

3 May 2018

Reference No. 1898380-001-L-Rev0

Joseph Fonti

Salta Properties Pty Ltd
Level 26, 35 Collins Street
Melbourne VIC 3000

459-471 CHURCH STREET, RICHMOND

+20-26 Brighton St Richmond

POTENTIAL IMPACT OF THE PROPOSED DEVELOPMENT ON THE CITYLINK BURNLEY TUNNEL

Dear Joseph

Engagement

Salta Properties Pty Ltd (Salta) has engaged Golder Associates Pty Ltd (Golder) to provide geotechnical consulting services for the proposed redevelopment of the site located at 459-471 Church Street, Richmond.

Golder submitted a proposal (reference P1898380-001-L-Rev2) dated 17 April 2018 to provide geotechnical consulting services including a supplementary geotechnical investigation and an assessment (without completing soil structure interaction analysis) and provision of comment on the potential impact of the proposed redevelopment on the CityLink Burnley Tunnel (Burnley Tunnel) which runs beneath the south western corner of the site.

Acceptance of our proposal and instruction to proceed with the scope of services presented was provided by Salta in an email dated 19 April 2018. This letter presents the results and findings of our assessment of the potential impact of the proposed development on the Burnley Tunnel.

Experience with similar assessments

Golder has significant experience in undertaking the assessment of the potential impacts of both high-rise buildings and deep basements on underground infrastructure, particularly tunnels. In Melbourne, Golder has provided advice and analysed the interaction and impact of developments on nearby underground tunnels and infrastructure such as station boxes at numerous sites including the following:

- 506-510 Church Street, Richmond (Burnley Tunnel)
- City West Police Complex – Spencer Street, Melbourne (Melbourne underground rail loop – MURL)
- Concept Blue development – Russell Street, Melbourne (MURL)
- Aurora Apartments and several other sites in La Trobe Street Melbourne (MURL)
- Hotel Windsor – Spring Street, Melbourne (MURL)
- Former Telstra site on the corner of La Trobe and Exhibition Street (MURL).

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Site conditions and proposed development

Based on the information provided by Salta we understand the proposed development is bound by Shamrock Street to the north, Brighton Street to the east, low level buildings to the south and Church Street to the west. The plan area of the site is approximately 5285 m².

A low rise residential building is located adjacent to the north east corner of the site. The site is currently occupied by a low rise building over the north half and an at-grade car park with a low rise building over the south half of the site. The location of the proposed development is presented on Figure 1.

Based on discussions with Salta we understand the proposed development includes a three-level basement across the footprint of the site and separate buildings ranging from about fifteen levels at the west of the site to about three levels at the east of the site.

Information on the southern link Burnley and emergency egress tunnels

We have reviewed the following drawings relating to the Burnley and associated emergency egress tunnels.

- 1) Southern link, underground structure Burnley tunnel protection guidelines, longitudinal section (reference SK-101 – Revision 1) dated 2 March 2015.
- 2) Southern Link, Burnley tunnel and emergency egress tunnel, tunnel chainage 13100 to 13350 (reference SK-209 – Revision 1) dated 2 March 2015.
- 3) Southern Link, Burnley tunnel and emergency egress tunnel, general arrangement (reference SD2-TU-0511 – Revision 5) dated 3 June 1998.
- 4) Southern Link, tunnel highway alignment, Alignment Plan - Eastbound Carriageway CH13 250 to CH13 600 (STG-C1-0310 – Revision 3) dated 16 December 1999.

The four drawings are attached to this letter are for information and reference purposes. We note that several of the drawings include notations from the assessment of the site located at 506-510 Church Street, Richmond. We have annotated information relating to the 459 – 471 Church Street site onto relevant drawings.

Based on the alignment plan drawing (reference STG-C1-0310) the eastern and western extent of the proposed development is approximately located between chainages CH13 250 and CH13 380. (We note that different chainage values are indicated on drawing SD2-TU-0511 – Revision 5, we have ignored these values)

Based on the longitudinal section drawing (reference STG-CA-0513) we understand the level of the tunnel grade line is between about RL -32.3 m AHD (Chainage CH13 200) and RL -21.9 m AHD (Chainage CH13 400) and hence the grade line of the tunnel slopes downward to the west (north west) at a gradient of about 5.2%.

