Public–Private Partnerships

Case Studies on Infrastructure Development

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Preface

America's aging infrastructure, its roads, bridges, and tunnels, is in dire need of upgrading and expansion, but with federal and state funding stretched to the breaking point, the private sector has been invited to lend their resources—technical, managerial, and financial—to partially fill this gap.

When the American Society of Civil Engineers (ASCE) issued their 2005 *Report Card on America's Infrastructure,* it revealed an overall grade of D for the 15 infrastructure categories it covered, which included highways, bridges, energy, water and waste water treatment, schools, parks, and recreation. At that time, ASCE estimated that a total investment of about $1.6 trillion would be required for all infrastructure upgrades.

The 2009 ASCE report reflected a similar overall grade of D, but because of the deteriorating conditions of America's infrastructure and the effect of inflation, the costs to remediate were now placed at $2.2 trillion.

Transportation Funding as a Percentage of Gross Domestic Product

As an industrial nation, America directs 0.76% of its gross domestic product (GDP) toward the country's transportation infrastructure. The Highway Trust Fund portion accounts for 0.26% of GDP, but that number is projected to decrease to 0.20% by the year 2018, according to the Congressional Budget Office (CBO).

The Transport section of the World Bank's website reported that industrialized nations around the world typically spend slightly more than 1.0% of GDP on their road sectors and that the largest industrialized nations spend 0.4% of GDP on road maintenance and 1.3% on new construction.

Even developing and transition countries spend more than the United States on their roads and bridges. African nations spend 0.78% of their GDP, on average, on their highways, and eastern Europe spends 0.84%. Only Latin America, at 0.49%, and Asia, at 0.67%, spend a smaller portion of their GDP on roads than does the United States.

Fitch Ratings Looks at the State of U.S. Highways

Fitch Ratings, a global credit rating company, looked at our U.S. highway system in August 2008, when toll traffic began to fall because of the spike in fuel prices that began in 2007. On Feb. 18, 2009, Fitch Ratings issued a report on global infrastructure projects and rated our toll roads sector outlook as negative.

This report included events that bear watching in the coming decades:

- A potential continuing decrease in vehicle miles traveled (VMT) may create further reductions in toll-road revenue. As a by-product, though, free alternatives may become less congested and more competitive on a travel time basis.
- Publicly operated toll roads may face increased political resistance to raising tolls at a time when increases are necessary to maintain their financial viability.
- Interstate tolled turnpikes with a significant commercial traffic component may experience a loss in revenue because of the drop in retail sales and lower consumer spending.

These views appear to be looking at the short term while the U.S. economy was in the doldrums, but this slowdown, expected to continue for several years, is most likely temporary, and the infrastructure problems and financing shortfall experienced in that 2008–2009 period will only be exacerbated when the economy picks up.

How the Congressional Budget Office Views the Problem

On July 10, 2008, Peter Orszag, then-director of the Congressional Budget Office, appeared before the U.S. Senate Committee on Finance to discuss public spending on infrastructure and the options for meeting the demands that sector will place on the economy. He set forth several options:

- Increase federal spending by raising the tax on gasoline and diesel fuel. A one-cent per gallon increase would yield $1.8 billion annually, and an increase of $0.25 would bring in $44 billion per year.
- Improve the cost-effectiveness of tax expenditures by changing some forms of debt instruments. Tax-exempt bonds will cost the federal government an average of $31.2 billion per year in lost taxes for the period 2007–2011. A new debt instrument, the tax credit bond, pays no interest but allows the purchaser to receive a credit equal to 100% of the interest that would have otherwise been paid. If these tax credit bonds were replaced with tax-exempt bonds, the government could save $3 billion to $6 billion.
- Reduce the cost of providing infrastructure by minimizing low-value projects. Almost $5.7 billion of the $36.6 billion set aside for Federal Highway Administration projects in 2006 were earmarked, and about $2.4 billion of the $8.6 billion set aside for the Federal Transit Administration were also earmarked.

- Promote reductions in demand by asking users to pay the full cost of the services provided, which translates into higher costs for those services. An example would be congestion pricing, which allows drivers to use express lanes at an additional cost. CBO also suggested that basing truck fees on the number of miles traveled and the weight per axle could induce freight carriers to reconfigure their trucks or to ship them intermodally.

The Marketplace at Work

Market forces in our country performed well in that 2007–2008 period when the rising cost of fuel changed the travel habits of the American public. The gas-guzzling SUVs and pickup trucks began to accumulate on the dealers' lots, and the waiting list for hybrid cars grew longer.

Public transportation ridership increased dramatically across the country. Americans took 10.7 billion trips on public transit systems in 2008, the highest level of ridership in 52 years, according to a March 2009 report by the American Public Transportation Association.

But at a time when light rail, trolley, and bus use increased, operating and maintenance funding for these public transportation systems was woefully short. The potential for fare increases and/or cutbacks in service threatened the viability of these transit systems at the time when they were needed the most.

The American Recovery and Reinvestment Act of 2009

On Feb. 17, 2009, President Barack Obama signed the American Recovery and Reinvestment Act (ARRA) and Vice President Joe Biden and U.S. Department of Transportation Secretary Ray LaHood announced that $26.6 billion of this total $787 billion funding would be made available to the states for highway investment. Although far short of what was needed to bring our crumbling highway infrastructure back to acceptable quality levels, it was welcomed by state governments as a good start. Additionally, $8.4 billion, as part of the overall $787 billion, would be made available for transit, $8.0 billion for high-speed rail, and $1.3 billion for Amtrak. Within this more than $26 billion was a $1.5 billion "discretionary" fund, that when announced on May 18, 2009, was known as TIGER (Transportation Investment Generating Economic Recovery). This money would be made available to states as grants, based on several criteria, aimed at creating jobs quickly, called shovel-ready projects. The grant size would vary from $20 million to $200 million.

As of June 15, 2009, $14.465 billion of the ARRA money had been obligated, and the federal government was turning its attention to monitoring the oversight of fund distribution to avoid future claims of fraud.

As the Troubled Asset Relief Program (TARP) funds were dispersed to some unstable U.S. banks in late 2008 and early 2009, the flow of credit in the country began to improve slowly; foreign banks were also getting their houses in order,

which meant that private investors were able to begin to look at new infrastructure projects once again.

Public–Private Partnerships Can Play a Role in This Situation

The public–private partnerships formed in this country in the past several years have provided a number of specific benefits to all parties. They have provided some government entities with cash payments that could supplement local and state transportation budgets. These PPPs have provided innovative financing alternatives to government-mandated fiscal year spending restrictions, and they have created high-quality projects and brought risk sharing to the risk-averse public sector.

The toll-road concession agreements with the city of Chicago provided that city with $1.83 billion in an up-front payment that was used to establish a "rainy day fund," relieve a budget shortage, and set up a $100 million program to build affordable housing. A similar up-front payment by the same concessionaire to the state of Indiana, in the amount of $3.85 billion, allowed Indiana to have one of the few fully funded transportation budgets in the country.

Two contractors in Florida were able to win a contract to widen one of the Sunshine State's interstates by foregoing their last payment until the Florida Department of Transportation (FDOT) had the funds available. Even though the contractor/developer must have included lost interest in the estimate, it allowed FDOT to save money by completing the improvements in one contract rather than in several as fiscal year funding became available. In the process, FDOT took advantage of the elimination of multiple contracts, each containing mobilization and demobilization costs. FDOT also avoided the inflationary spiral that could have affected future costs.

In Texas, the concept of *shadow tolling* was introduced when a contractor proposed building a loop extension onto an existing tolled road. Because ongoing construction operations would reduce traffic count, the state department of transportation paid a fee for each vehicle traveling on a road under construction rather than levy the toll on drivers.

The concept of *availability payments* was also being considered on several transportation projects, including the nearly aborted Port of Miami Tunnel project in Florida. Under this system, payments are not based on toll revenue but are paid to the developer by the government agency based on achieving certain performance criteria, such as meeting predetermined schedule commitments.

These are just a few of the ways in which the private sector has contributed, and will continue to contribute, to the upgrading of America's infrastructure.

The Railroads Weigh In

As our highways become more congested with freight traffic, the railroads offer alternatives to shift traffic away from the roadway and onto the railway.

For every intermodal train, those that carry containers or piggyback trailers, 280 trucks are removed from our highways. Trains are also environmentally efficient, moving each ton of freight 423 mi (262.26 km) on a single gallon of fuel, which correspondingly reduces harmful emissions.

The American Association of Railroads estimated that to add one mile of highway costs about $10 million, whereas adding one mile of rail costs between $1 million and $3 million.

The railroads have embraced public–private partnerships and point to a project in California as an example of what these PPPs can achieve: the Alameda Corridor, where rail freight operates from the Los Angeles–Long Beach ports to a rail hub in Los Angeles. The BNSF and Union Pacific railroads teamed up with the Los Angeles County Metropolitan Transportation Authority, using a PPP arrangement to create a series of overpasses and underpasses for rail traffic, eliminating 200 at-grade crossings, speeding the flow of freight safely, and providing a financial stimulus and lots of employment for the local communities involved in the corridor.

Truck Transport

Several states are considering the advantages of creating truck-only lanes (TOLs) on both new and existing highways. These lanes, designed and constructed to meet the heavier loads imposed on them, may reduce the wear and tear on our existing roadways, increase safety, and reduce trucking costs.

The California Department of Transportation determined that these TOLs were feasible on congested highways under the following conditions:

1. truck volumes exceed 30% of the vehicle mix,
2. peak-hour volume exceeds 1,800 vehicles per hour per lane, and
3. off-peak volume exceeds 1,200 vehicles per hour per lane.

When these TOLs are properly and safety segregated, some state officials envision tractor-trailer "trains," where multiple trailers can be connected and towed by a single tractor. Combined with an intelligent transportation system, both increased safety and efficiency may possibly translate into lower shipping costs.

The Anticipated Benefits from a Public–Private Partnership

The benefits of embracing public–private partnerships are wide and varied:

- **Freeing public funds for other uses:** By having private consortiums fund design and construction of a new highway, bridge, or tunnel, or provide an up-front payment to obtain a long-term toll-road concession agreement, the

limited federal, state, or local resources can be allocated to other important transportation projects.

- **Reducing risk to the public sector:** Cost overruns, in either the design or construction phase, are shifted to the private sector when carefully scripted PPP agreements are created. Some public highway projects require a series of fiscal year funding to be completed, setting the stage for inflation-related cost increases and other costs associated with multiple contracts for a single project. The long series of delays experienced by travelers as these publicly funded projects stretch out over the years is also of concern to the involved public officials.
- **Mobilizing other financial sources:** Whereas the public sector depends primarily on funding as prescribed in state and federal budgets, the private sector can use the lure of return on investment to secure funding from many sources, both domestic and worldwide.
- **Increasing efficiency of operation:** The private sector can introduce some efficiencies that the public sector may have difficulty in doing because of political, financial, or other reasons. When Cintra/Macquarie won the lease for the Indiana Toll Road, they bought new snowplows to increase efficiency and they bought automatic coin-counting machines, which freed up 45 minutes each day for the toll collectors.
- **Achieving lower maintenance costs:** Because a private consortium not only designs and constructs, but also operates and maintains the facility during the term of the agreement, often 75 years or more, they build high-quality features into the projects to lower future maintenance costs. At the time of transfer to the public agency, a high-quality facility will be handed over.

The federal government and local and state governments are actively engaged in pursuing the many options that these arrangements can provide.

The Call for a National Policy

We need a coordinated, prioritized program that includes highway, public transit, rail, waterway, and air transportation needs and solutions, taking into account the changing demographics of our citizens. We need a national policy that establishes realistic revenue sources to adequately cover the cost of improving our highway system and to stick with these sources. A good start would be to raise the gasoline and diesel fuel tax and adjust both taxes for inflation.

Paying user fees appears to be a fair way of raising revenue, and toll roads provide those fees. Congestion pricing provides drivers with a way to avoid delays, but they must pay for this service. We pay to use light rail, bus, or the railroad, so user fees are not alien to us, but we may have to increase those fares if we wish to retain dependable, good-quality service.

Based on study after study from public agencies and private transportation organizations, the immediate action to correct our country's aging infrastructure seems to include the following:

- Enhance urban multimodal transportation systems.
- Provide dedicated corridors to move truck and rail freight efficiently and safely.
- Create other sources of revenue, such as toll revenue and federal and state highway related taxes.
- Encourage the private sector to collaborate with the public sector in participating in a variety of infrastructure projects.

By forming these public–private partnerships, we can use the best minds and resources of both sectors to the advantage of the public they serve.

Advancing PPPs

Public–private partnerships are in their nascent stage in this country, although they have existed in other parts of the world for decades. We have seen many variations on the theme: up-front payments in return for long-term concession agreements, availability payments, and shadow tolls.

Because of the long-term nature of many of these types of agreements, it may be decades before we finally determine whether they were viable options. But in the meantime, in the face of declining federal and state revenue and the parallel declining of our infrastructure, these public–private partnerships appear to offer one way to supply the aspirin of relief for our infrastructure headache.

I have chosen a case-study approach in this book to examine the successful PPP projects and to look at the ones that did not come to fruition. This, I believe, allows the reader to take a look behind the scenes and gain a little more insight into the formulation and administration of these complex projects, both in the United States and with our Canadian and Mexican neighbors. These case studies frequently reveal what went right and what went wrong. They also show the sometime convoluted path that some projects take, tying up, for years, both the human and financial resources of engineering firms, contractors, and the developers that bring all of these parties together.

Sidney M. Levy
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Contents

CHAPTER 1

The Public–Private Partnership Movement

The movement toward public–private partnerships to provide infrastructure is a relatively recent phenomenon, appearing on the world stage in the early 1990s. This chapter first presents the vocabulary for talking about PPP (also referred to as P3) projects, followed by a brief overview of the advantages for government agencies to engage in PPPs. Then, the adoption of PPPs for infrastructure projects is described for Europe, Asia, Australia, South America, and North America, followed by a more detailed examination of PPP in the United States. The last part of this chapter discusses the arguments for and against involving private enterprise in public projects.

Background: Definitions, Scope, and Advantages

Perhaps I should start by defining what a public–private partnership is not: it is not privatization. A public–private partnership is a process whereby private management assumes an operational role in a public project via a long-term "concession" or lease-type contract with a public authority. This partnership is different from privatization, where ownership or title to a public facility is transferred to a private entity.

The PPP is a relationship between the public and private sectors where a long-term contract permits the public agency to retain full ownership of an infrastructure project—the *asset*—as well as full oversight of the private sector's activities in that project while the private entity operates the facility and collects the generated revenue. Some experts argue that there is no partnership in PPP because there is no sharing of business activities, just a straightforward relationship between lessor and lessee. In any case, PPP is a project delivery system that is gaining more momentum around the globe and in the United States because a demand for quality infrastructure remains while the availability of public funds is becoming scarcer.

The need for new and upgraded infrastructure varies throughout the world. Water, waste treatment, and electric power generation are high-priority projects in developing nations, whereas developed nations need more movers of people

and freight. The terms *greenfield* and *brownfield* have been added to the PPP lexicon; they refer, respectively, to new projects and existing projects. The extent to which a project is greenfield or brownfield varies, to a large degree, according to whether the project is in a developing or developed country. Developed countries have significant existing, functioning infrastructure projects (brownfield), whereas developing countries are in need of new ones (greenfields).

The United Nations Population Fund (UNFPA) estimated in 2007 that by 2008 more than 3.3 billion people would live in towns and cities and that growth would increase this number to almost 5 billion by the year 2030 (UNFPA 2007). Such growth puts enormous strain on governments to provide the basics—water, waste removal, and power—for the multitudes residing in cities, as well as transportation to move goods and people. Not even the richest nations will be able to marshal the money and technical resources to deal with this explosion of infrastructure needs, and governments will look to the private sector to play a major role in satisfying the demand for infrastructure.

The Form and Scope of PPP Projects

Public–private relationships can assume several forms, many of which are slight variations on a central theme:

- Build–operate–transfer (BOT): A private entity builds a project to meet the public agency's requirements, providing design, construction, financing, operation, and maintenance during the concession period. The BOT entity collects the revenue generated during the concession period and returns the project to the public agency at the end of the contract period for little or no additional compensation.
- Build–own–operate (BOO): Similar to BOT, except that the BOO entity owns and operates the facility.
- Design–build–operate–maintain (DBOM): A private entity provides design–build (DB) services to construct a publicly owned facility and assumes operational and maintenance responsibility for a specific period of time. This approach was developed to ensure that the DB proposal will result in a high-quality project because the DB entity must maintain the facility for *x* years.
- Lease–develop–operate (LDO): A private entity leases a facility from a public agency. It then provides capital to renovate, expand, or upgrade the facility and operates it under a contract with the public agency.
- Buy–build–operate (BBO): The public agency sells an asset to a private entity that is able to complete any improvements (such as expansion or rehabilitation) that are necessary to create a profitable venture for the private entity to operate.
- Availability payment process: The public agency makes periodic payments to a private entity in return for delivering a service or a product, generally with specific delivery and/or quality milestones as part of the agreement.
- Shadow tolling: A private entity obtains revenue from a tolled roadway. The revenue is calculated by a formula, rather than the physical collection of tolls.

Other forms of PPP include tax-exempt leases, sale/leasebacks, tax credits, and turnkeys—all with the end purpose of allowing the private sector to use its unrestrained initiative and capital sources to generate a profit for itself while serving a public need.

A sense of the growth and spread of PPP infrastructure arrangements can be provided by looking at the results of recent research conducted by private companies (analyzing a new and growing market), government offices (looking to leverage available funding), and development agencies (assessing effectiveness). Table 1-1 shows how many infrastructure projects in six categories were planned worldwide and in the United States as of 2007. Figure 1-1 presents a picture of worldwide highway infrastructure projects funded and completed using PPP. A large share of the total number of projects comes from North America, which includes Canada and Mexico, as well as the United States. In terms of expenditures, however, significantly higher costs were incurred in Europe and Asia than in North America (GAO 2008).

In 2007, a World Bank report examined private investment in infrastructure, in parallel with investment in the public sector, and credited PPP with being an engine of productivity in developing nations. The World Bank's Private Participation in Infrastructure (PPI) Project Database (http://ppi.worldbank.org) tracks more than 4,300 PPP projects worldwide that involve telecommunications, energy (electricity and natural gas transmission), transport (highways, airports, and seaports), water, and sanitation infrastructure (Figs. 1-2 to 1-4). Table 1-2

Table 1-1. Infrastructure Projects by Type of Project and Road Projects by Region, 1985–2004

	Worldwide		*United States*	
	Planned and Funded	*Funded and Completed*	*Planned and Funded*	*Funding Amount (billions of $)*
Type of Project				
Road	656	359	73	41.1
Rail	247	107	27	34.8
Airport	182	67	24	2.9
Seaport	142	44	1	0.3
Water purification and distribution	616	391	152	12.4
Building	253	153	87	11.6
Total Projects	2,096	1,121	364	
Road Projects by Region				
Europe	205	91		
North America	174	106		
Latin America	126	83		
Asia	137	72		
Africa	14	7		

Source: AECOM 2007.

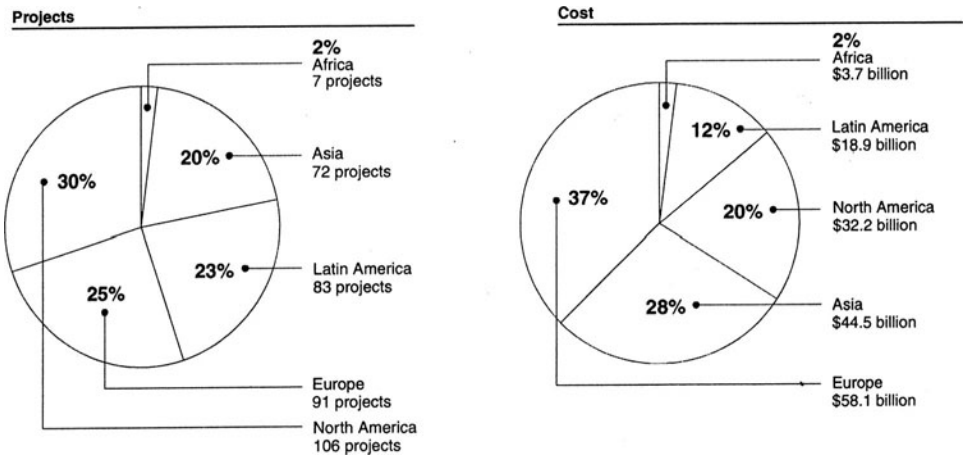

Figure 1-1. Worldwide Highway Infrastructure Projects Funded and Completed Using PPP, 1985–2004. *Note:* The term "highway infrastructure" includes roads, bridges, and tunnels. *Source:* GAO 2008, 18.

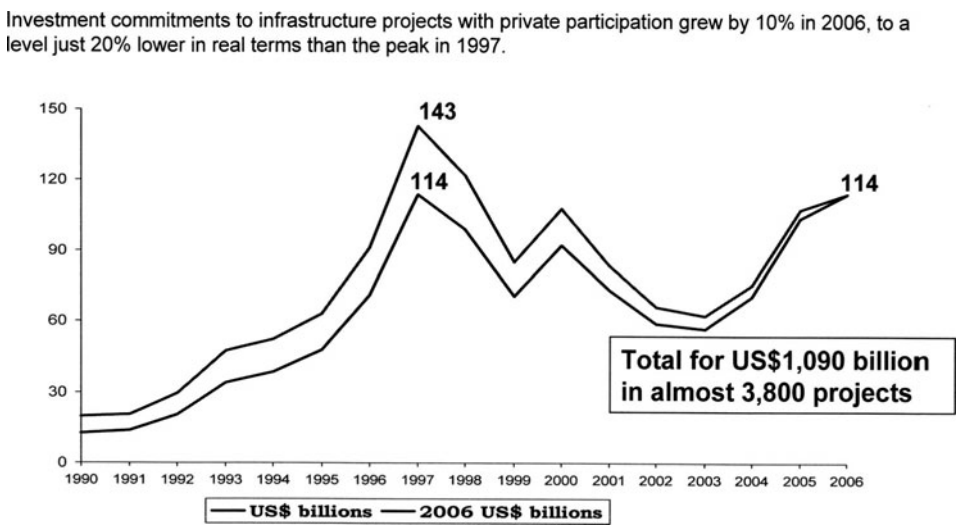

Figure 1-2. Investment Commitments to PPI Projects in Developing Countries in Real and Nominal Terms, 1990–2006. *Source:* World Bank and PPIAF, PPI Project Database.

presents a snapshot of investment by developing nations in PPP infrastructure projects by sector.

With respect to highway projects in developed and developing countries, data in the World Bank PPI database can be summed up as follows:

- In Europe, Spain, Germany, Greece, Great Britain, and Ireland lead the way in the number of PPP infrastructure projects.

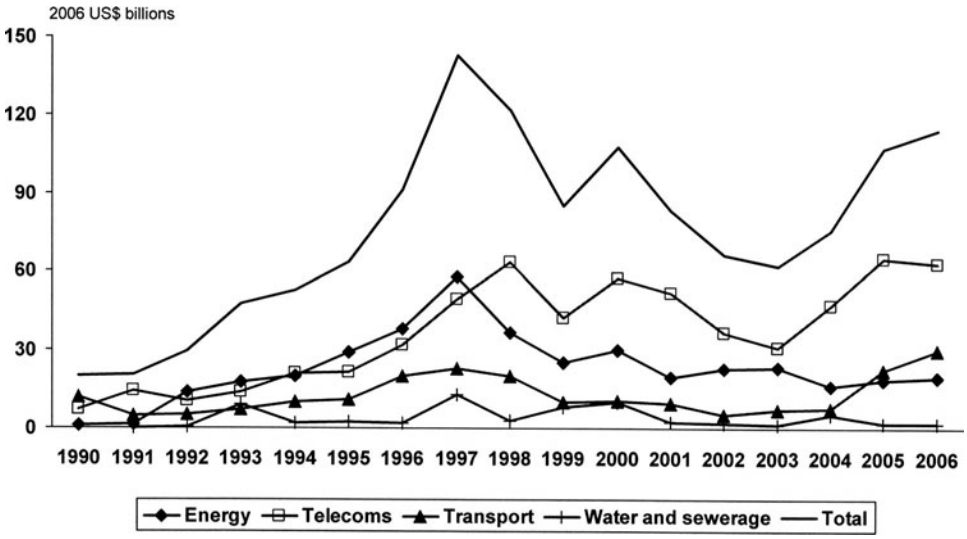

Figure 1-3. Investment Commitments to PPI Projects in Developing Countries by Sector, 1990–2006. *Source:* World Bank and PPIAF, PPI Project Database.

All developing regions saw growth in investment in 2006 except Europe and Central Asia, where investment declined from its peak in 2005, and East Asia, where investment remained stable. Investment has been more evenly distributed among developing regions since 2002.

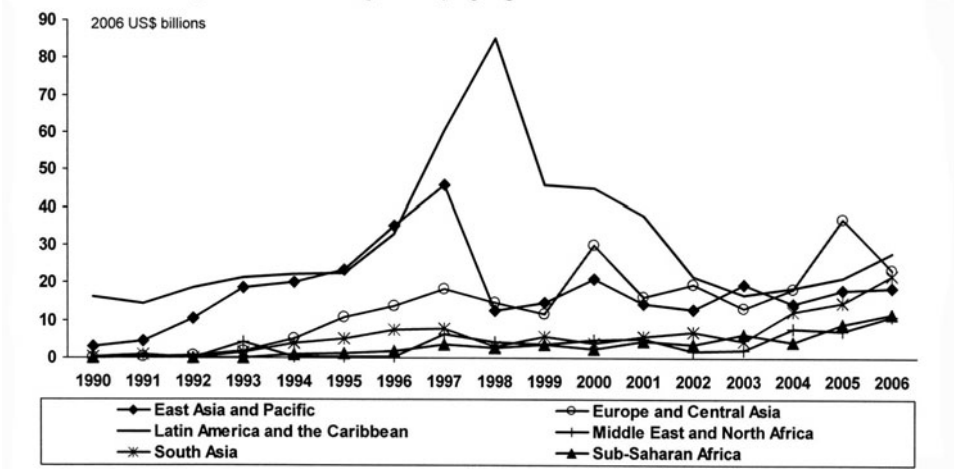

Figure 1-4. Investment Commitments to PPI Projects in Developing Countries by Region, 1990–2006. *Source:* World Bank and PPIAF, PPI Project Database.

- In the Pacific Rim and Asia, China, Malaysia, South Korea, Australia, and India are leaders. China, however, is beginning to formulate joint development agreements, which may be the precursor to an even greater number of public–private ventures.
- In Latin America, Brazil, Chile, Peru, Colombia, and Argentina are actively pursuing PPP arrangements.

Table 1-2. Investment Commitments in Developing Countries to PPP for Infrastructure by Subsector, 1990–2006

Subsector	*1990–2000 (%)*	*2001–2006 (%)*
Power	30	18
Telecommunications	42	58
Roads	9	6
Water	6	3
Natural gas	5	5
Railways	4	3
Seaports	2	4
Airports	1	4
Total value, 2006 US$	$782 billion	$509 billion

Source: World Bank 2007.
Note: Totals do not achieve 100% because of rounding.

- In North America, the United States and Canada dominate, and Mexico is beginning once again to embrace PPP after stopping many projects because of financial problems.
- In Africa, few toll road projects are in evidence.

In all sectors, however, the following points are clear:

- Power projects remain in the US$16–20 billion range.
- Telecommunications projects remained at peak levels in 2006, accounting for more than half of all such PPI investments.
- Transport investment became less concentrated in 2006.
- Water investment commitments of US$2 billion in 2001–2006 were below the peak in the 1990–2000 period.

Reasons for Public Agencies to Consider PPP Projects

With the widening gap between infrastructure requirements and the government's ability to fund projects through traditional means, one obvious solution is to look to the private sector. However, other reasons, some more subtle, have been identified by the U.S. Federal Highway Administration (FHWA) and the U.S. Department of Transportation (U.S. DOT). In a 2004 report, the FHWA notes that including the private sector in infrastructure projects offers benefits by

- accelerating the implementation of high-priority projects by packaging and procuring services in new ways;
- providing specialized management capacity for large and complex projects;
- enabling the delivery of new technology developed by private companies;
- drawing on private-sector expertise in assessing and organizing the widest range of private-sector financial resources;

- encouraging private entrepreneurial development, ownership, and operation of highways and/or related assets;
- allowing a reduction in the size of a public agency by substituting private-sector resources and personnel (This outsourcing has become a trend on the national level, as evidenced by the number of consultants hired to perform what are essentially government functions. The value and cost of outsourcing in government has been and will continue to be a highly debatable topic.);
- reducing the public deficit; and
- reallocating funds to other projects (U.S. DOT 2004).

However, the U.S. DOT report also observes that not all highway projects are "bankable" and that many factors enter into the equation:

- The economics of the project: Is the anticipated revenue sufficient to cover all costs and expenses, including debt service coverage?
- Financial institutions require an interest rate on debt that is lower than the standard return on equity. The lower interest reflects lower risks because senior debt is served before equity.
- Financial institutions prefer a lower debt-to-equity ratio, and shareholders look for a higher ratio because that benefit increases their return on equity.
- The debt service cover ratio gauges the cash flow available to meet debt service. A high minimum provides reassurance to lenders.
- Loan life cover ratio (LLCR) measures future cash flow available to service the debt throughout the life of that debt. Lenders require a minimum LLCR as applied to the debt service cover ratio.
- A discounted cash flow model is necessary to predict, with some accuracy, that an adequate revenue structure meets the economic and financial goals of the project.
- A fair and reasonable allocation of risks to be shared by each party to the project is essential during development and construction.

Private-sector involvement in projects that had historically been relegated to the public sector has increased dramatically, with different models being adapted to meet regional needs.

Global Survey of PPP Models

Best Value: One European Approach

The National Cooperative Highway Research Program (NCHRP) is sponsored by the FHWA and the American Association of State Highway and Transportation Officials (AASHTO). NCHRP was created in 1962 to accelerate research into acute problems posed by highway planning, design, construction, operation, and maintenance issues. In 2001, NCHRP sent a team of government officials,

lawyers, contractors, and academics to Europe to investigate transportation issues. Specifically, the NCHRP team was interested in how European nations were coping with their current transportation problems and what programs they were considering to deal with future concerns.

Until the late 1980s, some European methods of procuring design and construction were similar to those in the United States. By the 1990s, however, the Europeans recognized new development in the areas of project finance, performance contracting, experience in design–build processes, and asset management. With these innovations in mind, Europeans began shifting their models toward partnering with the private sector. The Europeans often use a *best-value* approach during the selection process. The best-value solution is the program or proposal that meets four criteria: strategic objective, delivery schedule, quality standards, and cost parameters. In awarding contracts, the Europeans are careful to ensure transparency and uniform procedures. However, the NCHRP team discovered that specific best-value criteria and the weighting of these criteria varied somewhat from country to country.

For example, the Netherlands uses the short-list approach, that is, the client invites a selected group of contractors, generally three to five, to submit bids rather than placing a public announcement to which all interested contractors can respond. Then they evaluated proposals based on the contractor's ability to perform, personnel resources (e.g., experience of key managers), use of special equipment, experience, and proven achievements. Their grading process was the same for both short-list and final proposers, and it included price as a factor. The Swedish approach was similar, except that it weighted references, schedules, quality assurance system, traffic safety, and environmental issues at 30% and technical evaluation, technical performance, and human resources at 70%. Early on, the United Kingdom awarded contracts on the basis of 20% for quality and 80% for price. The weighting was later changed to 60% for quality and 40% for price.

The French system relied heavily on the low-bid approach. Evaluation standards were spelled out in the request for proposals (RFP; also called *tender*) in order of priority. For example, schedule might be the top priority, followed by quality, price, technical expertise, and so on. In theory, price was not the deciding factor, but the French Ministry of Construction told the NCHRP visitors that 95% of all awards had been made to low bidders. The French review process is a lengthy one. It usually takes two to three weeks to review all bids, but for bidders who submitted alternative processes or approaches, that review could stretch to six to eight weeks.

At the conclusion of these visits, the NCHRP research team recommended that the following concepts be explored in a U.S. model for PPP:

- consider a best-value selection process to promote competition and innovation;
- promote the use of performance specifications with low levels of design in design–build RFPs to promote innovation and accountability from private-sector bidders; and

- ensure quality of construction and cultivate a group of qualified life-cycle service providers by incorporating maintenance and operation into the design–build projects.

Other European PPP Approaches

United Kingdom

The private finance initiative (PFI) has been credited with energizing and accelerating the PPP movement in the United Kingdom. This program was started under the Conservative government of John Major in 1992. In its basic form, PFI allows federal, provincial, and municipal governments to contract with private entities to provide certain services on a concession-type basis; services can include highways, medical facilities, schools, prisons, and other government facilities. The developer or operator is paid for its work over the course of the contract, and payment is based mainly on performance. If the developer or operator fails to meet any of the agreed-on standards in the contract, its payment is adjusted accordingly. This method appeared to ensure that projects are delivered on time and with acceptable quality standards. Large projects are funded with corporate bonds issued by the private entity, which is assisted by the government in obtaining an acceptable bond rating. Small projects are generally funded by banks in the form of senior debt.

The PFI movement in Great Britain has not been relegated only to roads, bridges, and tunnels; it is also applied to the government-controlled health-care program, which has seen billions of private investment dollars allocated to the construction and upgrading of hospitals and related facilities. Prisons and schools have also been included in the PFI program.

The European Union

The European Union (EU), which now includes 27 nations, has undertaken quite a bit of PPP work. The EU's executive branch, the European Commission, led the way in advancing acceptance of PPP with a green paper (EU 2004; EU 2005). When the green paper was issued in 2004, no legal framework for PPPs existed in the European Union. The green paper studied the European Community treaty, as well as secondary legislation that might address the changes that PPPs might present. The green paper proposed a public consultation forum to deal with the following issues:

- the framework for selecting a private partner;
- the method by which private initiative PPPs should be established;
- the contractual framework of a PPP;
- how various components of the PPPs can be subcontracted; and
- the importance of introducing competition with institutionalized PPPs.

The movement took off, as country after country began exploring the use of PPP ventures.

Portugal

Portugal was one of the first European countries to use PPP when it created a program of 17 toll-road concessions that use shadow tolling. *Shadow tolling* is a system where the private entity collects revenue from the public authority based on the actual number of vehicles using the motorway after it is constructed. The private entity does not collect tolls from roadway users. Vehicle counters tally the number of vehicles traveling the toll road, and the government agency pays the concessionaire based on this traffic count. Portugal's Programa de Investimentos em Infra-Estruturas Prioritárias was to provide for 550 km (344 mi) of roads by the end of 2009, with a value of €25 billion (US$37.5 billion), as well as for another €1.5 billion (US$2.25 billion) for health-care projects.

Spain

In Spain, the Ministry of Public Works and Transport targeted an investment of €249 billion (US$373.5 billion) for road, port, rail, and airport construction and upgrades between 2005 and 2020, plus €1.1 billion (US$1.65 billion) for 13 new hospitals over the 2005–2008 period. Spanish contractors gained a great deal of experience in PPP toll roads when they ventured into the European market during the 1990s, offering competitive pricing. Some of these high-risk forays served the Spanish contractors well, as evidenced by the number of contracts either completed or under way by Spanish firms. Combined, the Spanish contractors had 171 concession projects in the operational stage and 134 in the active proposal stage worldwide in 2007–2008.

These Spanish consortiums have begun to take an active role in PPP projects in the United States over the past several years, putting their experience gained in Europe to good use in Illinois, Indiana, Texas, and several other states that have U.S. concession projects.

France

The French enacted a partnership ordinance in June 2004, which produced their design–build–finance–operate (DBFO) model. Legislation in 2005 created a PPP unit within the Ministry of Finance. A €1.4 billion (US$2.1 billion) high-speed train system, with large public subsidies, and an €870 million (US$130.5 billion) A-41 highway project are both conventional concession-type agreements and point the way to additional uses of PPP in France.

Germany

Germany has proceeded cautiously with PPPs. As of 2006, the German finance minister publicly announced the government's intent to raise the level of PPPs to 15% of the country's total investment in public infrastructure. Local authorities are, at present, using PPP to construct roadways: A-8 in Bavaria, A-4 in Thuringia, and A-5 in Baden-Wuerttemberg. The €426 million (US$639 million) Circle Line project in Dusseldorf and a €488 million (US$732 million) military helicopter training center are also under way.

Austria

Although Austria has no legislation dealing with PPP, the government solicited proposals for a €3.1 billion (US$4.65 billion) Ostregion project—a new network of roads to the north, east, south, and west of Vienna and between Vienna and the Czech border.

Greece

PPPs have been used in Greece since Law 3389/2005 was enacted, which provided the legal framework for the implementation of PPPs (www.sdit.mnec.gr/en/infopoint/law/). The Athens Ring Road and the Athens airport are two projects long operational. As of 2007, seven highway projects were under way. The €477 million (US$715.5 million) Thessaloniki submerged tunnel project was awarded in 2006 and was scheduled for completion in 2010, but the requirement to preserve three buildings and dredging problems have delayed the completion. The €400 million (US$600 million) Corinth–Kalamata and Lefktro–Sparta highway upgrades are under contract. A construction contract was signed in January 2007, and a 54-month construction schedule places completion in late 2011 or early 2012. Twenty-seven schools with a total value of €100 million (US$150 million) are also planned. In addition, Greek contractors were working with Spanish and French concessionaires on several BOT civil projects in their country, but the country's crippling debt burden in 2010 will probably curtail these ventures.

Asia

South Asia

For a while, India's problems with Enron and the failed Dabhol 2,015-MW liquefied natural gas power plant may have stifled the country's appetite for PPP projects. Now, however, India is aggressively pursuing its National Highways Development Program's fifth phase by targeting Rs412 billion (US$9.155 billion) in 2007–2008. The NHDP program has been divided into four phases. Phases I, II, and III are in progress as of 2010. Phase V (there is no Phase IV listed) will commence in 2011) to widen some 6,500 km (4,030 mi) of highways. This project is in addition to approximately Rs486 billion (US$10.8 billion) for other routes throughout the country. PPP is also seen as a key strategy for improving India's increasingly busy ports. Indian firms have allocated Rs292.5 billion (US$6.5 billion) to improve minor ports and Rs607.5 billion (US$13.5 billion) for major ports.

In 2007, India's neighbor Sri Lanka invited private infrastructure developers to become involved in several major highway projects.

China

In China, where construction of all sorts is seeing explosive growth, central planning appears to be the rule applied to infrastructure construction. The development of cities specializing in a specific manufacturing or commercial endeavor has created "pod" metropolitan areas that require individual centralized utilities

and public transportation. Eventually, these pod cities will need to be linked together, and this need has been recognized by the Chinese government in its quest to construct high-speed rail systems and expand the national highway system. Private companies specializing in offshore infrastructure have not looked favorably on investment in China because government laws limit foreign investment. Moreover, private entities have concerns over China's lack of transparency and too many striking examples of corruption.

With the Chinese government's coffers overflowing with trade surplus money, it may be some time before it sees the need to attract foreign investment in infrastructure development. But when China does, the possibilities should be substantial. Hong Kong, for example, has long used public–private concessions in the form of BOT projects, such as the Eastern and Western Harbor tunnels and the Tate's Cairn Tunnel.

Australia

Australia has enthusiastically embraced PPP for infrastructure. As of July 2007, 38 PPP projects were under contract in Australia, including tunnels, highways, light rail, waste and water treatment facilities, correctional facilities, film and TV studios, hospitals, and educational facilities. The concept of PPPs is so ingrained in the Australian psyche that Melbourne University Private Ltd. offers postgraduate degrees in public–private partnerships. Australia has given the world the Macquarie Bank, a leading PPP lending and infrastructure funding source. The Australian firm Transurban has become very active in the United States, with several PPP projects in Virginia.

South America

In South America, Skanska and several Spanish contractor–developers are working on PPP projects for highway construction but also for water and waste treatment facilities as well. Chile, for example, is building four new toll roads and is working on a fifth one around Santiago. The San Cristobal toll tunnel, a two-lane, 4.1-km (2.6-mi) concession project is another one of Chile's PPP projects. Brazil awarded a R$645 million (US$300 million) concession agreement to Equipav S.A. in 2007 to upgrade about 375 km (233 mi) of highway next to São Paulo state. The La Plata bridge project, which spans the Rio Grande between Argentina and Uruguay, was in the planning stage in 2007. Since the 1990s, Peru and Colombia have also started PPP programs, but with mixed results.

North America

Canada

As early as the 1990s, Canada embarked on a number of highway projects. Highway 407 north of Toronto was the first successful privately owned toll road in

North America. Completed in 1997, this 108.1-km (67-mi) toll road created quite a bit of criticism. The government leased the road for 99 years to a consortium consisting of Australia's Macquarie Bank and other Spanish and Quebec companies; in exchange, the government received a lump sum payment of C$3.1 billion. When the road was later revalued at C$10 billion, critics loudly claimed that the government negotiated a poor agreement.

British Columbia has been in the forefront of PPP project initiatives. The Partnerships British Columbia website lists 21 such partnerships as of February 2009 (http://partnershipsbc.ca, accessed July 29, 2009). Of these, 11 are health care or hospital related, 8 are highway and bridge projects, one is a sports center, and another is a water treatment plant.

One of Canada's most expensive PPP projects was launched in the mid-1990s: an C$850 million (US$806.8 million, in 1995 dollars), 12.9-km (8-mi) bridge spanning the Northumberland Strait from Jouriman Island, New Brunswick, to Borden, Prince Edward Island. A daunting task given the strait's high winds and severe winter storms, this bridge was intended to be an important link in the proposed Trans-Canada Highway system and an economic boost for the island. The bridge was completed in 1997 at a cost of C$1 billion (US$949 million). The concessionaires have not seen the return on investment that they anticipated, but this mainland link has certainly improved the economy of Prince Edward Island.

It is worth noting that Canada has also used PPPs for many medical facilities: Montfort Hospital in Ottawa, Abbotsford Hospital and Cancer Centre in British Columbia, and Thunder Bay and North Bay Hospital in Ontario, to name a few.

Mexico

Mexico experimented with PPP road projects during the early 1990s. When a financial crisis hit the country in the mid-1990s, some toll roads performed poorly and others displayed significant quality defects. In the past several years, however, Mexico has begun to reactivate PPP programs, with results that are not yet clear.

Evolution of PPP in the United States

The year 2006 marked the 50th anniversary of the Federal Highway Act. By signing the bill, President Dwight D. Eisenhower realized one of his lifelong goals, one that began in 1919. As a young army officer, he set out to make the case for a national highway system by leading a military convoy across the country. The trip, the first of its kind for the U.S. Army, took 62 days across mostly dirt roads.

The U.S. model for building transportation infrastructure has been a pay-as-you-go process. The foundation of this approach is a gasoline tax that commenced in 1916 at a rate of 2 cents per gallon. Along with user fees—notably taxes and other charges levied on vehicle owners—the gas tax provided the funds for U.S. highway systems.

The year 2007 was a pivotal year at the U.S. DOT. The Highway Trust Fund, the repository for gasoline and assorted vehicle tax revenues, was projected to have

a $4.3 billion negative balance by 2009. Unless revenue increased, U.S. DOT would be forced to reduce the federal apportionment to the states in 2010 by 42%. The 2008–2009 financial crisis threw many of the country's transportation project plans into disarray and changed many long-term goals to short-term expediencies.

The crisis in funding for highway projects is compounded by the overall poor condition of current highway infrastructure. In just one aspect of highway infrastructure—bridges—the U.S. DOT found significant deficiencies in highway bridges throughout the United States (Table 1-3). By another metric—the 2009 Infrastructure Report Card, issued by the American Society of Civil Engineers (ASCE)—U.S. bridges earned a grade of C and roads earned a grade of D–, further evidence of an urgent need for funding for maintenance, repairs, and new construction. Looking at U.S. infrastructure as a whole, ASCE estimated that the United States must invest $2.2 trillion in federal, state, and local funds over a five-year period to restore U.S. infrastructure to a *good condition* (ASCE 2009). Table 1-4 presents the results of ASCE's report card in 2005 and 2009.

The "perfect storm" of insufficient funding and urgent need has caused many government officials, planners, engineers, and contractors to cast about for innovative solutions. The search finally brings public–private partnerships to center stage in the United States. But the adoption of PPP methods is not without heated debate, and some valid issues are being raised by those who favor PPPs and those who question the effectiveness of such partnerships.

The Debate over PPPs in the United States

The benefits and the drawbacks of public–private concession projects make up a topic of hot debate in the United States today. When governments build infrastructure with federal funds—tax money—in theory, all taxpayers contribute to the cost to build and operate that facility, whether they use it or not. With tolled roads, bridges, or tunnels, users pay and nonusers don't. This system forms one of the issues in dispute: nonusers tend to view proposals for tolled projects more favorably than traditional, totally government-funded projects. Opponents of toll roads claim that the tolls are another tax on the poor. Here is a rundown of factors that are encouraging the growth of PPP for highway infrastructure in the United States.

Capital Is Only Part of the Cost

Under government-funded projects, bond issues usually provide funding for the design and construction of infrastructure projects. Each funded project also requires a source of funding for maintenance, repairs, and replacement, and this money is provided primarily by taxes. A bridge or tunnel project, over its expected life, hits taxpayers with a double whammy: the interest they pay on the construction bond issue and the taxes they pay to maintain the project after it is built.

A road, bridge, or tunnel is really never paid for until it is demolished. The cost to maintain a bridge, tunnel, or turnpike commences the day it becomes operational, and these costs increase incrementally as wear and tear take a toll

Table 1-3. Condition of U.S. Bridges, 2006

State	*Total Number of Bridges*	*Structurally Deficient (Number (Percentage))*	*Functionally Obsolete (Number (Percentage))*	*Structurally Deficient and Functionally Obsolete*
Alabama	15,879	2,102 (13%)	2,205 (13.8%)	4,307
Alaska	1,210	151 (12.4%)	167 (13.8%)	318
Arizona	7,248	161 (2.2%)	578 (7.9%)	737
Arkansas	12,502	1,068 (8.5%)	1,906 (15.2%)	2,974
California	23,625	2,994 (12.7%)	3,714 (15.7%)	6,708
Colorado	8,311	575 (6.9%)	822 (9.9%)	1,397
Connecticut	4,166	351 (8.4%)	1,050 (25.2%)	1,401
Delaware	849	35 (4.1%)	97 (11.4%)	132
District of Columbia	245	22 (8.9%)	134 (54.6%)	156
Florida	11,553	305 (2.6%)	1.731 (14.9%)	2,036
Georgia	14,523	1,113 (7.7%)	1,798 (12.3%)	2,911
Hawaii	1,110	156 (14%)	357 (32%)	513
Idaho	4,062	334 (8.2%)	437 (10.7%)	771
Illinois	25,943	2,447 (9.4%)	1,837 (7%)	4,284
Indiana	18,364	2,066 (11.2%)	1,987 (10.8%)	4,053
Iowa	24,825	5,152 (20.8%)	1,509 (6%)	6,661
Kansas	25,440	3,038 (11.9%)	2,393 (9.4%)	5,431
Kentucky	13,637	1,362 (9.9%)	2,927 (21.4%)	4,289
Louisiana	13,347	1,869 (14%)	2,194 (16.4%)	4,063
Maine	2,380	343 (14.4%)	477 (20%)	820
Maryland	5,059	410 (8.1%)	970 (19%)	1,380
Massachusetts	4,947	586 (11.8%)	1,974 (39.9%)	2,560
Michigan	10,887	1,746 (16%)	1,309 (12%)	3,055
Minnesota	13,008	1,135 (8.7%)	451 (3.5%)	1,586
Mississippi	16,952	3,170 (18.7%)	1,290 (7.6%)	4,460
Missouri	24,024	4,595 (19%)	3,141 (13%)	7,736
Montana	5,002	500 (9.9%)	540 (15%)	1,040
Nebraska	15,452	2,413 (15.6%)	1,328 (8.6%)	3,741
Nevada	1,630	50 (3%)	146 (8.9%)	196
New Hampshire	2,359	317 (13.4%)	431 (18.3%)	748
New Jersey	6,420	760 (11.8%)	1,532 (23.9%)	2,292
New Mexico	3,848	401 (10.4%)	291 (7.6%)	692
New York	17,335	2,110 (12%)	4,501 (25.9%)	6,611
North Carolina	17,666	2,256 (12.7%)	2,816 (15.9%)	5,072
North Dakota	4,482	776 (17.3%)	254 (5.7%)	1,030
Ohio	27,946	2,884 (10.3%)	4,049 (14.5%)	6,933
Oklahoma	23,460	6,299 (26.8%)	1,559 (6.6%)	7,858
Oregon	7,234	645 (8.9%)	1,139 (15.7%)	1,784
Pennsylvania	22,237	5,582 (25%)	3,989 (17.9%)	9,571
Rhode Island	753	191 (25.4%)	234 (31%)	425
South Carolina	9,238	1,275 (13.8%)	815 (8.8%)	2,090

(continued on next page)

Table 1-3. Continued.

State	*Total Number of Bridges*	*Structurally Deficient (Number (Percentage))*	*Functionally Obsolete (Number (Percentage))*	*Structurally Deficient and Functionally Obsolete*
South Dakota	5,945	1,186 (19.9%)	334 (5.6%)	1,520
Tennessee	19,803	1,324 (6.7%)	2,918 (14.7%)	4,242
Texas	49,518	2,219 (4.5%)	7,943 (16%)	10,162
Utah	2,827	239 (8.5%)	258 (9.1%)	497
Vermont	2,710	436 (16%)	502 (18%)	938
Virginia	13,357	1,197 (8.9%)	2,221 (16.6%)	3,418
Washington	7,548	381 (5%)	1,634 (21.6%)	2,015
West Virginia	6,956	1,075 (15.4%)	1,518 (21.8%)	2,593
Wisconsin	13,770	1,335 (9.7%)	792 (5.7%)	2,127
Wyoming	3,027	381 (12.6%)	230 (7.6%)	611
Puerto Rico	2,133	246 (11.5%)	799 (37.4%)	1,045
Total	**596,842**	**73,764 (12.4%)**	**80,226 (13.4%)**	**153,990 (25.8%)**

Source: U.S. DOT 2006.

Note: The Research and Innovative Technology Administration (RITA) of the U.S. Department of Transportation defines *structurally deficient* as those bridges needing significant maintenance attention, rehabilitation, or replacement. RITA defines *functionally obsolete* as a bridge that lacks the lane width, shoulder width, or vertical clearances adequate to serve traffic demand.

and inflation increases the cost of repairs. Because we need taxes for this maintenance (and we know how reluctant politicians are to raise taxes), where does that leave us?

Calamities such as the collapse of the I-35W Mississippi River Bridge in Minneapolis in August 2007 brought outcries from all sectors—politicians and citizens alike. How could this happen? Was it a design error or a maintenance problem? No one admits to cutting back on infrastructure funding, but when the U.S. Office of Management and Budget (OMB) published its midsession budget

Table 1-4. Results of ASCE Report Card for America's Infrastructure, 2005 and 2009

Category	*2005*	*2009*
Bridges	C	C
Dams	D	D
Drinking water	D−	D−
Energy	D	D+
Rail	C−	C−
Roads	D	D−
Solid waste	D−	C+
Transit	D+	D
Wastewater	D−	D−
Overall	D	D

Source: ASCE 2005, 2–3; ASCE 2009, 2.

review in July 2007, it predicted wider deficits in the Highway Trust Fund, leading to a $3.8 billion deficit by the year 2009. Mary Peters, then Secretary of Transportation, called the figures "a stark reminder that we need to reevaluate our policies for funding and operating the nation's surface transportation network" (Ichniowski 2007).

Innovations Address Congestion and Environmental Concerns

Unless additional funds can be found to relieve congestion or somehow regulate the flow of traffic in heavily traveled urban areas, our economy will suffer. Longer hours on the road equate to longer hours away from home, and individual productivity eventually suffers too. Innovations that regulate traffic flow via electronic tolling and congestion pricing can alleviate some of the congestion problem. People who want to avoid congestion or lessen traveling time have the option of paying more to spend less time on the road, an option that did not exist before.

Relieving congestion is a winner from an environmental standpoint, too. Smoother-flowing traffic at legal limits saves gas. Idling time in bumper-to-bumper traffic produces tons of particulate matter and noxious gases. Vehicle maintenance shows savings because cars and trucks are designed to operate more efficiently at speeds above 5 mi/hour. Reduced wear on engines and brakes accrues when constant stop-and-start traffic is alleviated.

The greening of America is once again a hot topic, and the Obama administration has put forth a strong voice for energy conservation. Making the United States energy independent is taking on a national imperative for political, economic, and military reasons; reducing consumption of gasoline and diesel fuel is front and center. Energy efficiency has a down side, however: Lowering the use of gasoline could exacerbate the revenue shortfall from gasoline taxes.

The Economic Effects of Highway Construction

A new spurt of highway construction brought on by the public and private sector has a trickle-down effect on the local economy. If the construction involves a private entity—whether domestic or foreign—the private firm relies on local assistance in the form of professionals: engineering, financial, legal, architectural design and construction, operations, and maintenance. Nearby shops, restaurants, material suppliers, and local labor sources also benefit. In other words, a lot of the money spent in a locale remains there.

Political Aspects of PPPs

The private sector can display efficiencies that come from innovative thinking and deep experience in similar projects to produce the best deal—but not necessarily the lowest priced deal. Sometimes the most obvious way of attacking the problem may not be the most achievable. The introduction of criteria that are qualitative leave any funding or construction process vulnerable to undue influence. The

$233 million Alaskan "Bridge to Nowhere" appropriation is a case in point. Congress provided the funding by attaching three earmarks to a highway appropriation bill. That money was earmarked to fund the construction of a bridge from Ketchikan (population 8,900) on the mainland to an airport on the island of Gravina (population 50). This bridge became a poster child for Congressional fiscal irresponsibility. Although funds were withdrawn for the bridge, the Alaska congressional delegation dug in its heels and captured the money for other uses (including a road that would have connected with the bridge). For good reason, then, skeptics of public–private partnerships ask whether PPP really stands for politics, pork, and power.

The Problem of Earmarks

The political process is not always rational, and legislation may be enacted to extract favors past, present, or future or to reward lobbyists or trade groups who provided needed campaign funds at election time. Political pork often takes the form of infrastructure projects, and the media has been focusing on congressional earmarks with more energy than usual. Defenders of earmarks say that they are proof that lawmakers are looking out for their state or congressional districts. Detractors identify earmark funding as "special interest" projects whose sole purpose is for politicians to ingratiate themselves with their constituents, rather than achieve beneficial results for all citizens.

Beginning in July 2007, the OMB began posting earmarks publicly with an online earmarks database, http://www.earmarks.omb.gov/. This website shows how earmarks move through the appropriations process.

The Problem of Lobbyists

Contrary to popular belief, lobbyists have a useful function. Lobbyists with ties to specific industries gather input from its members and communicate the pulse of the industry. Lobbyists also augment a legislator's research staff by providing information on industry statistics, product data, and research projects. But as one of those K Street lobbyists now serving a long prison term can attest, money collected by lobbying groups can be used for devious and deceptive arm-twisting that is definitely *not* in the public interest.

Lobbyists constitute a conduit for substantial contributions during election campaigns, but large lobbying firms headquartered in Washington, D.C., and state capitals maintain a sizable presence and continuous influence at all times. The Center for Responsive Politics maintains a website dedicated to tracking lobbyists: who they are, how much they spend, and where the money goes (CRP 2009). Table 1-5 shows the ranking for money spent by industry sector: transportation ranks sixth, spending about half of that spent by the top-ranked finance, insurance, and real estate sector. Construction comes in 11th, spending about a quarter of what the transportation sector spends. Table 1-6 shows the amounts spent by a selection of individual firms in the trucking, automotive, and railroad industries.

Table 1-5. Amount Spent by U.S. Lobbyists, by Industry Sector, 1998–2009

Ranking	*Sector*	*Total*
1.	Finance, insurance, and real estate	$3,696,067,299
2.	Health	$3,551,488,019
3.	Miscellaneous business	$3,401,586,627
4.	Communications & electronics	$3,066,673,860
6.	Transportation	$1,954,022,232
11.	Construction	$401,304,776

Source: CRP 2009 <http://www.opensecrets.org/lobby/top.php?showYear=a&indexType=c> (accessed Sept. 1, 2009).

