JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)

DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS (DPWH)
THE REPUBLIC OF THE PHILIPPINES

No.

The Development of The Public-private Partnership Technique for The Metro Manila Urban Expressway Network

FINAL REPORT

SUMMARY

March 2003

ALMEC Corporation

NIPPON KOEI Co., Ltd.

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J. Yen 119.2 = US$ 1 = Philippine Peso 50.50
J. Yen 1 = Philippine Peso 0.4237
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PREFACE

In response to the request from the Government of the Republic of the Philippines, the Government of Japan decided to conduct a masterplan study of the Development of the Public-Private Partnership Technique for the Metro Manila Urban Expressway Network and entrusted the study to the Japan International Cooperation Agency (JICA).

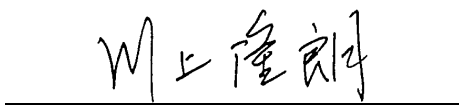
JICA selected and dispatched a study team consisting of ALMEC Corporation and NIPPON KOEI headed by Mr. Tetsuo Wakui of ALMEC Corporation to the Philippines from December 2001 to March 2003. In addition, JICA set up an advisory committee headed by Mr. Tadashi Okutani of the Ministry of Land, Infrastructure and Transport between December 2001 and March 2003, which examined the study from specialist and technical points of view.

The team made a careful review of past studies and experiences in urban expressway projects, conducted transportation demand forecast and economic/financial analyses; and, through a series of discussions with the officials concerned of the Government of the Philippines, reached the conclusions in this final report.

I hope that this report will contribute to the improvement of traffic conditions in the Metropolitan Region through acceleration of urban expressway network development.

Finally, I wish to express my sincere appreciation to the officials concerned of the Government of the Philippines for their close cooperation extended to the study team.

March 2003



Takao Kawakami
President
Japan International Cooperation Agency

March 2003

Mr. Takao Kawakami
President
Japan International Cooperation Agency

Letter of Transmittal

Dear Sir,

We are pleased to formally submit herewith the final report of "The Development of the Public-Private Partnership Technique for the Metro Manila Urban Expressway Network".

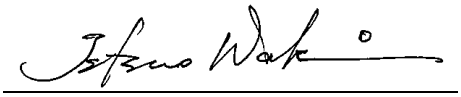
This report compiles the results of the study which was undertaken both in the Philippines and Japan, jointly by the study team organized by ALMEC Corporation & Nippon Koei and the Philippine Counterpart Team, from December 2001 to March 2003.

We owed a lot to many people for the accomplishment of this report. First, we would like to express our sincere appreciation to all those who extended their kind assistance and cooperation to the study team, in particular, the BOT Project Management Office of the Department of Public Works and Highways.

We also acknowledge the officials of your agencies, especially the members of the Steering Committee, the JICA Advisory Committee and the Embassy of Japan in the Philippines for their valuable advice and cooperation given to us throughout the course of the study.

We wish the report would contribute to development of the Metro Manila urban expressway network to solve traffic problems in the National Capital Region.

Very truly yours,



Tetsuo Wakui
Team Leader,
The Study Team for the Development
of the Public-Private Partnership
Technique for the Metro Manila Urban
Expressway Network

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ACRONYMS

AVC	Automated Vehicle Classification
AVI	Automated Vehicle Identification
BOT	Build-Operate-Transfer
BTO	Build-Transfer-Operate
CCTV	Closed Circuit Television
CMMTC	Citra Metro Manila Tollways Corporation
CPI	Consumer Price Index
DSRC	Dedicated Short Range Communication
DBFO	Design-Build-Finance-Operate
DPWH	Department of Public Works and Highways
DSRC	Dedicated Short Range Communication Standard
EIRR	Economic Internal Rate of Return
EIA	Environmental Impact Assessment
ETC	Electronic Toll Collection
FCA	Foreign Currency Adjustment
FIRR	Financial Internal Rate of Return
IC	Independent Consultant
IRR	Implementing Rules and Regulations
JICA	Japan International Cooperation Agency
LBCR	Laguna de Bay Coastal Road
LGU	Local Government Unit
MBE	Manila Bay Expressway
MCTE	Manila-Cavite Toll Expressway
MMUEN	Metro Manila Urban Expressway Network
MMUES	Metro Manila Urban Expressway System Study
MMUTIS	Metro Manila Urban Transportation Integration Study
MNT	Manila North Tollway
MNTC	Manila North Tollways Corporation
MSOM	Minimum Standards for Operation and Maintenance
NAIA	Ninoy Aquino International Airport
NLE	North Luzon Expressway
NPV	Net Present Value
OBU	On-board Unit
OD	Origin-Destination
Pasex	Pasig Expressway
PCU	Passenger Car Unit
PNCC	Philippine National Construction Corporation
PPP	Public-Private Partnership
PSP	Private Sector Participation
RCS	Road Communication Standard
ROW	Right of Way
RSU	Roadside Unit
SLE	South Luzon Expressway
TCA	Toll Concession Agreement
TCR	Target Cumulative Revenue
TIS	Traffic Information System
TOA	Toll Operation Agreement
TOC	Toll Operation Certificate
TOMMP	Toll Operation and Maintenance Manual and Procedures
TRB	Toll Regulatory Board
TTC	Travel Time Cost
URPO	Urban Road Planning Office
VOC	Vehicle Operating Cost

EXECUTIVE SUMMARY

Study Objectives and Background

The urban expressway network master plan of Metro Manila was formulated in 1993, by the Metro Manila Urban Expressway System Study (MMUES, JICA). In 1999, the Metro Manila Urban Transportation Integrated Study (MMUTIS, JICA) refined the MMUES network as part of an integrated transportation master plan. MMUTIS emphasized the importance of public-private partnership (PPP), recognizing the lack of financial capability of the government to bankroll infrastructure development. The Philippine Medium Term Development Plan, as well, encouraged the use of PPP to develop urban expressways and further encouraged the promotion multiplicity of private expressway operators without sacrificing network integration.

The BOT Law was enacted in 1993 to pave the way for private sector participation in endeavors previously primarily reserved for the government, such as urban expressway operation and development. Since its enactment, more than 12 urban expressway projects for Metro Manila have been mooted but only four have been realized. The last decade of experience in implementing urban expressways through PPP has been besieged with many problems – leading to the present stagnation in the development of Metro Manila's much needed urban expressway network. It is therefore urgent to study and review the current situation and past experiences in urban expressway development through PPP to identify problem areas and to recommend suitable countermeasures.

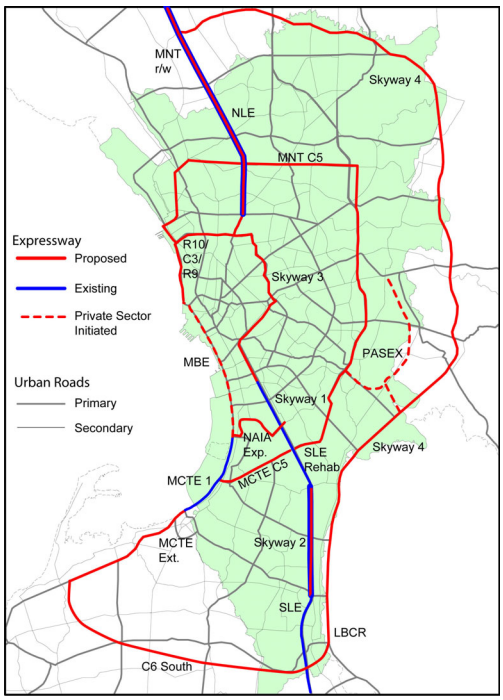
This study's objective is as follows: (1) to establish the strategic arrangement for optimum PPP technique for the Metro Manila Urban Expressway Network (MMUEN); (2) to formulate the basic framework for integrated and network-based management and operation of the MMUEN; (3) conduct a case study on the R10/C3/R9 expressway based on the framework recommended by the Study; and, (4) facilitate technology transfer.

The Metro Manila Urban Expressway Network (MMUEN)

The MMUEN and its implementation schedule were formulated based on consultation meetings with various government agencies and a review of relevant documents. The MMUEN is not a new expressway master plan; rather, it is an assumption of the future expressway network. The MMUEN is composed of 19 projects, including 4 existing projects and 15 proposed projects (13 solicited projects and 2 unsolicited projects). The existing components and 7 of the proposed components of MMUEN are under the legal mandate of MNTC, CMMTC, PNCC or PEATC.

【Project Cost】

Including only projects that are either committed or seriously proposed (13 projects), the MMUEN would require an average annual disbursement of Php 12 billion for the next 14 years. Project costs of MMUEN components vary considerably. On a per kilometer basis, Manila Bay Expressway is the most expensive due to its tunnel sections at around Php 2.5 billion/km. Unit construction cost varies, around Php 800~1,800 million/km for elevated expressways, Php 100~500 million/km for at-grade expressways and only around Php 40 million/km for rehabilitation and widening projects.



【Toll Rate】

The appropriate toll rate for the MMUEN was determined on the basis of revenue maximization and reasonableness to the expressway users. In 2010, the revenue maximizing toll rate is Php 6/km, but the reasonable toll rate from the viewpoint of expressway users is determined to be only Php 4/km. Thus, it is recommended by this study to adopt a base toll rate of Php 4/km for MMUEN.

【Demand Characteristics】

Using the recommended toll rate of Php 4/km, the future demand for the MMUEN was estimated. The MMUEN as a network will cater to around 1.4 million Passenger Car Units (PCU) per day in 2010 and by 2020, most of the MMUEN components will be operating in full capacity. Patronage per MMUEN component varies from 40,000 to 270,000 PCU/day in 2010. The effect of the configuration of the network to demand was investigated and it was found that the demand for some components is highly sensitive to the existence or non-existence of other components. It was also determined that on average 70% of MMUEN users will cross a boundary of two contiguous component.

【Financial Characteristics】

Overall, the MMUEN is financially unviable at only 8.9% FIRR. To achieve a marginally attractive FIRR of 15%, the government would have to shoulder 50% of project cost. If the two unsolicited proposals – Manila Bay Expressway and Pasig Expressway – are excluded, FIRR will improve to 11.5%, thereby reducing the needed government subsidy to 33% of project cost. If the government shoulders ROW cost, the financial viability would not improve significantly. Owing to the variability of unit construction cost and demand per component, the FIRR per component varies from 1.1% to 48.6%, with only 4 of the 15 proposed components considered to be financially viable (FIRR > 15%) – Manila Cavite Toll Expressway Extension, Manila North Tollway Rehabilitation, Manila North Tollway C5-Segment, and C5 Expressway.

【Key Characteristics of MMUEN】

Several key characteristics of MMUEN are noted that are very relevant to its development, management and operation through PPP. First, the MMUEN as a whole is not financially viable and that government support of up to 50% of projects cost would be necessary. Second, MMUEN's financial viability varies across components, which means that some links will be more profitable than others – assuming a uniform toll rate of 4P/km. Third, the demand, thus the revenue stream of several components would be significantly (positively or negatively) affected by the development (or non-development) of other links – thus some components financial viability will be highly uncertain as it will depend on the implementation schedule of MMUEN, which is not clearly defined. Fourth, once the MMUEN is substantially completed many users will be crossing the boundary of two contiguous components which may not be operated by the same proponent. Thus, it is important to integrate the toll collection system and traffic information system for efficient and seamless operation. Fifth, MMUEN will be managed by different proponents and without coordination and cooperation many tasks in managing the network will be duplicative and cost inefficient.

Review of PPP in the Development of Expressways in Metro Manila

【Institutional Issues】

It is a natural offshoot of DPWH responsibilities to assume greater involvement during the planning and engineering stages of the project development process and to hand over the supervision and regulation during the operations stage to the TRB. Under a PPP scheme, the operation aspects of a tollway – e.g. toll level – needs to be decided at the onset to achieve financial closure. This moves the involvement of TRB further upstream of the project development process. Fundamental differences in stance of the two agencies on key issues of tollway development create confusion leading to protracted negotiations with private proponents. To resolve the conflicting views, both DPWH and TRB became signatories on the Concession Contract. This may have provided some comfort to investors and lenders, but is also created a regulatory dilemma – where TRB is asked to adjudicate on a contract in which it is a signatory.

PPP projects turned out to be more complex than previously thought by the government personnel who had been hewn and nurtured in the traditional mode of project implementation. This lack of expertise and understanding of the business mindset became palpable during contract negotiations and the quality of project preparation and network planning. Consequently the PPP process either got protracted, or the government ended up assuming more contingent risks than it could handle.

【Right-of-Way (ROW) Acquisition】

The responsibility for ROW acquisitions falls squarely on the government because of its power of eminent domain. However, the track record of the DPWH and the TRB in this regard has been egregious. Lack of funding is often blamed for the delay. More than

funding, the convoluted procedures involved in ROW acquisition (which often shifted the burden to the overloaded judicial courts) are major impediments. The lack of confidence of investors in the ability of the government to acquire ROW in a timely manner has delayed and even cancelled financial closure in several projects.

【Political Intervention in Toll Rate Hikes】

The TRB, despite being a signatory to automatic toll adjustment in toll rates, have been unable to shake off the dicta of public hearings before allowing any adjustment in toll rates. Political intervention against increase of toll levels has either put some expressways in a financially unsustainable condition or increased the uncertainty that investments in tollway will be recouped, thereby lowering investor's confidence.

【Lack of an Appropriate Funding Source】

Domestic capital market is inadequate in supporting the cash flow profile of tollway investment – i.e. high initial cost and long financial recovery periods. This has led investors to seek capital from foreign markets, and this meant that the financing terms of loans would reflect prevailing international sentiment about the high country risk of Philippines, the most significant of which is currency devaluation risk. As a result, reaching financial closure has been more turned out to be more lengthy and difficult than previously anticipated.

Fine Tuning PPP for the Development of MMUEN

This Study, found that PPP implementation in Philippines is not all bad, as evidenced by the several projects that have been implemented. Several past PPP practices in the Philippines are recommended to be retained for MMUEN implementation. First is the use of the BTO structure (practically used in all four existing toll concession contracts). The BTO scheme, clarifies the issue of property taxation from LGUs. Also, under the BTO scheme the government is shielded from market risk, which under the present budgeting scheme, DPWH would not be able to feasibly honor contingent liabilities in a timely manner. Second, the use of the automatic toll rate adjustment clearly defines how and when toll rates will be adjusted and this has lessened anxieties in toll rate increase. Third, the Southern Tagalog Arterial Road (STAR) Model in government support, where government support is in the form of a capital grant which was procured through ODA source. With the infeasibility of other forms of government support, the STAR Model is the one of the practical and doable approach in providing government support.

There is however, recognizable need to introduce refinements to the current PPP approach to answer current problems and to meet the identified needs in developing the MMUEN.

【Enhancing Institutions and Institutional Processes】

- Joint venture (JV) schemes (with PNCC, PEA and BCDA) should be avoided. All projects should be coursed through the solicited approach of the BOT Law.

- The DPWH and the TRB have to present a coordinated and consistent front amid a tightening market and low appetite of lenders. To iron out the conflicting roles of TRB and DPWH, is for the Concession Agreement to be granted by DPWH as an authorization to build an expressway, but a Toll Operating Certificate must be secured from TRB as a prerequisite to toll way operation. This will put DPWH as the lead agency and will clarify the role of TRB as regulator.
- The role of PNCC should be defined. Also to avoid market distortions, the Office of the President should temper the ambitions of any GOCC in venturing into urban expressways.

【Enhancing Project Preparation and Marketing】

- Project preparation should be shifted from private proponents to the government planning agencies. The government should then have the full understanding of the project and unhindered access to information, which would help the government at the negotiation table.
- Due to the weakened appetite for PPP in the Asian region, marketing should be undertaken to get project in the radar map of many investors.
- The expertise gap within government institutions needs to be bridged. To address this problem promptly, it is practical to seek technical assistance (vis-à-vis capacity building) from ODA sources to undertake project studies, establish business case as well as the proper scale for projects, and put the project into competitive tender.

【Enhancing Project Economics】

- Government support should be lined up to improve viability of projects. Feasible forms of support are identified.
    - *First* is to leverage ODA funds with private capital. DPWH designs the project and secures ODA financing for its construction. Two competitive tenders are conducted: one for construction and the other for the concession to operate and maintain the tollway.
    - *Second* is a “two projects in one” approach. Similar to the first, and perhaps more acceptable to lenders, this scheme entails dividing the project into two: one section under the government and ODA funding, the other section under a BTO arrangement.
    - *Third* is to guarantee the balloon payment of project loans. In case ODA is not available, a guarantee on the balloon payment of up to 50% of loan values at the time maturity will have the effect of doubling the loan maturity period.

Though all three approaches are feasible, the two-in-one project approach is deemed more recommendable.

- It is recommended, that a endogenous concession period be used in lieu of a fixed period. A target cumulative revenue level can be adopted in determining expiry. In that way, the concession period can be shortened, if revenues are better than forecast; or lengthened, if the converse is true. The scheme also serves to protect the concessionaire against delays in toll rate adjustment. However, rewards for early completion should be stipulated. A practical suggestion is to exclude all revenues

earned due to early completion from the computation of cumulative revenues that goes with an endogenous concession period contract. Bidding under this scheme will be based on technical feasibility of proposals and the lowest cumulative revenue required.

- A stable source for ROW acquisition should be identified and secured. One suggestion is to impose a surcharge on existing components toll fee, the proceeds of which will accrue to a ROW fund. This however, may require new legislation.

【Enhancing the Concession Contract】

- In terms of toll rate setting, the concession contract should only lay out the principles of toll rate setting, but the actual and detailed formula should be left to the subsequent Toll Operation Certificate. This would allow the starting base rate be calculated from actual cost at completion of construction subjected to auditing.
- A cap on the foreign currency exchange rate adjustment should be introduced to discourage undue reliance on foreign loans.
- Grant of options for future phases or extensions should be time bound. The rights to operate subsequent extensions or phases should expire if financial closure is not secured within a pre-determined period of time.
- There should be more frequent, albeit incremental, adjustments in toll rates to avoid abrupt jumps that invite heavy opposition.

【Enhancing the Network Development】

- A proper master plan with clear priorities and ordering and schedule of projects must be established. This master plan needs to be broadly accepted and that it should not be substantially altered without any compelling reason. It is desirable if the master plan would have legislative foundation. A clear and unwavering master plan would coordinate and concentrate efforts in developing projects as well as minimize uncertainties. On the same vein, project proposals should be dealt with formally whether it is already declared ineligible or not – to avoid confusion on the direction of the expressway master plan.
- The government should look at long-term financing for the development of the network. As one section matures, its healthier cash flows should be made to support the construction of missing sections and to reduce differences in toll rates across the network. A global view should also aim towards cross-subsidy between toll roads and uniformity of toll rates.
- The government should look into the proper sequencing of projects and avoid situation where projects are in competition. The proposed endogenous concession contract could help in resolving the issue of compensation in case of competing projects as well as curtail windfall profits in case project revenues are significantly improved as a result of the construction of another project.
- Standards in operation and management should be clearly spelled out, to ensure inter-operability, such Electronic Toll Collection and Traffic Information System standards.
- As the network develops, tollway operators would have to be organized to capture efficiencies in scale of operation.

Efficient Network Management and Operation of MMUEN

The multi-operator nature of MMUEN necessitates the use of a more sophisticated operation and maintenance scheme. To attain cost savings through synergies between operators, the organizational and operational framework of MMUEN needs to be rationalized.

【Toll Collection System】

Each project proponent will independently establish the toll rate parameters of the Toll Operating Certificate. But if each project will set-up their own toll gate at every entrance and/or exit this will create serious congestion and bottlenecks. For the MMUEN to function seamlessly, users will only have to pay once. Tolls would then be escrowed and distributed to the proper project operator.

At the moment, the network is still not evident as projects are not yet interconnected. But once missing links are constructed such as NAIA Expressway and Skyway 3, it would then be necessary to redesign the toll collection system of existing projects to form a seamless network.

The most practical way to achieve a one-time payment system is the use of Electronic Toll Collection (ETC).

- For ETC-equipped vehicles, vehicles would use the network similarly to the E-pass system. However, sensors will be installed at junctions to detect the route taken by the vehicle. Route information will then be use to properly charge the user and to distribute toll receipts.
- For non-ETC equipped vehicles, vehicles would borrow an ETC tag upon entering the network. Sensors would then be able to track the route taken by the vehicle and the charge can be calculated as well as the appropriation of toll receipts. Upon exiting, the ETC tag would be returned and the toll fee paid at the toll gate counter.
- It is recommended that the cost and construction of the ETC system be borne by the proponent. However, to ensure compatibility standards should be established. Moreover, a toll clearance system would need to be established.

【Traffic Information System】

For the MMUEN to optimize its performance, relevant traffic information would need to be disseminated to motorists. For example, if an accident happens at a certain link, traffic should be re-routed from bottleneck sections thereby avoiding overloading bottleneck sections. This means that traffic information would have to be exchanged across systems designed, built and operated by different operators. Moreover, MMUEN information system should be able to link up with MMDA's traffic information system, to form a Metro-wide traffic information system. It is therefore important to ensure that standards in message formats and technical specifications are met to avoid confusion and technical incompatibilities.

【Expressway Operation and Maintenance】

There are cost savings that can be achieved if project proponent share resources in the operation and maintenance of the MMUEN. For example, patrol units can be shared. However, to ensure quality of construction, major repairs and rehabilitation should continue to be the responsibility of each operator.

