



## Minister for Transport

80 Collins Street  
Melbourne Victoria 3000  
GPO Box 2797Y  
Melbourne Victoria 3001  
Telephone (03) 9655 8683  
Facsimile (03) 9655 8617  
[www.vic.gov.au](http://www.vic.gov.au)  
DX 210410

Our Ref:

### **NORTHERN CENTRAL CITY CORRIDOR STUDY**

The following is a summary report prepared by VicRoads and the Department of Infrastructure under the Kennett Government, describing investigations undertaken into road tunnel options in the inner northern suburbs.

**It should be noted that the Bracks Government does NOT endorse any of the concepts presented.** Rather, we are initiating a broader transport and land use study (the Northern Central City Corridor Study) to develop an integrated, overall strategy to improve the efficiency and sustainability of transport and development in the area.

The Bracks Government, as part of its commitment to consulting with the community and to open and transparent government, is making this report available for public scrutiny.

If you would like more information about the Northern Central City Corridor Study, please contact the study manager, William McDougall (telephone 9655 6659, facsimile 9655 8811, email [innernorth@doi.vic.gov.au](mailto:innernorth@doi.vic.gov.au)), or visit the study web site at [www.doi.vic.gov.au/innernorth](http://www.doi.vic.gov.au/innernorth)

I encourage you to contact the study team with your comments.

**PETER BATCHELOR MP**  
Minister for Transport

**April 2001**

# NORTHERN CITY CORRIDOR STUDY

## SUMMARY

This study was commissioned by the Minister for Roads and Ports in August 1999 to provide preliminary advice on the likely effectiveness, viability and impacts of a link between the Eastern Freeway and City Link and the strategic options for its connection to the principal road network.

This report presents progress with this preliminary review as at the end of October 1999.

## Existing Traffic Movements – Eastern Freeway

A detailed analysis of existing (pre-opening of the Western portion of City Link) traffic flows has been carried out. Some of the key messages from this work include:

- The typical weekday volume on the Eastern Freeway crossing the Yarra River is about 62,000 vpd in each direction.
- Weekend volumes on the Eastern Freeway are about 55,000 vpd in each direction
- During peak period traffic volumes on the Eastern Freeway are high, with typical weekday volumes crossing the Yarra River of 5,300 per hour westbound in the morning and 6,200 per hour eastbound in the evening.
- Around 50% of the westbound traffic on the Eastern Freeway crossing the Yarra River turns off at Hoddle Street
- Around 25% of the total westbound traffic progressively distributes into Collingwood, Carlton and the CBD via intersecting arterial roads
- Around 25% of the total westbound traffic (about 13,500 vpd) has trip destinations west of Royal Parade
- From an analysis of the VATS data, the weekend traffic is less directed towards the CBD with a greater proportion remaining in the corridor and accessing Tullamarine Freeway.
- The opening of the Western Link, toll free, appears to have had no change in the volumes on the Eastern Freeway
- Transit lane usage on the Eastern Freeway, in March 1998, was 2,770 vehicles during the period 7:00 to 9:30 am, with an average occupancy rate of 2 persons per vehicle.

## Travel Times

- Travel time in April 1999 along the Eastern corridor from Burke Road on the Eastern Freeway, via Alexandra Parade and Macarthur Rd, to Flemington Road

	AM peak	Off-peak	PM peak
West Bound	23.3	13.1	16.1
East Bound	12.8	13.1	29.2

- Travel times in the peaks varied - eg AM peak 12 min to 46 min, PM peak 15 min to 35 min.
- Key delay points west bound in the AM peak were between the Eastern Freeway at Yarra River and Alexandra Pde, at Smith Street and at the approach to Flemington Rd
- Key delay point east bound in the PM peak were Royal Parade and Nicholson St
- Travel time in April 1999 along the corridor from Burke Road on the Eastern Freeway, vis Hoddle Street, to the Victoria Parade/Nicholson Street intersection

