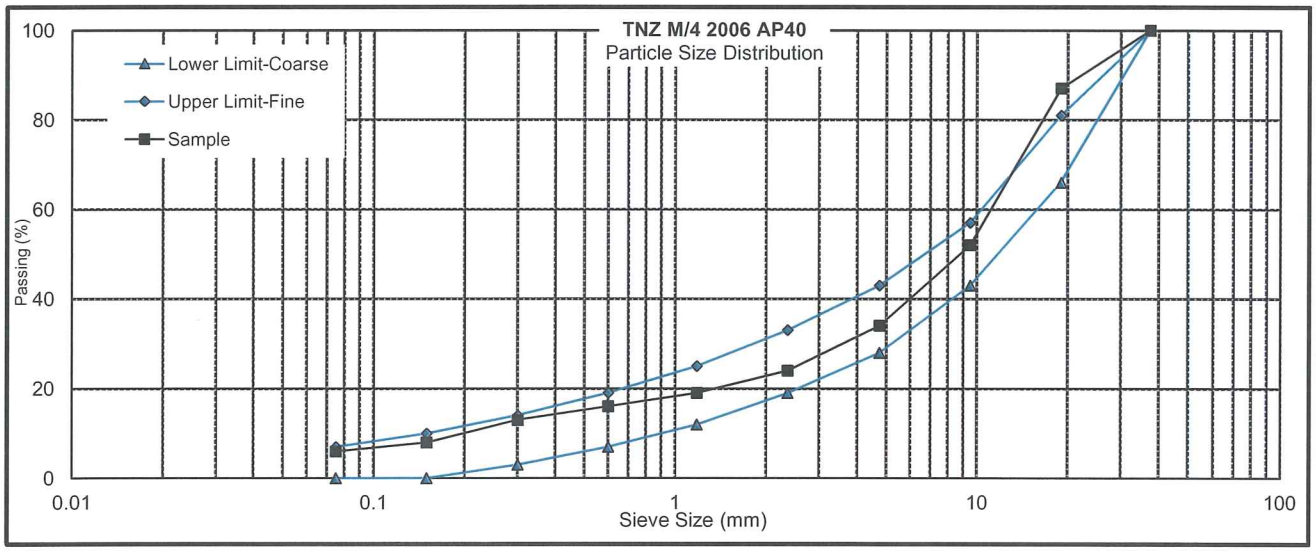
Sample PI	-
Specification	<= 5

Clay Index

Sample CI	-
Specification	<= 3

Sand Equivalent (Air Dried, Mechanical Shaking)

Sample SE	-
Specified	>= 40



Test Methods

Particle Size Distribution	NZS 4407 : 1991 : Test 3.8.1
Broken Faces Content of Aggregate	NZS 4407 : 1991 : Test 3.14

Date tested : 9 November 2012
Date reported : 12 November 2012

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Designation : *Senior Civil Engineering Technician*
Date : 12 November 2012

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Borehole Report –262 Edgeware Road
(Edgeware Road, Springfield to Hills)

Lab Reference: 2040 / 12J

CLIENT: Stronger Christchurch Infrastructure Rebuild Team
CONTACT NAME: Mr B. Stevens
LOCATION: 43 metres West of centreline of Hills Road, 4 metres South of centreline outside No 262

SAMPLED BY: L Sim, S Burgess **DATE OF SAMPLE:** 8 November 2012
TESTED BY: L Sim, S Burgess **DATE OF TEST:** 9 November 2012
TEST METHODS: RLB / 2: 2004, RLB / 4 : 2012, NZS 4402:1986 Test 2.1 (Test site selected by Client)

LOG OF BORE

Depth of Layer (mm)	Moisture Content (%)	Sand Content (%)	Silt Content (%)	Clay Content (%)	Classification / Description
0-50					Asphalt
50-240					Construction (AP40)
240-470					Construction (Pit Run)
470-810	25	96	4	0	Sand
810-1650	36	12	48	40	Clayey Silt
1650-2070	124				Peat
					Water Table found at 2070mm

SCALA PENETRATION AND INFERRED CBR

Depth (mm)	Scala Penetration (mm / blow)	Inferred CBR *	Classification / Description
50			Asphalt
100			Construction (AP40)
150			
200			
250			
300			Construction (Pit Run)
350			
400			
450			
500			Sand
550			
600	30	6.5	
650			
700			
750	48	3.5	
800			
850			
900			
950	60	3	Clayey Silt
1000			
1050			
1100			
1150			
1200			
1250	36	5	
1300			
1350			
1400			
1450	57	3	
1500			
1550			
1600			(continued see above)

*CBR values inferred from Austroads Pavement Design APRG Report 21

Issue Date: 13 November 2012 **Issued By:** _____ **Checked By:** _____

(M Foster, Senior Laboratory Technician)

262 Edgeware Road

Lab Reference: 2040 /12J

Issue Date: 13 November 2012 **Issued By:** **Checked By:**

(M Foster, Senior Laboratory Technician)

TNZ M/4 : 2006 AP40
TEST REPORT

Project :	**Material Investigation**
Location :	**262 Edgeware Road**
Client :	**City Care Laboratory**
Contractor :	**Not Advised**
Sampled by :	**City Care Laboratory**
Date sampled :	**8 November 2012**
Sampling method :	**Not Advised**
Sample description :	**NZTA M4 AP40**
Sample condition :	**Damp as Received**
Source :	**Insitu**

Project No :	**6-JCITY.12/006LC**
Lab Ref No :	**8682**
Client Ref No :	**2040/12j**

Particle Size Distribution

Sieve Size (mm)	Percentage Passing	
	Sample	Limits
63.0	-	100 - 100
37.5	**100**	100 - 100
19.0	**81**	66 - 81
9.5	**56**	43 - 57
4.75	**42**	28 - 43
2.36	**35**	19 - 33
1.18	**31**	12 - 25
0.600	**28**	7 - 19
0.300	**24**	3 - 14
0.150	**19**	0 - 10
0.075	**16**	0 - 7

% passing the finest sieve is obtained by difference

Grading Shape Control

Fraction (mm)	% Within Fraction	
	Sample	Limits
19.0 - 4.75	**39**	28 - 48
9.5 - 2.36	**21**	14 - 34
4.75 - 1.18	**11**	7 - 27
2.36 - 0.600	**7**	6 - 22
1.18 - 0.300	**7**	5 - 19
0.600 - 0.150	**9**	2 - 14

Crushing Resistance

% Fines @ Spec. Load	-	%
Specification	-	%
Crushing Resistance	-	kN
Nom Aggregate Size	-	mm
Specified Load	-	kN

Broken Faces Content of Aggregate

Fraction (mm)	Percentage by Weight	
	Sample	Lower Limit
37.5 - 19.0	**57**	70
19.0 - 9.5	**57**	70
9.5 - 4.75	**50**	70