Given such large amounts of money, the effect of having strong highway and road-building organizations, contractor associations, and professional organizations that can lobby for their members' interests cannot be overlooked. These groups can put significant pressure on U.S. representatives and senators to provide funding for local projects. Thus, when these lobbyists tend to inform, they

Table 1-6. Amount Spent on Lobbying by Associations and Corporations, by Industry Sector, 2008

Industry Sector	*Dollar Amount*
Trucking industry	
American Trucking Association	$1,977,016
Con-Way Inc.	$670,000
International Truck and Engine Corporation	$410,000
American Moving & Storage Association	$190,000
Household Goods Forwarders Association of America	$120,000
All trucking clients	$7,197,418
Automobile manufacturers	
General Motors	$13,101,000
Ford Motor Company	$7,695,000
Alliance of Automobile Manufacturers	$7,330,000
Cerberus Capital Management–Chrysler	$5,847,782
Nissan North America, Inc.	$3,710,000
American Honda Motor Company, Inc.	$2,303,694
All automobile manufacturers	$51,728,004
Railroads	
Association of American Railroads	$9,729,984
Norfolk Southern	$6,319,449
Burlington Northern Santa Fe Railway Company	$5,470,000
Canadian National Railway Company	$2,650,000
All railroad industry	**$43,980,957**

Source: CRP 2009. Trucking <http://www.opensecrets.org/lobby/indusclient.php?year=2008&lname=M03&id=>; automobile manufacturers <http://www.opensecrets.org/lobby/induscode.php?year=2008&lname=T2100&id=>; railroads <http://www.opensecrets.org/lobby/indusclient.php?year=2008&lname=M04&id=t> (all accessed June 12, 2009).

are helpful; when they tend to push for earmark projects that don't benefit all citizens, they are less than helpful. This evaluation applies whether the lobbying groups are pushing for funding or simply commenting on the viability of a particular infrastructure project.

The Problem of Foreign Ownership

In 2006, Congressman John C. Duncan (R-Tenn.) introduced a bill (H.R. 4881) that would bar non-U.S. corporations from owning, operating, or managing "critical infrastructure assets" in the United States. This bill was initiated partially in response to a flap stirred up when Dubai Ports World planned to acquire some U.S. port facilities; there was considerable public outcry because the move would put an Arab company (based in the United Arab Emirates) in charge of "strategic" ports. The bill defined *critical infrastructure* as a system or asset, whether physical or virtual, that is so vital to the United States that its incapacity or destruction would have a debilitating effect on national security, on national economic security, or on national health or safety. The bill included a wide range of infrastructure facilities that could be interpreted to include highways, bridges, tunnels, airports, power plants, and communication facilities. Opponents of the bill said that, if passed, it would have a chilling effect on foreign investment in the United States and that other countries may, in turn, block some U.S. investments in their countries. The bill went to committee and never passed the House. In a March 2006 poll taken by Fox News, 77% of U.S. citizens disapproved of U.S. ports being managed by an Arab firm, even though Dubai is one of America's closest allies. Dubai Ports World got the message and withdrew its offer to operate six U.S. ports. A British firm subsequently was awarded the contract.

The Problem of Ensuring Quality

Some government officials expressed concern that a move to concession-type highways could affect the integrity of the integrated national surface transportation system. This possibility seems unlikely. The primary function of FHWA's national highway system is to establish highway standards, provide some funding to the states, and plan overall networks. The system leaves a great deal of the actual planning to the states, which coordinate with the federal government.

The Problem of Exclusionary Tolls

Politicians often raise the concern that a concessionaire could try to make too much money by increasing tolls to such high levels as might exclude the average worker. Several solid arguments counter this concern. First, city and state officials are fully cognizant of citizen concerns about high tolls; they are sensitive to these concerns and perform due diligence in their formulation of toll rates. They take care to avoid any politically charged toll-rate structure when they negotiate with the concessionaire.

Second, public officials can regulate private concessionaires' allowable return on investment by including provisions in the agreement to share excess profits. However, if the rate of return on investment is insufficient, then private entities would not dedicate capital to a high-risk venture. Responding to an official's complaint that the return on investment was too high, one concessionaire asked whether the official's agency would guarantee a certain minimum revenue, thereby lowering the private firm's risk.

Third, the laws of supply and demand remain in effect, even in PPPs. So, the argument that toll roads penalize those who can ill afford to pay daily tolls only works in the short term. Alternate routes without tolls usually exist, and public transportation might be an option—both slightly inconvenient, but available. In the long term, if the toll rates are not acceptable to large numbers of users and traffic falls off, supply and demand may force lower rates.

Finally, there is a related argument that concession periods of 45, 50, and 99 years are too long, extending well beyond the life of the facility and ceding public control for four generations or more. Countering that argument, however, it appears that long-term leases actually relieve future generations of increased taxes to pay for the highway, bridge, or tunnel upkeep and maintenance.

When all is said and done, the fact is that PPPs have great appeal to public officials who are responsible for providing transportation services and managing tight budgets. When Chicago received $1.823 billion from a concessionaire and Indiana obtained a $3.85 billion up-front payment for the Indiana Turnpike, the interest of government officials around the country was piqued. These officials are looking more closely at the PPP trend.

The Problem of Risk Allocation

The argument for PPPs often cites the premise that the private sector can perform in a manner superior to the public sector. This argument is somewhat misleading: there are exceptional managers and resources in the public sector. But the private sector is willing to assume many of the risks associated with public works projects, whereas the public sector, rightfully, is averse to risk assumption and takes steps to mitigate or avoid risk.

For decades, public agencies have searched for cost-effective project delivery systems that reduce the cost overruns that seem to occur with regularity in the design–bid–build or, more frequently, the design–bid–redesign–rebid–build process. From low bidder to negotiated low bidder to partnering to design–build, public agencies continue to search for ways to produce a high-quality structure at a fair price with limited exposure to risk.

Enter the private sector, which says, in effect, "We will assume project risks and deliver your highway/bridge/tunnel for a stipulated return on investment. But we want to be compensated for the risks associated with this venture."

Risk allocation plays a major part in the PPP movement. The complexity of maintaining and upgrading highways, bridges, and tunnels is often overlooked when capital outlay financing is put forth by the government agency. The costs to

inspect, maintain, and repair must be factored into the initial capital costs—or some other funding source must be provided to do so.

Practical Aspects of PPP

In 2005, Hurricane Katrina vividly brought home the need to inspect and correct built infrastructure, in this instance, the levees around New Orleans. Other examples abound. In 1983, for example, a 100-ft (30.3-m) section of the Mianus River Bridge, which carried I-95 traffic in Connecticut, fell into the river and took several cars with it. At that time, Connecticut had only 12 engineers at the Department of Transportation, who worked in pairs to inspect 3,425 bridges within the state. The collapse was determined to be caused by pin failures in the bridge's pin and hanger design, a failure that could possibly have been avoided if time and money had provided more inspectors and more inspections.

Let's leave the anecdotal for the statistical. The Urban Land Institute conducted a survey of state transportation officials in 2007 and reported the following:

- 83% of officials thought that our present infrastructure was incapable of meeting the country's needs in the next 10 years.
- Half of the respondents were of the opinion that U.S. transportation infrastructure does not meet its current needs. Only 44% indicated that most needs are met.
- 62% of respondents stated that U.S. roads, bridges, and highways required *much* improvement, and only 35% thought that moderate improvement was all that was required.
- About half of the respondents assessed transit and rail facilities as requiring moderate improvement, but 38% felt that *much* improvement was needed.

By all accounts, the more than $2.2 trillion needed over the next five years to plug the gaps in infrastructure funding is simply not there. For instance, highway construction costs have accelerated from an indexed base of 100 in 1999 to 150 in 2007, and revenue from gasoline and vehicle taxes, which are not indexed to inflation, has *decreased* in real dollars (Nicholson 2007). (To track deviations from construction material and labor costs, a standard from which all costs will be compared must be established, and that standard was the number 100. This indexed base was created decades ago, an arbitrary number to be sure, but one that would allow readers to determine if current costs had increased or decreased when measured against a preestablished standard.) The per-gallon gasoline tax last increased in 1993 to 18.4 cents; in terms of today's dollar, it is worth half as much. But the average cost of state highway construction has increased 105% in that same time frame (Ichniowski 2007).

Compounding the problem of low tax rates on gasoline, total revenues plunged in mid-2008 when high fuel prices swept the country. On May 28, 2008, *Bloomberg News* reported that gasoline demand fell 5.5% from the previous week

as the $4.00+ per gallon price hit home. Market forces were at work, with the net result that less fuel would be consumed and thus less fuel tax collected.

So, the Highway Trust Fund potentially faced a deficit as early as 2008, and a U.S. Chamber of Commerce study reported the potential for a $507 billion gap between existing revenues and funds required to maintain our current surface transportation system.

On March 18, 2010, President Obama signed H.R. 2847, referred to as the HIRE Act, which reimbursed the Highway Trust Fund in the amount of $19.5 billion (fastlane.dot.gov) and, as a result, the closing balance of the Highway Trust Fund stood at $8.937 billion as of June 2010 (www.fhwa.dot.gov/highwaytrustfund).

In 2006, the Transportation Research Board (TRB), a division of the National Research Council, provided a comprehensive look at the causes of funding shortfalls by looking at motor vehicle trends and future technological advances (TRB 2006). Fuel taxes generate approximately 64% of revenues from highway user fees, which means that any change in the amount of fuel consumed affects the amount of revenue collected. The loss of revenue from highway user fees is a real problem because, as TRB observed, the amount of fuel consumed is being attacked from several sides:

- Accelerating concern about global warming and the need to reduce harmful vehicular and industrial emissions increases emphasis on conservation and stokes a movement that advocates public versus private transportation.
- Promising developments in car and truck engine technology could produce commercially viable hybrid engines and fuel cell power that would lead to a 25% improvement in average fleet fuel economy after 2025. Improved fuel economy got a boost in November 2007 when the Ninth Circuit Court of Appeals in San Francisco voided the 2008–2011 model year vehicle regulations. The Appeals Court ruled that light trucks, sport utility vehicles, and minivans cannot be treated differently from automobiles when it comes to fuel efficiency standards.
- The annual turnover rate of vehicles is about 6%, but spikes in fuel costs, as evidenced during the energy crisis of the 1970s, tend to accelerate this trade-in rate, and owners replace their less fuel-efficient vehicles.
- Excise tax revenues are particularly vulnerable to inflation. Inflation also tends to increase maintenance costs and new construction costs, further increasing the gap between income and spending.

Caught in this dilemma of rising costs, lower revenues, and a backlog of unfunded repairs, federal officials correctly realized that the vacuum could be filled by the private sector … if the proper incentives were put in place. Federal and state laws would need to be changed, and this requirement meant convincing federal and state legislators that such changes were in the best interests of their constituents. Because PPPs could bring about much-needed improvements to highways, bridges, and tunnels traveled by the public—with no increase in taxes—this argument did not seem to be hard to sell.

The Current State of PPPs

The PPP movement in the United States is relatively new—not even a few decades old—and for many foreign PPP projects, the operational phases are not even close to the end of their 75- to 99-year concession agreements. What will that entire concession period reveal? Already critics complain that the public is being duped, that rising tolls will reap a bonanza for concessionaires. For example, investors in the $3.8 billion Indiana Toll Road concession project could earn profits of $21 billion over the entire 75-year concession term (Thornton 2007). But do the critics take into account dramatic market changes, such as the effect of $4.25/gallon gasoline prices or new technologies or major shifts to public transportation? Do they envision deep recessions, as in 2008–2009, when massive unemployment would dramatically change America's driving patterns?

To pay for improvements over the long term of a concession agreement, these toll road operators must have the flexibility to institute innovative approaches—such as congestion pricing, high-occupancy lanes, and high-tech revenue collection systems—that benefit the commuting motorist but also put additional revenue in the hands of the operator. If both parties benefit, is that a bad thing?

Some critics say that "selling" toll-road concessions or other PPP programs is another way for politicians to avoid the long-term planning that intelligent infrastructure requires; in other words, PPPs are a short-term fix without long-term considerations. Other critics call PPP projects leveraged buyouts, just another arrow in the private equity quiver.

Timothy J. Carson, vice chairman of the Pennsylvania Turnpike Commission, wrote an analysis of PPPs in 2007. His thoughtful comments are worthy of discussion among officials at all public agencies considering a public–private partnership agreement. For example, he cautions against magical thinking:

> Prospective concessionaires will often extol the private sector's ability to unlock the "trapped value" (or "stranded equity") in an allegedly underperforming public asset, offering a large up-front payment in return for the right to operate the asset and collect user fees over the life of a concession agreement. Cash-strapped public officials are understandably tempted to view the private concessionaire's offer as the proverbial "free lunch" which is made possible through the "secret sauce" of some ultra-complex transaction devised by the financial rocket scientists and the multi-billion dollar global financial behemoths which employ them (Carson 2007, 6).

All the same, Carson concludes that PPPs have real value:

> Far from an evil concept, privatization should be embraced by all public entities as a viable alternative for any or all of the functions involved in the development and operation of public facilities. However, in the United States (as opposed to South America, China or Europe) where

> lower-cost, tax-exempt financing is available to public entities, the comprehensive privatization represented by long-term concession agreements will continue to be more difficult to justify, given the lower cost of capital enjoyed by the public sector (Carson 2007, 16).

Carson proposes six strategic initiatives that Pennsylvania should consider in addressing transportation funding shortfalls. These initiatives could apply to many other states.

1. Consider public–public as well as public–private partnerships. The lower cost of tax-exempt financing combined with the expertise of other state agencies might be advantageous, and forming various public–public partnerships, such as regional authorities, may produce synergistic benefits.
2. Fund the rehabilitation and selective expansion of key interstate highways by tolling. Tolling could free up other highway operating and capital dollars. The creation of tolled express lanes has been used successfully by other states.
3. Instead of a pay-as-you-go approach, which severely restrains funding for capital highway projects, use current revenue streams to leverage other sources of revenue. Long-term, limited-recourse bonds, backed by state pledges, could be issued.
4. The transportation needs of a state can vary greatly from region to region, and mass transit funding shortfalls are most acute in metropolitan areas. The establishment of regional mobility authorities could focus on problems within that region, instead of looking at them from the micro perspective. A surcharge of $1.00 per vehicle exiting a highway to a metropolitan area could generate funds for regional mass transit uses.
5. Revisit funding recommendations that dealt with increasing various transportation-type taxes, for example, increases in vehicle registration and license fees or in the state gasoline tax by $0.01 per gallon.
6. Investigate a more cost-effective public-sector monetization program. By using the same tolling and traffic assumptions that a private concessionaire would use, can the public agency generate the same financial valuations that the private sector can, therefore allowing them to retain public ownership and operation?

Conclusion

Predicting life cycle and projected maintenance for infrastructure projects may be more a matter of witchcraft than science. How these costs will play out in a world where shrinking resources combine with increased labor and material costs is subject to some speculation. Will the choice of PPPs prove to be a smart move?

Travel patterns for both people and freight may change in ways not thinkable today, providing economic alternatives to highway travel. When containerized freight shipments began arriving on U.S. coasts, who could have foreseen

the dramatic increase in sea freight, along with the positive effect it would have on freight train and trucking revenue? And could super jumbo jets that carry 500 people make travel between major cities in this country inexpensive enough that some travelers would forgo their automobiles and make that twice yearly trip between New England and Florida by air?

Credit rating agencies are no doubt keeping an eye on long-term performance of PPPs to determine whether PPP projects generate less-than-anticipated revenues because of unanticipated events and significant variations from their original projections.

For the present, PPP infrastructure projects appear to offer an attractive solution to funding shortfalls. In the chapters ahead, I will examine the players and the issues of PPP for transportation infrastructure and report on how various PPP projects have developed and how they fare in various U.S. states.

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CHAPTER 2

Tools for Implementing PPPs

In the United States, public–private partnerships (PPPs) were first adopted by a handful of states with nimble legislatures and far-seeing transportation officials. As PPPs gain momentum, planners at federal, state, and local levels are looking for the tools to help them initiate and manage successful infrastructure projects. To some extent, routes to success can be deduced from analysis of PPP projects undertaken to date. But it is just as important to understand the practical problems and underlying assumptions that can be identified in most PPP projects.

In Chapter 1, you read about how public–private partnerships have been embraced by countries around the world as a practical method to leverage limited government funds to provide various types of infrastructure. This chapter narrows the focus to the emergence of PPPs in the United States as a way to finance large, capital-intensive transportation projects. First you will learn about two key government reports that frame the PPP discussion on the federal level and some attempts at drafting enabling legislation. Then you will find out about approaches to resolving problems in three areas essential to the success of a PPP project: estimating revenues, analyzing risks, and managing risks.

Setting the Stage for PPPs

As transportation officials and planners on all levels are coming to realize, future U.S. transportation needs cannot be funded totally from public coffers. Without levying new taxes or indexing existing ones for inflation, current revenues and priorities do not leave much left to spend on roads, bridges, tunnels, and transit systems. To chart a new course involving the private sector, officials at the federal level looked to several studies for data and guidelines.

The National Surface Transportation Policy and Revenue Study Commission

The National Surface Transportation Policy and Revenue Study Commission was created by Congress in 2005 under Section 1909 of the Safe, Accountable, Flexible, Efficient Transportation Equity Act—A Legacy for Users (SAFETEA-LU). The

commission is composed of 12 members representing federal, state, and local governments; metropolitan planning organizations; and transportation-related industries and organizations. The commission was charged with examining the future needs of the U.S. surface transportation system; they published their findings at the beginning of 2008 (NSTPRSC 2007). The commission found that major overhauls to the existing federal surface transportation programs were essential for an efficient highway system, and they spelled out the consequences of inaction:

- The nation's transportation system assets will further deteriorate and the system will require significant funds to maintain it in its current conditions, much less improve it.
- Automobile casualties will increase, adding to the 3.3 million lives lost to traffic crashes in the past 100 years. In 2006 alone, 43,000 people died on U.S. roads, and almost 2.6 million were injured.
- Congestion will continue to affect every mode of surface transportation as a result of the mismatch between supply and demand of limited capacity.
- Underinvestment in all modes of transportation will continue.
- America's economic leadership in the world will be jeopardized by the inability to efficiently move the goods it produces.
- Excessive delays in making investments will continue to waste public and private funds.
- Transportation policies will remain in conflict with other national policy goals.
- Transportation financing will continue to be politicized (NSTPRSC 2007, 3–5).

Although the commission was unable to agree on recommendations to finance new or existing transportation programs, they did offer several suggestions, such as developing comprehensive, performance-based approaches and harnessing the technical strength of the U.S. Department of Transportation to develop a national strategic plan that could guide public-sector investment in programs to serve a growing and vibrant population and economy. They also recommended the establishment of an independent National Surface Transportation Policy and Revenue Study Commission. The original study commission expired on July 7, 2008.

A National Fund for Infrastructure

Meanwhile, several congressional representatives and senators recognized that the appropriations battles that took place from one fiscal year to the next were hampering efforts to plan and build large infrastructure projects. They started looking for a more stable environment in which to manage infrastructure funding. As far back as 1983, U.S. Representatives Lee Hamilton (of Indiana) and James J. Howard (of New Jersey) proposed creation of a Federal Infrastructure Bank to provide revolving funds to cities and states, but the idea died. In 2007, however, Senators Chuck Hagel (of Nebraska) and Christopher Dodd (of Connecticut) again raised the issue and introduced a similar bill. The Dodd–Hagel

National Infrastructure Bank Act of 2007 (S. 1926) was presented to address the needs of America's major infrastructure systems. The bill made it through two committee hearings and then went no further. A similar bill introduced in the House (H.R. 3401) was referred to a subcommittee and went no further.

In 2009, Representative Rosa DeLauro (of Connecticut) and 38 cosponsors introduced the National Infrastructure Development Bank Act of 2009 (H.R. 2521), along the same lines as the Dodd–Hagel bill. H.R. 2521 would be capitalized with an appropriation of $5 billion per year for five years, and $250 billion in total subscribed capital would be available from the U.S. Treasury. It remains to be seen whether the 112th Congress can do what previous Congresses could not.

Emergence of Metropolitan Planning Organizations

The work of the National Surface Transportation Policy and Revenue Study Commission and the legislative efforts to set up a national infrastructure bank are taking place at the national level. These initiatives could be viewed as macro solutions, encompassing the entire country by establishing concepts that require federal government planning over the long term. However, individual states are addressing their immediate priorities, and these projects might be called micro solutions, because they focus on a smaller geographic area, a portion of a state, or even a portion of a city within that state. Like the federal government, each state has individual financial concerns, and states must spend money wisely as they struggle to improve highways and mass transit systems while dealing with impending deficits.

Following passage of the 1991 Intermodal Surface Transportation Efficiency Act (ISTEA), the era of the metropolitan planning organization (MPO) flowered. An MPO is a transportation policy-making organization composed of representatives of local governments and transportation authorities that is formed for urban areas with populations exceeding 50,000. The ISTEA doubled the funding for MPOs; to comply with ISTEA regulations, the MPOs had to evaluate a variety of transportation systems to solve their traffic problems. Federal officials recognized that transportation investment sources were scarce and should be allocated only after a considerable study of needs. Moreover, they also recognized that adequate planning requires a comprehensive examination of a region's future growth and investment alternatives and that this planning must include not only intergovernmental collaboration but also public interest groups.

As MPOs have evolved, they have five basic functions:

- establish and manage a setting for a fair and impartial regional decision-making process;
- evaluate transportation alternatives;
- develop and maintain a long-range transportation plan;
- develop a transportation improvement program; and
- involve the public and significant subgroups in planning and decision-making processes.

MPOs might be defined as semi-macro or enhanced micro because they prompt cities and contiguous states to look beyond political subdivisions and to form alliances that can deal with transportation corridors. In the process, MPOs gradually develop coalitions with the private sector.

Some micro transportation projects might not be cost-effective, and some might be less effective than others in making use of limited government funds. Two studies looked at different approaches to infrastructure investment on the micro scale: One study examined the efficacy of commuter rail, and another investigated a type of revenue-producing, government-owned facility referred to as "high" and "elite" infrastructure.

Commuter Rail as an Alternative to Automobile Travel

Commuter rail systems (sometimes called light-rail systems, though this is only one type of commuter rail system) have been adopted by several large metropolitan areas as a means of relieving congestion on the roadways leading into and out of center city, reducing commuter time, and increasing safety by taking more cars off the highway. The viability of commuter rail as a significant contributor to lessening highway congestion, however, is in doubt, because it may not fully supplant passenger car usage.

Thomas A. Garrett, senior economist for the Federal Reserve Bank of St. Louis, studied the commuter rail transit system and found that, although at times commuter rail systems did reduce existing congestion, at other times they merely slowed the growth of congestion in some cities (Garrett 2004). Garrett reported the following results of commuter rail systems:

- In Baltimore, Maryland, road congestion increased an average of 2.8% per year before the commuter rail system was built. After commuter rail, congestion increased on average 1.5% per year.
- In Sacramento, California, average annual growth in congestion before commuter rail was 4.5% and afterwards, 2.2%.
- In St. Louis, Missouri, road congestion before and after was 0.89% and 0.86%, respectively. (Road congestion can be defined as a condition that occurs as traffic increases and is characterized by slower speeds, longer trip times, and increased vehicle queuing.)
- In Dallas, Texas, congestion remained at an average of 2.25% before and after the commuter rail system was built.

The more densely populated areas and lower income areas showed the greatest rail transit ridership, but at what price? Garrett used statistics from the Federal Transit Administration's National Transit Database, the Federal Highway Administration's Highway Statistics, and the American Automobile Association to compile unit costs for automobiles, commuter rail, and bus transportation (Table 2-1).

Commuter rail does have several advantages over automobile and bus travel that are not reflected in the costs per vehicle or passenger mile. During construction, a commuter rail system provides employment and an economic boost to the

Table 2-1. Cost Efficiency of Three Types of Commuting Transportation

Cost Efficiency per Mile	*Auto*	*Light Rail*	*Bus*
Operating cost per passenger mile	$0.414	$0.544	$0.645
Operating cost per vehicle mile	$0.659	$12.972	$6.753
Subsidy cost per passenger mile	$0.010	$0.386	$0.467
Subsidy cost per vehicle mile	$0.015	$9.203	$4.897

Source: Garrett 2004.

local business community; after construction, it provides additional public-sector employment opportunities. Commuter rail offers residents travel options, usually at significantly reduced costs. As a people mover, commuter rail produces almost 0.5% fewer carbon dioxide and nitrogen oxide emissions, thereby increasing air quality.

During 2008, commuter rail ridership in the United States continued to grow, encouraged, no doubt, by rising fuel costs. Overall, the American Public Transportation Association (APTA) reports a 32% increase in public transit nationwide since 1995 (APTA 2008, 7). In November 2010, APTA reported ridership increasing 4.2% nationally in the second quarter of 2010. Commuter rail systems in five cities (New Orleans; Los Angeles; Phoenix; Seattle; and Portland, Oregon) showed double-digit increases, and 12 other commuter rail systems revealed ridership increases from a high of 9.9% in Philadelphia to a low of 2.0% in Salt Lake City. The state of New Jersey reported a 1.4% increase.

Infrastructure versus Elite Infrastructure Concept

Joel Kotkin, senior fellow with the New America Foundation, studied the way that communities prioritize infrastructure projects and developed a model that sorts projects into two classes (Kotkin 2007). One class, *high infrastructure,* is basic infrastructure—roads, water systems, and transportation—that benefits the poor, the middle class, and the wealthy. *High elite, low infrastructure* projects—such as convention centers, museums, opera houses, and sports arenas—do not benefit all social groups and, in his view, mostly create a drain on public funds.

To make his case, Kotkin analyzed two regions in California: the San Francisco Bay area and a region in southern California that includes Orange County, San Diego, Riverside, and San Bernardino. He identified the Bay area as focusing on high elite, low infrastructure projects and the Orange County region as being a high infrastructure spender. He found significantly higher job growth in Orange County—38.9% between 1994 and 2005—than in the Bay area—4.9% for the same period. He found a similar job growth pattern when he compared Charleston, Dallas, Houston, and Phoenix (high infrastructure) with New York City, San Jose, and Boston (high elite, low infrastructure).

It may be reasonable to assume that the elite infrastructure projects do benefit local economies by filling hotels, restaurants, souvenir shops, and public parking garages when they hold events; conversely, these "elite" projects may divert

money away from school repairs, pothole repairs, numbers of on-duty police, and better trash pickups.

The Regional Corridor Phenomenon

A variation on MPOs broadens the scope of planning and analysis. State officials are also beginning to look outward to consider the effects of their proposed roadways on contiguous states, as well as on other modes of transportation. This broadening of vision to encompass an entire region is called an *intermodal corridor concept*. One of the first of these projects to gain notoriety is the Ports-to-Plains Study, often referred to as the NAFTA trade corridor. The U.S. Department of Transportation envisioned this project as Interstate 69, connecting Mexico and Canada through Texas, Louisiana, Arkansas, Mississippi, Tennessee, Kentucky, Indiana, and Michigan. As the immigration issue developed a high profile during the 2008 presidential campaign, the I-69 project took on a life of its own, and critics far and wide expressed concerns about cheap imports, drugs, and illegal immigrants flowing into the country via the NAFTA road. North America's Corridor Coalition, Inc. (NASCO), composed of city, county, and state organizations as well as private concerns, promotes development of the I-69 corridor, defuses criticisms, and contributes to the public relations campaign to keep the concept in limbo.

Meanwhile, the Texas Department of Transportation developed its own regional project, the Trans-Texas Corridor (TTC), which would run east–west and contribute a link to the NAFTA highway. When the TTC was announced in 2002, neighboring states studied its potential and its effects on them. Out of this came the Gulf Coast Strategic Highway (proposed I-14), running from Texas across Louisiana, Mississippi, Alabama, and Georgia. This highway advances military deployment by connecting six army bases: Fort Bliss and Fort Hood in Texas; Fort Polk in Louisiana; and Fort Benning, Fort Gordon, and Fort Stewart in Georgia. As proposed to Congress by officials from Mississippi, Alabama, and Georgia, I-14 would provide an important alternate to I-10 and I-20, both roads that carry a great deal of long-haul freight traffic.

The I-95 Corridor Coalition is another regional highway planning group. The I-95 corridor group is an alliance of transportation agencies, toll authorities, and law enforcement officials from Maine to Florida. Members gather to form policies addressing transportation management and operations issues common to all. In May 2007, the U.S. Department of Transportation invited the I-95 Corridor Coalition to submit a Phase 2 application for the Corridors of the Future program. The focus of the application is on the following:

- providing real-time traffic information to reduce congestion and delays caused by major incidents, accidents, construction, and weather conditions along the corridor;
- implementing projects that address major highway and rail bottlenecks;
- expediting incident clearance through programs such as Move-It!; and

- integrating intercity air, bus, and rail services by linking trip-planning information, thus making it easier for travelers to combine long-distance with local trips, particularly in the section between Boston and Washington, D.C.

Another regional corridor formed around I-81 is examined as a case study at the end of this chapter.

Estimating Revenues

For toll roads, bridges, and tunnels to have a reasonable chance of financial viability, means and methods to prepare a reliable forecast of traffic and revenue is key. For a PPP project, revenue must be sufficient to service the debt, cover operations and maintenance, and provide a return on investment commensurate with the risks.

Revenue Estimation for Planners

The National Cooperative Highway Research Program (NCHRP) published a review of actual versus projected revenue during the first five years of service for a series of toll roads that opened between 1986 and 2004 (NCHRP 2006). The results for a selection of toll roads are shown in Table 2-2, which shows that ramp-up performance is somewhat erratic. According to the NCHRP report, projects with lower-than-forecasted traffic during the first year tended to have lower-than-forecasted traffic during years two thru five.

NCHRP's performance by category presentation identifies the characteristics attributed to the performance of each group: high congestion areas, outlying areas, developed corridors, and least developed areas.

The NCHRP report drew several conclusions about the toll roads and the actual revenues they generated. For example, three toll roads in highly congested suburban areas approximated or exceeded their revenue projections. These roads shared several characteristics, including location in a well-developed part of a large metropolitan area, high personal income along the corridor, substantial corridor traffic, and no competitive nontolled alternatives. Several toll roads in outlying areas, however, yielded revenues about a third less than projected. This forecast error appears to be attributable to overestimation of initial usage and the rate of growth (ramp-up) in the early years. In the least developed areas, which saw actual revenues at a quarter to a half of estimates, the forecast error can be traced to insufficient existing congestion, overestimation of the value of time savings for drivers, and, again, overestimation of initial use and ramp-up rates (NCHRP 2006, 23–24, Table 2).

To improve the forecasting of travel demand, the NCHRP report suggests that the following considerations be taken into account:

- past trends along with future projections, because populations change;
- past trends along with statewide economic growth studies, because changes occur in employment;

Table 2-2. Actual Revenue as a Percentage of Projected Results of Operation

Authority/Facility (Reference)	*Year of Opening*	*Year 1 (%)*	*Year 2 (%)*	*Year 3 (%)*	*Year 4 (%)*	*Year 5 (%)*
Florida's Turnpike Enterprise/Sawgrass Expressway (Muller 1996)	1986	17.8	23.4	32.0	37.1	38.4
North Texas Tollway Authority/Dallas North Tollway (Muller 1996)	1986, 1987	73.9	**91.3**	**94.7**	**99.3**	**99.0**
Harris County Toll Road Authority (TX)/Hardy (Muller 1996)	1988	29.2	27.7	23.8	22.8	22.3
Harris County Toll Road Authority (TX)/Sam Houston (Muller 1996)	1988, 1990	64.9	79.7	81.0	83.2	78.0
Illinois State Toll Highway Authority/ Illinois North South Tollway (Muller 1996)	1989	**94.7**	**104.3**	112.5	116.9	115.3
Orlando–Orange Expressway Authority/ Central Florida Greenway North Segment (Muller 1996)	1989	**96.8**	85.7	81.4	69.6	77.1
Orlando–Orange Expressway Authority/ Central Florida Greenway South Segment (Muller 1996)	1990	34.1	36.2	36.0	50.0	NA
Oklahoma Turnpike Authority/John Kilpatrick (Muller and Buono 2002)	1991	18.0	26.4	29.3	31.4	34.7
Oklahoma Turnpike Authority/Creek (Muller and Buono 2002)	1992	49.0	55.0	56.8	59.2	65.5
Mid-Bay Bridge Authority (FL)/ Choctawhatchee Bay Bridge (URS Consultants Inc. and Coverdale & Colpitts 1991 and URS Consultants Inc. 1995)	1993	79.8	**95.5**	**108.9**	113.2	116.7
Orlando–Orange Expressway Authority/ Central Florida Greenway Southern Connector (Muller 1996)	1993	27.5	36.6	NA	NA	NA
State Road and Tollway Authority (GA)/ GA 400 (Muller and Buono 2002)	1993	117.0	133.1	139.8	145.8	141.8
Florida's Turnpike Enterprise/Veteran's Expressway (Muller and Buono 2002)	1994	50.1	52.9	62.5	65.0	56.8
Florida's Turnpike Enterprise/Seminole Expressway (Muller and Buono 2002)	1994	45.6	58.0	70.7	78.4	70.1
Transportation Corridor Agencies (CA)/ Foothill North (Muller and Buono 2002)	1995	86.5	**92.3**	**99.3**	NA[1]	NA[1]
Osceola County (FL)/Osceola County Parkway (Muller and Buono 2002)	1995	13.0	50.7	38.5	40.4	NA
Toll Road Investment Partnership (VA)/ Dulles Greenway (Muller and Buono 2002)	1995	20.1	24.9	23.6	25.8	35.4

Table 2-2. Continued.

Authority/Facility (Reference)	*Year of Opening*	*Year 1 (%)*	*Year 2 (%)*	*Year 3 (%)*	*Year 4 (%)*	*Year 5 (%)*
Transportation Corridor Agencies (CA)/ San Joaquin Hills (Muller and Buono 2002)	1996	31.6	47.5	51.5	52.9	54.1
North Texas Tollway Authority/George Bush Expressway (Muller and Buono 2002)	1998	152.2	**91.8**	NA	NA	NA
Transportation Corridor Agencies (CA)/ Foothill Eastern (Muller and Buono 2002)	1999	119.1	79.0	79.2	NA[1]	NA[1]
E-470 Public Highway Authority (CO)/ E-470 (Muller and Buono 2002)	1999	61.8	59.6	NA	**95.4**[2]	NA[3]
Florida's Turnpike Enterprise/Polk (Muller and Buono 2002)	1999	81.0	67.5	NA	NA	NA
Santa Rosa Bay Bridge Authority (FL)/ Garcon Point Bridge (URS Consultants Inc. and Coverdale & Colpitts 1996 and Florida Department of Transportation 2004)	1999	32.6	54.8	50.5	47.1	48.7
Connector 2000 Association (SC)/ Greenville Connector (Muller and Buono 2002)	2001	29.6	NA	NA	NA	NA
Pocahontas Parkway Association (VA)/ Pocahontas Parkway (Wilbur Smith Associates 1998 and Pocahontas Parkway 2005)	2002	41.6[4]	40.4	50.8	NA	NA
Northwest Parkway Public Highway Authority (CO)/Northwest Parkway (Vollmer Associates LLP et al. 2001 and Northwest Parkway Public Highway Authority 2004)	2004	60.5	56[5]	NA	NA	NA

Source: Kriger et al. 1977, with permission from the Transportation Research Board.
Notes: Bold type reflects actual within 10% of projected. NA = traffic and revenue report not available or not provided.
[1]For these years, the Transportation Corridor Agencies combined the revenues (earnings) for the two facilities (Foothill North and Foothill Eastern). Accordingly, the individual performance for the two facilities cannot be calculated.
[2]Data reflect updated traffic and revenue study (Vollmer Associates LLP et al. 2000 and Public Highway Authority 2003).
[3]Incomplete information (missing November and December).
[4]This percentage is approximated because construction delays only allowed the facility to be open for one quarter of the expected full year.
[5]Projected performance for the 2005 fiscal year (Standard & Poor's 2005).

- regional distribution of future population centers and employment opportunities;
- existing land use and potential future changes in zoning;
- demographic changes, including household size, household income, automobile ownership, and households with more than one wage earner; and
- changes in travel behavior caused by increases in telecommuting (NCHRP 2006, 36).

The FHWA included those points when they compiled a checklist on travel forecasting methods that could be used by MPOs when they prepare their federally mandated transportation plans (FHWA 2004). In addition to the considerations recommended by NCHRP, the FHWA identified several areas of technical documentation that should be available for public inspection:

- last model revision, that is, when the current set of travel models was last revised;
- description of models used;
- description of data used to calibrate the model set;
- local surveys of homes or households;
- model validation;
- size of the model highway network;
- number of zones included in models; and
- explanation of how nonhome-based travel is modeled (FHWA 2004).

Revenue Estimation for the Financial Community

Because revenue estimation is so crucial to the viability of assessing risk and securing funding, analysts in the financial community may wish to augment the planners' forecasts with some or all of the following:

- incorporation of a range of possible outcomes, given the low probability that the base-case forecast will exactly match the likely outcome;
- further study and greater validation of the value of time as an input in forecasting models;
- further study and greater validation of the ramp-up effect on startup toll-road facilities;
- creation of more detailed truck traffic analysis, because the higher revenue margin created by trucks is an important component of a forecast, especially when trucks are projected to be a significant fraction of total traffic;
- incorporation of the risks and rewards of electronic toll collection, balancing violations and toll evasion against faster throughput, ease of use, and revenue recovery through penalties; and
- enhancement of investors' understanding of modeling and highlighting risk in the final product (for instance, enhancing the validation process by validating more than one year and fully disclosing model limitations) (George et al. 2003).

Major bond rating companies generally look for the following components in a toll-road demand-and-revenue forecast:

- land use and demographic assumptions regarding population and employment data;
- highway networks and alternative roads either feeding into or competing with the proposed project;
- weekday versus weekend traffic figures;
- assumption reviews of travel demand parameters;
- trip characteristics;
- truck travel count and generated income;
- peak versus off-peak period management, especially as it relates to managed or congestion pricing lanes;
- value of time;
- ramp-up period;
- violation rate;
- toll rates and proposed increases;
- point estimate forecasts; and
- economic and political risk (Gustavo 2004).

Analyzing Risks

For PPP projects, analyzing risk is the next logical step after estimating revenues and the other forecasting techniques described above. Credit rating agencies, such as Fitch Ratings, Moody's, and Standard & Poor's, perform financial research for the investment community. Fitch, in particular, has dedicated many resources to reporting a global review of infrastructure projects, including energy, industrials, utilities, social infrastructure, and transportation projects. Fitch prepares an analysis by establishing a base case and a stress case. The *base case* is a highly probable scenario under normal conditions in which debt will be serviced in full and on a timely basis. The *stress case* examines the ability of a project to survive a combination of severe but reasonably probable stress situations and still pay debt service in full and in a timely manner. For a toll-road project in a developed economy, for example, the Fitch base case assumes a 0%–5% cost overrun for a simple project and a schedule with a zero- to three-month delay. The similar stress case allows for a 5%–10% cost overrun and a delay of three to six months. A toll road that passes all these tests is eligible for an "investment-grade" rating, which is BBB to AAA. Obviously, it is desirable for a PPP project to be given a Fitch investment-grade rating because then bonds can be issued with risks identified, and other funding sources can be obtained at attractive interest rates.

In addition, Fitch Ratings analyzes a variety of variables during a project's conceptualization period, including the following:

- Sponsors: Are the sponsors experienced in their own markets and experienced in the region where the new project will be built? Do they have a significant

investment in the project in terms of resources and time? Do the sponsors have the financial strength to see the project through, or do they need a guarantee from a stronger corporate entity?

- Contractors: Do the contractors have the required experience and credit quality to proceed? Have they successfully completed similar projects on time and under budget? Will the group consist of sufficient numbers of local contractors, who have both business and political experience in the area under consideration? Are the contractors' staffing capabilities sufficient, and is their staff experienced? Will the contractors be able to assemble the required number of skilled and unskilled workers from local labor pools? How are their labor relations in the community?
- Costs: Is the construction budget reasonable? Are there provisions to increase costs, and what are the circumstances that allow for cost increases? How do the costs for the current project compare with adjusted costs from similar projects?
- Delays: The risk of a project delay should be investigated; projects with longer completion dates carry more risk. What is the contractor's exposure to unforeseen subsurface conditions? What about the availability of labor, materials, and equipment? How much time is required to obtain the necessary permits and various consent agreements to start the project?
- Technology: Is the project using proven technology or something new? Proven technology is less risky, especially when a power plant or waste treatment facility must meet certain local, state, and federal standards before it can be accepted. New open-road tolling technologies could affect revenue collection if they require a long ramp-up period.

During the operational phase of a project, the Fitch analysis looks at several additional factors, such as the following:

- Operator: The experience and compensation of the toll-road operator should be assessed, and its staffing should be reviewed to ensure that competent parties are in control of an operation. Could penalties for substandard performance result in loss of revenue? Is the operator new to the country in which it will be working? With respect to the operations and maintenance contract, are dispute resolution measures in place?
- Operating costs: What are the makeup, timing, and potential volatility of the operating costs? Will any potential changes in government regulations affect operating costs?
- Technology: Technology risks relate, somewhat, to the toll-collection process applied to toll-road projects. Is the technology proven? If new, what risk does the project face if it fails to perform as planned?

With so much at stake, it is no wonder that the credit rating agencies are subject to scrutiny by potential investors and the public agencies that use their ratings. For example, investors raised the question of objectivity when the 2007–2008 crisis in the home mortgage industry focused attention on how the credit rating

agencies could have given some of the highest ratings to securities that backed subprime mortgages. Specifically questioned were situations when a company being rated had paid the agency for its rating—a transaction that could hardly be viewed as arm's-length. Standard & Poor's, Moody's, and Fitch Ratings all reviewed their rating methodologies after several companies that had received their high ratings posted billion-dollar losses on collateralized debt obligations.

Municipalities and state agencies also are taking a closer look at the rating agencies because prices for municipal bonds are established by a municipality's credit rating and insurance costs. Some government officials believe that bond prices are too high, given the rare instances when municipal agencies failed to honor their debts. Other officials claim that municipal bonds are safer than corporate bonds, but municipal bonds cost more than those issued by private corporations.

Bill Lockyer, treasurer of the state of California, was leading a nationwide campaign to change the way that municipal and state bonds are rated. According to Lockyer, "Taxpayers are paying billions of dollars in increased costs because of the dual standard used by the rating bureaus" (*New York Times* 2008). If this reevaluation of bond ratings is successful, it would have a positive effect on the cost of financing infrastructure projects around the country.

Managing Risks

Risk managing has qualitative facets—what is the nature of the risk and who is at risk?—and quantitative facets—how much risk is allocated and what is its cost? Public officials always seek the Holy Grail of risk avoidance, and PPPs offer a fair degree of risk reallocation away from the public agency. The quest to reduce or do away with risk for public projects has traveled a long and arduous road. The conventional design–bid–build project depended a great deal on the quality of the bid documents to ensure that the public agency was defining exactly what was required and conveying this information precisely to all bidders via complete, coordinated plans and detailed specifications.

Even with complete bid documents and exculpatory provisions in the contract, however, a low-balling contractor intending to take advantage of a public agency could still find ways to do so. Thus, public agencies tried other approaches. One of these, partnering, involves a facilitator. Partnering is a method that brings all parties—owner, designer, contractor, and subcontractors—together to agree on mutual goals and to avoid disputes and claims by a sort of mediation or "working it out" process. In practice, too many "partners," both public and private, slipped back into their adversarial ways during the progress of construction.

Another approach, design–build, was seen as a more efficient project-delivery system because it placed the design and construction responsibility in the hands of one entity. Design–build was promoted as—and indeed proved to be—less susceptible to contractor-initiated change orders. The total time to design and build was substantially reduced, and the facility was turned over to the owner more

quickly. These reductions lowered other costs, among them the interim financing charges that had interest rates generally higher than the long-term loan costs. Today, the design–build approach is still working and gaining ground as a desirable project-delivery system in both the public and private sectors.

Typical PPP Risks

PPPs are yet another way of transferring risk from a government agency to a private entity, and just as the projects tend to be large and complex, so are the risks. Given that risk allocation requires that the risk taker be compensated, all parties to a PPP must determine the nature of the risk involved and how much the transfer of risk is worth.

For infrastructure projects, some of the risks that must be considered involve the transfer (or not) of specific responsibilities from a public agency to a private developer. These transfers include determining who is responsible for acquiring necessary rights-of-way; who pays utilities for the costs of relocating their lines, pipes, and so on; how environmental studies are conducted; and who assumes the cost of changes required as a result of final approval of the study.

The private entity's proposal should identify its assumptions about revenues and costs, on which it will base its assessment of the risks and the compensation it would need to undertake those risks. Key issues to consider include the following:

- Whether the traffic count will unfold as predicted: Was the traffic study provided by the public agency, was it vetted by the developer, or was it the responsibility of the developer?
- Whether the revenue stream will develop as it was originally calculated: Will the proposed congestion pricing or assumptions about HOT lane revenue prove out?
- Whether other facilities, not initially contemplated, drain revenue from the project at hand: Would a noncompete clause be accepted by the public agency?
- Whether the maintenance and operating costs, as projected over the life of the concession, would be achievable.

In addition, the private entity needs to take normal design and/or construction risks into account, such as differing soil conditions or unforeseen subsurface conditions; material price increases and labor shortages; design errors; normal cost overruns; and severe weather.

If the PPP is in a foreign country, the private entity must evaluate the risks associated with currency fluctuations and the possibility of expropriation or an unstable host government. These risks are quite real. For example, in 2002, the Indian government effectively expropriated Enron's Dabhol power plant when the government unilaterally lowered the negotiated utility rates. In Thailand in 1993, a Japanese contractor completed the Bangkok Expressway, which was a build–operate–transfer project; the government then seized the expressway's assets, forcing the contractor to sell 65% of its share to a local concern, thus allow-

ing the tolls to be lowered from the original contract rate. And more recently, Hugo Chavez, president of Venezuela, took control of four privately held oil refineries during his first term in office.

The FHWA acknowledges seven types of risks associated with PPPs; the types of risks are listed with descriptions, allocations, and mitigation strategies in Table 2-3.

Mitigation Strategies during Contracting

Fortunately, mitigation strategies are available to ease the risks involved in a PPP infrastructure project, and more will evolve as PPPs come into wider use in the United States. Here are a few such strategies.

Changing a Project's Timing

Market timing can affect risk, and in some cases, the public agency can overcome bad marketing timing by merely reissuing the request for proposals at a more favorable time. Markets can change rapidly and unexpectedly, as they did when the subprime mortgage defaults began to surface in 2007 and extended into 2010. The resulting monetary crisis sent shudders through the world financial community and made lenders more wary of extending credit, even to firms with sound financial statements.

Addressing Changes in Traffic Patterns

Changes in traffic patterns that were not anticipated in initial traffic studies could be managed by contract language that gives the government agency a layer of control over certain types of unanticipated changes. For example, let's say that traffic count and the resulting revenues far exceed expectations. The government agency runs the risk of being charged that it "gave away the store" unless the concession agreement includes some form of additional recompense in this situation. The agreement could include something as simple as a cap on revenue to the concessionaire, after which a percentage of excess revenue reverts to the government agency.

As another example, perhaps heavy traffic builds up over the years, straining the capacity of the highway and creating delays and congestion. The public might perceive that it has not been well served by this long-term highway leasing arrangement. This risk can be mitigated by provisions in the contract that require the concessionaire to expand the highway or take other measures to relieve congestion once it reaches certain specified levels.

Of course, if revenue goes the other way and continually falls below expectations, the private partner will look to mitigate its risk with a contract provision that diverts a higher percentage of revenue to the concessionaire for a specific time or until some event is triggered.

Indemnification

Some risks can be mitigated with indemnification, or "hold harmless," clauses. Indemnification clauses transfer from one party (the indemnitor) to another party

Table 2-3. FHWA Classification of Types of Risks in PPPs

Risk Type	*Description*	*Allocation*	*Mitigation Strategies*
Technology performance	Existing technology being unproven in terms of revenue service	Private (vendors)	Warranties
Environmental flaws or delays	Lengthy studies Delays in obtaining permits Lengthy regulatory approval periods	Public (funders)–Private (lenders)	Use of investment-grade traffic and revenue studies accepted by credit rating agencies Adequate debt coverage ratios Adequate reserves Credit enhancement, insurance Flexibility in adjusting tolls Careful budgeting processes and operation-and-maintenance controls Noncompete protections
Policy/political constraints or support	Uncertainties regarding public policy and changes in laws Regulatory uncertainties Funding support	Public and private	Persuasive and supported arguments for project Early regulatory agency involvement Public relations and citizen/policymaker education campaign Community engagement and strategy for buy-in
Phasing timing and resources	Uncertainties about the economics of initial and subsequent phases	Public and private	Strong process management Early regulatory agency involvement Expedited and streamlined procurement process Early and continuous contact with other state and local governments
Liability	Construction defects Day-to-day operational problems Subcontractor claims Environmental damages	Public and private	Warranties Insurance Well-thought-out allocation of liability in contract based on which party is best able to control and mitigate Innovative insurance products
Operations and maintenance (O&M) costs	Excessive costs of operation Excessive expenditures for capital maintenance Unpredictability of costs Regulation of direct user charge rates and contractor return on resources	Private (O&M contractor) and public	Nonrecourse financing Guaranteed minimums Flexibility for toll adjustment Credit enhancement, insurance Careful budgeting processes Capital asset replacement assurances Warranties, incentives, and penalties Financially viable private partners Use of private O&M contractor Use of fixed price or guaranteed maximum pricing, with escalations and adjustments over time

Source: FHWA website on public–private partnerships <http://www.fhwa.dot.gov/ipd/pdfs/faq_3.pdf> (accessed Dec. 3, 2010).

(the indemnitee) the obligation to pay for losses that the indemnitee incurs or for which it may be held liable. Indemnification clauses can achieve the following:

1. transfer the risk of liability for damages entirely from one party to another;
2. transfer the duty to defend and costs to litigate;
3. transfer the duty to insure to the party with the capability to provide insurance at the lowest cost; or
4. encourage compromise by changing contract language away from " to any and all extents" and "whether or not" to a more reasonable distribution of risk.

Insurance is a key factor in indemnification; subrogation of rights in insurance policies allows the insurance company to act against the party responsible for the damage to recoup their losses. When the subrogation clause is waived, the risk of loss is shifted to one of the contracting parties, who then shifts it to the insurance company in exchange for "consideration" (value). Typical language waiving subrogation reads as follows: "Owner and contractor waive all claims against each other and against all subcontractors to the extent covered by insurance obtained pursuant to the contract."

Open-Road Tolling as a Mitigation Strategy to Ensure Revenues

Earlier in this chapter, you read about the need to estimate revenues accurately and include clauses to cover situations where there is a wide disparity between estimated and actual revenues. But what about the risk of losing revenues that are not considered?

Unfortunately, toll jumping is alive and well. In March 2007, a motorist was charged with evading $16,000 in tolls on the Delaware Memorial Bridge and I-95 in Newark, New Jersey. That same month, a Boston limousine service was fined $65,000 for evading commercial tolls in Massachusetts. According to New Jersey authorities, the government spent $19 million adjudicating erroneous violations claims, $6 million more than it netted from actual violations. And the United States is not alone in fighting toll jumpers. In China, motorists use fraudulent toll-exempt military plates, resulting in losses on one highway of $1.2 million. On another toll road, one driver went so far as to outfit his vehicle to look like an ambulance, complete with flashing lights, so that he could race through the tollbooths without paying. He was eventually arrested by police.

Open-road tolling (ORT) is a system for collecting tolls without vehicles stopping at a booth. ORT systems encourage traffic to flow smoothly because vehicles can drive through the toll plaza but don't have to stop at a manned tollbooth. ORT increases the problem of toll jumping because it is so easy for drivers to race through. However, new advances in ORT include the placement of high-resolution cameras at the tollgates to photograph violators, who are then identified and sent a ticket or traffic summons. As more states pass reciprocity laws, these types of violations should decrease even more.

ORT systems use transponders placed on the windshields of vehicles. Tolls are collected as the transponders of the vehicles are read at normal highway speed as the vehicles speed by electronic scanners generally located at conventional-looking but unmanned tollbooths. Drivers must open accounts with the appropriate toll-road authorities before using the transponders, and each trip is automatically deducted from a monetary deposit made with the issuance of the transponders. Accounts can be automatically replenished by credit card or when vehicle owners are notified that their accounts need replenishment.

If a vehicle passes through an ORT gate with no transponder, a photo of the vehicle's license plate is automatically taken and a fine is sent to that vehicle's owner. This is a more advanced technology than the older automatic vehicle identification (AVI) systems that rely on radio signals and transponders, such as those associated with the E-ZPass system. One expert compares E-ZPass to a retail business dealing with anonymous customers, whereas ORT is a utilitylike business dealing with known customers engaged in regular interaction with that provider.

In the past decade, Germany has been developing an open tolling system that was devoted primarily to truck traffic. In addition, the system had to accommodate large numbers of foreign truckers entering and exiting the German road system. The German system also reveals the degree of sophistication that can be built into such a program, and it will be one of several case studies that will conclude this chapter.

Case Studies

This chapter—and most others in this book—concludes with case studies drawn from real-world efforts to use PPPs for large transportation infrastructure projects. The first two studies in this chapter illustrate how much time it can take a project to go from conception to reality. The Mississippi River Bridge would have probably taken about 15 years to finish if pursued as a PPP project, and California's State Road 125, which was approved in 1990 did not open for business until 2007, took 17 years. The third case study involves Interstate 81, where a regional coalition includes not only state officials but also representatives from private stakeholders with an interest in the area's transportation infrastructure. Finally, the last case study describes a German project that devised an innovative open-road tolling system.

The Mississippi River Bridge

In 1992, a study began to investigate building a major new bridge across the Mississippi River at St. Louis between Missouri and Illinois. The proposed bridge over the Mississippi River would ease traffic congestion for commuters and interstate travelers crossing between the two states. The current primary crossing was

the Poplar Street Bridge, which carries traffic for three interstates: I-70, I-64, and I-44/55. The convergence of three interstates causes recurring rush hour delays. Off-peak congestion and delays also are common, resulting not only from the volume of traffic but also from the configuration of ramps and approaches. Existing bridges to the north and south operate not as part of the interstate highway system but merely as independent river crossings. In 1992, estimates ranged from $1.8 billion for an eight-lane highway to a more affordable $550 million for a four-lane highway.

Locating the bridge and its entry and exit ramps, agreeing on the number of lanes, and getting actual commitments from both states were all factors that delayed the start of construction. In June 1999, the mayor of St. Louis, Missouri, and the chair of the St. Clair County Board signed a resolution to proceed with an environmental impact statement for the project.

After almost 10 years of planning, the Illinois and Missouri departments of transportation submitted a final environmental impact statement and received a record of decision from the Federal Highway Administration in 2001.

On Aug. 2, 2005, concerned citizens learned about the proposed bridge. Five public hearings were held to keep the populace on both sides of the river informed of the obstacles facing the design, construction, and financing. After these initial meetings, a 15-person Roundtable Advisory Committee was formed by representatives from both states to discuss and meet with the public regarding matters of design and financing. The public hearings and roundtable committee meetings resulted in minimal public objections. A public–private partnership plan was proposed by Missouri to sell the rights to build, operate, and maintain the bridge for 99 years. This project would require a toll. Objections to tolling the bridge were made by Illinois Governor Rod Blagojevich. On Feb. 28, 2008, both governors agreed that the bridge would be toll free, thus killing the PPP option, at a public forum conducted jointly by the Missouri and Illinois departments of transportation.

Initially, the cost of the new bridge, planned with four 12-ft (3.6-m)-wide lanes with breakdown lanes on each side for a total of eight lanes, was estimated to cost $1.8 billion. But later design studies shortened the main span from 2,000 ft (609.6 m) to 1,500 ft (457 m), and by combining local street crossings, using a simpler interchange design, and making other significant “value engineering” changes, the costs were reduced to about $1.4 billion. Still looking for savings, major portions of the project, such as the Illinois Route 3 relocation, an I-64 connector, and a trilevel interchange of I-70/I-64/I-55 and the Poplar Street approaches, were separated, to be funded by other means at other times.

At a cost of about $2.5 million, URS Corporation conducted a reevaluation study in 2005 to find a more economical solution to the river crossing. The URS study focused on a different bridge design and the relocation of the I-70 and the I-70 North interchanges. In November 2005, at another public open house, the new bridge design was unfolded, along with a new cost for the total project of $910 million. The Regional Business Council Mississippi River Bridge Task Force

prepared a report, presented in January 2006, that summed up the need for the bridge, the options for financing and constructing the bridge, the steps needed to execute a concession-type project, and conclusions and recommendations. In short, they recommended a simple process to follow in planning for a PPP project. A revised EIS was received in 2006, resulting in a reduction on project scope (and cost) and allowing the project to proceed.

Establishing the Need, Costs, and Financing

The existing Poplar Street Bridge carried not only cross-state and cross-country traffic, but also commuters traveling to work and home again. The proposed crossing would be north of the existing one; it would reduce I-70/I-64 travel by 1.6 mi (2.6 km) and would provide better connectors to the central St. Louis business district. A computer model indicated that without a new bridge, congestion hours could double from 1.5 to 3 hours per day and the average 10-min. trip at that time could go as high as 55 min. in the future. Ease of travel would enhance economic opportunities, help to keep existing businesses in the central business district, and have a positive effect on leisure time and recreational facilities. So the need was there.

As plans evolved, a final price tag of $910 million emerged from the URS study. Ribbon-cutting costs including engineering, land acquisition, utility relocation and adjustments, railroad relocation, and environmental mitigation. Here's a breakdown:

- Missouri North I-70 interchange: $120 million;
- Mississippi River Bridge, including Missouri and Illinois approach units: $400 million;
- Illinois I-70 roadways: $170 million;
- Total base cost (2005 dollars): $690 million; and
- 15% +/− contingency, to include inflation to 2013 dollars: $220 million.