	<b>AM peak</b>	<b>Off-peak</b>	<b>PM peak</b>
West Bound	22.8	12.4	14.1
East Bound	10.1	10.4	19.2

- Travel times in the peaks varied - eg AM peak 9 min to 36 min, PM peak 11 min to 24 min.
- Key delay points west bound in the AM peak were between the Eastern Freeway at Yarra River and Hoddle St, at Johnston St, Hoddle St at Victoria St and Victoria St between Wellington St and Landsdowne St
- Key delay point east bound in the PM peak were Victoria St between Smith St and Hoddle St and on Hoddle St between Victoria St and Johnston St

### ***Proposed Improvements***

Works are proposed to commence shortly in Hoddle Street and Victoria Parade aimed at easing congestion at three key locations.

### ***Assessment***

- At its western end, the Eastern Freeway's primary role (75% of its volume) is to provide access to the CBD and environs. Its secondary role is as a northern bypass of the city.
- There is currently very little use of the Eastern Freeway by commercial vehicles (3.5% between Chandler Highway and Burke Road).
- The Northern City Corridor is primarily a distribution route for traffic approaching the City from the north, north-east and the east. It also provides a link between the Eastern Freeway and City Link.
- Both the access and bypass roles of the Northern City Corridor need to be recognised.

## **Traffic Movements Post City Link Opening**

The City Link project joins the Tullamarine, West Gate and Monash Freeways. Significant re-distribution of traffic in the inner suburbs is expected to occur following the opening of the project and a settling period as drivers understand the changes in travel patterns.

From the modelling carried out, the key differences when compared with the 1999 pre-City Link analysis are:

- A reduction in through traffic between the Eastern Freeway and Tullamarine Freeway, with this role being taken by City Link
- A shift from Heidelberg Road to the Eastern Freeway
- Volumes on the Eastern Freeway remaining similar
- Volumes in and distribution along Hoddle Street remaining similar
- A reduction in the volume of traffic from the Eastern Freeway using the north/south streets between Alexandra Parade and the CBD
- A reduction in the volume of traffic from the Eastern Freeway to the CBD

## **Geology**

Silurian sedimentary rock is the primary material through the corridor. The area surrounding Moonee Ponds Creek is mixed ground, including very soft material. East of Nicholson Street basalt and basaltic clays overlay the silurian material.

At the City Link end, a tunnel portal may require extensive support because of the possible need to excavate in mixed ground. This problem appears to be common both north and south of Flemington Road.

Under Royal Park is a surficial covering of Brighton Group sediments (Black Rock Sandstone Unit) overlying Silurian sedimentary bedrock. The depth of the Unit is variable as a result of the undulations in the bedrock surface upon which it was deposited. Depths of up to 18 m were recorded for bores drilled toward the margin of the sediments to the east of Royal

---

Parade to the north of the section line. It can be expected that groundwater will be associated with this sedimentary sequence and some sandy horizons can be expected to be of high relative permeability.

East of Royal Parade to East of Lygon Street the Silurian sedimentary rock and overlying residual soils outcrop over this length with a topographic high sited near Smith Street. The depth of weathering and joint discontinuity spacing for this material is not known.

East of Lygon Street to Merri Creek basalts of the Newer Volcanics outcrop. The depth of residual basaltic clay may be in excess of 8 metres and the quality of the rock variable. The depth of the basalt is only known in the vicinity of Hoddle Street where bridge foundation investigations variously penetrated from 15 to 25.5 metres of basalt and overlying residual soils. Beneath the basalt, minor alluvial sands about 1 metre thick were encountered above the Silurian bedrock (interbedded siltstone and mudstone, and quartzite). The deepest intersection of the base of the basalt at this site is at about RL -5 m.

Near the railway bridge, the prior channel of the Yarra River (with possibly a substantial alluvial infill) has been buried by the basalt flows. The invert of this buried valley is expected to be substantially below current sea level.

A tunnel portal excavated to the west of Merri Creek would be in completely weathered (basaltic clay) to extremely weathered basalt. As in the presently depressed section of freeway beneath Hoddle Street, crib or retaining walls would be required to support the basaltic soils and the upper extremely weathered rock.