Plasticity Index

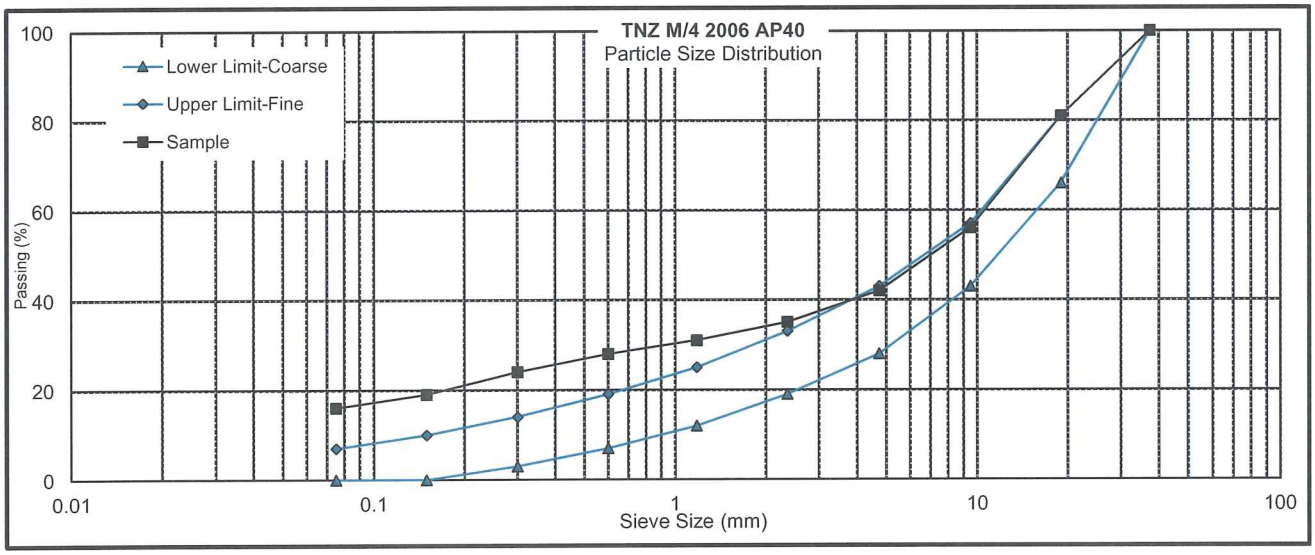
Sample PI	-
Specification	<= 5

Clay Index

Sample CI	-
Specification	<= 3

Sand Equivalent (Air Dried, Mechanical Shaking)

Sample SE	-
Specified	>= 40



Test Methods

Particle Size Distribution	NZS 4407 : 1991 : Test 3.8.1
Broken Faces Content of Aggregate	NZS 4407 : 1991 : Test 3.14

Date tested : 12 November 2012
Date reported : 12 November 2012

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Designation : *Senior Civil Engineering Technician*
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T: 03 941 7616 F: 03 941 7618 www.citycare.co.nz

Borehole Report –577 Manchester Street
(Edgeware Road, Springfield to Hills)

Lab Reference: 2040 / 12e

CLIENT: Stronger Christchurch Infrastructure Rebuild Team
CONTACT NAME: Mr B. Stevens
LOCATION: 31 metres West of centreline of Manchester Street,
3 metres South of centreline of Edgeware Road outside No 577

SAMPLED BY: L Sim, S Burgess **DATE OF SAMPLE:** 7 November 2012
TESTED BY: L Sim, S Burgess **DATE OF TEST:** 9 November 2012
TEST METHODS: RLB / 2: 2004, RLB / 4 : 2012, NZS 4402:1986 Test 2.1 (Test site selected by Client)

LOG OF BORE

Depth of Layer (mm)	Moisture Content (%)	Sand Content (%)	Silt Content (%)	Clay Content (%)	Classification / Description
0-20					Chipseal
20-110					Construction (AP40)
110-180					Macadam
180-360					Construction (Halswell AP65)
360-460	32	40	32	28	Silty Sand (contains organic material)
460-960	34	36	44	20	Sandy Silt
960-1700	37	4	96	0	Silt
1700-2000	52	34	66	0	Sandy Silt (contains organic material)
					Water table found at 2000mm

SCALA PENETRATION AND INFERRED CBR

Depth (mm)	Scala Penetration (mm / blow)	Inferred CBR *	Classification / Description
50			Chipseal
100			Construction (AP40)
150			Macadam
200			Construction (Halswell AP65)
250			
300			
350			
400	36	5	Silty Sand (organics)
450			
500			Sandy Silt
550			
600	44	4	
650			
700			
750	20	10	
800			
850			
900			
950			
1000	19	11	Silt
1050			
1100			
1150			
1200	16	13	
1250			
1300			
1350			
1400	40	4.5	
1450			
1500			
1550			
1600			

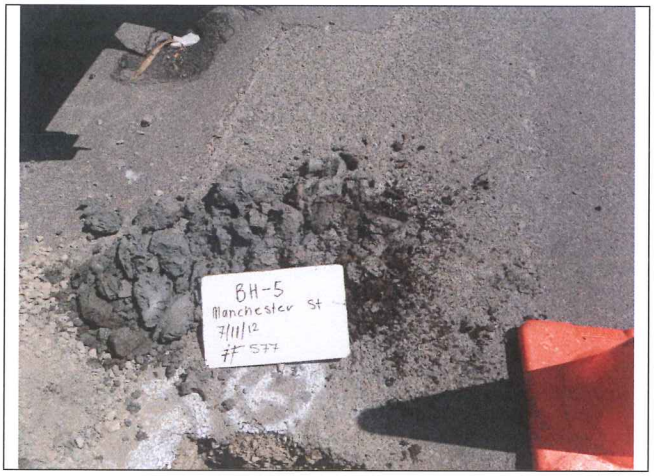
*CBR values inferred from Austroads Pavement Design APRG Report 21

(continued see above)

Issue Date: 12 November 2012 **Issued By:** **Checked By:**

(M Foster, Senior Laboratory Technician)

577 Manchester Street



Issue Date: 12 November 2012 **Issued By:** _____ **Checked By:** _____

(M Foster, Senior Laboratory Technician)

TNZ M/4 : 2006 AP40
TEST REPORT

Project :	**Material Investigation**
Location :	**Corner Edgeware Road & 577 Manchester Street**
Client :	**City Care Laboratory**
Contractor :	**Not Advised**
Sampled by :	**City Care Laboratory**
Date sampled :	**8 November 2012**
Sampling method :	**Not Advised**
Sample description :	**NZTA M4 AP40**
Sample condition :	**Damp as Received**
Source :	**Insitu**

Project No :	**6-JCITY.12/006LC**
Lab Ref No :	**8677**
Client Ref No :	**2040/12e**

Particle Size Distribution

Sieve Size (mm)	Percentage Passing Sample	Percentage Passing Limits
63.0	-	100 - 100
37.5	**100**	100 - 100
19.0	**96**	66 - 81
9.5	**61**	43 - 57
4.75	**40**	28 - 43
2.36	**32**	19 - 33
1.18	**29**	12 - 25
0.600	**26**	7 - 19
0.300	**22**	3 - 14
0.150	**14**	0 - 10
0.075	**9**	0 - 7

