

# The University of Sydney



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From Dr John Goldberg  
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Ms Rachel Simpson  
Committee Director  
Joint Parliamentary Select Committee on the Cross City Tunnel  
Parliament House  
Macquarie Street  
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23 January 2006

Dear Ms Simpson,

## **OUTSTANDING ISSUES IN CONNECTION WITH MY APPEARANCE BEFORE THE COMMITTEE ON 9 DECEMBER 2005.**

Please find enclosed the following documents in relation to the above..

1. The delegate list to the 28<sup>th</sup> Australian Transport Research Forum '05.
2. A supplementary submission on the matter of the Internal Rate of Return of the Cross City Tunnel equity investment.
3. Correspondence between the undersigned and Price Waterhouse Coopers.

Item (3) is provided to the Committee on the strict understanding that it will not be circulated outside the committee membership.

Please acknowledge receipt of this material.

Yours sincerely,



28<sup>th</sup> Australasian Transport Research Forum  
*'Transporting the Future: Transport in a Changing Environment'*

28 - 30 September, 2005  
Sofitel Wentworth Sydney

## **DELEGATE LIST**

The Conference Managers have excluded delegates who have withheld permission to publish their details in accordance with the Privacy Act. This list is current as at 21 September 2005.

**28th Australasian Transport Research Forum**  
**28 - 30 September 2005**  
**Sydney, Australia**  
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# 28th Australasian Transport Research Forum

28 - 30 September 2005

Sydney, Australia

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### **CROSS CITY TUNNEL: Internal Rate of Return (IRR) on Equity Investment.**

This analysis was prepared on notice at the request of the Parliamentary Select Committee on the Cross City Tunnel.

In Figure 2 of the author's submission to the Select Committee (dated 9 December 2005), it is shown that if the equity dividends as specified in the model are paid, then for most of the concession period, the net financial balance of the CCT project is negative except for the final three years.

However, there is no evidence given in the model that the real economic or present value of the financial quantities involved has been used. To quote Samuelson (1989)<sup>1</sup>:

*"The main thing to remember about present value is that future payments are worth less than current payments—they are discounted relative to the present. Why are future payments discounted? Because a positive interest rate means that today's dollars will become more valuable in the future; hence future payments are worth less now, just as a distant building looks tiny".*

To take the argument a step further, it is evident that the Deutsche Bank had used an average interest rate<sup>2</sup> of about 8.7% per annum over most of the concession period in calculating the cost of debt servicing. This value appears to be concordant with a three year average for large business loans specified by the Reserve Bank of Australia. However, it is difficult to see that this interest rate will be maintained at such a level over the long CCT concession period. Nevertheless, in the argument that follows this value with its inbuilt bias has been accepted and used as a "hurdle rate". The project overall must show a positive rate of return at least equal to this rate, implying a positive present value.

Figure 2 shows that the present value of the financial balance when discounted at the hurdle rate of 8.7% pa is always negative. In other words the project, if dividends are paid, cannot produce a positive rate of return.

If one now extracts the equity dividends used in the above calculation and calculates their present values, the accompanying graph shows the

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<sup>1</sup> Samuelson, P and Nordhaus, W. (1989) Economics (McGraw Hill) page 733-734.

<sup>2</sup> This interest rate is substantially higher than the CCM 2001 "blended interest rates" of 6.15 %pa (post completion) and term interest rate of 5.8 %pa mentioned in the document carrying the name of Julieta Legaspi –Economic Services 86173. Such interest rates would appear to be consistent with a higher internal rate of return to equity investors of 16%pa, an essentially unattainable outcome.



marked differences between the undiscounted and discounted dividend values.

To obtain the corresponding internal rates of return for the two sets of equity dividends, we note that an amount  $E = \$405.063$  has been invested and is divided among three investors in the proportions 20%: 50%:30%. Two of these investors are stated to be superannuation funds.

The internal rate of return (IRR) is that rate that makes the present value of the series of equity dividends equal to the original equity investment. It is not to be confused with the "hurdle rate" or discount rate described above. The term is confined to considerations of equity amounts only.

For example, over a successive two years, if the dividends in each year are  $D_1$  and  $D_2$  respectively, the IRR is calculated from the equation<sup>3</sup>:

$$E = D_1 / (1 + IRR) + D_2 / (1 + IRR)^2,$$

It is obvious that calculation of IRR becomes a major mathematical task when the number of dividend-paying years becomes very large as in the CCT model. However, specialised computer software has enabled the results to be rapidly obtained numerically.

The two bars in the accompanying figure labelled IRR and IRRd show that the internal rate of return for equity are respectively 9.8% and 1% respectively.

But are these magnitudes meaningful?

If we refer back to Figure 2 of the author's submission, the corresponding traffic volumes necessary to produce such a financial outcome are so large that they must be classed as artefacts not related in any way to those derived by the interaction of transport and land use as properly dealt with in the EIS by Masson, Wilson Twomey..

### **Derivation of traffic forecasts**

In response to a question raised by a member of the committee as to how the traffic forecasts were derived, the following example is provided. We shall take the traffic in the half-yearly period 66 at the end of the concession period. The necessary revenue data for the tunnel traffic appear at the first two lines of page 27 of 54 and are reproduced in the table below. The reader should bear in mind that we are dealing with data relevant to a half yearly period,

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<sup>3</sup> Ross, Sheldon M. (1999) An introduction to mathematical finance. (Cambridge) Section 4.3 "Rate of return". Equation 4.2

Toll revenue (east flowing traffic) TRevE	\$57.002m
Toll revenue (west flowing traffic) TRevW	\$68.560m
Toll (for East and West) T	\$3.49
TRAF E = $TrevE \times 10^6 / (T \times 182.5)$	89,496 Av daily traffic
TRAF W = $TrevW \times 10^6 / (T \times 182.5)$	107,548 Av daily traffic
Total traffic in the period 66	197,044 vehicles per day

Such a large traffic volume is consistent with the work back principle explained in the author's original submission. The omission of such extraordinary traffic figures would tend to disguise the improper nature of the CCT Base Case model.