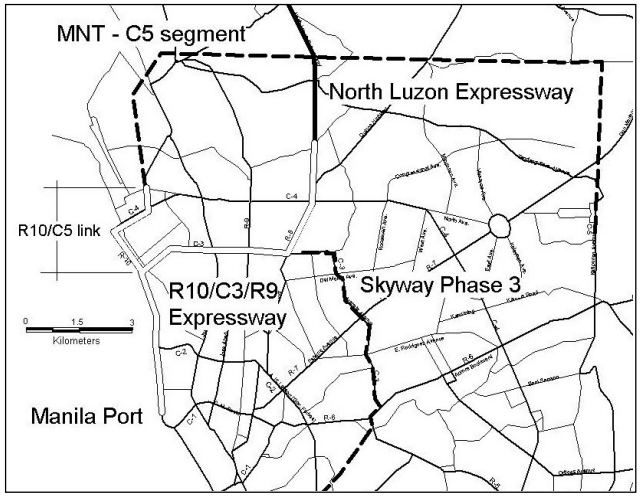
【Organization for Operation and Maintenance】

To operationalize an integrated network-wide system, an entity will have to be created or identified. However, at present, and until the different expressways become interconnected, there is no compelling need to consider new organizations. Based on anticipated implementation schedule, an urban expressway network would emerge only between 2006 and 2010. The need for a special purpose expressway organization should be felt once the Skyway 3, R10/C3/R9 Expressway and NAIA Expressway are completed. Before then, the demand would be for an organization within DPWH to manage and sustain the long-term development of the MMUEN.

R10/C3/R9 Expressway – A Case Study

【The R10/C3/R9 Expressway】

The R10/C3/R9 Expressway has been proposed by the MMUES and the MMUTIS to address the problems of accessibility of the city center, especially the Manila Port, to areas north of Manila via the R10 – C3 – A. Bonifacio alignment.



During the course of the Study, it was proposed to extend the R10 section to connect with the MNTC project Manila North Tollway C5 (MNT C5) segment. This extension is referred to as the R10/C5 Link. From hereon the R10/C3/R9 Expressway and the R10/C5 Link will be collectively referred to as the Case Study Expressway.

The main purpose of the case study is to examine the applicability of the proposed framework for PPP and the operation and management system to a selected expressway.

【Toll Rate】

The appropriate toll rate was examined from the basis of revenue maximization and reasonableness to the users. Annual revenue is maximized at Php 1,800 million in 2015 when the toll rate is Php 6/km. However, the reasonable toll rate from the viewpoint of expressway users in only Php 4/km. The reasonable toll rate will increase as traffic conditions worsen at the alternative ordinary roads worsens and the level of income of

people increase. The following toll rates are therefore recommended for the Case Study Expressway.

Year 2010 Php 4/km
Year 2015 Php 10 + 4/km
Year 2020 Php 20 + 4/km

【Demand】

Three scenarios are assumed: (Case 1) no other expressways will be developed except the Case Study Expressway; (Case 2) Case Study Expressway and the Skyway Stage 3 will be developed; and, (Case 3) Case Study Expressway and the MNT C5 will be developed. Under Case 1, patronage will be 55,900 pcu/day or 428,000 pcu-km/day in 2010 and will reach near capacity by 2020. Without the R10/C5 Link, demand will decrease by 25% (in terms of pcu-km) in 2010, but will gradually lessen to only 7% by 2020.

Under Case 2, the presence Skyway 3 will enhance the inland north-south corridor and will directly compete with the Case Study Expressway, which is essentially part of the coastal north-south corridor. Demand for the Case Study Expressway will decrease by almost half. On the other hand, the MNT-C5 will enhance the Case Study Expressway and will increase revenue by 20% in 2010, by 40% in 2015 and by 50% in 2020. It is therefore recommended to closely coordinate the development of the Case Study Expressway with these two projects.

【Project Cost】

Based on preliminary engineering designs, the project cost of the Case Study Expressway is estimated. The total project cost is Php 13.4 billion.

【Engineering Issues】

Preliminary engineering investigation of the Case Study Expressway revealed several important technical concerns.

- The C3-A. Bonifacio Intersection Improvement Project requires modification of the expressway alignment.
- MRT 3 extension from North Avenue to Monumento along EDSA will use the median of EDSA at the Balintawak Interchange. The expressway must secure the vertical clearance for MRT 3.
- The intersection of the PNR rail at C3 is a topographic low point and is therefore prone to flooding. The expressway design would have to take into consideration mitigation measures to alleviate flooding along this section.

Despite these engineering issues, the Case Study Expressway is technically feasible as long as the required ROW, especially along C3 and the junction of MNT-C5 and the R10/C5 Link, can be acquired.

【Environmental Issues】

Environmental screening was conducted on the Case Study Expressway and items identified for further study are the effect of community relocation as a result of ROW acquisition; effect of shifting of traffic; air pollution; community disruptions; wastes, noise and vibration due to construction; damage to street trees that have to be cut or replanted; change in urban landscape; and, the effect of the project on the former Smokey Mountain dumpsite. Based on environmental scoping, it was identified that resettlement issues would be critical for the Case Study Project. It is estimated that 62 formal households and 12,919 informal households would be directly affected by the project. It is estimated that the cost of resettlement and compensation would amount to Php 1.7 billion. However, it is assumed that the current efforts to widen the R10 and 5th Ave. (C3) segment will be concluded before the Case Study Expressway construction. Thus, resettlement costs are not included in the project cost.

【Economic and Financial Evaluation】

The project is considered to be economically justifiable. The Case Study Expressway has an EIRR of 27.5%, greater than the 15% hurdle rate. If only the C3/R9 section is built, the EIRR is 24.4% and if only the R10+R10/C5 section is built the EIRR is 25.4%. The economic analysis shows that the Case Study Expressway and its components are very robust in terms of economic viability.

Financially, the Case Study Expressway can only muster an FIRR of only 10.7% (excluding ROW cost). If the government provides financial support of 50% of project cost, the FIRR will improve to 16.8%, an FIRR level attractive enough to attract serious investors. To implement the Case Study Expressway through PPP, the government has to provide a certain level of financial support.

【Financing Scheme】

Several financing options and project configurations were mooted and analyzed, including bankrolling the project through government funds, several modifications of the Case Study expressway and combinations with the Skyway 3. It was concluded that the most appropriate scheme is that the private sector undertakes the R10 + R10/C5 Link section and the government will implement the C3/R9 section. After completion of the C3/R9 section, the operation rights as well as the right to collect tolls from the C3/R9 section will be given to the private sector. Under this scheme, the FIRR is viable at 16.5%. The government will cover nearly 50% of project cost. The equity IRR is however rather low at 13.0, mainly due to corporate tax. Thus some tax perks may be needed to attract more investors. If investors are exempted from corporate tax, the equity IRR will improve to 15.5%.

【Key Features of the Proposed Concession Contract】

A draft concession contract is prepared for the Case Study Expressway with the following key features:

- BTO scheme
- Completion risk for the C3/R9 section will be borne by the government while that of the R10 + R10/C5 section will be borne by the private sector
- Winning bidder will be given 12 months to secure financial closure, beyond which the concession may be cancelled and the performance bond and bid bond forfeited
- An endogenous concession period will be used
- And indicative rate to be used for bidding is Php 4/km, average for all vehicle class. The actual base rate will be recalculated depending on the out turn project cost.
- The target cumulative revenue shall be the bid price, as adjusted upon completion – but adjustments shall be limited to price escalation and design changes requested by DPWH.
- The base fare rate shall be subject to periodic adjustment. However, the concessionaire is free to charge lower rates and settle for a longer concession period.
- A closed toll collection system is recommended, combined with ETC and information systems compatible with interconnected expressways such as NLE, MNT-C5 and Skyway.
- The following incentives would accrue to the concessionaire:
  - Right to repatriate proceeds of investment
  - Income tax holiday for six years from commencement of operation
  - Tax and duty exemption on imported capital equipment
  - Tax credit on domestic capital equipment
  - Exemption from Contractor's Tax
- Liabilities for the two sections shall accrue to the respective responsible party. Repairs arising from damage to the entire Case Study Expressway shall be borne by the concessionaire, but if the damage is on the C3/R9 section, cost for repairs will be added to the target revenue total.
- Concession fee at 2% of the annual budget shall be charged for repairs and maintenance
- Title and ownership of the R10 + R10/C5 section shall be transferred to the government upon completion, except for toll collection equipment and systems which shall remain with the project company.
- Property insurance shall be treated as part of operating expenses

【Bidding and Implementation】

Bidding documents were prepared for the Case Study Expressway with key features as follows:

- The C3/R9 section will be tendered based on the lowest most responsive construction cost bid. The concessionaire for the R10 + R10/C5 section shall be chosen by bidding for the lowest target cumulative revenue. The target cumulative revenue would provide capital recovery for the design and construction of the R10 + R10/C5 section and the

toll operation equipment and facilities, inclusive of profits and financial charges based on a base toll fee of Php 4/km.

- The two sections will have two construction managers, each answerable to the respective responsible party. Necessarily, a coordination mechanism and information-sharing arrangement has to be set up between these two groups. In addition, an independent engineer ought to be employed to ensure quality as well as integration for both sections.
- Cost and responsibility for ROW and resettlement shall be borne by the government. Bidding for R10 + R10/C5 section shall only commence after substantial progress on ROW acquisition.
- Tendering for both sections should be cautiously coordinated to synchronize the completion dates of both sections. The C3/R9 shall have a head start to provide comfort to lenders of the R10 + R10/C5 section.

Key Recommendations

Problem areas in the development of urban expressways through PPP in Metro Manila can be categorized into institutional issues; planning issues; financing issues; and ROW issues. Based on these and the basic features of the MMUEN, a PPP framework is proposed, with the following features:

- Improved and substantial project preparation and network planning by the DPWH through ODA technical assistance
- Develop a well defined urban expressway master plan with clear priorities and timetables – that is not easily altered without any compelling reason
- Clear delineation of the roles of DPWH and TRB, with DPWH being the sole initiator of urban expressway projects
- All projects should be coursed through the Solicited Approach of the BOT Law
- Recommended forms of government support schemes are:
  - Leveraging ODA funds with private capital
  - Government support through capital grants and cross-subsidies across two projects through a “two projects in one” scheme
  - Guaranteeing balloon payment of project loans to extend the effective repayment period of loans
- Use of a BTO contract with an endogenous concession period
- A stable funding source for ROW acquisition be identified – a recommendation is to impose a toll surcharge on existing expressways for a ROW Acquisition Fund
- Time bound limits to financial closure
- Uniform toll rates across the network

To ensure the seamless and efficient operation of the MMUEN, the following framework for operation and maintenance is recommended:

- One time payment system for MMUEN users using an ETC based toll collection system and a toll revenue clearance system
- Integrated traffic information system (TIS)
- Formulation of tollway operation standards, including standards for ETC and TIS
- Coordinated tollway operation and maintenance system, wherein several operators are sharing resources
- Creation of a single organization unit to undertake routine operation and maintenance activities

An Action Program is proposed to provide a schedule of what needs to be done. The following are considered to be the most urgent.

- A necessary first step is for the government to forge a consensus on what the expressway network for Metro Manila would be for the year 2020. Priorities should be established as well as the sequencing of projects.
- The next step should then be to clarify the roles of DPWN and TRB. This should lead to greater coordination within the government and improving the PPP development process
- Priority projects should then be thoroughly prepared by the government for bidding through ODA technical assistance, which should also be utilized as an opportunity for capacity building.

Finally, it should be noted that recommendations made herein function as a package – which means that recommendations are interrelated and interdependent. If some recommendations are not adopted, care should be exercised to ensure that loopholes are identified and properly dealt with.

FINAL REPORT

Summary

INTRODUCTION

Study Background

In 1993, the Japan International Cooperation Agency (JICA) conducted the Metro Manila Urban Expressway System (MMUES) Study to establish a master plan for the development of an urban expressway network as well as to determine the priority of proposed projects. In addition, in 1999, JICA carried out an integrated transport master plan study, entitled the Metro Manila Urban Transportation Integration Study (MMUTIS), which includes a refined plan for the development of an urban expressway system. MMUTIS emphasized the importance of public-private partnership (PPP) arrangement in the development of transport infrastructure, recognizing the lack of financial capacity of the Philippine government.

Since the BOT Law was enacted in 1993, a number of privately financed expressway projects have been proposed. However, most of these projects have been delayed, if not cancelled, due to various reasons which included lack of private funds, absence of a clear-cut risk-sharing principle between the public and the private sector, improper setting of toll rates, difficulties in land acquisition, and lack of coordination between government agencies.

Under these circumstances, it is most essential and urgent to establish a reasonable set of PPP rules and guidelines after reviewing current practices in order to accelerate expressway development. For this goal, role- and risk-sharing systems of both sectors should be carefully studied and designed.

In addition, a traffic management standard, that includes a toll collection system, a traffic information system and a road maintenance system, which at present are developed and operated independently by operators, should also be studied to enable the entire expressway network to function as an integrated and effective transport network.

Toward this end, the Government of the Republic of the Philippines (GOP) requested the Government of Japan (GOJ) for technical assistance. JICA dispatched a Preparatory Study Team to discuss the Terms of Reference with officials of the Department of Public Works and Highways (DPWH) and other concerned organizations. In November 2001, the JICA Study Team officially started the Study titled "The Development of the Public-Private Partnership Technique for the Metro Manila Urban Expressway Network in the Republic of the Philippines".

Study Objectives

The following were the Study's objectives:

(1) To establish the strategic arrangement for an optimum PPP technique for the development of Metro Manila's expressway network;

(2) To formulate a standard management system for the entire urban expressway network including a toll collection system, traffic management, information management, and road maintenance system; and,

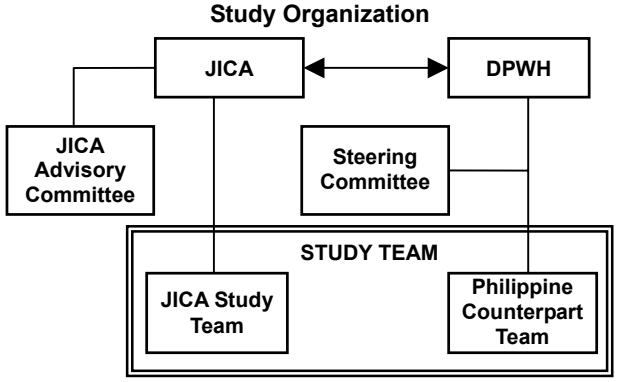
(3) To conduct a case study of the R10/C3/R9 route in terms of road construction, operation and management using the PPP technique and through information technology.

Study Area

The entire Metro Manila and its adjacent areas affected by the urban expressway network were used as the study area. The Case Study Expressway is the R10/C3/R9 route. However, in March 2002, at the end of Stage 1 of the Study, the Study Team proposed to extend the R10 section to the north beyond the R10/C3 intersection, turning right on C4 and linking the Case Study Expressway with the Manila North Tollway (MNT) C5 Link (Phase 2) at the northern end of Dagat-dagatan Avenue. The proposal was approved and the section was included in the Case Study Expressway.

Study Organization

The study organization is composed of the JICA Advisory Committee and the JICA Study Team on the Japanese side, and the Steering Committee and the Counterpart Team on the Philippine side, as shown below.



1. METRO MANILA URBAN EXPRESSWAY NETWORK (MMUEN)

1.1 Existing Expressways in Metro Manila

As of March 2002, there are four toll roads operating in Metro Manila: North Luzon Expressway (NLE), South Luzon Expressway (SLE), Metro Manila Skyway (Skyway 1) and Manila-Cavite Toll Expressway (MCTE 1) with a total length of 161.4 km. The NLE and the SLE have characteristics of a suburban or an intercity expressway rather than an urban expressway. They were constructed in the 1970s while the Skyway 1 and the MCTE 1 were recently developed using public-private partnership (PPP) schemes.

1.2 Future Expressway Network MMUES and MMUTIS

The first masterplan on Metro Manila expressways was developed in 1980 by the Construction Development Corporation of the Philippines (CDCP) now known as PNCC. The Plan was reviewed and updated twice, first in 1985 by the National Transport Planning Project (NTPP) and second in 1989 by the University of the Philippines Transport Training Center (UPTTC). In 1993, a JICA-assisted project, the MMUES, comprehensively reviewed past plans and prepared a new master plan.

The MMUES network is composed of two circumferential expressways (C3 and C5) and 11 radial expressways. Routes C3 and C5 are 6 to 8 km apart and are connected by six radial expressways at an interval of 4 to 8 km. Outside Route C3, eight radial expressways are extended towards the outer areas of Metro Manila: three in the south, two in the east and three in the north. The MMUES plan is ambitious: it includes 150 km of urban expressways and was conceived before the Asian financial crisis.

In 1997-1999, a new JICA-assisted master plan study, the MMUTIS was carried out, in which the MMUES network was reviewed and downscaled to 112 km to meet the financial capacity of the Government. Included in the MMUTIS, as well as in the MMUES, is the case study route – R10/C3/R9 Expressway.

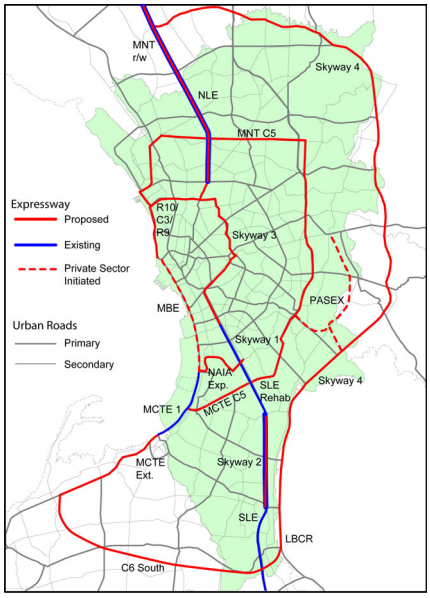
Since the MMUTIS was concluded, several expressways have been committed by the Government or proposed by the private sector. A proper consideration should be taken for some of them in this Study and these include the following:

- Pasig Expressway (Pasex) – an alternative to the R4 and R5 expressways proposed by CMMTC;
- Manila Bay Expressway (MBE) – an expressway proposal that will link the Manila Port Area to the MCTE 1;
- Manila North Tollway C5 Link – a committed expressway along the northern segment of C5 that is a component of the Manila North Tollway (MNT), a project of the Manila North Tollways Corporation (MNTC);
- Ninoy Aquino International Airport (NAIA) Expressway – a link between Skyway 1 and Roxas Boulevard and an airport access being pursued by the Department of Public Works and Highways (DPWH); and,
- C6 Expressway – composed of the (i) Metro Manila Tollway (Skyway 4), (ii) Laguna de Bay Coastal Road and (iii) C6 Southern Link.

1.3 Metro Manila Urban Expressway Network

Based on a series of consultation meetings with various government agencies and a review of relevant documents, the MMUEN was formed based on the list of expressways proposed in one or more of the reviewed plans and proposals. The MMUEN is not a new expressway master plan; rather, it is an assumption of the future expressway network to test the applicability of various PPP techniques for the purpose of this Study. Figure 1.1 illustrate the MMUEN.

Figure 1.1 Future Expressway Network for Study



(1) Review of the MMUEN's Project Cost

This section preliminarily reviews the MMUEN's project cost to update the cost inputs for financial analysis. Table 1.1 summarize the project cost for each MMUEN component.

Table 1.1 Summary of Amended Project Cost

Project	[A] Original Cost	[B]Updated Cost	[B] / [A]
MCTE-ext	2808.0	3835.4	1.4
MNT-rehab	3583.0	610.4	-
NAIA Exp	10355.7	11799.6	1.1
Skyway 2	11475.0	14287.4	1.2
Skyway 3	27030.0	27071.4	1.0
R10/C3/R9	5406.4	18697.7	3.4
MCTE-C5	2678.0	3657.8	1.4
MNT-C5	2878.0	3107.0	1.1
LBCR	10659.3	15805.6	1.5
Manila Bay Exp.	63299.2	50522.0	0.8
C5 Exp.	-	5622.4	-
MMT(C6)	34098.2	50560.9	1.5
C6 SS	11633.5	17250.2	1.5
NLE-east	16848.0	1964.7	-
Pasex	12688.0	16085.7	1.3

In general, demand for an expressway is much influenced by traffic conditions in the free (non-toll) road network. In order to forecast the demand for the MMUEN, therefore, one of the key inputs is the future road network. The MMUTIS has developed a plan for road development for 2015 and is the only road master plan that has the consensus of relevant government agencies. As such, this Study adopts the MMUTIS road network. Furthermore, it is assumed that the MMUEN will have a capacity of 20,000 passenger car units (PCUs)/lane/day.

The future urban rail network will also significantly influence the demand for the MMUEN. In this Study, the rail network proposed by the MMUTIS is also assumed and it is shown in Table 1.2

Table 1.2 Assumed Implementation Schedule for the Metro Manila Rail Network

Year	Line in Operation
Existing as of 2002	LRT-1, MRT, PNR
By year 2005	Line 2, MRT Extension, LRT-1 Extension
By year 2010	Line 4
By year 2015	MCX, North Rail

(2) Demand for the MMUEN

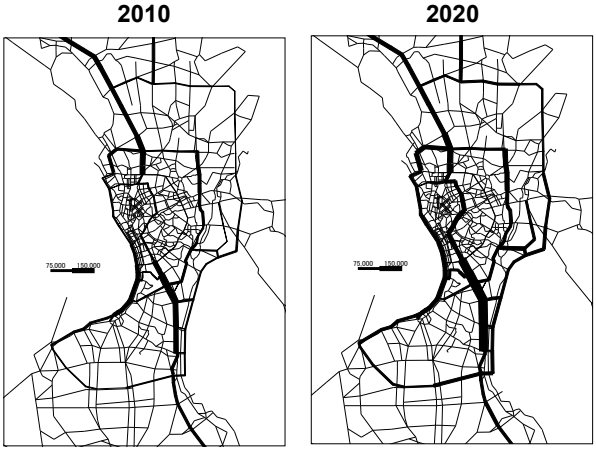
Based on the assumed network and trip maker characteristics, the demand for the MMUEN network was forecast for the benchmark years of 2010, 2015 and 2020 by assigning the future OD traffic volumes onto the aforementioned network. OD data is based on the MMUTIS OD data which was revised and updated for this Study.

