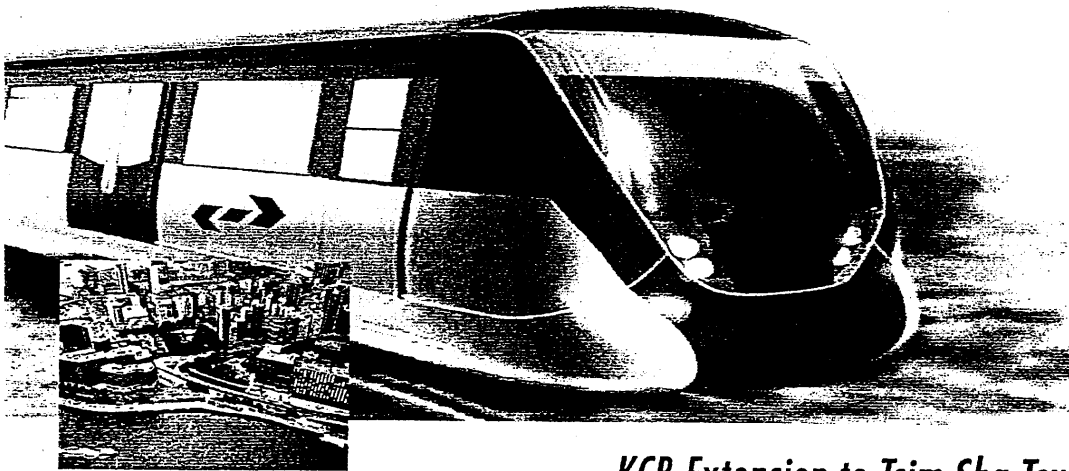


Financial Study



*KCR Extension to Tsim Sha Tsui
Ma On Shan to Tai Wai*

Kowloon-Canton Railway Corporation
July 1999



KCR
九廣鐵路



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1. INTRODUCTION

The Ma On Shan to Tai Wai rail link (MOS Rail) and the extension of the Kowloon-Canton Railway from Hung Hom to Tsim Sha Tsui (TST Extension) together form one of the three high-priority projects recommended in the 1994 Railway Development Study.

On 9 December 1997, following an Executive Council decision, the Government invited the Corporation to submit detailed proposals to undertake the MOS Rail and TST Extension as a package.

In June 1998, the Corporation completed a financial feasibility study, and the major findings, updated after agreement with the Government regarding funding of the project, are set out as follows.

2. DATA AND ASSUMPTIONS USED IN THE FINANCIAL PROJECTIONS FOR THE MOS RAIL AND TST EXTENSION

2.1 Capital Cost

2.1.1 Background

The preliminary engineering design work was undertaken by external consultants led by KCRC staff, with engineering sections providing input for railway systems and operational requirements. The preliminary design work was completed, and in parallel the design consultant and a cost consultant each derived separate cost estimates. These separate estimates were then reconciled to provide the agreed cost estimate for the Financial Study. It follows that the basis of the design from which these costs have been derived is preliminary, and the contingency included in the estimate provides for further development of the design.

The capital cost, excluding financing cost, as it currently stands, is estimated to be \$13,490 million at January 1998 prices, or \$15,118 million in MOD, broken down as follows-

**Table 2.1 : MOS Rail and TST Extension Capital Cost Estimate
(Consolidated)
(\$ million)**

Description	Jan-98 prices	MOD
Line Segments	3,011	3,266
Stations	2,868	3,187
Depot	462	517
Systemwide E&M	2,000	2,319
Rolling Stock	1,170	1,372
Miscellaneous	503	562
Sub-total	10,014	11,223
Design Development/Detailed Design	1,002	1,122
Project Management	803	898
Contingency	1,034	1,142
Land Costs	481	534
Pre-operating Costs	156	199
Total	13,490	15,118

Note

All financial projections for MOS Rail and TST Extension, assume construction commencing during year 2000 and commencement of revenue operations during year 2004.

2.1.2 Capital Cost Estimate : Background and Assumptions**(a) Line Segments**

This relates to the civil engineering cost for the rail alignment. This is essentially viaduct for MOS Rail and tunnel for TST Extension.

(b) Tai Wai Depot

The Tai Wai Depot will provide train stabling and maintenance facilities for the MOS Rail.

(c) Systemwide E&M

This relates to the permanent way, the power supply, signaling, communication and ticketing systems.

(d) Rolling Stock

The number of electric multiple units (EMUs) required was determined by a comprehensive study undertaken by KCRC's Railways Systems group. The estimate for MOS Rail includes the cost of twenty units of 4 car EMUs. Two locomotives have been included for shunting and maintenance.