% passing the finest sieve is obtained by difference

Grading Shape Control

Fraction (mm)	% Within Fraction Sample	% Within Fraction Limits
19.0 - 4.75	**56**	28 - 48
9.5 - 2.36	**29**	14 - 34
4.75 - 1.18	**11**	7 - 27
2.36 - 0.600	**6**	6 - 22
1.18 - 0.300	**7**	5 - 19
0.600 - 0.150	**12**	2 - 14

Crushing Resistance

% Fines @ Spec. Load	-	%
Specification	-	%
Crushing Resistance	-	kN
Nom Aggregate Size	-	mm
Specified Load	-	kN

Broken Faces Content of Aggregate

Fraction (mm)	Percentage by Weight Sample	Percentage by Weight Lower Limit
37.5 - 19.0	**32**	70
19.0 - 9.5	**60**	70
9.5 - 4.75	**63**	70

Plasticity Index

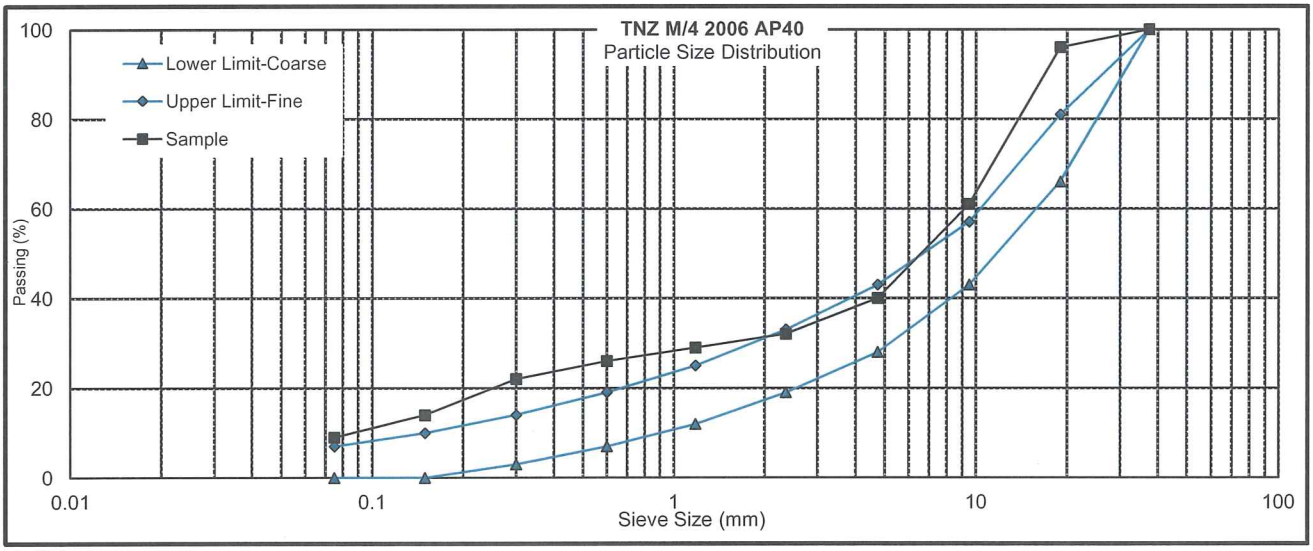
Sample PI	-
Specification	<= 5

Clay Index

Sample CI	-
Specification	<= 3

Sand Equivalent (Air Dried, Mechanical Shaking)

Sample SE	-
Specified	>= 40



Test Methods

Particle Size Distribution	NZS 4407 : 1991 : Test 3.8.1
Broken Faces Content of Aggregate	NZS 4407 : 1991 : Test 3.14

Date tested : 12 November 2012
Date reported : 12 November 2012

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IANZ Approved Signatory

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Email mail@hill-labs.co.nz
Web www.hill-labs.co.nz

ANALYSIS REPORT

Client:	Stronger Christchurch Infrastructure Rebuild Team	**Lab No:**	1067966	SPv1
Contact:	Mr M Foster	**Date Registered:**	10-Nov-2012	
	205 Springs Road	**Date Reported:**	14-Nov-2012	
	Hornby	**Quote No:**	46810	
	CHRISTCHURCH 8042	**Order No:**	855738112	
		Client Reference:	Edgeware Road	
		Submitted By:	Mr M Foster	

Sample Type: Miscellaneous

		Sample Name:	14, 30 Edgeware Road 07-Nov-2012	79, 117 Edgeware Road 07-Nov-2012	577 Top Layer Manchester St. 07-Nov-2012	577 Bottom Layer Manchester St. 07-Nov-2012	196, 218, 231 Edgeware Road 07-Nov-2012
		Lab Number:	1067966.1	1067966.2	1067966.3	1067966.4	1067966.5
Individual Tests							
Dry Matter	g/100g as rcvd		99	99	99	99	99
Benzo[a]pyrene Toxic Equivalence (TEF)	mg/kg dry wt		< 0.6	1.8	< 0.6	112	< 0.6
Polycyclic Aromatic Hydrocarbons Screening in Soil							
Acenaphthene	mg/kg dry wt		< 0.3	0.3	< 0.3	38	< 0.3
Acenaphthylene	mg/kg dry wt		< 0.3	< 0.3	< 0.3	2.0	< 0.3
Anthracene	mg/kg dry wt		< 0.3	0.3	< 0.3	48	< 0.3
Benzo[a]anthracene	mg/kg dry wt		< 0.3	0.8	< 0.3	82	< 0.3
Benzo[a]pyrene (BAP)	mg/kg dry wt		< 0.3	1.1	< 0.3	68	< 0.3
Benzo[b]fluoranthene + Benzo[j] fluoranthene	mg/kg dry wt		0.3	1.4	< 0.3	94	< 0.3
Benzo[g,h,i]perylene	mg/kg dry wt		0.2	0.9	< 0.3	46	< 0.3
Benzo[k]fluoranthene	mg/kg dry wt		< 0.3	0.5	< 0.3	41	< 0.3
Chrysene	mg/kg dry wt		< 0.3	0.8	< 0.3	72	< 0.3
Dibenzo[a,h]anthracene	mg/kg dry wt		< 0.3	0.3	< 0.3	15.7	< 0.3
Fluoranthene	mg/kg dry wt		< 0.3	1.9	< 0.3	250	< 0.3
Fluorene	mg/kg dry wt		< 0.3	0.3	< 0.3	35	< 0.3
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt		< 0.3	0.8	< 0.3	40	< 0.3
Naphthalene	mg/kg dry wt		< 1.2	< 1.2	< 1.1	2.4	< 1.2
Phenanthrene	mg/kg dry wt		< 0.3	1.3	< 0.3	186	< 0.3
Pyrene	mg/kg dry wt		0.2	1.8	< 0.3	197	< 0.3