Location of the Burnley tunnel relative to the proposed development site

We have assessed the location of the proposed development relative to the Burnley Tunnel and the asset protection zones indicated on the drawings previously referenced. The results of our assessment can be described as follows:

- i) The south west corner of the site is about 30 m to the north east of the Burnley Tunnel.

- ii) The depth to the crown of the Burnley Tunnel in the vicinity of the site ranges between about 24 m and 29 m.
- iii) The south west corner of the development footprint is marginally within the "Horizontal Asset Protection Zone 2" (as defined in the CityLink/Transurban drawings – reference SK-101 and SK-209).
- iv) Based on our assessment about 2.5% (about 125 m²) of the overall site area (about 5285 m²) is within the "Horizontal Asset Protection Zone 2" zone.

The results of the assessment as described above is presented graphically on Figure 1.

Subsurface conditions

Geology

We have reviewed published geological information and Golder's database for projects undertaken in the vicinity of the site. The Geological Survey of Victoria, 1:63 360 Melbourne mapsheet indicates the site lies near the boundary of two distinct geological units. These two units are described as Quaternary age Newer Volcanics basalt and Silurian aged sandstone, siltstone and shale of the Dargile formation. Should both units be present the younger Quaternary age Newer Volcanics basalt would overlie the Dargile formation. A layer of residual clays from weathering of the weathered basalt and/or siltstone is expected above the surface of the weathered rock. Variable fill materials are likely to overlie the natural subsurface materials.

Based on the published geological information we understand there is a significant thickness of weathered siltstone above the crown of the tunnel.

Preliminary geotechnical investigation

Salta has provided us with a report (reference 118613) dated 30 October 2017 prepared by AS James Pty Ltd (AS James) which presents the results and findings of an initial geotechnical investigation together with design recommendations for the proposed development.

Based on the results of the AS James investigation we understand that both the Quaternary age Newer Volcanics basalt and the Dargile formation are present at the site.

Borehole BH2 from the AS James investigation was located in the south west corner of the site and hence is closest to the alignment of the Burnley Tunnel. The subsurface conditions encountered in this borehole can be described as about 0.6 m of fill over 3 m of very stiff to hard clays (inferred residual basaltic clay) over about 4 m of weathered basalt which is underlain by weathered siltstone. The weathered siltstone was predominantly extremely weathered between depths of 7.7 m and 11.2 m and was predominantly moderately weathered below a depth of about 11.2 m.

The AS James report states that no free groundwater was encountered at the time of the site investigation. However, no measurements were made. We would expect the groundwater level to be within either the weathered basalt or weathered siltstone units.

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Assessment of potential impacts of the proposed development on the CityLink tunnels

Based on the guidelines presented in the relevant CityLink/Transurban drawings (reference SK-101 and SK-209) we understand vertical and horizontal asset protection zones surround the Burnley Tunnel and emergency egress tunnel located to the south of the Burnley Tunnel.

The south west corner of the development footprint is marginally within the "Horizontal Asset Protection Zone 2" (as defined in the CityLink/Transurban drawings – reference SK-101 and SK-209). We have discussed this with representatives of Transurban and understand that there is no specific action or assessment required should excavation extend into the Zone 2 asset protection zone but rather an assessment of potential risk to the tunnels should be undertaken.

The site of the proposed development is a minimum of 30 m from the alignment of the Burnley Tunnel. Whilst excavation for the proposed multi-level basement will encroach on Zone 2 it will not encroach into either Zone 1A – support zone or Zone 1B - non-support zones above and below the nominated support zone.

Based on available information on the subsurface conditions in the general area the vertical distance between the crown of the tunnel and the base of the excavation is likely to be in the order of about 15 m with the majority of this material comprising moderately or less weathered siltstone.

Golder has completed numerous assessments of the interaction between proposed developments located above or in proximity to tunnels in Melbourne. These assessments have typically been for the MURL tunnels. In undertaking these assessments, the primary criterion used to assess the impact of the proposed development is an assessment of the extreme fibre stress in the tunnel lining.

Changes in the stress in the lining of the tunnel can be caused by changes in the stress condition in the materials around the tunnels. This could be due to excavation (stress relief) or the addition of surcharge loading (increase in stress) due to the construction of buildings.