No additional passenger rolling stock is required for TST Extension. However, one locomotive for maintenance / engineering train has been provided. Modifications to East Rail's existing twenty-nine units of 12 car EMUs are required, to ensure that a two and a half minute service can be achieved after the extension of the line to Tsim Sha Tsui.

(e) Miscellaneous

This includes ancillary buildings such as plantrooms, traction feeder stations, systemwide modifications and geotechnical investigation. This also includes provision for 8-car train, bridge connections, utility diversion, secondary glazing and air-conditioning, roadworks, playground reinstatement,

landscaping, site modification, regrading, footbridge and slope protection works.

(f) Design Development and Detailed Design

Design development and detailed design has been allowed at 10% of the sub-total capital costs, taking into consideration the current stage of design.

(g) Project Management

Project management is provided at 8% of the sub-total capital costs.

(h) Contingency

Contingency is provided at about 10% of the sub-total capital costs.

(i) Pre-operating Costs

The estimated pre-operating costs are shown in Table 2.2. It is assumed that the operations staff team will be gradually built-up from 2003, with a full team in place for commissioning and railway opening during 2004.

**Table 2.2 : Pre-operating Costs
(\$ million, MOD)**

	1999	2000	2001	2002	2003	2004	Total
Staff Costs	-	-	1	8	9	76	94
Energy Costs	-	-	-	-	1	15	16
Others *	8	9	9	11	21	31	89
Total	8	9	10	19	31	122	199

* include fitting-out, supplies, repair and maintenance costs

2.2 Financing Cost

At an assumed interest rate of 10% p.a., the financing cost is estimated to be \$1.2 billion (MOD), making a total project cost of \$16.3 billion (MOD).

2.3 Costs Excluded from the Capital Cost Estimate

The estimate excludes the cost of the subway link between MTRC and KCRC Tsim Sha Tsui Stations, and the cost of such works as may be entrusted to the Corporation by the Government as transport interchange facilities. Telecommunications capital costs are assumed to be met up front by companies which will be licenced to provide mobile telephone facilities.

2.4 Revenue Assumptions

2.4.1 Patronage Forecast

The patronage forecasts are generated using a territory-wide computerised transport model. This model recognises all forms of transport, such as rail, light bus, franchised bus, taxi, private cars, etc. The transport model was calibrated against the 1992 Travel Characteristics Survey, and was further validated against passenger and traffic flows in the public transport and road networks, observed during 1995. The model has been enhanced by sub-dividing the original study zones in the NENT and Ma On Shan areas into smaller zones, thereby improving the representation of the ER/MOS rail passenger catchment areas.

Input data to the model includes future planning assumptions, for example, socio-economic data, the different types of transport and corresponding networks, as well as the convenience of usage to the travellers. For MOS patronage forecasts, service characteristic such as fares, frequency, access to the MOS rail stations, connectivity with other systems, and competing forms of transport, were entered into the transport model.

A key variable in forecasting rail patronage, is the population and the related employment assumptions for those living within the rail catchment areas. For MOS Rail three cases are taken into account, the Base Case which assumes a total population in the Shatin and Ma On Shan Sectors of 697,000 in 2011, a Base ⁺¹ total population of 784,000, and the Base ⁺² case which assumes a higher total population of 802,000.

The total population assumptions drive the population in each of the MOS rail station catchment areas. Within most of the areas residents can easily walk to a MOS rail station. The catchment population assumptions are summarised in Table 2.3 below, and are shown diagrammatically in Annex 1. The 1996 Population By-census numbers are given in the table for reference purpose.

**Table 2.3 : 2011 Population Assumption
(in '000)**

MOS Rail Catchment Area	1996	2011		
	By-census	Base Case	Base ⁺¹	Base ⁺²
South East Shatin (4 Stations; STT, SKS, CIO and SHM)	190	201	235	235
Ma On Shan (4 stations; CHG, HEO, MOS and LEO)	140	216	247	265
Total	330	417	482	500

For the Base Case, Base ⁺¹ and Base ⁺² catchment area population assumptions in Table 2.3 above, the model has generated MOS rail patronage forecasts shown in Table 2.4 below. The equivalent Government Railway Development Study forecast, is shown for comparison.

**Table 2.4 : MOS Rail Daily Patronage Forecast
(in '000)**

Year	RDS High	RDS Low	KCRC Base Case	KCRC Base ⁺¹	KCRC Base ⁺²
2004	-	-	279	287	290
2006	344	298	282	308	317
2011	349	308	290	329	338

For TST Extension a patronage was derived from the transport model, using East Rail catchment area populations and fare levels, cross-boundary train services combined with MOS Rail patronage via East Rail. Passengers will be able to access Tsim Sha Tsui and MTRC cross-harbour services directly.