		Sample Name:	251, 262 Edgeware Road 08-Nov-2012				
		Lab Number:	1067966.6				
Individual Tests							
Dry Matter	g/100g as rcvd		99	-	-	-	-
Benzo[a]pyrene Toxic Equivalence (TEF)	mg/kg dry wt		< 0.6	-	-	-	-
Polycyclic Aromatic Hydrocarbons Screening in Soil							
Acenaphthene	mg/kg dry wt		< 0.3	-	-	-	-
Acenaphthylene	mg/kg dry wt		< 0.3	-	-	-	-
Anthracene	mg/kg dry wt		< 0.3	-	-	-	-
Benzo[a]anthracene	mg/kg dry wt		< 0.3	-	-	-	-
Benzo[a]pyrene (BAP)	mg/kg dry wt		< 0.3	-	-	-	-
Benzo[b]fluoranthene + Benzo[j] fluoranthene	mg/kg dry wt		< 0.3	-	-	-	-
Benzo[g,h,i]perylene	mg/kg dry wt		< 0.3	-	-	-	-

Sample Type: Miscellaneous						
Sample Name:		251, 262 Edgeware Road 08-Nov-2012				
Lab Number:		1067966.6				
Polycyclic Aromatic Hydrocarbons Screening in Soil						
Benzo[k]fluoranthene	mg/kg dry wt	< 0.3	-	-	-	-
Chrysene	mg/kg dry wt	< 0.3	-	-	-	-
Dibenzo[a,h]anthracene	mg/kg dry wt	< 0.3	-	-	-	-
Fluoranthene	mg/kg dry wt	< 0.3	-	-	-	-
Fluorene	mg/kg dry wt	< 0.3	-	-	-	-
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt	< 0.3	-	-	-	-
Naphthalene	mg/kg dry wt	< 1.2	-	-	-	-
Phenanthrene	mg/kg dry wt	< 0.3	-	-	-	-
Pyrene	mg/kg dry wt	< 0.3	-	-	-	-

SUMMARY OF METHODS

The following table(s) gives a brief description of the methods used to conduct the analyses for this job. The detection limits given below are those attainable in a relatively clean matrix. Detection limits may be higher for individual samples should insufficient sample be available, or if the matrix requires that dilutions be performed during analysis.

Sample Type: Miscellaneous			
Test	**Method Description**	**Default Detection Limit**	**Samples**
Polycyclic Aromatic Hydrocarbons Screening in Soil	Sonication extraction, Dilution or SPE cleanup (if required), GC-MS SIM analysis (modified US EPA 8270). Tested on as received sample.	-	1-6
Dry Matter (Env)	Dried at 103°C for 4-22hr (removes 3-5% more water than air dry) , gravimetry. US EPA 3550. (Free water removed before analysis).	0.10 g/100g as rcvd	1-6
Benzo[a]pyrene Potency Equivalency Factor (PEF) NES	BaP Toxic Equivalence calculated from Benz(a)anthracene x 0.1 + Benzo(b)fluoranthene x 0.1 + Benzo(j)fluoranthene x 0.1 + Benzo(k)fluoranthene x 0.1 + Benzo(a)pyrene x 1 + Chrysene x 0.01 + Dibenz(a,h)anthracene x 1 + Fluoranthene x 0.01 + Indeno(1,2,3-c,d)pyrene x 0.1 Ministry for the Environment. 2011. Methodology for Deriving Standards for Contaminants in Soil to Protect Human Health. Wellington: Ministry for the Environment.	0.002 mg/kg dry wt	1-6

These samples were collected by yourselves (or your agent) and analysed as received at the laboratory.

Samples are held at the laboratory after reporting for a length of time depending on the preservation used and the stability of the analytes being tested. Once the storage period is completed the samples are discarded unless otherwise advised by the client.

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Client Services Manager - Environmental Division

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BETTER TESTING BETTER RESULTS

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Web www.hill-labs.co.nz

ANALYSIS REPORT

Client:	Stronger Christchurch Infrastructure Rebuild Team	**Lab No:**	1067966	SPv1
Contact:	Mr M Foster	**Date Registered:**	10-Nov-2012	
	205 Springs Road	**Date Reported:**	14-Nov-2012	
	Hornby	**Quote No:**	46810	
	CHRISTCHURCH 8042	**Order No:**	855738112	
		Client Reference:	Edgeware Road	
		Submitted By:	Mr M Foster	

Sample Type: Miscellaneous

		Sample Name:	14, 30 Edgeware Road 07-Nov-2012	79, 117 Edgeware Road 07-Nov-2012	577 Top Layer Manchester St. 07-Nov-2012	577 Bottom Layer Manchester St. 07-Nov-2012	196, 218, 231 Edgeware Road 07-Nov-2012
		Lab Number:	1067966.1	1067966.2	1067966.3	1067966.4	1067966.5
Individual Tests							
Dry Matter	g/100g as rcvd		99	99	99	99	99
Benzo[a]pyrene Toxic Equivalence (TEF)	mg/kg dry wt		< 0.6	1.8	< 0.6	112	< 0.6
Polycyclic Aromatic Hydrocarbons Screening in Soil							
Acenaphthene	mg/kg dry wt		< 0.3	0.3	< 0.3	38	< 0.3
Acenaphthylene	mg/kg dry wt		< 0.3	< 0.3	< 0.3	2.0	< 0.3
Anthracene	mg/kg dry wt		< 0.3	0.3	< 0.3	48	< 0.3
Benzo[a]anthracene	mg/kg dry wt		< 0.3	0.8	< 0.3	82	< 0.3
Benzo[a]pyrene (BAP)	mg/kg dry wt		< 0.3	1.1	< 0.3	68	< 0.3
Benzo[b]fluoranthene + Benzo[j] fluoranthene	mg/kg dry wt		0.3	1.4	< 0.3	94	< 0.3
Benzo[g,h,i]perylene	mg/kg dry wt		0.2	0.9	< 0.3	46	< 0.3
Benzo[k]fluoranthene	mg/kg dry wt		< 0.3	0.5	< 0.3	41	< 0.3
Chrysene	mg/kg dry wt		< 0.3	0.8	< 0.3	72	< 0.3
Dibenzo[a,h]anthracene	mg/kg dry wt		< 0.3	0.3	< 0.3	15.7	< 0.3
Fluoranthene	mg/kg dry wt		< 0.3	1.9	< 0.3	250	< 0.3
Fluorene	mg/kg dry wt		< 0.3	0.3	< 0.3	35	< 0.3
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt		< 0.3	0.8	< 0.3	40	< 0.3
Naphthalene	mg/kg dry wt		< 1.2	< 1.2	< 1.1	2.4	< 1.2
Phenanthrene	mg/kg dry wt		< 0.3	1.3	< 0.3	186	< 0.3
Pyrene	mg/kg dry wt		0.2	1.8	< 0.3	197	< 0.3