## Heritage

The area to the north of the CBD was very important in the early development of Melbourne. This is reflected in that there are about 270 buildings on the Victorian Heritage Register in this area. The development of route concepts needs to recognise the importance of these places and work within these constraints. Those places close to any potential route include:

- Dights Mill site, Abbotsford
- Shot Tower, Clifton Hill
- Cambridge Terrace, Carlton North
- Melbourne General Cemetery
- Melbourne University and the Colleges
- Parkville Uniting Church
- Royal Melbourne Zoological Gardens
- Anzac Hall, Royal Park
- Former Burge Bros Factory, Flemington

## Public Transport

Extensive rail, tram and bus services operate in the area north of the CBD.

## Alexandra Parade Utilities

The work undertaken to upgrade Alexandra Parade has given a good insight into the very extensive utilities in this section. These utilities run along and across Alexandra Parade. The most significant is a main drain. The cross-section of the drain varies, at its largest it is about 5 metres wide at the top and 3 metre deep. It is on a very flat grade of about 0.3%.

Other significant services that have been identified include other drainage lines, water, sewerage, gas and power.

Any works proposed near the surface along Alexandra Parade will have very significant implications on these utilities. Relocation will be a time-consuming and expensive process. The major nature of some of the utilities will mean that extensive pre-planning will be needed and the relocation undertaken at times when demand is at its lowest. An allowance of about \$50 million should be included in the estimates for schemes involving 'cut and cover' tunnels

---

along Alexandra Parade for relocation of utilities and an additional \$50 million for schemes that involve relocation of the main drain.

## Route Concepts

The existing corridor runs through a residential and mixed-use area, past the Melbourne General Cemetery and Melbourne University, and through Royal Park. Significant community unrest was displayed during the original construction of the Eastern Freeway, and later with the rehabilitation of Alexandra Parade.

This study is being undertaken on the understanding that the new link between the Eastern Freeway and City Link will be in tunnel.

The link should aim to:

- Cater for traffic traversing the entire corridor from Hoddle Street to City Link (and beyond)
- Improve the accessibility of the CBD and environs for traffic, via the Eastern Freeway or other routes
- Reduce traffic volumes along the current surface level road system
- Improve the operation of public transport

It has been assumed that the tunnel cross-sections would be similar to those used for the Southern Link, ie:

- 11.5 m between barrier faces for 3-lane tunnels
- 8.0 m between barrier faces for 2-lane tunnels
- 4.9 m vertical clearance.

A series of generic route concepts has been developed to illustrate the types of projects that may deliver the above objectives.

These concepts can be grouped as follows:

- direct, deep tunnel link between Eastern Freeway and City Link
- direct, deep tunnel link between Eastern Freeway and City Link with a supplementary deep tunnel link to the edge of the CBD
- shallow tunnel between Eastern Freeway and Nicholson Street and a deep tunnel across to City Link

Very preliminary cost estimates for these concepts have been prepared using tunnel rates derived from other tunnel costing work. These costs are in the range of \$900 million to \$1600 million depending on the schemes and the connections provided.

## Interchange Concepts

### *At City Link*

A variety of interchange or intersection arrangements to connect a tunnel from the Eastern Freeway to City Link have been tested. It has been assumed that all existing connections to the arterial road network are to remain, or to be reinstated. The preferred objectives for this connection are to provide:

- A freeway-to-freeway standard connection from the tunnel to northbound on City Link (and vice versa)
- A freeway-to-freeway standard connection from the tunnel to southbound on City Link (and vice versa)
- A connection to the local arterial road network, either directly or via an interchange on City Link. This would allow access to Racecourse Road (or equivalent) for traffic wishing to head further west and access to Flemington, Dynon or Footscray Roads for traffic wishing to access the north-western part of the CBD.