Here, public modes (i.e. bus and jeepney) are assumed to be prohibited on expressways except at NLE, SLE, Skyway at-grade, and MCTE. Tolls as of June 2002 are assumed for existing expressways and a rate of P4 per kilometer was assumed for all other expressways to be developed, except NLE East to which the SLE rate was applied, because it is located outside of C6 and is considered as an inter-city expressway.

Most projects will have lesser demand due to the development of the network, except for several projects located in suburban areas. However, the difference between the demand under the "with" network case and "without" network case tends to narrow as the 80,000 PCU capacity for four-lane expressways and 120,000 PCU capacity for six-lane expressways is nearly reached. Figure 1.2 illustrates the future traffic flow on the MMUEN.

In 2010, traffic volumes on existing sections of the NLE (MNT), the SLE (Skyway) and the MCTE will be outstanding, while demand for new projects will be moderate. East C5 expressway, the western arc of MNT-C5 and NLE East will have daily traffic of over 50,000 PCU. On most expressway sections, however, traffic will grow to capacity level by 2020, due to worsening traffic conditions on the general road network as well as rising willingness to pay of users.

Figure 1.2 Traffic Flow on the MMUEN



(3)Mutual Influence on Demand among Projects

One expressway project will affect positively or negatively the demand of another. Among existing expressways, Skyway 1 will be strongly

and positively affected by Skyway 2 and 3 but negatively affected by MCTE-ext. and C5 Exp.

The mutual influence is classified into three categories: competitive, complementary and parasitic relationships (see Table 1.4). For instance, MCTE-ext. will lose 17% of its demand if LBCR exists and LBCR will lose 33% if MCTE-ext. exists. Thus, their relationship is competitive. Complementary projects are mutually beneficial to each other, while parasitic projects refer to the case where one project benefits from the demise of another.

Table 1.3 Projects with Strong Mutual Relationships

Competitive				Complementary				Parasitic			
Project	%	Project	%	Project	%	Project	%	Project	%	Project	%
MCTE-ext	-17	LBCR	-33	MCTE-C5	90	C5 Exp	13	MCTE-ext	24	C6 South	-37
Skyway 2	-39	LBCR	-39	LBCR	31	Skyway 4	13				
Skyway 3	-32	MBE	-14	LBCR	138	C6 South	79				
MBE	-15	C5 Exp	-13	R10/C3/R9	58	MBE	21				
C5 Exp	-13	Skyway 4	-15								

% = Percentage change in demand if other project is realized

1.4 Financial Analysis

(1) Toll Rate and Revenue

Several toll rates were systematically tested to determine the rate that will maximize the MMUEN's revenue. As shown in Table 1.4, the maximizing rate will become higher in the future, mainly because people's time value will rise as their income increases and traffic conditions on ordinary roads further worsen.

Table 1.4 Relationship between Toll Rate and Toll Revenue

(Billion Peso/year)

Toll Rate	All MMUEN Components			New MMUEN Projects Only		
(Peso/km)	2010	2015	2020	2010	2015	2020
2	11.96	16.26	18.20	9.41	13.23	15.01
3	13.28	19.88	23.31	10.39	16.53	19.78
4	14.76	24.30	29.87	11.46	20.65	26.06
5	15.56	26.87	33.80	12.02	22.83	29.57
6	**15.89**	28.02	38.16	**12.23**	23.73	33.07
7	15.86	28.74	41.30	12.15	**24.47**	36.07
8	15.27	**29.01**	42.94	11.53	24.29	37.42
9	14.45	27.99	**43.86**	10.71	23.11	**38.17**
10	14.05	27.23	43.08	10.24	22.02	37.21

Note: Figures in bold are revenue-maximizing rate.

In 2010, the rate that will maximize revenue is estimated at P6/km and will increase to around 7 or P8/km in 2015. The maximizing rate will further rise to P9/km in 2020. In any year, however, the peak is not sharp. For example, the revenues in 2010 will not be significantly different within the P5 to 8/km range.

The toll rate that will maximize revenue is different by project due to different traffic conditions of their respective alternative ordinary roads. The heavier the congestion on the ordinary road, the higher the maximizing rate will be. As a result, Skyway 1 and 2, MCTE-ext, MBE, and C5 Expressway have higher revenue-maximizing rates. Also, MCTE-C5 and MNT-C5 also exhibit high maximizing rates, because there is no alternative ordinary road that can reasonably compete with these projects.

It should be noted that the toll rate that will maximize total revenue is not necessarily the optimum rate. It may be to the advantage of expressway owners or operators, but tolls must be acceptable to the users, in this analysis, a uniform toll rate of P4 /km is assumed for all the new projects. However the actual toll rate as of May 2002 is assumed for existing projects. In reality, the toll rate will differ by project as they will be based on construction cost.

In the future, when the MMUEN will be almost complete, a flat rate regardless of traveled distance will be desirable for operational convenience. Towards this end, traffic simulations were made to determine the flat rate that will result in almost the same revenue as a P4/km toll. The result is P68/entry, which is lower than the present rate of Skyway 1. This suggests that there is a good possibility to feasibly apply a flat rate structure for the MMUEN.

(2) Financial Evaluation

A preliminary financial analysis was made to clarify the profitability of each expressway project and the necessary government support to attract private capital to the project. (see Table 1.5)

Table 1.5 FIRR of the MMUEN and Its Components

Priority	Project	Cost	Revenue	Rev./ Cost	FIRR(%)		Cost Reduction to make FIRR 15%
			2010-2040		Including All Cost	Excl. ROW	
Group A (2002-2010)	MCTE-ext	3,835	40,858	10.7	23.9	27.9	0.0
	MNT-rehab	610	11,600	19.0	41.9	44.7	0.0
	NAIA Exp	11,800	45,676	3.9	6.4	6.9	75.2
	Skyway 2	14,287	88,829	6.2	11.4	11.4	33.0
	Skyway 3	27,071	107,050	4.0	7.3	7.6	65.0
	R10/C3/R9	13,693	46,127	3.4	7.4	7.6	57.0
	Subtotal	71,297	340,141	4.8	9.3	9.7	48.5
Group B (2010-2015)	MCTE-C5	3,658	19,719	5.4	9.9	11.5	44.0
	MNT-C5	3,107	85,577	27.5	48.6	61.9	0.0
	LBCR	15,806	52,740	3.3	8.1	12.2	50.5
	Mbay Exp	50,522	61,224	1.2	1.1	1.5	83.8
	C5 Exp	5,622	45,372	8.1	19.9	23.2	0.0
	Subtotal	78,715	264,631	3.4	8.2	9.7	48.6
Group C (2015-2020)	MMT(C6)	50,561	217,782	4.3	8.6	12.2	52.9
	C6 SS	17,250	74,572	4.3	8.8	12.5	51.0
	NLE-east	1,964	3,715	1.9	3.9	5.0	70.0
	Pasex	16,086	112,778	7.0	10.7	11.7	42.5
	Subtotal	85,861	408,847	4.8	9.1	12.0	51.0
	MMUEN	235,873	1,013,619	4.3	8.9	10.5	49.5
All excluding Mbay Exp & Pasex		169,265	839,618	5.0	11.5	13.5	33.0

1.5 Toll Rate Affordability

The Amended BOT Law (RA 7718) states that all toll fees and adjustments thereof shall take into consideration the reasonableness of the said rates to the end-users. It is thus important to consider the user's side in determining the appropriate toll rate in designing concession contracts.

Government guidelines on how to define a reasonable toll rate is non-existent. However, there are methodologies to objectively examine the affordability of toll rates, namely (i) percentage of user benefit; (ii) degree of diversion; (iii) percentage of average income; and (iv) comparison with international practice – as described in Table 1.6.

Table 1.6 Methodologies in Examining Toll Rate Affordability

Methodology	Description	Key Merit	Key Demerit
User Benefit	Toll rates should not exceed the total user benefit, which is equal to user savings from time savings and vehicle operating costs.	Highlights the benefits received by users	May favor high-income class
Willingness-to-Pay	Toll rates should at least attract a certain % of the potential demand to use the expressway (who are in effect willing to pay for the expressway service).	Highlights the number of users benefiting from the project	Not appropriate for monopolistic links
Income	Toll fees should not exceed a certain percentage of income.	Highlights the budget constraint and examines tolls in absolute terms	Difficult to establish reasonable benchmark % of income
International Comparison	Toll rates should be within the range of toll rates used in similar countries	Bases analysis on real world experience	Difference in countries makes transferability of practice questionable

To operationalize the four methodologies or definitions, key parameters have to be quantified and are summarized in the Table below. Since expressway users are generally wealthier sectors of society, the Study adopted rather liberal assumptions leading to estimates on the high end of the spectrum.

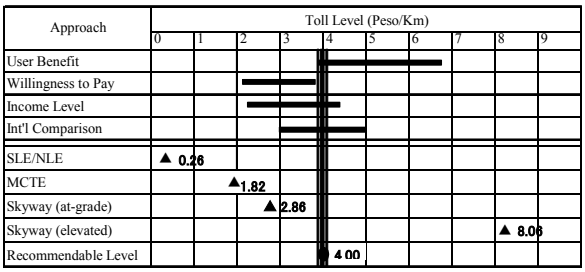
Table 1.7 Key ParameterS in Defining Reasonable Toll Rate

Methodology	Key Parameters
User Benefit	Toll rates is at least equal to user benefit
Diversion Rate	At least 50% of potential demand will use the expressway (or are willing to pay for the expressway service)
Income	Tolls should at least be within 4% of average user income
International Comparison	Toll rates should be within the range of urban expressway toll rates used in countries within the same range of GDP/cap (700US$ ~ 2,000US$)

Based on the described definition of reasonableness, simulation experiments were conducted to determine the reasonable toll rate. Conditions (e.g. congestion levels and capacity) vary at different segments of the network. Therefore the reasonable toll rate would vary as well at different segments of the expressway leading to a range of values. Table 1.8 summarizes the range of reasonable toll rate under different definitions and its comparison with toll rates of existing expressway facilities.

Based on the above analysis, it is recommended by this Study that the toll rate for the MMUEN should be constrained to 4P/km as the maximum reasonable toll rate from the user's point of view. In the previous analysis of the revenue maximizing toll, the revenue of the network will be maximized at between 4P/km to 7P/km toll rate in 2002. Since, tolls should be maximized to minimize government support – thereby reflecting the user's pay principle – this Study recommends the toll rate for MMUEN at 4P/km in 2002.

Table 1.8 Range of Reasonable Toll Rate and Comparison with Existing Toll Rates



2. PPP TECHNIQUE FOR METRO MANILA EXPRESSWAY DEVELOPMENT

2.1 Review and Assessment of PPP Techniques

(1) Policy and a Decade of PPP

The Philippines' Medium Term Development Program articulates the official policy for private sector participation in the road sector as follows:

'Public-private sector partnership shall be used especially in the development of toll expressways along clogged road arteries. A multiplicity of private tollway operators shall be encouraged without sacrificing network integration.'

Subsequent pronouncements by the DPWH rationalized BOT/PPP projects as instruments to:

- reduce the fiscal burden on the Government,
- accelerate the development of new roads, and
- improve the efficiency in the delivery of basic services.

After about a decade of pursuing the above policy, only four expressway projects were concluded out of more than 12 projects mooted. Realization was below expectations for a number of reasons. The four that managed to hurdle the PPP gauntlets are: MMS, the MCTE, the MNT, and the Southern Tagalog Arterial Road (STAR). Of these, only two got implemented by 2002.

(2) Obstacles of the Governmental Kind

Factors within government control that are Contributory causes to the low take-up of expressway projects are the following;

Two Paths, Same Destination

A private company can secure a franchise directly from Congress or from the DPWH following the BOT Law, or via joint venture with the PNCC (or the Public Estates Authority and the Bases Conversion and Development Authority). Of the four concluded projects, three went the joint-venture route for many reasons – such as the faster implementation (which turned out to be false), the all-encompassing scope of the PNCC franchise and the fear of losing in a bidding.

The BOT Law re-stated the regulatory powers of the Toll Regulatory Board (TRB) on tollways, but opened the possibility of two agencies being able to grant a toll franchise – the TRB and the DPWH. The inter-agency composition of the TRB, and its being chaired by the DPWH Secretary, was supposed to achieve harmonization as well as facilitate governmental approvals of any concession agreement, but it did not.

The private sector players exploited the two routes to market entry, which placed the two agencies in a collision course and led to a slowdown of the PPP process.

Institutional Inadequacies

BOT projects turned out to be more complex than previously thought by government personnel who had been hewn and nurtured in the traditional mode of project implementation. This lack of expertise and understanding of the business mindset became palpable during negotiations with the private proponents. Consequently, the process either got protracted, or the Government ended up assuming more contingent risks than it could handle.

Also, turf battles flared up between the TRB and the DPWH's BOT-Project Management Office due to the foregoing dual points of entry, ambiguities of the BOT Law and the honest differences in views. Consider Table 2.1 on the potential points of conflict.

Table 2.1 DPWH and TRB Views on Contract Issues

ISSUE	DPWH LINE	TRB LINE
Contracting Party for the Government	DPWH should sign for the GOP; TRB should limit itself to the O&M aspects of the project	TRB cannot wait down the road, as it may find the terms of the Contract unacceptable later on, and preclude grant of TOC
Design and Construction of Toll Facilities	Design standards and approval should be with DPWH, since toll roads and facilities are covered by DPWH's mandate	Should comply with TRB's standards, being part of its requirements for the grant of TOC
Toll Rate Setting and Adjustments	As stipulated for in the BOT contract and TOC to be issued by TRB	Following TRB rules, subject to public hearing, or appropriate notice to the public
Partial Operation of Completed Segments	May be considered for purposes of enhancing financial viability of the project	Has no objections per se but prefers operation to commence only upon completion of construction of the whole facility
Control of Upside	As proponent is made to assume traffic risk, there should be no cap on profits if traffic exceeds initial projections	Profits should be moderated in case traffic is higher than forecast, so that income does not exceed 12% RORB
Principal Concern	Successful implementation of Concession Agreement	Efficient operation of the tollway, at rates acceptable to motorists

To resolve the conflicting views, both the DPWH and the TRB sign on the concession agreement. This may have provided some comfort to investors and lenders, but it also created a regulatory dilemma – where the TRB is asked to adjudicate on a contract in which it is a signatory.

The lack of expertise has forced the Government to offload project planning onto the private proponent. As a consequence, it has taken a long time for DPWH and TRB staff to understand and appreciate the details of projects where they had no hand in preparing. During the negotiation stage, the ad hoc government panel is at a disadvantage vis-a-vis a high-powered private panel.

Passing the Buck to Private Proponents

Under PPP, the Government assumed that project studies and other preparatory works could also be offloaded onto the private sector. This has occasioned divergences of views on traffic projections, toll rates, toll adjustment formulae, real project costs, and other strategic issues. Private proponents, laboring on inchoate concepts about infrastructure and on the pretext of confidentiality, were reluctant to divulge their full assumptions and behind-the-scenes arrangements. To secure financing, proponents were inclined to use more sanguine traffic projections. Had the Government conducted the preparatory works, the divergent viewpoints would have been minimized, negotiations moved faster, appropriate government support mobilized, and uncertainties faced by the private sector reduced.

Rights-of-Way Conundrum

The responsibility for ROW acquisitions falls squarely on the Government because of its power of eminent domain. However, the track records of the DPWH and the TRB in this regard have been egregious on the four concluded projects. Lack of funding was often blamed for the delay, but having the proponent advanced the amount meant putting the cost in the private sector's ledger. More than funding, the convoluted procedures involved in ROW acquisition (which often shifted the burden to the overloaded courts of the land) were major impediments.

Political and Judicial Interventions

The new expressways were heralded during construction and upon completion, but criticized when the new, and higher, toll rates took effect. This was the game played by politicians, but abhorred by businessmen. The TRB, not being an independent body, is prey to political pressures. When the heat is on, economic merits take a back seat to populist concerns. The rates for the NLE and the SLE, for example, are still the same for the last 17 years. The new rates for the Skyway I and the MCTE became controversial and were held back momentarily, before final adoption.

Despite being a signatory to automatic toll adjustment, the TRB is unable to shake off the dicta of public hearings before allowing any adjustment in toll rates. Consequently, it unduly raises the risks faced by PPP proponents.

Aside from political pressure, opponents of toll increases have often resorted to the courts to prevent the TRB from granting the increase in toll rates sought by toll road operators. While courts have generally been reluctant in preventing the TRB from performing the latter's quasi-judicial mandate, the mere delay occasioned by the pendency of the matter before the courts often already serves as its own reward.

Other Legal Hurdles

Private proponents also have to overcome two other legal requirements: environmental compliance and building permits from LGUs.

Although well meaning, the procedures for securing an Environmental Compliance Certificate have often proved nightmarish to project proponents. The term 'environment' is interpreted broadly as to include political and social acceptability of the project. Even a small group of squatters could thwart or delay the project, on the pretext that its environment would be altered or despoiled.

An uncooperative LGU could derail road construction works through several subterfuges, like building permits, environmental nuisance, or traffic obstruction. The Skyway project suffered delays when the cities of Parañaque and Makati extracted their 'own pound of flesh' from the project proponent.

(3) Exogenous Obstacles

Even if the above issues were somehow resolved, the development of PPP might only be marginally better off because of macro-economic constraints. Probably more fatal to the delivery of projects via the PPP scheme, these obstacles can only be surmounted as they are normally outside the control of infrastructure agencies, and the proponents. The key obstacles are:

- Commercial term loans in the domestic market are generally short (5 to 7 years)

versus the cash throw-off profile of road projects. The few projects that got implemented relied on foreign funding, with its attendant risk of foreign exchange fluctuation versus peso revenues.

- Reliance on foreign loans meant that toll road projects, regardless of their merits, would have to bear with prevailing international sentiment about high country risk. Perceptions about the Philippines have more often been negative than positive.
- Getting to financial closure has turned out to be lengthier than previously anticipated. Lenders are wary of overleveraged borrowers and about project risks.

(4) Guideposts from Concluded Toll Road Projects

A comparison of the four expressway projects that were granted concessions in the last decade revealed the following:

All four expressway projects suffered completion delays.

ROW issues derailed all of them, although not to the same degree. The Skyway 1 project was adversely affected more by antagonistic LGUs than by ROW issues per se. The STAR got stalled due to ROW problems and its failure to secure financing. MNT has announced a financial closure, but loan drawdowns were withheld due to ROW issues.

Build-Transfer-Operate

BTO is the common contractual framework of the four aforementioned expressway projects, notwithstanding the fact that only one of the four projects was undertaken under the BOT Law. Ownership is transferred to the Government upon substantial completion of construction. Usufructs or operating benefits are retained by the concessionaire for 30 years (except MCTE, which has 35 years).

Projects Bankrolled with (or Seeking) Foreign Loans

The proponents tapped the foreign capital markets, instead of borrowing locally. To shield them against foreign exchange risks, the proponents transferred the risks to the motorists by incorporating a FCA (i.e.foreign currency adjustment) clause into their approved toll adjustment formulas.

Formation of Special-purpose Entities

None of the private proponents directly assumed the obligations and rights attendant to holders of Toll Operating Certificates (TOCs). A special-purpose vehicle was created. The project itself is treated as a separate entity from the sponsors, and this project entity borrows funds solely on the strength of the project's cash flows and the equity of sponsors in the entity itself. Presumably, to avoid the legal limitations on foreign equity ownership of public utilities, a separate "operator" entity was created.

All Projects Got Some Form of Government Support

The Skyway benefited from the established traffic over the existing SLE from Nichols to Alabang. Similarly with the MNT, the STAR and the MCTE. Existing roads were folded into the project, after some improvements. The burden for the ROW was lodged on the Government. It is difficult to estimate the values of government contributions in the absence of a prior asset accounting by both the TRB and the DPWH, or an appraisal of the intrinsic values of the SLE and the NLE at the time of cession by the PNCC. In all cases, the Government's share can be classified as capital grants.

Automatic Adjustment in Cost-based Toll Rates

Another significant commonality in the toll concession agreements governing the four expressways is the toll setting and adjustment provisions. All were granted freedom to set their initial toll rates based on estimated project costs and to adjust the tariff periodically based on changes in two or more pre-defined cost variables.

In addition, the agreement contained a default clause whereby the Government is compelled to buy out at a premium the proponent's interest in the project when there is failure to allow an adjustment in the prevailing toll rate.

Similar Yet Different

While similar in many respects, the concession agreements revealed some interesting differences.

In the case of the Skyway, the investor bore the completion risk as well as risks arising from design changes. In contrast, the STAR had lodged completion and design risk to the project company.

Concession fees also differed among the four projects. The STAR Infrastructure Development Corporation was required to pay the DPWH the amount of 2% of the total construction cost as Operation and Maintenance Supervision Fee. There is no equivalent imposition on the CMMTC, other than continued payment by the PNCC of its obligations under the original PNCC franchise. Effectively, the Skyway would not pay a concession fee.

(5) PPP Lessons from International Experience

What lessons can be learned from international experience and how can these be brought to bear on the PPP techniques applicable to the circumstances found in the Philippines?

Broad Range of PPP

Table 2.2 highlights the various forms of PPP applications in other countries. The level of participation by the public or private sector vary by modality – from full project development by the private sector under an unsolicited BOT type contract to assistance with the planning phases or specialist inputs during design or operation. The techniques for compensating the private sector are also varied – from direct collection of revenues via tolls to government finance or other fiscal benefits (i.e. tax holidays or free usage of existing infrastructure).

