

PRIVATE DEVELOPMENT OF TRANSPORTATION INFRASTRUCTURE;
ASSESSING FEASIBILITY, RISKS, AND FINANCIAL STRATEGIES

by

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B.S. Civil Engineering Kansas State University
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Submitted to the Department of Architecture
In Partial Fulfillment of the Requirements
for the Degree of
Master of Science in Real Estate Development
at the
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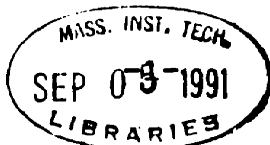
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ABSTRACT

This paper explores the belief that private development of transportation infrastructure is an economically appropriate, and financially necessary and beneficial method to supply certain types of public works.

Infrastructure has an important role in the economic and socio-cultural growth of the United States. Yet, a declining rate of investment for infrastructure maintenance and development, due in part to financially and statutorily constrained municipal, state, and federal governments, is blamed for causing a loss of global economic influence.

A need for increased investment, potentially more efficient development and operation, and the condition of fiscally constrained governments has caused the private sector to be interested in infrastructure development. Although privatization is not a panacea, it can provide an acceptable alternative for situationally developing and financing certain projects.

This paper examines: the monetarily and statutorily constrained government supply of infrastructure as a near-public good, the United States history of private toll road, railroad and airport development as far back as the late eighteenth century, the potential benefits and consequences of private infrastructure development and the types of projects which might be developed more efficiently by the private sector, the potentially significant systematic and specific risks faced by private firms, and financial trends which may permit the efficient, private development of infrastructure. Three case studies describe recent private projects/ proposals - a tollroad, a magnetically levitated train, and an airport.

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CHAPTER ONE
INFRASTRUCTURE

It is industry that gives birth to and develops in humankind new needs, and gives them at the same time the means to satisfy them.

Marc Seguin

1.10 INTRODUCTION TO INFRASTRUCTURE

Chapter One frames the problem to be explored in this thesis; the economic and sociological need for infrastructure, inherent inefficiencies of supply and demand of infrastructure as a subsidized near-public good, and the monetary and legislative constraints of infrastructure maintenance and development in the United States.

1.11 What is Infrastructure?

Public works are the underlying foundation, the basic framework of real assets which support civilization. These physical facilities provide necessary and efficient networks for transportation, communication, sanitation, national defense, and cultural and economic growth. Infrastructure is a subset of public works; physical assets required for transportation, communication, and utility services.

1.12 Economic Implications

From the beginning of time, nations have invested in the development of infrastructure to increase their economic and military power. The economic growth of industrialized nations depends on efficient production, operation and maintenance of networks for transportation, communication, and utility services. Transportation matrices (highways, waterways, railroads, and airports) enable merchants to trade across local boundaries. Communication networks (optical and audio telecommunication networks) make information transfer, and thus business, more efficient. Utility services (water and sewer treatment, power generation, and waste disposal) enable industry to mass produce commodities.

1.13 Socio-Cultural Implications

Nations also invest in infrastructure to improve socio-cultural conditions. Worker productivity and life styles change with improved infrastructure. Moreover, transportation and communication networks encourage cultural diversity and strengthen society because of improved information exchange, educational opportunities, and social interaction.

Thus, both the economy and social culture of a nation are transformed when transportation and communication networks, and municipal utility services are developed. Generally, these large and interconnected networks are financed wholly by federal, state or municipal tax revenues. A conventional social contract requires taxpayers to contribute a portion of their wealth so that infrastructure may be developed and financed. This paper, however, will explore the potential advantages of private development and finance of infrastructure.

1.20 THE ECONOMICS OF INFRASTRUCTURE

The market for infrastructure development is rather complex. Each piece of infrastructure inevitably ties into other pieces of the same class. A toll road is of no use unless it has connecting arterials to dissipate traffic, and an airport is of no use unless other airports with similar characteristics (e.g runway lengths), can meet the particular demands of aircraft. Segmenting the infrastructure market helps to analyze different types of goods.

1.21 Public Goods vs. Near Public Goods

Historically, governments have provided public goods to their citizens to encourage economic growth and to protect national interests. No other institution in society is

better equipped than the government to promote the rights of citizens in the development and protection of public goods such as national defense and clean air. Theories regarding the production of near-public goods, however, continue to be debated. *To what extent should the government provide near-public goods to the public?*¹

Most infrastructure is a near-public good. Once produced, infrastructure is jointly consumed by paying and non-paying customers. For instance, a foreign traveler may benefit from roads and other public works which have been financed entirely by native citizens. It is feasible, although not always efficient, to exclude free-riders from the benefits of a near-public good, for instance, exacting a toll on a road or bridge, or charging an airport departure tax. This user fee finances the development, operation and maintenance of the asset from revenues directly paid by those who benefit from its use. Public works in the U.S., however, are rarely financed entirely by user fees, thus, the subsidization of infrastructure.

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public good - nonexcludable and jointly consumed good

near-public good - excludable and jointly consumed good

1. James D. Gwartney and Richard Stroup, Macroeconomics: Private and Public Choice, Second Edition (Academic Press, New York, 1980): 505-516.

1.22 Inefficient Supply and Demand

Apparently, one of the inherent difficulties of efficiently matching supply and demand and deciding on equitable user fees is the problem of clearly defining which infrastructure provides a public good and which provides a near-public good. Quantifying external costs and benefits is also very difficult. Moreover, the provision of infrastructure purely from the public or private sectors may be insufficient to effectively match supply and demand.

The supply of infrastructure as a government subsidized, near-public good causes fundamental economic inefficiencies.^{2,3} Subsidizing use causes both an artificially depressed supply and inflated demand. Factors which cause an artificially low supply of infrastructure are described below.

1. The value of the good cannot be easily determined without competitive markets. Cost-benefit analysis cannot predict the full benefits of a facility without considering the aggregate willingness-to-pay of all consumers.⁴ Also, social benefits are difficult to quantify.

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2. David Beito, "Owning the Commanding Heights: Historical Perspectives on Private Streets", Public-Private Partnerships: Privatization in Historical Perspective, (Public Works Historical Society, Chicago, 1989): 23.

3. James D. Gwartney and Richard Stroup, Macroeconomics: Private and Public Choice, Second Edition (Academic Press, New York, 1980): 505-516.

4. Ibid: 512.

2. Taxpayers have minimal direct input in appropriating tax dollars, and therefore, pay for facilities in other regions from which they may never benefit. A facility which is not self-supporting (unprofitable) may be subsidized in perpetuity by non-users, ultimately decreasing taxpayer willingness-to-pay for additional infrastructure. Near-public goods cannot be produced when people don't pay.

3. Elected political representatives who are responsible for appropriating public funds may be uninformed and ignore or inflate the need for infrastructure. The "crisis orientation of public sector resource allocation and democratic decision making prevents sensible, long range planning".⁶ (The same might be said about a "crisis orientation" of publicly held private corporations whose decisions are driven by quarterly dividends.)

Factors which cause an artificially high demand of infrastructure are described below.

1. The government will not price the use of public works to their true market cost (subsidization).
2. The government will not use variable pricing mechanisms to equilibrate demand during peak periods.⁸
3. "Free-riders" may consume a greater portion of the good than they would if priced in a competitive market.

In addition to unmatched supply and demand, subsidized development of infrastructure in a non-competitive market

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5. James D. Gwartney and Richard Stroup, Macroeconomics: Private and Public Choice, Second Edition (Academic Press, New York, 1980): 506.

6. Ibid: 513.

7. Robert W. Poole, Jr., "Private Tollways: Resolving Gridlock in Southern California", (The Reason Foundation, Santa Monica, CA, May, 1988): 4-6.

8. Ibid.

may lead to inefficient production and higher development costs. Unlike the government, private firms capitalize on market inefficiencies and compete with other firms for profit by capturing a share of demand. Presumably, private firms competing in an open market will deliver and operate infrastructure more efficiently because of the profit motive.

Similar to the inefficiencies of governmentally supplied infrastructure, however, the private sector is unlikely to perfectly match supply with demand. Demand may be underexploited (underutilized asset) and supply may be artificially depressed resulting from variables discussed below.

1. Infrastructure, as a near-public good, is likely to be underutilized if the owner sets prices which exceed the marginal costs of providing service to users. If the operator charges a price which is greater than the true marginal cost of operating the facility, some people who would benefit from using the facility will be needlessly excluded. This will happen if the revenue maximizing price for the private owner exceeds both the true marginal cost and the marginal benefit for the marginal user.

2. The supply of public goods and near-public goods may be depressed due to the profit motive. Certain near-public goods are inextricably linked to the provision of pure public goods. For instance, fire trucks, police cars and ambulances provide public goods which consume near-public goods; roads. If these vehicles require accessibility to areas from which the private sector cannot profit by constructing roads, necessary public goods will be in short supply.

Thus, the private sector acting in a monopoly will potentially underexploit demand (resulting in underutilized assets) and/or depress supply of necessary public goods. Ultimately, this may decrease the standard of living for the majority while also potentially sacrificing the quality and quantity of public goods for all of society.

1.23 Resource Allocation, Efficiency and Profitability

The government is empowered with eminent domain and sovereign immunity to allocate and steward resources, protect the public, and provide functional services (some with pure social benefits such as museums and schools).

Conversely, the private sector is not constrained with meeting the same social goals for which the government is entrusted. Private firms strive to make a reasonable return on capital by assuming risks on an investment. Unlike the government, private firms do not have such far reaching powers as eminent domain or sovereign immunity, and are unable to compete with the government in the production and ownership of public works.

The government may have a natural monopoly on the production and operation of certain types of infrastructure. The concept of natural monopoly, as described by the economist

Richard Posner, concludes that if the entire demand within a given market can be satisfied at the lowest cost by one firm rather than competitive firms, competitive firms will merge or fail, or competitive firms will waste resources.⁹ A municipal water company is an example of a natural monopoly; competing firms would duplicate networks, waste resources, and pass the ultimate cost inefficiency to the consumer.

Where a natural monopoly does not exist, however, the government monopoly on infrastructure may perpetuate inefficient supply and thus, waste resources. Moreover, the opportunity cost of these inefficiencies may be severe if productive resources are diverted from social services and other public goods.

This paper concedes that the government is best equipped to efficiently protect and operate public goods and socially sensitive near-public goods, but argues that greater economic efficiency may be achieved by situationally increasing private activity in the competitive development and management of infrastructure. This paper will explore the potential efficiencies of private development and finance of infrastructure.

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9. Richard Posner, "Theories of Economic Regulation", Bell Journal of Economics (Autumn 1974): 548.

1.30 INFRASTRUCTURE DEVELOPMENT IN THE U.S.

Infrastructure development in the United States is of major concern to political representatives, business interests, developers and the general public. For many, the issue is not one of economic efficiency, but rather one of sheer politics; securing necessary capital to invest in public works.

1.31 Declining Investment

Since the turn of the century, most industrialized nations have invested large sums of money in infrastructure development, especially following World War II. These projects have supported an era of unprecedented industrial growth and international trade.

While the rate of infrastructure investment in Western European and Asian countries has increased recently, the rate of investment in the United States has declined. Japan has recently adopted a ten year, \$3.4 trillion infrastructure program.¹⁰ The U.S. currently ranks 55th in the world in capital spending on infrastructure.¹¹ The National Governor's Association estimates that the U.S. invests only

10. PW Financing, (Westfield, New Jersey) February 1991: 9.

11. William H. Miller, "The American Infrastructure", Industry Week, (May 21, 1990): 89.

1.1% of today's GNP in public works, compared to a rate of 2.3% of GNP in 1960.¹²

There is currently a tremendous shortage of capital investment for infrastructure in the U.S.. Estimates of needed capital congregate near \$3 trillion.^{13,14} Assuming an interest rate of 8.125% over thirty years (U.S. government 30 year bond rate¹⁵), a constant annual payment of \$269.6 billion would be required to finance the current needs. This year's proposed budget of \$43.8 billion for non-defense physical capital¹⁶ falls severely short of this estimate.

Deficit induced capital restraints, different spending priorities and a lack of commitment to invest federal dollars exacerbates the infrastructure crisis. Dr. Aschauer,

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12. William H. Miller, "The American Infrastructure", Industry Week, (May 21, 1990): 89.

13. Ibid.

14. Thomas W. Bradshaw, Vice President for The First Boston Corp, Debt Financing (Paper on Municipal Finance, 1986): 1.

15. Treasury Bonds, Notes & Bills, The Wall Street Journal, Friday, July 5, 1991.

16. "President Bush's 1991 Budget Does Little for Infrastructure", The Public's Capital, Volume 2, No. 3, Winter 1991. (Published by Graduate School of Public Affairs, University of Colorado, and the John F. Kennedy School of Government, Harvard University)

previous Senior Economist at the Chicago Federal Reserve Bank, estimated that a five year delay in repairing existing infrastructure will increase the costs threefold, primarily due to accelerated deterioration and higher construction costs.¹⁷

Fiscally constrained government entities are willing to experiment with privatizing certain infrastructure, demonstrated by enabling legislation enacted in several states to allow or test certain projects.¹⁸

When infrastructure development fails to meet the socio-economic needs of a nation, economic growth is constrained, standards of living decrease, and educational and cultural growth is stymied.

1.32 Governmentally Constrained Supply

The federal government has constrained infrastructure development and maintenance by reducing appropriations and by limiting the capacity of states to fund projects. The 1986 Tax Reform Act (TRA) imposed state volume caps on the

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17. William H. Miller, "The American Infrastructure", Industry Week, (May 21, 1990): 89.

18. California AB680, Virginia Highway Transportation Act, are a few examples of recent enabling legislation.

amount of private-activity bond revenue (any project with 10% "private-purpose") which can be issued per year. Therefore, state and local governments are limited in the production of public works which are funded with tax-exempt bonds and are co-sponsored by equity holding private firms.

States are financially constrained in two other ways. State governments are near debt capacity (statutory caps on general obligation bonds) and they do not have the political leverage to win public referenda approval to increase taxes. The Government Association of State Budget Officers cited twenty-nine states as having "significant budget trouble", further stating that many cities are in worse financial condition.¹⁹ The taxpayer believes that the government will not provide additional services which are worth the costs. Secondly, state and municipal bonds are being closely scrutinized as municipal issues exceed a record default of \$3.0 billion during the first half of 1991.²⁰ Poor planning, inefficient financing and unexpected economic market conditions are the cause.

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19. "Wall Street's Latest; Main Street is Paved With Gold", The Wall Street Journal, May 9, 1991: C1.

20. Credit Markets, "Corporate Bond Defaults Show Sharp Decline", The Wall Street Journal, (July 10, 1991): C1-15.

States must look for other creative sources to fund and develop needed public works. This paper will explore the opportunities, and discuss potential benefits and consequences of privately developed and financed infrastructure projects.

1.40 SUMMARY OF CHAPTER ONE

Infrastructure has an important role in the economic and socio-cultural growth of our civilization. Monopolistic development of public works causes severe economic inefficiencies when a natural monopoly does not exist and, thus, increases costs to the public. Declining government investment and constrained supply of infrastructure attract private firms to the opportunities of developing infrastructure.

The remainder of this paper will explore the potential advantages, efficiencies, and consequences of private development and finance of infrastructure. Chapter Two will briefly describe the history of private transportation development in the U.S., will address the potential benefits and consequences of privatization, and will explore the types of projects which are appropriate for privatization. Chapter Three will explore the identification and allocation of risks. Chapter Four will conceptually compare the

finance costs of infrastructure developed by the private and public sectors, and address trends which may encourage or impede private investment in infrastructure. Chapter Five will present three case studies of recent private transportation projects.

CHAPTER TWO
PRIVATIZATION

When the carriages which pass over a highway or bridge... pay toll in proportion to their weight or their tonnage, they pay for the maintenance of those public works exactly in proportion to the "tear and wear" which they occasion of them. It seems scarcely possible to determine a more equitable way of maintaining such works." - Adam Smith 1776

2.10 PRIVATIZED INFRASTRUCTURE DEVELOPMENT

Chapter One has framed the issues of infrastructure development to be explored in this thesis. Chapter Two will provide an historical context for studying the birth and demise of private transportation development in the U.S. and will address potential benefits and consequences of private infrastructure development.

2.11 What is Privatized Infrastructure Development?

While privatization connotes innumerable meanings, for the purpose of this paper privatized infrastructure development means that private firms have capital at risk with respect to a specific project. Often, a public-private partnership is established to combine the individual talents and organizational leverage of both sectors and to improve and expedite project delivery. Privatization agreements or

franchises differ greatly, but as a minimum, the government and the private firm(s) have jointly identified a demand for a public service and a potentially profitable enterprise. (Knowledgeable public and private parties do not see infrastructure privatization as a panacea for resolving the capital investment shortage. Rather, private development of near-public goods is seen as an additional option for situationally meeting public ends with private means.)

2.12 History

The privatization of infrastructure is not a new concept either in the U.S. or internationally. The United States has a particularly strong heritage of privately developed infrastructure, especially during the rapid westward expansion of the eighteenth and nineteenth centuries. This section will briefly describe the rise and decline of private infrastructure development in the United States, including descriptions of the road and bridge, railroad, and airport industries.

Highways and Bridges

Following the Revolutionary War, the states of Virginia and Maryland pooled funds with private investors to profit from developing toll roads and residual land sales. George Washington was president of the Potomac Company which, among

other projects, planned a toll road to Ohio. The federal government gave land grants to states and private firms for tollroad construction, and by the 1850's hundreds of state chartered private companies operated thousands of miles of turnpikes.

The eminent decline of road companies is primarily due to technical obsolescence; the growth of the railroad network provided a more economical means of moving goods and people. Increasing railroad competition captured a substantial marketshare of cargo transport. Over time, some private roads fell into severe disrepair with escalating road maintenance costs. In some cases, poorly maintained private roads were taken by the state and local governments, which then continued to maintain them for public use.