No single arrangement has been found that meets all criteria. The two arrangements that best meet the criteria are:

- 
- Brunswick Road northerly-orientated interchange and an intersection with Racecourse Road for southerly access to City Link and access to the local arterial road network
  - Intersection with Racecourse Road and Flemington Road with one-way flows though the area.

### ***At Eastern Freeway***

The primary objective of this interchange is to provide direct, freeway-to-freeway standard connection to the proposed tunnel. Full connections to Hoddle Street are to remain. Options to reduce the number of lanes between Alexandra Parade and the Eastern Freeway can be investigated, depending of the extent of works proposed to aid access between the Eastern Freeway and the CBD. Options for deep and shallow tunnels have been investigated.

The option that appears to have the greatest potential has tunnelling commencing between Alexandra Parade and the railway bridge with split portals for the entry / exit tunnels west of Hoddle Street. The tunnel heads mainly in a westerly direction. This concept provides entry/ exit access in a west / east direction respectively from the Freeway as well entry/ exit at Hoddle Street. The major advantage of this option is that it provides for full interchange movements between Hoddle Street and the tunnel /Eastern Freeway as well a wide range of traffic movements / alterations on the exiting ramps and/or carriageways during the construction period. The main disadvantage is the requirement for land acquisition for the southern tunnel requirements.

### ***Near the CBD***

The intent of these proposals is to take traffic from the Eastern Freeway directly to the edge of the CBD. It is an essential element of each of these concepts that they be fully integrated into the surrounding built environment. Many of the concepts are intended to be located fully within the existing road reserves. Considerable further work is required to confirm this. The concept at the old CUB site in Victoria Street is intended to form part of the street level of a major development and may merit further consideration.

The CBD link that seems worthy of further analysis is the concept at Albert Street. This concept would close Albert Street to through traffic but provide access to the CBD and to Lonsdale and Exhibition Streets. This option also maintains Victoria Street as the northern bypass of the City.

## **Shallow Tunnels**

Options for the construction of shallow tunnels within the corridor have been considered. The section along Alexandra Parade between Eastern Freeway and Nicholson Street has the greatest potential. A shallow tunnel through Royal Park may be acceptable subject to careful and detailed landscape proposals. Shallow tunnels along other sections are not considered appropriate.

Within the Alexandra Parade road reserve, two options present themselves for construction of a cut and cover tunnel – within the existing median or under the existing carriageways. Both options would involve extensive relocation of utilities. Construction within the median would require relocation of the main drain and removal of the trees. There would be significant disruption during construction.

### ***Interchange at Nicholson Street***

Preliminary investigation indicates that an easterly oriented interchange could be provided at the Nicholson Street intersection with any proposed shallow tunnel. The majority of the traffic from this exit would wish to head towards the CBD along Nicholson Street, which is already congested and has very limited scope for capacity improvement.

## Associated Works

The work undertaken to date indicates that there is either no scope, or very limited scope to improve the capacity of the various north/south routes between Alexandra Parade and Victoria Street. The roles of these streets, the strip shopping centres and the numbers of buildings on the Heritage Register limit the opportunities to undertake major work.

Considerable additional work is required to identify any possible opportunities to both reduce congestion and improve the operation of public transport vehicles.

## Modelling Future Travel

The year 2011 traffic model for this project remains to be developed. This model is intended to provide for tolls on City Link, increased public transport mode share and allowance for an Airport rail link. Analysis of the model output will assist in determining the need for and scope of any major improvements in the corridor.