Table 2.2 Type of PPP Techniques

Type	Description	Examples	Applicability
Management	The private sector is involved with the maintenance of existing highways. Measurement of performance is set against predetermined criteria.	Australia USA	Not a real option, with few suitable highways to privatize.
Turnkey	The private sector designs and constructs new highway infrastructure to specifications defined by the public sector.	USA Hong Kong	Requires significant public sector funding, not an option at present.
Operate and Maintain	Similar to the management form of PPP, but during operation and maintenance compensation is made through collection of tolls.	Argentina Hong Kong	Lack of suitable roads makes this option limited in applicability to the Philippines.
Rehabilitation	The private sector rehabilitates existing highways to predefined specifications. Tolls are collected to cover these costs and the costs of maintenance and operations during a concession term.	Argentina Columbia	MCTE, MNT and MMS involved rehabilitation of existing roads
BOT and Variants	The private sector designs, finances and constructs new highway infrastructure. Tolls are collected to cover the cost of construction and operation and maintenance over the concession period.	Malaysia Thailand Philippines	Applicable in the Philippines, but hobbled by lack of government support
Corridor Management	Corridor management contracts are a combination of both BOT and operation and maintenance concessions applied to section of the highway network.	UK (DBFO) Columbia	No transport fund to dip from and pay the concessionaire

Careful Planning and Preparation

A favorable climate for private sector investment in roads is not created overnight, but a product of careful cultivation. PPP requires thorough preparation, involving the following:

- Define objectives and strategies, particularly in the transport sector
- Develop coherent plans – strategic plans for the transport network as well as interaction between transport modes and city or regional development.
- Define projects – feasibility studies and designs of specific projects, and prioritized for implementation.
- Evaluate options – assess most sensible route to implementation, whether via PPP or not.
- Formulate financial plan – formulate a realistic financing arrangement between public and private sectors.
- Specify PPP technique – the full parameters of the chosen PPP option should be specified.
- Support project at all stages – deliver and honor the commitments of the public sector throughout the concession period, where and when needed.
- Monitor performance throughout the concession period.

International experience has also shown that PPP techniques are often more difficult to implement in the transport sector than in other sectors, due to such factors as network effect, uncertainty in demand, requirements for linear land, and widespread notion of free use of roads.

Government Support – Other Countries

In Europe and other countries, road concessions almost always involved government support or aid. Governments used an array of mechanisms to provide financial support that will make the project attractive to private investors. These are illustrated in Table 2.3 with corresponding remarks about their feasibility in the Philippines.

Table 2.3 Government Support Based on International Experience

Country	Description of Government Support	Applicability to the Philippines
Mexico	In the Toluca Toll Road project, the Government guaranteed traffic volumes by vehicle and category. If volume falls short, concessionaire may request for extension of concession term.	Yes. However, it may not address the short-term cash flow crunch arising from debts of short maturities.
Brazil	Linha Amerala road: City of Rio de Janeiro gave a capital grant of $112 million (out of $174 million project cost).	Yes. However, it requires Congressional appropriation and direct assumption of specific project items.
Malaysia	North-South Expressway: Government guaranteed the interest rate and exchange rate.	Already adapted to the extent that concessionaire is allowed to adjust toll fees to recover financial market fluctuations. Direct assumption of risk unlikely.
Thailand	Don Muang Tollway: Government guaranteed tariff rate per contract. Expressway authority failed to honor commitments, leading to a government rescue.	Already incorporated in the TOA to the extent that concessionaire is allowed to adjust toll fees periodically.
Chile	South Access to Concepcion: Revenue guarantee.	Not feasible. Will rely on unstable yearly appropriation.
Norway	Toll collection is privatized, but design, financing, construction, and maintenance remain with the Government.	Few opportunities to apply in the Philippines. Does not capture inherent strengths of public and private sectors.
United Kingdom	Widespread use of design-build-finance-operate (DBFO) or shadow toll. For example, extension of highway A13 to east of London. British's Highways Agency pays the concessionaire based on traffic.	Not applicable. No funds to dip from with which to pay the shadow toll. High transaction costs. Long cycle time. Weak ability to measure traffic.
Spain	State advances a given sum which must be subsequently reimbursed by the concession company. Also, issuance of participating capital loans to be repaid according to agreed schedule.	Not feasible. Will require Congressional appropriation. On-lending of program loans from ODA sources possible, but consent from lenders maybe difficult.
France	A new tollway is backed up by an existing more mature toll road, accompanied by a longer concession period, for the combined entity.	Yes. Already adapted in the case of Skyway and Manila North Tollway.

2.2 Guidelines for PPP Development

(1) A Practical Strategy

During the last decade, PPP in the Philippines proceeded by muddling through rather than by purposive action. The ideal strategy should remedy existing weaknesses in the PPP process, leverage strengths that are evident in the transport sector, exploit emerging opportunities, and address threats and problems. This entails:

- Dismantling or resolving the various obstacles of the governmental kind, (see Section 2.1.(2)) and
- Mitigating or 'lowering the bar', in the case of the exogenous factors (see Section 2.1.(3)).

(2) Dismantling Endogenous Obstacles

The recommended countermeasures involve the following:

Expand PPP Modality

PPP should not be limited to new, big-ticket expressway projects, but should extend to the privatization of existing roads – even for rehabilitation and maintenance – with its lower capital requirements. Many of these roads, however, may not qualify as urban expressways per se, but the method would expand the PPP modality and enhance the overall environment for PPP.

Fine Tune the Organizational Processes

The DPWH and the TRB have to present a coordinated and consistent front amid a tightening market and low appetite of lenders. A suitable *modus vivendi* is for the TRB to be responsible for the legal and financial aspects of toll road planning and contracting, plus the monitoring of operations. On the other hand, the DPWH shall be responsible for planning, design, construction oversight, plus supply of any facilities or sections that the project may require from the Government.

Corollarily, the TRB should focus on economic regulation and phase out its operational functions. Its attachment to the DOTC should be clarified, as this may impinge on future expressways. A revision of the Implementing Rules and Regulations (IRR) of the BOT Law may be necessary to remove the authority of the TRB to grant Concession Agreements. A practical solution to the 'two gatekeepers' problem is for the Concession Agreement to be granted by the DPWH to serve as an authorization to build an expressway, but that a TOC must be secured from the TRB upon the completion of construction and as a prerequisite to toll operation.

The tension between the DPWH and the TRB should naturally subside because: (i) personalities have changed, (ii) accommodations learned in dealing with the four PPP projects, (iii) prospect for joint venture, which placed the TRB in the upstream stage of the PPP process and on collision course with the DPWH, has diminished since the PNCC has no more operating and mature toll roads to cede.

Remedy the Expertise Gap

The usual remedy is to undertake capacity-building exercise for the DPWH and the TRB. This is desirable but unlikely to produce results in the short term because of the low salary in the public sector as well as the non-commercial backgrounds of new recruits. The more practical solution is to seek technical assistance from ODA sources to undertake project studies, establish the business case as well as the proper scale for the projects, and put the project into competitive tender. The ODA-funded consultants would also provide hands-on training to

government personnel. Until such time that a pool of in-house experts are developed, consultants can also be tapped to assist the government panel during bidding and negotiations.

Institute Other Reforms

Other complementary measures that should be undertaken are the following:

- Stick to the BOT Law, avoid joint venture agreements (sans competitive tender) and eschew unsolicited proposals.
- The draft concession agreement should always be made part of the bidding documents, and any material changes made during negotiations shall be released or made known also to losing bidders.
- A future role for the PNCC should be defined. Its broad franchise – Presidential Decree No. 1113 – has become a barrier to entry, but amending the same maybe unnecessary. It is supposed to expire in 2007. New concessions for the NLE and the SLE have effectively divided and ceded the old franchise to new entities. Under the BOT Law, renewal of the PNCC's franchise becomes moot and academic.
- To avoid market distortions, the Office of the President should temper the ambitions of any government-owned and controlled corporation (GOCC) in venturing into urban expressways. As a matter of policy, GOCCs' choice of joint-venture partners should likewise be subjected to competitive tender.
- There should be more frequent, albeit incremental, adjustments in toll rates to avoid abrupt jumps that invite heavy opposition. The bad experience of the MMS and the MCTE on their toll adjustments could be traced to the public's being inured to the stagnant rates of the NLE and the SLE. For more than 15 years, the toll fees in the PNCC-controlled expressways remained unchanged.

(3) Lowering the High Hurdles

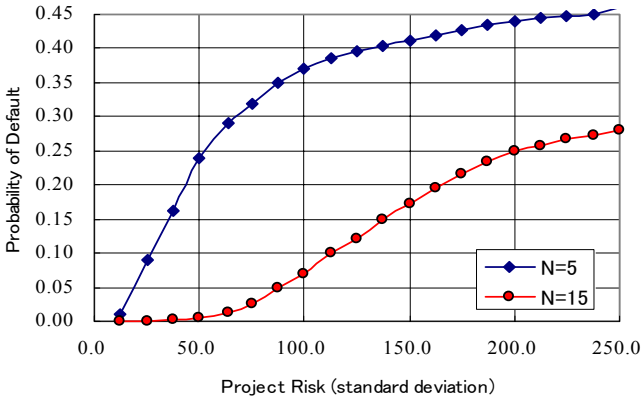
The obstacles that could make or break a project are lack of domestic long-term financing, reliance on foreign loans, ROW conundrum, and negative cash flows during the early years of a toll road.

Extend Government Support

Feasible forms of Philippine government support that can be mustered for urban expressways are the following:

- Leverage ODA funds with private capital – the DPWH designs the project and secures ODA financing for its construction. Two competitive tenders are conducted: one for construction and the other for the concession to operate and maintain the tollway. The concessionaire will be required to provide the counterpart funds in the amount and timing required by the construction schedule.
- Two projects in one – similar to the above, and perhaps more acceptable to lenders, this scheme entails dividing the project into two: one section under government and ODA funding, the other section under a BTO arrangement. Both sections, however, will be operated as one integral tollway facility. Revenue throw-off from the government-funded section should enhance viability.
- Guarantee the balloon payment of project loans – in case ODA is not available, a guarantee on the balloon payment up to 50% of loan values at time of maturity will have the effect of doubling the maturity period. In project finance, lenders typically have no recourse to the assets of the sponsoring company and rely on the project's cash flows for repayment. Longer maturity brings down project risk as illustrated in Figure 2.1.

Figure 2.1 Loan Maturity and Probability of Default



Source: Mansoor Dailami and Danny Leipziger, "Infrastructure Project Finance and Capital Flows: A New Perspective", Economic Development Institute, 1997

The foregoing form of support will raise the return on investment to levels that exceed the minimum hurdle rate of private investors. In the Philippines, this ranges from 15% to 20%.

Secure Budget for ROW Acquisition

This is an obvious solution, which the Government has long recognized. Advance funding, however, has been very scarce and erratic. It is a cost item not eligible for ODA funding. A stable source should be found. One

suggested option is to impose a surcharge on existing toll fees, the proceeds of which will accrue to a ROW fund. This may need legislation, aside from 'taxing' current users to benefit future motorists. It may not be as burdensome if collected only from mature tollways with sufficient cash flows despite low tolls.

2.3 Proposed Scheme for PPP Project Development

(1) Government Must Do Its Homework First

The Government must study and design the project rather than leave these tasks to private proponents. The private sector is ill-equipped to develop projects in the context of an expressway network to year 2020. The long-term plan needs to be agreed among agencies.

Detailed business cases need to be developed for each project to provide a structure for successful project delivery. Prior to any invitation to bid, the full financial positions should be understood and the required contributions from public and private sectors established. Project preparation by the Government has the salutary effect of foreclosing unsolicited proposals and other forms of entry into the market other than by way of the DPWH and the BOT Law.

(2) Move the Project into the Market

Due to the weakened appetite for PPP in the Asian region, the Government has to actively market the projects to entice investors. Past method of waiting for suitors will no longer suffice. Marketing should be undertaken to get the project in the radar map of many investors. Several proponents should be invited to bid to ensure competition. Clear guidelines (bid documents and support literature) should be given to the bidders and ample time allowed to prepare bids.

(3) Evaluate and Close the Deal ASAP

The proposals should be evaluated both technically and financially to ensure that they will provide value for money. This requires enough information to be provided by bidders. A single evaluation criterion, although easier for the evaluation process, often does not ensure that value for money will be received in complex PPP deals.

Contract negotiation would necessarily follow from award. The process should not be adversarial, nor an occasion to improve one's bargaining position. Rather, it is a natural step in ensuring that the agreement reached is one that both the public and private sector "partners" are comfortable with.

The ability of the winning bidder to sew up financing will hinge on the acceptability of the agreement to lenders.

(4) Desirable Features of Concession Agreements

There are many good features in the four concluded concession agreements that ought to be retained such as: (a) the BTO structure, (b) automatic adjustment mechanism for toll rates, and (c) obligations of the respective parties.

Refinements, however, should be introduced in the fare-setting mechanism. A concession agreement should lay out the principles, but the actual and detailed formula should be left to the subsequent TOA or TOC. Also, the starting or base rate should be based on out-turn cost at the completion of construction and subject to audit. A cap on the extent of FCA should be considered to discourage undue reliance on foreign loans.

Another aspect requiring a change from past practices is the grant of options for future phases or extensions of the project. This should contain an automatic expiry, like failure to secure financial closure within a pre-determined period.

A new feature that is strongly recommended is an "endogenous toll concession period" in lieu of a fixed term. A target cumulative revenue level can be adopted in determining expiry. In that way, the concession period can be shortened, if revenues are better than forecast; or lengthened, if the converse is true. It also protects the concessionaire in the likelihood that fare adjustments get delayed or deferred – as is wont to happen in the Philippines.

Delays in project completion have built-in penalties that need not be provided for in the concession agreement. But the rewards for faster completion should be stipulated. A practical suggestion is to exclude all revenues earned earlier than target date from the computation of cumulative revenues that goes with an endogenous concession period.

2.4 Guidelines for Network Development through PPP

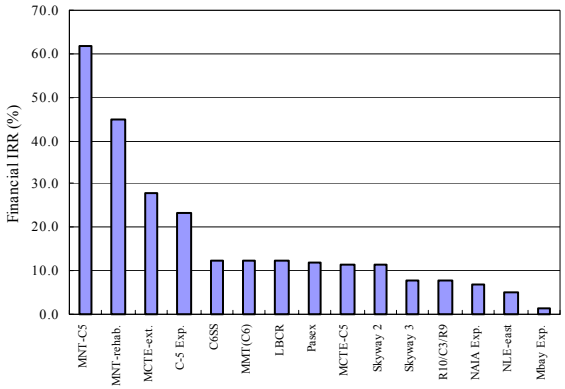
(1) Line up Government Support

Figure 2.2 shows the comparative financial rates of return (FIRRs) for the 15 sections of the contemplated urban expressway network up to year 2020. Eleven of these would not materialize without some form of government support.

Essentially, the Government must be prepared to assume up to 50% of the project cost. The mechanism is the 'two-projects-in-one' model.

Likewise, the Government should look at long-term program financing for the development of the whole network. As one section matures, its healthier cash flows should be made to support the construction of missing sections and to reduce differences in toll fees across the network. A global view should also aim towards cross-subsidy between toll roads and uniformity of toll fees. It is very difficult for the urban commuters to understand rate differences between toll operators when benefits are relatively the same.

Figure 2.2 Comparative FIRR of Urban Expressways



(2) Piece-wise Efforts to Evolve a Network

No road segment is an 'island', separate from the network. Computer simulation of traffic indicated that traffic demands are higher on most links when developed as part of a network, except for Skyways 2, 3 and 4 which may suffer from re-assignment of traffic as new sections emerge. The systemic effects is apparent from Table 2.4, which shows the degree of changes in demand when one of the projects is not built.

Related to this aspect is a concessionaire's insistence on a protection clause against competing expressways. A network view would logically avoid direct competition – which could transpire if another road is built on the same corridor. Proper sequencing of the development of each section should generally lead to the enhancement of demand – to the benefit, but through no effort, of the concessionaire. The concession agreement to be signed for each project should therefore try to capture the resultant benefits, which would naturally ensue under an endogenous concession period contact.

Table 2.4 Influence of a Project to Another

	Causer (If it exists)	The Affected (Increase or decrease of demand in %)																
		SLE	MCTE1	Skyway 1	MCTE-ext	MNT-rehab	NAIA Exp	Skyway 2	Skyway 3	R10/C3/R9	MCTE-C5	MNT C5	LBCR	Mbay Exp	C5 Exp	Skyway 4	C6 South	NLE East	Pasex
Group A	MCTE-ext	-4	9	-16		0	-15	-3	-7	5	108	1	-33	6	5	-6	-37	0	-6
	MNT-rehab	0	0	1	1		2	3	9	1	3	-8	-4	-2	1	-5	-2	-9	-1
	NAIA Exp	0	3	-2	-1	0		0	-1	2	-3	0	-1	2	0	-1	-1	0	-1
	Skyway 2	0	2	11	-2	0	5		4	1	-4	0	-39	-2	-1	-7	-4	0	-2
	Skyway 3	0	3	13	-1	0	-8	4		-13	-4	-1	-1	-14	-3	-2	0	0	-2
	R10/C3/R9	0	0	1	0	0	6	1	3		-13	0	-1	21	-7	-5	0	0	-1
Group B	MCTE-C5	0	1	-3	6	0	-7	-4	-4	-7		1	-9	-6	13	-4	-1	0	-6
	MNT C5	0	0	-3	4	0	0	1	-38	-9	30		-6	5	39	-14	-1	-2	1
	LBCR	1	0	9	-17	0	0	-39	4	-4	-16	-1		-4	-5	13	79	0	9
	Mbay Exp	0	-5	-28	6	0	-56	-6	-32	58	-11	1	-8		-13	-5	-1	0	2
	C5 Exp	-1	-1	-16	8	0	-22	-4	-30	-22	90	3	-19	-15		-15	-3	1	-28
Group C	Skyway 4	-1	0	-9	-5	0	-11	-25	-8	-9	-15	-7	31	-5	-13		9	3	-4
	C6 South	-1	1	-2	24	0	5	-34	-3	-2	17	0	138	0	1	5		0	1
	NLE East	0	1	4	1	2	1	3	-5	-2	-6	4	-3	5	0	2	-1		-3
	Pasex	0	2	-9	-1	0	-1	-8	-3	-4	2	0	6	-2	-9	-1	0	-1	

Note: Group A-High maturity
Group B-Medium maturity
Group C-Low maturity

(3) Inter-operability

As one concession agreement is signed after another, each one should have provisions for future inter-operability. This is meant to achieve the following:

- Motorists can move from one concession to another seamlessly, using the same payment system;
- Congestion in one part could be mitigated by proper re-distribution of traffic to other parts of the network;
- Number of tollbooths can be reduced and requirements for toll space minimized; and
- Overhead for maintenance (e.g. location and number of maintenance stations, various classes of maintenance equipment, etc.) and emergency systems can be shared among several operators, aside from reaping the benefits of coordinated maintenance schedules.

Early action by the TRB is important in adopting a compatible electronic toll collection (ETC) system.

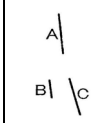
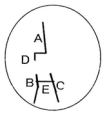
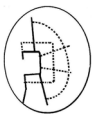
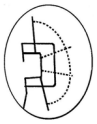
(4) Organizing for Network Management

At present, and until the different expressways become interconnected, there is no compelling need to consider new institutions. If the anticipated implementation schedule fans out, an urban expressway network would emerge only between 2006 and 2010. By then, their electronic

toll card and traffic information systems would have to function across several sections. The organization demand for the next five years can be met by the DPWH – which is to manage and stoke the development of the proposed urban expressway network.

Figure 2.3 sets out the changing organizational challenges as the network evolves. It assumes that a multiplicity of toll concessions and operators would emerge over time.

Figure 2.3 Future Phases in Expressway Development

Phase	Present	Phase 1	Phase 2	Phase 3	Phase 4
Situation	- Fragmented projects; - Sectionalized management; - No network	- Network planning; - Coordinated development - Inchoate network	- Network implementation ; - Emergence of a strong network;	- Integrated TIS and ETC - Cooperation on O&M; - Strong network	- Integrated TIS and ETC; - Shared O&M; - Complex & robust network
Network Topology					
Traffic Mgt	Virtually none, as a network	Low requirements for network traffic	Medium demand for network management	High demand for network management	High demand for network management
Dev't		Focus on project preparation	Construction of many sections	Construction of many sections	Renewal & rehabilitation

A decision about organizations is not yet critical at this stage, and can be deferred. However, there are several considerations that will shape the choices, viz: (a) forming a new government corporation is difficult to push through the legislative mill; (b) the role of the PNCC in such a network, (c) separately, the tasks can be performed either by the DPWH (for network planning and development), the TRB (for toll regulation, ETC standards) or the MMDA (for traffic information system) without need for new legislation; (d) no need for a 'banking-type' agency since the desirable form of government support is capital grant rather than project loan; (e) the active tollway operators have formed an association which could address network issues alluded to earlier.

2.5 Action Program for PPP Development

(1) Summary of Recommendations

The Action Program provides a time-scale to the following recommendations:

- Expand objective for PPP to include modalities other than big-ticket BOT projects;
- Agree on a long-term expressway network plan up to 2020, with explicit project priorities over the medium-term horizon;
- Carefully prepare project studies and establish the business case for the priority segments;
- For the key agencies to collaborate with each other, each contributing their core strengths;
- Tap ODA resources to remedy the expertise gap;
- Adopt the two-in-one project model, as a means of channeling government support;
- Move the project into the market through open, transparent, competitive tender with clear rules, only after undergoing preparatory studies;
- Establish time-bound limits on options for future extensions of an expressway concession to avoid tying up government hands;
- Designate the DPWH as the sole grantor of development rights and the TRB as the issuer of TOCs;
- Adjust toll fees more frequently; and,
- Seek appropriation for ROW acquisition in advance of tendering the concession.