Total project costs were estimated to be $910 million. These estimates were considered preliminary but based on the best information then available.

When the idea of a Mississippi River Bridge was first floated in the late 1990s, the federal government was going to provide the major portion of the funding. By the autumn of 2005, however, area legislators found that the federal government would only provide matching funds of $299 million. With the bridge estimate lowered to $910 million, a shortfall of $611 million still remained. Elected officials felt that they might be able to obtain another $250 million as an earmark in the 2009 budget, but with the increased scrutiny of earmarks in the 110th Congress, that promise proved to be tenuous at best.

Goldman Sachs was authorized to prepare a study on financing options for the new Mississippi River Bridge. It drew up some basic assumptions about toll rates and the concession period and concluded that a PPP project was a viable alternative. Goldman Sachs recommended further studies to evaluate toll-rate structures and concession periods.

In February 2006, a bill was introduced in the Missouri state senate to allow the Missouri Highways and Transportation Commission to enter into a PPP to build the new Mississippi River Bridge. Nothing came of it.

Enter the Metropolitan Planning Organization

For the area affected by the Mississippi River Bridge, the East-West Gateway Council of Governments is the federally designated metropolitan planning organization responsible for overseeing the development of both short- and long-term transportation plans for the region, defined as a total of eight counties in Missouri and Illinois. In this role, the council was responsible for preparing *Legacy 2035,* a study of the region's long-term surface transportation needs. It also presented an assessment of alternatives for financing the bridge, issued in January 2007 and developed in association with InfraConsult, an organization devoted to development of sustainable infrastructure projects, and Sharon Greene + Associates, a California company that performs strategic financial analysis relating to transportation economics. This report gave four options for the river crossing:

1. Move forward with the full project, the eight-lane Mississippi River Bridge and its connections to I-70 and I-64. The total project cost would be $1.56 billion. The report included several suggestions to obtain funding from the federal government and other sources to make up the shortfall.
2. Provide suitable connections to I-70 and I-64 to alleviate a major source of congestion, but no new bridge. The cost of this option was estimated to be $550 million.
3. Rule out tolling. The current committed public funds, including a federal earmark and some Illinois Department of Transportation funds could build a "trilevel" interchange for both I-70 and I-64 to improve connections to the existing Poplar Street Bridge, leaving open the option to build a tolled bridge in the future.
4. Do nothing and use the committed funds for other projects.

Future as a PPP Project

As of October 2007, Michael Pritchett, studies and plans project engineer for the Illinois Department of Transportation, reported that slow progress was being made on the Mississippi River Bridge project (personal communication, Oct. 12, 2007). He added that a PPP arrangement seemed unlikely because no legislation was in place in either Missouri or Illinois to allow deviation from the conventional design–bid–build process for this bridge.

In February 2008, Illinois and Missouri reached an agreement to fund the Mississippi River Bridge project, with Missouri's Department of Transportation acting as the lead agency. Estimated project costs, including contingencies and inflation, are based on a 2010 construction start with work to progress over a four- to six-year time span. The project now consists of three components: relocating I-70 roadways in Illinois, including a trilevel interchange ($264 million); building

the Mississippi River Bridge, including the Missouri and Illinois approach structures ($306 million); and building the Missouri North I-70 interchange ($70 million). This account brings the total cost to $640 million. For funding, Illinois will provide $313 million, Missouri will provide $88 million, and $239 million will come from the federal government (New River Bridge 2009).

According to Andrew Gates of Missouri's Department of Transportation, HNTB has been awarded the contract for bridge design, CMT is doing the Missouri interchange, and CTEE is designing the trilevel interchange. The work is proceeding on a conventional design–bid–build process (personal communication, June 6, 2008).

From 1999 (when the environmental impact study was authorized) through 2010 (when construction starts) to 2014 (estimated completion), the Mississippi River Bridge will have been under development for 15 years and will be completed without the involvement of a PPP.

California's State Road 125

Some large infrastructure projects seem to spend an inordinate amount of time in the planning stages because of continual public hearings, multiple environmental studies, or activities by NIMBY (not in my backyard) groups. California's State Road (SR) 125 project is a case in point and highlights the unanticipated delays that could increase the cost of the project to public agencies, private developers, and even the commuting taxpayer.

In September 1990, George Deukmejian, California's then-governor, approved the California Department of Transportation's (Caltrans) selection of four privately constructed projects mandated by the state's passage of Assembly Bill 680. Assembly Bill 680 authorized Caltrans to "exercise any power possessed by it with respect to the development and construction of state transportation projects to facilitate the development and construction of privately constructed projects." At the time, the only other public–private toll road concessions were operating in Virginia, so California was breaking new ground in the western United States. The four projects selected for PPP development were SR 57, SR 91, SR 125, and the Mid-State Tollway. In 1999, Caltrans set the allowable return on investment for all four projects. A potential concessionaire for SR 125 was allowed a return on investment (ROI) of 18.5% because the SR 125 project was considered more risky than SR 91 (with a 17% ROI). The ROI for SR 57 was set at 20.25%, reflecting its higher design and construction risks. The riskiest project of all was the Mid-State Tollway, with an allowable rate of return at 21.25%.

The SR 125 toll road, also known as the San Miguel Mountain Parkway, was planned to be an 11-mi (17.6-km) highway. Its northern terminus would connect to SR 54, and it would run south to the international border with Mexico. A 1.5-mi (2.4-km) segment that included the interchange at SR 54 would be a publicly owned freeway, but the lower 9.5-mi (15.2-km) portion was to be a design–build–finance–operate (DBFO) electronic toll collection road to be built by California Transportation Ventures Inc. (CTV). The original SR 125 project

was estimated to cost $500 million and was scheduled for completion in December 2005. CTV was given a 35-year concession and allowed to set market-rate tolls, within the 18.5% ROI.

The Long Environmental Review Process

Kent Olsen was the president of CTV in 1990; according to Olsen, there was local community opposition to the project from the first day it was proposed. "From the beginning, this group threatened litigation," said Olsen. "And so Caltrans and CTV were very thorough and conservative throughout the environmental process. After evaluating 10 to 20 alternative routes during the screening process, the list of alternatives was narrowed down to three at the north end of the project. These were carried forward for environmental studies. While these studies were going on, the local citizen group advisory committee came up with one more alternative which the state had rejected, but CTV eventually agreed to add to the environmental document" (personal communication, July 2007).

After the draft final environmental impact study was circulated, a supplemental study was required because a newly listed endangered butterfly species was discovered in the area. The environmental consultant found one butterfly one year and another one the second year, but the supplemental study added 12 months to the approval process, according to Olsen, who added that the final environmental report ran to 1,802 pages, and 400 copies were required for distribution.

Community Concerns

Charles "Muggs" Stoll was a project manager for Caltrans from 1993 to 2004. He was involved in addressing environmental and community concerns about the SR 125 project, which were anything but simple to address.

According to Stoll, the community at the northern end of SR 125 had many misgivings about the project (personal communication, Aug. 18, 2007). The northern terminus ran through an old, established community called Bonita Sunnyside, a rural area with horse trails and bucolic settings. Environmental issues were at the forefront, and it is not difficult to understand the local anxiety about the way their community could be changed by the project. The fact that the new road would be a public–private venture was not as important as its route because the route would have more of an effect on life in the community.

The southern end of SR 125 was in the vicinity of Chula Vista, a relatively new community, where the highway was greeted with more enthusiasm than in the north. Chula Vista residents saw the new tollway as a benefit because it would provide additional access to adjacent areas, including San Diego.

Local opposition to the San Miguel Mountain Parkway portion of SR125 (according to a telephone conversation I had with Kent Olsen on July 31, 2007) made it imperative that litigation by the residents of that community be avoided because these local citizens fought California Transportation Ventures at every turn. He said that their final environmental study must be 100% complete; every "i" must be dotted and every "t" crossed. So a rather simple state road project with a "privatization" twist took seventeen years from first proposal (1990) to completion in 2007.

This is a lesson that future PPP entities need to absorb: When strong local opposition to the proposed project exists, sufficient time and money need to be considered and reflected in the pro forma.

SR 125 opened to traffic in September 2007, 17 years from its initial authorization. The cost was $558 million, about 11.6% higher than initially projected. The higher figure includes $363 million for development and capital costs, $63 million for financing and interest during construction, and $132 million for connector and interchange costs. The project was financed by $94 million loan guarantees, a $33 million TIFIA line of credit, and $132 million federal and local funding. (The TIFIA program is a federal government program that provides three forms of credit assistance and is described more fully in Chapter 4.) Macquarie Infrastructure Group is the current concessionaire, having acquired CTV in October 2002.

According to Stoll, who is now with the San Diego Association of Governments, the $155 million in public funds that built the toll-free northern 1.5-mi (2.4-km) section includes revenue from sales tax funds and regional highway funds. As of the summer of 2007, there was legislation on the governor's desk to extend the SR 125 toll-road franchise by 10 years, from 35 to 45 years. The partners to the agreement were reviewing the change to set a value on the extension.

The I-81 Corridor Coalition

The I-81 Corridor Coalition has its roots in efforts by Virginia to seek assistance in widening and adding safety improvements to a stretch of Interstate 81 that runs roughly southwest to northeast inside Virginia's western boundaries. This coalition now includes state transportation officials from New York, Pennsylvania, Maryland, Virginia, West Virginia, and Tennessee, as well as two metropolitan planning organizations and representatives from the Norfolk Southern Corporation and the Pennsylvania Motor Truck Association. The coalition is charged with creating a transportation structure that addresses common issues, such as safety and incident management. The coalition also grapples with more complex yet important issues to improve the transportation infrastructure of the entire region. For example, railroads might be able to carry more freight in containers than trucks can; railroads might also be more cost-effective, more energy-efficient, and less harmful to the environment. If so, can the highway be designed to allow railroads to relieve highways of truck traffic? Another issue involves truck-only lanes. Can they contribute to more rapid movement of freight and increased safety for motorists? These are among the issues that the I-81 Corridor Coalition is considering, with each state weighing in regarding its own best interest and the best interest of the coalition as a whole.

Initially, Virginia's Department of Transportation sought a concession agreement to improve a 325-mi (523-km) section of I-81, but as of January 2008, the state elected to proceed without private-entity collaboration. The plan to improve this particular stretch of highway is what awakened the interest of Norfolk Southern Railroad, which owns a pathway from Virginia to Chicago and on to the West

Coast by way of Pennsylvania and New York State. Not surprisingly, Norfolk Southern considers the flow of freight along this corridor to be of vital interest to their business.

New York's section of I-81 runs north–south through Syracuse in the central part of the state and crosses into Ontario, where Canada's Route 137 picks up. This interstate is one of the major trade corridors for the state, with interchanges to other major east–west arteries, including I-90 and I-86/88. State officials view improvements to I-81 as the key to increasing the movement of freight along the corridor and relieving congestion in the stretch west of Fort Drum, New York, which will see a population increase of 10,000 resulting from expansion of that army base.

I-81 in Pennsylvania is 233 mi (373 km) long and heads northeast from the center of the Pennsylvania–Maryland border. Pennsylvania's section of I-81 carries significant truck traffic; the annual value of goods moving through the state, as of 2003, was valued at $231 billion. According to the Pennsylvania Motor Truck Association, trucks traveling through the state carry goods that account for one twelfth of the country's $12.5 trillion gross domestic product. The Norfolk and Western Railroad runs parallel to I-81 in Pennsylvania and carries large numbers of trailers and shipping containers on flatcars; hence, the railroad again has a vested interest in changes to the highway system along this corridor.

Aspects of this I-81 coalition are discussed in subsequent chapters. For now, the important point is that state and private interests are coming together to discuss and resolve common goals and problems.

Germany's Open-Road Toll System

In 2000, the newly elected German administration wanted to develop an efficient, effective open-road tolling system for 12,000 km (7,500 mi) of existing highways. This system, which finally opened in 2005, is for trucks with a gross vehicle weight (GVW) of 12 tons or more, and the cost per kilometer depends on the number of truck axles and the vehicle's emission standards category. Passenger vehicles and trucks under a 12-ton GVW would not be charged a toll.

The Challenges

The German ORT system faced many challenges in getting up and running, not the least of which was dealing with trucks from foreign countries that were passing through Germany. The program had to find ways of accommodating a disparate group of elements:

- applying a system that could distinguish high GVW vehicles;
- serving trucks coming from more than 36 countries whose drivers spoke at least 12 different languages;
- providing a secure mode of data protection and privacy to all users; and

- installing a network with approximately 5,200 sections, each of which is, on average, less than 4 km (approximately 2.5 mi) long, and designing the system so that it could be extended quickly and at a reasonable cost.

Environmental restraints in Germany precluded the use of toll plazas, and a dedicated short-range communications system would require thousands of gantries over the 5,200 sections.

So officials turned to global positioning systems (GPSs). A GPS antenna installed on a truck along with a transponder makes it easy to locate the truck. The on-board-system (OBS) automatically relays information to a collection point whenever the vehicle arrives at a toll section, and a charge registers. But what about occasional users who may not have elected to install the OBS? Highway officials provide infrequent users with two manual payment systems: by Internet or by tickets. For the Internet option, a driver books a trip online in advance. If the trip is cancelled, the driver can void the tickets at no charge before the trip date. For the other option, the driver can purchase tickets using one of 3,600 point-of-sale machines at service stations and stand-alone machines scattered around the country and in nine bordering countries.

The Response

Truckers who request an OBS first register with the system installer, a firm called Toll Collect GmbH. When registration is completed, users receive a transponder at no cost but must pay for installation. The transponder provides enforcement identification and localization when a positioning beacon is operating.

The GPS tolling system debuted in January 2005, and 150 days later, it had proven to be successful. Fraud was less than 2%, and 1.1 billion was collected (about US$1.54 billion, based on a conversion rate of 1.40). In that period, 450,000 OBSs were installed, and 82% of all collections were made via an OBS, signaling that devices were user friendly.

Enforcement is part of the Toll Collect system, and it relies on 300 complex multilane audiovisual information control gantries that perform the following functions:

- scans each vehicle in a three-dimensional mode, verifying a truck's total weight and number of axles, and determining whether a toll is due;
- checks via the transponder whether the vehicle has the OBS and whether the OBS has been activated; and
- reads the license plate and compares it with the plate information in the database to ensure that they coincide.

The system determines instantaneously whether a truck is legal and whether a violation has occurred. If there is a violation, law enforcement officials at 150 offices are notified, and they, in turn, relay this information to mobile German enforcement officials.

Further advances in electronic tolling will most certainly close the gap between speed of operation and effective toll collection, as well as reducing installation and maintenance costs and becoming even more user friendly.

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CHAPTER 3

The Players: Developers and Financers

Chapter 2 focused on the planning side of a public–private partnership, most of which occurs on the public side of the partnership. On the private side, a host of companies that develop, operate, and finance PPPs have emerged. Many of these companies are based in Europe, but by no means all of them. Almost every one of these companies has projects in several countries, making PPPs one of the powerful engines driving globalization.

In this chapter, I introduce some the leading PPP transportation developers and discuss their corporate structures and significant projects. Then, I survey a handful of prominent toll-road operations and, finally, look at the major players on the financing side.

The Leading Transportation Developers

According to *Public Works Financing Newsletter*, which ranked a list of international transportation developers by number of projects, none of the top 15 developers are U.S.-based firms. Table 3-1 shows the top 15 developers as of October 2010. Since 2008, seven companies are Spanish, with ACS/Iridium keeping their No.1 spot, but the placement of the other Top 15 has changed. The Macquarie Group slipped from No. 2 in 2008 to No. 5 in 2010, and Global Via has risen from fifth place to No. 2 with 45 concession projects in either the construction or operational stage. Therefore, it isn't surprising that foreign consortiums—such as Macquarie, Ferrovial/Cintra, ACS/Iridium, and OHL—captured several U.S. concession toll-road projects. Nor is it surprising that other international firms submitted unsuccessful bids and still others continue to test and investigate the U.S. market. A consortium led by France's Bouygues and Meridiam Infrastructure was awarded the billion-dollar Port of Miami project in 2009, and construction is currently under way. Meridiam also leads the consortium that was awarded a design–build–finance–operate–maintain PPP project—the Long Beach, California, court building—in June 2010. Portugal's Brisa, a new entry to the

Table 3-1. Top Transportation Developers Based on Number of Projects, 2010

	Company	*Country of Origin*	*Number of Operating or Constructed Projects*	*Number of Active Proposals*
1	ACS/Iridium	Spain	60	52
2	Global Via	Spain	45	37
3	Abertis Infraestructuras	Spain	40	7
4	Ferrovial-Cintra	Spain	38	12
5	Macquarie Group	Australia	36	9
6	VINCI/Cofiroute	France	35	14
7	OHL	Spain	29	18
8	NWS Holdings Ltd.	China	28	2
9	Acciona/Nesco	Spain	23	13
10	Sacyr	Spain	22	12
11	Hochtief	Germany	22	7
12	Cheung Kong Infrastructure	China	21	4
13	EGIS Projects	France	20	30
14	Bouygues Construction	France	18	14
15	John Laing PLC	United Kingdom	18	8

Source: Reproduced with permission by Public Works Financing, Westfield, New Jersey.

U.S. market, won the toll concession contract for Colorado's Northwest Parkway deal in August 2007.[1]

Spanish firms seem to fill the upper echelon of concession developers. Spain began using PPPs in the 1960s to construct some 22 tolled concession roads as part of their 3,000-km (1,860-mi) highway network. Spain turned to PPPs in part to mitigate some of the country's budgetary restrictions when Spain was trying to join the European Union's Economic Monetary Union. Other analysts, such as Alicia Revenga, export director at SEOPAN (the major association of contractors in Madrid), attribute Spanish dominance in highway concession projects to a domestic recession in the late 1990s, when civil engineers had so little work they were "selling dictionaries." During that slump, Spanish investors were pouring tens of billions of euros into the South American market, gaining access to opportunities for many types of investments, including highway concessions. Following the investors, the large Spanish construction firms pursued concession-type projects, primarily in Latin America, where they could take advantage of the similarities in language and customs.

In the 1980s, European construction firms began to consolidate, and the bigger companies were able to get bigger projects. Aided by huge infrastructure

[1]Throughout this chapter, I use a conversion rate of €1.45 = US$1.00. The actual conversion rate between 2005 and 2010 fluctuated considerably. As of Oct. 10, 2010, the conversion was €1.30 = US$1.00.

grants from the European Union and Spain's domestic construction market, which in 2006 was the third largest in Europe, these contractors began to flourish and gain experience in concession work.

Alberto Jimenez, development director of Itinere Infraestructuras, said that Itinere gained quite a bit of experience in Europe in this type of infrastructure business, and in Spain they have concessions that have been in operation for more than 30 years (Reina 2007). Jimenez acknowledged that the United States presented a completely new market for their company, but he added that if foreign firms can apply a great deal of patience, there would be ample opportunities in this country. These foreign contractors have wide and varied business interests.

Next, let's take a closer look at these leaders in the transportation infrastructure concession business to become more familiar with their projects and corporate structures.

Abertis

In the late 1990s, as the introduction of the new euro currency began in earnest, many European companies began to develop sharing with their neighbors. Acesa began to increase its position in the Spanish motorway sector and through a series of acquisitions became one of Spain's leading toll-road operators.

Abertis Infraestructuras S.A. was incorporated in 2003 and was formed through the merger of Acesa, a motorway service group, and Aurea Concesiones de Infraestructuras S.A. It became the Spanish leader in toll roads, directly managing more than 1,500 km (925 mi) of toll roads, which represents 59% of Spain's toll routes. In 2003, the company also acquired Saba, giving it control of 99.1% of the Spanish parking garage market. In June of that year, Abertis purchased Retevisión Audiovisual, a leader in television and radio signal transmission in the country.

In 2006, Abertis acquired the French concessions company Sanef after the French government awarded the toll-road privatization contract to Holding d'Infrastructures de Transport, where Abertis held a 52.5% stake. This award added 1,743 km (1,075 mi) of managed toll roads to their portfolio.

In South America, Abertis controls the Grupo Concesionario del Oeste in Argentina and Autopistas de Puerto Rico. In Puerto Rico, Abertis also holds the concession of the Teodoro Moscoso Bridge. In Chile, Abertis is the 100% owner of the Concesionaria del Elqui, a 229-km (141-mi) toll road, and a 100% interest in Gesora de Autopistas S.A., a company responsible for operating and maintaining the operation of the 218-km (134-mi) Santiago–Los Vilos highway, the 5-km (3-mi) Tunel del Melon, the 75-km (46-mi) Chillán–Concepción toll road, and a 78.9% stake in the Rutas del Pacifico, a 131-km (80-mi) toll road connecting Valparaiso and Viña del Mar.

Abertis manages parking garages and is the owner of several radio and television networks in Spain. The company is a major airport manager with contracts at the Cardiff and Belfast international airports, London's Luton Airport, and Juan Santamaría International Airport in San José, Costa Rica. Abertis has also branched out into the United States, managing the Bob Hope Airport in Burbank,

California, and Hartsfield-Jackson Atlanta International Airport. Its Abertis Saba subsidiary manages parking garages in Spain, Italy, Portugal, Morocco, Andorra, and Chile.

Since 2003, Abertis's toll-road operations have shown increasing revenues and earnings before interest, taxes, depreciation, and amortization, as shown in Table 3-2. A Reuters news report dated July 5, 2010, revealed that shares of Abertis were suspended on that date after rising sharply because of a *London Financial Times* report that core shareholders and a private equity group were looking to make a buy-out bid for the company. Although Spain's infrastructure was hit hard in the worldwide recession of 2007–2010, Abertis's diversified holdings have helped it overcome some of the financial travails of their competitors.

On Aug. 10, 2010, CVC, a global private equity and advisory firm headquartered in Luxembourg, reached an agreement with ACS to jointly invest in a structure that will control ACS's current 25.8% stake in Abertis Infraestructuras S.A. Both firms will actively participate in the management of Abertis, according to the Aug. 11, 2010, press release from ACS.

Grupo ACS and Two Subsidiaries

Grupo ACS was founded in 1983 by a group of engineers who acquired a midsized construction firm, Construcciones Padros, which was experiencing financial problems. The new owners turned the company around, restructured it, purchased another larger construction firm three years later, and continued this process until ACS was officially formed in 1997. This path of acquisition took its biggest leap forward when the company doubled its size in 2003 after buying another Madrid construction company, Dragados. In August 2007, ACS acquired a 25.1% interest in German contractor Hochtief, increasing their presence in Europe and the United States, where this German builder had been operating for years.

On Sept. 16, 2010, ACS President Florentino Pérez held a press conference in Madrid to announce that he was preparing an initial public offering to increase their stake in Hochtief to 100%. All shareholders of the German company have accepted the proposal. According to the ACS website, Hochtief construction company is the third largest in Europe, with an annual sales volume of 18,166 million euros in 2009 and a net profit of 195 million euros.

Table 3-2. Abertis's Toll-Road Operation Revenues and Earnings before Interest, Taxes, Depreciation, and Amortization (in million euros)

Year	*2003*	*2004*	*2005*	*2006*	*2007*	*2008*	*2009*
Revenue	1,080	1,138	1,209	2,537	2,751	2,756	2,923
EBITDA	850	911	971	1,827	1,994	1,934	2,068

Source: www.Abertis.com/sectors-detail/var/lang/en/idm/663.
Note: Data from 2004 forward are from Normas Internacionales de Información Financiera (International Financial Reporting Standards).

The Unión Fenosa division of Grupo ACS has generated 15,111 GWh of electric power internationally, and their electrical distribution network has distributed 17,913 GWh of power worldwide. Unión Fenosa has a 50% interest in Unión Fenosa Gas, which is responsible for distributing 30,000 GWh of power in Spain. Unión Fenosa's construction and civil works division accounts for 57% of all construction in Spain but only 10% of activity in the international marketplace. Revenue in 2007 was €21.3 billion or US$30.8 billion; they reported net profit of €1.55 billion (US$2.25 billion) for that period. They have 144,919 employees worldwide.

ACS Dragados

Dragados USA is the most active ACS division in the United States. Company President Jose A. Lopez-Monis said the company entered the U.S. market to become familiar with the U.S. way of doing business and to find a local partner (Cho 2006). He observed that Dragados assumes a great deal of risk when working with their clients, something that U.S. firms are not always ready to do.

In 2006, Dragados was awarded a US$246 million contract to extend the New York City subway system between the Long Island network in Queens to Grand Central Station in Manhattan. This work was not their first venture in New York; they had previously won a US$141 million contract with partner Yonkers Contractors, Ltd., to rehabilitate I-287 in the northern part of the state. The subway extension project was a tough one because the subsurface conditions contained a significant amount of rock. Dragados planned to use tunnel-boring machines with a cross section of 6.70 m (22 ft) and, in the process, had to excavate 265,000 m^3 (12,759.259 $yard^3$) of rock and an additional 50,000 m^3 (65,000 $yard^3$) of rock that required blasting. The project was completed in September 2010.

On Oct. 13, 2010, a press release from ACS announced that they would include the Dragados group in a US$447 million contract awarded by the Metropolitan Transportation Authority of New York to construct an underground subway station at Second Avenue in New York City. The work will also include protection and relocation of all services. The project is expected to take 37 months.

ACS Infrastructure Development and Dragados USA have submitted two proposals to the Virginia Department of Transportation for sections of the project to connect the Washington, D.C., area's commuter rail system to Dulles International Airport. In January 2007, these companies released their estimate of US$2.39 billion to complete Phase 1 of the project, which involves an 11.5-mi (18.6-km) extension to Metrorail, including the construction of six additional stations. This estimate was $1.95 billion lower than Virginia DOT's budgeted amount. A month later, they submitted a proposal to complete the final design and construction of a proposed 3.4-mi (2.11-km) segment of Metrorail underneath Tyson's Corner for a fixed price of $823 million. The schedule proposed by ACS Dragados shortened the completion time by 6 to 12 months. However, since then, the Metrorail project bounced back and forth between the Metropolitan Washington Airports Authority and the U.S. Department of Transportation as the entities debated which one could move the project forward and whether it would be a PPP project.

The PPP aspect of the project was settled as of May 2008, when it was determined that the extension would be managed by the Virginia DOT.

ACS, in their third quarter 2010 nonaudited figures, revealed that over the past year they have reduced their gross investment in concessions from €510 million to €448 million. But they have invested €141 million in Florida's I-595 highway project, €183 million in the Eje Diagonal Highway in Barcelona, and €56 million in the Pyrenees Highway in Spain. ACS subsequently sold their stake in the Platinum Highway in South Africa—hence the reduction in concession projects—but divestiture of this highway resulted in capital gains of €57.9 million.

ACS Iridium

Iridium Concesiones de Infraestructuras, a wholly owned subsidiary, is also active in the PPP world. Iridium was one of 48 companies responding to an inquiry from the Pennsylvania Turnpike Commission regarding a potential concession of that highway. In April 2007, they submitted a proposal to finance, design, construct, commission, operate, and maintain Airport Link, a mostly underground toll road, between Windsor and Kedron in Australia's Queensland section. This ACS subsidiary currently has 40 concessions under way worldwide, half of which are highway projects.

Iridium has continued to pursue and receive concession work in Europe and North America in 2010. They completed the Port Laoise, Ireland, M7/MB toll road on May 28, 2010, four months ahead of schedule. This €367 million project includes a 30-year concession period. Also in May 2010, Iridium signed a 40-year contract to run the concession for the AVE high-speed train from Poceirao to Caia in Portugal after a project investment of €1.651 million.

They have also been selected as the preferred bidder for the 23.5-year concession of Canada's South Fraser Freeway in British Columbia. The concession agreement is worth 716 million Canadian dollars.

Ferrovial and Its Subsidiary Cintra

Ferrovial History

In 1952, Rafael del Pino founded Ferrovial to enter into a contract with Renfe, the state-owned Spanish passenger and freight railroad, to fit out sleeper cars and to replace railroad tracks. By the late 1950s, the company had embarked on construction projects and, branching out, built a hydroelectric complex on the River Sil in Páramo del Sil. In 1996, Ferrovial obtained its first toll-road concession project in Spain, the Costa del Sol toll road running between Málaga and Estepona. The following year, they did some road work on the Pan-American Highway in Chile. In the late 1990s, Ferrovial's work expanded from infrastructure projects to vertical construction, and in 1997, they built the world-famous Bilbao Guggenheim Museum, which was designed by U.S. architect Frank Gehry.

Grupo Ferrovial has more than 100,000 employees worldwide and a capitalization of €10 billion (US$14.5 billion). Eighty-nine percent of its earnings before interest, taxes, depreciation, and amortization derives from the operation of airports, toll roads, car parks, and related services. Grupo Ferrovial's financial statement showed 2007 net sales of €14.630 billion (US$21.2 billion), an 18% increase over 2006, which saw net sales of €12.355 billion (US$17.9 billion). Net income also reflected a significant €733.7 million in 2005 (US$1.06 billion) to €1.426 billion (US$2.06 billion) in 2006.

Road construction as a percentage of revenue dropped from 42% in 2006 to 36% in 2007, whereas airport operations increased from 17% in 2006 to 26% in 2007. Toll roads and car parks remained at 7% for each of these two years, and their service sector work declined slightly from 35% to 32%.

Cintra's Worldwide Operations

In 1998, Ferrovial created Cintra S.A. (Concesiones de Infraestructuras de Transporte) to bid on toll roads and manage concession-type projects, such as highways, airports, and car parks, both in Spain and elsewhere around the world. As of mid-2007, Cintra had concession-type operations in Portugal, Spain, Canada, Ireland, the Azores, Greece, Chile, and the United States. Some of its concession agreements currently in operation are the following:

- Ausol Freeway between Málaga and Guadiaro in Spain, with a value of €672.8 million (US$975 million);
- South Madrid Freeway between Madrid and Ocaña and an extension from Ocaña to La Stem, valued at €815.3 million (US$1.18 billion);
- North coast and Algarve portions in Portugal of the Euroscut Freeway, valued at €659.3 million (US$955 million); and
- Santiago–Talca Freeway, Río Bueno–Temuco Freeway, Talca–Chillán Freeway, Chillán–Collipulli Freeway, and Chillán–Temuco Freeway—all in Chile—with a total value of €1.574 billion (US$2.28 billion).

In total, Cintra has a stake in 20 toll-road concessions worldwide, including seven in Spain, one in Ireland, one in Greece, two in Portugal, and five in Chile. It is also the largest parking garage owner–operator in Spain, managing more than 250,000 parking spaces in 142 cities. As of 2007, Cintra had consolidated assets exceeding €15 billion (US$21.75 billion).

Cintra entered the North American market in 1999, when it acquired a 99-year concession to lease Toronto's Highway 407 Express Toll Route (ETR) for a payment to the government of Ontario of C$3.1 billion. Highway 407 was probably the most expensive highway in North America at that time, estimated by the Canadian government to have cost C$1.6 billion for construction and another C$100 billion for land acquisition. As part of the deal, the Cintra consortium would also finance, design, and build the west and east partial extensions to that highway.

Cintra has landed several concession-type highway projects in the United States, most notably the Chicago Skyway and adjacent Indiana Turnpike. In 2007, a consortium headed by Cintra was selected by the Texas Department of Transportation (TxDOT) as "Apparent Best Value" in a competition for the US$3.4 billion State Highway 121 project. The Texas project showed, however, how uncertain the bid process can be. North Texas Tollway Authority (NTTA), a state-authorized organization, convinced TxDOT to entertain its proposal—even though Cintra's offer had been conditionally accepted. This maneuver brought a sharp rebuke from the Federal Highway Administration, but because of disclaimers in the bid documents, NTTA was able to win the competition.

Cintra, not discouraged by their experience with the State Highway 121 project, continued its efforts in Texas. The efforts brought results in January 2009, when TxDOT awarded the North Tarrant Express project, valued at US$1 billion, to NTE Mobility Partners, in which Cintra is an equity member. The North Tarrant Express project is described in more detail in Chapter 7. Cintra's Chicago Skyway, Indiana Turnpike, and other U.S. concessions are described in Chapter 6.

The Merger of Ferrovial and Cintra

On Oct. 20, 2009, at a Ferrovial extraordinary general shareholders' meeting, stockholders approved a formal merger with Cintra, which they announced would create a larger company "which is more efficient, stronger, better diversified, and with much better access to capital markets."

The share exchange ratio in the merger was four shares of Cintra with a par value of 22 cents each for each share of Ferrovial, with a par value of one euro each. This consolidation was followed by some divestitures.

On Sept. 16, 2010, a Ferrovial press release revealed that they were selling 60% of Cintra Chile to ISA, a Colombian company, for € 229 million. Cintra Chile had operated 907 km (559 mi) of toll road before the sale. Although it had earned €112.2 million in revenue for the first six months of 2010, the earthquake that later hit the region caused extensive damage to the highway. This same press release indicated a further sale of its 50% stake in Autopista Trados in Spain and its holdings in U.K. companies Tube Lines and APP for undisclosed amounts.

In an Oct. 6, 2010, Ferrovial press release, the company announced that their Cintra subsidiary had reached an agreement to sell 10% of their stake in the 407 Express Toll Route in Toronto, Canada, to the Canadian Pension Plan Investment Board for C$894.3 million. Cintra had previously owned a 53.23% share, along with the Intoll Group (30%) and SNC-Lavalin Inc. (16.77%).

The Origins of Fomenti de Construcciones y Contratos S.S.

Fomenti de Construcciones y Contratos, S.A. (FCC), had humble beginnings. Founder Ernesto Koplowitz was Jewish and fled his native Silesia, which was a part of Germany before World War II. He relocated to Spain. Because he had poor command of the Spanish language but was fluent in German, he began to repre-

sent companies trying to regain business in postwar Europe. One such company, AEG, an electrical goods manufacturer, was created when the I.G. Farben combine was broken up. AEG became the basis for the FCC empire, which is still family controlled. Ernesto's daughter, Esther Koplowitz, is the principal shareholder of FCC and is reported to be Spain's wealthiest woman, with a reputed net worth of €2.5 billion (US$3.6 billion).

FCC, like many of its European counterparts, has several divisions and subsidiaries, such as Realia, a property management firm with almost 8 million ft^2 (743,224 m^2) in Europe; Aqualia, a water management company; and Cemusa, the second largest cement producer in Europe. FCC's construction division has completed projects in 11 Central and South American countries, Canada, Portugal, Monaco, Italy, Greece, Romania, Algeria, Morocco, and Libya. Their June 2007 financial report shows that total revenue increased from €3.96 billion (US$5.7 billion) to €6.6 billion (US$9.57 billion).

FCC's early PPP projects include the following:

- Through its Austrian subsidiary, Alpine, FCC obtained a new contract to build the southern section of the A1 toll road in Poland. The value of this work was €233 million (US$338 million). Between 1997 and 2001, Alpine obtained orders of more than €3 billion (US$2.07 billion).
- With Itinere (Sacyr Vallehermoso Group) and Irish partner PJ Hegarty, FCC entered into a 35-year concession agreement to design, build, finance, and operate the M50 Ring Road in Dublin. They were also awarded a 56-km (35-mi) toll highway near Galway.
- FCC obtained a 35-year shadow toll project in Barcelona, Spain.
- Under Great Britain's Private Finance Initiative, FCC will manage through its British WRG subsidiary the municipal waste of Wrexham in southeast Wales for 25 years. FCC also has a 25-year waste management contract with the cities of Reading, Bracknell Forest, and Wokingham, which was awarded in 2006.
- FCC obtained a 30-year concession agreement to construct and operate a 1,600-m (5,248-ft) tunnel in Veracruz, Mexico; 700 m (2,296 ft) of the tunnel is under the sea.

Global Via

In a press announcement on Jan. 31, 2007, Fomenti de Construcciones y Contratas S.A. established a 50–50 joint venture with Caja Madrid, Spain's fourth largest bank, to combine the infrastructure assets owned by the two partners. The company's initial stock was worth €250 million (US$172.25 million) and had combined holding of 35 infrastructure concesssions, basically in roads, commercial ports, marinas, and rail lines.

The new joint venture became known as Global Via Infraestructuras (GVI) and was created to become one of the world's leading infrastructure groups, concentrating on obtaining concession contracts in Europe and North America. Three years later, in 2010, Global Via ranks No. 2 in transportation developers.

The Global Via–FCC Alliance Increases Their Concession Acquisitions

The first of these projects is a contract to build an 85-km (53-mi) road between Nuevo Necaxa and Tihuatlan in Mexico, a project valued at approximately US$540 million. Global Via was the sole bidder after France-based Bouygues Construction withdrew from the competition. A 37-km (23-mi) section will operate as a toll road and—a first for Mexico—the remaining 48-km (30-mi) portion will be an availability payment project in which the Mexican government will make payments to Global Via on the basis of achieving certain project milestones. Both projects were part of a 293-km (183-mi) highway crossing the states of Puebla and Veracruz and tying into the Veracruz tunnel project. Recent projects include the following:

- On Sept. 23, 2008, Global Via purchased two toll roads in Chile, paying US$553 million. They will operate these toll roads as PPPs.
- On Oct. 27, 2008, Global Via was awarded the Auto-Estrada Transmontana concession in Portugal, a 194-km (119-mi) tolled PPP highway project worth approximately €706.5 million (US$486.78 million) with a concession period of 30 years. This is the second highway concesssion under the control of GVI in Portugal.
- GVI opened its first motorway in Ireland, the M6/M4 from Galway to Dublin, a PPP in which they have a 45% stake with a lease expiration of 2037. The total value of the project is €475 million (US$327.274 million).
- On Jan. 28, 2010, the 77-km (47.5-mi) Autopista del Sol toll road in Costa Rica was announced to be built and managed by Sacyr and FCC, an investment of US$360 million.
- On May 6, 2010, a consortium composed of GVI, FCC, Macquarie Capital Group, and local contractors announced that they will build the next section of the N11 Arklow–Rathnew dual carriageway. The road will be untolled, with payments made based on the availability mechanism during its 25-year operational period.
- In the United States, FCC subsidiary Cemusa will pay the city of New York US$1 billion spread over 20 years for the concession to build and maintain 3,300 new glass-and-aluminum-framed bus stop shelters, 330 newsstands, and 20 automatic toilets at no cost to the city. In exchange, FCC has the right to place advertisements on the installations. In December 2006, Cemusa delivered its first payment of $50 million to New York City.
- Caja Madrid, via a press announcement on June 10, 2010, had begun a process to merge with Caja Insular de Ahorros de Canarias, Caixa Laietana, Caja Segovia, Caja Rioja, and Caja de Ávila, which, if successful will create a bank with $411.6 billion in assets.

Macquarie

Lachlan Macquarie was a British army officer who became governor of the colony at New South Wales, Australia, in 1810. Macquarie changed a dreary little town of

10,000 into a bustling community of 35,000. He was instrumental in building Australia's toll-road system from Sydney to the Hawkesbury River and beyond.

The Macquarie Bank, named after this pioneering Australian, has emerged as a powerhouse in the PPP infrastructure field, building on early experience from PPPs in its home country. The Macquarie Bank could trace its strength back to a 1922 Australian law that required employers to set aside a percentage of each employee's income for retirement. As of 2007, that percentage was 9%, and the national nest egg amounted to A$591 billion (US$516.9 billion), to which approximately A$70–80 billion (US$61–69.9 billion) is added every year. Thus, the government-mandated fund created a huge lode of cash that could be tapped by Australia's banking industry.

Today, the Macquarie Group has five operating groups and three divisions, encompassing real estate structured finance, real estate investments, securities, commodities, banking, and financial services. As of March 31, 2008, the group's total assets equaled some A$167.2 billion (US$145 billion), with profit after tax attributable to ordinary equity holders of A$1.803 billion (US$2.07 billion). The return on average ordinary shareholders' funds (per year) was 23.7%.

Macquarie Investment Banking Group

The Macquarie Investment Banking Group manages a wide range of specialist funds that are linked to PPP projects:

- The Macquarie Infrastructure Group (MIG) Fund is listed on the Australian stock exchange and has investments in the Dulles Greenway in Virginia, the Chicago Skyway in Illinois, the Indiana Toll Road, and the South Bay Expressway in California. Investments outside the United States include Highway 407 in Canada, M7 in the United Kingdom, Autoroutes Paris–Rhine–Rhone motorway in France, and the M7 in Australia. The MIG investment criteria are discussed below.
- Macquarie Airports invests in airports, including Bristol and Birmingham in the United Kingdom; Brussels, Copenhagen, and Rome in continental Europe; and Sydney.
- Macquarie Korea Infrastructure Fund invests in South Korean infrastructure assets, including the Inchon Grand Bridge, Cheonan–Nonsan Expressway, and section one of the Gwangju Second Beltway.
- Macquarie Infrastructure Company (MIC) is engaged in investing airport services and energy projects in the United States.
- Macquarie International Infrastructure Fund, listed on the Singapore Stock Exchange, invests in global infrastructure assets with a focus on Asia.

The Macquarie Infrastructure Group

The Macquarie Infrastructure Group (MIG) is Macquarie's global investor in toll roads and has a worldwide portfolio (Table 3-3). MIG views toll roads as attractive investments, given that between 1996 and June 2007, MIG registered a

Table 3-3. Macquarie's Global Portfolio of Toll Roads, March 2007

Asset	*Location*	*Percent Interest*
407 ETR	Canada	30
M6 Toll	U.K.	100
Chicago Skyway	U.S.	22.5
Dulles Greenway	U.S.	50
South Bay Expressway	U.S.	50
Indiana Toll Road	U.S.	25
Tagus River Crossing	Portugal	30.6
Warnow Tunnel	Germany	70
Westlink M7	Australia	47.5[a]

Source: Reproduced with permission from www.macquarie.com/eu/infa/acrobat/global_portfolio.pdf.

[a]On Feb. 27, 2009, Macquarie Infrastructure Group issued a news release indicating that it sold its interest in Westlink M7 to the Western Sydney Roads Group for A$1 billion.

compound return of 17.8%. MIG cites the following points as reasons for its interest in toll roads:

- Being a long-term asset, toll roads allow the concessionaire to amortize the cost of the road over many years. The weighted average of MIG's remaining concessions is 61 years.
- Cash flows based on traffic growth are generally predictable. In the United Kingdom, for instance, MIG has never experienced a decline in motorway traffic since it first became involved in 1955. With more or less fixed operating costs and an established schedule of toll increases, cash flow predictions can be made with some degree of certainty.
- The legally enforceable concession agreement with a government agency sets out the rights, obligations, and responsibilities of all parties to the agreement in a stable legal environment. MIG avoids deals in countries without well-developed legal systems.
- Operating and maintenance costs on well-managed toll roads can often be less than 20% of revenue.
- MIG's competitive advantage can be sustained because new competitors face barriers that prolong entry into a new project, such as funding, community concerns, and environmental studies.
- Increasingly congested urban roads make the toll-road option more attractive because toll roads provide better service. As time goes by, initial objections to a toll road diminish accordingly.
- Long-term growth patterns attributable to increases in traffic and in toll rates make this type of investment attractive.
- Toll roads are a growing investment opportunity because there are relatively few companies with experience in mature, developed toll-road operations.

North America represents a lucrative market for the obvious reasons: economic stability, relatively prosperous population, number of vehicles owned and operated, and a highly developed road system.

Macquarie Infrastructure Group Restructuring

A letter from the chairman of MIG on Dec. 18, 2009, announced a proposal to restructure MIG into two separate Australian Stock Exchange listed toll-road groups, Intoll and MQA (Macquarie Atlas), with assets allocated accordingly. Intoll will continue to hold a 30% interest in 407 ETR in Toronto and a 25% interest in Westlink M7 in Sydney.

MQA will include a new Australian company incorporated in Bermuda. It will hold a 100% interest in the M6 toll road in Australia; a 20.4% interest in Autoroutes Paris–Rhine–Rhone; a 70% interest in the Warnow Tunnel located in Rostock, Germany; a 50% interest in the Dulles Greenway; a 25% interest in the Indiana Toll Road; a 50% interest in the South Bay Expressway (which we will see later declared bankruptcy); and a 100% interest in Transtoll, a turnpike tolling company that integrates operations and maintenance operations for toll-road owners.

In this split, Macquarie Infrastructure Group stockholders will receive 1 Intoll and 0.2 MQA securities for each MIG security held. The newspaper *The Australian* on Jan. 22, 2010, quoted Mark Johnson, chairman of Macquarie Infrastructure Investment Management, Ltd., as saying, "Intoll will contain MIG's interest in both the 407 ETR and the Westlink M7. These assets are high-quality assets, have stable capital structure, and more mature cash flows … these assets have a combined value of $3.8 billion." He went on to state that the more leveraged assets were dragging on MIG's highly prized 30% stake in 407 ETR and their 25% interest in Sydney's Westlink M7. It could be that Johnson's reference to "dragging" may have referred to some of their U.S. investments. The April 21, 2010, issue of *Tollroadnews* reported that Dulles Greenway traffic was off 6.7% during the first quarter and revenue was down 4.7%; the Chicago Skyway traffic was down 2.6%, and revenue was off 4.9%. Only the Indiana Toll Road showed positive revenue, up 7.4%, even though traffic was down 1.7%.

The restructuring of Intoll Group was completed on Feb. 3, 2010.

Sacyr Vallehermoso S.A.

Another Madrid-based infrastructure giant, a holding company comprising Itinere Infraestructuras S.A. and Sacyr S.A.U., operates internationally in the highway concession business. Fifty-year-old Sacyr currently participates in 29 highway concessions in seven countries—Brazil, Bulgaria, Chile, Costa Rica, Ireland, Portugal, and Spain—with more than US$7 billion equity invested in these projects. In August 2007, Sacyr attempted a hostile takeover of France-based Eiffage S.A., Europe's seventh largest construction and concession group, but the move was blocked by French financial regulators.

In 2007, Sacyr's consolidated group strength was €5.760 billion (US$8.35 billion), with a net profit of €946.4 million (US$1.37 billion). Sacyr's total investment

in motorway concessions as of March 31, 2007, was valued at €9.2 billion (US$13.3 billion).

The Sacyr Vallehermoso group includes the following divisions:

- Sacyr, a construction company operating in seven countries with 2007 revenues of €3.34 billion (US$4.84 billion);
- Vallehermoso, a residential development company that sold more than 4,800 housing units in 2005 and had 2007 revenues of €1.4 billion (US$2.03 billion);
- Itinere, a concessions company ranked second in highway construction in Spain with 2,262 mi (1,413 km) under contract, of which 1,706 mi (1,066 km) are in operation, and 2007 revenues of €558.1 million (US$809 million);
- Testa, a commercial development company holding property assets worth €4.7 billion (US$6.8 billion) and 2007 revenues of €263.8 million (US$382.5 million); and
- Valoriza, a services company involved in alternative energy, water, and environmental businesses with 2007 revenue of €633.1 million (US$981 million).

Sacyr's list of projects under way or recently completed includes the following:

- Messina Bridge, connecting Sicily to Italy's mainland, under way as of 2009 and worth €4.9 billion (US$7.1 billion);
- Barajas Airport Terminal 4 near Madrid, Spain, which opened in 2006 to effectively double the aircraft and passenger capacity of the airport, worth €840 million (US$1.2 billion);
- Palermo Railway in Sicily, valued at €1.1 billion (US$1.59 billion);
- Salerno–Reggio–Calabria highway in Italy, about 32 km (20 mi) long, worth €1.0 billion (US$1.45 billion);
- Madrid subway expansion, valued at €200 million (US$290 million);
- Oporto Metro in Portugal, about 74 km (46 mi), worth €1.2 billion (US$1.74 billion); and
- Lisbon subway, 4.5 km (2.8 mi), valued at €525 million (US$761 million).

In a May 13, 2010, press release from Sacyr Vallehermoso, the company announced that they sold a 49% share in two shadow toll highways in Spain, the northwest Autovia del Noroeste Concesionaria de la Comunidad Autonoma de la Región de Murcia and the Turia Motorway, to the Eiser Infrastructure Fund. They also sold Eiser two intermodal transfer facilities in Spain for a total of €46.8 million. Sacyr Vallehermoso also sold a 40% share of the Vallenar–Caldera Motorway in Chile to Fondo de las Américas for €16.7 million. Itinere would be the next company of which Sacyr Vallehermoso would divest themselves.

Itinere Infrastructuras,S.A. operates the following toll roads in Spain:

- 100% of AG55 of Autoestradas de Galicia, a 32.6-km (20-mi) toll road accepting cash, credit cards, and electronic devices (term of concession: 50 years, expires 2048);

- 100% of AG57 of Autoestradas de Galicia, a 25-km (15-mi) toll road that accepts cash, credit cards, and electronic devices (term of concession: 50 years, expires 2045);
- 100% of Atlantic-Audas, the north to south Galicia highway, a 219.6-km (135-mi) toll road that accepts cash and electronic devices (term of concession: 75 years, expires 2048);
- 100% of Aucalsa, AP 66, an 86.8-km (53-mi) toll road accepting cash and electronic devices (term of concession: 75 years, expires 2050);
- 100% of AP-1 Europistas, an 84.3-km (52-mi) toll road accepting cash and electronic devices (term of concesssion: 44 years, expires 2018); and
- 50% of Artxanda Tunnel, a 3-km (1.85-mi) tunnel connecting Bilbao to Highway AP68 (term of concession: 50 years, expires in 2048).

On Dec. 1, 2008, Sacyr Vallehermoso announced the sale of its highway operator to Citigroup for €7.88 billion . Reuters had reported in their newsletter dated March 3, 2008, that Itinere had a market capitalization of €1 billion, but at the end of 2007, they had a net debt of €4.60 billion. Its 33 road concessions provided €588 million in revenue for the Sacyr Group in 2006 and made a profit of €41.2 million.

Perhaps the sale of Itinere coincided with the Federal Election Commission's investigation of Itinere North America LLC, which culminated on Aug. 17, 2009, with a finding that Itinere North America LLC, Itinere Infrastructure LLC, and Itinere Infraestructuras S.A. had made nonfederal contributions with funds provided by their parent corporation. This announcement was made by the Federal Election Commission in their Aug. 17, 2009, news release (http://www.fec.gov/press/press2009/20090817MUR.shtml).

Fluor Corporation

Thus far, I've been examining international firms from the list of the top 15 in Table 3-2. Further down the list, several U.S. companies involved in support roles eventually appear, providing traffic studies, engineering and legal services, financial analysis, and environmental studies.

Fluor Corporation is the exception. After enactment of the Virginia Public–Private Transportation Act in 1995, Fluor formed a joint venture with Morrison Knudsen to design, finance, and construct the Pocahontas Parkway project in that state. Fluor created an IRS 63–20 nonprofit corporation to issue tax-exempt bonds to finance the $324 million project. This was a "greenfield" project that had no past history of traffic flow, but the pro forma was based on a traffic consultant's estimate. By issuing these tax-exempt bonds, Fluor effectively transferred the risk of the bondholders from the state to a private entity. And well they did, since the actual traffic revenue when the project opened in 2002 was substantially below expectations and threatened the repayment of the bonds. A future working partner of Fluor, Australia's Transurban, came to the rescue and bailed the bondholders out, as we shall see in Chapter 5.

Fluor Corporation, founded in 1912, is headquartered in Irving, Texas, but its 43,000 employees are scattered among four U.S. offices and 25 countries on six continents. Its business expertise extends to chemical and petrochemical design and construction, commercial and institutional projects, government services, health care, life sciences, microelectronics, mining, oil and gas, power, telecommunications, and transportation infrastructure. According to Tulacz (2008), Fluor was then number 2 among the top 400 contractors, following only Bechtel. Fluor's 2007 revenue totaled $13.332 billion, split between $7.94 billion in international contracts and $5.39 billion in domestic contracts, with new contracts of $22.59 billion.

Gary L. Groat, director of project development-infrastructure for Fluor, says that Fluor's great strength is creativity, rather than what he called "taking a box off the shelf." In other words, Fluor doesn't respond to RFPs or structured projects proposed by, in the case of infrastructure, public agencies. Instead, Fluor looks for potential projects, does the research, and approaches the owner with a proposal (personal communication, December 2007). For example, Fluor has submitted a number of unsolicited proposals to public agencies, the latest of which was a project involving the Capital Beltway, which connects Maryland, the District of Columbia, and Virginia, with its related components, Interstates 95, 495, and 395.

According to Groat, this unsolicited proposal piqued the interest of the Virginia Department of Transportation (VDOT), which had been wrestling with the issue of congestion on the major interstates around the nation's capital. Fluor's proposal was an eye-opener in several ways. VDOT envisioned a highway program that would cost about $3–$4 billion, stretched out over many years because of fiscal-year funding restrictions, and that would require the relocation of about 300 homes and many businesses. The Fluor proposal created an asset that would not only reduce the relocation numbers from 300 to about 8, but would also produce a future revenue stream for VDOT in the form of HOT lane income. Fluor was given a contract in December 2007, and work began in 2009.

Among other Fluor transportation projects are the following:

- San Francisco–Oakland Bay Bridge, a $41.4 billion, 549-m (1,800-ft) self-anchored suspension bridge with two parallel five-lane steel decks (completion scheduled for 2013);
- a 19-km (12-mi) limited-access highway with six interchanges and 28 bridges valued at $238 million for the Minnesota Department of Transportation (completed in 2008);
- State Highway 130 in Texas, a 78-km (49-mi) toll road with 124 structures and five major interchanges, valued at $1.1 billion (fourth segment completed in 2007). (On March 22, 2007, SH 130 Concession LLC (Cintra-Zachry) was awarded the extension to SH 130, segments 5 and 6 of which are now under construction and due for completion in 2012);
- a high-speed rail line with four tunnels, a 3-km (1.9-mi) bridge, and five major interchange connections for the Netherlands, valued at $1.5 billion (completed in 2006);

- a design–build 13.6-km (8.5-mi) commuter rail line for Los Angeles at a cost of $420 million (now completed);
- a finance–design–build–operate–maintain contract with the United Kingdom Highways Agency to upgrade core intelligent transportation systems supporting 4,000 km (2,500 mi) of motorways and major trunk lines (with a completion date of 2015); and
- the World Trade Center Transportation Hub in New York City to provide a new terminal for 250,000 commuter passengers and ground-level transit daily users, valued at $1.1 billion (scheduled for completion in 2010). The World Trade Center Transportation Hub's schedule and costs continue to increase. The Port Authority, on their website (accessed on Dec. 9, 2010), estimated the target completion date as the fourth quarter of 2013. Its probable completion date is the second quarter of 2014. The cost may be US$3.2 billion.

Toll-Road Operators

Among toll-road operators, three firms stand out: Autostrade per l'Italia of Italy; Cofiroute of France; and Transurban of Australia. Next is a brief profile of each of these three operators.

Autostrade per l'Italia

Autostrade per l'Italia, the largest toll-road operator in Italy and one of the largest in the world, was founded in 1956 and is represented in the United States by its subsidiary Autostrade International of Virginia O&M Inc., which has the contract for the Dulles Greenway.

Autostrade's interest in foreign expansion includes designing, implementing, and managing large-scale toll transport systems; participating in tenders for concessions of brownfield toll projects; and acquiring controlling interests in companies working in the toll-road sector. Their motorway concessions in Europe include the following:

- Aosta to Mont Blanc tunnel, 32.4 km (20 mi);
- managing the Italian side of the Mont Blanc tunnel, 5.8 km (3.6 mi);
- Turin to Savona Spa on the Ligurian coast, 130.9 km (81.8 mi);
- Livorno–Civitavecchia motorway, 240 km (150 mi);
- the Naples orbital road, 20.2 km (12.6 mi);
- Naples–Pompei–Salerno motorway, 51.6 km (32.3 mi); and
- Rome–L'Aquila–Torano and Torano–Pescara motorways.

The company has a 56% interest in a Polish firm engaged in the distribution of steel and toll-road construction and management; this firm holds the concession agreement for the 61-km (38-mi) Krakow–Katowic motorway. Autostrade plans to use this foothold to expand their presence in Poland's construction of new motorways and the management of existing ones. In Chile,

Autostrade operates the 43-km (26.8-mi) Costanera Norte, a toll road crossing the capital, Santiago.

Cofiroute

In France, Cofiroute operates 60 toll plazas and more than 500 toll lanes. The company was awarded a 70-year concession agreement to design, finance, construct, and operate two underground tunnels in an urban area outside of Paris. The project is 100% privately financed, and repayment to the concessionaire is via tolls collected from tunnel users. Cofiroute has also developed an innovative intelligent transportation system using Bluetooth technology and an inter-vehicle hazard warning system that allows vehicle-to-vehicle communication. In addition, Cofiroute has substantial financial backing from its association with VINCI Construction, a French conglomerate that has interests in concessions, energy, and, of course, construction. VINCI reported first-quarter 2007 revenue at €6.1 billion (US$8.84 billion).

In the United Kingdom, Cofiroute has contracts for toll collection and traffic management at the busiest toll crossing in Europe: Dartford Crossing, which consists of two tunnels and the Queen Elizabeth II Bridge. Each day, 190,000 vehicles cross to the London-bound M25 at this point. In Germany, Cofiroute joined with other members of a consortium to finance, develop, and operate a US$7.5 billion global positioning system for tolling commercial traffic on that country's highways. In the United States, Cofiroute USA operates 91 express lanes in Orange County, California, and the MnPASS I-394 HOT lane operations in Minneapolis, Minn.