Government subsidies were a competitive disadvantage for private firms. In 1916, the Federal Bureau of Public Roads began funding states' development of free roads and bridges. The Bureau had a strong image of expertise and clout with state and local governments, which they advised not to build toll facilities. The argument was that toll facilities were unfair, a form of double taxation (since other levies eventually gasoline taxes, were paid to finance these improvements). A 1939 publication by the Bureau, Toll Roads

and Free Roads, was a manifesto against toll roads and bridges. Until recently, federal funding was prohibited for toll facilities.^{1,2}

Governmental lobbying against toll roads may have damaged road owners. Governmental regulation and oversight of industries increased during The Progressive Era of the late 1800's, due to notorious private firm neglect of the environment and social welfare, and suspected impropriety with government officials. In a movement to ensure the governmental responsibility for developing free roads, the Federal Bureau of Public Roads began an ardent campaign against toll bridges and roads which extended from the 1890's thru the late 1940's.

Similar to the first roads in the U.S., the first bridges were privately built and operated under state charters or franchise. Bridge construction evolved into a turnkey business with demand for greater loads and spans. Most of the major urban toll bridges were built by bridge companies

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1. Ann Durkin Keating, "Public-Private Partnerships in Public Works: A Bibliographic Essay", Public-Private Partnerships: Privatization in Historical Perspective, (Public Works Historical Society, Chicago, 1989): 86-88.

2. Bruce Sealy, Associate Professor of History, Michigan Technological University; Interview July 25, 1991.

whose stock was partially owned by adjacent cities (such as the Brooklyn bridge, built in 1867 and turned over entirely to the cities of Brooklyn and New York in 1874). With municipal governments owning substantial shares of stock in bridges, the bridge owners ultimately became merchant builders. Corporate consolidations and steel company acquisitions caused the decline of independent bridge companies in the late 1800's. Andrew Carnegie merged twenty-five of the largest bridge companies into the American Bridge Co. in 1900.³

Railroads

Railroad expansion began in the 1830's and by 1837, over 200 railroad companies were active in the U.S. Despite controversy over the federal role with railroads, merchant railroad companies were given over 130 million acres, comprising 9.5% of the continental U.S., to privately build and operate infrastructure which would improve economic and territorial accessibility. States and cities attracted railroads for economic development using financial subsidies: purchasing stocks and bonds, granting tax exemptions, granting land, and guaranteeing credit. During

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3. Ann Durkin Keating, "Public-Private Partnerships in Public Works: A Bibliographic Essay", Public-Private Partnerships: Privatization in Historical Perspective, (Public Works Historical Society, Chicago, 1989): 86-88.

the financial depression following the Civil War, municipalities stopped providing incentives to rail companies.

Subsidization of rail companies and allegations of governmental corruption within the railroad industry in the mid to late 1800's led the public to demand more governmental regulation over rates and business conduct. Regulation of railroads in 1887 began to ensure the service of the public interest. Private operation was further restricted when the rail network was nationalized during World War I. Without additional revenue from subsidies and land value capture, railroads became less profitable from cargo and passenger traffic.⁴

Airports

Prior to 1930, more than half of the 1,037 airports in the U.S. were privately built and operated by airlines, plane manufacturers and flying schools. The Great Depression caused a dramatic decline in private airport development and caused many private operators to go bankrupt. The table on the following page summarizes the private and government

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4. Ann Durkin Keating, "Public-Private Partnerships in Public Works: A Bibliographic Essay", Public-Private Partnerships: Privatization in Historical Perspective, (Public Works Historical Society, Chicago, 1989): 84-85.

shares of airport development from 1911 to 1938. (Note that a large share of the development from 1933 to 1938 may have been due to military defense.)

COST SHARE OF NEW AIRPORT DEVELOPMENT

	<u>1911 - 1932</u>	<u>1933 - 1938</u>
Private Firms	49.7%	3.6%
Municipalities	47.6%	17.7%
State Governments	2.0%	2.0%
Federal Government	0.7%	76.7%

The first airports were primarily developed by private firms, often in partnership with municipalities. Similar to railroads, airports were seen as an economic development tool to catalyze growth and create jobs. Also similar to railroads, the transportation of cargo and passengers was generally not profitable in the early years. Commercial passenger traffic was not profitable until 1959. Air cargo subsidies from the U.S. Postal Service helped keep the airline industry alive during the early years.

Along with federal and state subsidies came regulation. The federal Air Commerce Act in 1926 authorized federal regulation of airways. During the 1930's, the government recognized the strategic importance of airports for national defense. After World War II, federal policy included ultimate control of airports for national security. This was guaranteed with FAA approval of major airport sites and

federal subsidies which link airport control to the government. A re-possession clause entitles the federal government to assume operations of federally subsidized airports in the event of a national emergency. (The federal government also maintains the right to seize assets of the airline industry in the event of a national emergency, which occurred during the war with Iraq.)

From 1946 to 1971, the federal government spent over \$1.2 billion on commercial airport grants. Municipal governments financed the majority of the cost. Private developers had extreme difficulty securing site approval from the FAA for major commercial airports, and disadvantageously competed against airports which received federal subsidies.^{5,6}

Although the current economic, environmental, and political arena for business is fundamentally different from the past, it is important to draw conclusions about the respective histories of private infrastructure investment to realize the potential risks and rewards of private development in the future.

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5. Ann Durkin Keating, "Public-Private Partnerships in Public Works: A Bibliographic Essay", Public-Private Partnerships: Privatization in Historical Perspective, (Public Works Historical Society, Chicago, 1989): 89-90.

6. Paul Barrett, Associate Professor, Illinois Institute of Technology; Interview July 25, 1991.

The government used incentives to encourage private investors to finance infrastructure development for the sake of economic and territorial expansion. Infrastructure precedes development. Thus, it was common for the government to convey land and or franchise rights to private firms whose infrastructure would promote economic expansion.⁷ This related to the concept of the "tied sale"; the consumption of a second product could be achieved through the consumption of the collective good.⁸ In other words, private developers would build infrastructure, profit from residual appreciation of land adjacent to their roads, rails, and bridges, etc., while simultaneously homesteaders and urban dwellers could respectively benefit from newly claimed assets and the bounty sent from the claimed areas.

Private infrastructure development was encouraged in certain urban situations where the government was viewed as fiscally or bureaucratically incapable of providing necessary infrastructure. For example, St. Louis in the late 1800's

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7. Ann Durkin Keating, "Public-Private Partnerships in Public Works: A Bibliographic Essay", Public-Private Partnerships: Privatization in Historical Perspective, (Public Works Historical Society, Chicago, 1989)

8. David Beito, "Owning the Commanding Heights: Historical Perspectives on Private Streets", Public-Private Partnerships: Privatization in Historical Perspective, (Public Works Historical Society, Chicago, 1989): 18.

relied heavily on private street, water and sewer development because of bureaucratic corruption, incompetence, and tax and debt limits which constrained public development.⁹

The decline of private infrastructure development is also well documented. The decline began much sooner than President Roosevelt's New Deal during the Great Depression.¹⁰ A growing sentiment of the need for government provision and protection of the public good arose, accompanied by arguments which supported the government control of all natural monopolies.¹¹ To a great degree, these arguments strengthened government monopoly on most infrastructure ownership. Although historians are still researching the issues, some of the variables attributed to increased government roles and regulations, federal subsi-

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9. David Beito, "Owning the Commanding Heights: Historical Perspectives on Private Streets", Public-Private Partnerships: Privatization in Historical Perspective, (Public Works Historical Society, Chicago, 1989): 14.

10. Ann Durkin Keating, "Public-Private Partnerships in Public Works: A Bibliographic Essay", Public-Private Partnerships: Privatization in Historical Perspective, (Public Works Historical Society, Chicago, 1989): 81.

11. Charles David Jacobson, "Private Firms and Public Goods: An Historical Perspective on Contracting Out for Public Services" Public-Private Partnerships: Privatization in Historical Perspective, (Public Works Historical Society, Chicago, 1989): 54.

dies to government entities, and the decline of private ownership of transportation infrastructure are described below.

1. The Jacksonian period (late 1830's) increased voter awareness and public power beyond the common influence of business interests. Following the Civil War, municipal governments expanded functional services to provide infrastructure which had previously been provided by the private sector.¹² Voters required better and more services for the public good, many of which the private sector could not profit from owning.

2. Private firms received government subsidies and often entered long term monopolized service contracts leading to allegations of monopolistic abuse and corruption.¹³ The public demanded more governmental accountability through rate regulation and operational oversight.

3. Urbanization of cities required greater sophistication for utilities and transportation planning to protect the public health and welfare. Regulated private companies that supplied these valuable transaction specific assets became incapable of providing necessary capital for major expansions and improvements.¹⁴

4. Private firm industrialization and environmental insensitivity caused governmental functions to expand to protect the social welfare.¹⁵

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12. Ann Durkin Keating, "Public-Private Partnerships in Public Works: A Bibliographic Essay", Public-Private Partnerships: Privatization in Historical Perspective, (Public Works Historical Society, Chicago, 1989): 81.

13. Richard Ely, An Introduction to Political Economy (New York: Chataqua Press, 1889): 257.

14. Charles David Jacobson, "Private Firms and Public Goods: An Historical Perspective on Contracting Out for Public Services" Public-Private Partnerships: Privatization in Historical Perspective, (Public Works Historical Society, Chicago, 1989): 48-73.

5. Private assets were acquired by the government through condemnation.¹⁶ Some privately owned assets provided a near-public good, but without subsidization they became unprofitable (due to technical obsolescence, competition, excessive operating expenses, economic shock etc.)

6. Federal subsidization of state and municipal projects cause(d) a competitive disadvantage to private firms who vied for the same development rights.¹⁷

7. Court rulings loosened municipal tax and debt limits which allowed government to build infrastructure previously supplied by the private sector.¹⁸

For better or for worse, during a time of great anti-trust legislation in the late 1800's, the government essentially reinforced a subsidized monopoly on infrastructure.

The United States has a long and diversified history of private infrastructure development. Private firms ceased to own infrastructure for one or more of the following reasons:

1. Financial returns were not commensurate with the investment risks.

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15. Ann Durkin Keating, "Public-Private Partnerships in Public Works: A Bibliographic Essay", Public-Private Partnerships: Privatization in Historical Perspective, (Public Works Historical Society, Chicago, 1989): 81.

16. David Beito, "Owning the Commanding Heights: Historical Perspectives on Private Streets", Public-Private Partnerships: Privatization in Historical Perspective, (Public Works Historical Society, Chicago, 1989): 42.

17. Ibid.

18. Ibid.

2. Government subsidization of publicly owned infrastructure caused a discriminatory disadvantage to private firms.

3. Governmental expansion, specialization and regulation caused private firm costs to exceed costs for the public sector (natural monopoly).

Varying shocks of technological obsolescence, increased governmental regulation, increased governmental spending and competition or exogenous economic shocks impacted private firms, which caused many to change the nature of their business to government subcontracting. The government assumed greater development risks and subsidized the provision and operation of infrastructure as a near-public good. It is likely that the government has a natural monopoly on many types of infrastructure.

2.20 THE PRIVATIZATION DEBATE

Privatization is a controversial issue. Opponents claim that privatization is a regressive policy which will benefit a minority, penalize the majority with higher service costs, and decrease the public's protection from powerful business interests. Proponents argue that privatization is an equitable means of charging market fees while at the same time decreasing service costs due to claimed private firm efficiencies. A wealth of literature on privatization is available. This section abstracts the information which is most applicable to infrastructure development. General

conclusions distort the positive and negative attributes of privatization, but provide a context for evaluating projects on a case specific basis.

2.21 Benefits of Private Development

Why should private firms become more active in developing infrastructure? The contracting of public services to private firms has been shown to reduce costs,¹⁹ and if this can be extrapolated to development, private firms operating in a competitive market may develop infrastructure for less cost than the government.^{20,21,22} The comparative efficiencies of private versus public sector management continue to be debated, and conclusions vary. In comparative cost studies, Jack Donahue concludes that the critical factor for cost efficiency is not whether the

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19. Charles David Jacobson, "Private Firms and Public Goods: An Historical Perspective on Contracting Out for Public Services" Public-Private Partnerships: Privatization in Historical Perspective, (Public Works Historical Society, Chicago, 1989): 48.

20. Ibid.

21. Jack Donahue, The Privatization Decision: Public Ends, Private Means (New York: Basic Books, 1989): 76.

22. Jose A. Gomez-Ibanez, John R. Meyer and David E. Luberoff; Harvard University, "The Prospects for Privatizing Infrastructure: Lessons from U.S. Roads and Solid Waste", (Paper presented at the conference: The Third Deficit: The Shortfall in Public Investment", June 27-28, 1990): 18.

public or private sector manages the operation, but rather, whether the market is competitive or not.

Re-allocating development risks to the most capable parties may greatly reduce costs.^{23,24} Private firms have faster procurement procedures, firm efficiencies and specialization, and freely innovative finance systems which may contribute to less costly development. Infrastructure projects are not fungible assets, therefore, comparing the absolute dollar savings between government and private development is very difficult.

Re-allocating rewards to private firms who are more experienced in managing the risks of development, finance, construction and operations is an efficient means of reducing project costs. Conventionally, the government assumes almost all project, finance and operational risks. For a fee, capable firms may efficiently bear these risks. Ultimately, private firms may reduce the overall project costs and, in many cases, deliver a facility to the

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23. Robert Band, Vice President Project Development for Perini Corp., Interview May 29, 1991.

24. Scully Capital Services, Inc., "Impact of the Tax Reform Act of 1986 on Privatization", (Paper prepared for the National Council on Public Works Improvement, Washington, D.C., June 1987): ii.

government at the end of a franchise for no cost.

Second, private firms save money with faster procurement procedures.²⁵ Federal and state projects are often serial; land assembly and design must be 100% complete prior to construction. Conversely, private firms can save time by fast-tracking development. Unlike the government, private firms are not bound to competitive bidding guidelines which allow the developer to achieve other important objectives such as time savings or service guarantees. Private firms are not subject to these constraints which prolong completion, increase holding costs, and delay facility use and revenue.

Third, private firms achieve better scale economies and firm efficiencies through specialization.²⁶ They specialize in certain fields, maximizing profits by repetitive process. They have lower operating costs since they are less bound by labor unions, opting for automation whenever possible.

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25. Robert W. Poole, Jr., "Private Tollways: Resolving Gridlock in Southern California", (The Reason Foundation, Santa Monica Ca. May 1988): 21-22.

26. Charles David Jacobson, "Private Firms and Public Goods: An Historical Perspective on Contracting Out for Public Services" Public-Private Partnerships: Privatization in Historical Perspective, (Public Works Historical Society, Chicago, 1989): 49.

Government employees are often responsible for overseeing vastly different types of work and may be subject to severe administrative, procedural and cultural shocks when political leadership changes. Additionally, private firms reward employees for the monetary efficiencies they achieve, whereas governments reward employees on criteria often unrelated to their performance.²⁷

Fourth, private firms have broader access to capital markets and are more flexible to finance projects than governments. Many institutional investors (pension funds and insurance companies), who are tax exempt and have yield requirements higher than tax exempt securities, will not as readily invest in government issued tax exempt debt.²⁸ (Chapter Four will illustrate how a taxable sponsor, with a higher cost of debt financing than a government tax exempt sponsor, can achieve an overall lower relevant project cost.) Therefore, governments cannot access international and private sources of debt and equity as freely as private firms.

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27. James D. Gwartney and Richard Stroup, Macroeconomics: Private and Public Choice, Second Edition (Academic Press, New York, 1980): 514.

28. Francis McDunnough, Vice President for Goldman Sachs Co., Interview July 11, 1991.

Laws restrict both the way governments can finance projects and how they mitigate risks using finance instruments. Two examples are the state volume cap on tax-exempt private purpose bonds (states are annually limited to the greater of \$50 per capita or \$150 million) and the arbitrage restriction (an issuer fiduciary is legally restricted from arbitraging bond proceeds to hedge inflation - debt service reserve funds or temporarily unspent bond proceeds may be reinvested only for a short period).²⁹

The public may benefit from private infrastructure development. In public-private partnerships, the government can re-deploy cash received from participating revenue, tax revenue, lease payments or sales of unproductive assets into other public-goods such as human services. In a competitive market where a natural monopoly does not exist, pricing should be more efficient, thus assuring better allocation of natural, economic and managerial resources. Private developers' broader access to capital markets will conserve government debt capacity for near-public goods such as social services.

29. Tax Reform Act of 1986.

When assessing the benefits and consequences of privately developed infrastructure, government and private firms should fundamentally achieve three objectives:

Government Objectives

1. Deliver a service to the public at a lower net cost than would otherwise be achievable through conventional state delivery process (procurement and development procedures).
2. Increase the rate of investment and mitigate risk exposure by rewarding private firms for bearing some systematic-market and specific-project risks.
3. Maintain long term control of important physical assets while paying a reasonable price to shed the short term risks.

Private Firm Objectives

1. Deliver a service to the public for which it can achieve a reasonable financial return.
2. Maximize competitive advantage over the state by using: fast track construction, efficient procurement procedures, automated operations, personnel performance incentives and innovative financing techniques.
3. Mitigate risk by forming a consortium of firms with specialized expertise in: design, development, negotiations, law, construction, finance and operational management.

Private firms must have a distinguishable competitive advantage over the state in order to offer the service to the public at a lower net cost, since debt (raised through tax-exempt sources, e.g. municipal bonds) costs less for the state than for private firms and private firms' revenues are taxable. When considering the types of projects which are most appropriate for private development, the

consequences of privatization should be compared to the benefits.

2.22 Consequences of Private Development

What are the potentially negative consequences of increasing private involvement in the development of infrastructure? First, if a private firm is granted exclusive franchise rights (a non-competitive monopoly), and if the private firm is not regulated, user fees may preclude the economically disadvantaged from using the facility, resulting in underutilized assets. The government should regulate prices or provide subsidies for basic services if alternative services are not available.

Second, without the power of eminent domain and sovereign immunity, private firms may encounter development risks which ultimately increase the costs above that of a conventionally sponsored government project. Securing politically controversial franchise rights, land assembly, and environmental approvals pose significant risks. The pre-development time and costs may negate any advantages a private firm has to offer and increase costs to the user. Therefore, the private firm should secure government assistance to mitigate these risks.