		Sample Name:	251, 262 Edgeware Road 08-Nov-2012				
		Lab Number:	1067966.6				
Individual Tests							
Dry Matter	g/100g as rcvd		99	-	-	-	-
Benzo[a]pyrene Toxic Equivalence (TEF)	mg/kg dry wt		< 0.6	-	-	-	-
Polycyclic Aromatic Hydrocarbons Screening in Soil							
Acenaphthene	mg/kg dry wt		< 0.3	-	-	-	-
Acenaphthylene	mg/kg dry wt		< 0.3	-	-	-	-
Anthracene	mg/kg dry wt		< 0.3	-	-	-	-
Benzo[a]anthracene	mg/kg dry wt		< 0.3	-	-	-	-
Benzo[a]pyrene (BAP)	mg/kg dry wt		< 0.3	-	-	-	-
Benzo[b]fluoranthene + Benzo[j] fluoranthene	mg/kg dry wt		< 0.3	-	-	-	-
Benzo[g,h,i]perylene	mg/kg dry wt		< 0.3	-	-	-	-

Sample Type: Miscellaneous						
Sample Name:		251, 262 Edgeware Road 08-Nov-2012				
Lab Number:		1067966.6				
Polycyclic Aromatic Hydrocarbons Screening in Soil						
Benzo[k]fluoranthene	mg/kg dry wt	< 0.3	-	-	-	-
Chrysene	mg/kg dry wt	< 0.3	-	-	-	-
Dibenzo[a,h]anthracene	mg/kg dry wt	< 0.3	-	-	-	-
Fluoranthene	mg/kg dry wt	< 0.3	-	-	-	-
Fluorene	mg/kg dry wt	< 0.3	-	-	-	-
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt	< 0.3	-	-	-	-
Naphthalene	mg/kg dry wt	< 1.2	-	-	-	-
Phenanthrene	mg/kg dry wt	< 0.3	-	-	-	-
Pyrene	mg/kg dry wt	< 0.3	-	-	-	-

SUMMARY OF METHODS

The following table(s) gives a brief description of the methods used to conduct the analyses for this job. The detection limits given below are those attainable in a relatively clean matrix. Detection limits may be higher for individual samples should insufficient sample be available, or if the matrix requires that dilutions be performed during analysis.

Sample Type: Miscellaneous			
Test	**Method Description**	**Default Detection Limit**	**Samples**
Polycyclic Aromatic Hydrocarbons Screening in Soil	Sonication extraction, Dilution or SPE cleanup (if required), GC-MS SIM analysis (modified US EPA 8270). Tested on as received sample.	-	1-6
Dry Matter (Env)	Dried at 103°C for 4-22hr (removes 3-5% more water than air dry) , gravimetry. US EPA 3550. (Free water removed before analysis).	0.10 g/100g as rcvd	1-6
Benzo[a]pyrene Potency Equivalency Factor (PEF) NES	BaP Toxic Equivalence calculated from Benz(a)anthracene x 0.1 + Benzo(b)fluoranthene x 0.1 + Benzo(j)fluoranthene x 0.1 + Benzo(k)fluoranthene x 0.1 + Benzo(a)pyrene x 1 + Chrysene x 0.01 + Dibenz(a,h)anthracene x 1 + Fluoranthene x 0.01 + Indeno(1,2,3-c,d)pyrene x 0.1 Ministry for the Environment. 2011. Methodology for Deriving Standards for Contaminants in Soil to Protect Human Health. Wellington: Ministry for the Environment.	0.002 mg/kg dry wt	1-6

These samples were collected by yourselves (or your agent) and analysed as received at the laboratory.

Samples are held at the laboratory after reporting for a length of time depending on the preservation used and the stability of the analytes being tested. Once the storage period is completed the samples are discarded unless otherwise advised by the client.

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Client Services Manager - Environmental Division

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Borehole Report – 14 Edgeware Road
(Edgeware Road, Springfield to Hills)

Lab Reference: 2040 / 12a

CLIENT: Stronger Christchurch Infrastructure Rebuild Team
CONTACT NAME: Mr B. Stevens
LOCATION: 68 metres East of centreline of Springfield Road, 5 metres South of centreline outside No 14

SAMPLED BY: L Sim, S Burgess **DATE OF SAMPLE:** 7 November 2012
TESTED BY: L Sim, S Burgess **DATE OF TEST:** 9 November 2012
TEST METHODS: RLB / 2: 2004, RLB / 4 : 2012, NZS 4402:1986 Test 2.1 (Test site selected by Client)

LOG OF BORE

Depth of Layer (mm)	Moisture Content (%)	Sand Content (%)	Silt Content (%)	Clay Content (%)	Classification / Description
0-20					Chipseal
20-200					Construction (AP40 & silt)
200-470					Construction (Pit Run)
470-1080	20	36	44	20	Sandy Silt
1080-1140	26	56	36	8	Silty Sand
1140-1410	32	44	34	22	Silty Sand
1410-1970	33	18	44	38	Clayey Silt (contains organic material)
					Water table found at 1970mm

SCALA PENETRATION AND INFERRED CBR

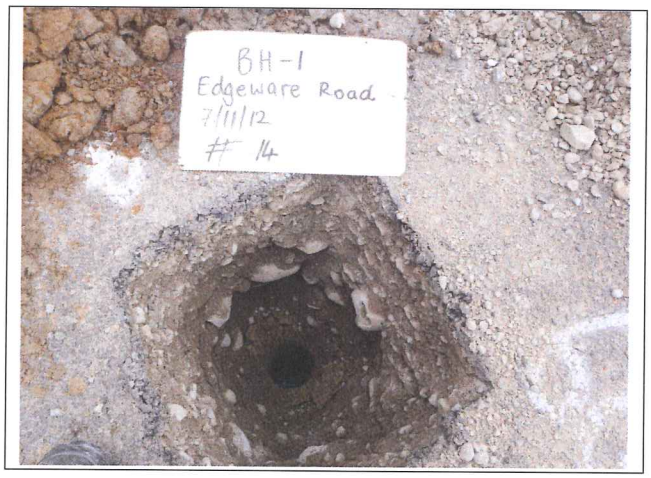
Depth (mm)	Scala Penetration (mm / blow)	Inferred CBR *	Classification / Description
50			Chipseal
100			
150			Construction (AP40 & silt)
200			
250			
300			Construction (Pit Run)
350			
400			
450			
500			
550			
600			
650	36	5	Sandy Silt
700			
750			
800			
850	36	5	
900			
950			
1000			
1050	27	7	
1100			
1150			Silty Sand
1200			
1250			Silty Sand
1300			
1350	29	6.5	
1400			
1450			
1500			Clayey Silt (organics)
1550	25	8	
1600			(continued see above)

*CBR values inferred from Austroads Pavement Design APRG Report 21

Issue Date: 13 November 2012 **Issued By:** _____ **Checked By:** _____

(M Foster, Senior Laboratory Technician)

14 Edgeware Road



Issue Date: 12 November 2012 **Issued By:** _____ **Checked By:** _____

(M Foster, Senior Laboratory Technician)

TNZ M/4 : 2006 AP40
TEST REPORT

Project :	**Material Investigation**
Location :	**14 Edgeware Road**
Client :	**City Care Laboratory**
Contractor :	**Not Advised**
Sampled by :	**City Care Laboratory**
Date sampled :	**8 November 2012**
Sampling method :	**Not Advised**
Sample description :	**NZTA M4 AP40**
Sample condition :	**Damp as Received**
Source :	**Insitu**