Transurban

The Transurban Group is a major participant in Australia's toll-road program, and with its subsidiaries is focusing more attention on the U.S. market. As of August 2007, Transurban's annual revenue was posted at A$573.2 million (US$504.4 million) and its earnings before interest, tax, depreciation, and amortization increased a healthy 38% from A$286.1 million (US$251.7 million) in 2006 to A$394.6 million (US$343.3 million) in 2007. However, Transurban reported a A$99.2 million (US$87.1 million) loss for 2007, as compared to a A$109 million (US$95.94 million) loss for the previous corresponding period and attributed most of the loss to depreciation and amortization, both normal for a company with significant investment in infrastructure assets that incurred disproportionately high depreciation charges in the early years of operation.

In Australia, Transurban has an ownership stake in six toll roads:

- CityLink in Melbourne, a 22-km (13.75-mi) toll road linking manufacturing, the business district, port, and airport. Traffic was up 3.1%; revenue increased 8.8% to A$331.5 million (US$291.9 million).
- M1, a 6-km (4-mi) link in Sydney's orbital road network that has traffic up 2.8% and revenue up 5.7% to A$69.9 million (US$61.5 million). Transurban has a 71.35% stake in this roadway.

- Hills M2, a 21-km (13-mi) four-lane highway linking the lower north shore and northwest regions of Sydney. Traffic was up 7.5% and revenue increased 16.9% to A$112 million (US$98.6 million).
- M4 Western Motorway, a 40-km (25-mi) expressway in western Sydney with 19 major interchanges. Traffic was up 2.3%; revenue was also up 2.3%, to A$85.5 million (US$75.3 million). Transurban has a 50% stake in this motorway.
- M5 South West Motorway, connecting Sydney to the suburbs and to F5, M5 East Freeway, and Westlink M7. Traffic increased 2.7%; revenue was up 15% to A$148.8 million (US$131 million). Transurban has a 50% interest in this highway.
- Westlink M7, Sydney's first distance-based toll road, 40 km (25 mi) joining M2, M4, and M5. Traffic increased 16.8%; and revenue was up 20.7% to A$129.5 million (US$114 million).

In the United States, Transurban, teaming up with the Fluor Corporation, has the Pocahontas Parkway toll-road concession in Virginia and was granted a federal government loan that allowed them to commence construction in 2008 of Virginia's Route 895 Richmond Airport Connector (expected completion date of early 2011). As of the fourth quarter of 2010, a series of lane closings have been taking place as the four-lane highway over Sprouse Road and the bridge over the CSX tracks south of Charles City Road are being constructed. Completion of the project is scheduled for March 2011. Teaming up with Fluor, Transurban proceeded, as of early 2009, on a major project in the metropolitan District of Columbia–Northern Virginia area to create HOV and HOT lanes (optional tolled lanes) in the I-95/395 and Capital Beltway corridor.

In 2007, Transurban gathered together investors to create DRIVe (Direct Road Investment Vehicle) to bid for new toll-road assets in the United States. With a goal of committing US$2.86 billion to that purpose and a 75% stake in the venture, they plan to continue to seek subscriptions from other U.S. investors as well as from the United Kingdom and Europe. In the meantime, they have transferred their US$236 million interest in their Pocahontas Parkway project to DRIVe, and when the Capital Beltway project comes to fruition, this project will also end up in the DRIVe portfolio.

The company has an investment in Roam, a company experienced in electronic tolling systems. Roam produces devices allowing motorists to use electronic tolling lanes and several payment options. For commercial operators, they provide business accounts for fleets with five or more vehicles.

The Investors: Infrastructure Funds

With the vast interstate highway system, the huge number of passenger and truck miles, and relatively high wealth, the United States is a potentially lucrative market for investors seeking above-average returns emanating from a stable market. Foreign countries have long invested in U.S. Treasury notes, and foreign investment

houses have recognized the relative stability of the U.S. economy, notwithstanding the subprime mortgage meltdown in 2007–2009.

Baeb and Baer (2006) wrote an article on the role of investment banks and their advisers and infrastructure fund operators. They reported that infrastructure represents an entirely new range of fees for investment banks. They pointed out that, at that time, 13 states were looking to hire private companies to build and operate toll roads that have, in total, a value of about US$34.5 billion. This fact means that at least US$175 million in fees would be up for grabs, based on rates charged by financial advisers on other completed toll roads.

Goldman Sachs, they noted, earned US$20 million in fees on the US$3.8 billion Indiana Toll Road concession and received US$12 million for its involvement in the US$1.83 billion Chicago Skyway deal.

Macquarie's Murray Bleach, head of their infrastructure banking division in North America, projected that an additional US$50 billion in new U.S. toll-road project concessions would be consummated in the next several years.

Norman Mineta, in his last speech before leaving office as Secretary of the U.S. Department of Transportation, said that almost every major financial infrastructure institution on Wall Street had created or is in the process of creating an infrastructure fund with transportation as a major component. He took this as a sign that Wall Street recognized the enormous potential in infrastructure investment.

A five-member committee in Harris County, Texas, was taken aback when the members learned how much money was at stake. The committee cut short a meeting with 10 banks that had assembled to make presentations offering financial advice regarding an impending Houston toll-road project. The US$13 billion project would have netted the successful candidate about US$65 million in advisory fees. The Harris County committee decided to keep control of this project, but thanked the bankers for telling them how much that deal was really worth.

In short, opportunities abound for banks, private equity infrastructure investment funds, insurance companies, and private pension fund operators, and some are taking steps to cash in. The *New York Times'* Dealbook (2008) reported on May 16 that Kohlberg Kravis Roberts, a leveraged buyout firm, announced that it was creating a new fund to invest in infrastructure. Henry Kravis and George Roberts were quoted as saying, "Infrastructure is a multi-trillion dollar global marketplace with enormous need for private investment. KKR recognizes the important role infrastructure investing plays in the growth of both developed and developing economies." Other financial firms looking to infrastructure investing include Credit Suisse, which recently hired Mineta as a senior adviser, and Morgan Stanley, which closed a $4 billion infrastructure fund after it captured almost twice as much money as initially planned.

Here is a rundown of some of the major players on the financial side of a PPP.

Babcock & Brown

Founded in 1977, the Australian firm Babcock & Brown (B&B) has offices across Australia, as well as in North America, Europe, Asia, and the Middle East. With

1,000 employees worldwide, Babcock & Brown has five operating divisions: real estate, infrastructure and project finance, operating leasing, structured finance, and corporate finance.

The company's involvement in infrastructure began in the 1980s when it became the adviser and arranger of project financing in Australia, and this interest became more intense when it began to take on principal investment positions in Great Britain's Project Finance Initiative program. In 1997, Babcock & Brown's Infrastructure and Project Finance Division expanded into the growing infrastructure climate in Australia, and it acquired a Commonwealth-owned investment bank with substantial holdings in those kinds of projects. The company has become involved in power generation and transmission, marine ports, and other types of transportation projects. It recently took on the role of developer after being awarded the right to develop between 30,000 and 100,000 m^2 (323,550 to 1,078,500 ft^2) of high-quality office space in Wales.

In August 2007, Babcock & Brown announced that it had reached a second closing on its European Infrastructure Fund, a private equity offering. Total commitments to the fund were then €1.627 billion (US$2.36 billion), which was an increase of €250 million (US$362 million) from May of that same year.

The London *Financial Times*, however, painted a somewhat different picture of Babcock & Brown Infrastructure (BBI) in a May 6, 2008, article. Jeff Kendrew, CEO of BBI, was quoted as saying that the company was going to prioritize organic growth from its assets and sales of noncore assets to reduce debt. This explanation sounded to the financial community like the company was pulling back its horns, particularly after Moody put the company's debt on a negative watch a few days before that article was written. This event appears to be another outcome of the 2007–2009 worldwide financial crisis affecting highly leveraged, aggressive growth funds. Kendrew was quick to state that B&B was not in a "fire sale" mode.

Barclay's Bank

Barclay's Bank was one of the first institutions to invest in private infrastructure projects when the United Kingdom initiated its Private Finance Initiative and Public Private Partnership Programme in the early 1990s. In partnership with French bank Société Générale, Barclay's established the Infrastructure Investors Fund with a capital outlay of £450 million in 2005 (US$882 million in 2008 conversion rates). More than 60 investments have been made through Barclay's U.K. infrastructure fund and the Barclay's European Infrastructure Fund. Société Générale had some rather embarrassing publicity in January 2008, when it was discovered that a rogue middle manager lost US$7.2 billion in bank funds via bogus transactions, and the bank was seeking a capital infusion to replace those losses.

Goldman Sachs

Goldman Sachs established its first infrastructure fund in December 2006, when it announced the formation of GS Infrastructure Partners Fund, a private equity

deal funded with about $6.5 billion in committed capital. Goldman Sachs was leveraging its experience on the Chicago Skyway and Indiana Toll Road projects to expand its municipal finance group to include infrastructure. The then-newly named head of this group, Tracy Wolstencroft, addressed some underwriters and dealers shortly after the fund was formed and assured them that the core underwriting of the municipal group would continue. But Wolstencroft also expressed a desire to work with clients to solve other issues that might involve using structured products, derivatives, and public-to-private partnerships. These arcane financial instruments later proved to be the undoing of many Wall Street firms.

A handful of other U.S. banks and private equity funds are joining the PPP arena:

- J.P. Morgan formed its Infrastructure Investments Group in 2006 and between 2007 and 2008 placed investments in two U.K. utility companies; gas-fired power generation plants in California, Colorado, Nevada, and New Mexico; and a natural gas distribution company in Missouri.
- Citigroup started Citi Infrastructure Investors, headed by Juan Bejar, the former head of infrastructure at Spain's Ferrovial. Citi commenced building a $3 billion fund in 2007, using $500 million of its own capital.
- The Carlyle Group, a global private investment fund based in Washington, D.C., formed a $685 million renewable energy infrastructure fund.
- GE and Credit Suisse announced in June 2007 that they intended to establish a $1 billion joint venture, Global Infrastructure Partners, to invest in infrastructure.
- As of mid-2008, Morgan Stanley had raised $5.64 billion and established their infrastructure fund in February 2007. By mid-2008, Morgan Stanley Infrastructure Partners had raised $4 billion, $1.5 million more than it had targeted.

Australian Investment Firms

Other Australian investment firms have also sprouted down under. Challenger Infrastructure Fund, listed on the Australian Stock Exchange, is one of the country's largest nonbank mortgage lenders, with a total book of A$21.6 billion (US$18.89 billion), and its Asset Management Division, with A$5.3 billion (US$4.6 billion) under management that has strong expertise in infrastructure and property management. ANZ Infrastructure Services, with offices in Sydney, Melbourne, and Brisbane, provides analysis, structuring, financing, and ongoing management of PPP infrastructure projects. Hastings Funds Management is one of Australia's leading diversified transport infrastructure funds.

India Funds

In India, where the government has shown a determination to push for infrastructure spending, five infrastructure funds have been created since 2006: DSP Merrill Lynch India TIGER Fund, Prudential ICICI Infrastructure Fund, Tata Infrastruc-

ture Fund (Tata is also the automobile manufacturer that announced the production of a $2,500 family car in 2008), UTI Thematic Infrastructure Fund, and the Sundaram BNP Paribas Capex Opportunities Fund.

The Underlying Support for Infrastructure Funds

Economic growth and changing demographics worldwide provide the impetus behind the growth of the infrastructure funds listed above.

- As of January 2008, the world's population was 6.7 billion and is projected to grow to 7.8 billion by 2018 and to 9 billion by 2028.
- The worldwide infrastructure and housing required to provide this growing population with basic needs is estimated at between $8 trillion and $30 trillion by the Collaboratory for Research on Global Projects at Stanford University in California.
- The long-term life cycle of infrastructure projects lends itself to the length of investment periods, making it attractive to investors and fund managers.
- More countries are enacting legislation allowing foreign companies to own segments of their infrastructure. In the United States, these sovereign wealth funds are looked at askance when key infrastructure projects are targeted.
- As this type of investment vehicle becomes more mature, more sophisticated models will emerge and enlarge the market for these types of funds.

More Investors: Pension Funds

An Inter-American Development Bank study by Senior Deputy Manager Antonio Vives in 2000 examined Latin American and Caribbean pension fund investments in infrastructure projects. The bank reported that US$18.771 billion was invested in transportation projects between 1990 and 1997. Vives listed the benefits that could accrue from pension fund investments:

- Foreign exchange risk exposure is reduced because the projects generate local currency revenue.
- Financing and refinancing risks are reduced because pension funds are more long-term-oriented than conventional funding sources.
- The cost of capital is reduced because these funding sources are less expensive on a risk-adjusted basis.

With trillions of dollars being held by public and private pension funds, will these funds become one of the big players in tomorrow's infrastructure investors? On March 25, 2008, Texas Senate Finance Committee Chairman Steve Ogden was quoted on statesman.com website as saying that Texas ought to consider creating a public–private partnership to invest in the state's roads by tapping the resources of Texas's major pension funds. Ogden added that the Texas teacher

and state employee retirement funds oversee $130 billion in assets. Why not invest some of this money in infrastructure projects? he asked. Doing so could also free up some state highway money for other projects.

Pension fund investments are acutely sensitive to interest rates, and when those rates fall, the cost of benefits rises because more dollars are required to produce the revenue needed to pay recipients. Toll-road investments may provide a leveling effect on some pension fund investments because the term of the concession is rather long. Retirement funds in California, Texas, and Virginia are investigating investments in local toll-road concession projects, and other states are sure to join the party.

However, pension funds must carefully weigh their fiduciary responsibilities against expected returns because of the possibility of lawsuits from unhappy pensioners if these investments turn sour.

California Pension Fund Looks to Infrastructure

California has always been a trendsetter, and now the state is investigating whether pension funds should invest in infrastructure projects. In April 2006, Phil Angelides, California State Treasurer, announced Cal-Build: Smart Pension Investments for California's Infrastructure. Cal-Build proposes to invest up to $15 billion in the state's infrastructure projects. Angelides called for the California Public Employees' Retirement System (CalPERS) and the California State Teachers' Retirement System (CalSTRS) to invest up to 5% of their assets in state infrastructure projects.

This discussion was ongoing as of the summer of 2008. Alice Scott, the public affairs director of current California Treasurer Bill Lockyer's office, stated by e-mail on June 18, 2008, that this policy, formerly known as Cal-Build, is now known as CalPERS Infrastructure policy.

On June 5, 2008, *Pensions & Investments* (an online newspaper: www.pionline.com) carried an article on how CalSTRS' investment committee approved an investment in infrastructure of $1 billion from the $31 billion fixed-income portfolio. The first reading of the infrastructure policy took place on April 21, 2008, and a final vote by the full board was expected sometime in August 2008. CalSTRS' investment portfolio for the period ending Sept. 30, 2010, is shown in Table 3-4.

They listed projects that were deemed to have low risk, medium risk, and high risk:

- Low risk: existing toll roads and bridges; regulated water, wastewater, gas, and electric facilities; hospitals; and prisons.
- Medium risk: airports; seaports; industrial water and wastewater treatment plants; contracted independent power generating plants; and gas pipeline and storage facilities.
- High risk: greenfield project development; communication broadcasting, both satellite and cable; and merchant power plants.

Table 3-4. CalSTRS Investment Portfolio for the Period Ending September 30, 2010

Assets	*Worth in Millions of Dollars*	*Percent of the Portfolio*
Global equity	74,198	53.5
Fixed income	28,057	20.2
Real estate	13,816	10.0
Private equity	19,931	14.4
Absolute return + alpha	1,597	1.2
Total investment assets	137,599	99.3

Source: www.calstrs.com/investments/invport.asp.
Note: Absolute return is gain or loss expressed as a percentage of invested capital; relative return is return the assets achieve over a period of time compared to a benchmark.

SEIU Expresses Interest in an Infrastructure Fund

In February 2008, the Service Employees International Union (SEIU) floated a proposal to form an investment pool funded by state retirement systems. With $2 trillion in assets, the SEIU, the second largest union in the country, is looking to invest some of this money in roads and airports, in part, to keep these projects away from private equity groups and sovereign wealth funds.

Public Sector Pension Funds Come Under Scrutiny

With union pension funds looking to infrastructure investments, will other labor organizations follow suit? In theory, infrastructure investments offer improved returns and assist in the creation of jobs that may benefit their members. Although there is interest in many states in using pension funds for infrastructure investing, the state pension funds themselves have come under scrutiny because they may be underfunded. The amount of income needed to provide for future benefits in public-sector pension funds is based on actuarial assumptions.

A May 21, 2008, article in the *New York Times* quoted Jeremy Gold, a New York actuary, as saying that he believed actuaries routinely underestimate the cost to provide government pensions by as much as a third. These actuaries may be basing their assumptions on overly aggressive investing and overly rich benefits. The article refers to a Fort Worth, Texas, pension fund with a $10 million deficit that appeared to have been caused by the actuary's assumption that the fund would earn 10.23% per year on its investments.

In San Diego, numbers produced by an actuarial firm were found to be so misleading that the U.S. Securities and Exchange Commission accused the city of security fraud. The commission settled after the actuarial firm was sued and settled the case with the city.

Undoubtedly, pension funds, banks, and investment houses will take a closer look at their fiduciary responsibilities as public opinion rails against irresponsible allocation of private and public funds. As the 2008–2009 world financial crisis

plays out, some players will survive and prosper, and it is almost certain that some will disappear.

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CHAPTER 4

The Federal Role in PPPs

In the last chapter, you read about players on the private side of public–private partnerships who represented development and finance. In subsequent chapters, you will learn how different U.S. state governments have implemented PPPs for transportation infrastructure. This chapter, however, focuses on the contributions made by the federal government to research, enable, and eventually help to finance PPPs proposed by the states. The first part of this chapter touches on a brief history of toll roads and financing efforts. The next section presents an assessment of highways in the 21st century, which leads to a series of reports from the federal government about highway needs. Key features of major pieces of enabling legislation and federal funding programs are also reviewed, followed by a selection of innovative approaches toward relieving congestion.

Early American Roadways

In 1654, the Common Road represented the extent of Colonial America's nascent highway system, connecting Boston, Massachusetts, to Providence, Rhode Island. Water travel was widely used in those days because the early colonies were established near navigable rivers, estuaries, or the Atlantic Ocean. But as commerce among colonies grew, so did the need for overland highway systems, and so the Common Road was later extended to New York City and became known as the Shore Road. Even later, the Common Road became part of U.S. Route 1, and the New York to Boston portion was referred to as the Boston Post Road. The Boston Post Road still meanders through New England but now acts more as a background for local shopping areas and automobile dealers than a quick way to get from one place to another.

As time went on, fishing, whaling, lumber, and small manufacturing businesses began to flourish. Back in 1643, a capital infusion of £1,000 sterling established the first successful ironworks in Lynn, Massachusetts. America would need highways to transport men and materials to the factories and to deliver finished goods to consumers. These highways would also function as a communications conduit—postal service between Boston and New York began in 1672, and newspapers appeared in 1704 with the publication of the *Boston News-Letter*.

America's First Toll Road

Daniel Klein dates America's first toll road to 1794, when the Philadelphia to Lancaster roadway in Pennsylvania opened for business. The first toll bridge was the Charles River Bridge in Massachusetts, which opened to traffic in 1786 and was hailed by a newspaper of the time as "the greatest effect of private enterprise in the United States" (Klein 1990, 794). The early toll roads were not especially successful as business ventures, but investors in toll bridges were rewarded with a 10.5% return on their investment for the first six years of operation. One reason that toll bridges seemed to have an edge was that it could have been relatively easy to circumvent a portion of a road with a toll station, but it was more difficult to find an alternate route over a river or stream. The indirect or direct benefits from toll roads were certainly not lost on early America's businessmen and politicians. Henry Clay had this to say:

> I think it very possible that the capitalist who should invest his money in these objects (referring to toll roads) might not be reimbursed three percent annually upon it; yet society in various forms, might actually reap fifteen or twenty percent. The benefit resulting from a turnpike road made by private association is divided between the capitalist, who received his toll, the land through which it passes and which is augmented by its value, and the commodities whose value is enhanced by the diminished expense of transportation (Durrenberger 1931, 125).

Except for the return on investment figures, Clay's remarks ring true even to today.

As colonial America's road system increased, the need for maps to inform travelers and commercial traffic about these newly developed networks became evident. Christopher Colles, an Irish-born engineer and surveyor, is credited with producing the first road map in this country. By 1792, he had compiled an atlas covering about 1,000 mi (1,600 km) of roads extending from Albany, New York, to Williamsburg, Virginia. This atlas paints a virtual blueprint of the young nation's developing highway system. Colles' map collection can be viewed at the Library of Congress in Washington, D.C.

America's First National Road

In 1806, President Thomas Jefferson signed an act establishing the National Road, which was intended to open up a trans-Appalachian highway. The National Road was to connect Cumberland, Maryland, with Wheeling, West Virginia. We know this road today by another name: U.S. Route 40.

In 1811, the first 10 mi (16 km) of the National Road was complete, and by 1816 mail coaches began using the highway. In the 1830s, the federal government conveyed authority to the states to built tollhouses, even though the federal government retained responsibility for road repairs.

With the advent of railroad expansion in the 1860s, the importance of the National Road faded. In 1926, the route revived when U.S. 40 became an inte-

gral part of the coast-to-coast highway system. Today, travelers along this route can still visit the historic bridges that were part of the National Highway. One of these is the S Bridge, a single-span stone arch structure built in 1828 about 4 mi (6.4 km) east of Old Washington, Ohio. Another is the Casselman River Bridge, spanning the Ohio River at Cumberland, Maryland. This 80-ft (24.4-m) bridge was the largest single-span stone arch bridge in the country when it was built in 1814.

The construction of Interstate 70 during the 1960s bypassed the National Highway/U.S. 40, until congestion on I-70 led to the upgrading of U.S. 40 to Interstate 68. U.S. 40 has been revived; it traverses the country east to west, at times paralleling several interstates. Its western terminus is at I-80 outside Park City, Utah, and its eastern terminus is Atlantic City, New Jersey.

Early 20th-Century Developments

The Changing Roadbed: Horse-Drawn Carriages to 18 Wheelers

With the industrial revolution of 1820–1870, the transportation of raw materials, equipment, and finished goods in America required a better transportation system. Commerce-miring mud roads could no longer be tolerated. A Scotsman, John Loudon McAdam (1756–1836) designed a modern highway using soil and aggregate (macadam). The base course of the roadway was 7.8 in. (200 mm) thick, consisting of stones no larger than 2.9 in. (75 mm). The upper stratum was 1.9 in. (50 mm) thick, and stone size was limited to 0.787 in. (20 mm). He also elevated the roadbed a few feet higher than the adjacent terrain to provide drainage away from the road.

Another engineer, Richard Edgeworth (1744–1817) improved this basic macadam system by filling the gaps between the surface stones with stone dust and water, a system referred to as water-bound macadam.

With the advent of motor vehicles, dust became a problem as it obscured vision and gradually caused the erosion of the road surface. A mixture of coal tar and ironworks slag was invented and patented by a British engineer named Edgar Purnell Hooley (1860–1942). Hooley formed Tarmac Public Limited Company and created this material, which could be applied to "macadam" to create tar-bound macadam, or tarmac. This material caused the next evolution in road construction.

The first bituminous mixtures produced in the United States were used for sidewalks as well as roadways, the first being a sand mix laid in front of City Hall in Newark, New Jersey, in 1870 by Edmund J. DeSmedt, according to the National Asphalt Pavement Association. The material used was a natural asphalt obtained from one of two sources: Lake Trinidad and Bermudez Lake, both in Venezuela. The development of refined petroleum-based asphalt by 1907 caused the demise of the natural product.

According to the Portland Cement Association, the first concrete highway built in the United States was a 24-mi (38.6-km) long, 9-ft (2.7-m) wide by 5-in. (12.7-cm) thick pavement near Pine Bluff, Arkansas, in 1913.

The construction of the interstate highway system, beginning in 1956, established the 12-ft (3.65-m) wide lane, a maximum 4% grade, and full access control.

More recently, fast-track concrete pavement technology, using mixtures of various types of Portland cement, the retrofitting of dowels, and the refitting of existing undowelled joints, are part of the new technologies, including Superpave (developed in 1993), that continue to improve the quality and life cycle of our highway system.

America's First Federal Highway Program

The Office of Public Roads was created in 1905, consolidating the Division of Tests of the Bureau of Chemistry and the Office of Public Roads Inquiries of the U.S. Department of Agriculture into one agency. The Agriculture Appropriation Acts of 1912 and 1913 included provisions for funding this agency, and by the end of 1916, a federal highway construction program was well under way.

The Federal-Aid Road Act of 1918 recognized the need for a federal highway engineering organization and established 10 districts, each one responsible for the construction of rural roads within its district in cooperation with the federal government. To celebrate the 200th anniversary of the birth of George Washington, in 1928, the Bureau of Public Roads designed and built the Mount Vernon Memorial Highway in Virginia along the Potomac River. This road represented a new concept in highway design because it followed the natural contours of the land and was beautifully landscaped. Today, this road is part of the George Washington Memorial Parkway, still one of the most beautiful and scenic in the nation's capital.

The Agriculture Appropriation Act of 1919 changed the name of the federal highway agency to the Bureau of Public Roads, which it retained until July 1939, when in the depths of the Depression, it became the Public Roads Administration of the Federal Works Administration.

During World War II, highway construction in the national parks and forests was suspended, and federal construction employees were reassigned to defense projects, such as building the Alcan (Alaska–Canada) Highway, the Inter-American Highway, the Pentagon road network, and access roads to military bases and installations. The U.S. Department of Transportation was established in 1967, at which point the Bureau of Public Roads became part of the Federal Highway Administration.

Just as the initial phase of highway expansion led to the availability of road maps, this second phase precipitated a need for a consistent naming system. In 1925, the American Association of State Highway Officials (which had been established in 1914) began to plan a naming system for the federal highway system that would replace names with numbers. Major east–west roadways would be numbered in multiples of 10, whereas north–south highways would be numbered in odd numbers, ending in 1 or 5. Under the new system, the Lincoln Highway (the first coast-to-coast highway) was broken into various segments: U.S. Routes 1, 30, 40, 50, and 530. (In 1973, the organization changed its name to the American

Association of State Highway and Transportation Officials, or AASHTO, which is how it is known today.)

Evolution of the Gasoline Tax

President Herbert Hoover, a successful engineer before entering politics, served his country during trying times; in October 1929, the stock market collapsed and pulled the nation's economy down with it. During the depression that followed, the U.S. government spent more than $2 million per day more than it was taking in. Hoover tried to address the deficit with the help of Ogden Mills, who served first as an undersecretary of the Treasury and later as secretary of the Treasury. Hoover and Mills proposed a series of new taxes and sources of revenue to Congress, and subsequently the House and Senate approved the Revenue Act of 1932. The act included an amendment placing a 1-cent-per-gallon tax on gasoline and fuel oil, which was expected to generate about $150 million annually of new revenue.

The gas tax was set to expire at the end of June 1933. Although the American Automobile Association and the American Petroleum Institute opposed extending the tax, Congress "temporarily" extended it and increased it to 1.5 cents per gallon. The Revenue Act of 1934 rescinded the half-cent increase and set the stage for political considerations to influence future plans to raise gasoline taxes.

During the Korean War, the Revenue Act of 1951 increased the gasoline tax to 2 cents per gallon, but the increase was repealed in 1954. In 1956, the tax was increased to 3 cents per gallon, with revenue being credited to the new Highway Trust Fund. In 1959, Congress increased the tax to 4 cents on a temporary basis. The Surface Transportation Assistance Act of 1982 raised the tax to 9 cents. The Omnibus Budget Reconciliation Act of 1993 raised the tax to 18.4 cents per gallon, which is where it remains today.

The gas tax is one of several sources of revenue for the Highway Trust Fund. Other highway-user taxes include 18.4 cents-per-gallon taxes on gasohol, 24.4 cents-per-gallon taxes on diesel fuel, and taxes on tires, truck and trailer sales, and heavy-vehicle use. (Detailed information can be obtained at http://www.fhwa.dot.gov/infrastructure/gastax.cfm.)

Highways in the 21st Century

Roads, highways, bridges, and tunnels are the backbone of the U.S. transportation system. With traffic congestion and maintenance requirements both on the rise, the U.S. Department of Transportation estimates that the backlog of unfunded but necessary highway and bridge repairs and improvements will cost $461 billion; other analysts peg the costs much higher.

The costs of not repairing U.S. highway infrastructure are varied and just as significant; these costs range from economic (road congestion and trip times) to

environmental (reducing dependency on fossil fuels) to humanitarian (accident and stress relief). As one study reveals, the costs mount up:

- The average urban motorist in the United States is paying about $413 per year in additional vehicle operating costs because of poor road conditions.
- Motor vehicle crashes cost this country $160 billion per year in medical costs, lost productivity, insurance, and legal fees.
- If $1 billion in federal highway spending were combined with $250 million in state funding, the combined investment would support 34,779 jobs.
- Over a five-year period from November 2003 to November 2008, the average cost of material for highway and bridge construction increased by 55% (although a significant portion could have been attributed to the spike in fuel and asphalt-related products).
- The Texas Transportation Institute reported that the cost of highway congestion in lost time and wasted fuel was $78 billion annually.
- The U.S. Department of Transportation estimated that every dollar invested in the nation's highway system yields $5.69 in economic benefits in reduced delays, improved safety, reduced emissions, lower vehicle operating costs, and reduced maintenance costs.
- The freight tonnage moved in the United States is forecast to nearly double between 2005 and 2035, with trucks handling 84% of that growth.
- In a 2008 survey, AASHTO found that state transportation departments had 5,280 highway and bridge projects worth $64 billion ready to go within 180 days of approval of funding (TRIP 2009).

Several trends in transportation needs and use are also emerging that add to the urgency of repairing and upgrading the system: the changing mix of vehicles, changes in personal travel, and an increase in the number of elderly drivers. Each of these is discussed next.

The Changing Mix of Vehicles

We know that types and weights of vehicles, as well as their age and fuel efficiency, are important factors in highway design and maintenance, so it's useful to examine what kinds of vehicles are on the road, how old they are, and what sort of fuel efficiency they have. Table 4-1 offers a snapshot of the mix of vehicles on U.S. highways in 1995, 2000, and 2005. During this time, passenger cars as a percentage of all vehicles dropped from 62.5% to 55.2%, whereas light trucks grew from 32% to 38.53%. During the same period, cars on average got older, and light trucks grew younger. Even so, passenger cars got *more* fuel efficient, and light trucks became less so.

Changes in Personal Travel

The Federal Highway Administration conducts a periodic census of U.S. drivers, vehicles, and driving habits, known as the National Household Travel Survey. A

Table 4-1. Changes in Vehicles on U.S. Highways, by Characteristic

Characteristic	*Type of Vehicle*	*1995*	*2000*	*2005*
Share of total registered vehicles on the road (%)	Passenger cars	62.50	59.17	55.20
	Light trucks	32.00	35.02	38.53
	Other trucks	3.27	3.55	3.43
Median age (years)	Passenger cars	7.7	8.3	9.0
	Light trucks	7.4	6.7	6.6
	Other trucks	7.6	6.9	6.8
Average fuel efficiency	Passenger cars	21.1	21.9	22.9
	Light trucks	17.3	17.4	16.2

Sources: RITA 2007, Tables A-6 (share of vehicles), A-14 (median age), and E-1 (fuel efficiency).
Note: Light trucks include other two-axle, four-tire vehicles, such as sport utility vehicles and minivans. Other trucks include two-axle, six+-tire vehicles and combination vehicles. Percentages will not add up to 100 because other classes of vehicles are not included in this table.

summary of selected findings of the survey conducted in 1995 and 2001 appears in Table 4-2 (Hu and Reuscher 2004). The data show an increase in the number of vehicles per household and per licensed driver, whereas the daily number of person-trips went down. Trip purpose shifted slightly away from trips to and from work, and the start times for person-trips varied hardly at all. Average time spent in a private vehicle in a typical day was 62.32 minutes.

A look at commuter travel, however, shows some disturbing trends (Table 4-3). The average length of a commute to work has increased by more than a third in 18 years, and the time it takes has gone up by more than about 5 min per trip. Although the average commuting speed in 2001 was 6.6% higher than in 1983, it was also 8.3% *lower* than in 1995. All told, the average driver spends about 55 min driving about 29 mi every day. These numbers probably come as no surprise to those who hit the roads every morning in the nation's sprawling metropolitan areas.

In fact, the Bureau of Transportation Statistics (BTS) has coined two new terms for the people who commute long distances to work (RITA 2004). Of the 61.6 billion commutes undertaken each year, about half of 1% of them can be classed as *stretch* commuters. These 3.3 million Americans travel between 50 and 200 miles, each way, per day. Or, to put it another way, about 19% of all people who travel to and from work are stretch commuters. Stretch commuters are mostly male, with women making up only 16% of all stretch commuters. The *superstretch* commuter travels a distance of 200 or more miles each way; when the distance goes beyond that, one of four superstretch commuters switches to air travel and becomes likely to "commute" only one to four times in a four-week period.

Table 4-2. Selected Findings of the 1995–2001 National Household Travel Survey

Parameter	*1995*	*2001*
Vehicles per household	1.79	1.89
Vehicles per licensed driver	1.0	1.09
Daily number of person-trips	4.30	3.74
Daily number of person-miles of travel	38.67	36.89
Average length of person-trips (mi)	9.13	10.04
Trip purpose (percentage of total travel by private means)		
To or from work	20.9	17.7
Work-related business	4.8	5.6
Family or personal business	32.8	31.7
To or from school or church	4.3	4.6
Social and recreational	28.0	27.3
Other	0.3	0.9
Start time of a person-trip (percentage of total by private means)		
Between 10 P.M. and 1 A.M.	3.5	2.9
Between 1 A.M. and 6 A.M.	1.7	1.8
Between 6 A.M. and 9 A.M.	13.8	14.4
Between 9 A.M. and 1 P.M.	24.2	24.6
Between 1 P.M. and 4 P.M.	22.1	22.1
Between 4 P.M. and 7 P.M.	23.0	22.3
Between 7 P.M. and 10 P.M.	11.8	11.7

Source: Hu and Reuscher 2004, Tables 2, 3, 12, and 28.

The Increase in the Number of Elderly Drivers

According to Hu and Reuscher (2004), 75% of Americans 70 and older still drive, a slight increase from a previous 1995 study. From 1991 to 2001, the number of licensed drivers age 70 or older increased by 32% from 14.5 million to 19.1 million. And as America ages, these numbers will more likely increase, and these elderly drivers present new challenges for highway designers.

Diminished motor skills, vision, and slower reflexes can add to everyday driving hazards. Older drivers tend to have more intersection accidents; as witness, the results of a 2001 Federal Highway Administration report revealed that 50% of

Table 4.3. Changes in Commuting for Private Vehicles, 1983–2001

Commuting Characteristic	*1983*	*1990*	*1995*	*2001*	*Change from 1983 to 2001 (%)*
Average length (mi)	8.86	11.02	11.84	12.10	+36.5
Average time (min)	17.62	19.05	20.10	22.49	+27.6
Average speed (mi/hour)	30.28	34.70	35.18	32.27	+6.6%

Source: Hu and Reuscher 2004, Table 26.

all driver fatalities occurred at intersections as opposed to a 23% rate for drivers age 69 and under. This high incidence of elderly intersection accidents has been attributed to the time-related and complex speed–distance judgments required when approaching and leaving an intersection. Left-hand turns are more problematic for elderly motorists because they must make quick decisions relating to speed, distance, and gap while crossing the roadway.

Diminished vision and the inability to clearly read road signs and traffic signals can also add to the dangers facing older drivers. Small and complex road signs may require the motorist to slow down or make sudden lane changes, thereby endangering themselves and adjacent motorists. Road signage design is beginning to take these facts into consideration, and these changes will affect all drivers, not only the elderly, and add to highway safety.

The Road Information Program prepared by TRIP (2003) put together a list of recommendations to improve older driver safety, many of which can be applied to the populace as a whole:

Signage and lighting:
- clear and less complex signage;
- larger lettering on signs; and
- better lighting, particularly at intersections.

Intersections:
- bright, luminous lane markings and directional signals;
- overhead indicators for turning lanes;
- overhead street signs; and
- adding or widening left-turn lanes.

Streets and highways:
- wider lanes and shoulders to reduce the consequences of driving mistakes;
- longer merge and exit lanes;
- rumble strips to warn motorists when they are running off the road;
- curves that are not as sharp;
- improvements to pedestrian features at intersections;
- improved intersection design; and
- improved standards for acceptable stopping and reaction sight distances.

Fitch Ratings Rates U.S. Toll Roads

Fitch Ratings is a corporate rating group providing public and private ratings on companies and their debt instruments. Because of the growing demand for project financial analysis for infrastructure, the company formed the Global Infrastructure and Project Finance Team. The team published a report (2007) in which they looked at U.S. toll facilities, including intrastate turnpikes, bridges, expressway systems, and stand-alone facilities, and determined that overall these facilities have strong financial profiles. They found that toll revenue per lane mile grew at a compound average growth rate (CAGR) of 11.7% between fiscal years 2003 and 2005 and that it grew fastest on expressway systems. Table 4-4 reflects the increase

Table 4-4. U.S. Highway Toll Revenues for 2003–2005 and Their Percentage Compound Average Growth Rate

	Toll Revenue (thousand dollars)			
	2003	*2004*	*2005*	*CAGR (%)*
Toll revenue				
Intrastate turnpikes	2,276,077	2,571,554	2,808,470	11.1
Bridge systems	1,224,483	1,302,784	1,513,626	11.2
Expressway systems	1,151,696	1,229,561	1,503,741	14.3
Stand-alone facilities	437,773	504,237	553,817	12.5
Total	5,090,028	5,608,136	6,379,654	12.0
Lane miles				
Intrastate turnpikes	12,661	12,687	12,689	0.1
Bridge systems	277	277	277	0.0
Expressway systems	3,398	3,409	3,453	0.8
Stand-alone facilities	1,130	1,130	1,140	0.4
Total	17,466	17,503	17,559	0.3
Toll revenue/lane mile				
Intrastate turnpikes	179,771	202,692	221,331	11.0
Bridge systems	4,423,390	4,706,251	5,467,905	11.2
Expressway systems	338,914	360,660	435,463	13.4
Stand-alone facilities	387,475	446,302	485,885	12.0
Total	291,428	320,413	363,330	11.7
Electronic toll revenue*				
Intrastate turnpikes	833,867	1,094,037	1,323,070	26.0
Bridge systems	779,401	854,519	960,574	11.0
Expressway systems	583,051	683,305	930,202	26.3
Stand-alone facilities	238,619	265,446	302,496	12.6
Total	2,434,937	2,897,308	3,516,342	20.2
Cash toll revenue*				
Intrastate turnpikes	1,441,753	1,476,589	1,484,698	1.5
Bridge systems	430,944	535,025	569,079	14.9
Expressway systems	573,639	576,222	587,431	1.2
Stand-alone facilities	157,926	189,658	191,555	10.1
Total	2,604,262	2,777,494	2,832,762	4.3
Passenger toll revenue*				
Intrastate turnpikes	1,456,061	1,692,069	1,809,477	11.5
Bridge systems	159,268	161,609	260,008	27.8
Expressway systems	864,230	920,049	1,048,454	10.1
Stand-alone facilities	162,053	186,425	202,903	11.9
Total	2,641,612	2,960,152	3,320,843	12.1
Commecial toll revenue*				
Intrastate turnpikes	693,540	750,289	851,338	10.8
Bridge systems	43,278	44,187	48,674	6.1
Expressway systems	134,157	140,793	277,576	43.8
Stand-alone facilities	24,360	25,690	27,635	6.5
Total	895,335	960,959	1,205,222	16.0

Table 4-4. Continued.

	Toll Revenue (thousand dollars)			
	2003	*2004*	*2005*	*CAGR(%)*
Average passenger toll*				
Intrastate turnpikes	0.78	0.80	0.88	6.5
Bridge systems	0.38	0.38	0.62	28.1
Expressway systems	0.58	0.59	0.65	6.5
Stand-alone facilities	1.89	2.02	2.14	6.4
Total	0.68	0.70	0.80	8.1
Average commercial toll*				
Intrastate turnpikes	4.97	4.83	5.30	3.3
Bridge systems	1.50	1.72	1.87	11.5
Expressway systems	1.08	1.13	2.84	62.5
Stand-alone facilities	6.34	6.27	6.42	0.6
Total	3.02	3.10	4.18	17.7

Source: Reprinted with permission from Fitch (2009).
*Data were unavailable for a small subset of credits.

in revenue collected electronically and by cash and a breakdown between commercial and passenger toll revenue for those three years, as well as the percentage increase in CAGR. The increase in fuel costs in 2006 and 2007 and the economic downturn in the United States in 2008 and 2009 will affect toll revenue growth for some years to come and, in fact, in Fitch (2009), they offered a negative rating to U.S. toll roads, citing the deteriorating fundamentals that many public and private facilities were experiencing. Even though fuel prices dropped in 2008, so did employment growth.

Federal Reports

The Federal Government Recognizes the Need to Engage the Private Sector

With the widening gap between America's infrastructure requirements and the ability to fulfill those needs through traditional public funding, the Federal Highway Administration recognized the need to engage the private sector. The FHWA also recognized that public–private partnerships hold out options to address these shortfalls by providing not only funding but also the potential for improved efficiency in the production, operation, and maintenance of these infrastructure projects.

The FHWA has a website devoted solely to public–private partnerships (www.fhwa.dot./gov/ppp) and in January 2009 presented a report (FHWA 2009) in which they provide guidelines to help frame and address 14 public policy issues relating to PPPs. The table of contents poses the questions that state legislatures

and public officials need to consider when addressing proposed PPPs. The text in the report touches briefly on each of the points:

1. Toll rates: How can we assure that future toll rates will be reasonable?
2. How should a reasonable rate of return be established?
3. How should the term of the PPP agreement be determined?
4. How should the public sector evaluate the trade-off between up-front payments and the ability to share in revenues over the term?
5. How should proceeds of a transaction be spent?
6. Public sector comparator: How can we determine whether the public sector could have achieved the same or better financial results as a PPP through public borrowings and public operation?
7. How can the quality of long-term maintenance be assured?
8. Handback: How can we ensure that the facility will be returned to the public sector at the end of the term in a state of good repair?
9. Are there reasonable approaches to the construction of unplanned facilities that have an adverse effect on the project's revenues?
10. What criteria should be used to select appropriate projects for PPPs?
11. How can competition be assured, and how can the procurement process be made fair and transparent?
12. How can the public sector be protected in the event of the private partner's default or bankruptcy?
13. How do PPPs affect existing employees in concessions of existing assets?
14. How can compliance with existing and future environmental standards be assured?

The Government Accountability Office Report

The U.S. Government Accountability Office (GAO) is the audit, evaluation, and investigative arm of Congress. At the request of Congress, the GAO was to review our transportation system: the benefits, costs, and trade-offs of public–private partnerships; the federal role in PPPs; and how public officials can protect the public interest in these arrangements.

In February 2008, the GAO issued a report entitled *Highway Public–Private Partnerships* (2008). Never an agency to pull its punches, the GAO report stated,

> The nation is also on an imprudent and unsustainable fiscal path. Absent significant changes to tax and spending programs and policies, we face a future of unsustainable deficits and debt that threatens to cripple our economy and quality of life.

With respect to transportation, the GAO said that the government needs to weed out programs and policies that are not effective and modernize those programs that remain relevant. As it relates to transportation policy,

> The nation's transportation policy has lost focus and the nation's overall transportation goals need to be better defined and linked to performance measures that evaluate what the respective policies and programs actually accomplish.

Remarks on Concession-Type Programs

GAO (2008) references the $3.8 billion the state of Indiana received from their leasing of the Indiana Toll Road, stating that this money was used to fund a 10-year statewide transportation plan. They use this instance as an example of a concession agreement "obtaining funds by extracting value for existing facilities."

The report cautions that tolls may increase on a privately operated highway to a greater extent than they would on a publicly operated toll road. They also remark that highway public–private partnerships offer the potential to actually price highways better to reflect the "true costs of operating and maintaining them and to increase mobility by adjusting tolls to manage demand."

GAO (2008) also mentions that proponents of PPPs promote the potential lower costs caused by private-sector efficiencies and their market-driven goals and the fact that various risks can be shifted to the concessionaire, but they cautioned that public–private partnerships are not risk free and point out that concerns have been raised about "how well the public interest has been evaluated and protected. Concerns have also been raised about the potential loss of public control over critical assets for up to 99 years." The report also states that there is no "free money" and that these PPP highways constructed without public-sector financing are funded by the private sector and that the debt issued by that private entity must be repaid.

House Report 108-243

In the fiscal year 2004 Department of Transportation Appropriations Act, a provision was included requesting the U.S. DOT to prepare a report identifying any impediments to the formation of a highway and transit program using public–private partnerships (U.S. DOT 2004). This report was divided into five major parts and is available electronically on the FHWA's PPP website (http://www.fhwa.dot.gov/reports/pppdec2004/pppdec2004.pdf). The five major parts of the report are as follows:

1. a history of public–private partnerships in highway and transit projects;
2. the value of PPPs;
3. legal impediments to PPPs;
4. recommendations from states, trade associations, private law firms, consultants, designers, and contractors; and
5. DOT-proposed legislation to facilitate PPPs.

The federal government, recognizing the state's position as a prime mover in PPP projects, prepared a working draft of model legislation that states could use

as a matrix for developing their own laws and ordinances to authorize and regulate public–private partnerships. This working draft has 14 sections:

1. Definitions;
2. Solicited Proposals (how the state can prepare requests for proposals [RFPs]—two versions are included in this section);
3. Unsolicited Proposals (how the state can deal with these types of solicitations, also in two different versions);
4. Public–Private Agreement (two versions);
5. Reversion of Transportation Facility to the Department (also deals with termination of an agreement);
6. Material Default; Remedies;
7. Bonds;
8. Funding from Federal Government or Other Sources;
9. Property Tax Exemption;
10. Eminent Domain;
11. Police Powers; Violations of Law;
12. Utility Crossings;
13. Sovereign Immunity; and
14. Regulations.

The full text of this working draft is available at http://www.fhwa.dot.gov/ipd/pdfs/legis_model_0610.pdf. FHWA lists useful papers, including case studies and reports, at http://www.fhwa.dot.gov/ipd/p3/resources/index.htm.

Financing Available for Public–Private Partnerships

Between 2003 and 2004, the Federal Highway Administration, in cooperation with the Secretary of Transportation, sponsored a series of public–private partnership workshops. Many of the financing options introduced into the PPP process were explored, with an eye to maximizing the ability of the states to leverage capital or make more effective use of available funds to speed up highway construction starts.

Looking back on some already completed public–private partnership agreements, the U.S. Department of Transportation prepared a series of those PPP agreements in which they analyzed specific projects. Another U.S. DOT PPP agreement, this one for the concession and lease of an existing highway, uses the Chicago Skyway as the example; the agreement takes the reader through the process of turning over an existing facility to a concessionaire in exchange for an up-front payment and guarantees to upgrade and maintain current and future facilities.

In the workshops sponsored by FHWA in 2006–2007, they reviewed the federal alphabet of programs such as ISTEA, TEA, TIFIA, SAFETEA-LU, and GARVEE, which were available to assist private developers.

Federal Enabling Legislation and Funding Programs

Intermodal Surface Transportation Efficiency Act

The Intermodal Surface Transportation Efficiency Act (ISTEA), which quickly became known as Ice Tea, was enacted in 1991 to present a change in the country's transportation and planning policy. It presented an overall intermodal approach to America's transportation requirements by bringing together the demands of travelers and shippers alike to look at the best alternatives to address and resolve the needs of both groups. ISTEA expired in 1997 and was followed by the Transportation Equity Act for the 21st Century (TEA-21) and the Safe, Accountable, Flexible, Efficient Transportation Equity Act (SAFETEA) in 2005.

ISTEA allows states to apply toll revenues used for highway capital expenditures to obtain toll credits, which in turn can be used to satisfy the states' matching requirements for federal-aid highway funding assistance. As of May 2007, more than $41.8 billion in toll credits have been approved in 22 states and Puerto Rico. This toll credit applies to public, quasipublic, or private agencies when involved in building, improving, or maintaining a roadway, bridge, or tunnel that serves interstate commerce.

To qualify for such a credit, the following conditions must be met:

- The state's total nonfederal highway and transit transportation capital expenditure must be either equal to or above the average of the three prior years. This test is known as maintenance of effort and must be accepted by the federal government at the time the credit amount is established.
- Revenue generated from tolls must have originated from a facility open to the public. Travel on this tolled facility can be operated by a public, quasipublic, or private entity.
- The amount of the credit generated is based on the amount of toll revenue spent on eligible projects (e.g., tunnels, bridges, highways, or ferry systems) that serve interstate commerce. However, expenses such as snow removal, landscaping, maintenance, debt service, or cost to collect tolls cannot be included.

Revenues are considered to be those collected from toll receipts, concession sales, right-of-way leases, interest earnings, and bond or loan proceeds backing the revenue stream(s). Some current ISTEA projects include the Central Texas Turnpike System, the Miami Intermodal Center, State Route 125 in San Diego County, and the Reno Transportation Rail Access Corridor.

The Transportation Equity Act for the 21st Century

The Transportation Equity Act for the 21st Century (TEA-21) was modified in 2000 by adding Subsection (h) to Section 106 of Title 23, requiring recipients of financial assistance for "mega projects," defined as projects with an estimated cost

of $1 billion, to submit an annual financial plan for the project. An initial financial plan and annual updates were to be submitted to the FHWA for review and acceptance. The initial plan would consist of at least five major sections: cost estimate, implementation plan, revenue sources, cash flow, and other factors.

The annual updates would include these five sections and, in addition, a cost history of the project, a presentation and analysis of cost and revenue trends that could result in either additional funding requirements or cost reductions, discussion of additional funding required or cost reduction needed to meet shortfalls uncovered since the last report, a report on significant reductions in costs, and a list of cost increases.

Although primarily developed for mega projects, this five-part financial guidance plan is equally adaptable for smaller projects.

1. Cost estimate—This estimate is the total cost of the project, looked on as being the project's purchase price, and it should include the value of all resources required to provide design, right-of-way acquisition, environmental mitigation, construction, project management, insurance, etc., along with costs paid to others for such items as utility and rail relocations. All costs are based on standard accounting methods and generally do not include costs of acquiring revenue (taxation, mortgage interest payment, and other items included in DOT Order 4600.17A).
2. Implementation plan—This plan includes a schedule for completing the project, estimated expenditures to be covered by projected revenues, and assumptions for future inflation and other cost escalation factors. The reasonableness of the estimate is included. Also included is an indication of potential effects on the plan by either future costs or changes in the revenue stream. The implementation plan addresses unforeseen subsurface conditions; unanticipated environmental concerns that could arise; and the potential for litigation, including contractor claims and technology innovations that may result in either cost savings or added capital costs but reduced future operating costs. The following concerns are addressed as part of this plan: Will overtime costs be required to meet the schedule? Will changes in local or state rules affect the project? Will future administrations divert funds to other projects?
3. Revenue sources—Sources listed as Committed or Anticipated are included. If sources are listed as Anticipated, an evaluation of the likelihood that these funds will be available is included. Projected expenditures of federal-aid funds are constrained by anticipated annual limitations on federal-aid fund obligations. The amount and source of nonfederal-aid funds should be included. This section addresses the potential for unanticipated changes in expected revenue and the effect those changes may have on the project. The changes could include delays or even decreases in the receipt of project funding, reductions in user fees earmarked for the project, and changes in government rules that could affect the project's revenue.

4. Cash flow—The importance of this section is to demonstrate that sufficient revenue will be available to allow for annual project obligation and expenditure payments. This section includes an annual schedule of cash needs and available cash to meet those needs. This section will demonstrate that payments to contractors can be affected and yet continue through to final payment and sign-off of all project costs.
5. Other factors —This is not a "catch-all" section but rather one in which to describe the special nature of the project, such as project cost containment strategies; a design to meet budget agreements that can be attained by, say, using a design–build delivery approach; using a team of cost control experts; vendor participation via extended warranties, guarantees, incentive and disincentive clauses in design and construction contracts; or other such factors. Any special or unique agreements, laws, rules, or regulations in addition to National Environmental Policy Act and Title 23 are to be stated, including federal or state project-enabling legislation, financial agreements, or covenants. Significant project operation changes, such as the opening of traffic in a segment of the project while construction continues on the other segment(s), are important other factors.

The Transportation Infrastructure Finance and Innovation Act

The Transportation Infrastructure Finance and Innovation Act (TIFIA) was part of TEA-21 and an early attempt to provide federal credit assistance to large-scale transportation projects of regional or national importance. TEA-21 authorized up to $10.6 billion in TIFIA credit assistance within the fiscal year 1999–2003 period, and although this assistance continued at a $2.4 billion annual rate before the passage of SAFETEA in August 2005, the TIFIA credit program continues. This program includes three forms of credit assistance:

1. Secured or direct loans—These loans have a maximum term of 35 years from the date of substantial completion. Repayment of the loan must start 5 years after the date of substantial completion.
2. Loan guarantee—The loan guarantees a project sponsor's repayment to a nonfederal lender, and this repayment schedule is to commence no later than 5 years after the project has reached substantial completion.
3. Line of credit—A contingent loan is available for draws as needed for up to 10 years after the project's date of substantial completion.

TIFIA Benefits to PPP Sponsors

TIFIA benefits to sponsors of PPPs include the following:

- It provides improved access to capital markets.
- It provides flexible repayment terms.
- It allows for more favorable interest rates in the marketplace.

TIFIA Requirements and Threshold Limits

TIFIA requirements and limits include the following:

- Large surface transportation projects are valued at $50 million or more.
- Intelligent transportation systems are valued at $15 million or more.
- TIFIA contributions are limited to 30% of the project cost.
- Senior project debt must be rated investment grade.
- Dedicated revenues must be pledged to repay the TIFIA loan.
- Federal requirements such as civil rights, National Environmental Policy Act, Uniform Relocation Act, and Titles 23 and 49 of the appropriate U.S. DOT grant program apply to the use of TIFIA loan proceeds.

This credit assistance program costs the government very little. Since the inception of the TIFIA program in 1999, credit assistance of $3.6 billion for projects totaling $16 billion has resulted in a cost to the federal government of $200 million.

Advantages for Private Investors

Private investors find the TIFIA route attractive for several reasons:

- It can enhance borrowing power, particularly on those start-up facilities with an initial uncertain revenue stream but with the potential to grow.
- TIFIA credit can assume a junior lien role subordinated to senior lenders.
- Interest rates are attractive, generally at the U.S. Treasury's borrowing rate.
- Deferral of interest during construction and ramp-up activities can be arranged, along with other flexible payment plans.
- Involvement of TIFIA and its credit standing can expedite other financing arrangements and ostensibly accelerate the start of construction.
- Final maturity of TIFIA credit can be extended to 15 years after the date of substantial completion.

TIFIA Program Fees

Relative to the amount of the loan requested, TIFIA fees appear to be reasonable:

- Each applicant must pay a $30,000 nonrefundable application fee.
- In addition, each borrower is required to pay a processing fee equal to a portion of costs incurred by TIFIA in negotiating the credit agreement. These fees typically range from $100,000 to $300,000.
- Borrowers are required to pay an $11,000 annual loan-servicing fee.

Projects submitted for TIFIA loans recommend that sponsors make a presentation along with their application. Proposals are rated according to the following weighted criteria:

- significance, 20%;
- environment, 20%;

- private participation, 20%;
- creditworthiness, 12.5%;
- project acceleration, 12.5%;
- use of technology, 5%;
- budget authority, 5%; and
- reduced grant assistance, 5%.

The financial performance of TIFIA-assisted projects as of July 15, 2006, totaled $13.247 billion and involved 13 projects in 10 states, the District of Columbia, and Puerto Rico and are represented in Table 4-5.

Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users

The Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU) continues some of the TIFIA provisions. Enacted in August 2005, it provides additional flexibility in the use of tolling to finance infrastructure projects. The act authorized federal surface transportation programs for highways, highway safety, and transit for a five-year period (2005–2009) and provided $286.5 billion in funding over this period. SAFETEA-LU established state infrastructure banks (SIBs), under which all states, U.S. territories, and the District of Columbia are allowed to enter into cooperative agreements with the Secretary of Transportation to establish revolving infrastructure funds eligible to be capitalized by federal funds authorized for that five-year period. These SIBs were initially authorized under the National Highway System Designation (NHSD) Act of 1995. States participating in the SIB program can capitalize any SIBs they have with federal funds for any of the following projects:

- highway accounts—as much as 10% of the funds apportioned to the state for the NHSD program, the Surface Transportation Program, or the Highway Bridge Program;
- transit accounts—up to 10% of funds available for capital projects under the Urbanized Area Formula Grants, Federal Transit–Capital Investment Grants, and Formula Grants for Other Than Urbanized Areas programs; and
- rail accounts—funds available for capital projects under Subtitle V (Rail Programs) of Title 49 of the U.S. Code.