Last of all, if the government sells physical assets fee simple, multiple land use problems may occur in the future. Governments can avoid this problem in many ways with lease-purchase, Build-Operate-Transfer (BOT) or Build-Transfer-Operate (BTO) agreements so that government eventually owns the physical asset and land.

Privatizing infrastructure development and operations causes social change. Theoretically, taxes would decrease and user fees for services would increase, allowing consumers more choices in allocating their incomes where they choose. Certain habits, such as frequent driving on subsidized roads, would probably change.

2.30 MATERIAL SUITABILITY: APPROPRIATE PROJECTS

What types of projects should be privatized? Projects which pose technologically complex and sophisticated development and operational challenges, and projects which private firms can offer tremendous efficiency³⁰ and or specialized technical and financial expertise are most suitable for privatized development. Projects which yield high potential

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30. Jose A. Gomez-Ibanez, John R. Meyer and David E. Luberoff; Harvard University, "The Prospects for Privatizing Infrastructure: Lessons from U.S. Roads and Solid Waste", (Paper presented at the conference: The Third Deficit: The Shortfall in Public Investment", June 27-28, 1990):

for value capture from adjacent land are most suitable for private development, while landowners who receive external benefits should pay a share of the development costs.³¹

Advanced technology may make even the most simplistic capital assets more complex. For instance, toll road development, perhaps seen simply as a business of laying down ribbons of concrete across the countryside, is evolving into a complex automated system of computer metering. Automobiles previously delayed at toll booths would be "counted" electronically (automatic vehicle identification - AVI), and the user would receive a monthly bill based on the miles and time traveled (equilibrating peak periods).

"Greenfield" development, new projects which require multi-parcel land assembly and extensive environmental mitigation, will be much more risky ventures than additions or substantial improvements to existing facilities. Political and environmental opposition may be more easily overcome when demand for a service is apparently not met by existing facilities. Examples include adding toll lanes to a clogged highway, or building a new airport terminal to relieve passenger and airplane congestion. Therefore, oppor-

31. H. Anton Tucher, Vice President for Bank of America, Interview July 11, 1991.

tunities for private infrastructure development will depend more on the specific needs of a given governmental agency, the project's financial needs and market demand, than on a given project type.

Firm efficiencies and specialization, access to financing and scale economies may allow private firms to develop complex projects faster and for less cost than the government. The caveat lies in the fact that without government subsidies, private firms may not have sufficient capital to fund long term, technologically and politically complex projects.

One exception is the privately developed English-French Tunnel Crossing, the "Chunnel". The Chunnel poses tremendous risk and technological obstacles to the sponsors. Despite a near 100% project cost overrun, it will soon be finished. This \$14+ billion project will be developed free of government sponsorship (no government financing, or guarantees).^{32,33,34}

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32. Robert W. Poole, Jr., "Private Tollways: Resolving Gridlock in Southern California", (The Reason Foundation, Santa Monica CA, May 1988): 12.

33. Philip Sington, "Limited-Recourse Shifts The Risk", Euro money, (April 1989): 85.

34. "Chunnel's Rough Seas Subside", PW Financing (December 1990): 12.

Capital intensive and technologically experimental projects which potentially benefit public goods (clean air) will probably require government subsidies. For instance, sponsors of high speed magnetically levitated rail transport (maglev) argue that maglev offers alternative modes of travel which are environmentally cleaner than air or automobile transportation. Private firms will not develop the first rail lines, however, due to high equipment costs and insufficient financial yields. Therefore, public-private partnerships are the most suitable means of delivering infrastructure which promise long term benefits to the public-good.

Projects which are not good privatization candidates are those which are: prone to intensive regulation, competition from subsidies slated exclusively for state or local governments, threatened by severe political opposition, or those burdened with unnecessary governmental oversight. Only systematic policy changes (such as reduction of Federal Aviation Administration control of municipally owned airports) will make some projects viable privatization opportunities.

2.40 SUMMARY OF CHAPTER TWO

Private infrastructure development is not new. The historical review provides context for analyzing current infrastructure development risks and opportunities. Although privatization is not a panacea for infrastructure development, allowing private development and ownership of certain infrastructure may be an efficient means of reducing project costs, appropriating resources, stimulating growth, and augmenting the existing infrastructure network.

Infrastructure technology and operations will become more complex and will require more private firm specialization, development expertise and operational efficiency. Large, capital intensive projects which benefit the public-good will require government subsidies and increased use of public-private partnerships.

Chapter Three will explore the identification and allocation of risk using an established analytical framework. Chapter Four will conceptually compare the finance costs of infrastructure developed by the private and public sectors, and address trends which may encourage or impede private investment in infrastructure. Chapter Five contains three case studies of recent private proposals/projects.

CHAPTER THREE
INFRASTRUCTURE RISK

That which is necessary is never a risk.
Paul DeGondi 1679

3.10 INFRASTRUCTURE DEVELOPMENT RISK

Chapter One stated the economic and sociological importance of infrastructure and framed the issues which have led to increased interest in the private development of public works. Chapter Two summarized the history of private transportation and addressed the potential benefits and consequences of privatization.

This chapter will explore infrastructure risk; defined as deviations from the expected course of events during development or operations. This chapter is written for real estate developers who are not familiar with the risks of infrastructure development, and also for contractors, design firms or others who are not familiar with a framework for analyzing development risks. Systematic and specific finance and business risk are defined and illustrated. The key to effectively managing risk lies in specifically defining it and structuring the deal to mitigate risk exposure.

Risk Analysis is relevant to this thesis because private firms and the government price risk differently. Each sector is equipped to bear certain risks. Similar to real estate development, risk must be explicitly identified. Strategies to mitigate or shift risk using contractual covenants or finance mechanisms can then be implemented.

3.11 Analog to Real Estate Development

Infrastructure development has risks similar to real estate development. This provides an opportunity to use an established framework for analyzing systematic and specific finance and business risks. (See Exhibit A1 in Appendix for a graphic model.) Using this construct, risks are identified, quantified, and allocated to parties who are willing and most capable of bearing them. Generally, the risks of land assembly, environmental approvals, political opposition, design, construction and financing apply to both real estate and infrastructure development. Other factors, however, distinguish the type and magnitude of risks of infrastructure development from those of real estate development.

3.12 Unique Aspects of Infrastructure Development

The risks of infrastructure development are distinguished from real estate by three primary factors. Infrastructure

development usually requires interaction with a greater number of government officials and regulators, which increases the number and magnitude of systematic and specific business and finance risks. Infrastructure development can be more speculative, relying on extended and sustainable revenue growth forecasts, which increases the number and magnitude of specific business and finance risks. And finally, infrastructure projects are generally much larger in scale, which increases the magnitude of systematic and specific finance and business risks.

Infrastructure developers are subject to volatile politics and a close working relationship with multiple governmental agencies. Generally, states must enact legislation which will allow private firms to develop revenue transportation projects. Politics are known to change. The regulatory or enabling framework upon which equity and debt investors rely may be altered due to changes in policy or political leadership. This increases systematic or specific finance or business risks. In addition to the standard development approvals, the authorization for private toll roads in California (AB680) and in Virginia (Highway Transportation Act) require extensive negotiations for approval of the

project concept, route alignment, financial plan, and financial rates of return.

Unlike fee simple ownership of a real estate asset, the infrastructure owner/operator will be subject to perpetual and extensive regulatory control after the project is built. Financial returns are negotiated to protect the public from unfair pricing, and are priced to reflect comparable equity risks. In Virginia, the return is closely scrutinized by the State Corporation Commission to comply to standards which are similar for a regulated utility company. An explicit evidentiary trail must be documented by the project owner to justify increased fares.

Second, the magnitude of risks for infrastructure is greater than most commercial real estate because of the speculative long term forecasts for revenue and growth. Transportation projects rely on extended forecasts (three to five years) to reach a 1.0 debt coverage ratio. The recovery of equity will require several more years. The equity required to cover debt and operation expenses during this ramp-up period may be very high. (A project providing congestion relief in an area of inelastic demand may provide more reliable forecasts.)

The volatility of revenue and lack of marketing resiliency for owners of transportation assets increases the magnitude of speculative risks. In most commercial real estate, pre-leasing can better ensure demand whereas a transportation project is subject to speculative market forces. Unlike the steady cash stream from a building occupied by covenant-bound tenants, revenues may vary daily. In this regard, the volatility of revenue transportation infrastructure resembles the revenue volatility of a hotel, but generally with greater capital exposure. Marketing may provide less resiliency for owners of infrastructure than for real estate because locational choices for living, working or shopping are less fluid than for transportation. Transportation choices are likely to be very price sensitive.

Third, the capital scale of infrastructure projects is generally much greater than for most real estate projects. Highway costs average about \$10 million per mile, maglev trains about \$30 million per mile, and additions to or new airports may cost hundreds of millions of dollars. With the exception of immense real estate projects built over a long period of time, infrastructure projects are generally much larger. Most real estate developers gain experience from small projects prior to attempting a multi-hundred

million dollar development. The size of infrastructure projects proportionately increases the magnitude of systematic and specific finance and business risks.

The long term speculative nature of transportation infrastructure is distinguished from large land developments and large mixed-use urban developments. In a long term land development project, the capital exposure can be limited by pre-selling parcels or phasing construction of supporting infrastructure. Transportation projects can be phased, but the phasing may not be as flexible or divisible as it may be for land. Large mixed-use urban projects may also be resistant to flexible or divisible phasing, but unlike transportation infrastructure, they rely on a diversified source of income, some of which has been secured from pre-sales or pre-leasing. Transportation infrastructure might forecast diversified sources of revenue such as land value capture (tax increment financing, development fees, etc.), but the primary source of revenue is likely to be fixed to potentially volatile passenger patronage of one asset. Projects which rely on value capture of adjacent land increase the specific business or finance risks.

3.20 SYSTEMATIC RISK

By definition, systematic risks are unforeseeable. Investors cannot predict the galaxy of systematic risks, so they price expected returns in relation to knowledge of similar projects. A negative shock to the market will impair investor's project specific return as well as increase the cost of future projects because of additional, anticipated risk. Ultimately, investors negotiate contracts and use finance instruments to shift some risks to other parties.

3.21 Identifying and Shifting Systematic Risk

There are no formulas for identifying systematic risk. Only the collective experience of a multi-disciplined project team can attempt to define a galaxy of systematic risks. To the extent that these risks can be identified, the developer should attempt to shift the burden to parties who are more capable of bearing the uncertainty. Illustrations provided in this section will demonstrate the types of systematic events which might occur, and where feasible, how the developer can shift part of the finance or business risk using covenants or financial instruments.

3.22 Systematic Finance Risk; Illustrations

Three examples of systematic finance risks are described below, with techniques for shifting the risk when feasible.

- Scenario 1. Volatile Interest Rates and Inflation Increase Floating Interest Rate Debt Payments
- Scenario 2. Constrained Capital Markets Prevent Financing
- Scenario 3. Statutory or Tax Policy Revisions Damage Developer Investment

Scenario 1. Volatile Interest Rates and Inflation Increase Floating Interest Rate Debt Payments

Imagine that a developer is trying to secure construction and permanent financing during a period of highly volatile interest rates. Financing is desperately needed to begin construction, yet locking in at a current rate may negatively impact the project return.

The developer has options to ameliorate the expected loss by choosing a variable-rate instrument and/or hedging interest. Using the futures markets (e.g. LIBOR Futures), allows developers to reduce their exposure to volatile interest rates.¹ Generally, the lender will dictate a menu of hedging options which must be used for the project.

1. Michael Ochs, "Creating the Perfect Hedge", Real Estate Finance, Vol 3, No. 2, Summer 1986: 29.

The developer may choose from a menu of variable rate instruments, depending on the interest rate forecast of the financial advisor. For instance, if rates are expected to rise in the short term during construction but fall after construction is complete, long-term fixed-rate debt can be issued for construction with a provision to convert the debt to variable rate notes after a set period. (Swaps can also be used to fix a floating rate obligation.)

Issuing floating-rate bonds or variable-rate certificates of participation (COP's are normally issued for a tax-exempt purpose) secures long term financing at or below tax-exempt commercial paper rates with the flexibility of fixing the rate during favorable market conditions. The rate floats according to a set formula until the option is exercised to set the rate.

Furthermore, if rates are expected to decrease, an issuer can limit interest rate exposure with a provision for advanced refunding (a call provision), whereby the debt or equity are called before maturity and re-financed at lower rates. A callable security will initially cost more than a non-callable security, but it may save money in the long term. Government issuers are restricted from advanced refunding, however, due to the 1986 TRA.

Scenario 2. Constrained Capital Markets Prevent Financing

Imagine that a developer has spent substantial resources completing pre-development activities for a potentially profitable project, yet domestic capital markets are illiquid or governmentally constrained and the developer cannot secure construction financing.

The developer has options to improve the chances of securing financing with credit enhancements, limited or full recourse financing, risk sharing by syndicating the debt or equity, or by accessing international capital markets.

Credit enhancements may take one of many forms. The developer might pay a bank or reputable bond insurer to provide a letter of credit (LOC) which guarantees the credit worthiness of the sponsor or project. Normally, commercial LOC's are extended for a relatively short term, say seven years. The developer might negotiate a shared agreement with the government, whereby the government will collateralize the project indebtedness with tax revenues in return for additional benefits from the developer.

The developer may attract financing by limiting the exposure of one lender or equity source through a syndication of debt or equity. International sources of debt and equity may

strengthen the developer's options to finance a worthwhile project (depending on monetary exchange rates, comparative spreads on interest rates, and capital supply).

Scenario 3. Statutory or Tax Policy Revisions Damage Developer Investment

We need not imagine a developer's nightmare much worse than the Tax Reform Act of 1986 (TRA), which dramatically impaired the development and ownership of physical assets. TRA reduced the benefits of privatization to government agencies and private investors: capping private-activity tax exempt bond financing, limiting arbitrage investment on long term securities, eliminating accelerated depreciation, doubling or quadrupling the length of depreciation schedules (depending on the type of facility), lowering the marginal tax rate (implicitly lowering the attractiveness of tax exempt securities for upper income investors), eliminating the investment tax credit, and implementing the alternative minimum tax (AMT).²

TRA caused three aftershocks:

1. The costs of private infrastructure development increased by 10% to 30%.
2. The development risks shifted back to the public sector since private firm rewards were correspondingly reduced.
3. The public subsidization of private activity decreased in government projects.

The developer has options to shift risks of political volatility through risk-sharing covenants with the government. Ownership tax liability can be shifted by executing a capital lease-purchase or build-transfer-operate (BTO) agreement with the government. Revenue floors can be programmed for facilities which provide a necessary near-public good. Franchise rights (granted through enabling legislation) can be protected from subsequent legislation which negates the franchise by securing rights for fair compensation of out-of-pocket development expenses.

Shifting systematic finance risk costs money. Thus, the developer needs to determine the value of paying someone else to bear the risk.

3.23 Systematic Business Risk: Illustrations

Three examples of systematic business risks are described below, with techniques for shifting the risk when feasible.

- Scenario 1. Economic Shock Negatively Impacts Facility Demand
- Scenario 2. Demographic Change Negatively Impacts Facility Demand
- Scenario 3. Natural Catastrophe Destroys Asset

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2. Scully Capital Services, Inc. Impact of the Tax Reform Act of 1986 on Privatization, (Washington, D.C., June 1987).

3. Ibid.

Scenario 1. *Economic Shock Negatively Impacts Facility Demand*

Imagine that a developer/operator has a portfolio of toll roads and, unfortunately, a concurrent oil embargo constrains fuel supply, which dramatically increases fuel prices.

Depending on the elasticity of toll road demand and the alternative modes of transportation, the developer with a leveraged portfolio may suffer financial losses. Theoretically, the developer may ameliorate the loss prior to the shock by managing systematic risk through diversification; developing different asset types in different geographical or economically based areas. The infrastructure developer with a diversified portfolio of facility types (e.g. presume airports and wastewater plants are not correlated) may hedge against facility obsolescence. The developer also may reduce risks by developing facilities which have inelastic demand. (In the case of a toll road, this might mean building a reliever in a congested urban area.)

Scenario 2. *Demographic Change Negatively Impacts Facility Demand*

Imagine that a developer has recently completed an airport in the sunbelt which relies upon significant seasonal migration of cohorts within a specific age bracket. Due to changing preferences and an unexpected rapid decline in the

total population within the age bracket, patronage rapidly decreases.

Unless ownership has been shifted to other parties, the developer has few options other than to bear the loss.

Scenario 3. Natural Catastrophe Destroys Asset

Imagine that a developer has recently completed a multistory toll road, and business is bullish before an earthquake destroys the asset.

The most obvious method to shift the risk of such a business catastrophe is to secure insurance which covers the capital value and lost revenue during the replacement period. The developer may also shift the risk of such a loss by transferring the asset to the government in a BTO agreement, and contractually negotiating public acceptance for replacing the asset if such an event occurs. (Some road franchise agreements transfer ownership of the asset to the government for a nominal fee, with the government receiving tax revenue, lease payments, and at the end of the franchise, operational rights to the asset. Thus, privatization proponents say the government receives a "free" facility at the termination of the franchise.)

The six scenarios described above are only a few examples of a galaxy of systematic risks which might occur during the life of a project. Moreover, the methods to shift the risks are simplistic and conceptual. The examples show, to the greatest extent possible, that the developer should define systematic risks and determine when it is feasible to shift the risks through trade-offs or up-front payment.

3.30 SPECIFIC RISK

Unlike the broad unpredictability of systematic risks, specific risks may be easier to define, since they relate to project specific variables. Although identifying specific risks may be more simple, it does not necessarily make them easier to mitigate. Similar to pricing returns of systematic finance and business risks, investors rely on experience to estimate the types of specific events which may occur and use contractual covenants and finance instruments to mitigate the risks.

3.31 Identifying and Mitigating Specific Risk

Identifying project risk requires a realistic and often pessimistic view of the potential events which can impact a project. To a large degree, specific risks can be mitigated by negotiated risk allocation; sharing risks with parties which are most capable of bearing them. For instance, the

government can bear the risks of assembling land and tort liability better than most private firms, with the power of eminent domain and sovereign immunity. Illustrations provided in this section will demonstrate the types of specific events which may occur. It will also show how the developer can mitigate part of the finance and business risk using contractual covenants and finance techniques.