There is additional revenue arising from the traffic using Sir John Young Crescent, which would increase the overall revenue by 16%. This revenue is included in the financial analyses derived in the author's submission and this addendum on internal rate of return.

What then is the future financial outlook for the CCT?

This potentially adverse situation in which there will never be sufficient revenue to discharge all financial obligations has arisen before. It has been "solved" by some toll road operators such as Transurban by simply increasing the project debt out of which dividends are paid<sup>4</sup>.

What will be observed in all probability is that CCT Motorway will attribute the financial plight of the project to insufficient traffic, whereas the company's own financial model shows that even if the unattainable traffic projections, obtained by work back, were to be achieved it would still not be financially viable.

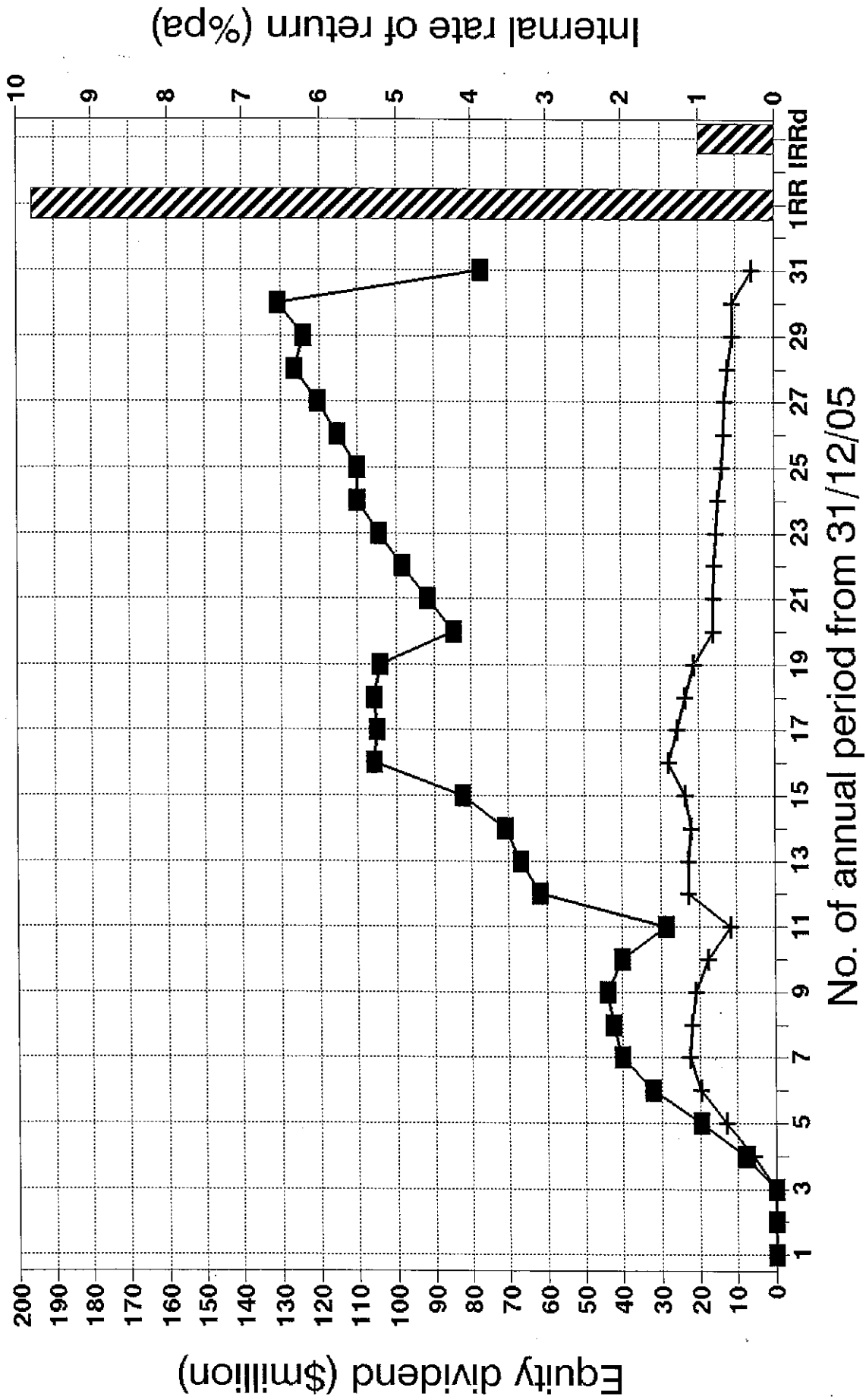
John L Goldberg

23 January 2006

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<sup>4</sup> See the author's letter of 6 November 2005, in reply to that of Price Waterhouse Coopers, both of which are enclosed with this submission. The graph on page 5 clearly shows the large increase in the long-term debt, completely at variance with that claimed in the Melbourne City Link Prospectus.

# CCT Internal Rate of Return Base Case Model(31/12/05 to 30/6/36)



Equity dividends
  Eq.div disc @8.7%pa