A summation of key provisions of SAFETEA-LU includes the following:

1. SAFETEA-LU establishes state infrastructure banks (SIBs) to provide nongrant assistance in the form of loans or leveraged credit to public or private entities engaged in eligible projects.
2. This SIB option extends to all states, U.S. territories, and the District of Columbia. Three SIB accounts can be created, one for highway, one for transit, and one for rail.

Table 4-5. The Financial Performance of TIFIA-Assisted Projects (as of July 15, 2006)

Credit Agreement	*Location*	*Status*	*Project Cost*	*TIFIA Amount*	*Amount Disbursed*	*Percent Disbursed*	*Project Completion*
Tren Urbano	Puerto Rico	Paid in full	$2,250,000,000	$300,000,000	$300,000,000	100.00%	6/6/05
Miami Intermodal Center[1]	Florida	Paid in full	1,349,700,000	269,076,000	15,000,000	5.57%	4/18/09
Cooper River Bridges	South Carolina	Refinanced	677,000,000	215,000,000	0	0.00%	7/9/05
Staten Island Ferry	New York	Paid in full	482,200,000	159,225,300	159,161,429	99.96%	7/1/06
Reno ReTRAC	Nevada	Paid in full	279,900,000	50,500,000	50,500,000	100.00%	11/18/05
Central Texas Turnpike System[2]	Texas	Active	3,659,900,000	916,760,000	0	0.00%	12/1/07
WMATA Capital Program[3]	DC, VA, MD	Active	2,324,000,000	600,000,000	0	0.00%	6/30/09
Miami Intermodal Center[4]	Florida	Active	[5]	170,000,000	0	0.00%	6/30/07
Strata Route 125 South Toll Road	California	Active	628,800,000	140,000,000	102,268,025	73.05%	12/1/07
183A Toll Road[2]	Texas	Active	331,200,000	66,000,000	0	0.00%	3/1/07
LA1 Project[2]	Louisiana	Active	247,300,000	66,000,000	0	0.00%	8/1/09
Warwick Intermodal Station	Rhode Island	Active	222,300,000	42,000,000	0	0.00%	10//1/09
Maynihan Station	New York	Term sheet	795,000,000	160,000,000	0	0.00%	tbd
Total			**13,247,300,000**	**3,154,531,300**	**626,929,454**	**19.87%**	

[1] The first of two Miami Intermodal Center (MIC) loans helped finance elements constructed by Florida DOT.
[2] Disbursements will occur near the project's completion date in order to refinance short-term bond anticipation notes.
[3] The TIFIA assistance is a loan guarantee. Disbursements would only occur if the borrower is unable to repay its third-party loan.
[4] The second of two MIC loans helps finance construction of a consolidated rental car facility.
[5] The project cost is incorporated into the cost of the first MIC loan.

Source: U.S. DOT (2007a).

3. Federal credit assistance is available in the form of secured loans, loan guarantees, and lines of credit for significant regional or national transportation projects.
4. Eligibility for participation is lowered to include a project with a value of $50 million or one-third of the state's annual federal-aid apportionment, whichever is less.
5. TIFIA proceeds are allowed for refinancing project obligations or federal credit instruments.
6. Eligibility has not been extended to private freight rail facilities and those ports that serve the public.
7. It authorizes $15 billion in exempt facility bonds, not subject to state caps, for qualified highway projects, thereby allowing private participation in projects while keeping the tax-exempt status of the projects.
8. The Interstate System Reconstruction and Rehabilitation Pilot Program will continue to permit authority to allow tolling on three existing facilities in states where the costs to fund those needs are demonstrated not to exceed available resources.
9. The Interstate System Construction Toll Pilot Program, which allows three interstate highway facilities to toll for the purpose of financing the construction of new interstate highways, continues.
10. The Express Lanes Demonstration Program allows for tolling of up to 15 demonstration projects to manage congestion and reduce emissions or finance additional lanes to reduce congestion.
11. The Value Pricing Pilot Program provides $59 million to encourage up to 15 value pricing pilot projects that would implement market-based strategies.

Grant Anticipation Revenue Vehicle Bonds

Grant Anticipation Revenue Vehicle (GARVEE) bonds can be issued by a state or a political division of a public authority; they provide for reimbursement of debt service and related financing costs with federal-aid highway funds. Recipients of GARVEE bonds can use those proceeds for reimbursement for debts incurred, such as a bond, a note, a certificate of mortgage, or a lease. Costs can include interest payments, principal reduction, and other incidental costs.

GARVEE bonds can make financing available for highway and transit projects that would attract the participation of a private entity to form a P3 project since they can help with the following things:

- providing a reliable source of funds quickly, thereby making a proposed project more attractive to a private entity;
- being used as a supplement to general obligation or revenue bonds and expanding access to capital markets;
- providing immediate cash access from bond proceeds that can supplement funding on projects of such magnitude that they exceed available grant funding and tax receipts; and

- generating up-front capital at tax-exempt rates, enabling a project to get started sooner than a conventional pay-as-you-go grant resource can provide.

GARVEE financing is available for national highway system and interstate construction, interstate maintenance programs, surface transportation projects, congestion mitigation, air-quality improvement programs, bridge replacement and rehabilitation work, state planning and research, and metropolitan planning. As of July 2006, GARVEE transactions totaled $5.671 billion (Table 4-6).

Table 4-6. GARVEE Transactions as of July 2006

State	*Number of Issues*	*Issue (in millions)*	*Projects Financed*	*Insurance*
Alabama	1	$200.0	County bridge program	Yes
Alaska	1	$102.8	Eight road and bridge projects	No
Arizona	5	$460.0	Maricopa freeway projects	No
Arkansas	3	$575.0	Interstate highways	No
California	1	$615.0	Eight road projects	Yes, except 2005 series
Colorado*	5	$1,486.7	Any project financed wholly or in part by federal funds	No
Georgia	1	$360.0	Various transportation projects	Yes
Idaho	1	$194.3	Various expansion projects	Yes
Kentucky	1	$139.6	Three interstate widening and rehabilitation projects	Yes
Maine	1	$48.4	Replacement of the Waldo–Hancock Bridge	Yes
Montana	1	$122.8	44 miles of U.S. 93 improvements	Yes
New Mexico	2	$118.7	New Mexico SR 44	Yes
North Dakota	1	$51.4	Highway and bridge projects	Yes
Ohio	6	$538.1	Various projects, including Spring-Sandusky and Maumee River improvements	No
Oklahoma**	2	$96.5	Projects in 12 corridors	No
Puerto Rico	1	$139.9	Various transportation projects	Yes
Rhode Island	2	$401.6	Freeway, bridge, and freight rail improvement projects	Yes
Virgin Islands	1	$20.8	Enighed Pond Port Project and Red Hook Passenger Terminal Building	Yes
Total	36	$5,671.6		

Source: FHWA 2006.
*Colorado DOT issued $400.2 million in June 2002 and $280.2 million in May 2004 to refund prior bonds.
**With premiums on net proceeds worth $50 million.

Flexible Match Program

The Federal-Aid Highway Program requires recipients of federal assistance to contribute toward the total cost of the project. Typically this program requires a 10% match for certain interstate highway projects and a 20% state match for many other projects. Recent federal-aid legislation changed a cash contribution to one that allows, in addition to cash, land, materials, and services to be counted toward this nonfederal match. If a private entity is considering forming a partnership with a public agency and wishes to contribute cash, land, materials, or services to that end, the formation of such a venture can proceed rapidly.

Section 129(a) Loans

This provision in the federal-aid highway fund allows states to loan some of their federal funds designated for highway projects to recycle some of their federal-aid highway money by loaning it out and receiving payment from revenue-producing projects. The requirements for a Section 129(a) loan are the following:

- The project sponsor must dedicate revenue from a source to repay the loan.
- The amount of the loan can be as high as 80% of the total project's cost, as long as the state has sufficient authority to fund the loan.
- Repayment of the loan must begin within five years after the project has either opened to traffic or otherwise been completed. The entire loan must be repaid within 30 years.
- The individual state can set their own interest rate, as long as those rates are at or below market rates.

Federal Laws and Regulations Pertaining to Public–Private Partnerships

Any federal law, such as U.S. Code Title 23, that applies to a federally assisted project applies to a public–private partnership project. With respect to design of a PPP, FHWA minimum design standards and specifications would apply; with respect to construction, workers' rights are included in 23 CRF Part 633, and nondiscrimination provisions are in Title VI of the Civil Rights Act of 1964. Environmental issues are contained in the National Environmental Policy Act of 1969, the Clean Water Act, and the Endangered Species Act. Acquisition and relocation assistance laws can be found in the Uniform Relocation and Real Property Acquisition Policies Act of 1970.

State laws and regulations vary considerably from state to state, and developers and concessionaires are advised to contact appropriate state officials when contemplating an unsolicited concession-type agreement in a particular state.

State Infrastructure Banks

Section 350 of the National Highway System Designation Act of 1995 allowed the U.S. Department of Transportation to establish a state infrastructure bank (SIB) pilot program and to offer direct loans and loan guarantees. The SIBs are

capitalized with both federal and state funds, and each SIB operates as a revolving fund: As loans are repaid, funds become available to new loan applicants. Three SIB accounts can be set up, one for highways, one for transit, and one for rail. Initially, TEA-21 limited funds for SIB capitalization to only four states, but under SAFETEA-LU, a new program was initiated for all states and territories to enter into cooperative agreements with the Secretary of Transportation to establish revolving funds eligible to be capitalized under the federal transportation funds for fiscal years 2005 to 2009. As of June 2005, 32 states and the territory of Puerto Rico had signed bank loans and loan agreements with the federal government.

Special Experimental Project No .15

Special Experimental Project No.15, referred to simply as SEP-15, allows FHWA to become more innovative when it comes to viewing public–private ventures. It allows more latitude in the selection of contracting methods, compliance with environmental requirements, right-of-way acquisition, and project finance, all essential elements in formulating PPP projects. A few unique projects could benefit from SEP-15 involvement in other parts of the country, such as the Minnesota Department of Transportation's redesign of highway shoulders to accommodate bus travel. Mn/DOT widened shoulders by 10 ft (3 m) and increased the depth of the base course by 7 in. (18 cm) to support bus traffic, which often flows more quickly than the passenger car lanes.

Oregon's Department of Transportation has embarked on a program by teaming up with Cascade Sierra Solutions, a nonprofit organization, to offer truckers a kit to reduce fuel consumption and reduce engine emissions. They tapped into the SIB program of the FHWA to offer the SmartWay Upgrade Kit, which includes the following:

- engine idle reduction technology, in which an auxiliary power unit is used on a truck;
- low rolling resistance tires;
- advanced aerodynamics for tractors and trailers; and
- exhaust aftertreatment devices to reduce fuel consumption and carbon dioxide and nitrogen oxide emissions.

These upgrade kits, available in 2008, were eligible for a 35% tax credit through the Oregon Department of Energy. SmartWay indicates that the savings resulting from using these kits will be paid back to the trucker within one to five years.

The High-Performance Highway Concept Looks to Improve Mobility

When highway traffic exceeds a certain threshold level, both vehicle speed and throughput drop. The high-performance highway concept involves initiating procedures to maintain optimum highway performance by presenting motorists with a number of options. The process of applying variable tolls on an existing toll

road and adding certain regulations to toll-free highways to manage traffic flow is the concept behind high-performance highways. A familiar procedure on toll-free roads is the high-occupancy vehicle (HOV) lane; a vehicle carrying two or more occupants has access to a dedicated lane where traffic flows more smoothly.

When tolled lanes are added, these HOV lanes become high-occupancy toll (HOT) lanes, and drivers can access them after paying a toll that varies according to the time of day or night. Because these innovations can be made to existing highways, no new rights-of-way are required and possibly no new environmental studies are required. Therefore, many high-performance highway procedures can be effected quickly and at minimal cost.

Efforts to Address Congestion: Addressing One of Our Most Critical Highway Problems

Traffic congestion on highways leading into and out of our major metropolitan areas has become intense in the past several decades. In the past 30 years, vehicle lane miles traveled increased more than 14% while only 5% more road capacity has been added.

A study issued by FHWA (2007) based on a Texas A&M University and Texas Transportation Institute report clearly shows the increase in travel time and associated costs. The study included delays experienced by drivers that increased significantly from 1996 to 2005 and the delays incurred, total fuel wasted, and total cost to the public incurred. Table 4-7 depicts these annual delays experienced in very large, large, and average size urban areas, listed along with wasted fuel per traveler in a variety of U.S. cities included in the study. This study also reflected the annual delay and wasted fuel per traveler for variously populated metropolitan areas: very large, large, and average sized cities.

Table 4-8 points out the need for commuters in certain large metropolitan areas to allow more time when planning an important trip. Even nonwork trips were increasing at that time. A U.S. Department of Transportation report (2007) showed that nonwork travel constituted 56% of all trips during peak A.M. hours and 69% of all trips during P.M. peak hours. Nonwork travel on a Friday grew by almost 200% between 1990 and 2001. These peaks occur as people take their kids to school or pick them up, go to the gym or pick up items at the store, and so forth. Various studies abound, but it appears that the average American spends more than 45 hours a year stuck in traffic, and delays are expected to increase by 65% over the next 25 years.

Innovative Ways to Increase Traffic Flow

Public–private partnerships and some innovative programs developed by the public sector have produced some options to increase the flow of traffic:

1. Add lanes to those congested highways and use those added lanes in innovative ways, such as high-occupancy vehicle (HOV) lanes and high-occupancy toll (HOT) and express lanes.

Table 4-7. Key Mobility Measures of Very Large, Large, and Average Urban Areas

	Annual Delay per Traveler		*Travel Time Index*		*Wasted Fuel per Traveler*	
Urban Area	*Hours*	*Rank*	*Value*	*Rank*	*Gallons*	*Rank*
Very Large Average	54		1.38		38	
Los Angeles–Long Beach–Santa Ana, CA	72	1	1.50	1	57	1
San Francisco–Oakland, CA	60	2	1.41	3	47	2
Washington, DC–VA–MD	60	2	1.37	7	43	5
Atlanta, GA	60	2	1.34	11	44	3
Dallas–Forth Worth–Arlington, TX	58	5	1.35	9	40	7
Houston, TX	56	7	1.36	8	42	6
Detroit, MI	54	8	1.29	21	35	10
Miami, FL	50	11	1.38	6	35	10
Phoenix, AZ	48	15	1.31	15	34	13
Chicago, IL–IN	46	16	1.47	2	32	17
New York–Newark, NY–NJ–CT	46	16	1.39	5	29	23
Boston, MA–NH–RI	46	16	1.27	25	31	19
Seattle, WA	45	19	1.30	17	34	13
Philadelphia, PA–NJ–DE–MD	38	33	1.28	23	24	34
Large Average	37		1.24		25	
San Diego, CA	57	6	1.40	4	44	3
San Jose, CA	54	8	1.34	11	38	9
Orlando, FL	54	8	1.30	17	35	10
Denver–Aurora, CO	50	11	1.33	13	33	15
Riverside–San Bernardino, CA	49	13	1.35	9	40	7
Tampa–St. Petersburg, FL	45	20	1.28	23	28	25
Baltimore, MD	44	22	1.30	17	32	17
Minneapolis–St. Paul, MN	43	23	1.26	26	30	21
Indianapolis, IN	43	23	1.22	32	28	25
Sacramento, CA	41	27	1.32	14	30	21
Las Vegas, NV	39	29	1.30	18	27	27
San Antonio, TX	39	29	1.23	28	27	27
Portland, OR–WA	38	33	1.29	21	27	27
Columbus, OH	33	36	1.19	36	24	34
St. Louis, MO–IL	33	36	1.16	46	20	40
Virginia Beach, VA	30	42	1.18	39	20	40
Memphis, TN–MS–AR	30	42	1.13	53	16	46
Providence, RI–MA	29	44	1.16	46	17	45
Cincinnati, OH–KY–IN	27	45	1.18	39	19	42
Milwaukee, WI	19	59	1.13	53	14	52
New Orleans, LA	18	63	1.15	49	11	62
Kansas City, MO–KS	17	64	1.08	73	10	66
Pittsburgh, PA	16	67	1.09	64	9	69
Cleveland, OH	13	75	1.09	64	9	69
Buffalo, NY	11	77	1.08	73	7	76

Table 4-7. Continued.

	Annual Delay per Traveler		*Travel Time Index*		*Wasted Fuel per Traveler*	
Urban Area	*Hours*	*Rank*	*Value*	*Rank*	*Gallons*	*Rank*
85-area average	**44**		**1.30**		**31**	
Remaining areas						
51 urban areas over 250,000 population	22		1.15		15	
301 urban areas under 250,000 population	20		1.12		11	
All 437 urban areas	**38**		**1.26**		**26**	

Source: Reprinted with permission from Texas Transportation Institute (2007).
Notes: Very large urban areas: more than 3 million population; Large urban areas: more than 1 million and less than 3 million population.

Annual delay per traveler: Extra travel time for peak-period travel during the year divided by the number of travelers who begin a trip during the peak period (6 to 9 A.M. and 4 to 7 P.M.). Free-flow speeds (60 mi/hr on freeways and 35 mi/hr on principal arterials) are used as the comparison threshold.

Travel Time Index: The ratio of travel time in the peak period to the travel time at free-flow conditions. A value of 1.35 indicates a 20-min free-flow trip takes 27 min in the peak period.

2005 values include the effects of operational treatments.

Do not place too much emphasis on small differences in the rankings. There may be little difference in congestion between areas ranked (for example) sixth and twelfth. The actual measured values should also be examined.

The best congestion comparisons use multiyear trends and are made between similar urban areas.

2. Use the private sector's access to new technologies to create more open-road tolling, effectively eliminating tollbooths.
3. Encourage the use of public transportation by taxing traffic coming into central city (inner-city congestion pricing).
4. Control the flow of traffic on-ramping.
5. Use more computer-control traffic signal technology to permit smoother flow of traffic at major intersections and reduce the stop-and-go traffic that unsynchronized traffic signals create.
6. Inner-city one-way streets are often able to carry 50% more traffic in a more seamless manner than two-way streets, and city traffic engineers need to explore more such options.
7. The proliferation of low-cost, dependable electronics and telecommunication devices allows many people to work at home, thereby taking some vehicles off the road. This trend should be encouraged whenever possible by employers.
8. The embrace of flextime by government and business has also been instrumental in changing traffic patterns once considered "standard morning and evening" commuting times.

Table 4-8. If You Want to Get There Early, Leave a Little Sooner

	Multiply the Free-Flow Travel Time by This Factor to Estimate the Time to Reach Your Destination	
Region	*In Average Conditions (Travel Time Index)*	*For an Important Trip (Planning Time Index)*
Chicago	1.48	2.07
Detroit	1.24	1.65
Houston	1.43	2.01
Los Angeles	1.47	1.92
Minneapolis–St. Paul	1.29	1.70
Orange County, Calif.	1.40	1.77
Philadelphia	1.29	1.76
Phoenix	1.38	1.80
Pittsburgh	1.28	1.70
Portland, Oregon	1.34	1.87
Providence	1.14	1.43
Riverside–San Bernardino, Calif.	1.34	1.77
Sacramento	1.26	1.61
Salt Lake City	1.16	1.52
San Antonio	1.22	1.61
San Diego	1.31	1.66
San Francisco	1.25	1.51
Seattle	1.44	2.06
Tampa	1.23	1.55

Source: Reprinted with permission from Turner et al. (2004) and Schrank and Lomax (2007).

Notes: Index values are a ratio of travel time in the peak to free-flow travel time. A Travel Time Index of 1.40 indicates a 20-min off-peak trip takes 28 min on average. A Planning Time Index of 1.80 indicates the 20-min off-peak trip might take 36 min one day each month.

In most regions, only a few freeways are included in this data set. The difference in coverage and differences in the data collection devices make comparisons between the regional values in this table impossible. These 2007 data are only for freeways and, thus, are not comparable with the areawide data included in other tables in the *2007 Urban Mobility Report.*

9. Use incident management: For every minute that traffic is blocked, congestion adds five more minutes to the commute. A minor highway accident accompanied by rubberneckers can cause a serious delay. Signs on Maryland highways state, "Fender Benders—Please Move Off to the Side of the Road," encouraging motorists incurring minor accidents to move over to the shoulder so that traffic can keep moving.

FHWA Looks at Congestion

Congestion pricing is also known as "value pricing," using the market to reduce waste associated with traffic congestion. With congestion pricing, tolls vary by time of day and are collected at highway speed using electronic collection technology. There are four main types of congestion pricing strategies:

1. variable price lanes—creating separate lanes within an existing or expanded highway system designated Express Lanes or High-Occupancy Vehicle (HOV) Lanes;
2. variable tolls on the existing roadway priced to reflect higher tolls during morning and evening rush hour;
3. cordon charges—fixed or variable charges to drive within or into a congested area within a city; and
4. area-wide charges—a per-mile fee on all roads within an area that may vary by level of congestion.

Patrick DeCoria-Souza (2007) prepared an article that listed the benefits, costs, and potential revenue stream from congestion pricing.

FHWA researchers looked at three scenarios: moderately, severely, and extremely congested highway networks. They based their study on a typical metropolitan area with approximately 9 million drivers traversing an existing 100-mi (162-km) highway system consisting of 600 lane mi (966 lane km). The highways in the study had a total of six lanes, three inbound and three outbound.

A moderately congested highway was defined as one with average peak period speed of 43 mi/hr (69 km/hr) and a total of 4 hours of congestion per day: 2 hours in the morning and 2 hours in the evening. The average speed was arrived at by combining the higher traffic speeds on some segments of the systems with the much slower speeds on the congested portions of the highways at peak time and arriving at a ratio of peak travel time to free-flow travel time. A severely congested highway would have a peak period speed of 40 mi/hr (64 km/hr) and a total of 5.5 hours of congestion per day: 2.5 hours in the morning and 2.5 hours in the evening.

An extremely congested highway would have an average peak period speed of 34 mi/hr (55 km/hr) for a total of 7 hours per day: 3 hours in the morning and 4 hours in the evening (Table 4-9).

MIT's Intelligent Transportation Systems Program

Massachusetts Institute of Technology (MIT) teamed up with Oak Ridge National Laboratories and the Federal Highway Administration to look into research and development of an intelligent transportation system program. Work on this project commenced in 2000 and continued through 2006. The result was DynaMIT, a state-of-the-art, real-time computer system designed to support other systems of traffic management.

DynaMIT combines a memory bank of detailed highway networks coupled with models of traveler behavior augmented by real-time input from field installations

Table 4-9. Costs Associated with Congestion: Moderate, Severe, and Extreme

	Initial Congestion Level		
Annual benefits (million $)	**Moderate**	**Severe**	**Extreme**
Highway benefits	$105.80	$184.51	$360.49
Transit benefits	$5.18	$9.02	$17.55
Multimodal benefits	$110.99	$193.53	$378.04
Annual Costs to Transportation Network (million $)			
Highway costs	$25.46	$33.34	$41.21
Transit costs	$52.50	$72.19	$91.88
Multimodal costs	$77.96	$105.53	$133.09
Multimodal benefit–cost ratio	1.4	1.8	2.8
Annual Toll Revenues vs. Cost (million $)			
Toll revenues	$118.19	$196.35	$358.85
Multimodal costs	$77.96	$105.53	$133.09
Surplus	$40.22	$90.82	$225.76

Source: DeCoria-Souza (2007).

of surveillance cameras and control logic for traffic signals, ramp meters, and tollbooths. DynaMIT, using all of this information, can do the following:

- estimate network conditions;
- predict network conditions in response to various traffic control measures and information dissemination strategies; and
- generate traveler information to guide travelers toward optimum decisions.

For example, the core of the DynaMIT system is the ability to predict future traffic snarls. Let's say that a New England Patriots football game is scheduled. A simulator equation can predict back-up and program variable message roadway signage and alert in-car navigation devices to give drivers a warning based on those predictions and provide motorists with alternate solutions to the back-up problem.

According to the MIT program, their system would include the following features:

- simulation-based dynamic estimation of the state of the network;
- predictions to generate information and guidance that account for the evolution of traffic conditions over time;
- detailed microsimulation (or enumeration) of drivers, facilitating fine distinctions in vehicle type and driver behavior;
- distinguishing between informed and uninformed drivers;
- individual simulations of each trip to generate detailed vehicle trajectories;
- use of historical, surveillance, and on-demand data to generate reliable on-demand estimates in real time;
- iterations between predicted network-state driver responses to information and the resulting network state and generation of a consistent information strategy;

- use of a rolling horizon to achieve efficient and accurate real-time estimations and predictions;
- generation of both descriptive and prescriptive information to help drivers easily adapt to specific requirements;
- handling of a variety of real-time scenarios, such as incidents, special events, weather conditions, highway construction activities, and fluctuation in demand; and
- recording valuable information obtained from previous on-demand estimations to update the existing on-demand database.

The Movement toward Truck-Only Lanes

How Truck-Only Lanes Work

Each of us has had the experience of driving at speed on a busy highway sandwiched between two 10-wheelers or cursing the truck spray on our windshields when ice and snow coats the roadway. Well, truck drivers also display a degree of anxiety when driving near passenger cars. Although large truck fatal crashes have been falling in terms of 100 million miles traveled when crashes do occur, according to the Federal Motor Carrier Safety Administration, 84% of all fatalities incurred were passengers in vehicles other than large trucks.

Segregating trucks from automobiles on the highway could result in fewer accidents between the occupants of passenger vehicles and large trucks because about 12% of all passenger vehicle occupant fatalities occur in crashes with those large trucks. U.S. DOT (2008) revealed the following statistics:

- Truck tractors pulling a single trailer accounted for 62% of all large trucks involved in fatal crashes.
- Doubles (pulling two trailers) made up only 3% of fatalities.
- Tractors pulling triples (three trailers) contributed to only 0.1% of all large-truck fatalities. This disparity has been explained by trucking companies as a result of assigning only their most experienced drivers to haul doubles and triples.
- Exceeding the speed limit was a factor in 25% of fatal crashes involving a large truck.
- No adverse weather conditions were reported for 87% of fatal truck crashes.
- The most harmful event was a collision with another vehicle in transport.
- In fatal two-vehicle rear-end crashes, passenger vehicles struck large trucks in the rear approximately three times more often than large trucks striking passenger cars in the rear: 16% versus 5%.
- Twenty four percent of fatal crashes that took place in work zones or areas under construction involved a truck.

A dedicated truck corridor (truck-only lanes, or TOLs) would accommodate larger long-haul trucks, allowing them to carry heavier loads and, along with evolving electronic traffic management technologies, could move freight cost-

effectively and safely over our highways. As traffic management systems progress, these TOLs can be revenue-producing, affording the trucker an opportunity to pay for the use of greater weight, size, and speed on these dedicated roadways. Trucking represents by far the largest segment of the commercial freight distribution network, carrying about 68% of all freight tonnage, and about 620,000 interstate trucking firms operate 14 million commercial vehicles.

From an economic standpoint, the creation of TOLs should aid the trucking industry immensely. TOLs would allow bigger and heavier truckloads to be transported and provide Congress with the rationale to increase the gross vehicle weight (GVW) from the current 80,000 lb mandated in 1975. Not only would trucks be allowed to carry bigger loads, but also this program would reduce the number of large trucks on the highways.

FHWA indicated that a seven-axle, triple 28-ft tractor-trailer with a GVW of 116,000 lb would be 20% more productive than a standard five-axle, 53-ft tractor-trailer with a GVW of 78,000 lb.

A nine-axle, twin 48-ft tractor-trailer with a GVW of 127,400 lb would be 24% more efficient, and both of these configurations would not only be more cost-effective and present much less wear and tear on the machine but would also present much less wear and tear on the driver.

These economic advantages, however, may be offset by the added costs to upgrade and update existing bridges to support these heavier loadings. Table 4-10 compares the movement of 500,000 lb of freight between two points using the following combinations:

- ten regular five-axle tractor-trailer trips;
- eight trips by a Canadian-style six-axle tractor-semitrailer (three axles on the tractor plus 3 axles on a tridem-axle semitrailer);
- seven trips by a Rocky Mountain double;
- six trips by a Canadian B double or a U.S. triple trailer; and
- five trips by a turnpike double.

The Corridors of the Future Looks at the Interstate 70 Corridor TOL Concept

The Corridors of the Future program, which is discussed more fully in Chapter 10, is supported by the U.S. Department of Transportation. That agency selected six pilot programs in 2007 as part of a large anticongestion initiative. The application of TOLs in the I-70 portion of the pilot program bears special attention because it deals with the movement of truck freight from the country's various marine terminals, and the transportation of goods across the United States is integral with the health of our economy.

The I-70 initiative, funded by $5 million from the Transportation, Community, and System Preservation (TCSP) program and the Interstate Maintenance Discretionary (IMD) program, proposes to provide dedicated and segregated truck lanes along the 750-mi (1,200-km) I-70 corridor from the Interstate 435 Beltway east of Kansas City, Missouri, to the Ohio–West Virginia border.

Table 4-10. Gross Vehicle Weight of Various Tractor-Trailer Combinations

	Tractor-Trailer	*Double*	*Canadian Tridem Semi*	*Rocky Mountain Double*	*Turnpike Double*	*Triple*	*Canadian Double*
Configuration	3-S2 5-axle	2-Si-T2 5-axle	3-S3 6-axle	3-S2-T2 7-axle	3-S2T4 9-axle	2-S1-T2 7-axle	2-S3-S2 8-axle
Trailers (ft)	Up to 53	2 × 28	48	48 + 28	2 × 48	3 × 28	2 × 32
Gross Vehicle Wt (thousand lb)	80	80	97	119	148	132	132
Empty Wt (thousand lb)	30	30	33	43	47	44	38
Payload (thousand lb)	50	50	64	76	101	88	94
Payload ratio Tractor/semi	1.00	1.00	1.28	1.52	2.02	1.76	1.87
Trips to move 500,000 lbs.	10	10	8	7	5	6	6

Source: Reproduced with permission from the Reason Foundation.

Both the TCSP and the IMD are programs initiated under SAFETEA-LU public law and are a part of the Federal Highway Administration, U.S. Department of Transportation. The mission of the TCSP is to investigate the relationships between transportation and state, metropolitan, and local governments, including tribal governments, and to identify private-sector initiatives to improve these relationships. The IMD provides funding for resurfacing, restoration, rehabilitation, and construction of added lanes to increase the capacity of existing interstate routes.

These TOLs would accomplish a number of goals:

- reduce the need for tractor-trailers to break down their loads to conform to weight and length restrictions imposed by various states;
- deploy longer combination vehicles, thus saving multiple trips;
- reduce the number of trucks on the road, which may have some environmental benefits;
- reduce the anxiety of passenger car drivers, who frequently feel threatened by these huge vehicles;
- reduce congestion on other roads since a combination truck takes up the same road capacity as up to eight cars; and
- remove trucks to segregated lanes, permitting them to have more uninterrupted travel, with all of the economic and environmental benefits that would follow because acceleration and braking of large trucks are much slower than those of most passenger cars.

Another concept that this TOL program could advance is something called "truck platooning." This concept envisions moving commercial vehicles on a

dedicated highway, allowing an entire platoon of trucks to be controlled as one unit. The basic concept of platooning is that of physically or electronically attaching driverless vehicles to a manually driven truck. If electronically attached to operate effectively and safely, the trucks would require significantly improved electronics, such as a vision-based sensor system both in the TOLs and on the platooned vehicles. These systems have not yet been fully commercially developed. Because more than 50% of fuel consumed by a conventional tractor-trailer is due to aerodynamic drag, if additional trailers are platooned behind the driver-operated tractor, this drag would be reduced; it has been estimated that fuel savings in the 10–20% range can be effected.

Dedicated TOLs combined with platooning and advanced electronic traffic management tools could be one solution to moving higher volumes of freight more cost-effectively, and the FHWA is taking a hard look at all of these potential options.

Is Technology the Solution?

Future federal or state funding sufficient to bring our highways and bridges back to serviceable condition does not look like it is in the cards. All 50 states need to look to technology innovations, such as HOV, HOT, and truck-only lanes, and the initiatives offered by the private sector to rebuild our highway system and prepare it for the demands the future holds. On Jan. 16, 2009, the FHWA signed the I-70 Corridors of the Future Development Agreement with the departments of transportation of Indiana, Missouri, Illinois, and Ohio. This agreement will provide and clarify the initial requirements and expectations among the approving agencies on how to develop, operate, and maintain the I-70 dedicated truck corridor. The next step will be to conduct a feasibility study to test the dedicated truck lane concept, perform a freight market analysis to quantify demand for the route, and complete an environmental impact study.

Colorado has been the most active participant in moving their portion of I-70 forward. They formed an organization known as Regional Economic Advancement Partnership, which has been holding meetings in 2010 to keep the counties along the I-70 Corridor alerted to the business opportunities that will be presented as this corridor develops. The other states through which the corridor will pass are taking a more cautious approach to improving their portion of I-70 because of the unsettled nature of funding available in 2011–2012 from both state and federal sources.

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CHAPTER 5

Virginia Department of Transportation

This chapter covers innovations in only one state, the commonwealth of Virginia, from the Virginia Highway Corporation Act of 1988 and working forward to the 21st century. The stories of the road projects are quite different, starting with the private and public Dulles Toll Road and the Dulles Greenway and including the Pocahontas Parkway, the Capital Beltway, and the ongoing Interstate 81 projects, among other projects.

An Early Innovator

The northeastern portion of the commonwealth of Virginia, particularly Fairfax and Loudoun Counties, blends into a small megalopolis that extends through the District of Columbia and reaches into Montgomery and Prince George's counties in the state of Maryland—and even further on to the city of Baltimore 40 mi (64 km) away. The transportation system in this area must be able to deal with huge movements of government employees and other commuters during the morning and afternoon rush hours, as well as substantial north–south commercial and vacation traffic flows that seem to increase every year.

The Virginia Department of Transportation (VDOT) has been aggressive and innovative in finding approaches to moving people and freight from point to point within its jurisdiction. VDOT recognized early on the value of bringing the private sector into the fold, enacting the appropriate legislation in 1988 to do so. In this chapter, I review that enabling legislation and then describe five significant projects: the public and private Dulles Toll Road in northern Virginia; the Pocahontas Parkway, southeast of Richmond; the Richmond Airport Connector, outside the state capital; the Capital Beltway HOV/HOT project, again in northern Virginia; and the Interstate 81 project along the state's western spine.

The Virginia Highway Corporation Act of 1988

The Virginia Highway Corporation Act of 1988 not only established the course of the Dulles Greenway but also provided the model for other public–private

transportation projects in the state. This act established the framework for present and future PPPs and included step-by-step measures to be initiated by respondents to requests for proposals (RFPs) relating to PPPs.

Major Provisions of the Act

A review of the salient points of this act can provide a look at the basic elements of any generic state agreement.

Powers of the Commission

The Virginia State Corporation Commission would supervise and control the concession operators' performance, approve initial toll rates, and consider applications for revisions to those rates but on its own initiative could require the operator to set tolls at a more reasonable rate. The commission would establish a reasonable rate of return to the operator and would charge the operator a small annual fee to cover the costs to review its operations.

The Application for a Certificate of Authority

The commission would set a fee to cover the cost to review and process an application to design, build, operate, and maintain a private toll road, whether it is ultimately approved or denied. The following items are to be included in any application:

1. the geographic area to be served and a topographical map indicating the route of the proposed roadway;
2. a list of property through which the proposed roadway will cross, including the names of the property holders;
3. the way the applicant plans to secure the necessary rights-of-way;
4. a complete and comprehensive plan indicating how this roadway will pass through all counties, cities, and towns in its proposed path;
5. the developer's plan to finance the project, the proposed toll rates, anticipated traffic flow, and details of how the distribution of funds will be made;
6. a plan for the operation of the proposed highway;
7. a list of all permits and approvals required for the project;
8. a description of the project design and all proposed interconnections with existing interstate, state, and local highways, as well as secondary roads and local streets;
9. a list of all public utilities that will be crossed or will need to be relocated;
10. a certification that the roadway design will meet or exceed VDOT standards;
11. a certification that the highway will be built within the timetable established for the project; and
12. completion and performance bonds in a form and amount satisfactory to the commission.

Power of Eminent Domain

The power of eminent domain would not belong to the proposed developer for the purpose of acquiring land for the project.

Powers and Duties of the Roadway Operator

The highway operator will be vested with the authority to operate the project, collect tolls, pledge any revenue net of operational expenses to repay obligations incurred during design, and undertake construction. Financing methods will be at the discretion of the developer, and repayment of loans will be effected by the collection of tolls. The state will have no responsibility whatsoever to assume any financial obligations of the operator.

The operator has the discretion, after receiving approval from the commission, to do the following:

- classify traffic to reasonable categories for the purpose of assigning toll rates;
- set minimum and maximum speed limits and exclude undesirable vehicles or cargoes from using the roadway, after consulting with and receiving approval from VDOT;
- establish commuter lanes for use during the day or any part of the day, after consulting with and receiving approval from VDOT; and
- do anything deemed reasonable and proper in the operation of a toll road, provided the practice is reasonable, nondiscriminatory, and meets with VDOT approval.

The operator also has responsibilities to do the following:

- file with the commission an accurate schedule of rates charged to the public, along with a statement that these rates will apply to all users within the designated vehicle classification;
- construct and maintain the roadway in accordance with the appropriate standards of VDOT and allow for periodic inspections of construction of new or existing conditions;
- cooperate fully with VDOT in establishing any interconnections with the roadway that VDOT plans to make; and
- contract with the commonwealth for enforcement of traffic and public safety laws and contract with local authorities for those portions of the roadway with their local jurisdictions.

Department Approval and Inspection Requirements

The Commonwealth Transportation Board is vested with the authority to approve or deny application for a certificate. The board acts on whether there is a public need for the roadway and whether it is compatible with the existing network of roads. Construction costs are reviewed to determine whether they are reasonable. If the project is approved, the board would enter into a comprehensive agreement

with the operator to review all plans, specifications, proposed maintenance practices, reimbursement of all VDOT direct costs, and assurance that the operator will fund an account to meet all of its financial obligations, including the establishment of a reasonable reserve for contingencies, maintenance, and replacement costs. The operator must reimburse the department for all services performed by VDOT on behalf of the operator, including, but not limited to, project development review costs and the cost to review any environmental impact statements submitted by the operator.

Insurance and Sovereign Immunity

The commission will determine the amount and form of public liability insurance required of the operator. The commonwealth does not waive its right of sovereign immunity as it relates to its participation in or approval of any portion of the proposed roadway application or operation, including the interconnection of the proposed roadway with existing highway systems. All counties, cities, and towns through which the proposed roadway will pass will also retain their sovereign immunity relating to the proposed roadway construction and operation.

Utility Crossings and Relocations

If the operator and the utility company cannot agree on the terms and conditions of a crossing or relocation, the commission will be called on to review the situation and render a decision.

Default

If construction has not begun within two years after the issuance of a certificate, the commission will hold a hearing to review all facts to determine if the delay is justified or if the certificate ought to be revoked. Any claims against the bond will take effect at that time, and if claims are made, the commission will receive the full proceeds and will take into account any costs incurred in connection with the completion or fulfillment of unperformed applicant obligations. Any surplus funds will be returned to the applicant.

Police Powers

The act provides for state police to patrol the roadways, even though portions may lie within the corporate limits of other jurisdictions. The operator and the Department of State Police must agree on reasonable terms and conditions for patrolling the roadway. Traffic and motor vehicle laws of Virginia apply to all persons and vehicles traveling on the roadway. These state police officers are under the exclusive and direct supervision of the Superintendent of State Police.

Termination of Certificate

The operator must provide the commission with a full disclosure statement concerning all financial arrangements within 90 days of the completion and closing of the original permanent financing and must advise the commission of the term of the original financing and its termination date. The authority and duties of the

operator cease and all highway assets and improvements revert to the commonwealth when the certificate of authority terminates.

The Act Amended

House Bill 1501—Amendment in the Nature of a Substitute, passed by the legislature in 1996, amends the Virginia Highway Corporation Act of 1988 in that it makes reference to the Public–Private Transportation Act of 1995 but does not materially change the provisions of the original act.

The Private and the Public Dulles Toll Roads

The Dulles Toll Road was built by the Virginia Department of Transportation in 1984. The toll road is an eight-lane, 16-mi (25-km) highway beginning at the Interstate 66 connector to the Capital Beltway and terminating at the Dulles Greenway, a privately held tolled highway just beyond Dulles International Airport. The Dulles Access Road, State Route 267, is a four-lane highway located in the toll road median that directs traffic to the airport.

The Dulles Greenway, which picks up where the toll road ends and continues west to Leesburg, Virginia, was a groundbreaking achievement for Virginia, which recognized early on the value of public–private partnerships before most other states in the union.

The Dulles Greenway

About 145 years ago, the first privately financed toll road was built in Virginia. The Little River Turnpike was constructed in the 1860s and ran about 34 mi (54.4 km) west from the city of Alexandria. In 1988, the Virginia legislature passed a law that allowed this private toll road concept to be reauthorized, and the new Dulles Toll Road Extension, known officially as the Dulles Greenway, was conceived.

This Dulles Corridor is an area that extends from Tysons Corner in Fairfax County to Leesburg, the seat of Loudon County, an area that experienced dynamic (some say frenetic) growth. Beginning in the early 1970s, Loudon County's growth climbed almost 100%, from 57,000 to more than 100,000 in 1994. The highways linking Fairfax County to adjacent Maryland and the District of Columbia had to keep pace with the rapid growth in this entire three-state area, and one of the first steps would be to increase traffic flow from Leesburg into the District of Columbia and Montgomery and Prince George's counties in Maryland.

But the story of the Dulles Greenway begins a little earlier than that. In 1950, it was becoming quite evident that the facilities at National Airport in Arlington, Virginia (now called Ronald Reagan Washington National Airport), were being taxed to the limit, and another facility, also located in Virginia, was planned. Dulles International Airport opened in 1962. Because planners knew that easy

access to and from the new airport was essential, the Dulles Access Road was constructed to connect Dulles to the Capital Beltway (to serve the Virginia and Maryland suburbs) and Interstate 66 (to serve downtown Washington, D.C.).

By the 1980s, VDOT envisioned a 14-mi (22.4-km) toll road from Leesburg to relieve the congestion on Route 5. To escape the congestion, drivers would have to pay a toll that VDOT established at $0.07 per mile, a figure that they felt could return a small profit after meeting the construction costs of $57 million. VDOT leased the Dulles Corridor right-of-way from the federal government and began planning for the new highway.

Two people provided most of the impetus behind an idea that morphed into the Greenway: John Miller, a guiding force behind the Municipal Development Corporation, a small New York-based company that was searching for ways to develop privatized infrastructure projects, and Bill Allen, a top executive of the transportation engineering firm of Parsons, Brinckerhoff, Quade, and Douglas. Allen, familiar with the growth potential of the area, and Miller, looking for private investment, began examining the potential for a toll road at the same time that Virginia's Governor Gerald Baliles put new transportation priorities at the top of his list.

In August 1986, the newly formed Commission on Transportation for the 21st Century issued a report and placed a $7 billion price tag on Virginia's transportation requirements. John Miller stepped forward as lawmakers began to wrestle with ways to raise this money. Along with Steve Pearson of the law firm of Hazel and Thomas, Miller presented to the commission a report with a compelling argument in favor of a privately funded toll road. This report formed the genesis of the implementation of Virginia's Highway Corporation Act of 1988 and with it, the Dulles Greenway Project.

The Project Develops

The Toll Road Corporation of Virginia was formed after the 1988 act was enacted. The driving force behind this new venture was Magalen O. Bryant, heiress to a family fortune amassed by her father, who was not only a successful stockbroker but also built a substantial conglomerate that included Dover Corporation, the elevator manufacturer, and the Carlisle Companies, manufacturers of single-ply membrane roofing systems.

As the owner of Locust Hill Farms, a horse-breeding estate near Middleburg, Virginia, Bryant was a confirmed environmentalist. It was mainly through her efforts that during the course of construction, wetlands would be restored, natural habitats would be re-created, and trees cleared outside of the right-of-way would be replaced on a 1:1 acreage replacement basis. Goose Creek was a particularly sensitive area, and piers supporting the bridge were required to be located on shore instead of in the water. Turbidity testing of the water in Goose Creek was monitored twice daily during the active construction period; all under the watchful eyes of Mrs. Bryant.

Today, the Greenway concession is owned by Toll Road Investors Partnership II (TRIP II), a limited partnership. In September 2005, a subsidiary of Australia's

Macquarie Bank, Macquarie Infrastructure Group (MIG), invested $533 million in loans to TRIP II, and in December 2006, MIG completed the sale of its 50% financial interest in the Dulles Greenway to Macquarie Infrastructure Partners, which subsequently holds a 50% interest in the Greenway.

Postconstruction Performance

When the Greenway opened to the public on Sept. 30, 1995, then-CEO Charlie Williams, a retired U.S. Army Corps of Engineers general, said that operation and maintenance costs of $1.2 billion would be paid for out of toll revenues. Table 5-1 shows that the actual revenues may not achieve that goal. Benefits to the state would include the Greenway business entity paying more than $1.3 billion in federal and state income taxes over its period of operation.

As with many projects, both public and private, initial estimates of expenses and income can often be unrealistically calculated either by design or by overexuberance of their proposers, as was the case of the Greenway. According to the September 2007 issue of *PW Financing*, the outstanding debt of the Greenway as of Dec. 31, 2006, was $909 million, and even with the higher toll rates initiated in 2006, the rate of return for investors was only 0.62%.

However, the provisions of the 1988 act would allow the Greenway to increase its tolls even further. The act set three conditions for approving rate hikes:

1. The investors can make no more than a "reasonable" return on their investment (and 0.62% can certainly not be deemed reasonable).
2. The increase in rates will not "materially discourage" users of the roadway.
3. The rate structure is "reasonable" in relation to user benefit obtained.

Table 5-1. Traffic and Toll Revenues on the Dulles Greenway, 1996–2009

Year	*Traffic (thousands of vehicles)*	*Annual Toll Revenue (millions)*
1996	17.4	$6.3
1997	23.8	$8.8
1998	27.6	$11.3
1999	33.9	$14.0
2000	39.8	$19.7
2001	44.5	$22.9
2002	47.8	$26.0
2003	52.3	$32.9
2004	60.8	$40.2
2005	61.2	$44.5
2006	57.3	$55.4
2007	55.26	$56.1
2008	52.82	$56.5
2009	49.42	$63.8

Source: Reprinted with permission from http://www.tollroadsnews.com/node/4880.

In fact, as we shall see, tolls were increased, and a new program was instituted to encourage increased usage of the Greenway. Table 5-1 reveals that even in the face of slightly decreased usage in 2009, annual revenue increased.

In fact, in April 2006, Fitch Ratings, a global credit rating agency, issued a report on U.S. toll-road projects to affirm its BBB bond rating for TRIP II (Fitch 2006). The Fitch analysts looked at traffic count and revenue for selected periods of 2005 and 2006 and saw favorable trends. Business Wire (2006) indicated that part of Fitch's BBB bond rating was based on the strong economy and populations in Loudon County, which would increase demand for the Greenway. For example, traffic grew at an average of 13% between fiscal years 2000 and 2006. Traffic flow declined by 6.6% during the first three quarters of 2006, most likely in reaction to a $0.30 toll increase that took place on Jan. 1; the drop of 6.6% may have been just a reflection of that. Typically, toll-road rates are elastic in the short term; when rates increase, motorists balk at first but later resume their driving patterns. On the revenue side, Fitch reported that revenue for the first three quarters of 2006 was up 20.8% compared to 2005 and that 2005 revenue was almost 12% higher than 2004 revenues.

On Oct. 24, 2008, Fitch Ratings again affirmed its BBB rating on TRIP II insured revenue bonds. These bonds are secured by a net pledge of toll revenue collected at the Greenway's mainline and ramp toll plazas. The BBB rating reflects the strong economic and population growth potential of Loudon County. However, Fitch Ratings underscored the need for another toll increase so that investors would receive an acceptable return on equity.

The Process of Increasing Tolls

When the Greenway concept was approved in 1990, the Virginia State Corporation Commission approved a $2.00 toll, then halved it one year after the highway opened because traffic count was less than anticipated. The low traffic count could be attributable to the lag that accompanies any start-up venture, where word of mouth is needed to bring in business; it could also have been the result of an economic slowdown in the area. Ann Huggins-Lawler, Marketing and Public Relations Manager for the Greenway, issued a press release on July 19, 2006, indicating that TRIP II had requested the following toll increases for the base two-axle vehicles and also introduced a congestion management toll applicable only to weekday traffic during peak travel periods in both east and west travel lanes:

Date	*Toll before Date*	*Toll after Date*
Jan. 1, 2009	$3.40	$4.00
July 1, 2010	$3.70	$4.50
Jan. 1, 2012	$4.00	$4.80

Trucks with three or more axles would also face increases incorporating congestion management tolls when applicable.

Not surprisingly, the request experienced a public backlash, and a strong one came from Frank R. Wolf, a Republican congressman from the 10th District. Wolf stated,

> I oppose this increase because it will make this major commuter route one of the most expensive toll highways per mile of travel in the country. A toll of $4.80 on the 14-mile Greenway equates to 34 cents per mile.
>
> Let me give you some other comparisons:
>
> - 1-95 in Maryland—5 cents-per-mile.
> - The New Jersey Turnpike—less than 6 cents-per-mile.
> - Indiana Toll Road, also owned by the same Macquarie company—less than 3 cents-per-mile.
> - Powhite Parkway in Virginia—14 cents-per-mile.
> - Massachusetts Turnpike—less than 5 cents-per-mile.
> - Pennsylvania Turnpike—less than 6 cents-per-mile.
>
> I just don't believe that allowing this company to turn the Greenway into a cash cow is what a public–private partnership should be. The thought "price gouging" comes to mind (Wolf 2006).

Despite the objections of Wolf and others, the toll increase was approved. The commission's final order had some straightforward assessments. The hearing examiner wrote,

> Based on the Greenway's 2006 traffic count totals and assuming that toll rates were already established at $4 for cars and $14 for trucks as of January 1, 2006, TRIP II's net income would have been $8,465,000, a return of approximately 0.62%. This is hardly a "cash cow" enterprise nor "highway robbery," as some of the public witnesses have asserted (VSSC 2007, 4).

The commission found that the proposed toll structure, with its ceilings for two-axle and other vehicles and its phase implementation satisfied the statutory criteria and should be approved. The commission agreed that the introduction of congestion pricing would promote the efficient use of the Dulles Greenway. The congestion management premiums would apply to weekday traffic traveling east in the 6 A.M. to 9 A.M. period and west in the 4 P.M. to 7 P.M. period. Effective Jan. 1, 2009, the base toll of $3.40 became a congestion price of $4.00 during peak periods.

The current 2010 toll rates as posted on www.dullesgreenway.com/toll_rates.shtml also incorporate what they refer to as their VIP program. Tolls for the entire length of the Greenway as of July 1, 2010 are as follows:

Type of Transaction	*Two-Axle*	*Three-Axle*	*Four-Axle*	*Five-Axle*
Cash	$4.45	$8.40	$10.50	$12.60
E-ZPass	$4.45	$8.40	$10.50	$12.60
Congestion 6:30–9:00 A.M. eastbound, 4:00–6:30 P.M. westbound	$5.25	$10.00	$12.50	$15.00

The VIP program provides a 5% discount for those drivers who travel the Greenway frequently, acting as an incentive to encourage more usage. The reward is based on the number of trips accrued. For example, a driver making a round trip every day during the work week would accrue 10 points. A driver needs 180 trips during a 12-month period to qualify for the 5% cash-back check. The trips are recorded automatically when drivers use their Virginia E-ZPass transponders. Assuming two-axle travel (automobile, SUV, or pickup truck) conducted during noncongestion pricing periods, the travel would cost the motorist $801.00. The VIP program would return a $40.05 dividend by automatically sending the driver a check at the end of the 12-month period.

The Dulles Toll Road, Dulles Access Road, and the Metropolitan Washington Airports Authority

The Dulles Toll Road and its toll-free twin, the Dulles Access Road, run from the Greenway to the Capital Beltway. The flow of traffic through this transportation corridor is of vital interest to the Metropolitan Washington Airports Authority (MWAA), which operates Dulles International Airport, as well as Reagan Washington National Airport. MWAA was established in 1987, when it was given 50-year leases on both airports by the Federal Aviation Administration.

MWAA is self-supporting and takes no taxpayer funding; it uses aircraft landing fees, rents, and concession revenues to fund its operating expenses. MWAA is a big organization. In 2007, it saw revenues of $385.2 million, a $39.4 million increase over 2006. Car rental revenue was up $3.9 million, and beverage revenue was up $1.9 million. With operating expenses of $336.8 million, operating income was $48.4 million, slightly lower than the previous year. A capital expansion program at Dulles Airport, which includes building a new control tower, a fourth runway, and an underground train system, is funded by bonds issued by the MWAA and federal and state airport improvement program funds.

In addition to serving the airport, the Dulles Toll Road provides commuter access between Fairfax County and adjacent Loudon County to the District and Montgomery and Prince George's counties in Maryland, all fast-growing areas. Loudon County population alone is predicted to increase 150% by 2025, and the number of passengers using Dulles Airport is expected to grow from 27 million to 55 million. Dulles corridor employment is anticipated to increase 63% over the next two decades.

The Dulles Corridor Metrorail Project

All of these statistics spurred on the movement to extend the Metrorail service along the Dulles corridor. Metrorail is a commuter rail system operated by the Washington Metropolitan Area Transit Authority (WMATA). The Metrorail upgrade, when built, would extend the existing system another 23 mi (36.8 km) west to provide a seamless 106-mi (170-km) system with a one-seat ride from Route 772 in Loudon County all the way into downtown D.C. The program would be spread over two phases, starting with obtaining funding in June 2007 and con-

tinuing with utility relocation later that year, with a construction start some time in 2008. Needless to say, such a project attracted the attention of public and private interests. The Virginia Department of Rail and Public Transportation originally intended to transfer control of the project to the MWAA (not WMATA) in 2008. But things did not work out as planned.

Phase 1 included procedural, planning, and construction steps. First, the Fairfax County supervisors would approve operating and funding the plan, with the Loudon County supervisors following suit. Then, WMATA would approve the operation and financial agreements. After that, MWAA would step in to sign a design–build contract. The initial construction would include five new stations and 11.6 mi (18.6 km) of rail, plus pedestrian bridges, escalators, and elevators at all stations. Phase 2 would see six new stations and an additional 11.5 mi (18.4 km) of rail, resulting in direct access to Dulles Airport.

Through the MWAA Public Affairs Office memo dated Dec. 20, 2005, James E. Bennett, president and CEO of the Airports Authority, was quoted as saying,

> The Airports Authority has played an integral role in the development of the Dulles Corridor. The existence of Washington Dulles International Airport is the catalyst that has led to the development of much of Northern Virginia. We believe the economic future of this corridor and the future success of the Airport depend on a visible road and mass transit network. This will only happen if there is an investment in both improving the Dulles Toll Road and complementing that road with rail to Loudon County.

An Unsolicited Proposal under VDOT's 1995 PPTA Act Generates Much Interest

For many years, the MWAA expressed an interest in extending the Metrorail commuter rail line to Dulles Airport and beyond, along with a desire to improve the Dulles Toll Road. This intent was quickly picked up by several concessionaires, and on July 26, 2005, VDOT received an unsolicited offer from the Dulles Corridor Mobility Initiative (DCMI), a consortium composed of Macquarie, Autostrade (the Italian toll-road operator that provided toll consulting at the Dulles Greenway), and Laing Infrastructure Investment Group.

The Proposers

Upon receipt of this unsolicited proposal, VDOT determined that the proposal met all legal and policy requirements for an initial review. They accepted the proposal and on July 28, 2005, invited other private firms to submit competing ones, setting Oct. 28, 2005, as the closing date for acceptance. After DCMI, four teams responded and submitted proposals:

- Macquarie/Autostrade,
- Cintra USA/Ferrovial,
- Louis Berger Group/Cofiroute USA, and
- Transurban/Goldman Sachs/Fluor.

The offers were detailed, each one containing provisions to entice the commission into exploring them further; a few of those enticements are listed below:

Dulles Corridor Mobility Initiative

The DCMI proposal, submitted in July and resubmitted in Oct. 2005, included, among other detailed segments, the following:

- DCMI would seek a 50-year concession to "improve, operate, and maintain the Dulles Toll Road (DTR)" and assume all expenses and revenue.
- Ramp, roadway, toll plaza, sound wall, resurfacing improvements, and automated vehicle identification systems would be installed.
- DCMI would pay Virginia's supported share to fund construction of the Metrorail service to Dulles and into Loudon County and would accept responsibility for all DTR bonds and repayment of the Fairfax County note.
- The initial DCMI investment would be more than $1 billion.