3.32 Specific Finance Risk: Illustrations

Three examples of specific finance risks are described below, with techniques for mitigating the risk when feasible.

- Scenario 1. Government Non-Appropriation for Capital-Lease Risks Foreclosure
- Scenario 2. Facility Cannot be Re-financed or Owner Cannot Secure Permanent Financing
- Scenario 3. Financial Debt Covenant Prevents Prepayment

Scenario 1. Government Non-Appropriation for Capital-Lease Risks Foreclosure

Imagine that a developer has completed a facility which has been secured by annual lease payments promised by the government. During the life of the project, the government encounters fiscal problems, fails to appropriate the annual lease payment necessary to cover the project debt, and the reserve fund cannot cover the payment shortfall. The debt covenant entitles foreclosure unless certain debt coverage ratios are maintained.

The developer should avoid recourse financing, negotiate covenants with the right to cure any such default, and negotiate a lease contract with the government to be made whole in the event of non-appropriation. The developer has the ability to raise money through a subordinated mortgage or additional bond debenture, etc. to cover the temporary shortfall.

Scenario 2. *Facility Cannot be Re-financed or Owner Cannot Secure Permanent Financing*

Imagine that a developer of a rail network secured a five year mini-perm loan to finance the asset after construction. The loan covenant provides an option to extend the loan or secure permanent financing only if the debt coverage ratio exceeds 1.5 upon maturity. After five years, the project is profitable but debt coverage ratios are below 1.5. The mini-perm lender will not renew the loan and other lenders are not interested in permanently financing the asset.

The developer can mitigate finance risks by sharing ownership risks and rewards. If the rail serves a necessary near-public good, the developer may succeed in negotiating a revenue floor at which level the government will share in the operation risks. The government may promise contingent cash infusions or tax credits and exemptions because of the residual economic development catalyzed by the rail.

The developer may syndicate equity with a provision for calling additional funds in the event of a revenue shortfall. The developer may negotiate the right to exact fees from ancillary development and neighbors which benefit from the project (though fees and tax increment financing assume increased growth and increased property values, which will not occur in all regions of the country).

Scenario 3. *Financial Debt Covenant Prohibits Prepayment*

Imagine that the yield curve has been inverted for quite some time and the developer believes the "trough" has been hit. The developer locks in a fifteen year fixed rate mortgage. After five years, interest rates have declined further, yet, the mortgage agreement prevents pre-payment.

The developer should beware of mortgage agreements which impair financial flexibility. Despite the costly mistake, the developer may find a willing party to engage in an interest rate swap (an agreement where the developer trades a fixed rate mortgage for a floating rate mortgage). The developer may also negotiate a debt-equity swap, with the lender participating in future cash flow. Finally, if the developer wants to expand the facility, a wrap-around mortgage with another lender might be secured. In this case, the new mortgagee assumes payments for the first mortgage

and receives payments from the developer for a sum of the old and new mortgage at a new interest rate.

Mitigating specific finance risks costs money or requires the developer to share the expected benefits from the project. Thus, the developer needs to determine the value of the trade or payment to someone else who is willing to bear the risk.

3.33 Specific Business Risk; Illustrations

Three examples of specific business risks are described below, with techniques for mitigating the risk when feasible.

- Scenario 1. Environmental and Political Opposition
Delays Project Construction
- Scenario 2. Technological Advancement Makes Asset
Obsolete
- Scenario 3. Competitor Causes Reduced User-Fees and
Decreased Net Revenue

Scenario 1. Environmental and Political Opposition Delays Project Construction

Imagine that a developer planning to build a tunnel under the harbor between New Jersey and New York encounters unanticipated opposition from environmental groups who fear ecological damage, and from local, state, and federal political agencies who have uncoordinated review criteria.

The developer should spend resources to enlist government support for such a contentious project, to champion the public benefits, and should secure intergovernmental consensus among myriad public agencies. Land assembly and permitting can be expedited using the public power of eminent domain and political leverage. If eminent domain is not feasible for land assembly, the developer can reduce acquisition risk, and leverage available funds with land options. (Most government sponsored projects require land to be purchased up-front, with cash.)

Environmental and consumer groups interests will need to be met to avoid perpetual delays. A process known as "political mapping" requires building alliances and educating parties to the conflict. Political mapping involves identifying stakeholding proponents and opponents, gathering information which contributes to understanding stakeholder interests, prescribing mitigation which will satisfy stakeholders and finally building support for the project through negotiations.

Scenario 2. Technological Advancement Makes Asset Obsolete
Imagine that a developer has recently completed an airport relying on regional commuter air traffic from selected cities. Introduce quantum advancement in high speed rail

technology such that costs now permit feasible development. A competitive developer soon after assembles land to build a high speed rail network serving the same market.

Assuming that the rail network is more reliable and less costly for the commuter, the airport developer will suffer business loss due to the unforeseen technological advancement.

Unless the developer has sold the airport, essentially, the airport developer may have few choices but to change the airport market to serve other air users such as private operators, air cargo, or airlines maintenance facilities. Theoretically, the developer can ameliorate a loss due to technological advancement by developing a diversified portfolio of assets, described earlier (though this is highly unlikely since many developers specialize in one type of project).

Scenario 3. *Competitor Causes Reduced User-Fees and Decreased Net Revenue*

Imagine a moderately profitable toll road developer/operator has recently been shocked by a competitive toll road serving the same market area; revenues are down and may not cover debt service. Prior to the construction of the competitive toll road, objective university economists predicted that

construction of a second toll road would "oversupply" the market.

The developer could have eliminated the risk of competition by negotiating a "non-compete" clause. ("Non-compete" covenants guarantee franchise exclusivity and protect the private operation from competing facilities.) Doing so would definitely subject the franchise to rate regulation, a risk in itself because the private firm wants to maintain flexible pricing to be responsive to inflation.

The six scenarios described above are only a few examples of a galaxy of specific risks which might occur during the life of a project. Moreover, the methods to mitigate the risks are simplistic and conceptual. The examples show that to the greatest extent possible, the developer should define specific risks and determine when it is feasible to mitigate the risks through trade-offs or up-front payment. Risk management is the active manipulation of resources to minimize negative impacts to the expected course of events.

Note to the reader: Political and environmental obstacles are currently foremost risks for private infrastructure developers. (Privatization Council Fifth National Conference, Arlington, VA June 24, 1991.)

3.40 EFFICIENT RISK ALLOCATION AND MANAGEMENT

Who is most capable of bearing systematic and specific risks in the development of infrastructure? Who will assume the risks and spend the resources to manage them? Risk identification, pricing, allocation, and management is very difficult because risks are project specific. In other words, infrastructure assets are illiquid and are not fungible. Consequently, it is very difficult to build a project-type database sufficient to reliably measure risk and performance. (Standard deviation and variance are common tools for measuring and comparing risks of more fungible assets.)

Risk is generally allocated in one of three ways: it is eliminated, shifted or hedged. As a developer, the government may appear to operate in a risk-free environment but to the contrary, faces the same risks as private firms. Private firms are sensitive to risk allocation because of the profit motive, whereas the government may be insensitive to risks because of a lack of incentives and the perceived ability to financially bear all risks. This insensitivity to risks may increase development and operating costs.

Typically, the government bears most infrastructure development risks and rolls them up so that the taxpayer is not entirely aware of the cost of assuming those risks. For instance, land holding costs, design and construction delays, cost over-runs, environmental waste mitigation, delays due to political and environmental opposition, and excessive operation expenses are risks that the taxpayer assumes when the government develops infrastructure. If a cost overrun for a government project requires a new debt issue, the taxpayer incurs the additional obligations with higher taxes.

If the government and private firm have an equal cost overrun, the finance cost of the overrun may be less to the government. A second debt issue for a government project may not incur higher finance costs than the first debt issue because lenders often secure project debt with a portion of the government balance sheet and are relatively confident that the government will not fail on its obligation.

Private firms, however, bear the risk of cost overruns or inefficient management. Subordinated debt issued for a private project may incur higher finance costs than the first debt issue. Even with recourse, lenders perceive greater risk of security from project specific return.

Therefore, because of project cost sensitivity, private firms may be more capable of delivering a project at less cost than the government, bearing some risks more efficiently for a lower overall project cost.

Regardless of the risk allocation, balancing business and finance risks is critical to effective risk management. Ideally, a project with high business risk should absolutely seek a low-risk financial structure. For example, a rural toll bridge with relatively volatile cashflow should seek a finance structure which is very certain, perhaps with a low ratio of fixed-rate debt. The reality of high capital costs and a desire to keep the overall project costs low (equity costs more than debt) makes this ideal strategy very difficult to achieve. Inherently, these projects will involve high specific finance risk.

3.50 SUMMARY OF CHAPTER THREE

The risks of privatized infrastructure development are analogous to real estate development. Systematic and specific risk should be disaggregated into business and finance risks, and should be explicitly defined, allocated and managed using negotiated covenants, finance, or insurance.

Infrastructure assets are not fungible and risks must be assessed on a project specific basis to estimate potential deviations from the expected outcome. Private firms with a profit incentive may be more capable than the government of managing certain risks.

Chapter Four will examine the unique aspects of private infrastructure finance. It will conceptually compare finance costs of privately and governmentally developed infrastructure and will discuss potential sources of capital, financial trends and innovations. Chapter Five will present three recent proposals/projects of privately developed transportation infrastructure.

CHAPTER FOUR
DEVELOPMENT FINANCE

Yet, it is not granted to nations as a whole but only to few individuals to have such genius owing to their natural endowment. - Vitruvius

Chapter One stated the economic and sociological importance of infrastructure and framed the issues which have led to increased private interest in the development of public works. Chapter Two summarized the history of private transportation development and addressed the potential benefits and consequences of privatization. Chapter Three explored the identification and allocation of systematic and specific finance and business risk.

This chapter will examine the unique aspects of private infrastructure finance. To establish a context, tax exempt finance will be conceptually described. Private and government sponsored finance will be compared. Finally, private investor objectives, financial trends and innovations will be explored.

4.10 TAX EXEMPT MODEL

This section will not attempt to describe the business of municipal finance. It will conceptually describe the "typical model" for financing infrastructure to frame the discussion which follows.

Most infrastructure is financed with 100% tax exempt debt using some form of general obligation or revenue bonds. General obligation debt is secured by the full faith pledge of the government sponsor. Revenue debt (limited obligation) is secured by the expected revenue of a user-fee asset. (Revenue bonds are exempt from statutory caps on G.O. debt, and are seen by some as circumventing taxpayer control; they do not require referenda approval and if a revenue bond defaults on its obligations, future G.O. debt for the same sponsor is likely to be priced at a higher rate.)

The sponsor may use financial or contractual instruments, such as a credit enhancement or third-party insurer, to potentially decrease finance costs and to attract investors. The ultimate objective of the municipal financial sponsor is to secure finance at the lowest cost which will also be simple to administrate and politically acceptable to the sponsor's constituents.¹

One unique aspect of municipal finance which does not apply to the private sector is that projects are financed with 100% debt. The lender does not require equity because the credit risk of the government is considered to be very low.

4.20 COMPARING PRIVATE AND TAX EXEMPT DEBT FINANCE

Tax exempt debt is often viewed as the least expensive means of financing infrastructure. Although the nominal cost of municipal debt is lower than the nominal cost of privately secured debt, private firms may achieve situationally lower project costs than the government due to implicit transfers/subsidies, the current tax code, and market trends.

4.21 Transfers of Finance Cost

Tax exempt debt transfers external costs to the public which does not directly benefit, and transfers implicit "equity costs" to the constituents which do benefit from a facility.

Tax exempt debt inherently transfers an external benefit to the constituents of the government sponsor from taxpayers in other regions. Excluding federal grants, borrowers receive a benefit equal to the product of the coupon rate

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1. Thomas W. Bradshaw, "Debt Financing", (The First Boston Corporation)

and the investor taxable rate.

For instance, a tax exempt bond paying a 7% coupon to an individual investor with a combined state and federal tax obligation of 35% yields a subsidy of 2.45%. ($0.070 \times 0.350 = 0.0245$)

Neglecting financial advisory and administrative fees, the nominal cost of project debt is the coupon rate, or 7%. The real cost of project debt is the coupon rate plus the subsidy of 2.45%, or 9.45%. If federal subsidies or grants are added, the real cost of municipal debt increases.

In addition to the implicitly higher cost of debt for tax exempt sponsors, tax exempt projects have an implicit "cost of equity" which is often ignored in the comparison of public and private sector finance costs. Aaron Gurwitz explores the implicit "equity cost" for public projects. He states that a project secured by a full faith pledge from the government implicitly transfers the equity risk to the taxpayer. If the economic costs exceed the benefits, the taxpayer loses. Similarly, a limited obligation project implicitly transfers the equity risk to the potential users who are willing to pay the highest fares. A project not covering debt and operating expenses will shift the burden to users who are willing to pay the most by boosting the fare.²

This implicit cost of equity hides the real cost of a project. Gurwitz suggests that with identical credit risk for a government and private entity, a lender would require an equal equity contribution and theoretically, the return on equity to the public or the private entity would be the same. Furthermore, a G.O. debt project represents a full recourse obligation by the taxpayer and, therefore, the public should expect higher "return on equity" (benefits) for a project secured by a full faith pledge.³

Thus, the true finance costs of a government sponsored project are higher than the nominal coupon rate because of transfers of subsidized debt and the implicit costs of equity.

4.22 Comparing Finance Costs

If the equity costs for the public sector are evaluated properly, the finance costs of taxable and tax exempt sponsors may be quite similar.⁴ Moreover, private firms may achieve lower project costs than the government because of the current tax structure and market trends.

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2. Aaron Gurwitz, "Privatization in a New Key", Monthly Market Perspective, (New York: Goldman Sachs Co. 1989): M5.

3. Ibid: M6.

4. Ibid: M1.

Private investors typically require equity yields to be double or triple that of debt yields.⁵ Consequently, a project which has any proportion of private equity will appear to have higher finance costs than an equivalent project financed with 100% tax exempt debt. Ultimately, the finance costs depend on the capital structure and whether the analysis is done on a before tax or after tax basis.

The overall project costs may be lower for a private project due to the current tax code. If the private firm retains ownership, the tax code provisions for depreciation of the physical asset and for interest deductions helps a private firm achieve lower project costs. (The term of depreciation depends on the term of the useful life.) Moreover, the relevant borrowing cost for a profitable private project may be lower than the relevant borrowing cost for a tax exempt sponsor. Admittedly, the tax exempt sponsor will secure a lower nominal interest rate than a taxable sponsor. If the taxable sponsor and/or project is profitable, however, the relevant borrowing cost for the taxable sponsor will be the after tax interest rate.

For instance, if the nominal interest rate for a profitable private project is 10%, and the corporate federal and state tax rate is 38%, the relevant cost of debt is 6.2%. ($0.100 - 0.100 \times 0.380 = 0.062$)

Moreover, comparing private and government tax exempt project finance costs (considering the after tax project finance cost for a private firm and excluding the hidden "cost of equity", but considering the transfer subsidy for a government sponsor) reveals that the private firm may achieve lower after tax finance costs for a given project.

The after tax finance cost for a private firm equals the cost of equity plus the after tax cost of debt, or 9.02% ($[0.150 \times 0.250] + [0.850 \times 0.0620] = 0.0902$)

The relevant finance cost for a tax exempt project equals the coupon rate for debt plus the implicit subsidy, or 9.45% ($0.07 + [0.070 \times 0.350] = 0.0945$)

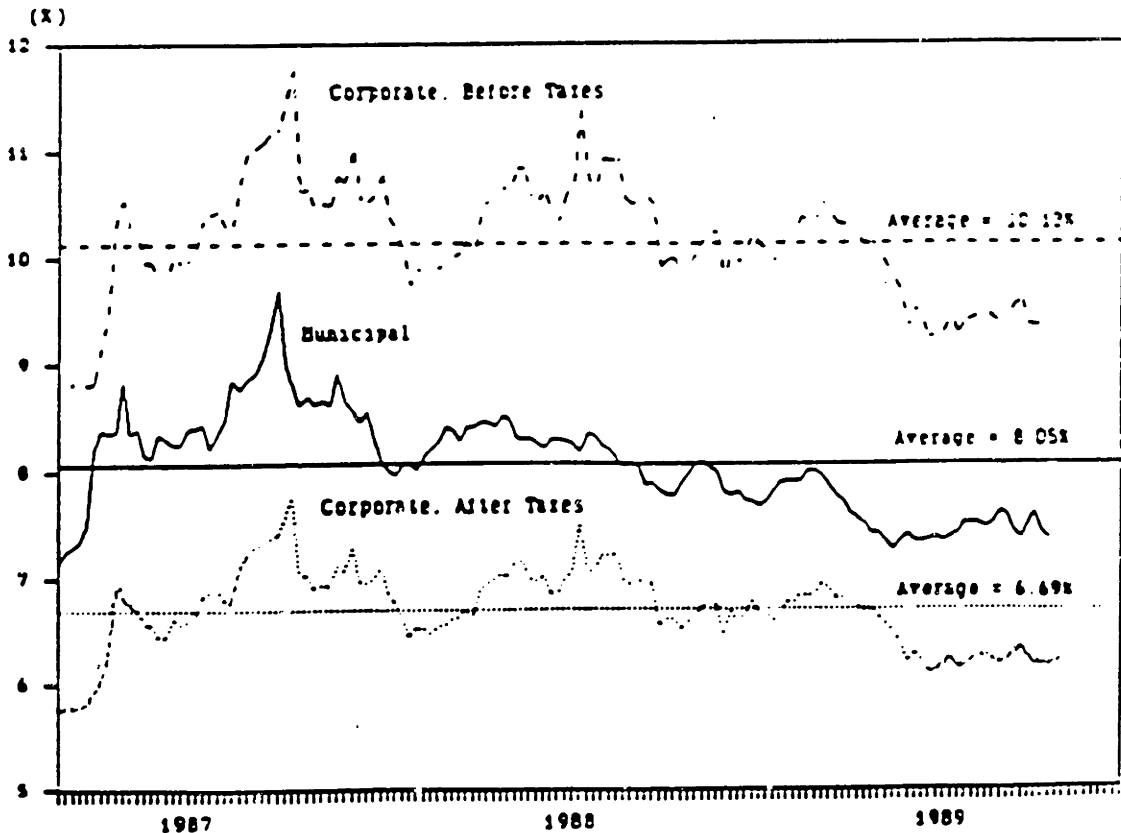
Exhibit A, shown on the following page, illustrates a recent period during which the relevant borrowing costs to a taxable sponsor were lower than for a tax exempt sponsor. From 1987 to 1989, the average yield on current coupon A-rated municipal revenue bonds was higher than the after tax yield on A-rated industrial corporate bonds.