Project No :	**6-JCITY.12/006LC**
Lab Ref No :	**8673**
Client Ref No :	**2040/12a**

Particle Size Distribution

Sieve Size (mm)	Percentage Passing Sample	Limits
63.0	-	100 - 100
37.5	**100**	100 - 100
19.0	**88**	66 - 81
9.5	**65**	43 - 57
4.75	**42**	28 - 43
2.36	**31**	19 - 33
1.18	**25**	12 - 25
0.600	**20**	7 - 19
0.300	**16**	3 - 14
0.150	**11**	0 - 10
0.075	**7**	0 - 7

% passing the finest sieve is obtained by difference

Grading Shape Control

Fraction (mm)	% Within Fraction Sample	Limits
19.0 - 4.75	**46**	28 - 48
9.5 - 2.36	**34**	14 - 34
4.75 - 1.18	**17**	7 - 27
2.36 - 0.600	**11**	6 - 22
1.18 - 0.300	**9**	5 - 19
0.600 - 0.150	**9**	2 - 14

Crushing Resistance

% Fines @ Spec. Load	-	%
Specification	-	%
Crushing Resistance	-	kN
Nom Aggregate Size	-	mm
Specified Load	-	kN

Broken Faces Content of Aggregate

Fraction (mm)	Percentage by Weight Sample	Lower Limit
37.5 - 19.0	**75**	70
19.0 - 9.5	**69**	70
9.5 - 4.75	**79**	70

Plasticity Index

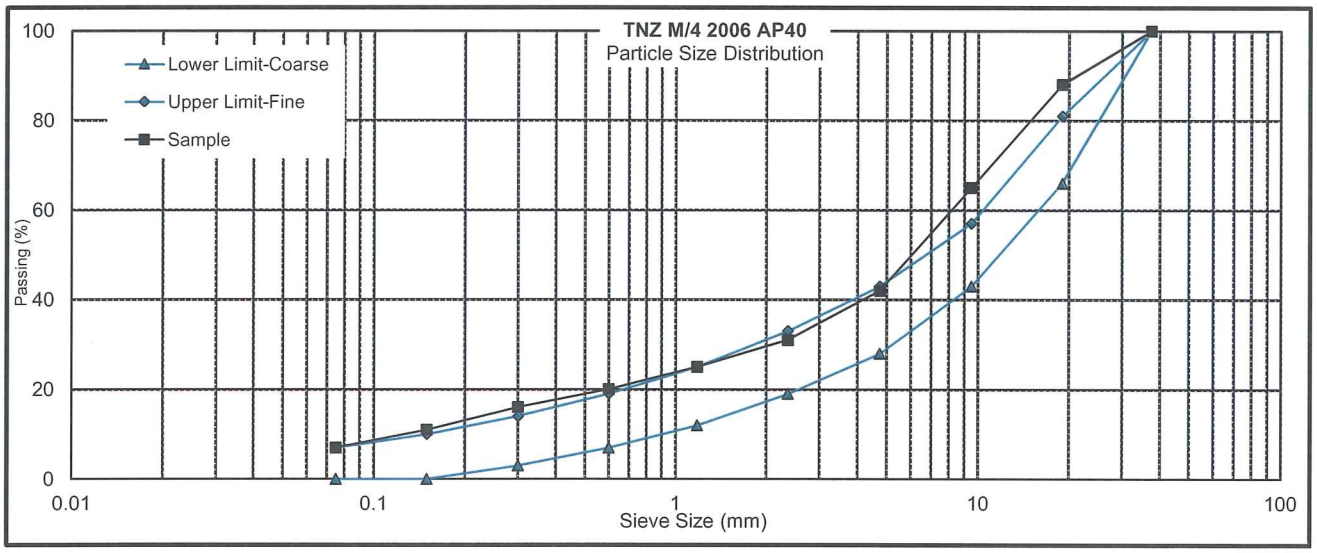
Sample PI	-
Specification	<= 5

Clay Index

Sample CI	-
Specification	<= 3

Sand Equivalent (Air Dried, Mechanical Shaking)

Sample SE	-
Specified	>= 40



Test Methods

Particle Size Distribution	NZS 4407 : 1991 : Test 3.8.1
Broken Faces Content of Aggregate	NZS 4407 : 1991 : Test 3.14

Date tested : 12 November 2012
Date reported : 12 November 2012

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.

IANZ Approved Signatory

Designation : *Senior Civil Engineering Technician*
Date : 12 November 2012

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Borehole Report – 30 Edgeware Road
(Edgeware Road, Springfield to Hills)

Lab Reference: 2040 / 12b

CLIENT: Stronger Christchurch Infrastructure Rebuild Team
CONTACT NAME: Mr B. Stevens
LOCATION: 158 metres East of centreline of Springfield Road, 5 metres South of centreline outside No 30

SAMPLED BY: L Sim, S Burgess **DATE OF SAMPLE:** 7 November 2012
TESTED BY: L Sim, S Burgess **DATE OF TEST:** 9 November 2012
TEST METHODS: RLB / 2: 2004, RLB / 4 : 2012, NZS 4402:1986 Test 2.1 (Test site selected by Client)

LOG OF BORE

Depth of Layer (mm)	Moisture Content (%)	Sand Content (%)	Silt Content (%)	Clay Content (%)	Classification / Description
0-20					Chipseal
20-240					Construction (AP40 & silt)
240-540					Construction (Pit Run)
540-920	31	18	44	38	Clayey Silt
920-1720	40	10	34	56	Silty Clay (contains organic material)
					Water table found at 1720mm

SCALA PENETRATION AND INFERRED CBR

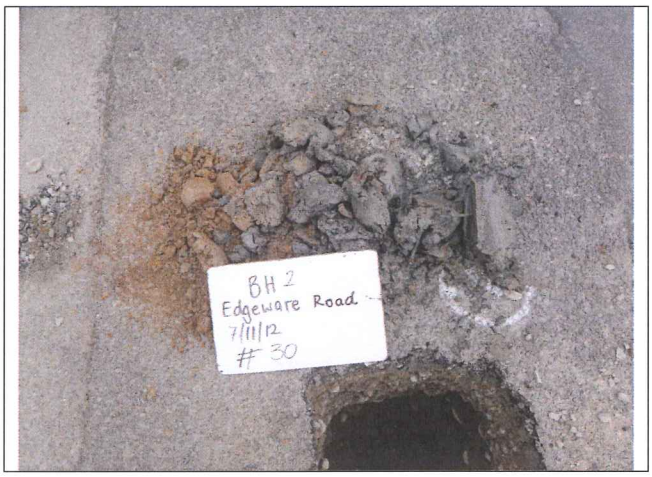
Depth (mm)	Scala Penetration (mm / blow)	Inferred CBR *	Classification / Description
50			Chipseal
100			
150			Construction (AP40 & silt)
200			
250			
300			Construction (Pit Run)
350			
400			
450			
500			
550			
600			Clayey Silt
650			
700	18	11	
750			
800	38	5	
850			
900			
950			Silty Clay (organics)
1000			
1050	58	3	
1100			
1150			
1200			
1250			
1300	44	4	
1350			
1400			
1450			
1500	43	4	
1550			
1600			(continued see above)