Cintra: Cintra USA/Ferrovial Agroman, and Hatch Mott MacDonald

The proposal from Cintra et al., composed of Cintra USA/Ferrovial Agroman, and Hatch Mott MacDonald, included, among other components, the following:

- Cintra et al. would have a 50-year concession term that included all expenses, revenue collection, and other standard concessionaire provisions.
- Ramps, roadway widening, and interchange improvements, including flyover ramps to improve access to DTR, would be made. All improvements would be made over a five-year period.
- The concession payments would be designed to cover the state's share of Metrorail Phases 1 and 2 (which, according to the Dulles Metrorail website, indicated full funding at $900 million), the DTR note, and the Fairfax County note.
- The proposed financial plan was based on current toll rate schedules.

Dulles Express LLC: Franklin L. Haney, Louis Berger, Cofiroute USA, Infrastructure Corporation of America, TransCore, Merrill Lynch, and McGuireWoods

The Dulles Express LLC proposal contained the following provisions:

- Dulles Express LLC would have a 50-year concession term with assumption of Dulles Airport Access Road operations and maintenance.
- They would build two new toll express lanes in each direction on the DTR.
- They would pay a concession fee of $267 million for Phase I of the Metrorail and $450 million for Phase II.
- They would assume all routine maintenance and operating expenses for the DTR, Dulles Airport Access Road, and the toll express lanes, including toll collection and funding for the Virginia State Police enforcement for the entire 50-year term of the concession agreement.
- They would pay $5.7 billion in total benefits to the commonwealth.

Dulles SmartLink: Transurban, Goldman Sachs, Fluor, and VMS

Dulles SmartLink's proposal included the following:

- Dulles SmartLink would have a 50-year concession term to collect tolls and assume operation and maintenance of the DTR.
- They expected an estimated $1.2 billion concession, assuming a programmed toll increase of $0.25 in 2010.
- They would convert HOV lanes to HOT lanes and introduce open tolling.
- Their enhanced option offer was estimated to be $3 billion based on the moderate escalation of tolls over time.

MWAA Keeps Its Crown Jewel in the Public Domain

The private developers' proposers may have succeeded in doing such a good job in stating their case for a concession-type agreement that they merely confirmed the high value of this project, furthering the desire for MWAA to keep such a profit-making endeavor in the public sector. After these four proposals were reviewed by the independent review panel created by the state's Secretary of Transportation along with a proposal submitted by the MWAA, on March 27, 2007, Governor Timothy M. Kaine announced that an agreement with the Metropolitan Washington Airports Authority had been reached giving the MWAA responsibility for the Dulles Toll Road and completing the Dulles Corridor Metrorail project.

The Work

The airports authority would do the following:

- expedite completion of the Dulles Metrorail project in the corridor to Dulles Airport and beyond to Route 772 in Loudon County;
- acquire from the commonwealth its easements in the corridor, including the Dulles Toll Road, all of which is constructed on those easements;
- assume all operational responsibility, including toll rate setting, for the DTR;
- assume all outstanding debt on the DTR;
- take responsibility for the commonwealth's remaining share of financing for Phases I and II of the Dulles Metrorail project;
- finance and construct needed improvements to the toll road and Dulles corridor; and
- retain for transportation uses in the Dulles corridor all revenue generated by the toll road.

James E. Bennett, president and chief executive officer of the Metropolitan Washington Airports Authority, stated that it was important that all revenues of the toll road continue to remain in the corridor to be used for transportation improvements in the public interest, particularly expedited rail service to Dulles Airport. On July 11, 2007, the MWAA held two public hearings in which they stated that the proposal would make no changes to the existing tolls on the Dulles Toll Road and the airports authority would retain the same tolls that were in effect at that time.

For the Metrorail project to move ahead, Virginia would need to look for $900 million in New Starts funds from the Federal Transit Authority (FTA) of the U.S. DOT, along with $580 million in a TIFIA loan for this 23-mi (36.8-km) Metrorail extension project estimated to cost $5.1 billion.

The New Starts Program

The FTA, authorized under SAFETEA-LU, contained $6.6 billion funding for fiscal years 2006–2009. It is the federal government's primary financial resource for supporting locally planned, implemented, and operated major transit capital improvements. This program funds new systems and extensions to existing fixed-guideway transit systems throughout the country and includes projects such as commuter rail, light rail, heavy rail, bus, rapid transit, streetcars, and ferries.

The Application Process

The process for an application for funding is broken down into three phases:

- Phase I—Local sponsors are required to analyze alternatives and evaluate the mode and alignment options for the particular corridor in the community for which funding is requested. This phase is satisfied when the local and regional decision makers select a locally preferred alternative that is also approved by the appropriate metropolitan planning organization for the area.
- Phase II—This stage involves a preliminary engineering (PE) phase, focusing on project cost, benefits, and impact. During this PE phase, local sponsors are required to finalize management plans, demonstrate their technical capabilities to develop the project, and commit local funding sources.
- Phase III—This last phase in the process includes preparation of final construction costs, detailed specifications, and bid documents.

Qualifying for New Starts

To qualify for New Starts funding, applicants are assigned ratings: high, medium-high, medium, medium-low, and low. Each of following six project justification criteria are examined and rated:

- mobility improvements: travel time benefits;
- environmental benefits: changes in pollutant emissions, energy consumption, or air quality;
- cost-effectiveness: cost per hour of travel time saved;
- operating efficiencies: operating costs of travel time saved;
- transit supportive land use and future patterns, measured by comparing existing land use, transit supportive plans, and policies and performance; and
- other: the projected economic impact of the project.

The U.S. Department of Transportation began to look askance at this Metrorail project. In late July 2007, the U.S. DOT's inspector general issued a statement that the first 18.7 km (11.6 mi) had an unacceptable cost-effectiveness rating of "low" and the application for funding under the New Starts program was not favorably received by U.S. DOT.

The Federal Transit Authority (FTA) Stalls the Project

On Jan. 28, 2008, James S. Simpson, administrator of the Federal Transit Authority, sent a letter to Governor Kaine of Virginia advising him that the Metrorail program did not meet FTA's statutory requirements. In the last paragraph of this letter, Simpson summed up the agency's concerns about the project. (The letter is available in full at http://www.fta.dot.gov/documents/Kaine.1-28-08(1).pdf. He stated,

> As explained in my January 24, 2008 letter to you, the project has received an overall rating of "Medium-Low," which, by FTA regulation, is insufficient to advance the Project. Aside from the New Starts rating, FTA's analysis of the Project's multi-organizational management structure and Design–build contract—both of which are not directly focused on in the PMOC's [project management oversight contractors] reviews—highlight a number of organizational and management risks that threaten MWAA's ability to implement the current project scope, schedule, and budget. As I wrote to you then "FTA is concerned that the cumulative risks and uncertainties that characterize the Dulles Project in its current form are extremely likely to result in further cost escalation and schedule delay." Nothing in the PMOC reports refutes this concern.

Governor Kaine sent a letter to Secretary of Transportation Mary Peters on Feb. 1, 2008, addressing all of the points in Administrator Simpson's January letter and suggesting that their staffs work together to analyze the issues raised in Simpson's letter in an attempt to get the project up and running.

The Project Moves Ahead

The governor's perseverance paid off. As a result of the collaboration between state and federal officials and the financial stability of the project, due to cost reductions and increased project oversight, the Secretary of Transportation responded to Governor Kaine in a letter dated Apr. 30, 2008, stating that Congress would advance the Dulles Corridor Metrorail project into final design stage. However, in the last paragraph of her letter she stated, "But we believe that the Project still represents substantial risk to the taxpayers and we urge you to continue efforts to reduce public exposure and transfer risk from the public to the private sector."

On May 12, 2008, FTA committed $159 million to be used for project engineering and design, right-of-way acquisition, and engineering and design costs for rail cars and project administration.

The Pocahontas Parkway PPP

What started out in 1980 as a concept to build a multilane, east–west highway to connect Interstate 295 to Interstate 95 near the Richmond, Virginia, airport quickly turned to a public–private project when Virginia, even with the tentative approval

of some federal funding, realized that it did not have enough money to move forward with the project. To cross the James River, a bridge would have to be constructed with a high enough span to allow shipping vessels to access the port of Richmond. This Pocahontas Parkway project did not get off the ground until 1998. The original plan was to build the project as a design–build–finance toll road, but this plan was later changed to design–build–finance–operate–maintain.

VDOT had investigated the need for this bridge and highway project southeast of Richmond since 1980; the need was there, but the funding was not. In 1995, Fluor Daniel saw an opportunity to use their resources to submit an unsolicited proposal to design–build–finance this project as a toll road under Virginia's current PPP legislation.

Fluor teamed up with Morrison Knudsen to create a joint venture for the project, and VDOT created the Pocahontas Parkway Association (PPA) to administer the project. The PPA, a nonprofit corporation, used what the Internal Revenue Service (IRS) calls their 63–20 ruling. Under the IRS 63–20 ruling, state and local governments have the right to finance public projects through a nonprofit corporation that issues debt on behalf of the government sponsor. As a 63–20 corporation, the PPA had the authority to issue tax-exempt bonds to raise the $354 million needed for the project and, in doing so, shifted the responsibility for repayment of those bonds from the commonwealth to the private entity. Repayment was based solely on toll revenue from users of the parkway. (Under the design–build contract with a guaranteed maximum price that finally evolved, Fluor returned $10 million to VDOT on completion).

The tax-exempt bonds issued by this corporation would pay the construction costs for the four-lane, 8.8-mi (14-km) highway and its 675-ft (205-m) clear-span bridge. The bondholders would be paid from toll revenue, not by taxpayers, so the commonwealth had no financial risk in the project.

A direct connection from the Parkway to Richmond International Airport was also in the planning stages for the first part of 2000.

The Toll Schedule

The plan used a $2.00 toll as of 2000, increased by $0.25 in 2003, 2006, 2010, and 2013. Based on a traffic study for this greenfield project, 20,000 vehicles per day were projected when the parkway and the James River Bridge opened in 2000. Revenue projections by Wilbur Smith Associates were prepared without and with a direct airport interchange (Table 5-2).

Australia's Transurban and DEPFA BANK Get Involved

When the parkway opened to traffic in 2002, toll revenue proved insufficient to service the $324 million debt, and VDOT had what looked like a losing proposition on their hands. Enter Transurban, an affiliate of one of Australia's most successful toll-road operators. In October 2004, Transurban and DEPFA BANK made an unsolicited proposal to VDOT to operate, maintain, and perform major

Table 5-2. Construction Costs without and with the Richmond Airport Interchange

Year	*Costs without Airport Interchange (millions)*	*Costs with Airport Interchange (millions)*
2000	$12.49	$13.9
2003	$20.4	$22.6
2006	$26.7	$29.5
2010	$34.2	$37.6
2013	$41.5	$45.6

Source: Pocahontas Parkway Authority.

repairs on the parkway in return for a long-term concession agreement to include toll collection. DEPFA BANK, a Dublin, Ireland, based bank serving public-sector companies, is a 100% subsidiary of Hypo Real Estate Group, a German real estate holding company based in Munich.

The Memorandum of Understanding

In June 2005, an exclusive memorandum of understanding was signed among the parties, and in May 2006, VDOT announced that Transurban had acquired the rights to enhance, manage, operate, maintain, and collect tolls on the Pocahontas Parkway. The benefits of the transaction included the following:

- voiding the existing PPA bonds and repaying all other debt associated with the highway project;
- removing the obligation of VDOT to fund operations and maintenance expenses;
- creating a flexible refinancing structure;
- improving customer satisfaction;
- facilitating delivery of the Richmond Airport Connector, which would tie into the Pocahontas Parkway;
- reopening the city of Richmond to more growth; and
- opening up the nearby Wilton Farm area to residential and commercial development that will ultimately provide 3,200 dwellings and 200,000 ft^2 (18,580 m^2) of commercial space.

This project made a rather convoluted entry into the Commonwealth's 1995 Public–Private Transportation Act, and although it was owned, administered, and maintained by VDOT, most of the toll revenues were directed to a nonprofit group. The Pocahontas Parkway Association (PPA) was organized to issue tax-exempt bonds. Only a portion of the parkway was opened at first, and no tolls were levied for several weeks. The opening of the parkway did not come off successfully, and when traffic flattened, it appeared that reduction of debt would not be in the cards.

The Current Financial Structure

In June 2006, the Commonwealth concluded 18 months of negotiations with Transurban, providing for a $191 million equity commitment: $136 million at closing and $55 million over the next six years. The concession-type agreement called for a 99-year lease, giving Transurban sole rights to manage, operate, maintain, and collect tolls. As part of the $611 million deal with VDOT, Transurban defeased all of the project's underlying debt and even paid VDOT for maintenance costs incurred before the lease.

This Transurban long-term lease is financed by a $195 million equity loan; total funding of $611 million consisted of funds to be used as follows:

- bond payout, $487 million;
- operational enhancements, $8 million;
- development fees, $13 million;
- financing and arranging fee, $11 million;
- major maintenance reserve, $2 million;
- reserves (contingency fund), $90 million; resulting in
- total, $611 million.

The projected traffic was anticipated to grow from 10,000 vehicles daily in 2002 to 33,000 vehicles daily by 2012. A toll schedule was fixed for the period January 2006 to January 2016 (Table 5-3).

After 2016, increases will be between 2.8% of the consumer price index or real gross domestic product per capita, whichever is higher. Although this project was supposed to be Transurban's first venture into the U.S. market, Transurban had eyes on getting involved in more PPP projects in this country and is actively engaged in several other endeavors in Virginia.

On July 12, 2010, Transurban issued a media release advising motorists that cash will no longer be accepted at the Laburnum ramp. About 50% of the customers using Pocahontas 895 are already using E-ZPass; this is an additional step to convert the entire parkway to a noncash basis. The initial rate schedule as shown in Table 5-3 has been modified slightly. Although it reflected a rate change in 2007 with the next one occurring Jan. 1, 2011, a $0.25 increase was announced on Dec. 19, 2008, and was put into effect on Jan. 5, 2009.

Table 5-3. Toll Rate Schedule through January 2016

	Jan 1, 2006	*Jan 1, 2007*	*Jan 1, 2011*	*Jan 1, 2013*	*Jan 1, 2014*	*Jan 1, 2015*	*Jan 1, 2016*
Main line	$2.25	$2.75	$3.00	$3.25	$3.50	$3.75	$4.00
Ramp	$0.75	$1.00	$1.25	$1.50	$1.75	$2.00	$2.25

Source: Pocahontas Parkway Authority.
Note: Rates are for two-axle vehicles; for each additional axle, add $1.00.

A Transurban news release dated Oct. 13, 2010, revealed that for the September 2010 quarter, Pocahontas toll revenue remained constant at US$3.6 million and average daily trips increased 2.1% to 14,400.

The Richmond Airport Connector

The James River Bridge linking I-95 and I-295 also creates a southern bypass of the city of Richmond. It provides a link that would connect to the Richmond Airport and that may have been what Transurban had in mind when they signed the parkway deal. This airport link had been in the works during that time, and funding for what is now called the Route 895 Airport Connector project was finally secured in 2007. It involved a $150 million TIFIA federal loan and some private financing. The 1.6-mi (2.56-km) connector would provide improved access to the airport, allowing travelers to bypass three sets of traffic lights and a rail crossing to head directly into the airport. Transurban will build, operate, and maintain the connector, and this road should enhance the value of the parkway since it already provides a shortcut to the Richmond Airport.

Groundbreaking on the Pocahontas Parkway airport connector was announced by Transburban on Dec. 2, 2008, and was attended by the chiefs of the Chickahominy, Eastern Chickahominy, and Upper Mattaponi Indian tribes. These Native American groups performed the Blessing of the Ground ceremony with a ritual dance and a drummer who sang along in the traditional Algonquin language. This 1.6-mi (2.6-km) $49.75 million road is scheduled to be complete by March 2011, according to a June 1, 2010, Transurban Airport Connector Update press release.

The Capital Beltway

As populations grow and businesses prosper, even those six- and eight-lane highways get crowded and commute times climb dramatically. In many cases, we find we can't widen the roads or add new commuter rail stops because they require expansive and expensive land acquisition, so we look to other means. In the Washington, D.C., area, the need was sooner rather than later, since traffic in the metropolitan area is projected to increase by 32.4% between 2000 and 2025.

Many people who work in D.C., northern Virginia, or nearby suburban Maryland can't afford to live there. Some of Virginia's counties are pretty pricey, as evidenced by Loudon County's median income of $86,000 (median means that half are above and half below) and Fairfax County's of $85,000; nearby Montgomery County, Maryland, has a $75,000 median income.

The highway system serving northern Virginia, Maryland's nearby suburban areas, and the District of Columbia forms a nexus where I-95 from the north feeds into the Capital Beltway (I-495) as Interstate 395 skirts D.C. to the south before entering northern Virginia and reconnecting with I-95, speeding interstate travelers to points south.

The major movement of interstate travel from north to south in this area is exacerbated by the plethora of government offices, high-tech corporations, normal

commercial and retail business operations, and the large residential areas that ring this three-state region, creating a mighty heavy traffic flow, especially at morning and evening rush hours.

The Capital Beltway Study

The Virginia DOT began to develop a series of short-term and long-term recommendations for the Capital Beltway in the late 1980s, and a major investment study was completed in 1994, which recommended the use of high-occupancy vehicle (HOV) lanes and bus transit as the most effective way to improve that roadway's problems. The Federal Highway Administration (FHWA), viewing environmental assessments followed by preliminary engineering studies, indicated that a larger footprint would be required and the environmental impact would be much greater if this plan were to be implemented.

Three main HOV alternatives and 15 concepts were developed and, in 2002 dollars, costs ranged from $2.68 billion to $3.25 billion. In addition, 170 acres of new right-of-way would be required, all in high-price areas. About 300 residences would be displaced and 32 commercial properties, 8 public parks, a school athletic field, and a historic property would be affected. In the summer of 2002, VDOT held three public hearings and presented alternatives, which were subsequently rejected by both the public and Fairfax Country officials.

Fluor Corporation Offers a Proposal

Representatives of the local office of Irvine, California, based Fluor Corporation attended those public hearings and, using Virginia's Public–Private Transportation Act of 1995, submitted an unsolicited proposal suggesting a fourth alternative to include high-occupancy toll (HOT) lanes, which would significantly reduce the displacement and cost of widening the beltway.

Their proposal was temporarily shelved while VDOT pursued environmental studies and took a close look at the HOT lane concept. VDOT subsequently developed two revised alternatives: a 10-lane concept that would add two new HOT lanes and a 12-lane concept adding four new HOT lanes.

In 2004, VDOT held two environmental workshops, and both local government officials and public comments favored the 12-lane concept; 54% of written comments favored widening the beltway, and 42% favored the HOT lane concept.

When all of those topics and associated costs were added up and public concerns were addressed, the scope of the project was scaled back. Right-of-way requirements were reduced by minimizing shoulders, replacing physical lane barriers with painted strips, and limiting interchange improvements. The first two changes represented significant safety improvements over existing conditions since a small number of interchange ramps were unable to achieve current design standards.

On Apr. 18, 2006, the final environmental impact study (EIS) was signed by FHWA. The selected alternate in the final EIS called for four general-purpose

lanes and two HOT lanes in each direction. The general-purpose lanes would be separated from the HOV–HOT lanes by a four-foot painted strip with frequent yellow delineators.

The HOV/HOT Lane Movement in Virginia

In 1969, a reversible two-lane bus roadway was created in the median strip of the Shirley Highway in northern Virginia, the first such highway in the nation with a dedicated bus lane. In 1981, this lane was opened to carpools and vanpools carrying more than four people. The concept proved popular because it promised to move greater volumes of people at higher levels of service by encouraging multiple-person vehicle travel, reducing the number of vehicles on the road and thereby speeding up travel time. Environmentalists saw this HOV concept as a way to reduce air pollution.

But elected officials were besieged to convert those dedicated lanes to general use, and environmentalists questioned whether air quality was actually improved. The HOV lane concept began to wane. When there were too few vehicles using the HOV lanes, other travelers saw those lanes as underused and demanded that they be used for regular traffic. One motorist said, "I'm looking at HOV now and two out of every five vehicles have only one person in them." Gradually several states abandoned the HOV concept; in 1999, Virginia lifted those restrictions on some local roads in the Hampton Roads area.

The HOT lane concept was introduced in the United States in 1993; these HOT lanes operated alongside regular highway lanes, much like the once-touted HOV lanes. Tolls were used to regulate traffic by changing rates to manage the flow of motorists who chose to pay to avoid congestion. High rates were charged in the normal morning and evening commute times, and lower rates were charged during off-peak hours.

Because HOT lanes permit buses and carpools to ride for free, they essentially operate as virtual bus lanes, similar to the earlier Shirley Highway bus lanes, except that they are not exclusively for busses and the construction cost is paid by the toll payers.

The Efficacy of HOT Lanes

As a result of the 2002 Fluor HOT lane proposal and the favorable press reaction, a study conducted by Washington, D.C., based Resources for the Future (RFF) in 2003 was prepared (Safirova et al.). It received a lot of media attention. This was the first article in the Urban Complexities series of Issue Briefs by researchers at RFF. The researchers found the following:

- HOT lanes tend to improve traffic flow in the restricted and free lanes.
- The application of tolls in the HOT lanes may actually encourage ride sharing.
- People of higher income tend to use HOT lanes; however, people of lower income use these lanes when they must save time, as when they have to pick up a child at a day care center.

RFF developed a model simulation of a northern Virginia HOT lane policy. They assumed converting each HOV lane in northern Virginia to a HOT lane that levies a $0.20-per-mile charge on vehicles. If this model were implemented, that would yield the commonwealth $40 million per year and would affect travelers' routines thus:

- During morning and evening rush hours, drivers would switch from general-purpose lanes to HOT lanes, thereby improving the traffic flow on the general-purpose lanes.
- When some single-occupancy vehicles (SOVs) switch to HOT and some HOV drivers decide to stop carpooling and use HOT, these tolled lanes would experience increased traffic and they might experience slightly increased travel times, say two minutes per day.
- When SOV drivers try to avoid congestion, they often drive on side roads. When HOT lanes take away some congestion from the general-purpose lanes, these SOV drivers may return to the more direct route provided by the highways, which could result in daily travel miles dropping by 0.2%.
- More trips may occur as some drivers, turned off by formerly congested highways, may make an extra trip or two via the HOT lanes. RFF estimates that this increase could create an additional 2,000 trips per day, or a 0.1% increase in total daily trips.
- A mode shift from carpooling to SOV because this mode now offers a smoother commute would cause an increase in daily trips of 0.42%, or 44,073 total trips.
- Although wealthier households would be more responsive to the tolled HOT lanes, which, according to the study, some people call Lexus lanes, poorer households could also benefit from the less congested general-purpose lanes.

In Conclusion

RFF looked at the conversion of HOV lanes to HOT lanes with considerable promise, in that it would relieve some congestion by increasing the usage of existing highways. The tolled HOT lanes would provide much-needed revenue for highway repairs and maintenance. All area residents would benefit from this conversion. But their last statement was prescient: "In addition, that revenue is also not large enough to even make a dent in the region's funding needs, leaving the policy as only one piece of the puzzle for solving the region's funding crisis."

Fluor and Partner Transurban Bring Congestion Relief to I-495

On June 26, 2002, Fluor Corporation submitted an unsolicited conceptual proposal to Pierce Homer, deputy secretary of VDOT, to develop, finance, design, and construct the Capital Beltway HOT lane project. The original Fluor team would consist of the following companies:

- HNTB, the largest pure design group in the United States;
- Lane Construction, a major heavy construction firm;

- Vollmer Associates (now Stantec Consulting), a transportation forecasting, revenue analysis, and traffic engineering firm;
- Bear, Stearns & Co., financial planners and underwriters (not the best choice since it disappeared as an entity in March 2008, after being swallowed up by JPMorgan Chase during the mortgage crisis)—a role then assumed by Goldman Sachs;
- Reed Smith, a major Virginia law firm;
- RSM, Inc., an expert in public opinion polling; and
- Wetlands Studies and Solutions, Inc., a leader in wetland mitigation and development and processing of permits.

The team expanded in 2004 when Transurban partnered with Fluor to provide investor and concessionaire operator input.

The Proposed Beltway HOT Lane Concept

The HOT lanes would extend from Springfield, Virginia, to north of the Dulles Airport Access and Toll Roads. The main roadway would consist of a 12-lane system. The HOT lanes will be tolled and operate between the existing lanes in each direction. Buses, carpools (HOV-3), motorcycles, and emergency vehicles will have free access to the HOT lanes. Drivers with fewer than three occupants can choose to pay to access those lanes, and the tolls will change according to traffic conditions to regulate demand for the lanes and keep them free of congestion, especially during peak travel hours.

There would be five intermediate access points for the HOT lanes along the entire length of this new roadway. A responder would be required to use these HOT lanes. Fluor estimated that the addition of the HOT lanes would not only create a revenue stream for VDOT but would also divert 15% of the anticipated 2015 traffic off the eight general-purpose lanes. The HOT lanes would have a 65 mi/hr limit, whereas the general-purpose lanes would have a 55 mi/hr limit. As with most unsolicited proposals of merit, the public agency receiving them was obliged to invite competitive bidding, and VDOT did just that.

After 120 days of open competition solicitation, VDOT did not receive any other proposals, at which point Fluor found itself in an exclusive negotiating posture.

The Comprehensive Agreement with VDOT

On Apr. 28, 2006, the Virginia Department of Transportation sent a comprehensive agreement to develop, design, finance, and operate the I-495 HOT lanes project in Virginia to Fluor Virginia, Inc., and Transurban (USA) Development, Inc. VDOT Commissioner David S. Ekern, on Sept. 10, 2007, announced that the commonwealth had reached an in-principle agreement with Fluor and Transurban DRIVe to design, construct, operate, and maintain the new HOT lanes.

The Project Goals

The key aspects of the agreement provide that Fluor-Transurban would do the following:

- finance and build a 14-mi (22.4-km) stretch of HOT lanes on the Capital Beltway on a fixed-price, fixed-time design–build contract (construction expected to last five years);
- finance and build three new direct-access points from the Beltway to Tysons Corner, Virginia, build HOV connections from I-95 to the Beltway, and reconstruct and improve many existing bridges, traffic lanes, overpasses, interchanges, and signs;
- finance about $1.3 billion of the $1.7 billion project cost;
- manage and fund all operations and maintenance of the HOT lanes, major repairs, and rehabilitation work;
- collect tolls from non-HOV vehicles;
- ensure that HOV vehicles and transit and commuter buses travel free; and
- return the HOT lanes to Virginia in good condition after the end of the agreement.

VDOT's Responsibilities

The Virginia Department of Transportation was obliged to do the following:

- retain ownership and oversight of the HOT lanes;
- have the right to build any other transportation improvements;
- provide a $409 million grant to the project to support the construction of key elements, including the final phase of the Springfield interchange and improvements to the I-66 interchange; and
- participate in the regional congestion management plan and reconstruction of existing infrastructure.

This project would incorporate the following work along with the HOT lane construction:

- add two new lanes on both the inner and outer loop of the Capital Beltway;
- increase road capacity from 8 to 12 lanes;
- upgrade 12 key interchanges;
- construct more than 70,000 ft (21,336 m) of new or upgraded sound walls; and
- add, upgrade, or replace aging infrastructure, including 12 bridges and overpasses.

The Agreement Is Completed

In December 2007, Virginia Department of Transportation Commissioner David S. Ekern signed all agreements allowing the HOT lane project to proceed to con-

struction. Mike Kulper, Transurban's executive vice president, North America, was quoted in VDOT (2007) as saying that "the Capital Beltway HOT lanes project is a great example of what can be achieved when the government and the private sector work in partnership to deliver much-needed improvements to the transportation network." Fluor Vice President Herb Morgan, in that same statement, said, "We understand that VDOT is managing the construction of this project with that of the I-95 Fourth Lane, Fairfax County Parkway, Telegraph Road Interchange, and Dulles rail projects in a comprehensive traffic and construction management program to make sure that we keep traffic moving throughout the region."

This agreement was the culmination of five years of study and negotiations that began in April 2002, when strong public opinion opposed a VDOT proposal to widen the Beltway, projected to cost billions of dollars, and also to condemn hundreds of homes and businesses. Now the team of Fluor and Transurban was charged with the following contractual responsibilities:

- finance and construct a 14-mi (22.4-km) stretch of HOT lanes, two in each direction, on the Capital Beltway in accordance with a fixed-price, fixed-time, design–build contract;
- complete construction by spring 2013 at a cost not to exceed $1.4 billion;
- finance and construct three new access points from the Beltway into Tysons Corner and build HOV connections from I-95 to the Beltway, which is all part of Phase VIII of the Springfield interchange project;
- reconstruct and improve existing bridges, traffic lanes, overpasses, interchanges, and signs along the way;
- finance all but $409 million in project costs, accepting financial risk if HOT lane use does not meet expectations or if construction costs exceed current estimates;
- manage and fund all operations and maintenance of HOT lanes, including major repairs and rehabilitation;
- collect tolls from non-HOV vehicles;
- ensure that toll collection and enforcement are in accordance with state laws, including privacy requirements and E-ZPass requirements;
- ensure that HOV lanes and transit and commuter buses travel for free; and
- return the HOT lanes to the commonwealth in good condition at the end of the agreement.

Tolls will vary and will be based on the level of congestion in the HOT lanes. All toll collection will be done in open lanes, using transponders. During rush hours, the average trip cost is expected to be $5 to $6, and Fluor–Transurban must ensure free-flowing traffic conditions in the HOT lanes at all times.

Construction Commences

On July 22, 2008, Fluor and Transurban announced that they had broken ground on the HOT lane project on Interstate 495 in northern Virginia. Concrete barriers were being installed on the outside shoulders of the Beltway, and crews were

beginning to clear land on the VDOT right-of-way to make room for the new HOT lanes. The first two outer lanes were scheduled for completion in 2010, at which time traffic would be shifted to these new lanes so that work on the two inner lanes could commence and be completed by 2012. In mid-December 2010, these completed lanes were being closed periodically for line stripping and other minor work; VDOT indicated that I-495 night work would commence later that month to ease 2010 holiday shopping. The HOT lanes are expected to be completed in early 2013.

The HOT Lanes Become a Regional Network

After the favorable response to Fluor's Beltway HOT lane proposal on Sept. 24, 2003, the Clark Shirley Construction Group, Inc., submitted an unsolicited public–private partnership proposal to VDOT to add HOT lanes to I-95 south of I-495.

VDOT then invited competing proposals during a 120-day competition period, and on March 1, 2004, Fluor–Transurban submitted a proposal for a more comprehensive solution to the entire I-95/I-395 corridor.

On Nov. 8, 2005, the VDOT advisory panel recommended that VDOT move forward with the Fluor–Transurban proposal. On Dec. 19, 2005, VDOT's commissioner accepted the panel's recommendation and initiated negotiations.

A corporate news release from Fluor Corporation dated Oct. 25, 2006, entitled "I-95/395 Bus/HOV/HOT Lanes Move Forward; Fluor–Transurban Welcomes Agreement," indicated that an interim agreement with VDOT had been reached, allowing the project to move to the next stage of development. Environmental impact studies and Fluor–Transurban will sign a final agreement once the federal environmental approvals have been obtained and financial feasibility has been established.

Amendment No. 1 to the interim agreement to develop and/or operate the I-95/395 HOT Lanes Projects in Virginia, executed by VDOT, Fluor, and Transurban on May 6, 2008, included a request by the private entity for a $10 million loan to commence environmental studies, and in July of 2009 the Virginia legislature granted that loan.

VDOT's news release on Feb. 2, 2009, indicated that VDOT was planning to hold public hearings on the project, presumably as Fluor–Transurban pursue their environmental impact study.

The existing 1-95/395/I-495 interchange in Fairfax County is a busy place, and the I-95/395 portion is part of a 28-mi (44.8-km) roadway consisting of three parts: a northbound portion, a southbound portion, and two reversible HOV lanes in the center median. These HOV lanes with limited access and egress points seem to focus primarily on access and egress to the Pentagon and downtown Washington, D.C., not on other areas in between, nor connections to the Beltway.

The Washington, D.C., area regional goals for this I-95/395 corridor include establishing an express bus rapid transit (BRT) system, increasing capacity by adding new lanes and completing the HOV system to connect to the new employment centers in the area.

The Fluor–Transurban Concept

Fluor–Transurban's conceptual design proposed a multimodal transportation solution that would provide great mobility and increase current HOV lane user benefits. The proposal covered the development, financing, design, construction, operation, and maintenance of the I-95/395 HOT lane and BRT project, and it was submitted in response to a public notice on VDOT's website.

This project was closely related to their Beltway work since I-395 and I-95 tie directly into the Capital Beltway. Fluor's proposal would extend two HOV lanes from the town of Dumfries to Massaponax about 27 mi (43 km) south on I-95 and the existing two-lane HOV portion from the 14th Street Bridge in Washington, D.C., to Quantico Creek would be widened to three lanes. The roadway would continue to operate as reversible lanes.

This project represents a second phase in the development of an integrated HOT lane network for northern Virginia, since it ties directly to the earlier Fluor I-495 Capital Beltway HOT lane project. Fluor–Transurban's proposal would add a third lane to the existing 28-mi (45-km) HOV lanes from the Pentagon in Arlington County and extend that lane 28 mi (45 km) further south along I-95 to Massaponax in Spotsylvania County, a distance of 56 mi (90.7 km), approximately halfway to Richmond, Virginia's capital. The new roadway would operate as reversible lanes.

Now called the I-95/395 HOV/Bus/HOT lanes, this second project would create a regional bus transit lane from Massaponax in the south to downtown D.C., Dulles Toll Road, Tysons Corner, Crystal City, and the Potomac Yards in Alexandria.

These HOV/Bus/HOT lanes would be reversible, and toll rates would vary based on the time of day and congestion levels and would be applied as follows:

- SOV (single-occupancy vehicle)/HOV with two occupants: variable toll rates;
- HOV with three or more occupants: no toll;
- buses: free; and
- emergency vehicles: free.

The Cost of the Project and the Financing Plan

Fluor estimated the cost of the I-95/395 project to approach $1 billion, which includes development, design, construction, utilities, toll systems, right-of-way, and asset management services. They would sign a fixed-price contract for this work, and the project would be financed using the following sources of revenue:

1. tax-exempt toll revenue bonds guaranteed by private investors, not by any government entity;
2. a TIFIA loan designed for innovative projects, which will not reduce or divert normal federal transportation funds provided annually to VDOT;
3. investment by team member Transurban, which was willing to invest up to $200 million in bonds that would be subordinate to the TIFIA loans; and

4. based on a business study conducted by Fluor, a financial subsidy of $5 million, which could be provided by Virginia during the first year of operation of the transit operations, and over the term of the project financing, $500 million could be available as a transit subsidy to be distributed to the appropriate regional agencies having responsibility for transit service within the corridor.

The Benefits of the Plan

Fluor listed the benefits of the plan thus:

- The proposed BRT/HOT lanes could be constructed with minimum impact to the environment and constructed entirely within the existing right-of-way.
- This BRT/HOT concept would create a regional network rather than just solving individual problems along the highway.
- The proposed project would be self-financing to support not only the HOT lanes but also the BRT via subsidized payments to the transit system.
- The BRT/HOT lanes would provide a smoother operation than the current HOV lanes since they will be in operation and actively managed 24 hours a day and 7 days a week.
- By moving more people with fewer vehicles, the BRT/HOT concept will increase vehicle occupancy (number of people per vehicle) by 60% by 2015.

The Transportation Planning Board's Approval

The Metropolitan Washington Council of Governments' Transportation Planning Board on Jan. 16, 2008, approved the 2007 Financially Constrained Long-Range Transportation Plan (CLRP), which includes the I-95/395 project. This approval was an important step in the environmental review process.

This plan includes the widening of the I-95/395 HOT lanes, along with a significant number of other road improvement and transit projects in the District of Columbia, Maryland, and Virginia. With respect to I-95/395, the following components were included in the approved CLRP:

- **Cost:** $882 million, which includes $492 million for engineering, right-of-way acquisition, and construction and $390 million for the transit service plan
- **Extent:** 36 mi (57.6 km)
- **Description:** Reconfigure the existing HOV facility between Eads Street in Arlington County and just south of the town of Dumfries from two to three lanes
  - Convert HOV to HOT lanes
  - HOV transit and emergency response vehicles would use these lanes free of charge
  - Other vehicles may use the facility by paying an electronic toll
  - Tolls would vary based on time of day, day of week, and level of congestion to maintain free-flow conditions

  - In the southbound direction, construction of an extended transition lane and a new flyover ramp from the HOV/Bus/HOT lanes would ease congestion as traffic merges into the general-purpose lanes. Creating or modifying a number of connections to the existing HOV lanes would improve access to the HOT lane systems for HOV and transit users
- **Transit Service Plan:** Provide the following enhancements to transit service:
  - 13 new bus routes
  - increased frequency of bus service on existing and new routes incrementally in 2010, 2020, and 2030
  - Addition of bus-only ramps in and out of the Pentagon at Eads Street, an inline bus station near the Lorton Virginia Railway Express station and a bus-only access ramp at Seminary Road
  - Six new Park & Ride facilities with a total of 3,000 additional parking spaces

This project is scheduled for completion in 2010.

The Complex Interstate 81 Project

Interstate 81 is the longest interstate in Virginia, some 325 mi (520 km) long, entering the state from Martinsburg, West Virginia, to the north and running southwest paralleling the Shenandoah Valley until it crosses into Tennessee. It is 30 years old, two lanes in each direction except for a three-lane each way section near Wytheville in the southwest portion of the corridor. It is a heavily traveled truck route; trucks account for 19–40% of the daily road traffic, but it was designed to handle only 15% truck traffic. There are difficult interchanges to navigate, with few rest areas, and I-81 work zone accidents have steadily increased in the past five years.

This is a highway in need of work, and VDOT estimated that with their "pay-as-you-go" plan, the traditional method of paying for highway improvements, these needed upgrades and repairs to I-81 would stretch out over 30 to 50 years.

Unsolicited Proposals

In 2002, a group called STAR Solutions International, Inc., composed of KBR, Inc. (the Halliburton affiliate), APAC, Inc., Adams Construction Company, English Construction Company, Inc., Koch Performance Roads, Inc., W-L Construction, and Wilbur Smith Associates, submitted an unsolicited proposal to VDOT for improvements to the I-81 corridor. Their design incorporated adding lanes, including dedicated commercial vehicle lanes, rail and intermodal facilities, high-quality paving, six fully directional dual interchanges, upgraded shoulders, and reducing right-of-way needs. In the process, they indicated that they would complete all work within 15 years. The project cost would be between $5.7 billion and $6.3 billion in constant 2002 dollars.

Financing for the proposal would include federal and state funds and a toll on commercial trucks. If tolls for passenger cars were instituted, truck toll rates could be reduced or additional capital improvements could be made.

The Ensuing Request for Proposals

In response to this unsolicited proposal, VDOT issued a formal RFP to seek competitive bids, and in January 2003, VDOT received conceptual proposals from the STAR Group and another one from Fluor Corporation.

These two proposals were approved by the commissioner in March 2003 and were followed by requests for more detail from both bidders in September of that year. The initial time line for the project in the RFP called for selection of a proposal by July 11, 2003, and a target date of Sept. 30, 2003, for completing negotiations and approving a comprehensive agreement.

As of late 2007, no negotiations had taken place and the date for approving a comprehensive agreement was not in the foreseeable future. What happened?

VDOT Public Hearings

On Jan. 10, 2008, I spoke with Fred Altizer, VDOT's I-81 program manager. He related that I-81 is a major multimodal corridor and that VDOT initiated the required National Environmental Policy Act (NEPA) study, anticipating dual tracking with STAR Solutions in the fall of 2003. The NEPA study required VDOT to look at all facets of the project, and this look included the entire I-81 corridor, involving not only freight movement within the commonwealth but also along the entire roadway system feeding into it from the south and exiting northward. At about the same time, VDOT made application to FHWA to toll I-81 under TEA-21's Interstate System Reconstruction and Rehabilitation Pilot Program.

All of these actions were in play, along with VDOT's public hearings and talks with business interests voicing concerns and comments about some of the proposed highway improvements. Because these public hearings would encompass groups along the entire 325-mi (203-km) length of the project, this process would prove to be a daunting task. During the Tier 1 review, many questions began to surface, as would be expected in any multimodal project of this size.

Fred Altizer said that VDOT was juggling three balls in the air at the same time: the formation of a PPP, the NEPA process, and the FHWA application to toll an existing interstate. The rail question brought more considerations to light. What VDOT did on their portion of I-81 could have an effect on the Norfolk Southern rail operations emanating from Memphis, Tennessee.

This rail line connects to Norfolk Southern's Midwest and West Coast freight movement. Heading north from Virginia, Norfolk Southern continues hauling freight through Harrisburg, Pennsylvania, another major rail distribution center. Interstate-81 continues to run north from Virginia, affording truckers access to the Canadian border between Toronto and Montreal. So the multimodal approach had to take this rail and truck movement into account.

What started out as a proposal to relieve congestion and improve safety on a major Virginia highway burgeoned into a study of multimodal traffic, not only through six East Coast states but also a flow of commercial goods from the south to and from the West Coast. Altizer characterized the I-95 corridor as one dealing primarily with congestion, whereas the I-81 corridor was one that dealt primarily with the movement of freight.

The Commonwealth's Transportation Board Resolution

On Oct. 11, 2006, Virginia's Commonwealth Transportation Board issued a proclamation regarding the Interstate-81 corridor in which they stated that the Tier 1 draft environmental impact statement (EIS) indicated the need to improve I-81 and that the Virginia Department of Rail and Public Transportation would conduct a study of I-81 to expedite short-term rail improvements and the diversion of truck traffic along that highway. They would take immediate action to build dedicated truck climbing lanes. Altizer said that the state had access to $140 million in federal funds and would proceed to build those truck climbing lanes to increase highway safety by allowing slow-moving trucks a lane to themselves.

To address the Tier 1 EIS, two general-purpose lanes in each direction would need to be built where needed to address travel demands in 2035. VDOT would also extend some on–off ramps, upgrade the guardrails, and modify some interchanges and other safety-related needs.

The Tier 1 final EIS summarized the deficiencies on I-81 as follows:

- Traffic volume had doubled, and, in some cases tripled since 1978.
- The volumes in 2004 were expected to nearly double by 2035.
- Truck traffic was projected to grow at a faster rate than general traffic.
- More than 90% of I-81 was expected to operate below the level of service (LOS) standard in 2035.
- Some 24 northbound and 21 southbound miles (38 and 34 km) or 6%, experienced crash rates 25% higher than the statewide weighted average.
- Trucks were involved in 29% and 30% of all crashes and fatal crashes, respectively.
- More than two-thirds of I-81 roadways had inside shoulder widths that did not meet current American Association of State Highway and Transportation Officials (AASHTO) geometric design criteria.
- More than 100 locations had sight distances that did not meet current AASHTO geometric design criteria because of highway alignment.
- Ten locations had steep grades that slowed truck traffic to speeds below the minimum for interstates.

About 53 bridges (42%) had vertical clearances less than the criterion of 16.5 ft (5.02 m) established in the VDOT *Road Design Manual* (2010).

Improvement Options

The improvement concepts set forth as guidelines included the following:

- a no-build concept that would include the 16 projects in the Commonwealth Transportation Board's Six-Year Improvement Program for fiscal years 2006–2011;
- transportation system management (TSM), a concept that includes safety improvements, such as lengthening acceleration lanes at interchanges, truck climbing lanes, and intelligent transportation system elements;
- rail concepts involving rail lines owned by Norfolk Southern Railroad that included four plans ranging from minor improvements in the line from the West Virginia border to Manassas, Virginia, to Rail Concept No. 4, which included a full level improvement plan and new freight hauling technologies that interface with intermodal centers along the corridor;
- roadway concepts that would add from one to three lanes in each direction along the entire length of I-81 and additional lanes where necessary to make the entire corridor a consistent highway with six (three each way) or eight (four each way) lanes with upgraded shoulders;
- a combination concept combining one of the rail concepts with one of the roadway concepts;
- the separated-lane concept, which includes lanes separated by barriers with separate interchange ramps and nonexclusive lanes with a rumble strip between the separated lanes, allowing vehicles to merge and use existing interchanges; and
- five toll scenarios, which included some rail concepts along with adding some general-purpose lanes in each direction.

The costs associated with each concept ranged from zero for the no-build concept to $1 billion for the TSM, to $0.1 to $5.4 billion for the various rail concepts, to $5.1 to $11 billion for the roadway concepts. The uniform eight-lane scheme would be the most expensive.

The Tier II review process would project future travel demands and take into account the I-81 rail study while the state pursued the toll pilot project for lanes other than dedicated truck lanes.

The I-81 Corridor Coalition

Recognizing the multistate interest and involvement in the improvements to the I-81 corridor, the I-81 Corridor Coalition was formed to investigate and coordinate the efforts of every state along the corridor. A conference was held in Carlisle, Pennsylvania, in September 2007 with representatives from New York, Pennsylvania, Maryland, West Virginia, Virginia, and Tennessee to focus on these parameters:

- identifying issues, not trying to solve problems;
- thinking in terms of corridor, not just the highway;

- focusing on issues that are common to the entire group; and
- thinking in terms of challenges, not insurmountable problems.

When asked to select and rank what the participants thought were the top issues through a weighted scoring system, the top three emerged, in this order:

1. capacity and congestion;
2. safety; and
3. freight movement as a multimodal system.

The next three were aging infrastructure, environmental impact, and economic development and land use.

The list of attendees at this conference included the Hagerstown, Maryland/Eastern Panhandle (West Virginia) Metropolitan Planning Organization, the Knoxville (Tennessee) Metropolitan Planning Organization, the Northeastern Pennsylvania Alliance, the Pennsylvania Motor Truck Association, and the Norfolk Southern Corporation.

The Dissident Groups Weigh In

As would be expected, the 325-mi (520-km) length of the I-81 project would prove to be a magnet for special interest groups to weigh in, and they did. One group wanted to file a lawsuit to declare the Tier 1 record of decision unlawful and invalid because it would allow the dislocation of 1,600 to 2,400 residences; require the taking of 7,400 acres of developed land, 1,062 acres of prime farmland, and 1,238 acres of Civil War battlefields; threaten 13 endangered species; and affect the environment by creating more pollution.

Another organization, the Shenandoah Valley Network, favored an expanded railway system in lieu of the I-81 roadway improvements, indicating that the $2 billion cost of a multistate rail upgrade would amount to only $833,333 per mile shared by the many states it crosses, whereas the projected $11 billion estimate to widen I-81 in one state, Virginia, would cost $33 million per mile.

The RAIL Solution, an association promoting the use of rail as an economical freight mover, began publishing a series of articles in their online newsletter, extolling the advantages of rail freight as opposed to truck traffic. They said that the Tier 1 review did not provide a fair and full discussion of the most viable rail alternative and that rail presented an advantage of 5-to-1 better energy efficiency and 3-to-1 lower emissions per ton mile of freight hauled.

On Jan. 21, 2008, Fred Altizer said that VDOT had ceased negotiations with KBR for the I-81 improvements and would proceed with the truck climbing lane project and would be issuing an RFP for that purpose based on a design–build concept.

The I-81 project plows ahead. The I-81 project has been, for now, relegated to construction of truck climbing lanes. VDOT's projects and studies update of Oct. 15, 2010, indicated that the agency has chosen to use the design–build

process for the proposed $75.4 million Montgomery County truck climbing lane work. The $74 million Rockbridge County truck climbing lane project was awarded to a private contractor in 2009, with an expected completion date of 2012.

For those firms that had proposed a PPP approach to these I-81 projects, spending considerable time and money on their proposals, this is another example of the convoluted path that developers face when proposing a new project delivery system still in its nascent stage in the United States.

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CHAPTER 6

The Chicago Skyway and the Indiana Toll Road

The last chapter covered the Commonwealth of Virginia and its work on long, complicated roadways and corridors in the public–private sector. Cintra's Chicago Skyway and Indiana Toll Road, along with other U.S. concessions, are described in this chapter.

The city of Chicago's decision to accept a concessionaire proposal in the cash amount of $1.82 billion to operate, maintain, and collect toll revenue from the existing Skyway certainly got the attention of public officials throughout the country, as did the $3.85 billion the state of Indiana received from the same concessionaire for the right to lease the Indiana Toll Road.

These concession agreements were an example of the benefits that can accrue to a city or state, its residents, and its business and professional community when the private sector displays the initiative that works for both sectors, private and public.

The Skyway project appears to be off and running quite well, but it still has more than 97 years to go. The city of Chicago embraced these public–private partnerships two years before the state of Illinois. On Feb. 7, 2007, Senate Bill 0378 was introduced into the 95th General Assembly of Illinois. Its synopsis read in part:

> Creates the Public–Private Partnership for Transportation Act. Provides that the Act is intended to promote public–private partnerships for transportation by authorizing the Department of Transportation and the Illinois State Toll highway authority to enter into public–private agreements for the development, operation and financing of transportation facilities.

The Skyway

The Chicago Skyway was originally known as the Calumet Skyway. Built in 1958 as a toll road, it provided a short cut to the steel mills in Indiana from the southeast side of Chicago. By the 1960s, the newly constructed Dan Ryan Expressway

and other nontolled expressways caused traffic on the Skyway to drop off to the point where the tolled road was unable to repay its revenue bonds, and by the 1990s there were discussions about tearing it down. But with the construction of some casinos in northwest Indiana, traffic picked up on the road and saved the Skyway from destruction.

The Skyway is one segment of a Chicago highway system that picks up at the Dan Ryan Expressway at 66th Street and heads southeast, connecting to the Indiana Turnpike just beyond Indianapolis Boulevard. It is an elevated highway about 7.8 mi (12.5 km) long with eight interchanges before it reaches the Indiana border. The Skyway also provides an alternative to a highly congested corridor linking residential areas to leisure-time activities in the state and elsewhere.

A 2,600-ft (800-m) steel truss bridge that is part of the Skyway spans the Calumet River and the Calumet Harbor, a major industrial ship harbor. The main span provides for 125 ft (38 m) of vertical clearance and was included in the 2001–2004 Skyway modernization project.

The Chicago Metropolitan Planning Council White Paper

The Metropolitan Planning Council (MPC) in Chicago (www.metroplanning.org), working with other local civic groups, published a white paper (2006) that sums up the need for private funds succinctly. The executive summary of the report makes the case for pursuing the PPP approach, stating that because of lack of available funds elsewhere, the state motor fuel tax revenue had lagged by 20% since 1990 and furthermore that these taxes were not matched for inflation, further eroding their value. The MPC report indicated that states, in general, have increased their reliance on general sales taxes and income and property taxes, but these revenue streams are not fulfilling demand, particularly when it comes to highway, bridge, and other infrastructure needs.

Even when state funds were available, they were usually insufficient, the report continues. The MPC cites the Illinois FIRST Program, approved by the general assembly in 1999, that devoted $6 billion for railroads and highways; although this infusion of cash helped to secure federal funds, by June 2004, both state and federal funds for those purposes were exhausted.

The report goes on to state that federal programs such as SAFETEA-LU, enacted in 2005, provided Illinois with some funding, but in many cases construction money was not included or was included in such small portions that it required the state to raise the necessary funds. They provided the following examples:

- Chicago Regional Environmental and Transportation Efficiency Plan (CREATE) for improving road and commuter rail networks by decreasing freight rail bottlenecks in northeast Illinois (project estimate: $1.5 billion; funds from the federal government: $100 million);
- Wacker Drive completion and reconstruction project (project estimate: $350 million; funds from the federal government: $25 million); and

- Elgin–O'Hare Extension and the O'Hare bypass (project estimate: $1.345 billion; funds from the federal government: $140 million).

Soliciting Proposals

On March 1, 2004, Chicago announced its plan to issue a request for quotation (RFQ) to "privatize" a toll road through a concession agreement, the first major city in the United States to do so. The RFQ indicated that a 50-year lease (which the city later changed to 99 years when a concession agreement was finally negotiated) would be made available to the successful bidder to maintain, develop, and operate the Skyway. That was a propitious time to consider leasing the Skyway because it had just undergone a $250 million reconstruction program. Proponents of the leasing option pointed out that the operation of a toll road was not one of Chicago's core missions and that a private, professional toll operator could provide higher levels of service. Goldman Sachs and Loop Capital Markets were announced as cofinancial advisers to evaluate the proposals from respondents.

Issuance of a Request for Qualification

The request for qualification (RFQ) indicated that the concession agreement would be a long-term agreement granting the private operator the exclusive right to operate the Skyway and to collect toll revenue from the Skyway during the term of the agreement, which was anticipated to be 50 years. The concession agreement included operating standards related to the operation, maintenance, and tolling of the Skyway with which the private operator would be required to comply.

Chicago knew that they had a saleable, or rather leasable, asset for many reasons:

- There was no other route that afforded motorists time savings of 20–45 min.
- The Skyway was a key link in the Interstate 90–Interstate 94 traffic pattern.
- Based on a traffic study conducted by Wilbur Smith Associates, motorists had no real objection to higher toll rates.
- The Skyway averaged an 8% annual growth rate over the past 20 years.
- A steady flow of "regulars" over the past four decades produced a base of established travelers.
- The toll road was in relatively good shape and did not require any serious expenditure of capital refurbishment since it was in the fifth year of a six-year, $250 million upgrade program.
- With casinos sprouting in nearby Indiana, increased traffic could be anticipated.
- The traffic count was 90% passenger and 10% commercial, so the city counted on a steady flow of vehicles.

In March 2004, the Chicago Department of Transportation (CDOT) contacted about 40 potential bidders and finally invited 10 to submit RFPs. The city

officials conducted a due diligence day with the prospective bidders and arranged site visits and tours for them. An extensive Q&A session was conducted that sent them off to prepare their proposals.

Of the 10 proposers submitting in April, five were dismissed as not qualified. The five short-listed responders were:

- Abertis Infraestructuras, S.A., Barcelona, Spain.
- Chicago Skyway Group: VINCI Concessions/ASF/Cofiroute; Canadian Highways Infrastructure Group; ABN AMRO, Parsons, Louisiana; American Bridge, New York; and Kenny Construction, the Irvine, California, subsidiary of a French construction company.
- Skyway Concession Company—Cintra Concesiones de Infraestructuras de Transporte, S.A., Spain, and Macquarie Investment Holdings, Australia.
- Skyway Infrastructure Group—Bilfinger Berger Build–Operate–Transfer (BOT) of Luxembourg and Cheung Kong Infrastructure Holdings, Hong Kong.
- Transurban Infrastructure Developments Limited, Melbourne, Australia; Ontario Teachers Pension Plan, Toronto, Canada; Gary/Chicago International Airport Authority, Gary, Indiana; VMS, Richmond, Virginia; Bear Stearns, New York; and Vollmer Associates, New York.

On Oct. 17, 2004, the Skyway Concession Company, composed of Spain's Cintra Concesiones de Infraestructuras de Transporte, S.A., and Australia's Macquarie Infrastructure Group, was declared the winner to operate Chicago's Skyway Expressway linking the Dan Ryan Expressway (U.S. 94) to the Indiana Toll Plaza at Indianapolis Boulevard. The project scope included the following:

- upgrading 19 bridges,
- resurfacing 4 mi (6.4 km) of roadway, and
- reconfiguring toll plaza lanes to improve traffic flow.

The Route of the Skyway

The Skyway, whose formal name is the Chicago Skyway Toll Bridge System, is 7.8 mi (12.5 km) long, linking the south side via the Calumet Bridge to Chicago's downtown Loop area and the Dan Ryan Expressway with connections to the Indiana state line.

As the name implies, the Skyway is an entirely elevated six-lane highway with three lanes in each direction. A $2.00 toll, at the time the RFP was issued, was paid on travel in both directions just west of the Calumet Bridge.

The Skyway's history included financial failure, having gone into default for about 10 years after it opened in 1959, during which time it could not compete with the new I-94 freeway. However, its fortunes turned, and the recent $1 million refurbishing had kept pace with the increased traffic, about 50,000 vehicles per day in 2005 when the makeover was completed.

The Skyway Concession Agreement

The high points of the concession agreement are as follows:

- Sponsor: City of Chicago;
- Concessionaire: Skyway Concession Company, LLC (SCC), composed of Cintra and Macquarie;
- Lease period: 99 years;
- Date operations commenced: Jan. 26, 2005;
- Cost of lease: $1.83 billion; and
- Revenue source: Tolls (for automobiles) up to $2.50 until 2008; increased to $3.00 until 2011; $3.50 until 2013; $4.00 until 2015; $4.50 until 2017; $5.00 as of January 2017.

The potential for increased congestion pricing was part of the agreement. This lengthy agreement, dated Oct. 27, 2004, between the city of Chicago and Skyway Concession Company LLC ran to 140 pages and had, as a companion document, a 180-page maintenance manual identified as Volume 1 of 2 prepared in cooperation with the Rolling Meadows, Illinois, office of URS Corporation. The agreement and schedules were available from the city of Chicago's Department of Budget and Management and the Department of Finance.

To dispel any concerns about who retains title to the Skyway, page 1 of the agreement states that the city of Chicago will own the Skyway and simply leases the highway to the concessionaire. This statement dispelled some concerns voiced by opponents to the project that ownership would be transferred to the concessionaire, and a foreign one at that.