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5. H. Anton Tucher, Vice President for Bank of America, Interview July 11, 1991.

EXHIBIT A*
Yields on A-Rated Municipal Revenue Bonds
and on A-Rated Industrial Corporate Bonds
Before and After Corporate Taxes

(Corporate Tax Rate = 34%)



* Aaron Gurwitz, "Privatization in a New Key", Monthly Market Perspective, (New York: Goldman Sachs Co. 1989): M5.

If corporations were no longer allowed to deduct interest payments and if no tax benefits accrued to municipal debt lenders, the cost of debt for both public and private sectors would be roughly the same.

Although interest deductions and depreciation help the private firm achieve lower project costs, these may be limited by the ownership structure. Individual investors and closely held corporations (a corporation with five or less persons owning more than 50% of the stock) will be subject to the internal revenue code for at-risk rules and passive loss limitations (tax code sections #465 and #469). Conversely, corporations held by more than five persons are eligible for offsetting passive losses from a specific project against other types of income.

In addition to accounting for transfers of tax exempt debt and the current tax code, market trends may help the private sector be more competitive with the public in achieving similar debt finance costs. Spreads between corporate and government debt, which decreased during the 1980's, will attract investors to private projects.

Negotiated sales, which are seen as a more expensive but less risky means of securing financing, have replaced competitive sales as the predominant method of placing long term municipal debt. The share of negotiated sales increased from 16.9% in 1975 to 79.1% in 1985.⁶ Pre-tax spreads between corporate and municipal AAA debt significantly decreased from 3.19% in 1981 to 1.36% in

1987.⁷ Finally, the unprecedented increase of tax exempt municipal bond failures this year may cause the overall yields on municipal debt to further increase.

The competitiveness of high quality securities such as A-1 corporate issues and federally backed mortgage securities may decrease the spread between private and government finance. On July 15, 1991, yields on Ten Year Treasury, GNMA current coupon mortgages, and high quality corporate notes were 8.25%, 9.23%, and 8.63%, respectively. The federal government is expected to refinance \$385 billion and issue \$90 billion of bills, notes, and bonds in the third quarter of 1991, and analysts believe that yields of long term U.S. Treasury bonds may increase to be competitive with other sponsor issues.⁸ If U.S. bond yields increase and if inflation is abated, the private sector may achieve all-in finance costs which are more competitive with the public sector (assuming the equity ratio of projects is

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6. Thomas W. Bradshaw, "Debt Financing", (First Boston Corporation: 1986)

7. Randall G. Holcombe, "The Tax Cost of Privatization", (Florida State University, Tallahassee, FL: 1987) Using Financial Data from St. Louis Fed.

8. Constance Mitchell, "Bond Rally is Unlikely amid U.S. Debt Sales", The Wall Street Journal, (July 15, 1991): C1.

less than about 25%). Decreasing spreads between the cost of debt for private and government entities will improve the ability of private firms to reduce project costs.

4.23 Statutory and Market Freedom

Private firms have more freedom than government sponsors to access capital, to enter into contracts and to issue and manage financial instruments.

Private firms have broader accessibility to capital because they are capable of negotiating rates of return layered to the investors needs, thus appealing to more domestic and international sources of debt and equity. Tax exempt institutions such as domestic pension funds and insurance companies, and taxable institutions which cannot benefit from tax exempt debt such as international investors, may be a very large and untapped source of capital for infrastructure investment.

Unlike government sponsors, private firms have much more flexibility to structure ownership, lease and finance covenants. The federal Anti-Deficiency Act is an example of a federal statute which restricts legislators from making long term financial commitments which unreasonably bind the actions of future legislators. Many states similarly

restrict legislative-private sector contracts. If enabling legislation is well written, the private sector may have more freedom than the government to develop infrastructure for a lower net cost.

Statutory restrictions imposed by the federal tax code increase government project costs. The Tax Reform Act of 1986, H.R.3838, restricts advanced refunding and arbitrage activities, imposes volume caps for debt with over 10% "private purpose", and decreased corporate and individual income tax rates, thus reducing the attractiveness of tax exempt debt.

4.30 UNIQUE ASPECTS OF PRIVATE FINANCE

Accounting for the transfer costs of subsidized debt and implicit equity costs described above, private firms are capable of situationally developing infrastructure at a lower project cost than the public sector. The reality of financing very large private transportation projects, however, should not be ignored. The following sections will attempt to identify potential sources of capital, investor criteria, and emerging financial trends for financing very complex private projects.

4.31 Investor Objectives and Sources of Capital

Private firms may attract unconventional sources of capital for investing in infrastructure because of the different characteristics of taxable and tax exempt projects. Investors in taxable debt have well-defined investment criteria and will not deviate from these objectives unless compensated for the additional investment risk.

Investors desire transferable, divisible, and liquid assets. Owning infrastructure will probably not offer any of these.⁹ Unless a private company is successful enough to securitize their assets, owners will hold the assets for very long terms without much chance for re-sale.

Investors scrutinize credit risk and project risk. For a risky project, investors will price debt at a lower rate if the project is backed by a worthy credit source. (The financing for the risky space program was successful because investors felt secure by the pledge of the U.S. government.) We will assume that private firms undertaking infrastructure projects will not be sufficiently credit worthy or will choose not to guarantee individual projects. Most projects will be non-recourse.¹⁰

9. Francis McDunnough, Vice President for Goldman Sachs, Co., Interview July 11, 1991.

Investors do not like project risk,¹¹ and since revenue projects will likely be non-recourse, the systematic and specific risks of development, finance, and business operations will be carefully scrutinized. Investors will generally look for reliable forecast data from multiple sources and will be attracted to projects which have a service monopoly or at least a constrained supply with inelastic demand. Quantifying congestion and a consumer willingness-to-pay for the use of the project will strengthen a project's stature for finance. Some form of government subsidy or contingency fund will also make a project more financable.

Tax exempt institutions which cannot benefit from tax exempt assets seek higher yielding investments. International investors have little interest in tax exempt markets, but prefer sovereign credit or recognizable names when investing overseas.¹³ Unless a project sponsor is a major firm, has exhibited exceptional traits, or has secured a letter of credit from a reliable source, international investors will

10. Francis McDunnough, Vice President for Goldman Sachs, Co., Interview July 11, 1991.

11. Richard Tilghman, Vice President for First Boston Corp., Interview July 10, 1991.

12. Richard Tilghman, Vice President for First Boston Corp., Interview July 10, 1991.

probably not be attracted to private infrastructure projects.

Domestic pension funds and insurance companies also prefer recognizable names and potentially, may represent the largest and most likely source of capital for domestic private infrastructure. These institutions generally want to match their long-term liabilities with long-term assets, and are therefore attracted to physical assets with a twenty to forty year life. They are primarily interested in achieving inflation adjusted returns, which regulated infrastructure projects may provide.

The total pool of domestic pension funds total approximately \$3 trillion, and is growing by about \$12 billion per year. The equity portfolio totals about \$100 billion. Driven by the 1974 federal ERISA regulations for pension investments, pension funds have diversified their portfolios with real estate which now represents about 4.7% of the total pool. Despite over-built real estate markets, pension funds still target a real estate allocation of 5% to 7%.¹³

13. Marc A. Louargand, Associate Professor at M.I.T., Interview July 18, 1991.

Assuming that the project is well located and has a strong inelastic market, pension funds may respond robustly to an asset which resembles real estate and performs like a regulated utility.¹⁴

4.32 Financial Trends and Innovations

Several reputable securities firms have recently formed privatization finance groups to manage the expected increase of privately developed infrastructure.¹⁵ These firms typically pool talented individuals from municipal, corporate and real estate finance departments because the analysis of private infrastructure finance requires disciplines from these varying fields.

Since few large private transportation infrastructure projects in the U.S. have secured financing during this century, this section will address apparent financial trends and will draw experience from other fields which may be applicable to financing private infrastructure.

The finance and business risks of an infrastructure project are similar to other industries. Comparing other ventures

14. Marc A. Louargand, Associate Professor at M.I.T., Interview July 18, 1991.

15. William Power, "Wall Street's Latest: Main Street is Paved With Gold", Wall Street Journal, May 9, 1991: C1.

to infrastructure development, however, shows that the magnitude and types of risks are not consistent over time. Formulating layers of debt and equity which correspond to the varying types and magnitude of risks is key to successfully finance a project.¹⁶ For instance, the risks for a toll road may initially resemble the risks of real estate development during the first few years, then resemble the risks for an independent power project for the next few years, and then move to other stages of risk, etc.. A form of mezzanine finance, pricing the varying degrees of risk in response to the project life cycle, will require innovation on behalf of financiers, negotiations with investors, and experimentation.

Along with increasing use of negotiated placement of municipal debt, infrastructure finance will probably be secured on a negotiated basis. Contrary to the competitive sale of securitized finance, the lack of recent experience in privately developed infrastructure will cause many investors to carefully scrutinize the potential benefits and risks of investment.

16. Francis McDunnough, Vice President for Goldman Sachs Co., Interview July 11, 1991.

Private firms may have the option to choose from finance structures which are a hybrid public-private venture (where an essential public good is created), or one which is purely private.

Public-Private Venture Innovations

Where the private firm can deliver an essential public purpose asset at a lower net cost than the government, the government may choose to enter a lease purchase agreement. A few years ago, these were so well established that when structured properly, the interest rate on tax exempt lease-purchase participation arrangements were only a few basis points above municipal debt.¹⁷ Lower project costs can potentially offset higher finance costs when the private firm offers a clear competitive advantage over the government as developer. Unless the volume cap restrictions imposed on state governments change, however, private firms are unlikely to use this method of financing for transportation projects.

Although the future of securitized capital leases is questionable,¹⁸ these finance structures may be an option

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17. John E. Peterson, James Mallory, Lawrence Pierce, Barbara Weiss, NonDebt Financing of Public Works, (Prepared for the National Council on Public Works Improvement by the Government Finance Officers Association, 1986): 67.

for private firms to develop and finance infrastructure. A securitized capital lease raises finance from the sale of lease-backed bonds to private investors, for the development of public purpose assets. The project is secured by the credit of the government which promises to make annual appropriations. Although the General Services Administration (GSA) prefers these arrangements for least-cost financing of government assets, the Office of Management and Budget (OMB) dislikes these agreements and may cause them to become obsolete.

If a private developer can deliver an asset at a lower net cost than could be achieved by the government, the government might bear part of the risk by securing a letter of credit, or by collateralizing the project debt with a portion of general revenue. This, or other financial cooperation between taxable and tax exempt entities, is governed by the federal tax code, especially section #468[H][6].

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18. The OMB argues that capital leases are "back door" financing which competes with the sales of U.S. Treasury securities. OMB threatens to enforce the Anti-Deficiency Act which prohibits congressional long term commitments which bind future legislators; OMB would require an up-front appropriation for all lease payments, nullifying the advantage to a capital constrained government entity. (PWF Feb '89 p9.

Private Venture Innovations

One major bank interviewed for this thesis has developed a financial model which achieves lower project costs with taxable finance. This is possible because of debt reserve and sinking fund requirements for the tax exempt sponsor, and tax benefits of depreciation and interest deductions to the taxable sponsor. To optimize the cost reductions, the project is leveraged as much as possible.

A joint venture between a taxable corporation and tax exempt institutional partners offers the option to allocate early losses to the taxable sponsor. Special allocations are a creative way to maximize the gains for each respective investor, but are subject to tax code restrictions found in section #704[B].

In the case of purely private ventures, convertible mortgages may appeal to investors and sponsors. This hybrid finance vehicle offers lower financing to the borrower and potentially higher overall yields to the lender. It provides an option to the lender to convert a portion of debt to equity at a later date. Assuming projections for a given project were accurate, as the risk decreases, debt holders would probably want to convert debt to an equity position and participate in the up-side potential for greater returns. A debt for equity swap provision allows

investors to participate in a more risky venture without sacrificing the less risky position of holding debt during the ramp-up period.

A convertible mortgage may be appropriate for a limited partnership which is structured to receive financed debt from a related but autonomous parent entity. In this instance the lending entity (acting for a thinly capitalized group of limited partners) might convert debt to equity when the project has positive cashflow and then transfer the equity to the limited partners. This thinly capitalized limited partnership would reduce the early risks of equity and take advantage of the ownership benefits as the project is profitable. In addition to the restrictions from the tax code already cited, this ownership structure may be governed by rules on qualified non-recourse financing, section #465[B][6]. Legal tax counsel should be consulted to confirm the viability of a financial and ownership structure.

A participating mortgage may also provide a lender more incentive to finance a project. The participating mortgage provides potential for greater returns through a contingent interest in the cash stream without compromising the lender's less risky debt position.

A leveraged sale leaseback, used in the aircraft industry during the 1980's, may provide an attractive finance structure for private firms. (This was the initial strategy planned for the Dulles Toll Road Extension which changed due to market conditions.) The asset may be sold to a syndicate of taxable owners who share the benefits of depreciation and interest payments with the developer/operator by leasing the facility back at a reduced rate.

4.40 SUMMARY OF CHAPTER FOUR

The relevant finance costs for tax exempt development is higher than the explicit debt cost due to subsidized transfers from other parties and an implicit "cost of equity".

When considering the relevant after tax finance cost for a profitable project, the private sector may achieve lower total capital costs than the tax exempt sector. Moreover, private firms who benefit from asset depreciation are able to further reduce project costs. These two factors may help private firms achieve situationally lower project costs than the government.

A trend of decreasing spreads between corporate debt and both municipal and federal debt may catalyze investment in

high-grade private infrastructure projects. Tax exempt institutional investors may be the best source of capital for private projects, since the assets require long term investment of substantial capital.

Chapter Five will present three recent proposals/projects of privately developed transportation infrastructure: the Dulles Toll Road Extension in suburban Washington, D.C., the LAX-Palmdale Magnetically Levitated Train proposal near Los Angeles, and the Pearson International Airport Terminal Three in Toronto.

CHAPTER FIVE

CASE STUDIES

The following case studies will briefly describe recent private transportation proposals/projects. The purpose of these cases is to examine government interaction with private infrastructure developers, to describe the ownership and financial structures, and to identify potential development risks. Only one of the projects described is completed, and since infrastructure assets are not fungible, no attempts are made to compare absolute savings by the private sponsor. Ultimately, the cases should illustrate the challenges and risks of developing infrastructure.

5.10 Dulles Toll Road Extension, Leesburg

5.20 LAX - Palmdale Maglev Train, Los Angeles

5.30 Pearson International Airport Terminal Three, Toronto

5.10 DULLES TOLL ROAD EXTENSION

The state legislature enacted the Virginia Highway Transportation Act in July of 1988, after a commission formed by Governor Bailes identified nearly \$7 billion of needed state transportation projects without funding sources. The enabling legislation permits the private finance, construction and operation of toll roads. Road development will be monitored by the Virginia Department of Transportation (VDOT) and financial operations will be regulated by the Virginia State Corporation Commission (SCC).

The Toll Road Corporation of Virginia (TRCV) was formed shortly after July, 1988 to develop an extension to the Dulles Toll Road, a project previously considered for development by VDOT. The Chief Executive Officer and Chairman of TRCV, Ralph Stanley, was former Administrator of the federal Urban Mass Transportation Administration and a member of President Reagan's Commission on Privatization. TRCV is composed of attorneys, financiers and previous public servants.

Project Description

TRCV will privately finance, develop and operate the Dulles Toll Road, a 14 mile extension of a currently state owned

and operated toll road from suburban Washington D.C. to the Dulles Airport. The highway extends from the Dulles Airport to Leesburg, Virginia and will initially have four lanes and seven interchanges with capacity to expand to six lanes. (See Exhibit B1 in Appendix for project location and key participants.) The project has received all necessary permits, and is expected to commence construction immediately after securing financing during the summer of 1991. The road will be the first build-operate-transfer (BOT) highway in the United States. Ownership of the facility will be transferred to the state in forty years, ten years after the retirement of the longest term project debt.

In addition to local, state and federal permits pertaining to the environmental impact and design standards, TRCV was required to obtain approval of the road alignment and design from the Virginia Commonwealth Transportation Board, and obtain approval for a financing plan, rates of return and toll rates for the receipt of a Certificate of Authority from the SCC. The Comprehensive Agreement with VDOT provides detailed standards for highway design, maintenance and operations. The SCC, an established staff of commissioners who regulate public utilities, will regulate financial rates of return, toll rates and other financial matters of the

owner throughout the life of the project.

TRCV overcame significant obstacles to the project in unique ways. Right-of-way (ROW) will be acquired from twenty-five property owners without the use of eminent domain. While some property owners will receive compensation from TRCV for the necessary ROW, others donated land and will rely on residual land appreciation of developable tracts resulting from improved accessibility. A ground lease is expected to be signed with the Dulles Airport for the remaining ROW.

TRCV worked extensively with state and local governments and special interest groups to manage their concerns and build support for the project. No environmental opposition existed, in part, because TRCV agreed to significant compensation for wetland areas impacted by highway construction. Since VDOT had previously considered the project for state development, TRCV was able to benefit from previous environmental surveys.

TRCV will avoid additional specific business and finance risk by not participating in value capture mechanisms from land appreciation or residual real estate development; principals want to maintain the integrity of TRCV strictly as a toll road builder and operator.