2.4.2 Fare Policy

The fundamental policy of KCRC is that the ERE will be an integral part of the East Rail system. Accordingly, the level of fares is distance based, and is determined having due regard to the competitive position of the railway in terms of speed of travel, convenience of connection to other modes of transport, as well as market affordability.

For the purpose of calculating revenue for financial projections, KCRC has assumed a base fare of \$8.2 (1997 prices) from Lee On to Tai

Wai. This fare level for a new railway is comparable to the fare over a similar distance on the MTRC.

2.4.3 Property Development Profits

The financial viability study includes profits of \$3,057 million in MOD to be generated from four property development sites along the MOS Rail as shown in Table 2.5 below.

**Table 2.5 : MOS Rail Property Development
(\$ million, MOD)**

Site	Anticipated year of completion	Profit to KCRC
Lee On	2005	903
Tai Wai Depot	2005-2007	928
Tai Wai Station	2006	927
Sha Tin Tau	2006	299
Total		3,057

Together with profits from two East Rail sites at Fo Tan and Ho Tung Lau, these will contribute to the KCRC's debt repayment and thus strengthen its financial position in the early years of East Rail Extensions operation.

2.5 Costs Assumptions

2.5.1 Operating Costs

The projected operating costs are based on current cost structures of East Rail where appropriate. Cash operating costs represent the costs for train operation, EMUs and station maintenance, cleaning, rates and Government rents, etc., for MOS Rail and TST Extension. The costs are projected based on the required train frequency, station design and system features, etc. Additional fixed overheads are avoided assuming MOS Rail and TST Extension is operated and maintained as part of the existing East Rail system.

2.5.2 Ongoing Capital Expenditure

This includes refurbishment and replacement of rolling stock and signaling equipment and steady-state capital expenditure. EMU refurbishment is assumed to take place after 15 years and replacement is based on a 30-year cycle. Replacement of other minor capital equipment is included as annual steady-state capital expenditure.

2.6 Financial Assumptions**2.6.1 Inflation**

The revenue and operating costs financial projections assume low inflation rates in the early years, rising to 5% per annum in 2002 and beyond.

2.6.2 Interest Rates

Interest rate for borrowings is assumed at 10.0% p.a.

2.6.3 Exchange Gain or Loss

No exchange gain or loss is assumed in the projections for the following reasons -

- (a) All major contracts are awarded in Hong Kong or US Dollars
- (b) Forward contracts and swaps are used to hedge exchange exposure arising from contract payments and borrowings as far as practicable.

2.6.4 Depreciation and Tax

Book depreciation of assets is calculated with reference to the rates in Table 2.6, which are consistent with KCRC accounting policy.

Table 2.6 : Depreciation Rates for Fixed Assets

<u>Asset Class</u>	<u>% per annum</u>
Land Formation	2%
Infrastructure (tunnel, bridges, roads)	1%
Buildings	2%
Rolling Stock (electrical)	3%
Rolling Stock (diesel)	3%
Lifts and Escalators	5%
Telecom and Signalling System	10%
Fare Collection System	20%
Other Plant and Equipment	10%

Tax depreciation on the assets of the extensions is calculated based on statutory tax allowances as follows:

- For civil works and buildings, an initial allowance of 20% and an annual allowance of 4% on a straight-line basis
- For plant and equipment, an initial allowance of 60% and an annual allowance of 10% to 30% on a reducing balance basis

Profits tax has been calculated at the rate of 16% on assessable income, the current rate applicable in Hong Kong.

2.6.5 Terminal Value

For the purpose of calculating the project internal rate of return (IRR), detailed cashflow projections are prepared up to 2037. From 2038 to 2123 (120 years after commencement of operation in 2004), a projected steady-state pre-tax cashflows is assumed, by extrapolating the operating cashflows at a rate of inflation minus 1% beyond 2037. A terminal value at year 2037 will be obtained by discounting all cashflows beyond 2037 with the project IRR.

3. FINANCIAL ANALYSIS

Three scenarios are developed in the financial analysis of the project. These scenarios, namely, the Base Case, the Base ⁺1 and Base ⁺2, are based on different patronage forecast as described in 2.4.1. All other assumptions remain the same in all scenarios. The project IRR and payback are calculated for each of the scenarios.