The Skyway Project as Defined in the Agreement

The Skyway project is defined in the agreement as any building or structure placed on Skyway land, including a four-story, steel frame and masonry operations and service building located at Anthony Avenue, two access ramp buildings connecting the toll canopy facilities, a garage located on 83rd Street, a water runoff pump house at 100th Street, and a McDonald's restaurant.

The Term of the Lease

Upon closing on the project, the concessionaire was to pay the city $1.83 billion in cash (the rent), and the term was to begin on the closing date and, unless terminated sooner, expire on the 99th anniversary of the closing date. The city acknowledged receipt of a cash deposit of $91 million in the form of a letter of credit, and if the city had terminated the agreement for reasons that were not satisfied in Section 2.4(b), they would retain the deposit. The guidelines for termination of the agreement are spelled out clearly.

No Guarantee to Skyway Employees

Along with standard covenants, access to information, and various disclosures, one section (Section 2.5(i)) regarding employees, did not guarantee future employment for any city employee who had previously worked for the city. This section merely required the concessionaire to use best efforts to interview all Skyway employees and offer employment to such Skyway employees who met the concessionaire's needs for employment, but the concessionaire had no contractual obligation to offer employment to any Skyway employees.

Skyway Operations

The concessionaire would be required keep the Skyway open and operational 24 hours a day, every day, except for closures specifically permitted under the agreement. It was incumbent on the concessionaire to have an active operator with the expertise, qualifications, and competence to perform the Skyway operations in accordance with the agreement.

Taxes and Utility Charges

The concessionaire would pay all taxes due, including property taxes, sales taxes, and use taxes, and would pay all gas, electric, light, heat, power, telephone, water, and other utility charges for services used in Skyway operations or supplied to the Skyway for the term of the lease.

Assignment of Services and Operating Agreements

The concessionaire was required to assign all operating agreements and all present and future specifications, plans, drawings, and documentation in relation to the Skyway operations to the city. This assignment would be important if a concessionaire default were to occur.

Traffic Control and Enforcement

The Chicago Police Department (CPD) would provide traffic patrol and enforcement services for the Skyway as well as police services in the general vicinity of the Skyway. The concessionaire would have the right to contract with CPD for additional services to control traffic for special events or for construction or maintenance activities, all at the concessionaire's expense.

The city would meet with the concessionaire at least 60 days before each anniversary of the lease to establish a budget for CPD services for the forthcoming year. For the first year of operations, the city budgeted $700,000, which represented the cost of one CPD squad car staffed by one CPD police officer 24 hours a day, every day, and included related overhead expenses. This cost was to be assumed by the concessionaire.

The concessionaire could hire private security forces to identify toll violators and to protect toll revenue collections for bank deposits, but they must contract with CPD for the apprehension of toll violators, also at the concessionaire's expense.

Modifications to the Operation

If the concessionaire wished to expand the Skyway or make any fundamental changes in quality, location, or position of any part of the highway, the concessionaire could issue a request and, if approved, be responsible for all costs to implement the change and also be responsible for any losses caused by those changes. The concessionaire could request additional land for any proposed expansion, and if the city approved, agree to initiate proceedings to arrange for acquisition or condemnation, all at the concessionaire's expense.

Revenues and Toll Collection

There was an existing McDonald's restaurant on the Skyway, and the revenue generated by that restaurant was recognized as Skyway revenue and would accrue to the concessionaire. The McDonald's lease expires in 2012, and since the location of the restaurant is in the center of the toll plaza and impedes traffic flow and would affect high-speed electronic toll traffic flow if and when installed; Skyway Concessions Co. LLC has to wait until 2012 to demolish the restaurant or possibly, as an option, buy McDonald's out of the lease before that expiration date.

The Toll Schedule and What It Really Means

The following vehicles were exempt from paying tolls: law enforcement and firefighting vehicles, vehicles with diplomatic license plates, ambulances, and vehicles owned or operated by the city. The toll schedules (Table 6-1) were established. This schedule of tolls could be amended to include the following adjustments:

- lowering tolls and including a discount program,
- time-of-day variable rate tolling,
- adjusting for inflation, and
- variable rate tolling.

As of Jan. 1, 2008, passenger car rates and two-axle vehicles rates had remained the same as in the concession agreement schedule listed in Table 6-1; the toll for vehicles with three or more axles that travel the toll road during peak periods, designated as the hours between 4:00 A.M. and 8:00 P.M., increased by 40% (Table 6-2). These 2009 rates would also be in effect for the year 2010, according to Leon Walton, manager at the Chicago Skyway in October 2010.

Table 6-1. Toll Schedule for the Skyway

Vehicle Toll Class	*01/01/05–12/31/07*	*01/10/08–12/31/10*	*01/01/11–12/31/12*	*01/01/13–12/31/14*	*01/01/15–12/31/16*	*As of 01/01/17*
Two axles	$2.50	$3.00	$3.50	$4.00	$4.50	$5.00
Three axles	$3.60	$5.40	$7.20	$9.00	$10.80	$12.60
Four axles	$4.80	$7.20	$9.60	$12.00	$14.40	$16.80
Five axles	$6.00	$9.00	$12.00	$15.00	$18.00	$21.00
Six axles	$7.20	$10.80	$14.40	$18.00	$21.60	$25.20
Seven or more axles	$8.40	$12.60	$16.80	$21.00	$25.20	$29.40

Source: Skyway Concession Company 2004.

A financial analysis of the Chicago Skyway toll rates was included in an article published by the International Bridge, Tunnel and Turnpike Association (Enright 2006a). Dennis J. Enright, a principal in the firm NW Financial Group LLC, stated that this long-term lease arrangement met with little resistance because tolls would more likely be paid by commuters from Indiana, so Chicago gained all the benefits and their constituency will pay little of the costs. Enright shows the toll rate and how increases in gross domestic product (GDP) for years 20–99 will affect tolls (Table 6-3).

Enright looked at the lost transportation funding dollars, adjusted for net present value, available to repay the franchise fee of $1.8 billion based on various degrees of increased GDP (Table 6-4). Table 6-5 shows the projected internal rate of return based on an initial equity of $887.6 million, adjusted for varying increases in GDP, and Table 6-6 reflects projected internal return on investment on the final equity investment of $652.6 million after refinancing.

Enright (2006a) suggested that as an alternative to the up-front $1.8 billion payment, a public entity with a track record of operating a toll road could issue toll-road revenue bonds and follow this debt program:

- Issue Series A bonds in the amount of $1.8 billion with interest only for 8 years, then debt service to cover 1.5 times for 20 years until fully paid.

Table 6-2. Peak and Off-Peak Tolls for Vehicles with Three or More Axles

Trucks	*Concession Agreement*	*Peak Period (4:00 A.M.–8:00 P.M.)*	*Off-Peak*
Three axles	$5.40	$7.60	$5.40
Four axles	$7.20	$10.10	$7.20
Five axles	$9.00	$12.60	$9.00
Six axles	$10.80	$15.20	$10.80
Seven or more axles	$12.60	$17.70	$12.60

Source: Skyway Concession Company 2004.

Table 6-3. Skyway Tolls If Increased over the Life of the Agreement and Inflated due to Adjustments for Gross Domestic Product

Year	*Initial Toll Maximums*	*With 2% Floor*	*With 3% CPI*	*With 4% GDP*	*With 5.5% GDP*	*With 7% GDP*
	$2.00					
1	$2.50					
3	$3.00					
6	$3.50					
8	$4.00					
10	$4.50					
12	$5.00					
20		$5.86	$6.33	$6.84	$7.67	$8.59
50		$10.61	$15.37	$22.19	$38.24	$65.40
75		$17.41	$32.19	$59.17	$145.84	$354.93
99		$28.00	$65.43	$151.66	$527.15	$1,800.36

Source: Reproduced with permission from NW Financial Group LLC, Jersey City, N.J.

Table 6-4. Skyway Lost Transportation Funding Dollars Adjusted for Potential Increases due to Changes in Gross Domestic Product

Traffic Growth Case	*With 2% Floor*	*With 3% CPI*	*With 4% GDP*	*With 5.5% GDP*	*With 7% GDP*
	Lost Funding in Billions				
No growth	$(0.33)	$0.12	$0.80	$2.68	$6.82
Historic growth (3.78%)	$6.98	$12.00	$21.08	$51.41	$131.84
Moderate growth (2%)	$1.68	$3.13	$5.56	$13.05	$31.46
Aggressive growth (5%)	$14.83	$26.05	$47.10	$120.17	$320.58

Source: Reproduced with permission from NW Financial Group LLC, Jersey City, N.J.

Table 6-5. Skyway Projected Internal Rate of Return on Equity Adjusted for Potential Increases in Gross Domestic Product

Annual Traffic Growth	*With 2% Floor*	*With 3% CPI*	*With 4% GDP*	*With 5.5% GDP*	*With 7% GDP*
	Internal Rate of Return on Equity				
No growth	8.1%	8.8%	9.5%	10.6%	11.6%
Historic growth (3.78%)	13.3%	13.9%	14.5%	15.4%	16.4%
Moderate growth (2%)	10.9%	11.6%	12.2%	13.2%	14.2%
Aggressive growth (5%)	14.8%	15.4%	16.0%	16.9%	17.9%

Source: Reproduced with permission from NW Financial Group LLC, Jersey City, N.J.

Table 6-6. Skyway Projected Internal Return on Investment Based on Final Equity Investment of $625.6 Million, Adjusted for Potential Increases in Gross Domestic Product

Annual Traffic Growth	*With 2% Floor*	*With 3% CPI*	*With 4% GDP*	*With 5.5% GDP*	*With 7% GDP*
	Internal Rate of Return on Equity				
No growth	8.0%	9.0%	9.7%	10.8%	12.0%
Historic growth (3.78%)	13.9%	14.5%	15.2%	16.1%	17.1%
Moderate growth (2%)	11.3%	12.0%	12.7%	13.7%	14.7%
Aggressive growth (5%)	15.6%	16.2%	16.8%	17.7%	18.7%

Source: Reproduced with permission from NW Financial Group LLC, Jersey City, N.J.

- Issue Series B bonds for $220 million, or more if required, of deferred-interest zero-coupon debt, maturing serially in years 30–40.Proceeds would be used as capitalized interest to add to available cash flow in the first 8 years to meet interest due on the Series A bonds.
- Assign a toll surcharge that could be securitized on its own without direct debt on toll-road operations.
- Public financing at the same or greater monetization levels would have been feasible for the Skyway transaction.

Enright's conclusion (2006a) may be prescient, or it may be just another avenue for public agencies to consider as they evaluate concession agreement options. He stated,

> In conclusion, the Chicago Skyway transaction has opened the door to new funding structure for transportation by monetizing future cash flows based largely upon known increases in toll rate user charges. The question for the public sector is: Should the public sector capture the excess revenues generated for public transportation purposes or should they allow the private sector to capture these revenues?

Another report (Enright 2006b) can be accessed at NW Financial Group LLC's website.

More Details of the Agreement

Insurance Requirements

Worker's compensation, commercial general liability insurance with limits not less than $75 million per occurrence, automobile liability with limits not less than $10 million per occurrence, builders risk, professional liability with limits not less than $2 million, property damage, pollution legal liability, and railroad protective liability insurance rounded out those concession agreement requirements.

Engineering Contracts Awarded in Connection with the Skyway Project

The concession agreement included several ongoing engineering contracts that would be assigned to SCC:

- professional service agreement with Alfred Benesch & Company for as-needed bridge and transit Chicago Skyway structural and civil engineering services;
- professional services agreement with Consoer Townsend Envirodyne Engineers, Inc., for as-needed structural and civil engineering design services;
- professional services agreement with Harry O. Hefter Associates, Inc., for professional construction engineering services;
- professional services agreement with HNTB Corporation for professional construction engineering services; and
- professional services agreement with Parsons, De Leuw, Inc., and the Department of Streets & Sanitation.

Capital Improvements Required by the City from the Concessionaire

Schedule 3 of the agreement is entitled "Specific Concessionaire Required Capital Improvements." It contains specific dates for completion of design and construction documents to allow the work to proceed. These projects included the following:

- design and construction documents for the painting of the Commercial Avenue viaduct;
- design and construction documents for the painting of the 10th Street viaduct;
- design and construction documents for the Skyway roadways that were not replaced during the 2000–2004 project;
- design and construction documents for the rehabilitation of Marquette Road's viaduct; and
- design and preparation of construction documents for the overpass structures, including complete replacement of the entire deck of each overpass; complete replacement of the wearing surface with latex-modified concrete; complete replacement of each overpass structure parapet; replacement, rehabilitation, modification, or repair of the steel superstructure of each overpass structure; replacement, rehabilitation, modification, or repair of the substructure piers and abutments of each overpass structure in whole or in part. This overpass work was to be substantially complete not later than Dec. 31, 2008. Contact with the Skyway site in December 2010 did not show any activity on overpass replacement or rehabilitation.

The Maintenance Agreement

The maintenance agreement contained in Volumes I and II of the concession and lease agreement set forth a series of concessionaire responsibilities:

- maintaining all components and features of the Skyway in the best possible condition at all times;

- improving substandard conditions with the goal of meeting or exceeding minimum standards;
- preserving all rights-of-way, roadways, structures, safety conveniences, plantings, and illumination equipment in a safe and usable condition to which it will have been built or improved;
- providing proper maintenance of all safety and traffic devices to ensure minimal disruptions and traffic hazards;
- identifying and correcting all inadequate safety features;
- providing an inventory of maintenance features, including a method whereby they can be located;
- establishing work procedures;
- maintaining a regular maintenance program for all aspects of the Skyway's operations;
- providing immediate and proper response to emergency and third-party events;
- performing routine and preventive maintenance and on-demand emergency maintenance activities and work; and
- maintaining the toll revenue systems, safety conveniences and devices, and illumination equipment.

The maintenance manual was precise in its scope and the assignment of obligations and responsibilities placed on SCC. There were performance time frames for each of the required tasks. For example, maximum time to respond to various repair and maintenance tasks were stipulated (Table 6-7).

What These Funds Would Do

Governments are beginning to look to the private sector for innovative funding sources and concession agreements like those the Skyway project provided. In this case, the city of Chicago received funding to be used for a number of projects. Mayor Richard M. Daley requested his financial people to make recommendations for "responsible and prudent use of the funds."

This infusion of cash increased the city's credit rating, lowered its debt, and accomplished the following:

- created a long-term reserve of $500 million, which will annually generate about $25 million in income;
- established a midterm reserve of $375 million to be invested and drawn down over eight years and used for budgetary relief and also to forestall the need to raise taxes;
- helped build a $100 million neighborhood, human, and business infrastructure fund to be dispersed over five years to assist low-income residents to obtain affordable housing and build senior centers and back-to-work programs for ex-offenders;
- retired the Skyway debt of $463 million;

Table 6-7. Maximum Time to Respond to Various Repair and Maintenance Tasks

Structure Feature	*Maximum Time for Remediation*
Existing Bridges	
Bridge decks and wearing surfaces	4 hours
Bridge railings and parapets	2 hours for temporary repairs 1 month for permanent repairs
Bridge joints	5 days
Structural damage	1 hour 2 months for nonstructural deterioration
Bridge bearings	48 hours
Painting	3 weeks if directly exposed to weather 3 months if protected from direct weather
Waterway protection	5 days
Retaining structures	24 hours for instability or structural damage 2 months for nonstructural damage
Tunnels	24 hours
Structure accessories	14 days
Lighting and Electrical System	
Roadway lighting controllers	4 hours
Light pole units, mast arms, and foundations	7 days
Luminaires	5 days
Sign illumination	12 hours
Aircraft warning beacon	1-hour response time 4 hours for temporary restoration 7 days for permanent restoration
Navigational warning light	1-hour response time 4 hours for temporary restoration 7 days for permanent restoration
Cables, conduits, and unit ducts	4 hours for temporary cabling 21 days for recabling, conduit, or duct repair 21 days for direct burial cable repair
Closed-circuit television (CCTV) system	24 hours for control cabinet damage repair 4 hours for power supply interruption 24 hours for a nonoperational camera
Accident- or Incident-Related Deficiency	
Vehicle incidents	15 minutes
Material spills	15 minutes for nonhazardous materials immediate for hazardous materials
Vandalism incidents	4 hours for graffiti removal 8 hours for all others
Atmospheric damage	30 minutes
Animal incidents	24 hours for damage 4 hours for carcass removal

(continued on next page)

Table 6-7. Continued.

Structure Feature	*Maximum Time for Remediation*
Landscape	
Sight distance obstruction	2 hours
Roadside litter	2 hours for illegal dumping
Fencing	24 hours for temporary repairs 30 days for permanent repairs
Mow	before turf reaches 6 inches in height
Roadside litter collection	every 7 days
Emptying of litter receptacles	every 2 days or once they become full
Inspections	
Bridges and overhead and bridge-mounted sign structures	once yearly, when no further winter chemicals will be applied on retaining walls and other structures

Source: Skyway Concession Company 2004.

- paid down the city's long-term debt of $134 million; and
- eliminated some $258 million of short-term debt obligations.

Skyway Revenue in 2007

Macquarie Infrastructure Group (MIG) published their six-month December 2007 financial statements regarding the operation of their toll-road operations and their revenue and earnings before interest, taxes, and depreciation (Table 6-8). This

Table 6-8. Revenue Change and Growth of Earnings before Interest, Taxes, Depreciation, and Amortization (EBITDA), July to December 2007 (US Dollars)

Asset	*Revenue Change (%) on Previous Corresponding Period*	*EBITDA Change (%) on Previous Corresponding Period*	*EBITDA Margin (%)*
407 ETR (Canada)	17.1	18.1	78.7
M6 toll (U.K.)	0.4	3.5	87.6
Autoroutes Paris-Rhine-Rhone (France)	7.4	NA[a]	NA[a]
Westlink M7 (Australia)	19.8	15.8	74.4
Dulles Greenway (Virginia)	6.7	7.2	73.4
Indiana Toll Road (Indiana)	7.7	11.6	74.7
Chicago Skyway (Illinois)	−5.3	−7.7	79.9
Lusoponte (Portugal)	11.2	12.9	84.6
Rostock (Germany)	5.1	5.4	57.2
MIG proportionately consolidated pro forma	8.7	10.5	72.3

Source: Reproduced with permission from Macquarie.
[a]Results not yet reported.

period shows a revenue change of negative 5.3% for the Skyway and a positive 7.7% change for the Indiana Toll Road. Table 6-9 shows a 12-month negative traffic growth of 2.0% for the Skyway and a negative 1.2% for the Indiana Toll Road. Both are below Macquarie Infrastructure Group (MIG) weighted average pro forma of +2.7% for their Australian, U.K., and Canadian projects, and their Lusoponte Bridge project in Portugal.

Skyway Revenue in 2009 and Third Quarter 2010

Skyway Concession Company LLC traffic statistics published by Macquarie Atlas Roads (Symbol MQA on the Australian Stock Exchange (ASX)) and released by MQA ASX Traffic Release for the September quarter of 2010 reported the traffic and revenue figures in Table 6-10.

Southern Growth May Add to the Equation

The Skyway project presented an excellent concession potential to the ultimate winner. First of all, it was a "brownfield" (existing) project, offering considerably less risk than a "greenfield" (new) project. Secondly, it would be relatively easy to implement enhanced tolling technology because of its configuration, and it could support several methods of congestion tolling options. And lastly, it was positioned to take advantage of increased traffic if and when a former U.S. Steel plant on the shore of Lake Michigan, 10 miles from downtown Chicago, was developed.

Table 6-9. Traffic Growth for 6 Months and 12 Months to December 2007 (US Dollars)

Asset	*6-Month Traffic Growth (%) on Previous Corresponding Period*	*12-Month Traffic Growth (%) on Previous Corresponding Period*
407 ETR[a] (Canada)	7.4	6.1
M6 toll (U.K.)	−11.7	−4.9
Autoroutes Paris-Rhine-Rhone (France)	3.0	2.8
Westlink M7[b] (Australia)	14.4	20.6
Dulles Greenway (Virginia)	−4.9	−3.8
Indiana Toll Road[c] (Indiana)	−2.3	−1.2
Chicago Skyway (Illinois)	−2.6	−2.0
Lusoponte (Portugal)	1.5	0.7
Warnow Tunnel (Germany)	2.1	4.2
MIG's weighted average pro forma[d]	8.7	10.5

Source: Reproduced with permission from Macquarie.
Note: Traffic is calculated as average daily trips, unless otherwise indicated.
[a]Results not yet reported.
[b]Vehicle kilometers traveled.
[c]Traffic calculated as total transactions.
[d]Revenue weighted average.

Table 6-10. Traffic and Revenue Statistics for July to September 2010

Parameter	*Jul–Sept. 2009*	*Jul–Sept. 2010*	*Change vs. Previous Comparative Period*
Revenue (US$)	$202,067	$194,170	(3.9%)
Average workday trips	53,162	49,431	(7.0%)
Weekends/holidays	60,984	60,162	(1.3%)
All days	55,542	52,696	(5.1%)
Noncash transactions	55.6%	56.6%	1.0%
Workdays in period	64	64	+0
Nonworkdays in period	28	28	+0

Source: Macquarie Atlas Roads.
Notes: According to the postscript attached to this report, MQA revealed that traffic volume continued to be negatively affected by ongoing construction work on the ITR barrier systems (these repairs and improvements were part of the deal) and the closure of Cline Avenue Bridge on State Road 912 at the end of 2009.

Arend (2005) quoted Garrett Hurley, president of USS Real Estate, a subsidiary of U.S. Steel Corporation, as saying that they were negotiating to sell 500 acres of land at their shut-down steel plant to a group of investors for a mixed-use development.

On March 26, 2007, United States Steel Corporation and Southworks Development LLC, a joint venture of Lubert-Adler Real Estate Fund IV, McCaffery Interests, Inc., and Western Development Corporation, announced an agreement to purchase 275 acres of land from the U.S. Steel's South Works steelmaking facility. Southworks Development envisions a mixed-use complex incorporating single- and multiple-family residences, retail, and other commercial uses.

ChicagoTalks.org, in their Dec. 21, 2009, local business newsletter, indicated that Southworks Development had selected architects Skidmore, Owings and Merrill (SOM) and Sasaki Associates as the architects of record. The project, as of that date, was in the process of seeking planning commission review and approval. As this project moves ahead, it presents the potential for increased traffic on the Skyway.

The Indiana Toll Road and Indiana's Transportation System

Indiana is known as the Hoosier state, the nickname derived from a poem written by John Finley in 1833 called "The Hoosier's Nest." The poem was copied widely both at home and abroad, and when the notoriety of this poem resulted in the toast, "The Hoosier state of Indiana," the name stuck. Today, the Hoosier state's transportation system is within a day's drive of 80% of the country's population, and the state is rightfully called the Crossroads of America.

The Indiana highway system is a key transportation link between major East Coast cities and northwestern Indiana. The city of Chicago serves as a portal to the western United States. The toll road, Interstate 80 (I-80) and Interstate 90 (I-90),

begins on the state's eastern portion at the Ohio line, where it connects to the Ohio Turnpike. Its western terminus is 157 mi (251 km) away as it connects to the Chicago Skyway.

The Indiana Toll Road (ITR) was completed and opened to traffic in 1956. It operated as a closed-barrier system (using a physical barrier, such as a gate arm) for toll collection between Milepost 1 (furthest west) and Milepost 23 and as a closed ticket-toll collection system (a ticket system based on the number of miles traveled) between Milepost 24 and Milepost 153 closer to the eastern terminus. The toll road was converted to the barrier system and equipped with a computerized toll-collection system in July 1986.

The Indiana Toll Road has connections to I-65 and I-69 (an FHWA designated Corridor of the Future) and leads to major Southern destinations that ultimately reach the Gulf Coast. The toll road varies from four to six lanes, and in 2005 it carried about 46,000 vehicles per day at its western portion and 25,000 on its eastern side.

When Governor Mitch Daniels took office in 2005, he directed the Indiana Department of Transportation (INDOT) to study the state's highway system to determine its present state and what would be needed to prepare it for the next decade. The May 2005 study showed a funding shortfall of about $1.8 billion, and Daniels requested that INDOT develop a set of priorities, inviting the public statewide to participate and comment. The result was a program entitled "Major Moves" that led to the legislation authorizing the leasing of the Indiana Toll Road.

Indiana's House Bill 1008

Executive Order 06-10, signed by Governor Mitch Daniels on June 6, 2006, recognized that HB 1008 authorized the Indiana Finance Authority (IFA) to enter into a lease agreement with a private entity to operate the Indiana Toll Road. The Major Moves program, a part of HB 1008, was created to provide funding for transportation projects that would leave more funding for other agencies, such as education, family, and social programs, as well as other state projects. The anticipated funds from a highway lease were anticipated to fully fund the 10-year transportation construction plan and eliminate the state's transportation deficit. The Major Moves program would include upgrading U.S. 31, building the Hoosier Heartland Highway, the Fort to Port Project connection of Fort Wayne to Toledo, Ohio, and extending 1-69 (one of the FHWA designated Corridors of the Future) from Indianapolis to Evansville, two Ohio River bridges, and many other projects.

The Request for Proposal

On Sept. 28, 2005, a formal request for proposal (RFP) to lease the turnpike was issued. It was a request for bidders to express their interest in leasing the Indiana Toll Road, and all responses were to be submitted by Oct. 26, 2005. Along with a description of the toll road and a map, the RFP included historical toll revenue by vehicle type (Table 6-11) for the period 1984–2004 and historical toll transactions for the period 1957–2004 (Table 6-12). It also included a list of existing

Table 6-11. Historical Toll Revenue by Vehicle Type, 1984–2004

Year[a]	*Passenger Cars*[b] *(thousand $)*	*Traffic Count Percent Change over Previous Year*	*Commercial Vehicles*[b] *(thousand $)*	*Commercial Vehicles Percent Change over Previous Year*	*Total Vehicles*[b] *(thousand $)*	*Total Vehicles Percent Change over Previous Year*
1984	14,687	—	23,473	—	38,160	—
1985[c]	14,703	0.1	23,287	−0.8	37,989	−0.4
1986	15,935	8.4	28,014	20.3	43,949	15.7
1987[d]	18,208	14.3	30,468	8.8	48,675	10.8
1988	19,399	6.5	32,467	6.6	51,866	6.6
1989	20,703	6.7	33,299	2.6	54,002	4.1
1990	21,762	5.1	33,403	0.3	55,173	2.2
1991	22,764	4.6	32,686	−2.1	55,448	0.5
1992	23,735	4.3	34,382	5.2	58,226	5.0
1993	24,509	3.3	36,785	7.0	61,295	5.3
1994	25,267	3.1	39,469	7.3	64,735	5.6
1995	26,149	3.5	42,998	8.9	69,148	6.8
1996	27,396	4.8	43,166	0.4	70,562	2.0
1997	29,559	7.9	44,780	3.7	74,354	5.4
1998	31,666	7.1	46,695	4.3	78,361	5.4
1999	32,422	2.4	48,892	4.7	81,314	3.8
2000[e]	32,405	−0.1	52,071	6.5	84,476	3.9
2001[e]	32,651	0.8	49,190	−5.5	81,841	−3.1
2002	34,881	6.8	47,531	−3.4	82,412	0.7
2003[f]	34,882	0.0	47,164	−0.8	82,046	−0.4
2004	35,313	1.2	49,593	5.2	84,907	3.5
Compound Annual Growth Rate						
1984–2004		4.5		3.8		4.1
1994–2004		3.4		2.3		2.7
1999–2004		1.7		0.3		0.9
1984–2000		5.1		5.1		5.1
1990–2000		4.1		4.5		4.4

Source: Wilbur Smith Associates for the state of Indiana.
Note: Some numbers may not add up due to rounding.
[a]Fiscal year ending June 30, except 1984.
[b]Revenues reflect gross toll revenues without adjustments.
[c]Toll road fiscal year end changed to June 30.
[d]In July 1986, converted from a full closed ticket system to the currently used barrier and ticket combination system.
[e]Volume declines due to construction on I-65, interchanges 1 and 24.
[f]Volume declines due to construction of Chicago Skyway and of interchange of I-65 and I-90.

Table 6-12. Historical Toll Transactions, 1957–2004

Year[a]	*Annual System Transactions*	*Average Daily Transactions*	*Traffic Count Annual Percentage Change*	*Annual System Revenue*[b]	*Revenue Annual Percentage Change*
1957	8,318,191	22,800	—	8,262,810	—
1958	9,594,091	26,300	15.4	9,729,053	17.7
1959	8,561,222	23,500	−10.6	11,963,557	23.0
1960	10,089,199	27,600	17.4	12,379,441	3.5
1961	9,881,121	27,100	−1.8	11,461,181	−7.4
1962	9,834,436	26,900	−0.7	13,751,370	20.0
1963	9,680,380	26,500	−1.5	13,483,787	−1.9
1964	10,610,030	29,100	9.8	14,422,354	7.0
1965	11,508,731	31,500	8.2	14,864,693	3.1
1966	12,451,887	34,100	8.3	15,967,482	7.4
1967	12,964,735	35,500	4.1	16,291,761	2.0
1968	14,188,189	38,900	9.6	17,789,405	9.2
1969	15,608,000	42,800	10.0	19,260,244	8.3
1970	15,554,024	42,600	−0.5	19,169,637	−0.5
1971	15,794,221	43,300	1.6	19,797,053	3.3
1972	15,080,155	41,300	−4.6	20,001,282	1.0
1973	13,599,931	37,300	−9.7	20,243,691	1.2
1974	12,635,310	34,600	−7.2	19,903,748	−1.7
1975	12,543,576	34,400	−0.6	20,602,305	3.5
1976	13,824,843	37,900	10.2	22,981,176	11.5
1977	14,960,105	41,000	8.2	24,932,420	8.5
1978	16,120,328	44,200	7.8	27,492,571	10.3
1979	16,442,799	45,000	1.8	28,042,847	2.0
1980	15,464,733	42,400	−5.8	28,691,830	2.3
1981	15,565,701	42,600	0.5	35,559,373	23.9
1982	14,783,300	40,500	−4.9	33,577,944	−5.6
1983	14,980,563	41,000	1.2	35,547,627	5.9
1984	15,751,803	43,200	5.4	38,160,100	7.3
1985[c]	15,710,175	43,000	−0.5	37,989,166	−0.4
1986	16,507,158	45,200	5.1	43,949,222	15.7
1987[d]	25,657,829	70,300	55.5	48,675,260	10.8
1988	27,662,706	75,800	7.8	51,865,774	6.6
1989	30,233,721	82,800	9.2	54,002,417	4.1
1990	31,638,525	86,700	4.7	55,172,700	2.2
1991	32,119,778	88,000	1.5	55,448,174	0.5
1992	34,726,205	95,100	8.1	58,226,368	5.0
1993	36,753,035	100,700	5.9	61,295,201	5.3
1994	38,807,941	106,300	5.6	64,735,204	5.6
1995	40,654,138	111,400	4.8	69,147,652	6.8
1996	43,395,240	118,900	6.7	70,561,917	2.0

(continued on next page)

Table 6-12. Continued.

Year[a]	*Annual System Transactions*	*Average Daily Transactions*	*Traffic Count Annual Percentage Change*	*Annual System Revenue*[b]	*Revenue Annual Percentage Change*
1997	49,169,397	134,700	13.3	74,354,138	5.4
1998	53,664,314	147,000	9.1	78,360,542	5.4
1999	54,385,652	149,000	1.4	81,314,087	3.8
2000[e]	53,106,478	145,500	−2.3	84,476,207	3.9
2001[e]	52,458,152	143,700	−1.2	81,840,967	−3.1
2002	55,144,510	151,100	5.1	82,412,158	0.7
2003[f]	53,236,421	145,900	−3.4	82,045,504	−0.4
2004	54,057,639	148,100	1.5	84,906,514	3.5
Compound Annual Growth Rate					
1974–2004			5.0		5.0
1984–2004			6.4		4.1
1994–2004			3.4		2.7
1999–2004			−0.1		0.9
1980–2000			6.4		5.5
1990–2000			5.3		4.4

Source: Wilbur Smith Associates for the state of Indiana.
Note: Some numbers may not add up due to rounding.
[a]Fiscal year ending June 30 for all years after 1984.
[b]Revenues reflect gross toll revenues without adjustments.
[c]Toll road fiscal year end changed to June 30.
[d]In July 1986, converted from a full closed ticket system to the currently used barrier and ticket combination system.
[e]Volume declines due to construction on I-65, interchanges 1 and 24.
[f]Volume declines due to construction of Chicago Skyway and of interchange of I-65 and I-90.

engineering department contracts and assorted toll road contracts that would be assigned to the successful concessionaire. Four mandatory expansion requirements were included in the RFP:

- implement a barrier-controlled electronic toll collection within two years of the closing date;
- expand to three travel lanes in each direction from Milepost 14.0 to Milepost 15.5 by Dec. 31, 2008;
- expand to three travel lanes in each direction from Milepost 10.6 to Milepost 14.0 and lower the toll road elevation to accommodate the flight path of Gary Chicago International Airport by Dec. 31, 2010; and
- expand to three travel lanes in each direction from Milepost 18.5 to Milepost 20.27 by Dec. 31, 2007.

Setting of Toll Rates

The RFP included proposed toll rates for all classes of vehicles. They also included a formula for future maximum toll levels beyond June 30, 2010, after which the concessionaire would be allowed to increase the maximum by the initial applicable percentage toll increase (IAPTI). This IAPTI takes into account the greater of (a) 8.2% or (b) the percentage increase compounded annually of the index or per capita nominal GDP, whichever is greater, measured from each of calendar years (i) 2006, (ii) 2007, (iii) 2008, and (iv) 2009. They provided the examples in Table 6-13 in the RFP.

Other restrictions were placed on tolls based on segments of the toll road; the highest per-mile increase could not exceed three times the lowest per-mile increase, and the Indiana Finance Authority (IFA) included the mileage between each toll station for that purpose.

The Short-Listed Bidder Proposals Are Opened

Bids from the concessionaires were received in January 2006, just as state legislators began discussions relating to House Bill 1008 and the Major Moves Bill. The short-listed bidders bid the following for total amount of rent:

- Indiana Toll Road Partners LLC, Morgan Stanley: $1.9 billion;
- Itinere Infraestructuras, S.A., subsidiary of Sacyr Vallehermoso: $2,520,220,101; and
- Indiana Road Company LLC, led by Babcock & Brown LLC, San Francisco, and including Challenger Financial Services and Transfield Holdings: $2.84 billion.
- Albertis, the Spanish concessionaire, pulled out of the competition two days before bid opening because they figured their $2.2 billion payment would be insufficient to win the award.

IFA opened all concession bids and were surprised and delighted to see the top bid of $3.85 billion by the Macquarie-Cintra Group.

Table 6-13. Toll Rates for the Indiana Toll Road Effective October 19, 2010

Class	*Cash*	*I-Zoom (ETC)*
2 axles	$8.80	$4.65
3 axles	$12.90	$12.91
4 axles	$26.90	$26.91
5 axles	$35.20	$35.14
6 axles	$41.20	$41.19
7 axles	$76.60	$76.60

Source: Data are from https://www.getizoom.com/tollRates.do.
Note: Cash figures are rounded to the nearest dime, and ETC is rounded to the nearest penny, therefore these "cash" rates are minimally higher than ETC rates, with the exception of two-axle vehicles.

On Apr. 12, 2006, the Indiana Toll Road Commission signed a 75-year concession agreement with the ITR Concession Company (ITRCC) in return for a $3.85 billion payment. The Indiana Finance Authority is the owner of the Indiana Toll Road. ITRCC is a venture composed of Macquarie Infrastructure Group (MIG) and Cintra Concesiones de Infraestructuras de Transport, S.A.

The Contract

The high points of the concession agreement are as follows:

- Sponsor: State of Indiana, Indiana Finance Authority (IFA);
- Concessionaire: Indiana Toll Road Concession Company LLC (ITRCC): 50% Cintra, 50% Macquarie;
- Lease period: 75 years;
- Date operations commenced: July 2006;
- Cost of lease: $3.85 billion; and
- Revenue source: Tolls and other income sources not applicable to tolls but agreed to in the agreement.

Rent, Not Lease

The bid proposal issued to all respondents referred to "rent," and the subsequent 103-page agreement continues with this term so as not to be interpreted as "sale." Article 1 of the agreement contains general information, such as definitions, lots of "Whereases" and a few "Therefores." Some articles deal with the nuts and bolts of implementing the transaction, and others are more noteworthy.

The Noncompete Clause

One of the more important definitions in Article 1 is that of "competing highway," which is defined as any newly constructed "comparable highway" to be built by or on behalf of Indiana during the term of the agreement with the concessionaire within 20 mi (32 km) of the toll road. The existing U.S. 20 would be considered a competing highway if, on or before the 55th anniversary of the closing date, it is expanded or improved by the state so that it becomes a comparable highway.

A "comparable highway" was defined as a divided highway with four or more lanes, controlled access, interstate quality, interchanges, interstate-quality bridges, or any combination thereof.

Debt Responsibility

Article 3 of the agreement is entitled "Terms of the Lease," and Section 3.2 includes toll road operations, stating that the official name of the highway is the Indiana East–West Toll Road. This article stipulates that the concessionaire agrees to

assume and discharge or perform when due, all debts, liabilities, and obligations relating to the operation of the toll road, but the IFA assumes responsibility for all debts incurred before the closing and for all contracts not assigned to toll-road contracts. The IFA must approve the toll-road operator; however, this operator, once approved, is under the full control of the concessionaire.

Reimbursement for State Police Services

On the closing date, the concessionaire was to pay the state $50 million to be used for other funding, including providing the Indiana State Police with funds for capital improvements and equipment. This stipulation was why the executed agreement stated that $3.8 billion was to be paid in rent, but the total payment received from the concessionaire was listed as $3.85 billion.

The IFA would provide traffic control and traffic enforcement, and the concessionaire would pay the IFA $6 million in advance, annually, in equal quarterly installments for that service. The IFA could increase the annual payment from the concessionaire under certain conditions. The concessionaire, however, could use a private security force to identify toll violators and can contract with the IFA for the apprehension of toll violators at the concessionaire's expense.

Capital Improvements by the Concessionaire

Article 4 deals with the capital improvements included in a separate schedule that were to be performed by the concessionaire at no cost to the IFA; a section of Article 5 deals with modifications to that agreement. One such improvement required ITRCC to perform certain highway enhancements, and on Oct. 3, 2006, a contract was awarded for that purpose to Indiana Toll-Roads Contractors, a joint venture between Ferrovial Agroman Indiana and the Goshen, Indiana, based Rieth-Riley Construction Co. Ferrovial is the U.S. subsidiary of its Spanish parent, and Rieth-Riley is a home-grown road builder that would employ their Indiana workforce in the project. This $250 million contract would add one lane in each direction on 7 mi (11.2 km) of the toll road between Milepost 10 and Milepost 20 in Lake County. When the work was completed, there would be three travel lanes in each direction between Cline Avenue and the Lake Station exit onto I-94, enhancing the smooth flow of traffic in both directions.

The Level of Service Requirement

Article 5 included provisions relating to the level of service (LOS) and required the concessionaire to provide IFA with a written study describing the LOS for the current year and project the LOS for the following seven-year period. There was to be a separate minimum LOS for elements of the toll road in urban areas and one for rural areas. If the current study revealed that the LOS had fallen below the minimum LOS, the concessionaire had 180 days to deliver a proposal to the

IFA setting forth recommendations for expanding traffic lanes, adding additional lanes, or taking other actions to improve the level of service.

LOS was to be determined for each element of the toll road in each direction based on (1) the average of the two highest A.M. volumes measured during a 48-hour period for each element in each direction and (2) the average of the two highest P.M. volumes measured during the same 48-hour period for each element in each direction.

Tolling and Revenue Provisions

Article 7 contains the tolling and revenue provisions of the agreement. Revenue sources can include revenue from mass transit facilities, the sale of alcohol, installation of utilities and safety measures, fiber optic cable (which might be for cable television or data transmission for residential and/or commercial usage), erection of billboards and other forms of advertising, all of which will belong to IFA and not the concessionaire, who is only entitled to revenue from toll collection.

Lost Revenue Accountability

Article 12, Section 5, was amended to include Section 12.13, "Funding and Reimbursement of Lost Revenues Related to the Toll Freeze." This lost revenue provision pertained to tolls (a) actually collected from Class 2 vehicles (two-axle vehicles, i.e., automobiles) during a toll freeze period (using the original toll rate) as the project reverts to ITRCC control and (b) tolls that would have been collected from Class 2 user tolls the concessionaire would have been entitled to receive less the amount of any annual renewal fees collected by the concessionaire for commuter identification cards. This difference is called "lost revenue." On the closing date, the concessionaire can apply $60 million from the payment of rent to fund this toll freeze deposit account and draw from it as required to document any "lost revenue" as stipulated above.

The Disbursement of the Up-Front Payment

Indiana received the $3.85 billion in July 2006; at that time, this $3.85 billion payment was announced as the largest public–private partnership agreement in the world. Taking into account the money paid to the Indiana State Police, a total payment of $3.617 billion went to the treasurer of the state, $355 million of which was distributed to various transportation projects. The remainder was assigned to the following:

- $500,000 went to the Next Generation Trust Fund Managers (a charitable trust), set up separately from the state to be "used exclusively for highway and bridge projects to benefit the people of Indiana."
- $682,520,039 was invested by the treasurer's office.
- The Major Moves program received $2.1 billion.

The Major Moves Program Moves Ahead

State Treasurer Richard Mourdock stated in a press release on May 29, 2007, as reported at Inside Indiana Business Report online:

> As a result of the Major Moves Construction Fund and the Next Generation Trust Fund, Hoosiers will be paying less in taxes while seeing important road repair and construction projects. The Major Moves Funds have earned an amazing $545,243 per day in interest since the transaction took place last July (referring to the concessionaire payment). That's more than $146 million earned in less than nine months by leasing a state-owned asset that was not able to pay its own way prior to the lease. While some may choose to continue to debate the philosophy of leasing a government asset to the private sector, the financial benefit to Hoosier taxpayers cannot be disputed.

Coincidentally, in July 2006, Honda Motor Company announced that they had selected Indiana as the site of their newest plant and would spend about $500 million in its construction and planned to employ almost 4,000 people. These two events were seen as strong vindication for supporters in the concession debate.

But not everyone saw it that way. At about the same time that HB 1008 was under discussion, Senate Bill 0221 was introduced to the state legislature on Jan. 9, 2006. The purpose was to forestall the "selling" of the Indiana Toll Road to a private entity. Its provisions were straightforward:

Sec. 28 (a) The authority may not do any of the following:
- Sell the Indiana Toll Road to any entity other than the state.
- Lease the Indiana Toll Road to any entity other than the state.
- Enter into a contract for the operation of the Indiana Toll Road with an entity other than the department.

This bill did not get too far, as evidenced by the fact that only six months later House Bill 1008, as amended, was signed by Governor Daniels, authorizing toll road agreements between the Indiana Finance Authority (IFA) and a private entity.

A Lawsuit Filed by the Citizens Action Coalition of Indiana

On May 19, 2006, opponents of HB 1008 filed a lawsuit with the state of Indiana in the St. Joseph County Superior Court, casting doubt on the constitutionality of the Major Moves legislation. The plaintiffs referred to Article 10, paragraph 2, of Indiana's constitution, wherein they theorized that the proceeds of the concessionaire's payment must be used to pay down the "public debt" and could not be used for Major Moves projects.

The response by the defendants, Mitchell E. Daniels, governor, and Tim Berry, treasurer of the state, was rather straightforward: The public debt that

existed in 1850 when the constitution was enacted was most likely retired more than a century ago, so Article 10 placed no limits on the use of the proceeds from the toll road lease.

Even though the turnpike concession agreement was clearly a lease and not a sale, these anticoncession advocates said that that differentiation was not the material issue; the material issue was that the funds were interpreted as "net annual income" and, as such, ought to be placed in the general fund to be used to pay down the state's public debt. The court dismissed the case.

The State and Macquarie Check In

On March 7, 2006, a study commissioned by the Indiana Finance Authority to perform a financial analysis of the Indiana East–West Toll Road was completed by Crowe Chizek and Company LLC of Indianapolis. This study projected cash flows from 2006 out to 2081, the life of the concession agreement, and gross cash flows of $18.1 billion with a net present value of $1.92 billion.

The report for years 2006–2015 showed revenues of $1.746 billion, expenditures of $1.294.9 billion, and revenues over expenditures of $451.7 million. By years 2036–2045, projected revenues were $5.453 billion, expenditures were $3.096 billion, and revenues over expenditures were $2.357 billion. Revenue over expenditures would peak in years 2056–2065 at $3.597 billion and would level off by the end of the lease in years 2076–2081 at $2.232 billion.

When the lease agreement was fully executed, Macquarie issued a statement that the investment was forecast to provide an internal rate of return to MIG security holders of 13.0%, based on certain assumptions which, if they were not achieved, would affect the internal rate of return. It was anticipated that the payback period to equity would be 15 years. ITR constituted 5% of the MIG portfolio as of June 30, 2006.

Lessons Learned

An article published in July 2007 by Cambridge Systematics, Inc., "Protecting the Public Interest: The Role of Long-Term Concession Agreements for Providing Transportation Infrastructure" (Buxbaum and Ortiz 2007), looked at the toll road lease one year after its implementation to discern any lessons learned. And what they concluded would apply applies to this concession as well as many others. The effort to complete a PPP agreement is immense and requires not only assembling a team of experts with the specific skills to attack the particular project in hand but also requires a great deal of communication among vast numbers of people: stakeholders, politicians, the public, and the assembled experts.

Education as to what a PPP project is must start early in the endeavor. The power of the Internet, as witness the comments from the many bloggers responding to the ITR concession announcement, was not to be underestimated and was used to stir up opposition quickly and effectively. The lengthy environmental

process, in which the public is engaged or not fully engaged, can add years to the approval of a PPP project.

What New Is Happening Today?

On Dec. 17, 2007, ITR Concession Company LLC opened a third lane in each direction between Milepost 18.5 and 20.27 on the turnpike. That was the first phase of the planned $250 million expansion program that is scheduled, in total, for completion in 2010. The next stage, planned to start Feb. 25, 2008, will add more lanes to one of the most heavily traveled sections of the toll road, and it is scheduled to be complete by the end of 2008.

Toll increases were announced effective Apr. 1, 2008, and those rates varied slightly from those in the concession agreement. Table 6-14 reflects ITR operations for the period 2009–2010.

The electronic tolling of the toll road began in late 2007, and ITR Concession Company had been alerting travelers to the areas where the work would be performed, advising them to expect lane restrictions. There were 25 projects to be performed by the concessionaire in 2008, ranging from guardrail maintenance to milling and resurfacing to bridge repairs and painting.

ITR Concession Benefits

In mid-July 2007, Indiana was the only state in the United States that had a fully funded transportation investment program, largely because of the toll-road concession lease. Governor Daniels, on his website www.mymanmitch.com/major_moves.html, listed the following benefits:

- the installation of i-Zoom, an electronic system to pay tolls, and E-ZPass, which connects users in other states;

Table 6-14. A Snapshot of ITR Operations in 2009–2010

Traffic Category	*July–Sept. 2009*	*July–Sept. 2010*	*Change vs. Previous Corresponding Period*
Average daily revenue (US$)	$469,099	$538,429	14.8%
Average daily traffic			
Full-length equivalent trips using ticket system	28,008	29,270	4.5%
Full-length equivalent trips using barrier system	63,963	60,661	(5.2%)
Noncash ticket	54.2%	60.2%	6.0%
Noncash barrier	60.3%	64.2%	3.9%
Workdays in period	64	64	+0
Nonworkdays in period	28	28	+0

Source: Macquarie Atlas Road Limited press release dated October 20, 2010.

- the funds deposited in the Major Moves fund as of July 28, 2008, earned $353,246,310 in interest;
- $500 million had been designated to Indiana's Next Generation Trust;
- $682,520,039 was invested by the state treasurer's office to maintain liquidity for short-term INDOT projects;
- $335 million was distributed to all 92 counties to assist them in fulfilling local infrastructure needs; and
- the concessionaire, ITRCC, had invested in the local economy, spending $5 million for snowplows from a company in the state.

With the near completion of electronic toll collection (ETC) in 2008, a dual toll rate system was established, providing a substantial discount for motorists and a slight decrease, and, in certain classes, a slight increase for truckers. Table 6-13 shows the cost to travel the entire 157-mi (254-km) length of the highway as of 2010.

The U.S. Government Accountability Office Takes a Look at These Two Projects

The U.S. Government Accountability Office (GAO), the federal government's watchdog agency, looked at the PPP movement in the United States, and specifically at the Chicago Skyway and the Indiana Toll Road projects, to look at the following:

- the benefits, costs, and trade-offs of highway public–private partnerships;
- how the public officials identified and acted to protect the public interest in those arrangements; and
- the federal role in highway public–private partnerships and potential changes in that role.

On July 24, 2008, in testimony before the U.S. Senate Committee on Finance's Subcommittee on Energy, Natural Resources, and Infrastructure, JayEtta Z. Hecker, director of Physical Infrastructure Issues of the GAO, was quoted as follows:

> Highway public–private partnerships provide potential benefits, such as sharing risks with the private sector, more efficient operations and management of facilities and, through the use of tolling, increased mobility and more cost-effective investment decisions. There are also potential costs and trade-offs—there is no "free money" in public–private partnerships, and it is likely that tolls on a privately operated highway will increase to a greater extent than they would on a publicly operated toll road. There are also financial trade-offs. Unlike public toll authorities, the private sector pays federal income taxes and can deduct depreciation on assets for which they have effective ownership. The extent of these

deductions and the amount of foregone revenue, if any, to the federal government is difficult to determine. Demonstrating effective ownership may require lengthy concession periods and, according to experts involved in the lease of the Chicago Skyway and Indiana Toll Road, contributed to the 99-year and 75-year concession terms on these two facilities, respectively. Experts also told us that in the absence of the depreciation benefit, the concession payments to Chicago and Indiana would likely have been less than $1.8 billion and $3.8 billion, respectively.

On page 6 of this report, Hecker lists some other trade-offs:

In addition to potentially higher tolls, the public sector may give up more than it receives in a concession payment in using a highway public–private partnership with a focus on extracting value from an existing facility. In exchange for an up-front concession payment, the public sector gives up control over a future stream of toll revenues over an extended period of time, such as 75 or 99 years. It is possible that the net present value of the future stream of toll revenues (less operating and capital costs) given up can be much larger than the concession payment received. Concession payments could potentially be less than they could or should be. Conversely, because the private sector takes on substantial risks, the opposite could also be true—that is, the public sector might gain more than it gives up.

And in conclusion, Hecker sums up:

Highway public–private partnerships show promise as a viable alternative, where appropriate, to help meet growing and costly transportation demands. The public sector can acquire new infrastructure or extract value from existing infrastructure while potentially sharing with the private sector the risks associated with designing, constructing, operating, and maintaining public infrastructure. However, highway public–private partnerships are not a panacea for meeting all transportation system demands, nor are they without potentially substantial costs and risks to the public—both financial and nonfinancial—and trade-offs must be made (Hecker 2008).

Tax Deductions on Long-Term Leases

As pointed out in the GAO report, the private sector can receive potential tax deductions for depreciation, and the availability of these deductions is another important incentive for private participation in these types of projects. The U.S. Tax Code allows private concessionaires to claim income tax deductions for the depreciations of a new or existing highway if the concessionaire has "effective ownership" of the property. Effective ownership requires that, among other considerations, the length of the concession is greater than or equal to the useful economic life of the asset.

Refinancing Gains Can Be Beneficial to Concessionaires

Public and private officials stated that refinancing is common in these private highway partnerships. In the case of the Skyway, the concession company had to obtain a considerable amount of money in a short time to be able to close, and upon closing they could seek refinancing at a better deal, which was exactly what happened. Many concessionaires include refinancing in their original pro forma because they see an opportunity to refinance throughout the term of the lease as project risks typically decrease, especially in the case of new projects where construction contingencies have been met. And as risk decreases, so could the cost of debt.

An investment banker for the Skyway concession told the GAO that there was no refinancing gain on the part of the Skyway since this had already been factored into the initial investment plan and was included in the financial offer to the city of Chicago.

GAO found that the governments of Australia and the United Kingdom have acknowledged these refinancing gains and include provisions in their agreements that any refinancing gains not already factored into toll increases will be shared equally with the government.

The Question of Toll Increases

Because, in the case of the Skyway and the Indiana Toll Road, toll increases beyond a specific time would be increased based on increases in the consumer price index or the gross domestic product, the GAO found that during the time when the Skyway was operated by the city of Chicago, toll rates changed frequently but actually decreased by about 25% in terms of 2007 dollars, between 1989 and 2004. Based on the provisions in the Skyway agreement, toll rates could increase in real terms almost 97% from 2007 to 2047; for automobiles that represents an increase from $2.50 to $4.91, in 2007 dollars.

Indiana hired an accounting and consulting firm to look into the net present value based on future revenue streams as set forth in the agreement, and they deemed the value of the toll road to be slightly less than $2 billion, but an economics professor hired by a group opposed to the lease changed certain assumptions and came up with a net present value of $11 billion. Does the real net present value lie somewhere between the two?

With the unemployment rate in Indiana at 10.1% and neighboring Illinois at 9.9% per the U.S. Bureau of Statistics report dated Oct. 23, 2010, these uptick ITR revenue and traffic figures appear to represent a bright side, but Bary (2009) suggested that the Hoosier State's timing of the concession agreement was perfect, concluded at a time when global infrastructure investing mania was at its height and cheap debt financing was available. Macquarie and Cintra, who hold the 75-year lease on the highway, reports Bary, paid a high price for the Indiana Toll Road in terms of potential returns on their investment.

The money paid to the states for toll-road concession agreements were a boon to many state coffers, but the concessionaires who offered up these payments may need to rethink the price they paid for these agreements. The Indiana Toll Road may set an example for future acquisitions.

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CHAPTER 7

Texas Strategic Plan Includes Public–Private Partnerships

Chapter 6 describes the Chicago Skyway and the Indiana Turnpike tie-in. This chapter covers a complicated set of issues in Texas. It starts with politics, telling the story of strategic plans that led to the use of comprehensive development agreements. The chapter then follows the story of the Trans-Texas Corridor, which was a concept that would link various parts of this huge state to a Mexico-to-Canada superhighway. The interplay of politics is evident in many of the decisions that will affect the lives of the many Texans who rely on top-flight highways for commerce and just getting to and from work; the politics become quite complicated when dealing with federal, state, and interstate policies.

The North Texas Toll Authority is described in several parts, and then shadow tolling, as it arrived in Texas. Along the way, studies and reports are described that were used to help political leaders, road authorities, and financial experts figure out how to pay for and implement their plans.

The Texas Department of Transportation Strategic Plan

The Texas Department of Transportation (TxDOT) in January 2005 issued their strategic plan for the period 2005–2009, and it was updated in 2007 to expand the time frame to 2011. That newer plan was touted as the beginning of a third revolution in the history of Texas' transportation infrastructure:

- The first revolution began in 1917, when the Texas Highway Department was established to plan, construct, and maintain the state's highway system. Funding was to be provided by vehicle registration fees, which were later augmented by a state fuel tax in 1923.
- The second revolution began in 1950, when Texas changed from a rural to a metropolitan society and the state took advantage of federal matching funds to connect their major cities to the interstate system.
- Revolution No. 3 was initiated by Governor Rick Perry, who, with the state legislators, developed a new transportation strategy encompassing intermodal concepts for rail, truck, and passenger cars.

Both the 2005–2009 and the 2007–2011 plans had basically the same goals:

- reduce congestion,
- enhance safety,
- expand economic opportunities,
- improve air quality, and
- increase the value of transportation assets.

The 2009–2013 Strategic Plan

The new strategic plan continues the same five goals, but they now include four strategies for achieving those goals:

Strategy 1: Recognizing that traditional tax-based methods of financing, such as motor fuel taxes, are no longer sufficient to cover the state's transportation needs, the state legislature passed House Bill 3588 in 2003, providing several options to raise money for transportation projects. Funds from traffic fines will be leveraged to generate billions in bond funds, and innovative tolling arrangements were just a part of HB 3588, which also granted the Texas Transportation Commission latitude to build a series of corridors in the state to link major metropolitan areas together.

Strategy 2: TxDOT empowered local and regional leaders to solve local and regional transportation problems. Whereas TxDOT will share its technical skills, this delegation to local authorities will allow for more flexibility in project development and construction.

Strategy 3: Using market-based principles to maximize competition and reduce costs, TxDOT affirmed its commitment to apply competitive pressure to drive down the cost of transportation projects.

Strategy 4: TxDOT will look at the cost of various transportation options from the user's perspective. Will the project be used enough to justify the cost? They will look at pricing concepts and options such as toll roads, high-occupancy toll lanes, and for-profit transportation providers.

The financing tactics of TxDOT will include the following:

- **Debt financing:** The fact that construction costs rise much faster than interest rates makes it feasible to borrow funds to accelerate construction. TxDOT will use toll revenues from completed projects to finance this debt.
- **Pass-through financing:** This is a partnership between a private developer and TxDOT, in which roadway construction is funded on a per-vehicle or per-vehicle-mile basis, paid by TxDOT to the developer. In effect, any toll that would typically be paid by a motorist is paid for, or "passed through," to TxDOT. This concept is being used on State Spur 601 and for construction of the U.S. 277 relief road in Val Verde County. This is similar to shadow tolling,

where the driver does not pay the toll, but the state pays the developer based on the number of trips and the resultant mileage.