(2) Agenda One: Action on Desired Network

A necessary first step is for the Government to forge a consensus on what the expressway network for Metro Manila would be to year 2020. Accordingly, the Government should put to rest incompatible (and often unsolicited) proposals.

Corollary to this is the setting of priorities to establish the sequence of implementation. The priorities should be decided on the basis of highest economic benefits and the principle of 'value for money'.

The assumed MMUEN implementation schedule is based on maturity of the project in terms of project preparation and implementation. This is based on a fragmented view of network development and should not be construed as a project priority list. The priorities should rather reflect the overall performance of the network, especially taking into account the promotion of mnutually enhancing projects and avoiding competing projects. Directly competing projects represent a duplication of function and is a waste of investment. The prioritization of projects should also look into bottleneck relievers as these projects tend to be more financially viable as well as economically rewarding.

(3) Agenda Two: Allocation of Responsibilities

With a shared vision on what needs to be done, the DPWH and the TRB should resolve to delineate their respective roles – not as agencies competing for turfs, but as partners leveraging their respective core competencies and

organizational strengths. This should lead to greater coordination (and collaboration) within the Government vis-à-vis private sector proponents/players.

(4) Agenda Three: Project Preparation

The Action Plan envisions the end to unsolicited proposals and for the Government to do its homework – by undertaking project preparation (feasibility studies and detailed designs) prior to bidding. ODA sources shall be tapped for technical assistance, which should also be utilized as occasions for capacity building.

3. OPERATION AND MAINTENANCE GUIDELINE FOR METRO MANILA EXPRESSWAYS

The multi-operator nature of the Metro Manila Urban Expressway Network (MMUEN) necessitates the use of a more sophisticated operation and maintenance scheme. To attain cost savings through synergies between operators, the organizational framework of MMUEN operation and maintenance needs to be rationalized. Moreover, it is also of benefit to end-users if the MMUEN is integrated and able to function as a seamless expressway network. This chapter aims to discuss the issues and recommend directions toward this end.

3.1 Operation and Maintenance

This section covers the scope of the operation and maintenance of the MMUEN. It includes:

- Routine maintenance: inspection, cleaning, vegetation, traffic accident recovery, and traffic regulation at work site
- Repair works: pavement renovation, repair of bridges and structures
- Rehabilitation: pavement rehabilitation, bridge and structure rehabilitation, traffic safety and control facilities rehabilitation.
- Disaster prevention: slope protection, seismic disaster prevention
- Maintenance of equipment and buildings: inspection and testing of equipment, maintenance of equipment, maintenance of buildings, vehicle management
- Expressway Operation and Traffic Management: asset management, patrols, emergency management, overlimit vehicle regulation, breakdown service, communication system, information management, toll collection.

3.2 Traffic Information System and Electronic Toll Collection System

(1) Current Status

Traffic Information System (TIS)

Traffic information includes information on traffic flow, incidents and road conditions that affect smooth traffic flow. In a narrow sense, it refers to the traffic situation of an area, a road or a particular location. Traffic volume, level of service, speed, queue length, and number of signal cycles to pass through a signalized intersection are some examples of typical traffic information. It also includes weather conditions and other events, such as construction and maintenance work, as they also affect traffic flow. Traffic information is useful not only to road users but also to road administrators to ensure good traffic management. From the viewpoint of road users, traffic information is sometimes called driver information.

In Metro Manila, several organizations deal, or are supposed to deal, with traffic information. In general, the organization in charge of road administration is also responsible for gathering and disseminating traffic information.

The types of information collection and dissemination facility are summarized in Table 3.1. Traffic information in Metro Manila is at a very rudimentary stage. Information collection and dissemination are done manually, while vehicle detectors, closed circuit television (CCTV) cameras and variable message signs (VMSs) are no longer working

Table 3.1 Traffic Information Collection and Dissemination in Metro Manila

Organization	Information Collection			Information Dissemination	
	Vehicle detector	CCTV	Manual collection	DIS	Manual dissemination
TEC	(operative)	(inoperative)		(inoperative)	
MMDA		17 cameras are in operation	By traffic enforcer		
Toll Road Operator		Not installed	Patrolling and observation point		Signboard at tollbooth
Broadcasting Networks			Helicopter		Traffic news program

Electronic Toll Collection (ETC) System

An ETC system is a system that automatically collects toll from vehicles passing on a toll road without them stopping and paying cash at a tollbooth. In addition, setting up an exclusive lane for ETC-equipped vehicles can eliminate queuing at the gate. Thus, transaction time is much faster. The ETC system consists of an on-board unit (OBU) installed in the user's vehicle, an electronic gate that identifies and classifies passing vehicles and a central processing system.

Among the four toll expressways in operation in Metro Manila, only the Skyway and the SLE have an ETC system. The same system is planned for the NLE, but no definite schedule is decided yet. The PEA Tollways Corporation, operating the MCTE 1, plans on installing an ETC system and has conducted a feasibility study already. Implementation is yet to be decided.

(2) Proposals for Traffic Information System

TIS Concept

The proposed traffic information system has various functions as listed below.

- Traffic surveillance;
- Data processing and incident detection;
- Information dissemination;
- Assistance in countermeasure implementation; and,
- Data logging.

It would be reasonable to establish a guideline to determine the coverage area of a traffic information system. The Study Team proposes, in principle, that a traffic information system be introduced in toll expressway sections with a traffic volume of more than 30,000 vehicles a day.

The traffic information system will cover all expressways, both existing and planned. There are, however, other systems that deal with traffic information, most of which though are still being planned for Metro Manila. One of these important systems is the traffic information system for ordinary streets. The existing area traffic control system, which controls most of the signals in Metro Manila, does not handle traffic information such as congestion or queue length on the road network. If a traffic information system is put in place for the road network, it must exchange congestion and other traffic data with that for the expressway network to ensure smooth traffic flow.

In order to achieve interoperability, interconnectivity and compatibility with other systems related to road traffic, the Philippine standards for ITS, such as Road Communication Standards (RCS), must be established and adopted so that all systems will stand on the same platform. RCS aims to reduce barriers and difficulties in connecting systems by establishing uniformity.

MMUEN TIS Standard

The traffic information system is an integrated system consisting of several subsystems. The complexity of the system varies depending on the subsystems employed and their configuration. In addition, there are different types of equipment to be used in each subsystem. As a result, the level of sophistication of a traffic information system can vary from the basic and simple to the most advanced and complicated. In the Main Text of this report, the most suitable system for Metro Manila expressways is presented.

(3) Proposals for ETC in Metro Manila

Basic Framework for Toll Systems and Toll Collection Methods

The toll system options for the Metro Manila expressway network are grouped into two. One is the "Independent Systems for Each Road Section" and the other is the "Single System for the Entire Network".

The biggest advantage of "Independent Systems" is that it clarifies the relationship between the traffic volumes of each expressway section and the toll revenue gained by the expressway operator. It means that a fair clearing of toll revenue among concessionaires is possible. But adopting this method is expected to cause user inconvenience, because tolls are collected on each of the expressway sections.

The adoption of a "Single System" can improve user convenience, as tolls only need to be paid once per trip. This can help alleviate traffic congestion. On the other hand, many problems must be addressed while creating the expressway network such as the method of determining, collecting and clearing toll revenues through this system.

The above comparison would suggest that the "Independent Systems" would be the better option for the Metro Manila expressway network, provided that the toll collection problem, on whether or not the traffic volume of each expressway section can be accurately obtained to allow for a fair clearing of collected tolls, can be overcome.

This problem can be solved fairly easily through the introduction of an ETC system which can record where a particular car enters and exits. Information on what roads are used can also be accurately obtained by installing roadside equipment at every junction.

Even non-ETC-equipped vehicles will not pose a problem because when they enter the expressway they will be given an ETC tag that they will return when exiting the expressway. The toll will be based on actual distances traveled according to the data recorded in the ETC tag. In this manner non-ETC-equipped vehicles will only

need to stop when entering and exiting the expressways. At all other times, information can be accurately obtained without having to make these cars stop. Moreover, the collected tolls can be accurately cleared to each expressway operator regardless of the toll collection system used.

System Concept

To realize the above functions, the MMUEN ETC system will have to be comprised of the subsystems listed below.

Entrance System for ETC-equipped Vehicle

The entrance system for ETC-equipped vehicle includes the following: vehicle detector, roadside unit (RSU), automated vehicle identification system (AVI) (including CCTV camera), and terminal computer.

At the entrance, the vehicle detector detects an approaching vehicle, then the RSU sends the tag a signal, requesting for vehicle identification data. The tag receives the signal and sends the data to the RSU. The AVI system refers to the data received by the RSU, together with the number plate captured by the CCTV camera. If the two do not match, the AVI judges the vehicle to be fraudulent and blocks its entry. If the data and the number plate match, the information about that vehicle, i.e. which entrance it used at what time, is transmitted to the tag, and the tag stores the information in its memory. The entrance system simultaneously transmits the same information to the central computer.

Entrance System for Non-ETC-equipped Vehicle

The entrance system for non-ETC-equipped vehicles comprises the following: vehicle detector, RSU, automated vehicle classification system (AVC), AVI (including CCTV camera), terminal computer, and a tag writer.

At the entrance, the vehicle detector detects an approaching vehicle, then the AVC classifies the vehicle type while the AVI reads the number plate. The tag writer immediately writes the number read from the number plate to the loaned tag, together with the vehicle type, entry time and entrance used. The entering vehicle stops briefly at the entrance and then receives the tag, which has been previously recorded with the vehicle number, entry time and entrance used. At the same time, the entrance system sends all these information to the central computer system.

Junction System

The junction system is comprised of a vehicle detector, an RSU and an terminal computer. The vehicle detector detects an approaching vehicle, then the RSU sends a signal to the tag, requesting for vehicle identification data as well as sending junction data and time data to the tag. The tag then sends vehicle identification data in response to the request and records the junction data and time data. The junction system sends the information on what vehicle passes which junction at what time to the central computer.

Exit System

The exit system is comprised of a vehicle detector, an RSU and a terminal computer. It detects the approach of a vehicle and its RSU requests the tag to send vehicle identification data, entrance data and running route data. The tag then sends the requested data to the RSU. The RSU sends the data received from the tag to the terminal computer and receives toll data from the terminal computer on the vehicle concerned. The RSU then instructs the tag to deduct the appropriate sum from the stored amount in the case of ETC-equipped vehicles. Booths for non-ETC-equipped vehicles display the toll to the driver, and the booth attendant collects payment in cash from the driver, as well as the loaned tag. Finally, the exit system sends toll collection related data, such as vehicle ID data, entrance and exit data, running route data, time and amount of toll, to the central computer system.

Central Computer System

The central computer system consists of a server computer, a memory equipment mainly. It has many functions, but the most important are as follows:

- To receive data from each entrance system, junction system and exit system;
- To stone and tally gathered data, for sending to every concessionaire and the Government in real time;
- To calculate the share of toll revenue for each concessionaire based on the data and to carry out the necessary procedures for fair toll clearance;
- To make necessary analysis, verification and inspection of the data and to take measures against errant vehicles; and,
- For related agencies to utilize the data for the purpose of analysis, cross reference and verification.

Transmission System

The ETC system shares the transmission system with the TIS.

The Dedicated Short Range Communication (DSRC) system is a communications system used between RSUs and tags. The International Telecommunication Union recommendations currently recognize 5.8GHz passive and 5.8GHz active systems as the two international standards.

The differences in technical specifications mean that the ETC system as an isolated function can operate on the 5.8GHz passive system, but if applications, such as container management, will be added to the ETC system's functions in the future, the 5.8GHz active system is more appropriate.

There are also RSUs dubbed "hybrid" which are now under trial in Shanghai. They are able to deal simultaneously with tags of both 5.8GHz active and 5.8GHz passive systems. The use of hybrid RSUs leaves users free to choose either type of tag, and manufacturers are expected to diversify tag functions and develop more attractive tags at lower prices.

(4) Cost Estimates

Assumptions of Cost Estimates

The following development stages are assumed to estimate the cost of introducing TIS and ETC system. The TIS and ETC system development scenario for each stage is likewise assumed.

Stage 1: Existing Expressway + R10/C3/R9 (Case Study Section)
Stage 2: Existing Expressway + R10/C3/R9 + Skyway 3
Stage 3: Existing Expressway + Group A Section (expected to be completed in 2010)
Stage 4: Whole Network Except for Unsolicited Sections (Pasex & Manila Bay)
Stage 5: Whole Network

Figure 3.1 Assumed Development Stages

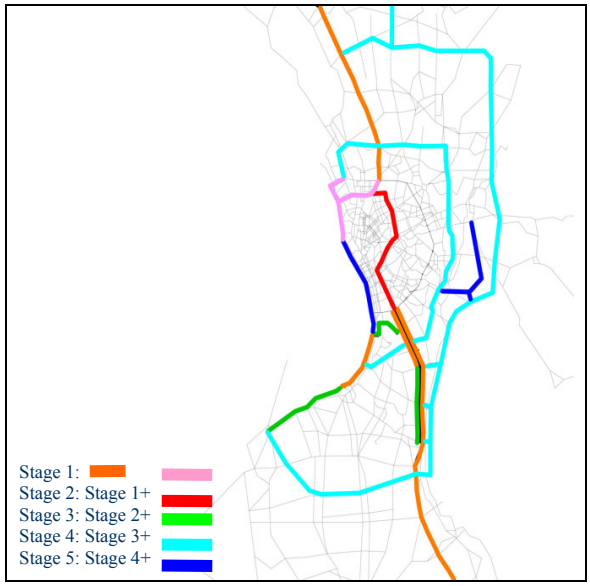
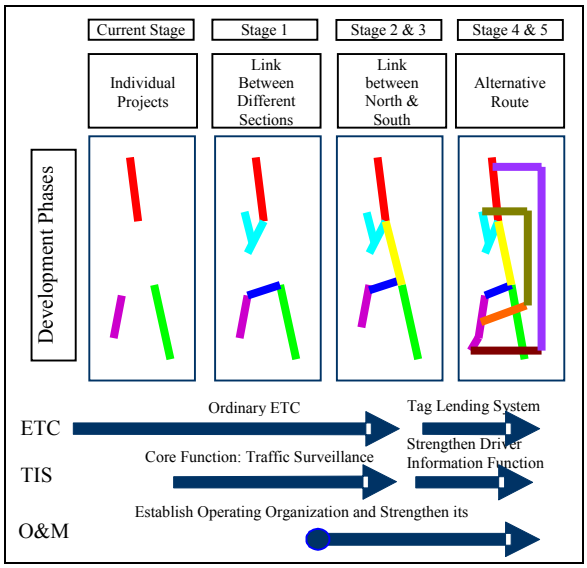


Figure 3.2 Phased Development Strategy



The assumptions of the required equipment size used to estimate costs are as follows:

TIS

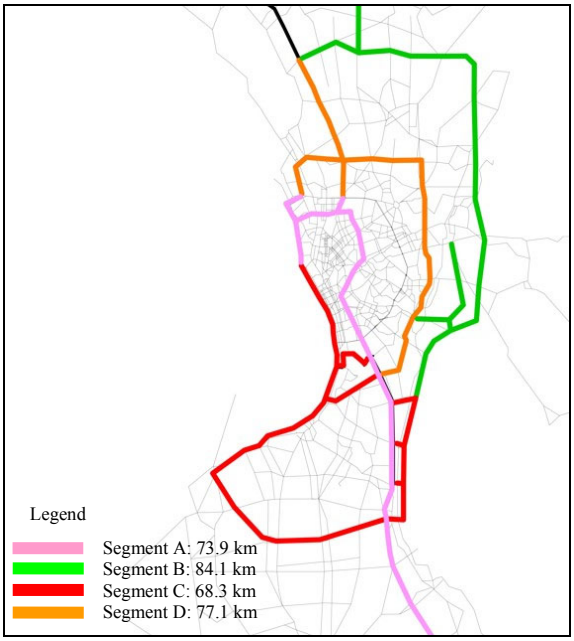
Central Computer System: 1

Number of Maintenance Office: 4 (To carry out monitoring)

Table 3.2 Field Equipment for TIS

	Segment A	Segment B	Segment C	Segment D
Vehicle Detector	At every section between junctions, at every junction and at every ramp	At every section between junctions, at every junction and at every ramp	At every section between junctions, at every junction and at every ramp	At every section between junctions, at every junction and at every ramp
CCTV Camera	At every junction	At every junction	At every junction	At every junction
VMS on Main Line	Before every junction and off-ramp	Before every junction and off-ramp	Before every junction and off-ramp	Before every junction and off-ramp
VMS at Ramp	At every on-ramp	At every on-ramp	At every on-ramp	At every on-ramp
Graphic Display Panel	3 sets	None	1 set	1 set
Emergency Telephone	Every 500m	Every 500m	Every 500m	Every 500m
Highway Radio	3 sets	None	1 set	1 set

Figure 3.3 Assumption of Segmentation



ETC

Center System: 1

Entrance System: 1 system at every on-ramp (average 1.5 lanes per ramp)

Exit System: 1 system at every off-ramp (average 1.5 lanes per ramp)

Junction System: 1 system at every junction (1 system includes 3 gantries)

Cost Estimates

- Table 3.3 shows that investment in TIS/ETC system increases in proportion to the network's scale. Stage 1 needs approximately ₱3.3 billion and Stage 5 approximately ₱11.8 billion.
- Table 3.4 shows that investment in the systems excluding those on existing sections amount to ₱1.8 billion in Stage 1 (or approximately 11.2% of the total project cost of Stage 1) and ₱11 billion in Stage 5 (or approximately 4.4% of the total project cost of Stage 5).
- Table 3.5 shows the share of estimated costs of TIS/ETC system to total investment cost (including ROW and TIS/ETC cost); toll revenue in 2010, 2015 and 2020; and total revenue for 30 years from 2010 to 2040. The share of the systems' cost in the toll revenue from 2010 to 2040 is only 1.1%.

Table 3.3 TIS/ ETC Cost Estimates

Length (km)	No. of Junction	No. of Ramps	ETC Cost (₱ mil)	TIS Cost (₱ mil)	Cost of Communication System and Cable (₱ mil)	Total (₱ mil)	Length (km)
Stage 1	73.9	1	50	1,138	1,376	774	3,287
Stage 2	99.8	1	80	1,610	1,782	1,047	4,438
Stage 3	124.6	13	105	2,121	1,624	826	4,571
Stage 4	278.7	16	198	5,710	2,765	2,233	10,708
Stage 5	303.4	19	230	6,335	2,989	2,464	11,788

Table 3.4 TIS/ ETC Cost Estimates

Length (km)	No. of Junction	No. of Ramps	ETC Cost (₱ mil)	TIS Cost (₱ mil)	Cost of Communication System and Cable (₱ mil)	Total (₱ mil)	Length (km)
Stage 1	16.6	1	13	555	987	266	1,808
Stage 2	42.5	1	43	1,027	1,390	557	2,973
Stage 3	68.6	13	71	1,538	1,624	826	4,034
Stage 4	221.4	16	161	4,806	2,765	2,233	9,923
Stage 5	246.1	19	193	5,430	2,989	2,464	11,051

(excl. those on existing sections)

Table 3.5 Comparison of TIS/ETC Costs with Investment and Revenue (%)

	Investment Cost	Revenue			
		2010	2015	2020	2010-2040
Stage 1	11.22	232.66	119.96	103.06	3.13
Stage 2	6.70	232.65	102.03	76.02	1.80
Stage 3	5.30	142.34	63.26	50.53	1.17
Stage 4	5.47	106.96	55.97	45.28	1.17
Stage 5	4.41	102.40	54.40	43.10	1.07

3.3 Organization and Cost of Expressway Operation & Maintenance

(1) Organizational Framework and Role of the Government

It is programmed that multiple concessionaires, ultimately around ten in number, will take part in the expressway projects and consequently operate and maintain separate portions of the network.

It is unusual and unrealistic to assume that as many different entities as ten will independently operate and maintain the different portions of a single network in Metro Manila with a total length of about 300 kilometers.

For operational efficiency and convenience to motorists, an organizational framework is proposed, based on the following principles:

- 24-hour conduct of activities throughout the network using uniform standards and undertaken by a central unit set up jointly by all concerned concessionaires and manned by experienced and competent personnel.
- Activities to be implemented routinely or periodically, or those to be swiftly carried out on site at any time, will be undertaken by a certain number of integrated stations, each of which will be set up by a few connected or

adjacent concessionaires and will be responsible for each of the network's sections.
- Activities based on a long- or medium-term program, or those requiring major capital expenditure, will be undertaken independently by each concessionaire.

A three-layer hierarchical structure, consisting of the Expressway Operation Center, O&M stations and each operator, should be constituted for operation and maintenance of the Metro Manila expressway network.

The roles of the Government are to:

- ensure that the operation and maintenance of the road network and related facilities are carried out properly;
- ensure that services are provided properly; and,
- guide the concessionaire, if necessary.

Periodic reports from the concessionaires about the operation and maintenance of the road network, related facilities and systems are necessary to carry out its first role.

For the second role, the Government should acquire information about the number of vehicles passing through an expressway section and the toll revenue by monitoring the ETC system. Moreover, the Government should receive reports on assets and balances.

To monitor the MMUEN, the TRB should set up a dedicated section simultaneous with the signing of the concession agreement or at the commencement of expressway operation.