With regard to the proposed development we consider the potential for changes in stress in the tunnel lining due to the proposed development (both basement excavation and construction of new buildings) to be negligible. This is based on the following considerations.

- i) The lateral distance between the site and the Burnley Tunnel.
- ii) The extent of the basement excavation within Zone 2 is very minor.
- iii) The depth of excavation is 10 m compared to the depth to the crown of the tunnel of about 24 m.
- iv) The material around and above the tunnel is likely to comprise moderately or less weathered siltstone with a relatively high modulus and hence any movement around the tunnel due to stress relief will be negligible.

In addition to the above comments we also note that we have completed analysis for similar developments which are located much closer to underground infrastructure both in terms of horizontal and vertical distances between basement excavations and tunnel linings and the changes in stress in the tunnel lining were demonstrated to be within acceptable criteria.

Whilst the groundwater level and whether the proposed basement will be constructed as a drained or sealed structure is yet to be confirmed based on the subsurface conditions at the site we consider any temporary or permanent lowering of the groundwater level is unlikely to have any impact on the tunnels. Should, as expected, the groundwater level be within the weathered basalt or siltstone then we expect lowering of the groundwater level to also be satisfactory with respect to any settlement induced at the ground surface.

Conclusion

We consider that the potential for an adverse impact on the CityLink tunnels in proximity to the proposed development at 459 – 471 Church Street, Richmond to be negligible. Further, given the distances between the site and the tunnels we consider it reasonable to make this assessment without undertaking detailed numerical modelling of the interaction between the proposed development and the tunnels which is the routinely adopted method of assessment.

Limitations

This Document has been prepared for the particular purpose outlined in Golder's proposal and no responsibility is accepted for the use of this Document, in whole or in part, in other contexts or for any other purpose.

Any assessments made in this Document are based on the conditions indicated from published sources and the investigation described. No warranty is included, either express or implied, that the actual conditions will conform exactly to the assessments contained in this Document.

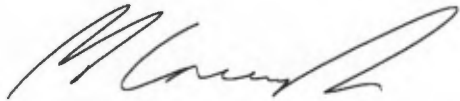
Where data supplied by the client or other external sources, including previous site investigation data, have been used, it has been assumed that the information is correct unless otherwise stated. No responsibility is accepted by Golder for incomplete or inaccurate data supplied by others.

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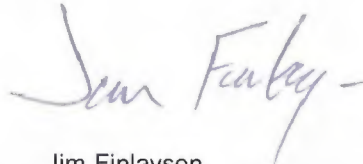
Please contact either Matt Greenough on 8862 3706 or Jim Finlayson on 8862 3551 should you have any queries regarding the information presented in this letter.

Yours sincerely,

Golder Associates Pty Ltd



Matt Greenough
Geotechnical engineer



Jim Finlayson
Principal

MLG/JEF/mlg

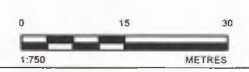
Attachments: Figure 1 – Location of the Transurban/CityLink assess protection zones in the vicinity of 459-471 Church Street, Richmond
Southern link, underground structure Burnley tunnel protection guidelines, longitudinal section (reference SK-101 – Revision 1)
Southern Link, Burnley tunnel and emergency egress tunnel, tunnel chainage 13100 to 13350 (reference SK-209 – Revision 1)
Southern Link, Burnley tunnel and emergency egress tunnel, general arrangement (reference SD2-TU-0511 – Revision 5) dated 3 June 1998.
Southern Link, tunnel highway alignment, Alignment Plan - Eastbound Carriageway CH13250 to CH13600 (STG-C1-0310 – Revision 3) dated 16 December 1999.

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- LEGEND**
- Tunnel Centreline
 - Site Extent
 - Protection Zone 1
 - Protection Zone 2
 - Site Extent - Protection Zone 2 Intersection
 - Burnley Tunnel



NOTE(S)

- REFERENCE(S)**
1. ROAD AND PROPERTY INFORMATION SOURCED FROM THE DEPARTMENT OF ENVIRONMENT, LAND, WATER & PLANNING, 2016.
 2. IMAGERY SOURCED FROM NEARMAP.COM, DATED 04/04/2018.
 3. BURNLEY TUNNEL INFORMATION SOURCED FROM SOUTHERN LINK, TUNNEL HIGHWAY ALIGNMENT, ALIGNMENT PLAN - EASTBOUND CARRIAGEWAY CH13 258 TO CH13 688 (STG-C1-0318 - REVISION 3) DATED 16 DECEMBER 1998.