*CBR values inferred from Austroads Pavement Design APRG Report 21

Issue Date: 13 November 2012 **Issued By:** _____ **Checked By:** _____

(M Foster, Senior Laboratory Technician)

30 Edgeware Road



Issue Date: 12 November 2012 **Issued By:** **Checked By:**

(M Foster, Senior Laboratory Technician)

TNZ M/4 : 2006 AP40
TEST REPORT

Project :	**Material Investigation**
Location :	**30 Edgeware Road**
Client :	**City Care Laboratory**
Contractor :	**Not Advised**
Sampled by :	**City Care Laboratory**
Date sampled :	**8 November 2012**
Sampling method :	**Not Advised**
Sample description :	**NZTA M4 AP40**
Sample condition :	**Damp as Received**
Source :	**Insitu**

Project No :	**6-JCITY.12/006LC**
Lab Ref No :	**8674**
Client Ref No :	**2040/12b**

Particle Size Distribution

Sieve Size (mm)	Percentage Passing Sample	Limits
63.0	-	100 - 100
37.5	**100**	100 - 100
19.0	**87**	66 - 81
9.5	**61**	43 - 57
4.75	**43**	28 - 43
2.36	**33**	19 - 33
1.18	**28**	12 - 25
0.600	**25**	7 - 19
0.300	**22**	3 - 14
0.150	**17**	0 - 10
0.075	**13**	0 - 7

% passing the finest sieve is obtained by difference

Grading Shape Control

Fraction (mm)	% Within Fraction Sample	Limits
19.0 - 4.75	**44**	28 - 48
9.5 - 2.36	**28**	14 - 34
4.75 - 1.18	**15**	7 - 27
2.36 - 0.600	**8**	6 - 22
1.18 - 0.300	**6**	5 - 19
0.600 - 0.150	**8**	2 - 14

Crushing Resistance

% Fines @ Spec. Load	-	%
Specification	-	%
Crushing Resistance	-	kN
Nom Aggregate Size	-	mm
Specified Load	-	kN

Broken Faces Content of Aggregate

Fraction (mm)	Percentage by Weight Sample	Lower Limit
37.5 - 19.0	**78**	70
19.0 - 9.5	**72**	70
9.5 - 4.75	**72**	70

Plasticity Index

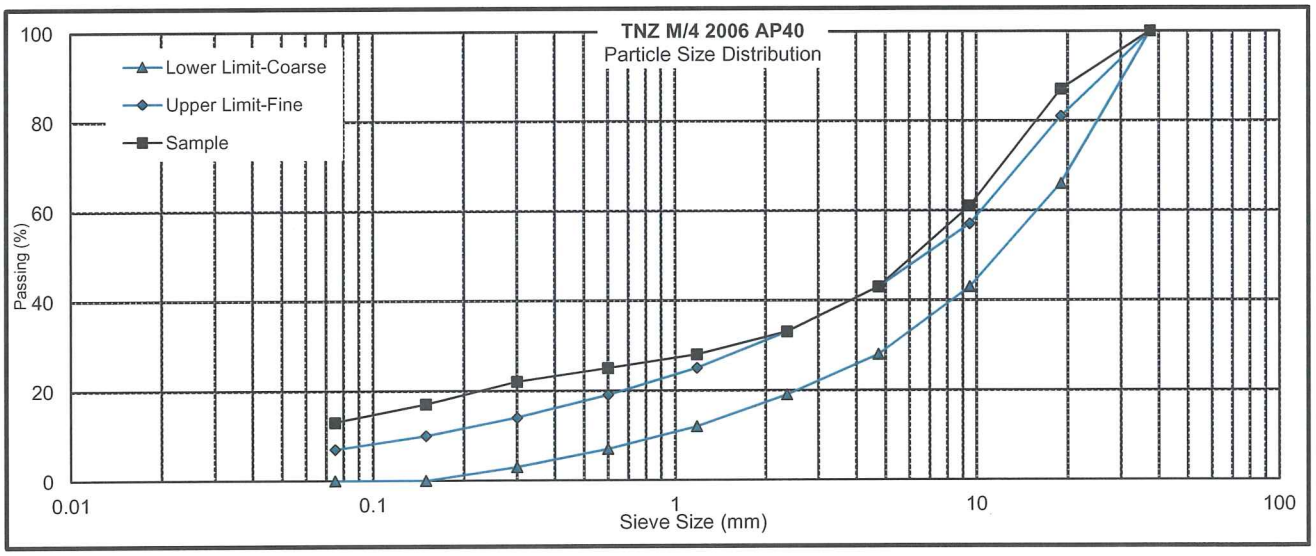
Sample PI	-
Specification	<= 5

Clay Index

Sample CI	-
Specification	<= 3

Sand Equivalent (Air Dried, Mechanical Shaking)

Sample SE	-
Specified	>= 40



Test Methods

Particle Size Distribution	NZS 4407 : 1991 : Test 3.8.1
Broken Faces Content of Aggregate	NZS 4407 : 1991 : Test 3.14

Date tested : 12 November 2012
Date reported : 12 November 2012

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.

IANZ Approved Signatory

Designation : *Senior Civil Engineering Technician*
Date : 12 November 2012

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Borehole Report – 69 Edgeware Road
(Edgeware Road, Springfield to Hills)

Lab Reference: 2040 / 12c

CLIENT: Stronger Christchurch Infrastructure Rebuild Team
CONTACT NAME: Mr B. Stevens
LOCATION: 55 metres West of centreline of Cranford Street, 3 metres North of centreline outside No 69

SAMPLED BY: L Sim, S Burgess **DATE OF SAMPLE:** 6 November 2012
TESTED BY: L Sim, S Burgess **DATE OF TEST:** 9 November 2012
TEST METHODS: RLB / 2: 2004, RLB / 4 : 2012, NZS 4402:1986 Test 2.1 (Test site selected by Client)

LOG OF BORE

Depth of Layer (mm)	Moisture Content (%)	Sand Content (%)	Silt Content (%)	Clay Content (%)	Classification / Description
0-120					Asphalt
120-300					Construction (AP40 & silt)
300-400					Construction (Pit Run)
400-700	21	96	4	0	Sand
700-1000	33	50	22	28	Silty Sand (contains organic material)
1000-1350	95				Peat
					Water table found at 1350mm