(2) Cost Estimates for the Operation and Maintenance of the MMUEN

Assumptions

The O&M cost was estimated based on the assumptions listed in Table 3.6. Other assumptions are average daily traffic volume at each toll plaza is 57.2 thousand vehicles and the number of O&M stations is four.

Table 3.6 Assumption of Operation and Maintenance Cost Estimates

	Distance	No. of IC	Number of Ramps			No. of Junctions	No. of Lanes	Type of Structure
SLE	41.9	6	10	10	20	1	6	At-grade
MCTE	6.3	3	4	4	8	3	4	At-grade
Skyway1	9.1	5	5	4	9	3	6	Elevated
MCTE-ext	12.0	4	6	6	12	2	4	At-grade
MNT r/w	12.9	4	6	6	12	0	6	At-grade
NAIA Exp	4.2	4	4	4	8	3	4 & 6	Elevated
Skyway 2	9.9	3	4	4	8	3	4 & 6	Elevated
S2kyway 3	13.0	5	9	9	18	2	6	Elevated
R10/C3/R9	16.6	6	7	6	13	3	4	Elevated
MCTE-C5	6.9	2	2	2	4	1	6	At-grade
MNT C5	20.0	7	10	10	20	3	6	At-grade
LBCR	18.6	2	2	2	4	5	4	At-grade
MBE	11.1	5	10	10	20	1	6	Underground
C5 Exp	16.5	4	8	8	16	1	4	Elevated
Skyway 4	59.5	7	14	14	28	4	4	At-grade
C6 South	20.3	5	9	9	18	1	4	At-grade
NLE East	11.0	0	0	0	0	1	4	At-grade
Pasex	13.6	4	6	6	12	1	6	At-grade
Total	303.4	76	116	114	230	NET 19	-	-

Results

The estimated O&M cost of the entire network is ₱35 billion, or approximately 14% of the annual toll revenue in 2020.

Table 3.7 Estimated O&M Cost

(million Peso/yr)

Items	Cost
Routine Maintenance	1,980
Repair Works/Rehabilitation	580
O&M Stations Running	49
Operation Center Running	6
Toll Plazas Running	923
Total	3,538

4. CASE STUDY OF R10/C3/R9 (+ R10/C5 Link) EXPRESSWAY

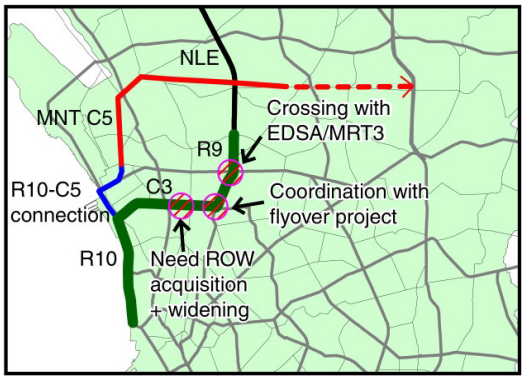
4.1 Planning Environment

(1) Background of the Case Study Expressway

At the beginning of this Study, an expressway over R10 (from 100 meters north of Zaragoza intersection to C3 intersection), C3 (from R10 intersection to A. Bonifacio Avenue) and R9 (from C3 intersection to toll gate of NLE) was designated as the object of the case study.

In the course of the Study, the Study Team proposed to extend the R10 section to the north beyond the R10/C3 intersection, turning right on C4 and linking the Case Study Expressway with MNT C5 (Phase 2) at the northern end of Dagat-dagatan Avenue. As this was approved by the DPWH and the JICA, the alignment of the Case Study Expressway was finalized as shown in Figure 4.1.

Figure 4.1 Location of Case Study Expressway

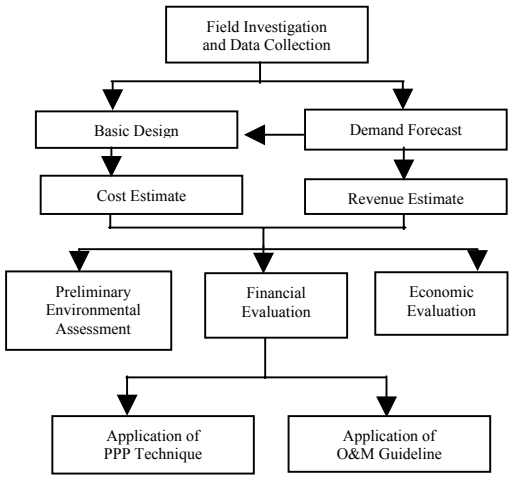


(2) Approach for Case Study

The main purpose of the case study was to examine the applicability of the PPP techniques stated in Chapter 2 and the O&M system (focusing on TIS, ETC and maintenance of expressways) stated in Chapter 3 to a selected expressway. This chapter explains the PPP techniques and O&M system more concretely from the standpoint of the Government and the private sector.

Prior to applying the PPP techniques and the O&M guideline, a feasibility study was conducted on the Case Study Expressway, following the procedures shown in Figure 4.2. Of the three evaluation methods used, the results of the financial evaluation became the key basis in designing the PPP structure of the project.

Figure 4.2 Work Flow of Case Study



(3) Consideration of Other Projects

Since the demand of an expressway will be affected by the development of another expressway, the case study needed clear assumptions on the existence of other expressways. The following cases of expressway network development were analyzed to forecast demand and evaluate the financial condition of the Case Study Expressway:

1) Existing expressways and Case Study Expressway only (Base Case)
2) Existing expressways, Case Study Expressway and Skyway Stages 3
3) Existing expressways, Case Study Expressway and MNT C5 Expressway

A precondition of this Study was that the current R10/C3/R9 arteries be widened prior to constructing the Case Study Expressway, in accordance with the geometric design standards of each artery. Some sections of these arteries are not wide enough to accommodate the elevated structures of an expressway

4.2 Demand/ Revenue Forecast

(1) Base Case (Case Study Expressway)

As a base case of demand forecast, future traffic was assigned on the network composed of existing expressways (SLE, NLE, MCTE, and Skyway Stage 1) and the Case Study Expressway (R10/C3/R9/R10 ext.) Here, no other expressways were assumed for 2010- 2040.

Under the basic toll rate of ₱4/km, daily patronage of the Case Study Expressway was estimated at 97,400 PCUs in 2010, which will increase to 143,300 PCUs in 2020 (see Table 4.1).

The average running distance on the expressway is 6.3-6.9 kilometers. Annual revenues are ₱781 million in 2010 and ₱1,312 million in 2020. (One year is equivalent to 330 days, assuming half of a weekday demand for holidays.)

Table 4.1 Demand and Revenue of Case Study Expressway under Various Toll Rates

Case	Year	Demand of Case Study Section		Toll Revenue (Million Peso/year)		
		Patronage (1000pcu/d.)	PCU-Km (1000/day)	Basic Toll	Toll by distance	Total
(1) Distance Proportional Toll Rate						
Base Case (4P/km)	2010	94.7	592	0	781	781
	2015	132.8	915	0	1,207	1,207
	2020	143.3	994	0	1,312	1,312
(2) Flat Rate						
10	2015	120.4	989	397	0	397
20	2015	99.2	907	654	0	654
30	2015	105.7	965	1,046	0	1,046
40	2015	94.1	885	1,242	0	1,242
50	2015	86.7	847	1,430	0	1,430
60	2015	67.9	670	1,344	0	1,344
70	2015	52.0	523	1,202	0	1,202
80	2015	39.7	396	1,048	0	1,048
(3) Compromised Rate						
10Peso+4 Peso/km	2010	55.9	428	184	565	749
	2015	116.5	897	384	1,184	1,568
	2020	123.8	924	409	1,220	1,629
20Peso+4 Peso/km	2010	35.9	309	237	408	645
	2015	86.5	725	571	957	1,529
	2020	122.1	991	806	1,308	2,114

The demand for an expressway is directly affected by the toll rate. Generally, as the rate goes up, the demand decreases, and the revenue rises to a certain point and thereafter goes down. When the toll rate is ₱6/km, the annual revenue will be maximized at ₱1,800 million in 2015.

The following toll rates are recommendable for the Case Study Expressway:

Year 2010 ₱4/km
Year 2015 ₱10 + 4 ₱/km
Year 2020 ₱20 + 4 ₱/km

Figure 4.3 shows the traffic flows on the Case Study Expressway assuming the recommended toll rates. The widest flow band between EDSA and the Balintawak toll gates encompasses the total volume of the NLE and the elevated portion of the Case Study Expressway.

In 2010, the daily traffic will be 74,000 PCUs on the eastern links of C3 and R9 and 41,000-44,000 PCUs on R10. The other links of the Case Study Expressway will have 20,000-33,000 PCUs. In 2020, traffic on R9, R10 and the eastern links of C3 will reach 80,000 PCUs which is the capacity of a four-lane expressway. On the other links, traffic will increase to 40,000-60,000 PCUs, which is almost double in a 10-year period.

Figure 4.3 Demand Forecast for the Case Study Expressway

(2) Case Study Expressway with Skyway Stage 3

By connecting the Case Study Expressway with the Skyway System, the expressway will significantly lose its demand. The demand will become almost half of the case without the Skyway connection. This is mainly because a sizeable part of the north-south traffic along the coast will be diverted to the inland north-south corridor enhanced by the Skyway. Fortunately, this negative influence will weaken in the long run due to the overall increase in demand and the worsening congestion on ordinary at-grade roads. The Case Study Expressway should therefore be planned in close coordination with the Skyway Stage 3 development.

(3) Case Study Expressway and MNT C5

MNT C5 will have a positive influence on the demand and revenue of the Case Study Expressway. Dividing the total revenues of both expressways by their respective PCU-km will result in a revenue for the Case Study Expressway at 20% higher than that without MNT C5 in 2010. It will be 40% higher in 2015 and 50% higher in 2020. This shows that the

financial feasibility of the Case study Expressway will be much improved by the construction of the MNT C5, particularly its western section.

It is, therefore, strongly recommended that the MNT C5 be developed as soon as possible by solving land acquisition problems along the route, not only for its sake but also for the sake of the Case Study Expressway.

4.3 Preliminary Engineering Studies

(1) Design Criteria

Geometric Design Standards

The applied design standards for expressways, interchanges, ramps, and design of speed change lanes in the Case Study Expressway are tabulated below (Tables 4.2 and 4.3).

Table 4.2 Geometric Design Standards

Description		Unit	Expressway	Interchange	Ramp
Design Speed		kph	60	60	40
Lane Width		m	3.25	3.25	3.25
Outer Shoulder Width		m	2.00	2.00	1.50
Median Width		m	2.00	--	--
	Median Island Width	m	1.00	--	--
	Inner Shoulder Width*	m	0.50	0.75	0.75
Horizontal Alignment	Minimum Radius	m	150 (130)	150 (120)	50 (40)
	Minimum Curve Length	m	100	100	--
	Maximum Super elevation	%	10.0	10.0	10.0
	Minimum Transition Length	m	50	50	35
Vertical Alignment	Maximum Gradient	%	5.0	5.0	7.0
	Minimum Radius of Vertical Curve Crest	m	2,000 (1,400)	2,000 (1,400)	450
	Sag	m	1.500 (1,000)	1,500 (1,000)	450
	Minimum Vertical Curve Length	m	50	50	35
Minimum Stopping Sight Distance		m	85 (75)	85 (75)	50 (40)
Pavement Cross fall		%	2.0	2.0	2.0
Composite Gradient		%	10.5	10.5	11.0
Vertical Clearance*		m	5.0	5.0	5.0

Note: Figures in ( ) show absolute minimum value to be used only when conditions necessitate it.

Table 4.3 Standard Speed Change Lane

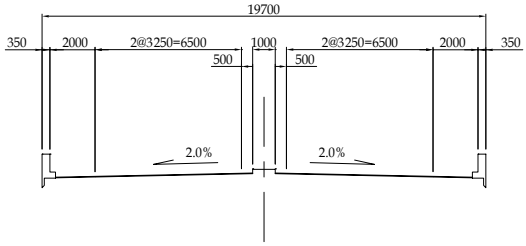
		Expressway Design Speed	
		(80 kph)	(60 kph)
Single Acceleration Lane	Acceleration Length (m)	160	120
	Taper Length (m) for Parallel Design	80	60
Single Deceleration Lane	Deceleration Length (m)	110	90
	Taper Length (m) for Parallel Design	80	60

Typical Cross-section

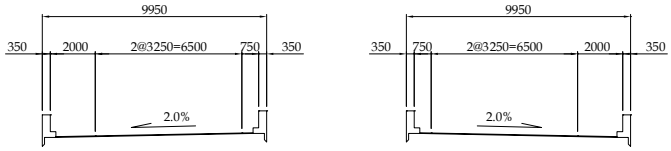
Typical cross-sections of the Case Study Expressway are illustrated in Figures 4.4. In a standard section, the expressway has four lanes of 3.25-m width each and a center median of 1.00-m width. Its outer shoulder is 2.00 m and the inner shoulder is 0.50 m. The pavement cross-fall is 2.0% in each outward direction.

Figure 4.4 Typical Cross-section of Case Study Expressway

(1) 4-lane Section



(2) 2-lane Section (Separated)



(2) Route Alignment

In this Study, the following two routes were studied:

1) Original Route

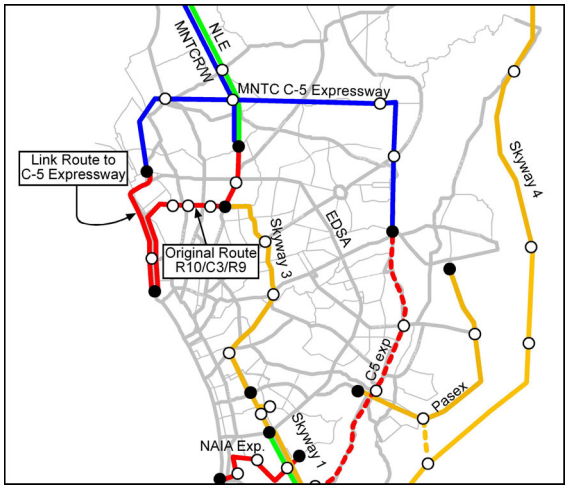
This starts about 100 m north of the R10-Zaragoza intersection and runs northward along the existing R10 up to C3. The alignment then turns eastward on C3 up to C3-A. Bonifacio intersection. From this intersection, it turns north along R9 (A. Bonifacio), crosses EDSA and links up with the NLE.

2) Link Route to C5 Expressway

This starts about 100 m north of the R10-Zaragoza intersection, runs northward along the existing R10, turns eastward on C4 up to the end point of MNT C5 Expressway on Letre Road near Dagat-dagatan Avenue.

The alignment layout of these two routes is illustrated in Figure 4.5.

Figure 4.5 Alignment of Case Study Expressway



Issues of the Original Route

In order to understand the issues concerning the original route, the following should be noted:

- Along the existing R10, the proposed widening area (inland-side) is occupied by informal dwellers.
- The horizontal alignment in the unacquired section of C3 between PNR North and Rizal Avenue requires adjustment based on the actual acquired land area.
- The C3-A. Bonifacio Intersection Improvement Project requires the modification of the expressway alignment.
- The MRT 3 extension from North Avenue to Monumento along EDSA is located in the center of the EDSA Flyover over R9. The proposed expressway shall secure the vertical clearance for MRT 3.
- The alignment of the expressway ends at approximately 160 m south from the existing Balintawak toll plaza of the NLE, which will be replaced with the new toll plaza by the MNTC.

Link Route to C5 Expressway

MNT C5 Expressway is scheduled to end at Letre Road with an at-grade intersection. Due to the section's geographical features, from McArthur Highway to Letre Road, which frequently suffers from flooding due to sea tide backwater, the MNTC suggested the application of a viaduct in this section.

In this Study, a link route to C5 Expressway is established to provide a direct connection to the MMUEN. Figure 4.6 shows the proposed layout where the elevated C5 Expressway directly connects to the elevated link route of this Study, with a trumpet-type interchange connecting the ramps to Letre Road.

Figure 4.6 Proposed Link of the Case Study Expressway and MNT C5 Expressway

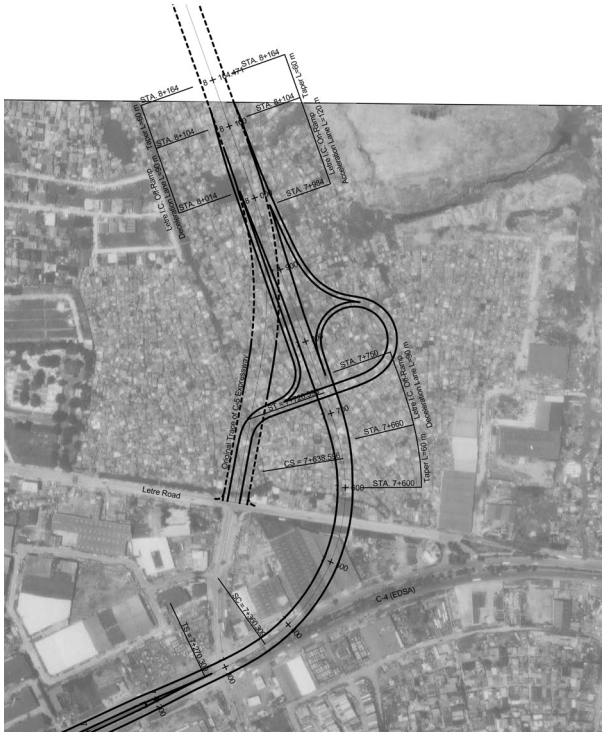


Table 4.4 On/Off-Ramp Schedule

		On-ramp	Off-ramp
R10	1	STA. 0+000 Northbound Beginning Point	STA. 0+000 Southbound Beginning Point
	2	STA. 1+435 Northbound from PPA Area	STA. 1+300 Southbound to PPA area
C3	3	STA. 5+889 Eastbound from Dagat-dagatan Avenue	STA. 5+570 Westbound, between Navotas Bridge and Dagat-dagatan Avenue
	4		STA. 7+661 Westbound to Rizal Avenue
R9	5	STA. 9+721 Southbound from EDSA	STA. 9+810 Northbound to EDSA
	6	STA. 11+290 Southbound from NLE	STA. 11+290 Northbound into NLE
Ext. Route to C5	7	STA. 6+905 Westbound from Dagat-dagatan Avenue	STA. 7+750 Northbound at Letre I.C.
	8	STA. 7+894 Northbound into MNTC C-5 Expressway at Letre I.C.	STA. 8+014 Southbound from MNTC C-5 Expressway at Letre I.C.

Note: On/Off-ramp data in rows 7 and 8 were provided for the Link Route to C-5 Expressway.

(3) Consideration of Expressway Extension Southward (South Port Area)

Two alternatives for the Case Study Expressway's southern extension are: (1) along the at-grade R10 median space constructed above the R10 flyover and the Roxas Bridge connecting to Bonifacio Drive, and (2) direct connection to the Manila North Harbor using a long span bridge based on the Manila Bay Expressway proposal. These were evaluated in Table 4.5, and Alternative-2 is recommended.

Table 4.5 Consideration of Expressway Extension Southward

	Alternative-1	Alternative-2
Land Acquisition	-Almost not necessary	-Necessary, with inhabitants' relocation
Construction of Structures	-Construction of substructures in the median space of two large bridges is considerably difficult. -Securing of traffic safety on at-grade R10 road is required during construction.	-Relatively easier than Alternative-1.
South Port Accessibility	-Relatively worse than Alternative-2.	-Smooth and direct access is anticipated.
Traffic Disruption on Local Roads	-Large piers would decrease capacity of local roads causing traffic disruption.	-Marginal, if not positive, effect on traffic
Cost	-Relatively lower cost required	-Higher cost due to required long-span bridge
Evaluation	-Not Recommendable	-Recommendable

(4) Mitigation Measures Against Flooding at C3-PNR Intersection

The section along C3 near the PNR crossing is a topographic low point and frequently suffers from flooding. It is recommended to provide a flood drainage system along C3 to guide the floodwater into the nearby Navotas River.

This drainage system assumed features a 1-m diameter pipe with a minimum covering depth of 0.5 m . The installation length will be around 1,700 m. Due to the terrain, the approach section of the drainage pipe was applied at 0.3% grade.

(5) Study of Structures

The study of structures is conducted based on the structure planning of the MMUES. In principle, the structure plans in the MMUES are not modified in terms of site and design conditions.

4.4 Cost Estimates

(1) Basic Conditions for Cost Estimates

The basic conditions for estimating costs are summarized in Table 4.6.

Table 4.6 Basic Conditions for Cost Estimates

Item	Condition
Price Level	As of July 2002
Currency of Cost Estimates	In Philippine Peso for both foreign and local currency portion
Exchange Rate	1.00 Philippine Peso = 2.36 Japanese Yen = 0.0198 US Dollar
Existing Road Condition	The widening and improvement of the roads under the new expressway shall be completed up to the construction of the R10/C3/R9 Expressway.

(2) Construction Cost of the R10/C3/R9 Expressway

The direct construction cost by segment of R10/C3/R9 is shown in Table 4.7 and the project cost is shown in Table 4.8.

Table 4.7 Direct Construction Cost of the R10/C3/R9 Expressway

Segment	Length (km)	Unit Cost (Million Pesos)	Total Cost (Million Pesos)
R10	3.41	668.2	2,278.5
Junction R10/C3	1.37	1,037.7	1,421.6
C3	3.18	642.1	2,041.7
Junction C3/R9	0.69	574.0	396.1
R9	2.66	583.8	1,553.0
R10 Extension	4.26	710.5	3,026.9
Total/Average	15.56	688.8	10,717.8

Table 4.8 Project Cost of the R10/C3/R9 Expressway

Description	Cost (Million Pesos)
Direct Construction Cost of R10/C3/R9 Expressway (DCC)	10717.8
Indirect Construction Cost (8% of DCC)	857.4
Engineering Cost (7% of DCC)	750.3
Physical Contingency (10% of DCC)	1,071.8
Total Construction Cost	13,397.3
Value Added Tax (10% of Total Construction Cost)	1,339.8

(3) Resettlement Costs of the Case Study Area

It is expected that the existing R10, C3 and R9 will be widened according to their respective rights of way (ROWs) prior to the Case Study Expressway. Resettlement cost estimates are therefore not included in the expressway cost and shall be considered for reference use only.