Some of the major risks include realizing forecasted growth, controlling construction costs and period completion, perpetual regulation of finances by the SCC, and inflation which might impair project finance. As Financial Advisor, Goldman Sachs relies on a forty year projection of increased regional development and toll revenue growth to secure debt and equity for the deal. The Loudoun County area northwest of Washington, D.C. experienced rapid growth during the 1980's and is expected to continue rapid growth during the 1990's. Revenue is expected to grow in the first three years by 153%, 28%, 21%, respectively, tapering off to about 10% in fifteen years and 4% in 30 years. (See Exhibit B2 in Appendix for proforma (now outdated).)

Construction specific risk will be managed with a guaranteed maximum price (GMP) contract to be signed with Kiewit, Eastern Co.. The contract includes a liquidated damage clause to guarantee timely completion, and an incentive cost savings clause.

The SCC, which regulates tolls and the overall project financial rate of return, may limit the owners ability to adapt to rapidly changing market conditions, thus, magnifying the specific financial risk. Increased tolls are subject to approval by the SCC, based on numerous factors

including project debt coverage and the rate of inflation. TRCV has agreed to an arrangement which will require an extensive evidentiary trail to warrant toll increases.

With variable rate debt, inflation is viewed as a significant risk for the project, especially with the layered risk of rate regulation which might prolong necessary fare increases. The systematic financial risk of inflation exposes the project to higher interest expenses.

Other specific risks include: the uncertainty of motorists willingness-to-pay approximately eleven cents per mile (the current fee for the state operated Dulles toll road is about seven cents per mile) versus the existing toll free alternatives, risks from change-in-law and regulatory requirements, residual environmental risk, tort exposure and lender/owner rights on default.

The SCC will allow an equity return accrual rate of 30% per year for the greater of five years of operation or until certain coverage tests are met. The allowed rate of return will decline over time as coverage ratios are expected to increase and risk is expected to diminish. A reinvested earnings account will track early revenues which

are insufficient to pay the allowable return.

TRCV plans to maintain the road to state standards with independent contractors, and will compensate the state for highway patrol. A private insurance company will be paid to insure the owner from tort liability.

Project Finance

Due to changing market conditions, both the finance strategy and project costs have changed. Goldman Sachs was completing the financing for TRCV at the time this thesis was written and was unable due to strict confidentiality to provide details of the actual financial strategy employed. Therefore, the earlier and current finance strategy will be described conceptually.

Previous Finance Structure

The project requires construction and take-out financing for approximate total development costs of \$198.8 million. (VDOT estimated initial capital costs of \$235.7 million for building the same facility, partially higher due to ROW acquisition costs.) Construction was planned to be financed with \$4 million in equity and the remaining debt provided by a syndicate of commercial banks at a floating rate estimated to be 10%.

After construction, permanent financing would be structured as a leveraged lease. A syndicate of institutional investors would purchase the toll road, lease the facility back to TRCV for 30 years with a renewal option for ten more years and discount lease payments due to the tax benefits of depreciation and interest deductions accruing to the lessor. An additional \$30 million in equity would be secured over four years through private placement of common and preferred shares in TRCV, funding a lease payment reserve to cover expected shortfalls in revenue during the ramp-up period.

Current Finance Structure

Total costs are now estimated between \$250 and \$300 million. Changing market conditions made the deal into a limited partnership. Senior and subordinated debt will be secured with different interest rates corresponding to different debt maturities. The debt/equity ratio for the nonrecourse deal is unknown. Limited Partners will realize tax benefits from depreciation and deduction of interest expenses.^{1,2,3}

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1. Lauren J. Walters, Chief Operating Officer for TRCV, and Chairman for Massachusetts Taskforce on Road, Bridge, and Tunnel Privatization, Interview May 30, 1991.
2. Robert E. Spring, "The Private Market Responds", PW Financing, February 1991: 15-16.
3. Paul Kerin, "Toll Road Corporation of Virginia", (Library case at the Kennedy School of Government, 1990)
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5.30 LAX-PALMDALE HIGH SPEED RAIL TRANSIT

In July of 1989, California Governor Deukmejian endorsed Assembly Bill No. 680 (AB680) due in part to a compromise for a new gasoline tax supporting an aggressive ten year, \$18 billion state transportation plan. AB680 authorizes the California Department of Transportation (CALTRANS) to contract four privately developed public transportation demonstration projects. Provisions include leasing state rights-of-way (ROW), air rights, granting of easements, and "the issuance of permits and other authorizations to enable the private entit(ies) to construct transportation facilities supplemental to existing state owned transportation facilities." CALTRANS is charged with overseeing the negotiations for franchise rights, design standards and operations, and for determining the allowable financial return on capital invested by private sponsors.

Project Description

The Joint Venture team (JV) of Perini Corporation, DMJM (Daniel, Mann, Johnson, Mendenhall) and HSST (High Speed Surface Transport Corp, a subsidiary of Japan Airlines) proposed a rapid transit train from the Los Angeles International Airport (LAX) to the Palmdale Regional Airport. (See Exhibit C1 in Appendix for project location and participants.)

The project was not selected for development, but was chosen as a "runner-up" to four other projects due to: reliance on government assistance beyond the intent of the legislation, a legislative requirement that at least one of the facilities be built in Northern California (this project was ranked fourth, but the top four were in southern California) and the comparative complexity of a new technology, magnetically levitated trains. Nevertheless, the project is of interest because of ongoing negotiations between the JV sponsor and local governments and the contributions the development may make to the public-good as an environmentally superior transportation alternative to automobiles.

The concept is a complex plan exploiting rights-of-way along highways, development air rights, and a new technology not yet used for on going rapid transit. The rail was planned to supplement the expanding rapid transit system being developed in Los Angeles, to provide feeders to employment centers, and to relieve highway congestion. The first of two phases would extend 31.5 miles from LAX to Santa Clarita, intersecting the Los Angeles transit Greenline and Redline with a total of six rail stations. The second phase would extend 38 miles from Santa Clarita to the

Palmdale Regional Airport and would connect the then-proposed Las Vegas-California high speed rail.

Phase One would require CALTRANS ROW and private easements along highway routes #405, #5, and #14, for elevated rail construction, the planned development of 4.9 million square feet of commercial and residential space, and the addition of 8,400 parking spaces to new and existing transit stops. Additional commercial development would occur if the sponsors could successfully negotiate additional rights for highway air space from CALTRANS, and on LAX property from the Los Angeles Airport Commission. The JV would likely sell development rights to other parties. A system of re-aligned highway ramps and pedestrian bridges would provide accessibility to rail stations.

Magnetically levitated train technology (maglev), first developed at MIT, is a relatively expensive and untested technology when compared to other rail transit systems. It is claimed, however, to promise a highly efficient mode of transportation. A "linear motor" created by an electrically induced magnetic field causes the train to be propelled on a cushion of air at high speeds, which eliminates moving parts and the bearing load and friction of conventional steel wheel trains. Thus, maglev trains are said to operate on

less energy with reduced noise and air pollution, and offer exceptionally smooth rides with both lower construction costs for the track and maintenance costs for the train.

Forecasting ridership was problematic because of unverifiable models used to estimate modal splits for freeway usage and user-fee patronage for an alternative type of transportation; rail. This directly impacted revenue forecasts and was a major concern as a specific business risk. Initial ridership estimates were conservatively decreased from over 100,000 average daily trips (ADT) to 57,784 ADT. The proforma (see Exhibit C2 in Appendix) escalated ADT at a rate of 2.5% per year, plus an additional increase of 2,000 per year for the first six years of operation due to increased air rights development.

The JV planned a central automated control system, which would require fewer operators than a conventional transit line, to reduce costs. Upon opening in 1997, trains would operate approximately every 3.5 minutes at an average speed of 60 miles per hour. The average trip would be about 9 miles and would cost \$3.25.

Project Finance

The following information was presented in the proposal by

the financial advisor, Bank of America. Total capital costs for the project (inflated at 5% per year, excluding all commercial and residential development, anticipating three years for securing permits and land assembly, and three years for Phase One construction), were estimated at \$1.83 billion. Construction was assumed to be financed using a tax exempt interest rate of 8% plus a 100 basis point premium for a credit enhancement.

First year operating revenue was projected to include \$78.2 million for ridership and \$17.4 million for parking, escalated at 5% per year, plus a 1997 present value of \$73.5 million for selling all development rights. Annual operating expenses and replacement reserve were estimated at \$47.4 million, escalated at 5% per year.

The financial advisor (FA) concluded that the project would not generate sufficient revenue to satisfy equity and debt holders as a purely private deal. The project risk profile would require 30% to 35% equity, with equity investors needing pre-tax returns in the area of 30%. The FA recommended that the project may be viable, however, as a public-private partnership leveraging the potential contributions of each sector.

As a public-private partnership, construction financing would be based on a fixed price, turnkey contract outlining detailed performance specifications, and a "completion support package" substantially shared by the contractors, vendors, sponsors, equity investors, and banks to cover the specific risks of cost over runs, delays and performance problems. Construction might then be financed with tax exempt short term paper on a revolving basis, backed by a bank standby letter of credit. Under this plan, the FA recommended three permanent financial alternatives, described below.

Alternative One - *Outright Sale to the Los Angeles County Transportation Commission (LACTC)*

The JV would execute the AB680 franchise with CALTRANS, build the transit facility, sell the concession to LACTC, and LACTC would operate the facility for the franchise life of 35 years before ownership reverts to the state. Tax exempt debt would be raised to purchase the maglev transit line from the sponsors and would be exempt from state volume caps since the transit was for a pure public purpose. Debt service would be covered by operating revenue and would be backed by general sales tax revenues. Forecasts predict that an internal rate of return of 9% on total capital would support tax exempt debt at 8% with a debt

coverage ratio of 1.1. (Escalating ridership growth 2.5%, and revenue growth 5% per year.)

Alternative Two - *Lease of the Completed Project to LACTC*

The JV would execute the AB680 franchise with CALTRANS, build the transit facility, lease it to LACTC, and LACTC would operate the facility for the franchise life of 35 years before ownership reverts to the state. LACTC would assume operation and revenue risks, and pay a fixed periodic amount to the sponsor which might be indexed to the rate of inflation. The FA assumed that tax exempt debt may qualify for exemption from the state volume cap if the JV was structured as a pure finance and holding entity. The financing costs are similar to Alternative One, above.

Alternative Three - *Private Operation Under Contract
With LACTC*

The JV would execute the AB680 franchise with CALTRANS, then build and operate the transit facility under a long term contract with "credit-worthy public sector entities guaranteeing project revenues sufficient to pay debt service and agreed-upon return on and of equity." Essentially, the city would underwrite the project with a contingent subsidy, a "safety net" or revenue floor to the project sponsors for the franchise life of 35 years before ownership reverts to the state.

This alternative allows the most flexibility for sharing risks, but may be severely constrained by rules for tax exempt financing. Therefore, taxable finance options would be explored, and may "achieve an all-in financing cost lower than tax exempt finance structures". Private use of asset depreciation and interest payment tax deductions make this a viable alternative to tax exempt finance.^{4,5}

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4. Robert Band, Vice President for Perini Corp., and Member of the Massachusetts Task Force on Road, Bridge, and Tunnel Privatization, Interview May 30, 1991.

5. Caltrans Privatization Project, LAX to Palmdale Transit, Volume 3 Technical Proposal, Perini/DMJM/HSST
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5.30 PEARSON INTERNATIONAL AIRPORT TERMINAL THREE, TORONTO

(Note all monetary citations are Canadian dollars.)

In 1986, the Canadian governmental agency, Transport Canada, issued an open request for proposals (RFP) to develop Terminal Three at the Pearson International Airport in Toronto. The RFP was authorized by a national policy which permits provincial airports managed by Transport Canada to privatize operations. A new passenger terminal was desperately needed to handle increasing traffic, and yet Transport Canada did not have the money for such a capital investment. Moreover, the agency felt that traditional government procurement procedures would unnecessarily delay the project.

Transport Canada reviewed proposals from several Canadian developers and international interests (e.g. British Airport Authority and Lockheed), and short listed a group of Canadian finalists. The contract was awarded in the second quarter of 1987 to Airport Development Corp., a subsidiary of a Toronto development firm, Huang and Danczkay Properties, Inc.. Huang and Danczkay enlisted Lockheed Air Terminal as a minority partner.

Background Information

Transport Canada (TC) is analogous to the U.S. Federal

Aviation Administration, except that in addition to regulating air traffic safety, TC also operates airport facilities. TC operates Terminals One and Two at the Pearson airport. Passenger and airplane traffic at the Pearson airport were severely limited. One carrier, Canadian Airline International, estimated annual losses of \$100 million. Terminal One, designed to accommodate 6 million passengers per year and a Terminal Two, a converted cargo pier, handled 21 million passengers in 1989.

Project Description

Terminal Three opened in February 1991, four years after the contract was awarded to the developer. (Transport Canada estimated that the project would take seven to eight years for development by their agency.) Terminal Three is a 1.25 million square foot mixed use project, consisting of a 500 room hotel, 100,000 square feet of retail space, 170,000 square feet of office space, plus a 3300 car garage. The design and contractual agreement allow the developer to double the airplane gate capacity at the terminal and to develop other properties on adjacent land. Twenty-nine airplane gates are serviced by two main piers and a satellite pier which are connected by an underground passage. Huang and Danczkay enrolled Lockheed as a partner for developing and managing the terminal, retail (a retail

consultant was hired to plan for the "Canadian shopping experience"), and garage, and enrolled other partners for the development of the hotel and office.

The development rights were principally negotiated in the project proposal. Airport Development Corp. (ADC) signed a 40 year ground lease for the terminal and adjacent land, with a renewal option for an additional twenty years. The initial annual lease payment will be \$30 million with subsequent lease payments to be a base minimum plus a percentage of participating revenue. The contract with Transport Canada explicitly described performance provisions for design, completion and operations.

Without major opposition from any local or environmental groups, ADC broke ground on the terminal in April 1988 and opened a new facility in February 1991. Preliminary engineering work was performed prior to signing the contract, so that a fast-track construction plan could be formulated. Timely construction performance was the major risk considered by ADC. Despite an aggressive project schedule, two systematic force majeure incidents delayed completion. Province-wide trade union strikes delayed the project for two weeks early in the project as well as for two months late in the project. The owner assumed the

costs, and was contractually covered from recourse by Transport Canada for the force majeure delays.

ADC does not expect to be burdened by government oversight, although they must follow existing Transport Canada rules - none of which are expected to impair ADC's operations. Since Terminal Three directly competes with Terminals One and Two for landing fees and passenger retail traffic, ADC is not subject to any form of rate regulation; they have a competitive incentive to attract business. The airlines, who are essentially the tenants of the terminal have the right to review ADC's operating budget.

The first year passenger traffic is expected to exceed 8 million, with forecasts for 4% annual growth. (The design capacity of the terminal is 15 million.) The owners are satisfied with revenue performance to date.

Project Finance

The total costs for the Terminal Three development are estimated at \$520 million. Expecting to benefit from a new facility, Canadian Air International invested \$22 million to "bring Terminal Three online".

The permanent financing was arranged by the financial

advisors of Burns Fry Co. an investment banker, and Murray Co. a real estate specialist. The financing was very well received by institutional investors as a leveraged limited partnership. With a popularly established practice of structuring limited partnerships in Canada, the investors did not differentiate the Terminal project from any other real estate development (e.g. an office building). The tax code allows investors to benefit from depreciation and deductions of interest payments, starting before the asset is placed in service. Owners can depreciate soft costs and construction costs as they are incurred during development.

No government collateralization or subsidies were provided, with one exception. Transport Canada promised a contingent loan for up to \$70 million prorated over 7 years, to cover revenue shortfalls incurred by the owner for the operations of the terminal. (The contingency excludes the office and hotel.) The interest rate on the contingent loan will be at the Canadian prime rate.

Due to the confidentiality of financing for this project, the owners were not able to share any additional information for this case study.^{6,7,8}

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6. Mike Yaman, Vice President of Finance for Lockheed Air Terminal, Inc. Interview July 18, 1991.

7. David Hughes, Aviation Week & Space Technology, Vol.134, January 7, 1991: 43.

8. Deirdre Kelly, "Nice Lounge, But When's My Flight?", Canadian Business, Vol 63. Sept 1990: 111.
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5.40 SUMMARY ANALYSIS OF CHAPTER FIVE

All three projects were enabled by governments which recognized a severe need for transportation infrastructure, but were unable to fund the improvements. For both the airport and the tollroad, the government explicitly identified a project and recognized the private sector as being capable of delivering the asset faster than the government.

The airport is complete, the toll road is soon expected to break ground, and the rail line is an active proposal waiting for governmental aid. As an addition to existing infrastructure, Terminal Three was completed very quickly without environmental or political opposition. Existing support infrastructure (utilities) was in place to expedite delivery. As a greenfield project, the Dulles Toll Road extension required intensive negotiations with environmental and local interests, and property owners to assemble

required ROW. The project is now one to two years behind the original schedule. The LAX-Palmdale was expected to be aligned mostly along state owned ROW, with some private negotiations required.

Competition from other facilities determined the degree of rate regulation and its impact on the owners' risk exposure. With direct competition from two other governmentally operated terminals, the owners of Terminal Three are not subject to rate regulation and can operate in a free market for passenger and airline traffic. The owners of the Dulles Toll Road Extension will be regulated since it is seen as a having a highway monopoly in the respective area. The LAX-Palmdale project would be subject to overall financial return limits (ranging from an allowable 17% to 21% on total capital for the four AB680 projects).

Two of the pure private projects, the airport and the toll road, have been structured as limited partnerships with institutional investors as owners. Ownership of all three assets will revert to the government.

Governmental sharing of the finance risks ranged from zero to a contingent loan. The LAX-Palmdale Maglev train will not be built unless supported by a risk sharing

public-private partnership. Owners of Terminal Three received the promise of a governmentally subsidized subordinated loan if needed to cover revenue shortfalls during the first seven years. TRCV will receive no subsidy or guarantees to share in the risks of the Dulles Toll Road Extension, even though ownership of the asset will revert to the state.

Land value capture mechanisms (tax increment financing, development fees, etc.) were not used for the airport or toll road, but were considered for the maglev train. Additional revenue from ancillary development rights were secured for the airport and were anticipated for the train.