SCALA PENETRATION AND INFERRED CBR

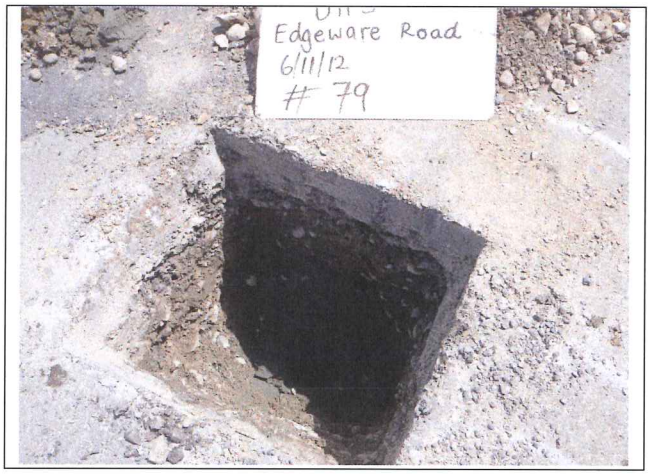
Depth (mm)	Scala Penetration (mm / blow)	Inferred CBR *	Classification / Description
50			Asphalt
100			
150			Construction (AP40 & silt)
200			
250			
300			
350			Construction (Pit Run)
400			
450			Sand
500			
550			
600			
650	48	3.5	
700			
750			Silty Sand (organics)
800			
850			
900			
950			
1000	48	3.5	
1050			Peat
1100			
1150			
1200			
1250			
1300	32	6	
1350			
1400			Water table
1450			
1500	32	6	
1550			
1600			(continued see above)

*CBR values inferred from Austroads Pavement Design APRG Report 21

Issue Date: 13 November 2012 **Issued By:** M. Foster **Checked By:**

(M Foster, Senior Laboratory Technician)

69 Edgeware Road



NB: Photos labelled incorrectly

Issue Date: 13 November 2012 **Issued By:** **Checked By:**

(M Foster, Senior Laboratory Technician)

TNZ M/4 : 2006 AP40
TEST REPORT

Project :	**Material Investigation**
Location :	**79 Edgeware Road**
Client :	**City Care Laboratory**
Contractor :	**Not Advised**
Sampled by :	**City Care Laboratory**
Date sampled :	**8 November 2012**
Sampling method :	**Not Advised**
Sample description :	**NZTA M4 AP40**
Sample condition :	**Damp as Received**
Source :	**Insitu**

Project No :	**6-JCITY.12/006LC**
Lab Ref No :	**8675**
Client Ref No :	**2040/12c**

Particle Size Distribution

Sieve Size (mm)	Percentage Passing Sample	Limits
63.0	-	100 - 100
37.5	**100**	100 - 100
19.0	**83**	66 - 81
9.5	**62**	43 - 57
4.75	**46**	28 - 43
2.36	**39**	19 - 33
1.18	**34**	12 - 25
0.600	**29**	7 - 19
0.300	**24**	3 - 14
0.150	**16**	0 - 10
0.075	**11**	0 - 7

% passing the finest sieve is obtained by difference

Grading Shape Control

Fraction (mm)	% Within Fraction Sample	Limits
19.0 - 4.75	**37**	28 - 48
9.5 - 2.36	**23**	14 - 34
4.75 - 1.18	**12**	7 - 27
2.36 - 0.600	**10**	6 - 22
1.18 - 0.300	**10**	5 - 19
0.600 - 0.150	**13**	2 - 14

Crushing Resistance

% Fines @ Spec. Load	-	%
Specification	-	%
Crushing Resistance	-	kN
Nom Aggregate Size	-	mm
Specified Load	-	kN

Broken Faces Content of Aggregate

Fraction (mm)	Percentage by Weight Sample	Lower Limit
37.5 - 19.0	**48**	70
19.0 - 9.5	**72**	70
9.5 - 4.75	**69**	70

Plasticity Index

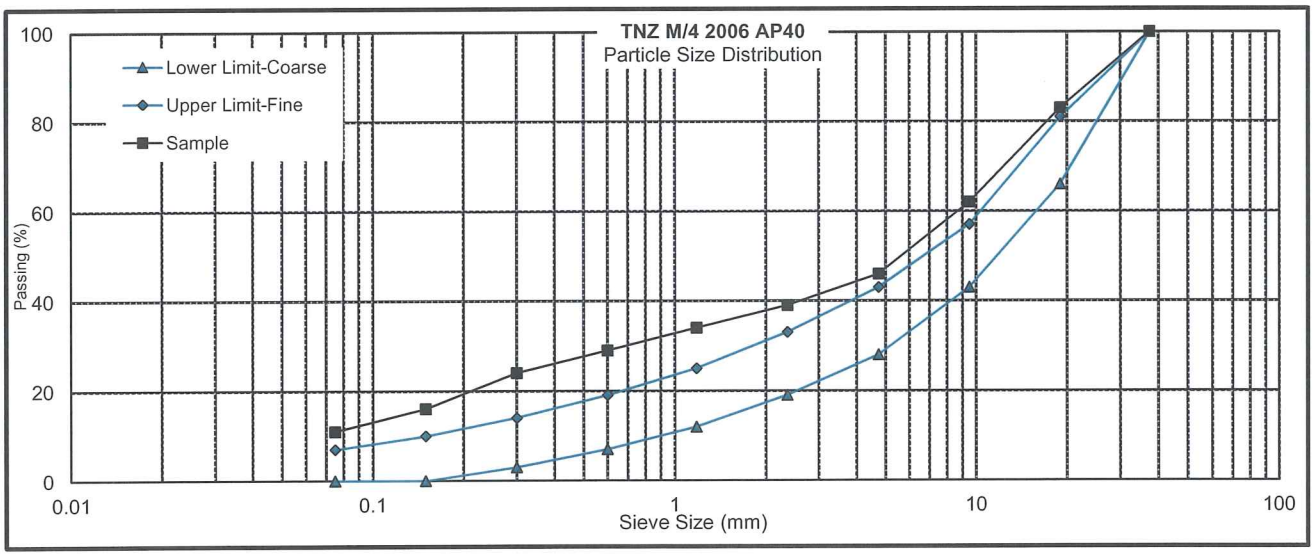
Sample PI	-
Specification	<= 5

Clay Index

Sample CI	-
Specification	<= 3

Sand Equivalent (Air Dried, Mechanical Shaking)

Sample SE	-
Specified	>= 40



Test Methods

Particle Size Distribution	NZS 4407 : 1991 : Test 3.8.1
Broken Faces Content of Aggregate	NZS 4407 : 1991 : Test 3.14

Date tested : 12 November 2012
Date reported : 12 November 2012

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.

IANZ Approved Signatory

Designation : *Senior Civil Engineering Technician*
Date : 12 November 2012

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G

Appendix G Record of Comments

Technical Advisors Comments	Designers Response	Close Out
Water		
Wastewater		
Stormwater Reviewed roading and SW on 22/11/12 & 23/11/12. Issues identified on plans, assume will be discussed/amended OK to proceed P.Wehrmann	comments accepted and incorporated.	OK to proceed assuming roading/SW comments also considered.
Roading 29/11/12 Reviewed drwgs and BofQ - some minor labelling issues OK to proceed. C.R. Nordstrom 22/11/12	- BOFQ UPDATED - DRAWINGS ALSO UPDATED 29/11/12	OK to proceed. C.R. Nordstrom 29/11/12
Structures		