The Census and Tagging conducted by the URPO in 1996-1997 showed that the number of project-affected families (PAFs) in the vicinity would be 12,981. Assuming an average size of six per family, the total project-affected persons (PAPs) would be 77,886. Of these, 62 households are formal dwellers and 12,919 are informal dwellers.

The estimated costs of resettlement and compensation for R10/C3/R9/C5 Link is summarized in Table 4.9.

Table 4.9 Estimated Costs of Resettlement and Compensation for R10/C5 Link/C3

(Million Pesos)

Item	R10	C5 Link		C3/R9	Total
		Letre Rd	Others		
Informal Settlers					
Compensation for Land	231.0	4.1	241.8	0.0	476.9
Resettlement Site: Land Acquisition and Development	0.0	.00	301.0	0.0	301.0
Replacement	286.7	20.1	176.4	0.0	483.2
Relocation and Transfer	45.5	3.2	28.0	0.0	76.7
Livelihood Assistance & Skills training	22.8	1.6	14.0	0.0	38.4
One month Rent Assistance	4.6	0.0	1.4	0.0	6.0
Subtotal	590.6	29.0	702.6	0.0	1,382.2
Formal Settlers					
Compensation for Land & Structure	0.0	0.0	0.0	348.0	348.0
Subtotal	0.0	0.0	0.0	348.0	348.0
Total ROW Cost	590.6	29.0	762.6	348.0	1,730.2

4.5 Environmental Evaluation

(1) Initial Environmental Findings on the Case Study Expressway

Initial environmental findings on the R10/C3/R9/C5 link expressway are summarized in Table 4.10.

Table 4.10 Initial Environmental Findings on the R10/C3/R9/C5 Expressway Project

Route	Segment	Initial Findings	Impacts
R10	Zaragoza St. - C2	Informal dwellers' houses are built along the roadside.	Relocation Traffic Air pollution, noise
	C2 - Estero de Vitas Bridge	Informal dwellers' houses are built along the roadside. Some parts of the road are flooded during heavy rains.	Relocation Traffic Air pollution, noise Flood
	Estero de Vitas Bridge - Marala River Bridge	There is an open landfill for reclamation. This mountain is formed by garbage erosion. Rainwater including heavy metals flow onto the roadside.	Traffic Air pollution, noise Erosion, Pollution from heavy metal
C3	Marala River Bridge - C3	Informal dwellers' houses are built along the roadside. There is a pond where drain gathers from about 100m in the landside to the C3 road entrance. During heavy rains flooding occurs when the pond overflows.	Relocation Traffic Air pollution, noise Flood
	Navotas River Bridge - Dagat-dagatan Ave.	From the bridge to about 200m, informal dwellers' houses are built up to the road edge and the pavement does not function in this section. There is a central separation belt, and street trees of about 3m in height are planted.	Relocation Flora (trees)
	Dagat-dagatan Ave. - A. Mabini Ave.	There is a central separation belt, and street trees of about 3m in height are planted. There are no environment problems except for air pollution and noise.	Traffic Air pollution, noise Flora (trees)
	A. Mabini Ave. - PNR crossing	Informal dwellers' houses are built along the roadside. The vicinity of the national railway crossing in heavy rains gets flooded up to the waist.	Relocation Traffic Air pollution, noise Flood
	PNR crossing – LRT crossing (Rizal Ave.), W 5th Ave.	Though the width of road is wide (6 lanes) from the railway crossing to about 100m ahead, informal dwellers' houses are built up to the road edge. The width of road has narrowed rapidly (2 lanes) from the place ahead. The shops, small repair factories and private houses are built on the road edge.	Relocation Traffic Air pollution, noise Flora (trees)
	LRT crossing (Rizal Ave.) – R9 (A. Bonifacio Ave.), E 5th Ave.	There is a central separation belt, and street trees of about 3m in height are planted. There are few environment problems except for air pollution and noise.	Air pollution, noise Flora (trees)
R9	C3 – EDSA	The road width is insufficient compared with traffic demand. Traffic jams often occur. There are few environment problems except for traffic jam, air pollution and noise.	Traffic Air pollution, noise
	EDSA – Toll Gate	The road width is insufficient compared with traffic demand. Traffic jams often occur especially in the vicinity of bus stops.	Traffic Air pollution, noise
R10/ C5 Link	C3 – Navotas River Bridge	Informal dwellers' houses are built along R10, although the part is leveled for road expansion.	
	Navotas River Bridge – Tonsuya River Bridge	Informal dwellers' houses are built along the Navotas River. Many commercial shops and maintenance factories are along the road.	
	Tonsuya River Bridge - Dagatdagatan Ave.	Informal dwellers' houses are built along the roadside. There is a central separation belt, and street trees of about 5m in height are planted.	

(2) Environmental Screening according to JICA Guidelines

Screening is defined as "the determination whether the development project requires the performance of an environmental impact assessment". Screening investigation must be carried out for each and every environmental component. Table 4.11 lists the evaluation of impact, the necessity of EIA for overall assessment and the background which leads to the judgment.

Table 4.11 Results of Initial Environmental Screening using JICA Guidelines

No	Environmental Item	Evaluation	Remarks (Reason)
Social Environment			
1	Resettlement	Yes	Informal dwellers' houses on R10 and private houses on C3 exist
2	Economic Activities	Yes	Various economic activities exist in R10/C3/R9
3	Traffic and Public Facilities	Yes	Narrow road of W-5h of C3, traffic jam on all roads
4	Split of Communities	Unknown	Scavengers' union along R10
5	Cultural Property	No	No cultural heritage is identified in the R10/C3/R9
6	Water Rights and Rights of Common	Unknown	Rights of scavengers' union along R10 will be lost
7	Public Health Condition	No	Large refuse amount will not be produced
8	Waste	Yes	Some construction waste dumps will be produced
9	Hazards	Yes	Measures for flooded roads in heavy rain along R10/C3
Natural Environment			
10	Topography and Geology	No	No large-scale structure or earthwork
11	Soil Erosion	Unknown	Influence of soil erosion from Smoky Mountain onto R10
12	Ground Water	No	No earthwork with large-scale excavation
13	Hydrological Situation	No	No earthwork affecting hydrological situation
14	Coastal Zone	No	Project area is on land
15	Flora and Fauna	Yes	Existing street trees to be cut or replanted along C3/R9
16	Meteorology	No	No large-scale development affecting meteorology
17	Landscape	Unknown	Existing urban landscape will be affected by project
Pollution			
18	Air Pollution	Yes	Impact of exhaust gas from increased traffic
19	Water Pollution	Unknown	Discharge water/facilities, rainwater from Smoky Mountain
20	Soil Contamination	Unknown	Soil near Smoky Mountain will include heavy metals
21	Noise and Vibration	Yes	During construction and operation
22	Land Subsidence	No	Sensitive lands do not exist in the subject area

(3) Environmental Scoping according to JICA Guidelines

Scoping involves selecting from "among the predictable environment impacts arising from a development project…those regarded as significant, and based on these selections, clarify key fields and components of environmental impact assessment".

Scoping is based on the comprehensive judgments made during the screening stage. The results of scoping are shown in Table 4.12, and the category for evaluation is divided into four classes (A-D) as described below, which determines the key fields in the EIA.

A: Serious impact is predicted.
B: Some impact is predicted.
C: Extent of impact is unknown (Examination is needed to make the impact clear).
D: No impact is predicted. EIA is not necessary.

If an item is graded C or above, an environmental study of that particular item is vital.

Table 4.12 Results of Environmental Scoping Uusing JICA Guidelines

No	Environmental Item	Evalu-ation	Remarks (Reason)
Social Environment			
1	Resettlement	A	Informal dwellers' houses in R10 and private houses on C3 have no option but to resettle
2	Economic Activities	B+	Economic activities will become more active, especially the movements of cargoes from/to Manila North Port
3	Traffic and Public Facilities	B+	Traffic flow will become good, especially on W-5h of C3
4	Split of Communities	C	Split of scavengers' union along R10 will be expected
5	Cultural Property	D	No cultural heritage is identified in R10/C3/R9
6	Water Rights and Rights of Common	C	Rights of scavengers along R10 will be lost
7	Public Health Condition	D	Large amounts of refuse will not be produced
8	Waste	B	Some construction waste dumps will be produced
9	Hazards	C	Flooding along R10/C3 during heavy rains will be prevented
Natural Environment			
	Topography and Geology	D	No large-scale structure or earthwork
11	Soil Erosion	C	Subject areas are already urbanized, but the soil erosion from Smoky Mountain onto R10 will be generated
12	Ground Water	D	No earthwork with large-scale excavation
13	Hydrological Situation	D	No earthwork affecting hydrological situation
14	Coastal Zone	D	Project area is on land
15	Flora and Fauna	C	Project sites are urbanized and developed; street trees to be affected by the project
16	Meteorology	D	No large-scale development affecting meteorology
17	Landscape	B	Existing urban landscape will be affected by project
Pollution			
18	Air Pollution	B	Exhaust gas from increased traffic will cause the deterioration of air quality
19	Water Pollution	C	There is discharge of residual water from transport facilities, but this will not affect water quality; rainwater from Smoky Mountain will flow onto R10
20	Soil Contamination	C	No activities requiring chemicals, but the soil in the vicinity of Smoky Mountain will include heavy metals
21	Noise and Vibration	B	During construction and operation, noise and vibration from construction equipment and increased traffic will cause noise and vibration
22	Land Subsidence	D	Sensitive lands do not exist in the subject area

4.6 Application of the PPP Technique to the Case Study Expressway

(1) Financial and Economic Evaluation

Financial Evaluation

By comparing costs and revenues, a preliminary financial evaluation has beenwas made for the Case Study Expressway. The financial internal rate of return (FIRR) of the Case Study Project Expressway was estimated under various conditions to determine which case(s) can bring an FIRR of over 15% (not in nominal terms but in real terms). Main assumptions and points on on methodology are as follows:

1) Construction period is four years from 2006 to 2009: In 2006, land is acquired and detailed design is conducted. (Detailed design cost is 5% of the project cost).
2) To years 2007, 2008 and 2009, 15%, 40%, and 40%, respectively, of the project cost are allotted, respectively.
3) Operation and maintenance cost is 15% of annual toll revenue. (In the case of the Tokyo Metropolitan Expressway, O&M cost is about 18% of toll revenue.).
4) Evaluation period is 30 years from 2010 to 2040, which may correspond to the concession period.
5) Residual value after 30 years is not taken into account.
6) No tax exemption is considered in this analysis.

The results of the financial analysis are summarized in Table 4.13. The FIRR is calculated for three cases: (1) project cost is fully accounted; (2) ROW cost is excluded because the Government is responsible for land acquisition, and (3) a half of the project cost is accounted because government subsidy cannot exceed 50% of the project cost. In addition, the cost reduction necessary to achieve a 15% FIRR is estimated to determine the minimum contribution by the public sector to implement the project through by a PPP scheme. The analysis was made for 12 cases. Note that in Table13, Group A includes the MCTE extension, the MNT rehabilitation/widening, the NAIA Expressway, the Skyway Stages 2 and 3, and the Case Study Expressway.

Table 4.13 Results of Financial Evaluation

Case		Cost (Million Pesos)		Project FIRR (%)			Cost Reduction necessary for FIFF of 15%
		Construction	ROW	All Cost	w/o ROW	50% Cost Reduction	
1	R10/C3/R9/R10 ext.	13,397.3	350.0	10.4	10.7	16.8	40.5
2	R10/C3/R9 only	7,341.6	0.0	14.2	14.2	12.3	7.0
3	R10/R10 Extension only	6.631.6	350.0	9.8	10.3	16.3	43.0
4	R10/C3/R9/R10 ext. in Group A	13,397.3	350.0	8.1	8.3	13.7	56.5
5	C3/R9 with Rev. of R10/R10 ext.	6,765.6	0.0	17.0	17.0	-	-
6	R10/R10 ext with Rev. of C3/R9	6,631.6	350.0	16.5	17.3	-	-

Note: In Case 5 and 6 the cost of Junction R10/C3 is included in C3/R10. Both cases do not assume the Group A Projects.

The Projected FIRR for the entire Case Study Expressway is 10.4%, which is not high enough to attract private capital. If the ROW cost will be included from the total project cost, the FIRR will slightly improves by only 0.3 percentage points. If 50% of the project cost will be shouldered by the public sector, the FIRR will be 16.8%, in which case the private sector may get interested. To secure a 15% FIRR or better, the public sector has to contribute at least 40.5% of the project cost (Case 1).

If the costs of the R-10 extension and the R-10/C-3 junction will be excluded from the

project, the cost will be reduced by about 40% and the FIRR will be much improved. If the Government will shares 50% of the cost, the FIRR will be 22.4% and if 13% of cost will be subsidized, the FIRR will be 15% (Case 2). On the other hand, the FIRR of R-10+R-10/C-5 Link is lower than that of the entire Case Study Expressway, as the costs of R10 extension and R-10/C-3 junction are relatively high (Case 3).

The Case Study Expressway will significantly lose its demand significantly if the Skyway 3 is built. The FIRR will fall to 8.1% in such a case. Even with a 50% subsidy, the FIRR will only be 13.7%. To make the FIRR 15%, 56.5% of the project cost has to be shouldered by the Government (Case 4).

If the Case Study Expressway will be divided into the two groups of C-3/R-9 and R-10/+R-10/C-5 Link and the former will be implemented by the private sector while and the latter by the public sector, the FIRR of the private sector will be 17.0%, if all revenues from both of the private and the public sections will be retained by the private sector (Case 5). If the former will be implemented by the public sector and the latter by the private sector, the FIRR of the private sector will be 16.5% (Case 6).

Among the cases analyzed above, Cases 5 and 6 are suitable for a PPP scheme because their FIRRs are in the feasible range and the participation of the Government does not exceed 50% of the total cost.

Economic Evaluation

The Case Study Expressway is scheduled to open in 2011. To attain this, construction work has to be commenced at the latest in the middle of 2007. Thus, ROW acquisition and the detailed design work should be all completed in 2006. Taking these into consideration, the investment schedule is assumed as shown in Table 4.14.

To convert the cost estimated at market prices to economic cost, the standard conversion factor (SCF) was used and, assumed to be 83%. Total economic cost will be ₱ 11,470 million at 2002 prices. Through the project life of 30 years (2010-2040), the maintenance cost was assumed at 15% of annual toll revenue. No residual values were assumed in 2040.

Table 4.14 Economic Cost and Investment Schedule

(Million Pesos at 2002 Price)

	Cost Item	2006	2007	2008	2009	Total
Annual Investment Proportion (%)	ROW Cost	30	70	0	0	100
	Project Cost	6	20	50	30	100
Financial Cost	ROW Cost	1810.2	4223.8	0.0	0.0	6034.0
	Project Cost	262.8	875.9	2189.7	1313.8	4379.4
	Total	**2073.0**	**5099.7**	**2189.7**	**1318.8**	**10413.4**
Economic Cost	ROW Cost	1502.5	3505.8	0.0	0.0	5008.2
	Project Cost	218.1	727.0	1817.4	1090.5	3634.9
	Total	**1720.6**	**4232.7**	**1817.4**	**1090.5**	**8643.1**

The most direct transportation cost is the vehicle operating cost (VOC) and the travel time cost (TTC). Here, economic benefits generated by an expressway project is defined as savings of VOC and TTC attributable to the project. The benefit was estimated using the "with project" and "without project" cases, thereby allowing a comparison of traffic assignment on the network. The units VOC and TTC used in the MMUTIS were updated using overall inflation rates during 1997–2001 as shown in Tables 4.15 and 4.16, respectively.

The public mode comprises bus and jeepney; and, the private mode includes car, taxi and truck. The unit costs shown in the tables are weighted averages. The unit VOC is expressed as a function of travel speed, which is different from those used in inter-city road planning.

Table 4.15 Unit VOC by Public and Private Modes as of 2002

Velocity	Public Mode		Private Mode	
(km/hour)	Peso/1000km	Peso/hour	Peso/1000km	Peso/hour
10	6127.6	58.8	4160.9	34.6
20	5720.1	69.6	3855.1	39.5
30	5446.4	74.2	3626.8	39.4
40	5302.9	76.1	3473.5	37.9
50	5397.5	77.1	3420.3	36.1
60	5609.0	77.6	3434.5	34.3
70	5990.7	78.3	3536.1	32.7
80	6655.6	79.6	3741.7	31.3
90	7794.9	82.2	4096.2	30.2

Table 4.16 Unit TTC by Public and Private Modes

(₱/hr/veh)

Mode	1997*	1997	2005	2010	2015
Public Mode	432.3	631.1	858.4	948.3	1047.7
Private Mode	60.4	88.2	120.0	132.5	146.4

Note: * 1997 price (Others are at 2002 price)

The economic benefit is the difference of the aggregate costs between "without project" case and "with project" cases. In the case of the entire Case Study Expressway, the benefit will expectedly amount to ₱ 4,251 million pesos (as annual total) in 2010 and ₱ 5,650 million pesos in 2020.

In 2010, about 80% of the economic benefits will accrue from mitigating the congestion mitigation of private modes and 20% of public modes. The benefit brought about to the public mode will

decrease to 12% in 2015 and 11% in 2020 due to worsening traffic conditions on the ordinary road network.

Table 4.17 Economic Benefits of the Case Study Expressway

(Million Pesos)

Year	Cost Item	Entire Case Study Expwy			C3 and R9			R10 and R10/C5 Link		
		Public Mode	Private Mode	Total	Public Mode	Private Mode	Total	Public Mode	Private Mode	Total
2010	VOC	449.3	756.3	1205.6	344.3	364.3	708.6	324.3	316.3	640.6
	TTC	457.5	2587.9	3045.4	273.5	760.8	1034.3	91.5	1244.6	1336.1
	Total	906.8	3344.2	4251.0	617.8	1125.1	1742.9	415.8	1560.9	1976.7
2015	VOC	108.2	1715.2	1823.5	108.2	596.0	704.2	17.2	487.1	504.3
	TTC	492.0	2661.6	3153.6	311.5	1024.8	1336.3	235.5	1574.5	1810.0
	Total	600.2	4376.8	4977.0	419.8	1620.8	2040.5	252.8	2061.5	2314.3
2020	VOC	339.8	1509.0	1848.8	339.8	661.0	1000.8	298.3	760.7	1059.1
	TTC	302.7	3498.3	3801.0	2.7	1312.9	1315.6	53.8	1514.3	1568.2
	Total	642.5	5007.3	5649.9	342.5	1973.9	2316.4	352.2	2275.1	2627.2

The entire Case Study Expressway, the R-10/C-3/R9/C5 Link, is envisioned to have a high economic internal rate of return (EIRR) of 27.5%. In the Philippines according to the NEDA's criteria, the threshold value to judge a project as economically feasible is 15%. This, then, confirms that the project is highly economically viable. The two components of the project also show a high return of 24 - 25%, meaning, each one can be implemented independently from an economic point of view.

Table 4.18 Economic Evaluation Indicators

Evaluation Indicators	Entire Project	C3 and R9	R10 and R10/C5 Link
EIRR	27.5	24.4	25.4
B/C	11989.8	4170.6	5069.2
NPV (Million Peso)	2.21	1.87	1.99

(2) Financing Options

The R10/C3/R9 can be funded in the conventional method or via PPP. In the former, the entire cost of P13,747 million would have to be squeezed into the capital budget of DPWH. Usually, DPWH would then borrow from ODA, up to 85% of cost. The loan amount would raise public debt. If not tolled, which is likely, even those who do not use the road would bear the project cost.

Subsequently, the completed expressway can be privatized to capture private sector efficiency in operations and maintenance. However, very little private investment is gained in the process.

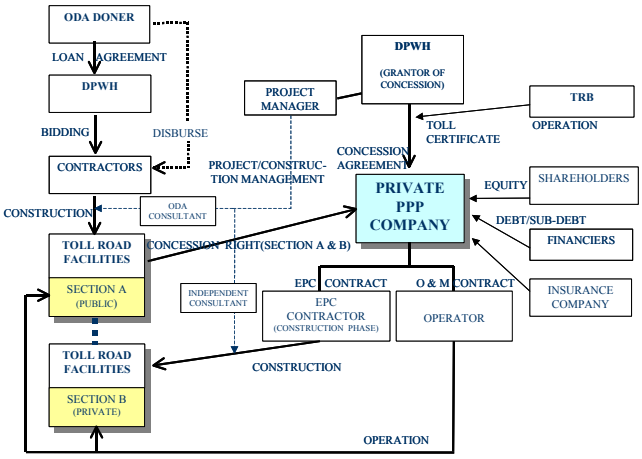
Preferably, the full cost of the R10/C3/R9 cost is assumed by the private sector. Because of the marginal FIRR (10.7% excluding ROW, and 10.4% if ROW cost is included), the project is unlikely to get serious bids. Or if somebody comes in, the resulting toll fees would be prohibitive.