CHAPTER SIX

CONCLUSIONS

The privatization of transportation infrastructure development is a very large topic. The current political, cultural and economic arena in the United States makes it very difficult to comparatively analyze domestic history and recent international experience. It is hard to say if the government has a natural monopoly on most infrastructure and whether or not private firms would unnecessarily duplicate services. It is hard to say that the private sector is necessarily more efficient than the public sector in the development of infrastructure.

Furthermore, it is hard to determine whether privatizing transportation facilities is a regressive policy which penalizes the economically disadvantaged, or is a progressive policy which more accurately exacts compensation from those who directly benefit. In this regard, projects must be analyzed case by case. With politically constrained appropriations for infrastructure, however, private development may be an appropriate and beneficial means of augmenting the existing public network of transportation infrastructure.

Developers of infrastructure should be equipped with a variety of skills to successfully complete projects. Similar to real estate developers, they should have experience or accessibility to persons with expertise in market analysis, finance, law, design, construction, environmental and political negotiations, especially in the field of infrastructure. Persons from the public sector who have knowledge and sensitivity to public goals may be helpful in negotiating project risk and reward allocations. Persons skilled in "political mapping" - identifying stakeholders, educating proponents and opponents, building alliances and overcoming environmental and political opposition - will be critical to project expediency. Persons with close ties to institutional tax exempt investors may be extremely helpful for financing private projects. Finally, developers should realize the unique skills required to operate facilities once they are built.

From the findings in this thesis, I can conclude the following:

1. The need for maintenance, expansion and new development of transportation infrastructure far exceeds the current ability of the government to provide these services. Without drastic departure from the existing fiscal appropriations and tax structure, governments will be incapable of meeting demand.
2. Rapid demographic shifts and technological changes will probably continue to outpace the ability of fiscally constrained local, state, and federal governments to develop and finance these assets.

3. Private development will not occur without support from the government. All levels of government should continue to evaluate what types of capital facilities are better developed by the private sector.

4. Systematic policy changes which test private projects should be carefully drafted to oversee, but not overburden the private sector, thus protecting the public interests by prudently regulating financial operations.

5. Government should retain the option to assume ownership of the assets at a later date, and should bear a share of the development or operational risk. Ultimately, the most efficient means for delivering projects may entail private firms competing for the right to enter a cooperative arrangement with the government.

6. The transportation network is too large to be efficiently developed and operated by only the public or private sector.

7. The government will need to continue protecting public safety, as a public good.

8. The most substantial systematic and specific risks for private firms will be due to potential policy changes, environmental mitigation, tort liability, demographic shifts, technological obsolescence and financial leverage.

9. The substantial capital needed for development will require new sources, perhaps from taxable institutional investors who have objectives for long term assets.

10. Private firms can situationally deliver infrastructure to the public for lower net costs than the government.

CREDITS

I want to express many thanks to the following people for assisting me in the research for this thesis:

The owners and affiliated interests of the three projects who helped me gather information to complete case studies: Lauren J. Walters of TRCV for the Dulles Toll Road Extension, Robert Band of Perini Corp. for the LAX-Palmdale Maglev Train, and Mike Yaman of Lockheed Air Terminal, Inc. for Terminal Three at Pearson Airport.

Isaac Manning of The Perot Group, Francis McDunnough of Goldman Sachs & Co., Roman Sheer of Arthur Anderson, Richard Tilghman of First Boston Corp., and H. Anton Tucher of Bank of America, for interviews regarding projects and finance.

Paul Barrett and Bruce Sealy, infrastructure historians from Illinois Institute of Technology and Michigan Technological University, respectively, for interviews regarding infrastructure history. David Luberoff from The Kennedy School of Government, and Dr. Fred Moavenzadeh from M.I.T. for helping expand the base of relevant information.

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Lawrence Bacow and Thomas Steele, from the Center for Real Estate Development at M.I.T. for their valuable insights.

Special thanks to my wife, Mary, who patiently endured my excitement and anxiety during the writing of this paper.

APPENDICES

A1. Framework for Risk Analysis

B1. TRCV Map

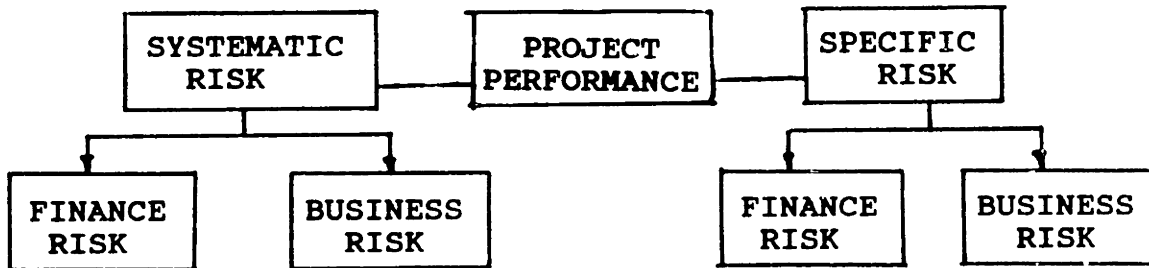
B2. TRCV Proforma

C1. LAX Map

C2. LAX Proforma

EXHIBIT A1.

FRAMEWORK FOR RISK ANALYSIS



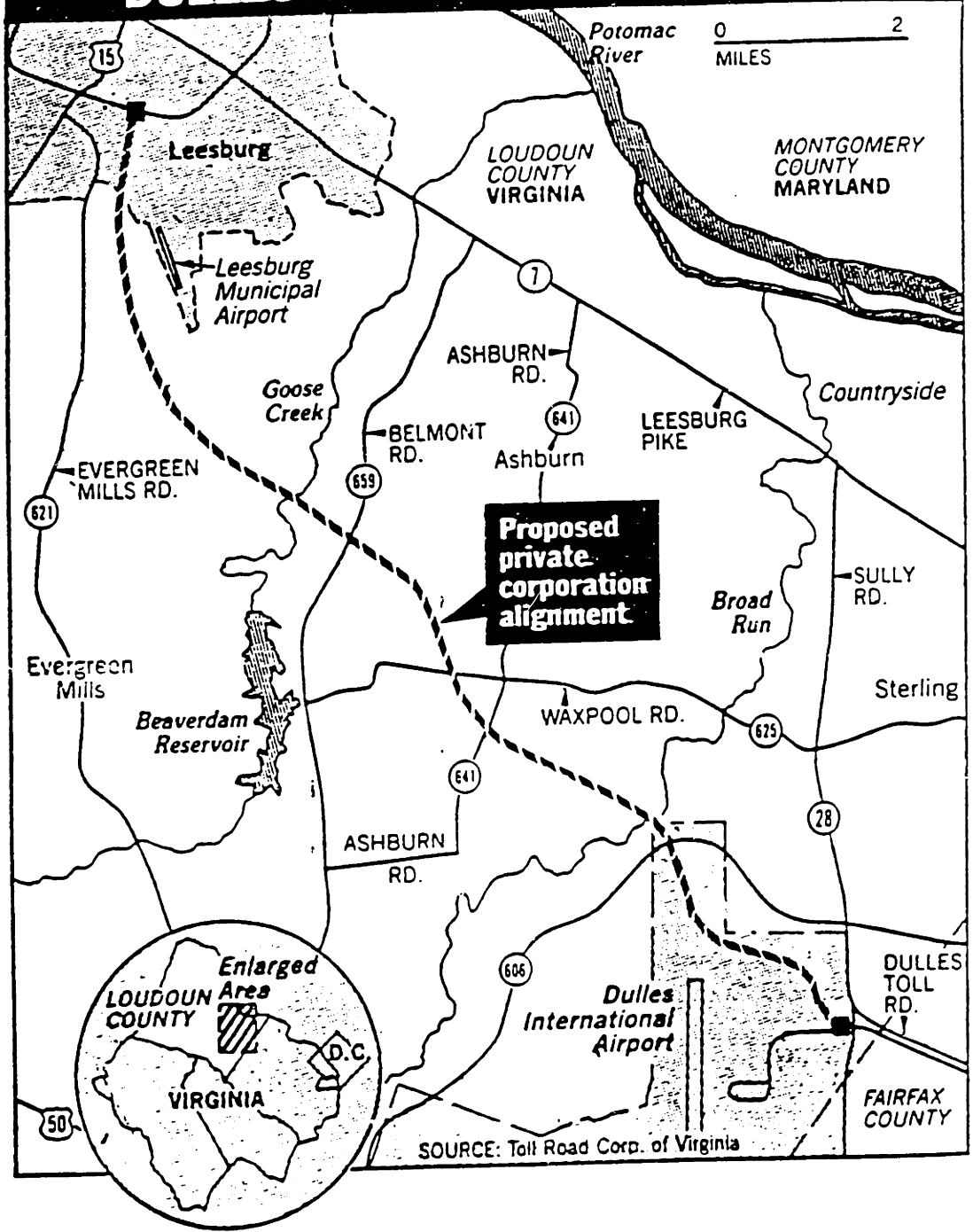
Dealing with risk entails:

1. Identifying possible events which could impair the project.
2. Disaggregating and quantifying the magnitude of the risk.
3. Allocating the risk; eliminating, reducing or shifting to others.
4. Managing the risk over the term of the asset.

Systematic Risk - unforeseeable, potential deviations from an expected outcome which impact the entire economy due to external events. (Market risks)

Specific Risk - potential deviations from an expected outcome due to impacts relating to a specific project. (Project Risk)

DULLES TOLL ROAD EXTENSION



Projected Capital Costs

TOTAL ROAD CORPORATION OF VIRGINIA

87-May-89

PROJECT CAPITAL COST CALCULATION (Balances in Thousands)

	Oct-88	Dec-88	Mar-89	Jun-89	Sep-89	Dec-89	Mar-90	Jun-90	Sep-90	Dec-90	Mar-91	Jun-91	Sep-91	Dec-91	Mar-92	Jun-92	TOTALS
Construction Draw																	
Inflated Construction Draw																	915,400
Engineering and Design																	54,000
WDO																	81,843
Total Quarterly Construction Draw																	815,243
Other Costs																	
Stage I Development Costs	4,000																4,000
TRCV Administration																	9,100
Financing																	400
MDC																	25
Payment of Loan																	0
Legal and Other Costs																	0
Property Taxes During Construction																	0
Total Other Costs	4,000																9,100
Total Quarterly Cash Requirements	4,000																9,100
Other Costs																	
(Less) Stage I Equity	(4,000)																(4,000)
Construction Equity Contribution	(4,000)																(4,000)
Net Funding Requirement																	
Beginning Debt Balance																	33,109
Commitment Fee																	323,091
Accrued Interest @																	8194,840
Quarterly Draw																	194,840
Ending Balance																	8194,840
TOTAL PROJECT COST:																	
																	8194,840

EXHIBIT B2.

TRCV PROFORMA

TOLL ROAD CORPORATION OF VIRGINIA
PREPARED BY GOLDBMAN, SACHS & CO.

TAX INCOME STATEMENTS	Jun-92	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
(1) TOLL REVENUE	0	4,200	11,070	14,150	17,100	21,500	24,900	31,500	31,300	40,740	44,070	46,100	49,000	51,000	60,000
(2) OPERATING AND MAINTENANCE EXPENSES	0	1,613	3,725	3,095	4,072	4,997	5,412	5,644	5,969	6,350	7,139	7,497	7,506	7,871	8,493
(3) ACTUAL REPAIRING EXPENSES	0	0	0	0	0	0	0	0	0	0	0	0	2876	2,674	0
(4) INTEREST ON 50% OF OPERATING INCOME	0	23	62	87	111	150	164	270	250	293	314	329	325	305	447
(5) NET OPERATING INCOME (EBITDA)	0	2,790	7,687	10,342	13,119	16,453	19,654	26,056	29,581	34,793	37,245	38,922	38,513	45,430	52,064
(6) LEASE PAYMENTS	0	0	8437	17,254	17,771	18,105	18,554	19,419	20,082	20,662	21,270	21,857	22,513	23,188	23,884
(7) INTEREST EARNINGS ON CASH RESERVE	0	234	842	1,118	1,142	1,249	1,504	1,244	1,244	1,244	1,244	1,244	1,244	955	852
(8) IMPROVEMENTS ON REPAIRING ESCROW	0	0	0	0	0	0	7	108	241	342	534	697	840	744	851
(9) LEASE PAYMENTS ON NEW EXCHANGES	0	0	0	0	0	0	0	0	0	487	1,320	1,240	1,176	1,452	2,064
(10) REAL PROPERTY TAX	0	678	1,356	1,356	1,356	1,356	1,464	1,572	1,572	1,572	1,572	1,690	1,824	1,824	1,824
(11) PRETAX INCOME	0	2,346	(1,543)	(7,149)	(4,464)	(1,757)	648	6437	9,511	13,408	14,931	16,090	15,143	20,476	24,774
(12) FEDERAL AND STATE INCOME TAX (\$7,943)	0	890	(584)	(2,714)	(1,139)	(647)	246	2443	3410	5120	5446	6167	5748	7848	10163
(13) NET AFTER TAX INCOME	0	1,455	(957)	(4,435)	(3,604)	(1,090)	402	3,993	5,901	8,348	9,285	9,922	9,394	12,627	14,610
(14) TAX CARRY-FORWARD ACCOUNT	0	0	890	304	(2,090)	(4,248)	(4,916)	(4,678)	(2,226)	0	0	0	0	0	0
(15) BEGINNING BALANCE	0	0	(1,843)	(2,714)	(1,139)	(647)	246	2443	2,774	0	0	0	0	0	0
(16) INCREASES	0	890	1,258	0	0	246	246	2443	2,774	0	0	0	0	0	0
(17) DECREASES	0	0	304	(2,090)	(4,248)	(4,916)	(4,678)	(2,226)	0	0	0	0	0	0	0
(18) ENDING BALANCE	0	890	(584)	(3,064)	(3,064)	(3,064)	(3,064)	(3,064)	(3,064)	(3,064)	(3,064)	(3,064)	(3,064)	(3,064)	(3,064)
(19) TAX ON LIQUIDATION NET OF CARRY-FORWARD	0	890	(584)	(3,064)	(3,064)	(3,064)	(3,064)	(3,064)	(3,064)	(3,064)	(3,064)	(3,064)	(3,064)	(3,064)	(3,064)
(20) NET AFTER TAX INC. AFTER CARRYFORWARD	0	1,455	2,056	0	0	0	748	6,437	8,127	8,348	9,285	9,922	9,394	12,627	14,610
(21) LEASE COVERAGE RATIO	.00E	.00E	110.51X	62.10E	72.73X	90.40E	98.80E	123.67X	130.77X	129.37X	131.64X	132.49X	140.84X	152.43X	154.01X

NOTES: THE ANNUALIZED TAX INCOME STATEMENT IS PREPARED FOR SUMMARY PURPOSES ONLY. REFERENCE SHOULD BE MADE TO THE QUARTERLY TAX INCOME STATEMENT IN THE FOLLOWING EXHIBIT TO FOLLOW COMPUTATIONS.
ALL AMOUNTS SHOWN ARE IN THOUSANDS.

EXHIBIT B2.
TRCV PROFORMA

TOLL ROAD CORPORATION OF VIRGINIA
PREPARED BY COLSON, SACKS & CO.

TAX INCOME STATEMENT	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
(1) TOLL REVENUE	6700	4870	7060	7160	7910	8120	8470	8760	9070	9310	9710	10050	10430	10765	11150
(2) OPERATING AND MAINTENANCE EXPENSES	895	952	984	1036	1083	1156	1187	1237	1283	1337	1410	1470	1545	1624	1701
(3) ACTUAL DEPRECIATION EXPENSES	0	572	572	0	0	0	452	452	0	0	0	0	0	9470	9470
(4) INTEREST ON 50% OF OPERATING INCOME	459	441	448	521	595	602	587	607	644	686	700	732	756	679	725
(5) NET OPERATING INCOME (EBIT)	54366	54537	55432	61885	69754	71284	69458	71885	78756	81160	83081	88394	89481	82744	81790
(6) LEASE PAYMENTS	24600	25330	26098	26881	27680	28518	29376	30255	31163	32090	33061	34052	35074	36126	37210
(7) INTEREST EARNINGS ON CASH RESERVE	852	852	341	341	341	341	341	341	341	341	341	341	341	341	341
(8) INTEREST EARNINGS ON DEPOSITS	1034	1109	833	872	1059	1240	1430	1620	1810	1997	1772	2024	2294	2591	1707
(9) LEASE PAYMENTS ON NEW EXCHANGES	1956	1827	1697	1548	1111	708	651	594	275	0	0	0	0	0	0
(10) REAL PROPERTY TAX	1824	1968	2112	2112	2112	2112	2280	2448	2640	2840	3060	3300	3560	3840	4140
(11) PRETAX INCOME	27875	27440	26098	32337	39163	41546	39033	40129	46509	48493	50606	52262	54123	46622	47880
(12) FEDERAL AND STATE INCOME TAXES 37.06%	10581	10418	10134	12275	15106	15771	16778	15233	17579	18407	19134	19839	20553	17697	18148
(13) NET AFTER TAX INCOME	17293	17027	16063	20062	24056	25775	24154	24896	28930	30085	31272	32423	33577	28924	29660
(14) TAX CARRY-FORWARD ACCOUNT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
(15) BEGINNING BALANCE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
(16) INCREASES	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
(17) DECREASES	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
(18) ENDING BALANCE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
(19) TAX OBLIGATION NET OF CARRY-FORWARD	10581	10418	10134	12275	15106	15771	16778	15233	17579	18407	19134	19839	20553	17697	18148
(20) NET AFTER TAX INC. AFTER CARRYFORWARD	17293	17027	16063	20062	24056	25775	24154	24896	28930	30085	31272	32423	33577	28924	29660
(21) LEASE COVERAGE RATIO	154.6%	171.3%	169.3%	161.3%	175.9%	177.9%	183.7%	184.5%	181.6%	183.5%	183.9%	184.1%	184.2%	194.5%	195.7%

EXHIBIT B2.
TRCV PROFORMA

TOLL ROAD CORPORATION OF VIRGINIA
PREPARED BY COLMAN, LACRY & CO.