CLIENT
SALTA PROPERTIES PTY LTD

PROJECT
459-471 CHURCH STREET, RICHMOND

TITLE
LOCATION OF THE TRANSURBAN/CITYLINK ASSET PROTECTION ZONES IN THE VICINITY OF 459-471 CHURCH STREET

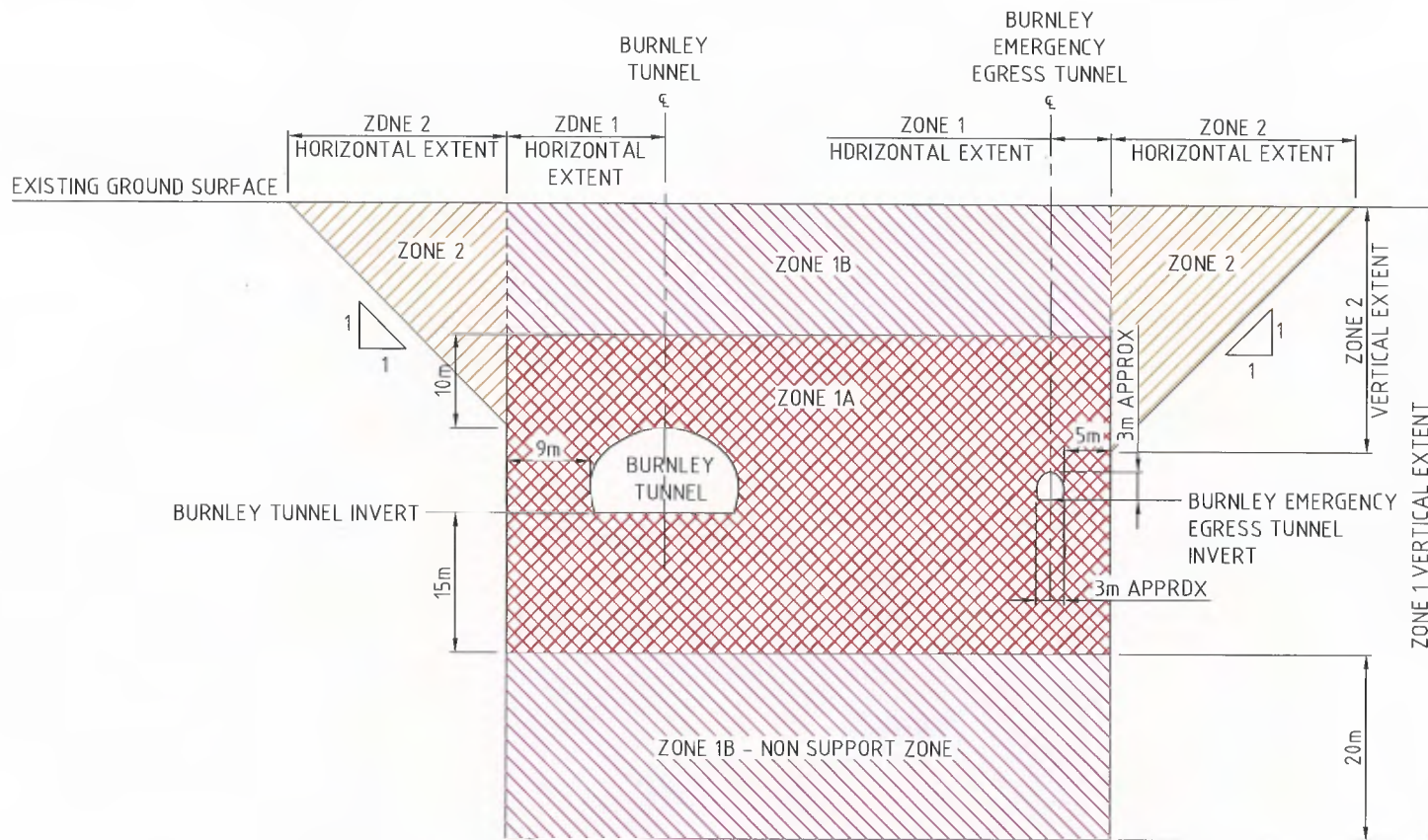
CONSULTANT	YYYY-MM-DD	2018-05-03
DESIGNED	KMM	
PREPARED	CJS	
REVIEWED	JEF	
APPROVED	JEF	