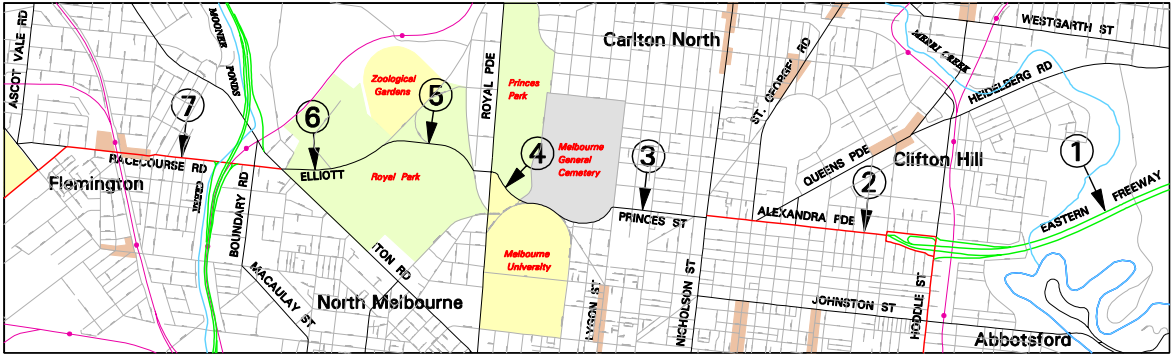
## Route Concepts – Short List

From the work undertaken to-date, three concepts appear to be worth further consideration. The Attached plans illustrate the concepts and suggested connections.

These concepts involve deep tunnels with an interchange at Eastern Freeway as suggested in the attached Figure 9. Twin two-lane tunnels have been assumed pending detailed traffic analysis.

- Concept 1 – a connection to City Link with a northerly orientated interchange at Brunswick Road, together with a tunnel connection to an intersection with Racecourse Road for southerly access to City Link and access to the local arterial road network. This arrangement is illustrated in Figure 1 attached. An indicative cost of this concept is \$1,050 million. Possible layouts of the concept are attached.
- Concept 2 – a connection to City Link with an intersection with Racecourse Road and Flemington Road that provides one-way flows though the area. This arrangement is illustrated in Figure 4 attached. An indicative cost of this concept is \$800 million. Possible layouts of the concept are attached.
- Concept 3 – tunnel connection to the edge of the CBD at Albert Street. An indicative cost of this concept is \$600 million. Possible layouts of the concept are attached.

The map below indicates the locations of the preliminary modelling results for the options shown in the table:



The traffic model for year 2000 has been used to provide an indication of traffic that would use the above concepts. The volumes are only indicative of the broad impacts that each of the concepts may have.

Traffic Projections (Yr 2000) in '000s								
	New Link	Site 7	Site 6	Site 5	Site 4	Site 3	Site 2	Site 1
Existing (99)	–	30	35	22	32	66	72	127
Yr 2000	–	29	34	20	27	43	66	126
Concept 1	87	31	57	12	18	24	48	146
Concept 2	63	31	63	16	20	27	51	140
Concept 3	60	28	26	18	26	42	57	138

## Conclusions

The study has identified that there are concepts for connecting City Link and the Eastern Freeway especially via a deep tunnel.

The opportunities to provide interchanges at City Link are limited and considerable further work is required to develop options that may be acceptable.

At the Eastern Freeway there is greater scope to develop interchange arrangements. Further work is required to develop the concepts and to ensure that they could be constructed under traffic.

Concepts that provide for shallow tunnels along Alexandra Parade would require significant relocation of utilities, including a major drain. There would also be considerable disruption during construction. An interchange at Nicholson Street would place considerable additional traffic onto Nicholson street, which has very limited scope to take this traffic within the existing reservation.

Concepts that include a direct tunnel link to the CBD appear to be worth further consideration.

Further analysis of the traffic models is required to gain a greater understanding of the changing travel patterns from the introduction of City Link.

Summary.doc  
27/10/99



The following sketches are attached:

- Northern City Corridor – Generic view of Concept 1
- Northern City Corridor – Generic view of Concept 2
- Northern City Corridor – Generic view of Concept 3
- Concept 1 – Link from City Link to Eastern Freeway via a deep tunnel
- Concept 2 – Link from City Link to Eastern Freeway via a deep tunnel
- Concept 3 – Link from Albert Street to Eastern Freeway via a deep tunnel
- Interchange Concept at Brunswick Road – Fig 1
- Interchange Concept at Flemington Road / Racecourse Road – Fig 4
- Interchange Concept at Albert Street – Fig 14
- Interchange Concept at Eastern Freeway – Fig 9.