Under the 'two-in-one' project scheme, government supports up to 50% of project cost (which is permissible under the IRR of the BOT Law). In such a case, the indicative FIRR jumps to about 16.8%, a level that could already attract serious bidders. But rather than channeling the funds into the private toll company, the R10/C3/R9 is split into two sub-projects, as follows:

Table 4.19 Assumed Financing Scheme

	Project Cost (Million Pesos)	Fund Source
C3/R9 (Government) Section A	1,328	Ordinary budget
	5,543	ODA sources
	6,871	Sub Total
R10+R10/C5 (Private Funding) Section B	1,719	Equity
	2,063	Domestic debt
	3,094	Foreign loan
	6,876	Sub Total

Figure 4.7 PPP Project Structure for R10/C3/R9



The above project structure implies that only 50% of the project cost would accrue from DPWH capital budget. By ceding the revenue potentials of Section A to Section B, the FIRR for the private concessionaire approaches 17.0%.

(3) Proposed Features of the Concession

- Contractual structure shall be BTO. Market risk is therefore with the private sector.
- Completion risk for Section A is assumed by the Government; that of Section B by the private concessionaire. As an incentive to faster completion of Section B, the concession period shall be reckoned from the date of completion of Section A.
- Winning bidder shall be given a period of 12 months for financial closure, beyond which the concession maybe cancelled and the performance bond or bid bond forfeited.
- Endogenous concession period is recommended to provide partial relief in the

absence of traffic guarantees and in case of delays in toll adjustments.

- The indicative rate to be used in the bidding is ₱4 per kilometer, averaged for all vehicle classes. The actual value or base rate, F_b, when the toll road commences operation may differ from this indicative rate, F_i, depending on the out turn project cost.
- The target cumulative revenue, TCR, shall be the bid price as adjusted upon project completion based on price escalation during construction period and change orders. This will effectively relieve the concessionaire of cost overruns due to inflation during construction as well as design deficiencies (made by DPWH) and transfer it to expressway users.
- Base rate, F_b, subject to periodic adjustment following a parametric formula. The concessionaire, however, is free to charge rates lower than F_b and settle for a longer period with which to recover fully TCR.
- A closed system of toll collection is recommended, combined with compatible ETC with interconnected expressways such as NLE, MNT-C5, and Skyway.
- The following incentives would accrue to the concessionaire:
  - ✧ Right to repatriate proceeds of investment at prevailing exchange rate;
  - ✧ Income tax holiday for six years from commercial operation;
  - ✧ Tax and duty exemption on imported capital equipment;
  - ✧ Tax credit on domestic capital equipment; and
  - ✧ Exemption from Contractor's Tax;

- Liabilities for the Two Road Sections – Defect liabilities due to design and construction shall be lodged with the party responsible for that section, i.e., government for Section A and to the concessionaire for Section B. Repairs arising from such damage shall be born by the concessionaire, regardless of sections, but that cost for Section A shall be added to the cumulative revenue target.
- Concession/Supervision Fee at 2% of the annual budget shall be charged for repairs and maintenance.
- Title and ownership for Section B shall be transferred to the Government upon completion of construction, except for toll collection equipment and systems which shall remain with the project company, since replacement or upgrading of technology may likely occur several times during the franchise period.
- Property insurance for all the assets shall be treated as part of operating expenses to be recovered from toll fees.

(4) Bidding and Implementation Issues

- The winning Bidder for Section A (the Government-funded section, C3/R9) shall be chosen as the lowest price among responsive bids.
- The criterion for choosing the winning bidder for Section B (and automatically, the concessionaire) shall be the lowest cumulative revenue target (TCR) that will trigger end of concession period. This revenue target would provide capital recovery for the design and building of Section B and the toll equipment and facilities for Sections A and B of the R10/C3/R9, inclusive of returns on equity and interest charges anchored on a base toll fee of P4 per kilometer.
- Section A and Section B shall have separate construction managers – one answerable to the Government and to the ODA, the other to the concessionaire and its stakeholders. Necessarily, a coordination mechanism and information-sharing arrangement has to be set up between these two groups. In addition, an independent engineer ought to be employed to ensure quality as well as integration for both sections.
- Cost and responsibility for ROW and relocation shall be borne by the government. Bidding for Section B shall commence only after substantial progress on these items.
- Simultaneous tendering of Sections A and B, to synchronize the start dates of both sections and to foster a competitive climate; and
- Section A shall have a head start to provide comfort to lenders of Section B, and minimize opportunity losses to the concessionaire.

Table 4.20 is an indicative timetable for implementing the R10/C3/R9 project. It takes into account the long lead time involved in lining up the ODA financing for the C3/R9 sections.

Table 4.20 Implementation Schedule for the R10/C3/R9 Expressway Project

	ACTIVITY	1 2003	2 2004	3 2005	4 2006	5 2007	6 2008	7 2009	8 2010	9 2011	10 2012
1	Project approval of Government										
	1.1 SAF (F/S and Basic Design review)										
	1.2 EIA clearance/Approval of NEDA										
2	Public Section										
	2.1 Request for ODA										
	2.2 Pledge										
	2.3 Loan Agreement										
	2.4 Selection of consultant										
	2.5 Preparation of BD & bid documents										
	Review of F/S and Basic Design										
	Detailed Engineering										
	Preparation of Bid Documents										
	Approval of DE and BD										
	2.6 Selection of Contractor										
	Pre Q										
	Bidding										
	Technical & Financial Evaluation										
	Negotiation & Contract Award, NTP										
	2.7 Construction										
3	Private Section										
	3.1 Preparation of Bid Docs (incl. Basic D.)										
	Review of F/S and BD										
	Preparation of BOT Bid documents										
	Approval of bid documents										
	3.2 Selection of concessionaire										
	Pre Q										
	Bidding										
	Evaluation & Approval										
	Negotiation & Signing of Conc.Agr										
	3.3 Detailed Design										
	3.4 Securing of Project Finance										
	3.5 Construction										
4	Operation										
	4.1 Grant of TOC by TRB & Set Base Toll Fee										
5	Right of Way										
	5.1 Secure appropriation										
	5.2 ROW acquisition/clearance										

(5) Detailed Financial Analysis

Conditions of Analysis

The following conditions were assumed for the detailed financial analysis.

1) Two in one Project
   C3/R9: Public Section ----- 6,871 Million Pesos
   R10/R9: Private Section --- 6,876 Million Pesos
2) Own Capital Ratio 25 %
3) Interest rate
   Deposit 5% p.a.
   Long term loan 12% p.a.
   (10 years repayment with 3 years grace period)
   Short term loan 10% p.a.
4) Inflation
   Domestic: 8% p.a.
   Foreign: 3% p.a.
5) Exchange rate Peso devaluates by 5% p.a.
6) Toll Rate
   4 Pesos/Km in 2010
   10 + 4 Pesos/km in 2015
   20 + 4 Pesos/km in 2020 and after
7) Toll Revenue
   1,032 million pesos in 2012
   1,767 million pesos in 2017
   3,843 million pesos in 2030 and after
8) Financial Cost
   Arrangement Fee (Up-front Fee) 1% of total loan amount
   Commitment Fee 0.4% of un-disbursed loan amount
   Management Fee one million pesos p.a. during operation
9) Corporate income tax: 32% of net operating income
10) Value added tax is exempted
11) Depreciation of Concession: 30 years by straight line method

Results

Annual revenue will top off in 2036 because traffic on the case study expressway reaches the capacity (80,000 pcu/day) in most sections. In nominal terms, toll rate is adjusted in every three years according to the formula stated in the concession Agreement while O&M cost is inflated at the same rate as CPI. As the toll adjustment rate is lower than the inflation rate during the foreign loan repayment period, O&M cost will increase at relatively higher rate than the gross revenue.

In the real-term cash flow, cumulative gross revenue (aggregate net revenue and O&M cost) will reach 85,777 million pesos in thirty years, 12.5 times of the initial project cost. Nominally, this rate will be 58.4 times.

Evaluation indices of FIRR and NPV are estimated as shown in Table 4.21. As long as the project cash flow concerns, the project seems financially sound. However, return to equity holders is rather low at 13.0%. This is mainly because of corporate tax payment and partially of financial cost such as arrangement fee (Up-front

Fee) and commitment fee. If the corporate tax is exempted throughout the concession period, the equity IRR in real-term will be improved to 15.5%. Therefore, some taxation measures will be needed to make this project more attractive to investors.

Table 4.22 shows the sensitivity of IRR to the change of revenue. By 10 % decrease of gross revenue, Project IRR lowers by 1.1 points and Equity IRR by 1.8 points. If the gross revenue decreases by 20%, Project IRR drops lower than 15% and Equity IRR lower than 10%. Thus, demand and revenue forecast is the key factor for the project viability.

Table 4.21 Evaluation Index of Project Cash Flow and Equity Cash Flow

	Revenue Change (times of Base Case revenue)					
	BC x 1.1	Base Case	BC x 0.9	BC x 0.8	BC x 0.6	BC x 0.4
Project IRR (%)	17.6	16.6	15.5	14.4	11.9	8.8
Equity IRR (%)	14.8	13.0	11.2	9.3	5.0	-

Table 4.22 Sensitivity of FIRR to Revenue Change (in real-term)

	Evaluation Index	Project Cash Flow	Equity Cash Flow
Real-term	NPV (at 12% of DCR)	2,184 mil. Peso	177 mil. Peso
	FIRR (%)	16.6%	13.0%
	Cost Recovery (Years)	12	17
Nominal-term	FIRR (%)	20.7%	19.1%
	Cost Recovery (Years)	12	16

(6) Beyond the R10/C3/R9

It is clear that the attractiveness of R10/C3/R9 to private investors would be enhanced with the existence of MNT-C5 and the non-existence the Skyway 3. From all indications, both the MNT-C5 and Skyway 3 would be delayed considerably. Nevertheless, the concessionaire would probably demand a protective clause against lost of traffic in the event of Skyway 3. DPWH and TRB should mobilize so that MNT-C5 is opened before R10/C3/R9. Failing in that, an 'endogenous concession period' should take care of the situation where MNT-C5 goes on stream after R10/C3/R9.

The concessionaire for the R10/C3/R9 would likely want to set up his own toll collection system, independent of and separate from that of NLT and Skyway. Steps must be taken so that inter-operability, particularly of ETC, is achieved across three toll operators.

4.7 Case Study on TIS, ETC and O&M

(1) Case Study on TIS and ETC

In this section, the assumptions of scale and equipment grade of systems as well as cost estimates are illustrated for ETC and TIS.

The form of the expressway is assumed to be as follows:

Table 4.23 Assumed Expressway Network at Completion of R10/C3/R9/C5 Expressway

	Length (km)	No. of Inter-change	Number of Ramps			No. Of Junctions	No. Of Lanes	Type of Structure
			on-ramp	Off-ramp	Total			
SLE	41.9	6	10	10	20	1	6	At-grade
MCTE	6.3	3	4	4	8	3	4	At-grade
Skyway 1	9.1	5	5	4	9	3	6	Elevated
R-10/C-3/R-9	16.6	6	7	6	13	3	4	Elevated
Stage 1 Total	73.9	20	26	24	50	Net 5	-	-
Skyway 3	13.0	5	9	9	18	2	6	Elevated
Stage 2 Total	86.9	25	35	33	68	Net 6	-	-

Assumptions

The completion time of R-10/C-3/R-9 and Skyway 3 are expected to be in 2012 at the earliest. In this case study, it is assumed that TIS and ETC will be simultaneously introduced on existing sections: SLE, MCTE and Skyway 1. Although, ETC has already been introduced on SLE and Skyway 1, it is expected that it will be replaced by around 2010, so it is assumed that the existing ETC system on SLE and Skyway 1 will be replaced to the same system as the system on R-10/C-3/R-9 at the time of R-10/C-3/R-9's completion.

It has been proposed that a complete MMUEN would be operated and routinely maintained by four O&M stations, each responsible for respective segments of the MMUEN. By the time the R10/C3/R9/C5 Link Expressway will be completed, only part of the MMUEN will be in place, therefore only two O&M stations should be set-up.

At these stages, it is assumed that there is no alternative route. Therefore, graphic display panels and highway radio systems for traffic information provision and junction systems for ETC are not necessary.

Estimated Cost

The costs of the systems are estimated in Table 4.24. These estimates are the same as the figures mentioned in Chapter 3.

Table 4.24 Cost Estimate for TIS and ETC System

(Million Pesos)

	Cost of ETC	Cost of TIS	Cost for Communication System and Cable	Total
Stage 1	1,138	1,376	774	3,287
Stage 2	1,610	1,782	1,047	4,438

(2) Case Study on Operation and Maintenance (O&M)

Organization for O&M

By 2012, it is expected that the northern part and southern part of MMUEN will be linked. It is recommended that an integrated operation and maintenance organization be established at this stage. The features of the organization are as follows:

- Related concessionaires invest in establishing the organization.
- Related concessionaires commit O&M work to the organization.
- The organization provides O&M works to the concessionaires.

The organizational structure and the roles of each division are mentioned in Chapter 3 of the Main Text.

Assumptions

The annual costs of operation and maintenance of R-10/C-3/R-9/R10/C5 Link and Skyway 3 are estimated with the following assumptions:

- Total length of expressway to be operated: .....29.6 km
  4-lane section (R-10/C-3/R-9).....16.6 km
  6-lane section (Skyway 3) .....13.0 km
- Dimension of roadway: Four-lane(R-10/C-3/R-9/R10/C5) and Six-lane(Skyway 3), two-way divided, with lighting
- Composition of roadway structure: ..elevated concrete-type viaduct
- Number of toll plazas: 11
- Daily traffic volumes handled at each toll plaza: 57,200
- Total length of entire expressway network: .....303 km
- Total length covered by an Operation and Maintenance Station: .....77 km

Cost Estimates for Operation

The result of cost estimate is as follows:

It must be noted that these estimates are not inclusive of the cost of repair and rehabilitation of the expressway. If periodic capital investment is included cost, it will entail an additional annual average cost of P43.9 million, assuming pavement overlay is done once every 12 years.

Table 4.25 O&M Cost of Case Study Expressway

((Million Peso /year)

Cost of Routine Maintenance	161.7
Shared Cost for the O&M Station	4.7
Shared Cost for the Expressway Operation Station	0.6
Operating Cost of Toll Plazas	133.4
Subtotal	300.4
General Expenses	75.1
Total	375.5

5. PREPARATION OF MODEL BIDDING DOCUMENTS

5.1 Review of Existing Bidding Documents

In order to prepare the model bidding documents under the PPP scheme, the following four existing toll expressway projects implemented or to be implemented in the Philippines were reviewed:

1) Southern Tagalog Arterial Road (STAR) Project
2) Manila-Cavite Toll Expressway (MCTE) Project
3) Manila North Tollway (MNT) Project
4) Metro Manila Skyway (MMS) Project, Phase 1

Among the four projects above, it is only with STAR project that bidding for the selection of a concessionaire was carried out by the Government through the DPWH. The others were procured in an unsolicited mode on a negotiated basis between TRB and concessionaires. A review of existing expressway projects in the Philippines showed that bidding documents were available only for the STAR project.

For the preparation of model bidding documents, references were sought on PPP projects in other countries as well as international agencies such as the United Kingdom and the United Nations Commission on International Trade Law.

The review of these references focused on the following points:

1) Appropriateness and applicability of the means and procedures of the bidding in the Philippines
2) Clearness of the scope of contract
3) Rights and obligations between contracting parties
4) Risk sharing among contracting parties
5) Contractual procedures in cases of unforeseen events and provisions for force majeure

Furthermore, the BOT Law (RA No. 7718) and its IRR were analyzed in detail to secure the applicability of the model bidding documents to PPP projects to be implemented in the Philippines.

5.2 Preparation of Model Bidding Documents

The bidding documents which were prepared for the Case Study Expressway Project consist of four components: Prequalification Documents, Bid Documents, Draft Toll Concession Agreement, and Bid Drawings. The latter two documents are part of the Bid Documents.

In preparing the bidding documents, the following points were especially noted:

1) Securing of transparency and fairness
2) Securing of competitive bidding
3) Clear contractual conditions
4) Appropriate risk sharing
5) Appropriate dispute settlement

(1) Prequalification Documents

Prospective bidders will be prequalified for the project in accordance with the method and procedures specified in the Prequalification Documents. Only applicants who passed the prequalification stage can participate in the succeeding bidding for the project.

The following is the composition of the Prequalification Documents set for the project:

Section 1: General Conditions
Section 2: Project Information
Section 3: Scope of Work
Section 4: General Information for Applicants
Section 5: Tentative Prequalification and Bidding Schedule
Section 6: Prequalification Procedures
Annexes

(2) Bid Documents

The proponent for the project will be selected through procedures specified in the Bid Documents. The Bid Documents consist of the following :

1. Bid Document Volume I:
   a. Part I Instructions to Bidders
   b. Part II Minimum Design and Performance Standards and Specifications
   c. Part III Draft Toll Concession Agreement
2. Bid Document Volume II: Bid Drawings
3. DPWH Standard Specifications for Public Works and Highways, 1988 Edition: Volume II- Highways, Bridges and Airports

Part I describes the procedures of the bidding which include bidding conditions, required documents for bidding, procedures of bid opening, bid evaluation criteria, and scoring system for the selection of a successful bidder. Part II includes the minimum requirements for design, construction and operation and maintenance to be undertaken by the proponent. Part III is a Draft Toll Concession Agreement to be entered into between the Government (the Grantor) and the Proponent (the Grantee).

The following is the contents of Volume I: Parts I and II of the Bid Documents:

Part I: Instructions to Bidders

Section 1 General Conditions
Section 2 Project Information
Section 3 Scope of Work
Section 4 General Information for Bidders
Section 5 Submission and Opening of Bids
Section 6 Bid Proposal and Evaluation Criteria

Part II: Minimum Design and Performance Standards and Specifications

Section 7 Technical Specifications: Design and Construction
Section 8 Operation and Maintenance Procedures
Annex
Bid Forms

(3) Draft Toll Concession Agreement

A Draft Toll Concession Agreement (TCA) composes a part of the Bid Documents. The Draft TCA should clearly define basic and legal relationships between parties concerned and their rights and responsibilities as well as procedures for settling matters.

The Draft TCA consists of the following sections:

Section 1 Definitions and Interpretation
Section 2 Scope of the Project
Section 3 Grant of Privilege and Recital of Obligation
Section 4 Independent Consultant
Section 5 Design of the R10/C3/R9/C5 Link Expressway Project
Section 6 Construction of the R10/C3/R9/C5 Link Expressway
Section 7 Ownership of the Toll Road
Section 8 Operation and Maintenance
Section 9 Project Financing
Section 10 Toll Rate and Toll Collections
Section 11 Default and Termination
Section 12 Representations and Warranties
Section 13 Settlement of Disputes
Section 14 Force Majeure
Section 15 Miscellaneous Provisions
Annexes

(4) Bid Drawings

Bid Drawings to be attached to the Bid Documents are provided for bidders to:

1) Provide a clear understanding of the demarcation of both sections.
2) Give structural features of the project including location, alignment, road elevation, foundation, and surrounding environment
3) Make a practical construction plan and construction schedule
4) Estimate the project cost
5) Anticipate possible problems in the implementation of the project
6) Judge the necessity of additional technical investigations

5.3 Contract Management and Project Monitoring System

The project shall be implemented under the TCA throughout the project life, from the beginning of the design and the construction phases up to the end of the operation and maintenance phase.

During Design and Construction Phases

Monitoring and management of the project during the design and the construction phases are generally carried out against the following four factors: construction progress, quality of construction, construction budget/cost, and safety/environment.

An Independent Consultant (IC) will be procured to assist the Government in managing the contract and monitoring the project during the design and the construction phases. The IC will function as both an Independent Design Checker and an Independent Certification Engineer.

During Operation and Maintenance Phase

The operation and maintenance of the entire Case Study Expressway shall be undertaken by the proponent throughout the concession period

in accordance with the TCA, the TOC and the approved Toll Operation and Maintenance Manual and Procedures (TOMMP) to be prepared by the proponent based on the Minimum Standards for Operation and Maintenance (MSOM) to be issued by the TRB. In this regard, the TRB shall have the right to inspect and check project operation and maintenance on site including the periodic verification and audit of toll revenues, financial books and all relevant records.

5.4 Points to Keep in Mind at Contract Negotiation

Financial Viability

A BOT scheme assumes that sufficient revenue is earned to recover funds invested and to assure certain operating profits for the private sector. Financial viability of a project depends on three main factors – revenue, costs and risks – that will affect the revenue and cost stream.

Technical Viability

In BOT projects, it is very important to set proper target levels of products or services. Therefore, a verification of the technical viability of a BOT project should emphasize the examination and setting of minimum specifications and requirements, which the public sector expects from a public facility. In this context, it is desirable to accept new technology and practical know-how that will be proposed by the proponent as long as these meet the minimum specifications and requirements of the facility.

Management of the Implementation Schedule of the Entire Section

The public-funded section, C3/R9, and the private-funded section, R10/C5 link, are scheduled to be implemented in parallel. In this PPP scheme, the implementation schedule for each section should be appropriately managed to realize simultaneous opening.

Appropriateness of Operation and Maintenance

The proponent shall pely as possible through proper procedures.

ANNEX

Members of the Respective Committees/Teams for The Development of the Public-Private Partnership Technique for the Metro Manila Urban Expressway Network

ANNEX

Members of the Respective Committees/Teams for The Development of the Public-Private Partnership Technique for the Metro Manila Urban Expressway Network

JICA Advisory Committee

1)	Mr. Tadashi OKUTANI	Chairman
2)	Mr. Hitoshi HAMAJI	Member

JICA Coordinators

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9)	Mr. Takashi KAMETANI	Road Structure
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6)	Mr. Romulo Neri	Current General Manager National Economic Development Authority
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13)	Mr. Reynaldo Malonzo	Member Mayor, City of Caloocan
14)	Mr. Lito Atienza	Member Mayor, City of Manila
15)	Mr. Amado Vicencio	Member Mayor, Malabon City
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