	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	Total
TAX INCOME STATEMENT													
(1) TOLL REVENUE	115,410	119,481	123,662	127,991	132,470	137,197	141,995	146,872	151,913	157,133	162,640	168,429	3,606,533
(2) OPERATING AND MAINTENANCE EXPENSES	17,916	18,809	19,750	20,717	21,716	22,763	24,006	25,297	26,637	27,990	29,470	30,980	529,565
(3) ACTUAL REPAIRING EXPENSES	64,622	64,622	0	0	0	0	0	0	0	9,992	24,996	17,909	110,821
(4) INTEREST ON 50% OF OPERATING INCOME	776	803	866	916	966	976	1,005	1,037	1,070	1,099	1,155	1,205	23,285
(5) NET OPERATING INCOME (EBITL)	91,861	95,033	106,799	106,160	111,640	115,210	118,995	122,793	126,417	129,571	133,290	137,149	2,753,332
(6) LEASE PAYMENTS	38,326	25,990	12,812	12,812	12,812	12,812	12,812	12,812	12,812	12,812	12,812	12,812	604,895
(7) INTEREST EARNINGS ON CASH RESERVE	341	341	341	341	341	341	341	341	341	341	341	341	4,170
(8) INTEREST EARNED ON REPAIRING ESCROW	1,723	1,729	1,710	1,510	1,773	2,026	2,296	2,586	2,896	3,139	3,416	3,720	49,836
(9) LEASE PAYMENTS ON NEW EXCHANGES	0	0	0	0	0	0	0	0	0	0	0	0	18,566
(10) NET PREPARED TAX	2,840	3,066	3,292	3,292	3,292	3,292	3,556	3,816	3,816	3,816	3,816	3,816	96,300
(11) PRE-TAX INCOME	52,759	67,589	90,355	93,868	97,651	101,600	105,175	109,000	113,276	117,423	121,270	125,294	1,816,756
(12) FEDERAL AND STATE INCOME TAX (\$7.045)	2,027	2,567	3,290	3,561	3,706	3,852	3,992	4,137	4,290	4,478	4,704	4,909	67,660
(13) NET AFTER TAX INCOME	32,731	41,932	54,056	52,282	60,482	64,958	65,250	67,624	70,246	72,445	74,665	76,595	1,127,115
(14) TAX CARRY-FORWARD ACCOUNT													
(15) BEGINNING BALANCE	0	0	0	0	0	0	0	0	0	0	0	0	7,653
(16) INCREASES	0	0	0	0	0	0	0	0	0	0	0	0	7542
(17) DECREASES	0	0	0	0	0	0	0	0	0	0	0	0	0
(18) ENDING BALANCE	0	0	0	0	0	0	0	0	0	0	0	0	0
(19) TAX OBLIGATION NET OF CARRY-FORWARD	2,027	2,567	3,290	3,561	3,706	3,852	3,992	4,137	4,290	4,478	4,704	4,909	67,660
(20) NET AFTER TAX INC. AFTER CARRYFORWARD	32,731	41,932	54,056	52,282	60,482	64,958	65,250	67,624	70,246	72,445	74,665	76,595	1,127,115
(21) LEASE COVERAGE RATIO	195.70%	193.19%	276.40%	511.77%	529.39%	545.56%	562.06%	577.07%	596.13%	612.16%	640.15%	735.97%	

EXHIBIT B2.

TRCV PROFORMA

EXHIBIT C1.

LAX MAP

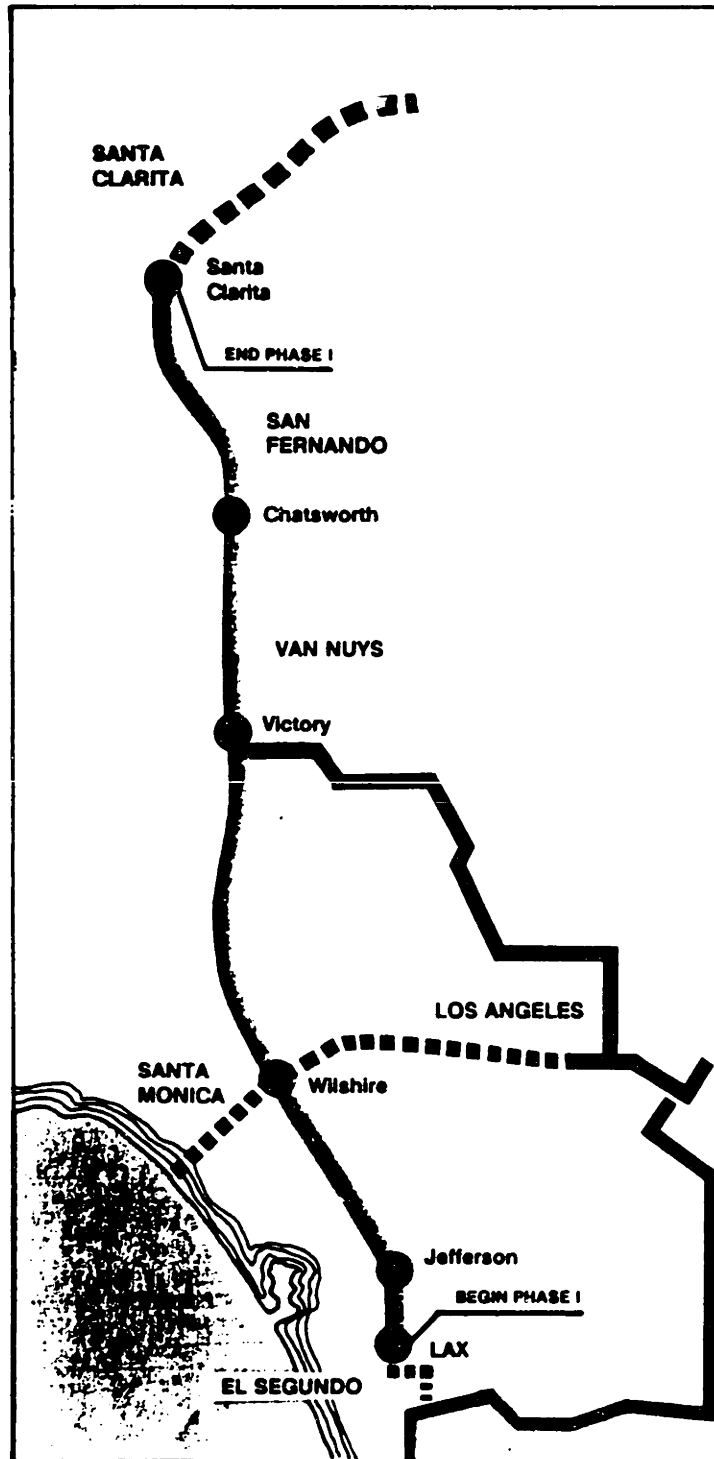


EXHIBIT 2

CALTRANS PRIVATIZATION
LAX-TO-SANTA CLARITA
MAGNETIC LEVITATION TRANSIT SYSTEM

BASE CASE ASSUMPTIONS

1. Project development begins in 1990. Construction begins in 1993 and is completed as of year-end 1996. The project goes into operation in the beginning of 1997.
2. All revenues and costs are expressed in current year dollars which assume an inflation escalation factor of 5% per annum.
3. Average daily ridership of 57,784 commencing in 1997 based on an assumed 55,000 average daily trips (ADT) in 1995 and an ADT growth rate of 2.5% per annum.
4. Average fare of \$3.25.
5. Incremental daily ridership shown under the line item labeled R-E Development ADT is assumed to be generated by real estate development projects along the corridor.
6. The Project Development Cost line item refers to the overall project development costs incurred and are not associated directly with real estate development.
7. The construction loan begins funding in 1993. All costs prior to that date are assumed to be contributed by the project joint venture partners in the form of equity.
8. Interest during the construction period accrues at a fixed rate of 9% per annum, which includes a 8% tax-exempt rate plus a 1% premium for credit enhancement.
9. The project joint venture sells the concession to LACTC at year-end 1996 upon completion of the construction for a consideration of \$1.73 billion. This amount would be funded by tax-exempt revenue bonds and represents the cost of building the system, plus capitalized interest. LACTC operates the system for the life of the concession beginning in 1997.

EXHIBIT C2.

LAX PROFORMA

EXHIBIT 2: INTERNAL RATE OF RETURN

CALTRANS PRIVATIZATION LAX-TO-SANTA CLARITA MAGNETIC LEVITATION TRANSIT SYSTEM															
PERIOD BEGINNING PERIOD NUMBER	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	
BASE CASE	27-JUL-90														
1995 ADT	55000														
ADT ANNUAL GROWTH RATE	2.50%														
AVERAGE FARE	\$3.25														
Average Daily Trips (ADT)	51704														
R-E Development ADT	4000														
Total ADT	59704														
INFLATION FACTOR @ 5.00%	1.00	1.05	1.10	1.16	1.22	1.28	1.34	1.41	1.48	1.55	1.63	1.71	1.80	1.89	
(Current \$ in Millions)															
Annual Trip Revenue	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Annual Parking Revenue	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
R-E Development Profits	0.0	0.0	0.0	0.0	0.0	36.8	36.7	36.7	36.6	36.8	36.8	36.8	36.8	36.8	36.8
Total Revenue	0.0	0.0	0.0	0.0	0.0	36.8	36.7	36.7	36.6	36.8	36.8	36.8	36.8	36.8	36.8
Less:															
Maintenance and Operating Costs	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Replacement Cost	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Net Operating Profit	0.0	0.0	0.0	0.0	0.0	36.8	36.7	36.7	36.6	36.8	36.8	36.8	36.8	36.8	36.8
Less:															
Project Development Cost	0.5	2.0	2.0	39.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Engineering Cost	0.0	5.8	8.3	16.3	21.4	12.3	12.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Land and Construction Cost	0.0	0.0	0.0	36.8	150.4	332.6	174.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
HSST System Cost	0.0	0.0	0.0	0.0	153.4	270.1	184.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Contingency	0.0	1.2	1.7	10.6	34.6	69.0	37.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Caltrans Fees	0.0	0.8	0.9	0.9	1.0	1.1	1.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Capital Costs	0.5	9.7	12.8	103.7	371.8	685.0	410.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Net Project Cash Flow	-0.5	-9.7	-12.8	-103.7	-371.8	-648.3	-373.5	84.9	92.0	99.9	71.6	80.9	91.7	99.2	
Capital Costs	0.5	9.7	12.8	103.7	371.8	685.0	410.2								
Capitalized Interest @ 9.00%	0.0	0.0	0.0	4.7	26.6	75.0	127.7								
Total Capital Costs	0.5	9.7	12.8	108.4	400.4	760.0	537.9								
Less: Development Revenue	0.0	0.0	0.0	0.0	0.0	36.8	36.7								
Construction Financing Requirement	0.5	9.7	12.8	108.4	400.4	723.2	501.2								
Equity Contribution	0.5	9.7	12.8	0.0	0.0	0.0	0.0								
Construction Loan	0.0	0.0	0.0	108.4	400.4	723.2	501.2								
Cumulative Loan Amount	0.0	0.0	0.0	108.4	508.7	1232.0	1733.2								
CASH FLOW ASSUMING OUTRIGHT SALE AT END OF CONSTRUCTION PERIOD	0.0	0.0	0.0	0.0	0.0	0.0	-1733.2	84.9	92.0	99.9	71.6	80.9	91.7	99.2	
PROJECT IRR	9.17%														

EXHIBIT C2.

LAX PROFORMA

EXHIBIT 2: INTERNAL RATE OF RETURN

BASE CASE 27-Jul-90
 1995 ADT = 55000
 ADT ANNUAL GROWTH RATE = 2.50%
 AVERAGE FARE = \$3.25

CALTRANS PRIVATIZATION
 LAX-TO-SANTA CLARITA
 MAGNETIC LEVITATION TRANSIT SYSTEM

PERIOD BEGINNING PERIOD NUMBER	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Average Daily Trips (ADT)	60687	70405	72165	73969	75118	77714	79656	81648	83689	85781	87926	90126	92377	94686
R-E Development ADT	12500	12500	12500	12500	12500	12500	12500	12500	12500	12500	12500	12500	12500	12500
Total ADT	81187	82905	84665	86469	88118	90216	92156	94148	96189	98281	100426	102626	104877	107186
INFLATION FACTOR @ 5.00%	1.98	2.08	2.18	2.29	2.41	2.53	2.65	2.79	2.93	3.07	3.23	3.39	3.56	3.73
(Current \$ in Millions)														
Annual Trip Revenue	149.4	160.2	171.8	184.2	197.6	211.9	227.3	243.8	261.5	280.6	301.0	323.0	346.4	372.0
Annual Parking Revenue	24.6	25.8	27.1	28.4	29.8	31.3	32.9	34.5	36.3	38.1	40.0	42.0	44.1	46.3
R-E Development Profits	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Revenue	174.0	186.0	198.9	212.6	227.4	243.2	260.2	278.3	297.8	318.7	341.0	365.0	390.7	418.3

Less: Maintenance and Operating Costs
 Replacement Cost

Net Operating Profit

Less: Project Development Cost
 Engineering Cost
 Land and Construction Cost
 M&T System Cost
 Contingency
 Caltrans Fee
 Capital Costs

Net Project Cash Flow

Capital Costs
 Capital (and Interest) @ 9.00%

Total Capital Costs
 Less: Development Revenue

Construction Financing Requirement

Equity Contribution
 Construction Loan
 Cumulative Loan Amount

CASH FLOW ASSUMING OUTRIGHT SALE
 AT END OF CONSTRUCTION PERIOD

PROJECT IRR

EXHIBIT C2.

LAX PROFORMA

EXHIBIT 2: INTERNAL RATE OF RETURN

BASE CASE 27-Jul-90
 1995 ADT = 55000
 ADT ANNUAL GROWTH RATE = 2.50%
 AVERAGE FARE = \$3.25

CALTRANS PRIVATIZATION
 LAX-TO-SANTA CLARITA
 MAGNETIC LEVITATION TRANSIT SYSTEM

PERIOD BEGINNING PERIOD NUMBER 2018 2019 2020 2021 2022 2023 2024 2025 2026 2027 2028 2029 2030 2031

Average Daily Trips (ADT) 97054 99400 101967 104516 107129 109607 112352 115366 118250 121207 124237 127543 130526 133799

R-E Development ADT 12500 12500 12500 12500 12500 12500 12500 12500 12500 12500 12500 12500 12500 12500

Total ADT 109554 111980 114467 117016 119629 122307 125052 127866 130750 133707 136737 139843 143026 146289

INFLATION FACTOR @ 5.00% 4.12 4.32 4.54 4.76 5.00 5.25 5.52 5.79 6.08 6.39 6.70 7.04 7.39

(Current \$ in Millions)
 Annual Trip Revenue 399.2 428.4 459.8 493.6 529.8 568.8 610.6 653.6 703.9 755.8 811.6 871.5 935.9 1005.1

Annual Parking Revenue 48.6 51.0 53.6 56.3 59.1 62.0 65.1 68.4 71.8 75.4 79.2 83.1 87.3 91.7

R-E Development Profit 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0

Total Revenue 447.8 479.5 513.4 549.9 588.9 630.8 675.8 724.0 775.7 831.2 890.8 954.6 1023.2 1096.8

Less: Maintenance and Operating Costs 125.1 131.3 137.9 144.8 152.0 159.6 167.6 176.0 184.8 194.0 203.7 213.9 224.6 235.8

Replacement Cost 7.1 7.4 7.8 8.2 8.6 9.0 9.5 9.9 10.4 10.9 11.5 12.1 12.7 13.3

Net Operating Profit 315.7 340.8 367.8 396.9 428.3 462.2 498.7 538.1 580.5 626.3 675.6 728.7 786.0 847.7

Less: Project Development Cost 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0

Engineering Cost 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0

Land and Construction Cost 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0

ISS System Cost 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0

Contingency 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0

Caltrans Fee 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0

Capital Costs 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0

Net Project Cash Flow 315.7 340.8 367.8 396.9 428.3 462.2 498.7 538.1 580.5 626.3 675.6 728.7 786.0 847.7

Capital Costs Capitalized Interest @ 9.00%

Total Capital Costs

Less: Development Revenue

Construction Financing Requirement

Equity Contribution

Construction Loan

Cumulative Loan Amount

CASH FLOW ASSUMING OUTRIGHT SALE AT END OF CONSTRUCTION PERIOD

PROJECT IRR

EXHIBIT C2.

LAX PROFORMA

EXHIBIT 2: INTERNAL RATE OF RETURN

BASE CASE 27-Jul-90
 1995 ADT = 55000
 ADT ANNUAL GROWTH RATE = 2.50%
 AVERAGE FARE = \$3.25
 PERIOD BEGINNING
 PERIOD NUMBER

PAGE 5 OF 5

Average Daily Trips (ADT)
 R-E Development ADT

Total ADT
 INFLATION FACTOR @ 5.00%
 (Current \$ in Millions)
 Annual Trip Revenue
 Annual Parking Revenue
 R-E Development Profits
 Total Revenue

TOTALS
 13414.8
 1575.9
 183.6
 15174.4

Less: Maintenance and Operating Costs
 Replacement Cost

4054.2
 228.8

Net Operating Profit

10891.4

Less: Project Development Cost
 Engineering Cost
 Land and Construction Cost
 ADT System Cost
 Contingency
 Caltrans Fee
 Capital Costs

43.5
 79.9
 702.4
 607.5
 154.5
 6.0
 1595.7

Net Project Cash Flow

9295.7

Capital Costs
 Capitalized Interest @ 9.00%
 Total Capital Costs
 Less Development Revenue

1595.7
 233.9
 1829.6
 73.5

Construction Financing Requirement

1756.1

Equity Contribution
 Construction Loan
 Cumulative Loan Amount

23.0
 1733.2
 1733.2

CASH FLOW ASSUMING OUTRIGHT SALE
 AT END OF CONSTRUCTION PERIOD

9084.8

PROJECT IRR

9.17%

EXHIBIT C2.
 LAX PROFORMA

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