PROJECT NO. 1898380 **CONTROL** 001-R **REV.** 0 **FIGURE** 1

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CityLink/PA/03103/03/S.00003-SECTION9-SK-209
 Last modified: 22 Sep 06 - 10:03



TYPICAL CROSS SECTION 9 - BURNLEY TUNNEL AND EMERGENCY EGRESS TUNNEL, CREMORNE

LEGEND:

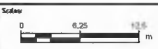
-  ZONE 1A - SUPPORT ZDNE
-  ZONE 1B - NON-SUPPDRT ZDNE
-  ZONE 2

NOTES:

1. REFER TO DRAWING SK-101 TO DETERMINE ZONE 1 AND ZDNE 2 HORIZONTAL AND VERTICAL EXTENTS

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No.	BY	DATE	DESCRIPTION	APPD
1	NI	13/03/05	FINAL	
2	NI	02/03/05	ISSUED TO TRANSPORT	GB



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DESIGNED	NI	CHECKED	GB
DRAWN	ES	CHECKED	NI
APPROVED	GB	DATE	02/03/05
THIS DRAWING IS CONFIDENTIAL AND SHALL NOT BE LOANED FOR THE PURPOSES OF THIS PROJECT.			

Client:



Linking Melbourne

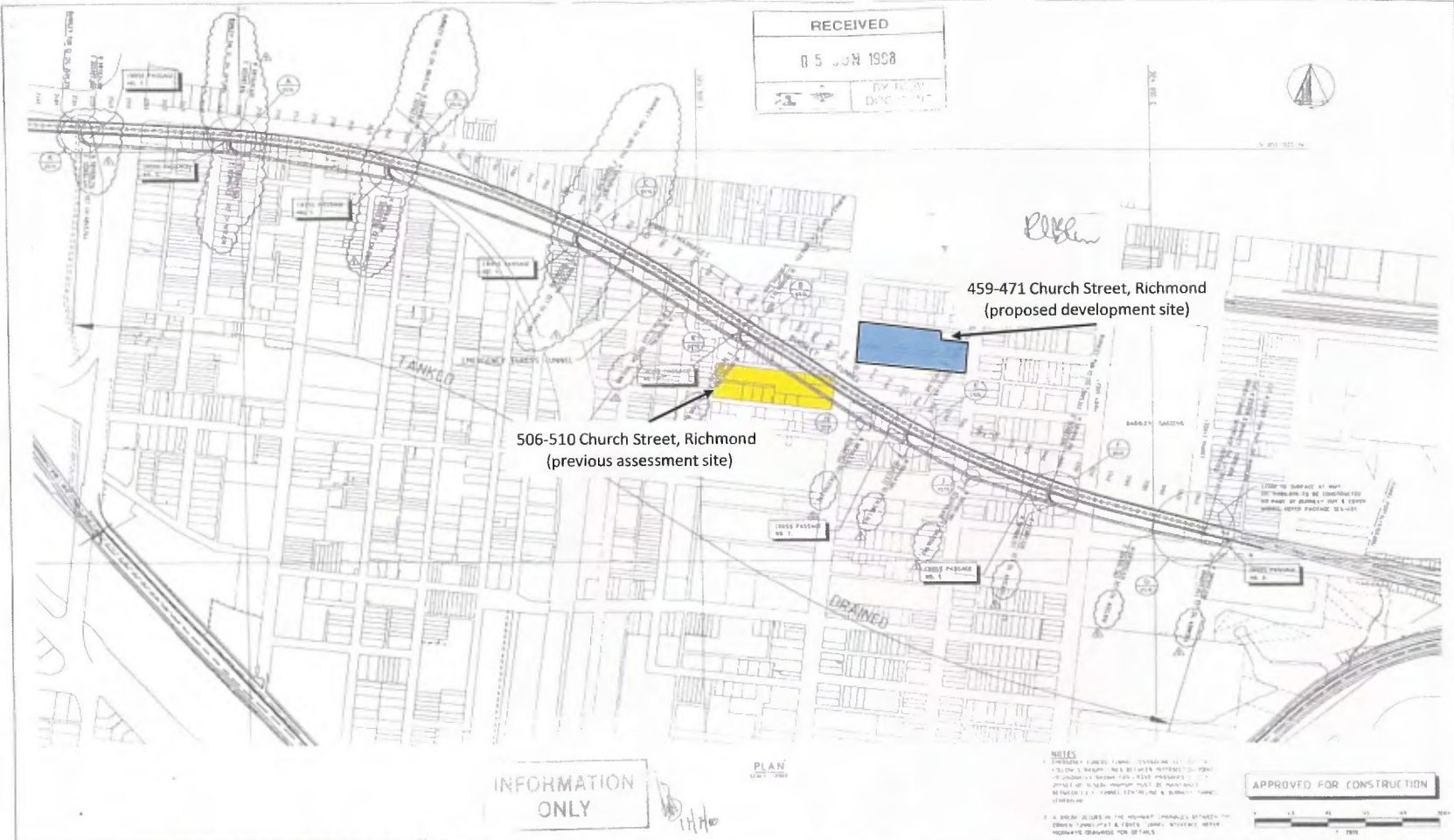
Designer:



AECOM Australia Pty Ltd
A.B.N. 28 093 846 925

Project: MELBOURNE CITYLINK		
Title: SOUTHERN LINK BURNLEY TUNNEL AND EMERGENCY EGRESS TUNNEL CHAINAGE 13100m TD 13350m		
Status: REFERENCE	Doc No: SK-209	Rev: 1

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BY PLAN
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506-510 Church Street, Richmond
(previous assessment site)

459-471 Church Street, Richmond
(proposed development site)

INFORMATION ONLY

PLAN

NOTES

1. THE PLAN IS A GENERAL ARRANGEMENT AND DOES NOT REPRESENT A CONTRACT. THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING ALL NECESSARY PERMITS AND APPROVALS FROM THE RELEVANT AUTHORITIES. THE CONTRACTOR SHALL BE RESPONSIBLE FOR VERIFYING THE ACCURACY OF ALL INFORMATION PROVIDED TO THEM.

APPROVED FOR CONSTRUCTION



Hyder
Obayashi
Transfield

NO.	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	TOTAL
1	DEMOLITION OF EXISTING CONCRETE WALLS	m ²	100	100	10000
2	DEMOLITION OF EXISTING CONCRETE SLABS	m ²	200	100	20000
3	DEMOLITION OF EXISTING CONCRETE BEAMS	m ³	50	100	5000
4	DEMOLITION OF EXISTING CONCRETE COLUMNS	m ³	10	100	1000
5	DEMOLITION OF EXISTING CONCRETE FOOTINGS	m ³	5	100	500
6	DEMOLITION OF EXISTING CONCRETE WALLS	m ²	100	100	10000
7	DEMOLITION OF EXISTING CONCRETE SLABS	m ²	200	100	20000
8	DEMOLITION OF EXISTING CONCRETE BEAMS	m ³	50	100	5000
9	DEMOLITION OF EXISTING CONCRETE COLUMNS	m ³	10	100	1000
10	DEMOLITION OF EXISTING CONCRETE FOOTINGS	m ³	5	100	500

Hyder Obayashi
Joint Venture

TRANSFIELD
OBAYASHI
Transfield-Obayashi Joint Venture

NO.	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	TOTAL
11	DEMOLITION OF EXISTING CONCRETE WALLS	m ²	100	100	10000
12	DEMOLITION OF EXISTING CONCRETE SLABS	m ²	200	100	20000
13	DEMOLITION OF EXISTING CONCRETE BEAMS	m ³	50	100	5000
14	DEMOLITION OF EXISTING CONCRETE COLUMNS	m ³	10	100	1000
15	DEMOLITION OF EXISTING CONCRETE FOOTINGS	m ³	5	100	500

MELBOURNE CITY LINK PROJECT
SOUTHERN LINK
BURNLEY TUNNEL - EMERGENCY EGRESS TUNNEL
GENERAL ARRANGEMENT

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1 1 MAY 2018