3.1 Project IRR

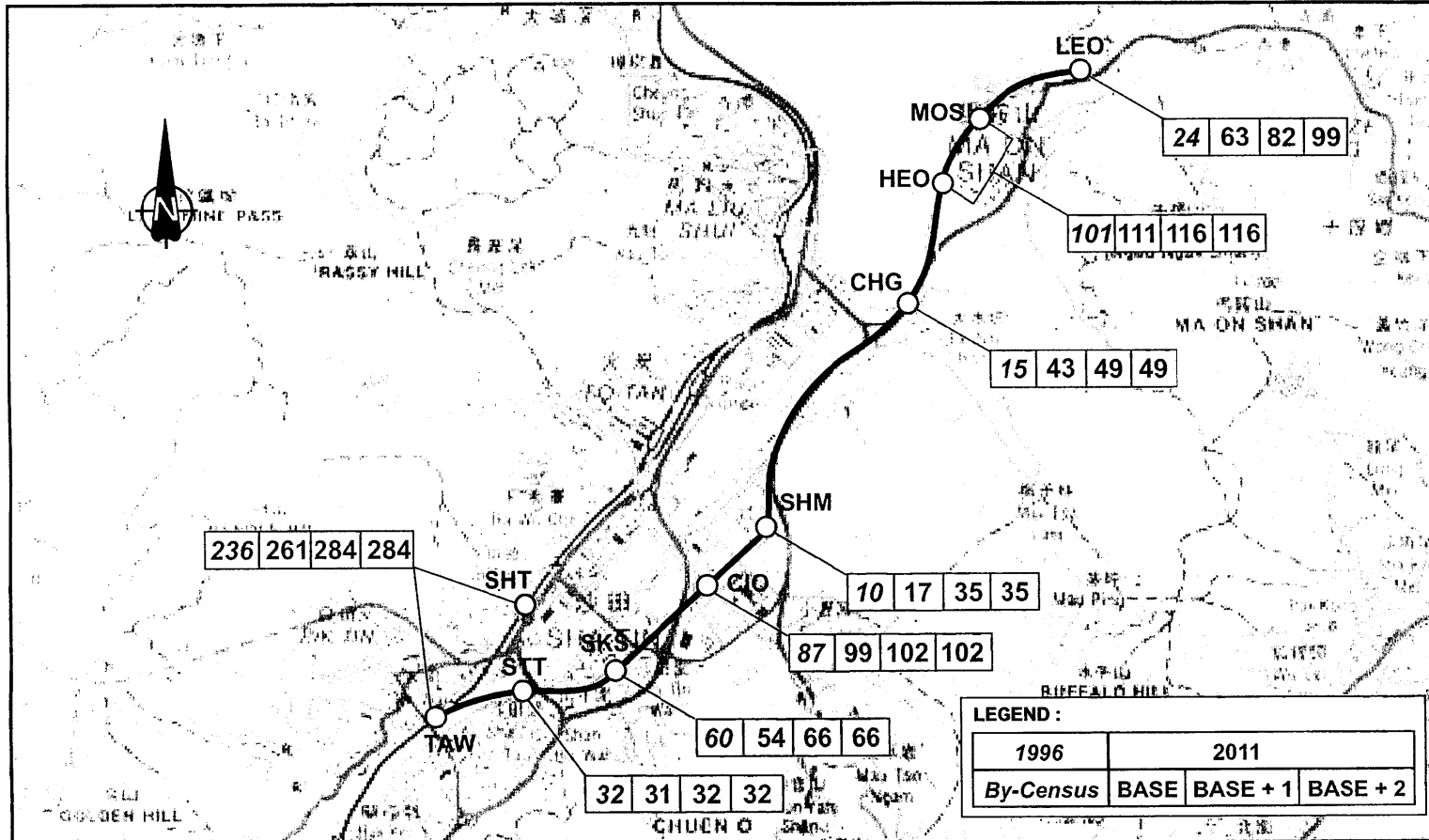
The resulting project IRR and payback year of the three scenarios are-

	<u>Base Case</u>	<u>Base ⁺1</u>	<u>Base ⁺2</u>
Project IRR	7.34%	8.16%	8.38%
Payback year	2022	2018	2017

4. FINANCING

4.1 Financing

Allowances have been built in the Corporation's financing model to allow it to adequately fund the construction of West Rail, Phase 1 and in situ improvement projects in East Rail and Light Rail to keep the systems modern, efficient and competitive. Based on these, and after discussions with the Government in June 1999, the Corporation agreed that the most cost-effective structure for the financing of this project is for the Government to inject an equity of \$8.5 billion into the Corporation. The Corporation will then borrow \$7.8 billion for this project which property development profits can help to repay.



Rev.	Description	Approved	Date

MOS RAIL ASSESSMENT

1996 BY-CENSUS, AND YEAR 2011 "BASE" "BASE + 1" AND "BASE + 2" POPULATION SCENARIOS ('000s)

Figure No.	1	Rev.	
Designed By	PIR	Scale	NTS
Checked By	MJR	Date	JUNE 1998



ANNEX 1

10282/800/W/M/F-1.CDR/LLH/5-5-98