- **Toll equity:** Toll equity allows state highway funds to be combined with other funds to build public toll roads. By issuing loans and grants, TxDOT can participate in the acquisition, construction, maintenance, or operation of a toll road built by other entities. The organization building the road issues debt to finance the remaining cost of the project, saving TxDOT a cost equal to that debt.
- **Registration fees:** With regard to vehicle registration fees levied on all vehicles in Texas, the fee varies according to the class of vehicle registered. In fiscal year 2007, vehicle registration fees contributed $984.2 million to the state highway fund.
- **Public–private partnerships:** Along with providing additional funds to allow TxDOT to complete projects more quickly than with traditional funding sources, these PPPs encourage cost savings and innovation by the private sector.

Texas was early to recognize the value of private investment. One of the tools in creating public–private partnerships is the state's Comprehensive Development Agreement (CDA), authorized by House Bill 2702 of the 79th Texas legislature, to allow private investment in their transportation system.

The Comprehensive Development Agreement

The CDA program provided TxDOT with a great degree of flexibility in selecting projects and the ability to leverage public and private funds and use long-term contracts for services required. The concession model for transportation projects was preferred, but CDA could consider design–build, design–build–maintain, design–build–operate–maintain, or design–build–finance–operate approaches.

Predevelopment agreements can also be awarded, for example, a CDA between TxDOT and Cintra Zachry executed on March 11, 2005, to develop deliverables, including a master development and master financial plan for the TTC-35 high-priority project, for which Cintra Zachry would receive $3.5 million in fees, a project that would later be scrapped.

CDA can issue requests for proposals and can also receive unsolicited proposals for evaluation, after which they will process all proposals, whether issued or unsolicited, through a screening process. Within the CDA framework, the following provisions, among others, are included when private-sector involvement is warranted:

- TxDOT can set the concessionaire's fee as an up-front payment, or the developer can be afforded exclusive right to the toll revenue stream.
- There may be some form of revenue sharing based on traffic flow and/or gross revenue receipts.
- Tolling is to be 100% electronic.

- Where conventional tolling is anticipated, toll rates will be capped, but where managed lane projects are concerned, overall toll charges, while being capped, will allow for congestion pricing.
- Toll rates will be adjusted annually and linked to the consumer price index (CPI), the gross state product, and/or other specified indices.
- Design risk, existing asset risk, and right-of-way acquisition risk are assigned to the developer (if no rights-of way can be obtained by the public agency, the private entity also assumes any risks associated with that decision). Environmental risks and statutory approval risks will be shared by TxDOT and the developer.
- The project would be handed back at the end of the lease at no cost to TxDOT.

The Two-Step Proposal Process

Responding to CDA proposals is a two-step process. A request for qualification (RFQ) on solicited projects generally includes requiring respondents to describe their technical and engineering experience, provide a conceptual strategy that will be applied to the project, and explain how the project will be tracked through completion. Each proposal is scored by CDA, and a "short list" is prepared, after which these selected developers must submit detailed proposals.

When an unsolicited proposal is received by CDA and evaluated as acceptable, TxDOT will issue a request for competing proposals and qualifications. The evaluation by CDA for solicited and nonsolicited proposals is as follows:

- When the project is a concession or design–build–finance–operate type, price and value, along with a firm financial and development plan, is part of the evaluation process.
- When the project is a design–build or design–build–maintain project, fixed price, along with schedule, technical approach, safety, and experience, is important.
- When CDA is looking for a strategic business partner, such as with the Trans-Texas Corridor projects, they will look at the respondent's qualifications, its conceptual development plan, its conceptual financial plan, and the price for the predevelopment work.

TxDOT Highway Expansion Program

The Texas highway expansion program is considerable and includes projects using design–build, public–private partnerships, and concession project delivery systems, such as the following:

- the 24-mi (38-km), $2.8 billion, State Highway 121 project in Dallas;
- the 40-mi (64.8-km) segments 5 and 6 between San Antonio and Austin of the 91-mi (147-km) long State Highway 130;

- the multibillion-dollar TTC-35 Trans-Texas Corridor, running from the Oklahoma border to Mexico;
- the multibillion-dollar TTC-69, running from the Texarkana–Shreveport area to the Mexican border;
- Interstate Highway 635's managed lanes project in Dallas, known as the High Five for its award-winning 12-story-high design of five interchanges;
- the 7-mi (11-km), $160 million State Highway 45 project in Central Texas that was awarded to Texas builder Zachry in 2004;
- the $2 billion North Tarrant Express (Interstate Highway 820, State Highway 121, State Highway 183, Interstate 35W) project in the Dallas–Fort Worth area;
- the more than $1 billion, 45-mi (72-km) U.S. 281, Loop 1604 toll project in San Antonio;
- the $1 billion State Highway 161 project in Dallas;
- the Dallas–Fort Worth Connector in Tarrant County;
- the $2.7 billion LBJ Express, a 13-mi (8-km) corridor in Dallas County;
- the statewide open-road tolling collection system project; and
- the tollbooth CDA.

The Ports-to-Plains Project

Governor Rick Perry proposed the Trans-Texas Corridor in January 2002, a comprehensive plan to create a multiple-use statewide network of transportation routes within Texas incorporating existing and new highways, railways, and utility rights-of way. Approved by the Texas Transportation Commission, and with the passage of House Bill 3588 in 2003, TxDOT was given broad powers to develop these Trans-Texas Corridors, which would include highway, rail passenger and freight, and utilities within a right-of-way that could be as wide as 1,200 ft (417.6 m).

The Ports-to-Plains Corridor would be an intermodal and conventional rail system linking the rural areas of west Texas from the U.S.–Mexico border at Laredo, Texas, and with the cooperative efforts of neighboring states, through portions of Oklahoma and New Mexico to Denver, Colorado, and beyond to Canada. About 600 mi (960 km) of this 1,390-mi (2,224-km) highway would pass through Texas. Designated by the U.S. Congress in 1998 as a high-priority corridor, the Ports-to-Plains concept was intended to expand economic opportunities while encouraging international trade among the United States, Mexico, and Canada.

The Cambridge Systematics Study

In Cambridge Systematics (2007), the key findings were the following:

- The Trans-Texas Corridor has the potential to enhance mobility and economic development in rural Texas by providing new infrastructure capacity and options to existing and emerging industries.

- In the Ports-to-Plains Corridor in West Texas, development of intermodal and conventional rail terminal facilities and improvements in rail interconnectivity could increase the productivity of several existing and emerging industries, including cotton and ethanol.
- Electric transmission lines developed as Trans-Texas Corridor facilities could help offset transmission capacity restraints and efficiently move west Texas wind power to urban customers in central and eastern Texas.

The combination of rail and highway improvements would have an exponential effect on the state's economy as well as a positive environmental impact. Rail improvements would mean faster freight time to market and therefore lower freight costs. Economic development would be spurred on by improved access to more cost-effective transportation options, and all of this new development would add to the tax base. Reduced emissions, lower highway maintenance costs, and less congestion would be by-products of this new corridor.

The Trans-Texas Corridor 35 Project

The Trans-Texas Corridor 35 (TTC-35) project is an example of the typical clash between citizens and politicians and the fallout that follows. This proposed corridor would more or less parallel existing I-35 and would be about 600 mi (960 km) long, running from the Mexican border on the south to just north of the Dallas–Fort Worth area.

According to one proposal submitted by Cintra Zachry, a private investment of $6 billion would be required to design, construct, and operate a four-lane, 316-mi (505-km) segment between Dallas and San Antonio. Cintra Zachry is now under contract to provide a master development and financial plan for TTC-35, and the final alignment will be determined after the environmental studies have been completed.

TxDOT (2005) states that "any corridor within the TTC-35 study area would cross multiple political boundaries, ecological regions, and zones of differing social and economic influences," so each of these variables would surely be ripe for debate by political leaders, environmentalists, businesses, and local communities, and TxDOT got lots of differing evaluations. One study showed that commercial land value in one area near U.S. 183 could gain $50,000 an acre, whereas another section a half mile away would lose $50,000 per acre. Studies on the effects on residential property in one area revealed an average loss of $2,050 per property near an abutting transportation project; however, in another community, residential property values increased as much as $5 million. Speculative buying could also change this matrix, and short-term conditions can change over the long term, some for the better, some for the worse. There was little doubt that TTC-35 would not pass quietly in the night.

The tier 1 draft environmental impact statement (EIS) was published in April 2006 and was studied and evaluated before submission of the tier 2 EIS.

Trans-Texas Corridors Face Their Public Doubters

When Governor Rick Perry signed State Bill 792 in June 2007, this much-debated bill permitted toll roads to be built in the state and expanded the power of local authorities to develop such projects. The governor's office distilled the law's contents as follows:

- Local toll authorities have the first option to consider the construction of new toll projects and can use the state's rights-of-way, if necessary.
- Local authorities must meet with the Texas Department of Transportation (TxDOT) to agree on certain business terms, such as setting toll rates, and also to conduct a market valuation study to ascertain the road's value.
- The law sets the term of 50 years as the time for the state's buy-back period when formulating a comprehensive development agreement (CDA) for a concession agreement.
- Competing toll roads cannot be built within 4 mi (6.4 km) of each other.
- Revenue generated must be used for other projects within the region where the CDA was developed.
- TxDOT can issue $3 billion in bonds to borrow against future gas tax revenue and can use the bond proceeds as toll equity for state toll roads.

Opposition to the Trans-Texas Corridor

At first, a San Antonio activist's lawsuit alleged that the Texas Department of Transportation failed to comply with the federal Environmental Protection Act; his group was seeking an injunction on the start of the first phase of the $83 million expansion of 4.9 mi (7.8 km) of U.S. Route 281. The plaintiffs were concerned that the road cuts through the recharge zone of the Edwards Aquifer, which provides water to 3 million people. They questioned the abatement plan, which used vegetation filter strips and earth berms to treat storm-water runoff. The state responded that there was no need for an environmental impact statement.

The Trans-Texas Corridor environmental work, currently under way, is due to be complete by 2012, but undoubtedly many obstacles will be faced along the way. Political opposition to concession-type toll-road projects began to be heard in volume at the Republican Party of Texas convention in June 2006, where one plank in the party's platform stated that the Trans-Texas Corridor included confiscation of private land and that state and national sovereignty concerns justified the repeal of the Trans-Texas Corridor legislation.

Other Political Concerns

Some state officials opposed new tolls that charged for traversing what were previously toll-free roadways and eliminated tolls on roads that were already paid for. A series of bills were introduced in the state Senate to forestall public–private

partnerships. Charges were made that existing legislation called for several non-compete clauses, that toll-road operators had unlimited authority to raise tolls, that buy-back provisions required the state to repay with up-front money, and that the state was signing away public control. And these statements were being voiced by public officials, not by citizens.

Senate Bill 792

In the last days of the 2007 legislative session, Senate Bill 792 was enacted and signed by the governor on June 11. This bill included a moratorium for private participation by a toll project entity after May 1, 2007, expiring Sept. 1, 2009.

Senate Bill 792 also limited a concession period to 50 years, from the previous term of 40 years, and included "an explicit mechanism for setting the price for the purchase by the department of the interest of the private participant in the comprehensive development agreement and related property, including any interest in a highway or other facility designed, developed, financed, constructed, operated, or maintained under the agreement." The bill also stipulated that with the exception of 12 ongoing road projects in the greater Houston and Dallas–Ft.Worth areas, toll-road projects would be subjected to a market evaluation by a third party.

The Ports-to-Plains Project Gained Momentum

The Trans-Texas Corridor initiative signed by Governor Perry in 2002 prompted TxDOT to select the Ports-to-Plains Corridor in west Texas as a case study for the program. The Ports-to-Plains Trade Corridor Coalition, based in Lubbock, had been working on developing an intermodal concept, and some of their findings led to the TTC initiative being expanded to encompass two proposed corridors: TTC-35 and TTC-69.

Chapter 227 of the Texas Transportation Code is known as the TTC Law, and it authorizes the state to build, own, and maintain any one of these facilities:

- **transportation,** including state highways, turnpikes, freight and passenger railroad stations, switching yards, bus stations, rest areas, service stations, restaurants, and intermodal transfer or staging areas, and
- **public utilities,** including those for water, wastewater, natural gas, petroleum pipelines, pipeline pumping stations, electric transmission or distribution lines (including associated equipment), telecommunications, and cable TV infrastructure (such as fiber optic cable, conduit, or wireless communication equipment).

The Corridor Master Plan

On Sept. 20, 2007, at the Great Plains International Conference in Denver, TxDOT announced that it was forming a working group to develop a master plan

for this Ports-to-Plains project. The project encompassed many of the goals in the Cambridge Systematics survey (2007):

- providing West Texas farmers and ranchers with a more efficient method of transporting products to a growing global market;
- providing the potential for increased mobility in the area, which could lead to more economic development;
- improving rail connectivity and intermodal facilities to increase the productivity of the cotton and ethanol industries in the western part of the state; and
- affording a method to move electrical power generated by west Texas wind power providers to urban customers in central and eastern parts of the state. This move would be accomplished by creating a utilities right-of-way in the center of the highway.

Public opinion poll responses as of June 2008 revealed an interesting evaluation of public concerns:

- 63% had concerns about the process for acquisition of property,
- 12% wanted connectivity to cities along the way,
- 11% were interested in funding and construction costs,
- 10% expressed concern about toll rates, and
- 4% were interested in the effect on businesses.

These Trans-Texas Corridors include two basically south-to-north highways, referred to as TTC-35 and TTC-69, for the designation of the existing highways that they traverse.

When the Texas Transportation Commission adopted the Trans-Texas Corridor plan in June 2002, they received an unsolicited proposal for the development of the project, which they evaluated. They subsequently issued a request for competing proposals in July 2003. Three groups were short-listed and after submitting a detailed proposal, the team of Cintra Zachry LP was selected as the winner. However, concerned about required environmental studies and public comments about the proposed route of TTC-35, TxDOT negotiated a CDA with Cintra Zachry on March 11, 2005.

The agreement was limited in scope; no construction contract was included, and although the term of the agreement is up to 50 years, both parties, TxDOT and the concessionaire, acknowledged the importance of defining events under which the developer should be entitled to compensation under this agreement.

There was an initial scope of work in the agreement, involving deliverables, spelled out specifically in one of the exhibits: a master development plan setting forth the developer's role and responsibilities, a project schedule, and a master financial plan, among other deliverables for which Cintra Zachry will be paid $3.5 million.

TTC-69

Increased rail and highway traffic in the southern and eastern portions of Texas drove the need to look at another corridor. This project would be about 650 mi (1,040 km) long and would generally follow the path of existing U.S. Route 59 from Texarkana, Arkansas, and Shreveport, Louisiana, to Laredo and the Rio Grande Valley. Two contractors expressed interest in the project when it was first announced:

1. Zachry American Infrastructure and ACS Infrastructure Development, Inc. (both equity owners), including Steers Davies Gleave (a transportation consultant); UBS Securities; Dannenbaum Engineering Corp.; ACI Consulting; Sociedad Ibérica de Construcciones Eléctricas, S.A. (SICE); Dragados; William Brothers Construction Company, Inc.; and Zachry Construction Corp.
2. Bluebonnet Infrastructure Investors, including Cintra (equity owner); Citigroup; Earth Tech; Blanton & Associates, Inc.; Maunsell; Othon; W.W. Webber, LLC; and Ferrovial Agroman, S.A.

Tier 1 studies were under way, and in an interesting statement from Texas Transportation Commissioner Ted Houghton, on June 11, 2008, the commissioner said that his department had received about 28,000 comments, and citizens were clear on two points: the roadway should be built along existing facilities, and they wanted Texas to own and control the project.

Taking these concerns into account, Amadeo Saenz Jr., executive director of TxDOT, in a June 9, 2008, letter to Janice Brown, division administrator of the Federal Highway Administration, informed the FHWA that TxDOT will eliminate the tier 1 new location alternative and would recommend that the I-69/TTC use existing facilities as the preferred alternative in the tier 1 final EIS, which will include using the right-of-way along U.S. Routes 59, 77, and 281 and State Highway 44.

The Record of Decision

On July 20, 2010, the U.S. Department of Transportation and the Federal Highway Administration's Texas Division Office issued their record of decision on the Tier One EIS relating to the Oklahoma to Mexico/Gulf Coast element of the Trans-Texas Corridor, effectively selecting the no action alternative to the project. Therefore, no funding would be forthcoming for TTC-35.

This action eliminated any further study and cancelled the preconstruction comprehensive development agreement between TxDOT and Cintra Zachry. The alternatives to be considered as listed in this EIS, along with the no action alternative, were the following:

- transportation systems management aimed at reducing traffic congestion and improving mobility without major capital expenditures to increase physical roadway capacity;

- upgrading of an existing facility; and
- developing and evaluating 12 reasonable alternatives to the corridor, as reflected in the Tier One EIS.

The other major Trans-Texas Corridor, TTC-69, which was to extend from Texarkana down to Houston, continuing southward to the Mexican border for a total length of about 650 mi (1,050 km) was abandoned in early 2009, but not until ACS Infrastructure Development, the North American branch of Iridium, and Zachry had been declared successful bidders for the design, planning, and development of the project.

This southwest to northeast highway, billed by opponents as part of the NAFTA highway linking Mexico to Canada via the United States, was unpopular with the communities through which it would pass and became a political football before TxDOT Executive Director Amadeo Saenz announced on Jan. 7, 2009, as reported in the Corpus Christi *Caller-Times* newspaper, that the TTC-69 concept would not proceed. According to this press release, Saenz stated that TxDOT will provide a $1 billion upgrade to bring I-69 from Corpus Christi to the Rio Grande Valley up to interstate highway specifications as the first step in providing the increased mobility the area requires.

State Highway 121: The Award and the Retraction

When the Texas Transportation Commission initiated the procedures for procuring the State Highway 121 toll-road concession, they requested proposals from more than a dozen companies in a competitive bidding process. Three final bids were evaluated by the commission by weighting development opportunities (41%), financial plan and financial strength of the proposer (40%), project management plan (10%), quality management plan (5%), and, surprisingly, price (4%).

On Feb. 28, 2007, the Texas Department of Transportation issued a news release accepting a proposal by the Cintra group to pay the state $2.1 billion for a concession to complete about 23 mi (37 km) of 12-lane roadway on State Highway 121 in the North Dallas area. The letter indicated that the next step involved final environmental approval by Collin County, to be followed by a "formal closure of the contractual agreements."

In return, Cintra would be granted a 50-year concession to collect tolls generated from this highway. In addition to the initial payment, they would also pay the state $700 million in revenue, additionally, over the 50-year life of the agreement. TxDOT had already completed the first segment of State Highway 121 in December 2006, at a cost of $700 million, and began collecting tolls at that time. The agreement would have some unusual provisions:

- There were no restrictions on competing roadways.
- Extra free lanes could be added, regardless of the effect on Cintra's toll lanes.
- TxDOT could make improvements to existing facilities regardless of the effect on Cintra's new toll-road facilities.

- Cintra–JPMorgan would be due compensation equal to the net loss of toll revenue attributed to any new competing roads.
- TxDOT had the right to collect extra toll revenues attributable to positive improvements.

The North Texas Tollway Authority Proposal

State officials transferred authority to shape the final negotiations to regional officials, and those officials in the Dallas–Forth Worth region voted in favor of the Cintra proposal as the winner of this concession agreement. But somehow, this same committee on June 28 decided by a vote of 27 to 10 to drop Cintra in favor of a proposal from the North Texas Tollway Authority (NTTA).

The North Texas Tollway Authority initially chose not to submit a bid to TxDOT for the State Highway 121 portion of the Trans-Texas Corridor system, but after the "best value" notification by TxDOT, NTTA stated that they could improve on the Cintra proposal. NTTA indicated that their proposal had a net present value (NPV) of $3.33 billion, as opposed to Cintra's NPV of $2.8 billion. NTTA also proposed the payment of $833 million versus Cintra's $700 million. This after-the-fact submission stunned some TxDOT officials. The federal government reacted rather promptly and said that NTTA's proposal was a breach of federal law on fair and open competition, and if accepted, federal funds and permits might be withdrawn.

Federal Highway Administration Action

An Aug. 16, 2007, letter from J. Richard Capka, the administrator of the Federal Highway Administration to Michael W. Behrens, executive director of the Texas Department of Transportation, pointedly included the federal law violations, citing the "fair and open competitive process" and regulations that "specifically prohibit a public entity from bidding directly against a private entity."

On Aug. 21, 2007, Amadeo Saenz Jr., assistant executive director of Engineering Operations at TxDOT, responded by letter to Janice Brown of the FHWA in Austin, Texas. He stated that the Texas Transportation Commission had taken the following steps to comply with these violations:

(1) cancelling the procurement for the award of a comprehensive development agreement for the project, as allowed under 43 TAC §27.3(b) and Section 8.0 of the Instructions to Proposers; and
(2) cancelling Minute Order 110968, by which the commission approved the Regional Transportation Council recommendation that the North Texas Tollway Authority (NTTA) undertake the development, design, construction, financing, operation, and maintenance of the SH 121 toll project, and taking other actions necessary to finalize a SH 121 project agreement with the NTTA.

Brown responded on Aug. 21, 2007, indicating that the steps taken by Saenz were sufficient to bring the Texas Department of Transportation into compliance with federal law.

North Texas Tollway Authority

The NTTA is a political subdivision of the state of Texas under Chapter 366 of the Transportation Code, and according to their website,

> is empowered to acquire, construct, maintain, repair and operate turnpike projects; to raise capital for construction projects through the issuance of Turnpike Revenue Bonds; and to collect tolls to operate, maintain and pay debt service on those projects.

NTTA serves Collin, Dallas, Denton, and Tarrant Counties and is responsible for the Dallas North Tollway system, which includes the President George Bush Turnpike, the Addison Airport Toll Tunnel, the Lewisville Lake Toll Bridge, and the Mountain Creek Lake Bridge.

NTTA's first project was the Dallas–Fort Worth Turnpike, started in 1955 and completed in 1957. All outstanding bonds were retired in 1997, 17 years ahead of schedule. From that initial project, NTTA created 12 other turnpike projects and pioneered toll business technology with transponder toll collection equipment and open-road tolling technologies.

Weinstein and Clower (2007) referenced the three private bids for the State Highway 121 project, and their report reflected the advantages of awarding the project to a public entity rather than a private firm. This report cited such advantages as not having to pay dividends to investors or shareholders, as a private firm would require; therefore, an estimated $1.3 billion over 50 years could be invested in new tolled or nontolled roads. The economic impact of public versus private contracting as contained in that report is reflected in Table 7-1.

Events Leading Up to the "Violation" Letter

Shortly after the announcement in February 2007 that Cintra represented "best value," on March 12, 2007, Paul N. Wageman, chairman of the board of directors of the North Texas Tollway Authority, sent a letter to Senator John Carona, chairman of the Senate Committee on Transportation and Homeland Security, advising Carona that the NTTA could also offer an up-front fee, as well as generate excess future cash flow after all debt service and operating and maintenance expenses had been paid. He also raised the issue of homeland security and the relative benefits of State Highway 121 being developed by the NTTA, rather than a private entity. The letter recognized the fact that there was a successful bidder on the project and also offered up some preliminary traffic and revenue stream information that appeared to compete with the Cintra proposal.

Table 7-1. Economic and Fiscal Impacts of the North Texas Tollway Authority Bid for State Highway 121 Concession

Description	*Impacts of Difference in NTTA vs. Private Bid*	*Impacts of Total NTTA Bid*
Total finances available for other construction projects	$1,833,000,000	$4,633,000,000
Economic activity	$2,516,435,000	$6,361,091,000
Labor income	$602,629,600	$1,523,338,000
Employment[a]	13,174	33,304
Other property income[b]	$189,787,400	$479,760,000
Indirect business taxes[c]	$42,231,905	$106,757,000

Source: Reprinted with permission from Weinstein and Clower (2007).
[a]Person-years of employment; actual employment levels will vary from year to year.
[b]Includes royalties, rents, dividends, and corporate profits.
[c]Includes state and local sales and use taxes, property taxes, and license and permit fees.

On June 28, 2007, the Texas Transportation Commission voted for a 60-day deadline so that the NTTA and the Regional Transportation Council could reach a decision on the developer for State Highway 121. Commission Chairman Ric Williamson was quoted as saying that the NTTA proposal was "a bunch of promises" while the Cintra agreement was a "firm executable contract." The minutes issued after that meeting recapped the events leading up to the June decision:

> On March 26, 2007, the Chair of the RTC, the transportation policy body for the region, sent a letter to the chairmen of the commission and the NTTA Board to determine if it wishes to submit a binding commitment for the SH 121 project in Collin and Denton counties to the RTC. If the NTTA wishes to submit a binding commitment, the letter provides the submission will be due to the RTC no later than 5 P.M. on May 25, 2007.

On May 18, 2007, the NTTA submitted a public-sector proposal to the RTC. The department reviewed the NTTA submission and compared it with the submission submitted by Cintra Concesiones de Infraestructuras de Transporte, S.A. (Cintra). The RTC contracted with PricewaterhouseCoopers to act as an independent financial adviser to the RTC to assess the financial value of the Cintra proposal and the NTTA submission.

On June 28, 2007, the Texas Transportation Commission voted to conditionally award State Highway 121 to NTTA. TxDOT issued a statement on behalf of the commission authorizing that body to enter into an agreement to proceed with the project once the Regional Transportation Council negotiated the major terms of the agreement with NTTA and submitted it to TxDOT, assuring the state that NTTA could close within 45 days of the agreement, and NTTA provided TxDOT with a quantification of public benefits.

A review of the Cintra proposal, as opposed to that of the North Texas Toll Authority, prepared by John B. Miller with the Washington, D.C., law firm of

Patton Boggs LLP appeared to contradict the conclusions of the Texas Transportation Commission. Miller has credentials as a civil engineer and a lawyer, receiving his Ph.D. in infrastructure systems at MIT. His 28-page report was comprehensive in its approach to the valuation of the project. In the executive summary of this report, Miller states:

> The Cintra/JPMorgan Fund proposal provides the best value to the Regional Transportation Council and the NCT [North Central Texas] Council of Governments. Award to Cintra/JPMorgan Fund establishes and brings $763+ million in new equity investments to meet the region's transportation needs, creates a swing of $2.25 billion toward funding the entire transportation initiative, establishes a $763+ million equity shield against downside performance risks, and isolates the toll rates payable to SH 121 from system wide NTTA toll increases triggered by pre-existing commitments to bond holders. The Cintra/JPMorgan Fund team has already managed and dealt with design, construction, and operation risks, having been in a competitive environment which required completion of this work for many months. NTTA has not yet substantially commenced this process and is substantially behind. NTTA's production rate for toll-road mileage produced per year will have to more than double and construction costs expended per year will have to more than triple in order for NTTA to maintain its other commitments (excluding SH 121), while NTTA attempts to more than double its size in the next eight years. Cintra has a proven track record of putting construction in place and opening toll road mileage that is five (5) and thirty (30) times greater, respectively, than NTTA.

Miller's report is informative and presents a nonaffiliated expert's opinion of these proceedings. He makes the following point:

> 1. This situation is certainly unusual, almost unique. The published procurement process for SH121 was completed, under which various consortia were pre-qualified, submitted proposals, were evaluated and the winner chosen. The putative winner was Cintra. After this process finished, NTTA has now submitted a "postcompetition" proposal and is competing with Cintra for the SH121 agreement. Because the original procurement is still technically "open," Cintra is not permitted to discuss its proposal with third parties or to change its "winning" proposal. The "postcompetition" competition is now an auction in which NTTA has been allowed to submit a proposal after it learned the contents of Cintra's proposal.

The qualifications of the two entities are included in Table 7-2. The report went on to state that future NCT projects might also face financial strain if NTTA were to take control of State Route 121:

- For the proposed 87.4 mi (1,398 km) in the NCT region, NTTA will add 133% to its current system miles over the next eight years.

Table 7-2. Comparative Experience of U.S. Toll Road Operations: NTTA vs. Cintra and Partners

Characteristic	*NTTA*	*Cintra & Its Various Partners*
Current total miles of toll roadway in operation	64	1,243
Toll roadway miles opened before 1999	22	30
Toll roadway miles opened in 1999 or later	42	1,213
Rate of toll roadway miles opened per year since 1999	5.2	151.7
Construction cost of toll roadways opened in 1999 or later (with partners)	$1.192 billion	$6.755 billion
Construction cost expended per year on toll roadways opened in 1999 or later (with partners)	$149 million	$807 million
Total miles of existing toll roadways in the United States	63.9	231.5

Source: Miller (2007).

- For the proposed 10.9 mi (17.4 km) per year to be opened in North Central Texas, NTTA would need to more than double its rate of delivery of toll-road miles over the next eight years.
- For the proposed construction cost of $3.991 billion for future roadways, NTTA would need to spend more than three times its previously incurred construction costs over the next eight years.
- The proposed rate of construction costs to be expended per year would be $499 million per year. NTTA will need to put three times the current construction expenditures in place over the next eight years.

Dr. Miller's conclusion regarding financial matters is succinct:

> Cintra/JPMorgan will bring an infusion of $763+ million of new investment capital into the region. NTTA must incur substantially more debt in order to do so and toll payers across the NTTA network will ultimately be paying off this debt.

And there were other factors relating to timing, but usually "timing" translates into "costs" (Table 7-3).

NTTA's Later Proposals

In a PowerPoint presentation presented at a May 7, 2007, meeting with the North Texas Tollway Authority board of directors, a comparison was made between their proposal and the private-sector proposal. Both presentations were converted to net present value (NPV). The private-sector proposal would bring $5.06 billion to the region, whereas the NTTA proposal would yield $6.695 billion. NTTA would provide a $2.5 billion up-front payment, would guarantee $833 million (NPV) in annual payments over a 49-year period, and would reinvest $1.3 billion in expected revenue in regional roads.

Table 7-3. Key Project Elements in Place: Cintra vs. NTTA

Operation	*Cintra*	*NTTA*
Financing	In place	Only short-term financing obtained
Design and construction team	In place	All contracts need to be advertised, negotiated, and executed
Toll-collection technology	In place	To be finalized
O&M team[a]	In place	Does NTTA have sufficient staff or will more be hired?
Sureties and insurance	In place	May be significantly higher in cost than Cintra's

Source: Miller (2007).
[a]O&M means operations and maintenance.

The NTTA and TxDOT finalized the State Highway 121 project agreement in October 2007, authorizing NTTA to design, build, operate, and maintain State Highway 121 in Collin, Dallas, and Denton counties for 50 years. NTTA made a $3.2 billion up-front payment to TxDOT and the Regional Transportation Council of the North Central Texas Council of Governments in November 2007, and on Sept. 1, 2008, NTTA assumed operation and maintenance of the Sam Rayburn Tollway.

On March 16, 2009, the NTTA Board of Directors named the corridor the Sam Rayburn Tollway (SRT) and formally dedicated it on June 5, 2009. The project was divided into five segments:

- Segment 1 from Denton Tap Road to old Denton Road, opened in 2006;
- Segment 2 from Old Denton Road to Hillcrest Road, opened in 2008;
- Segment 3 from Hillcrest Road to Hardin Boulevard, opened in 2009;
- Segment 4 from Hardin Boulevard to east of U.S. 75 (Central Expressway), scheduled for January 2011 completion; and
- Segment 5, the SRT/Dallas North Tollway interchange, scheduled for completion in January 2012.

An October 2010 Sam Rayburn Tollway progress report indicated that the next steps in this project involve construction of the SRT interchanges with U.S. 75 and Dallas North Tollway.

Harris County Toll Road Authority

Harris County, with its county seat in Houston, encompasses the Houston–Sugar Land–Baytown metropolitan areas in southeastern Texas. It is the most populous county in Texas, with a 2006 population of 3.8 million, encompassing 1,778 mi^2 (4,478 km^2), and its road systems include Interstates 10, 45, and 610, four U.S.

highways, and seven state highways. It is a county on the move, as witnessed by its 14.3% population growth since 2000.

The Harris County Toll Road Authority (HCTRA) came into existence in 1983 after being created by county voters when $900 million in bonds had been approved to build two toll roads, the Hardy Toll Road and the Sam Houston Tollway. In 1983, HCTRA had three separate units: Operations, Engineering, and Services, which handled the EZ TAG program. HCTRA was financially successful, generating a net revenue of $137 million for fiscal year 2006, an increase of about $27 million over the previous year.

In June 2005, a five-year capital improvement program (CIP) was adopted, allowing HCTRA and the county to evaluate the growth of the toll-road system. This five-year CIP included a proposed funding requirement of $1.3 billion for the expansion of seven highway programs; in addition, the county anticipated funding other connectivity projects and awarded a contract to First Southwest Company, a Dallas investment banking firm, to conduct an in-depth look at the future development of HCTRA. First Southwest Company had previously conducted sophisticated studies, such as the financial plan to build oil storage facilities in the Port of Valdez in connection with the Alaska pipeline project. This new study was to focus on the following issues:

1. Identify long-term funding solutions to provide for future infrastructure funding.
2. Develop an analytical matrix so that the county could evaluate financial alternatives in terms of operations, toll-rate-setting mechanisms and policies, and the resultant impact on future development.
3. Establish the financial capacity of the existing system and identify areas to pursue to increase the financial capacity of the HCTRA toll-road system.
4. Explore the growing trend of public–private partnerships to determine if these financing arrangements could result in a better economic situation compared to the existing structure available to the county.
5. Quantify the financial, structural, and operational differences among three basic financial alternatives: county owned and operated, asset sale, and concession awards.
6. Understand and quantify the changes in how mobility projects are funded with the state and the applicability of working with TxDOT to increase mobility within Harris County.

The First Southwest Study

To quantify the financial, structural, and operational differences of three basic financial alternatives, HCTRA engaged First Southwest Company to perform this study.

First Southwest assembled three teams: one headed by Citigroup, another by JPMorgan, and the third by Goldman Sachs. Each team was to pursue a different

track, and to keep each study on a more or less similar track, HCTRA used Wilbur Smith Associates to provide traffic and revenue projections to be used by all three consultants in their financial analysis.

The Findings

Citigroup confirmed that HCTRA operates a successful toll-road network in terms of traffic growth and quality of service and that this system had an estimated value in excess of $8.1 billion. If the county continued to grow, HCTRA would remain the premier toll-road authority in the greater Houston metro area. The JPMorgan team valued HCTRA's assets as between $4 billion and $10 billion, and the Goldman Sachs team also showed significant value (First Southwest Company 2006).

HCTRA Views Private Investment Considerations

Peter Key, director of HCTRA's toll-road authority, discussed his organization's thoughts about private toll-road investment in 2007. Key commented on why HCTRA can continue to fund, operate, and maintain toll roads in their own jurisdiction. He said that decisions must be made with the interest of the public foremost in mind, and they must strive for lower toll rates than concessionaires might provide. He said that concessionaires have to turn a profit, but when the local agency can operate efficiently, they can retain those profits and, in effect, turn them back to the public. He continued by stating that the founders of HCTRA had the financial strength and foresight to fund their highway projects without any need for private financing. Holding to that premise can provide a model for other states to attempt to follow.

Shadow Tolling Comes to Texas

Shadow tolling is a concept that originated in Great Britain, where the government paid the concessionaire instead of having motorists pay for highway travel. These payments are based on traffic volume and service levels and present no evidence to motorists of being tolled; drivers assume that these shadow-toll roads are actually toll-free. The advantages of a shadow-toll system are several:

- It minimizes the risk to the concessionaire, making it somewhat easier to obtain financing.
- The more rapid access to financial sources, in effect, speeds up the entire concession process and produces the end product more quickly.
- The method caps the concessionaire's exposure to lower-than-anticipated traffic volume.

Shadow tolls are generally applied to projects involving highway upgrades because this work affects the normal flow of traffic on the roadway partially under construction and therefore reduces revenue collection. There are about ten such

shadow-tolled projects in Great Britain and seven in Portugal, but the United States has shied away from private participation in these types of projects until quite recently.

FHWA's Look at Shadow Tolling

In 1995, FHWA engaged URS Greiner to study shadow tolling and its applicability in the U.S. market. The federal government concluded that shadow tolling could be appropriate in those cases where real tolls are not acceptable and the risk of reduced traffic would be borne by the developer. They decided that shadow tolls could be used selectively in the United States. Decisions would be based on a particular set of issues:

- the creditworthiness of a project, which depends on the quality and possibly the diversity of the underlying funding sources used to meet required shadow-toll payment levels;
- whether tax-exempt interest rates can be obtained;
- whether shadow-toll project debt is issued by a private-sector entity; and
- if traffic risk is borne by the investors, whether the higher cost of capital due to this additional risk can be justified.

Other advantages to shadow tolling as seen by the FHWA include the following:

1. Proposals occur in a competitive bidding situation where traffic and revenue levels may skew these proposals unless some benchmark for traffic and revenue is provided by the government agency. In simple terms, agencies can accept and evaluate apples-to-apples proposals.
2. Life-cycle costs depend on traffic levels, and annual maintenance and operations components strongly reflect projected traffic levels.
3. Shadow tolling can help avoid long-term problems and delays where there are significant political and/or institutional concerns, such as a political sentiment of "no windfalls for the developer" in an area.
4. If reliable, creditworthy revenue sources and tax-exempt debt are used, a shadow-toll-based issue could represent better credit (and lower cost of capital) than a conventional toll facility credit due to the absence of traffic elasticity and toll-rate modification. However, because of the presence of traffic risk, a shadow-toll-based bond would represent a higher cost of capital than those payable from the same underlying payment sources.
5. Shadow tolls can be a method for a state department of transportation to encourage environmentally or socially desirable goals, such as subsidized high-occupancy-vehicle lanes on a toll road. With the state paying a portion of the foregone toll on behalf of the motorist, the toll agency can meet restrictive terms of its bond covenant and still implement the desired improvements.

How Shadow-Toll Agreements Work

A shadow-toll system is similar to other concession-type agreements in that it provides for the developer or consortium to design, build, finance, operate, and frequently maintain a highway, or in some cases, a bridge or tunnel. What is different about shadow-toll systems is that the developer or consortium's revenue stream does not derive from actual toll collections but from a periodic or annual payment agreement between the developer or consortium and the government agency over the entire concession period. This process is often used when an existing highway project is to be expanded while traffic flow is allowed to continue on selected portions. Because the flow of traffic will be impeded by these upgrades, the developer or consortium would find the risk so high that their proposal would not make economic sense. In that case, the government agency would have to assume much of that risk to make the project viable.

The public agency can take safeguards to limit their exposure when a shadow-tolled project is under consideration. If traffic is actually higher than anticipated in the agreement, the developer and the government can share a portion of the overage, and conversely, if traffic flow is significantly lower than that called for in the agreement, the public agency may contribute to a portion of the shortfall in some fashion.

Shadow tolling has other potential benefits:

- It allows private funding of public participation in an otherwise risky project.
- It caps the public sector's exposure, eliminating the risk of excessive developer profits that are anticipated in any high-risk venture.
- It avoids the need to install toll plazas or build electronic tolling devices.
- It avoids adverse reactions of the public, which might object to paying tolls on a highway under construction.

TxDOT and the El Paso Inner Loop Shadow-Toll Project

El Paso, Texas, is home to the U.S. Army's Fort Bliss. About 21,000 soldiers and 30,000 family members are expected to arrive at the base during the Base Realignment and Closure (BRAC) program. Also, Boeing has a Defense Department contract to work on the future combat systems program at Fort Bliss, and about 300 contractors are expected to be posted to that base.

To accommodate this surge in population, the Texas Transportation Commission voted to build a 7-mi (11.2-km) inner loop connecting Loop 375 on the east side of El Paso to U.S. 54 at Fred Wilson Drive. This new inner loop would increase the speed of trade in and out of the city and provide better access to the El Paso International Airport. This new stretch of road would also open the east side to development near Fort Bliss and the Biggs Army Airfield.

J.D. Abrams Submits an Unsolicited Proposal to Build the Inner Loop

J.D. Abrams has been located in El Paso since the company opened for business in 1966. A heavy and highway construction firm, it has branch offices in Austin, Dallas, and Houston specializing in infrastructure projects; it changed its business structure from a corporation to a limited partnership in 2000. The company also owns a prestressed concrete firm, AustinPreStressed and Transmountain Equipment. Over the years, the company has built flood-control dams, airport runways, military housing infrastructure, and numerous bridges and highways, not only in Texas but in Florida and Mississippi as well.

William G. Burnett is J.D. Abrams' vice-president of Project Development and director of Strategic Initiative, having joined the company in 1997, after spending 29 years at the Texas Department of Transportation, retiring as executive director. On Aug. 2, 2007, I had a telephone conversation with Burnett, and he traced the sequence of events leading up to J.D. Abrams' agreement with TxDOT to build the first private shadow-toll road in Texas, and possibly the first in the United States.

On Dec. 1, 2005, J.D. Abrams submitted an unsolicited proposal to TxDOT to design, finance, build, and maintain a 7.5-mi (12-km) shadow-tolled expressway to be known as the El Paso Inner Loop. This new road would connect Loop 375 on the east side of El Paso to U.S. 54 at Fred Wilson Drive. J.D. Abrams would acquire all required rights-of-way, accommodate any existing utilities, design and construct the Inner Loop to TxDOT's standards and practices, and in return, TxDOT would reimburse Abrams through a pass-through toll agreement (Section 222 of the Texas Transportation Code). The term of the "lease" would not exceed 20 years. J.D. Abrams had hired URS and Kimley Horn and Associates, Inc., to do a traffic study and provide potential revenue streams.

In February 2006, TxDOT requested competing proposals, as prescribed in Section 222 of the Texas Transportation Code and TxDOT's Administrative Rules. They obtained another proposal, this one from Zachry Construction Corporation, that appeared to be more like a construction management at risk proposition than one for a concession-type project. In Zachry's proposal, TxDOT would have to acquire the necessary rights-of-way and be responsible for the cost of relocating existing utilities.

On Apr. 4, 2006, Abrams and Zachry submitted their proposals in response to TxDOT's request for competing proposals. In July 2006, TxDOT needed to get an apples-to-apples proposal for the project and asked both respondents to include maintenance for the highway during a 35-year concession period (changed from 20 years). Zachry was also requested to include costs for all required rights-of-way and costs to relocate all existing utilities. These revised proposals were submitted to TxDOT in August.

In September 2006, TxDOT rquested J.D. Abrams to submit the cost of an interim facility and a final facility, both within (now) a 20-year time frame. In November 2006, Abrams presented their financial plan to TxDOT, and on Dec. 8, 2006, TxDOT declared J.D. Abrams' proposal "best value." Abrams had been

using Citigroup as their investment adviser. On Jan. 11, 2007, negotiations began with TxDOT to hammer out a final agreement.

In February 2007, both parties agreed to a maximum payment of $350 million, to be disbersed in annual payments of $35 million, not to exceed 20 years. The cost per vehicle mile rate that would create the pass-through "shadow toll" was part of this negotiation process. At first, three classes of vehicles, with three different toll rates, were presented by J.D. Abrams: one for automobiles, one for light trucks, and one for heavy vehicles. This differentiation was eventually reduced to only two classes—automobiles and trucks—and the revenue stream was determined on that basis.

On July 5, 2007, TxDOT obtained their final environmental clearance, paving the way for an agreement with J.D. Abrams scheduled for mid-August. The time from December 2005 to August 2006, a time frame of only nine months from submission of the unsolicited proposal to acceptance, reflected not only the professionalism of the proposer but also the urgency that TxDOT felt this project deserved. J.D. Abrams promised the Texas Transportation Commission that they would have some sections of the Inner Loop opened by September 2008 and April 2009.

Although URS assumed the role of lead designer, they would be supplemented by the local engineering branch of KBR, Inc., Moreno Cardenas Inc., and Parkhill, Smith, & Cooper, Inc., as surveyors and Archana, Inc., a geotech company.

TxDOT's Unique Shadow-Toll Contract

On Aug. 30, 2007, J.D. Abrams executed their contract with the Texas Department of Transportation, referred to as a pass-through toll agreement, but the company, wanting to get a jump on the project, had already begun some design work in May of that year.

The agreement contained some basic representations and some unique ones, a few of which are excerpted here:

- **Environmental Assessment and Mitigation**—TxDOT was responsible for the identification of any environmental problems and would provide the developer (Abrams) with a written assessment of those issues. The developer was responsible for all environmental mitigation, remediation, and compliance identified in that report but would not be held responsible for any preexisting hazardous material nor any mitigation, remediation, or compliance not identified in the report.
- **Right-of-Way and Real Property**—The developer was responsible for the acquisition of all real property needed for the project, including easements needed for construction work. All property rights were to be placed in the state's name. TxDOT would acquire through eminent domain any needed rights-of-way, easement, or real property that the developer was unable to acquire.
- **Utilities**—The developer would determine the scope of utility work required and notify the appropriate utility company to schedule any adjustments. The

developer would be responsible for all costs associated with additional adjustment, removal, or relocation of utilities during construction. However, the developer would not be responsible for any costs associated with upgrading or improving any utilities.

- **Architectural and Engineering Services**—The department would provide their own preliminary engineering study, but the developer was responsible for all other architectural and engineering services.
- **Construction Responsibilities**—These responsibilities were rather straightforward and included compliance with the department's standards, including a requirement for an independent quality assurance firm.
- **Maintenance**—After acceptance of the project, TxDOT would be responsible for all maintenance, including the equipment to count the vehicle miles.
- **Repayment**—There were two notices to proceed: NTP 1 and NPT 2. Notice to Proceed 1 was a direct-pay scope of work effective with the signing of the contract and pertained to a limited scope of project deliverables with a schedule of values attached for each such deliverable that included a design summary report, schematic validation, quality management plan, right-of-way acquisition, design, and construction of Segment A (scope defined as a 5-mi (8-km) section of Spur 601, including the relocation of three existing roads and a backage road [i.e., one running behind developed land] at another location). Notice to Proceed 2 pertains to the balance of the scope of work included in the agreement. The balance of the contract pertained to more or less boilerplate language dealing with termination, remedies, insurance, and the like.

The various attachments were where some of the unique provisions to this shadow-toll project reside:

Attachment B: The detailed scope of work is included in this attachment, which defines in more detail the extent of Segments A and B. The attachment contains intermediate milestones (IMs) for two segments and the final project completion and the liquidated damages that accrue if those milestone dates are not met.

- Intermediate Milestone 1 (IM 1)—Segment A-1 was to open to traffic 425 days after issuance of NTP 1; and
- Intermediate Milestone 2 (IM 2)—Segment A-2 was to open to traffic 638 days after issuance of NTP 1.

The entire project was to be substantially complete and open to traffic 1,247 calendar days after issuance of NTP 1. If IM 1 or IM 2 were not met, liquidated damages of $1,580 per working day would accrue; if the entire project was not substantially complete as required, the same liquidated damages of $1,580 per working day would apply. Substantial completion was defined as "all travel lanes open to traffic and no further work is remaining that requires lane closures affecting the mobility of the traveling public."

Attachment C: This section contained some of the financial workings of the agreement, including the following:

- an overview of the financial plan, which outlined the direct-pay scope of work and the pass-through payments for a total of $367.45 million;
- Exhibit 1, which defines the direct-pay scope of work that includes the department's funding commitment of $55 million;
- Exhibit 2, which defines the pricing per vehicle classification for two types of vehicles, based on their lengths. This exhibit also contains an early completion clause; and
- Exhibit 3, which defines the schedule of pass-through toll payments with a formula for arriving at those payments. (Note: No time line was included in this exhibit, but it would be covered in the base contract agreement.)

Attachment D: This part is the project implementation section that deals with the nuts and bolts of the administration of the work and defines the responsible parties for environmental review, permitting, right-of-way, and utility relocation.

Attachment E: This attachment has the details of the direct-pay scope of work, deliverables, and eligible expenditures and the format for the request for payment.

El Paso Accepts Some Segments Ahead of Schedule

Segment A-1 of the project (city streets) was opened Labor Day 2008, 30 days ahead of schedule; Segment A-2 (the easternmost 2.5-mi [1.5-km] portion) opened on Memorial Day 2009 right on schedule. Segment A-3, the middle section (westbound 2.5 mi [1.5 km]) opened 9 months ahead of schedule on Apr. 15, 2010, which was quite an achievement for J.D. Abrams.

The remaining work continues on Segments B-1 and B-2, according to an e-mail I received on Oct. 22, 2010, from Bill Burnett, vice-president, Project Development, for J.D. Abrams. The westernmost portion of the loop is scheduled to be complete on Nov. 15, 2011, and the four direct connections will be opened to traffic in January 2011.

TxDOT has made two actual traffic payments, one in January 2010 and the other the following month. The next payment is due in January 2011, after which the agreed-on minimum and maximum payments will commence in July 2011.

Burnett stated that the company has experienced no unusual maintenance costs or other cost-related issues. The toll rates have not changed per contract and will remain at $0.25 per vehicle-mile for vehicles less than 20 ft (6.096 m) in length and $0.85 for those that exceed 20 ft (6.096 m).

The project is on schedule to be substantially complete on Jan. 28, 2011, and final acceptance by the city of El Paso and TxDOT is scheduled to be in May 2011.

Another TxDOT Strategic Plan Project Is Realized

Another one of TxDOT's Strategic Plan projects came to fruition in March 2008, when SH130 Concession Company LLC, a consortium owned 65% by Cintra and

35% by Zachry Construction, finalized their deal on the State Highway 130 Segment 5 and 6 project. Here are some facts about this project:

- The total length of State Highway 130 is 91 mi (147 km).
- Segment 5 goes from north of Mustang Ridge to FM 1185 north of Lockport, 11 mi (6.8 km).
- Segment 6 goes from FM 1185 to I-10 northeast of Seguin, 29 mi (17.9 km). It includes approximately 3 mi (1.8 km) of existing road and about 26 mi (16 km) of new right-of-way.
- The base rate for tolls is 12.5 cents per mile, and more for trucks, following Central Texas Turnpike rates. There will be no toll plazas on segments 5 and 6, but tolls will be collected electronically at certain points along the highway. There will be a maximum of two tolled lanes in each direction.
- As of October 2010, construction was in evidence all along State Highway 130 from State Highway 45 southeast to Interstate Highway 10. Construction was under way on 34 of the 54 bridge structures in segment 6; when it is completed in 2012, it will act as a bypass for I-35 between Georgetown and San Antonio.

The leasing agreement between TxDOT and SH130 Concession Company LLC contains some unusual components:

1. A competing facility clause allows TxDOT to have the "unfettered right in its sole discretion" to build a competing road, upgrade an existing one, or build a line rail or freight rail outside the concessionaire's right-of-way. Compensation to the developer shall be equal to the loss of toll revenues, if any, attributable to the competing facility. Notification of the competing road and other terms and conditions are spelled out in Section 11 of the agreement.
2. Vehicle detection rate is required to be 99.8% successful; transponder read rate is required to be 99.99% accurate.
3. Maximum toll rates are to be adjusted on each anniversary of the service commencement date by using the following formula:

   Maximum toll rate = Maximum toll rate base × (NGSPPC/NGSPPC Base)
   (NGSPPC = Nominal gross state product per capita).

4. Part C of Exhibit 7 refers to developer refinancing and how TxDOT would share in any refinancing gain. Refinancing gain is defined as the amount equal to the greater of zero and (A − B) − C, where
   A = the Net Present Value (NPV) of the distributions to be made over the remaining term following the refinancing as projected immediately before the refinancing (taking into account the effect of the refinancing) and using the relevant base-case financial model as updated (including the performance of the facility) so as to be current immediately before the refinancing.
   B = the NPV of the distributions to be made over the remaining term after the refinancing projected immediately before the refinancing, projected

immediately before the refinancing (but without taking into account the effect of the refinancing) and using the base-case financial model as updated (including the performance of the facility) so as to be current immediately before the refinancing.

C = any adjustment required to adjust the prerefinancing equity internal rate of return to the equity internal rate of return.

The facility agreement, dated March 22, 2007, will allow the concessionaire, the right to, as lessee, to build these 40-mi (64-km) segments on this $1.36 billion project.

SH130 Concession Company LLC will finance, develop, design, construct, manage, operate, maintain, repair, and toll the facility for a period of 50 years. The full concession agreement can be obtained via the TxDOT website.

Interstate Highway 635 Managed Lanes Project (LBJ Freeway)

On Sept. 4, 2009, TxDOT entered into a comprehensive development agreement (CDA) with the LBJ Infrastructure Group to design, construct, finance, operate, and maintain the 13-mi (8-km) LBJ-635 corridor in Dallas County, and followed up with a conditional award to that group with an agreement for 52 years.

The LBJ Infrastructure Group (formerly LBJ Development Partners) consists of the following entities:

- Cintra Concesiones de Infraestructuras de Transporte, S.A. (equity owner);
- Ferrovial Agroman, S.A.;
- W.W. Webber, LLC;
- Bridgefarmer & Associates, Inc.;
- Meridiam Infrastructure Finance (equity owner);
- Macquarie Capital (USA) Inc.;
- Ferrovial Infraestructuras, S.A.;
- Grupo Ferrovial;
- Meridiam Infrastructure (SCA) SICAR; and
- Dallas Police and Fire Pension System (possible equity partner).

The stated goal of the project is to relieve the severe congestion that occurs on 13 mi (9.9 km) of Interstate 635 from west of I-35E to east of U.S. 75 and south on I-35E from I-635 to Loop 12.

The improvements will consist of the following:

1. rebuilding 8 lanes 1 ft (0.3 m) wider than they currently exist,
2. constructing additional shoulders on the outside of the main lanes,
3. providing continuous frontage roads at least two or three lanes wide, and
4. constructing six barrier-separated managed toll lanes to be located between or below all frontage roads.

These managed lanes will allow traffic to move at a more reliable, faster, 50 mi/hour (31 km/hour) speed by adjusting the toll rate up or down as the number of vehicles increases or decreases. Motorists will have a choice of either remaining in the slower moving but improved and rebuilt free lanes or traveling at higher speeds on the tolled, managed lanes. The project is expected to take five years.

Because only a CDA has been executed, details of the actual concession agreement have not been finalized as of Nov. 2010; only the construction cost of $2.076 billion has been established.

The LBJ Infrastructure Group invested approximately $2.7 billion, which will be financed through a combination of public and private funds, including $665 million in private equity; U.S. DOT will provide $615 million in unwrapped private activity bonds, TxDOT will provide $496 million, and a U.S. DOT TIFIA loan will constitute $850 million. They will pay for design, construction, financing, operation, and maintenance of the entire project, anticipating repayment and a reasonable return on investment over the 52-year concession agreement.

The toll rates for the managed lanes had not been established as of November 2010, except that the base toll rate cap shall initially be $0.75 per mile per toll segment, of which there will be four. There will be a toll segment toll that multiplies the base toll by the toll factor, rounded to the nearest five cents. This toll factor will be based on the type of vehicle, ranging from 0.0 for exempt vehicles to 5.0 for large trucks with more than one trailer.

One interesting fact about this concessionaire group is that the Dallas Police and Fire Pension System will be an equity partner. The July 2010 issue of the Dallas Police and Fire Pension System monthly newsletter, "First Responder," indicated that their pension fund would invest in the LBJ Managed Lanes Project. Their first such venture was as an equity partner in the North Tarrant Express project, and they indicated in this July newsletter that their system is one of the first public U.S. pension funds in the country to invest directly in a major road infrastructure project.

A Fitch Ratings press release dated June 1, 2010, assigned a BBB– rating to the LBJ Infrastructure Group LLC's $600 million senior lien revenue bonds and a BBB– to the $850 million TIFIA loan, indicating that the "primary risks for the transaction include the limited amount of meaningful history for this type of asset class and uncertainty associated with toll rates given the highly demand driven nature of toll rates."

The Texas Transportation Commission Issues Updated Principles and Policies

In May 2008, the Texas Transportation Commission issued a series of principles and policies that will govern the development, construction, and operation of toll-road projects in the state highway system:

- All state highway facilities, including toll roads, will be completely owned by the state at all times.

- All comprehensive development agreements (CDAs) will include provisions for TxDOT to purchase or buy back the interest of a private developer in a CDA at any time when it appears that to do so is in the public interest.
- The commission shall approve in public meetings the initial toll rates charged on toll projects and shall approve the methodology for increasing the tolls.
- Only new lanes added to an existing highway will be tolled, and there will be no reduction in the number of nontolled lanes that currently exist.
- CDAs will not include noncompete clauses that would prohibit improvements to existing roadways.
- TxDOT will always consider using existing rights-of-way that satisfy the purpose and need of the projects when conducting environmental studies.
- To the extent possible, TxDOT will plan and design facilities so that a landowner's property is not severed into two or more separate tracts and the original shape of the property is preserved.

The Report on Private Participation in Toll Projects

Senate Bill 792, passed by the 80th Texas legislature, created a committee to study the public policy implications of entering into CDAs with private entities to develop new toll-project infrastructure. The committee was also charged with looking at the public policy implications of selling an existing and operating toll project to a private entity (they used the word *sell* rather than *lease*.)

On Dec. 1, the Legislative Committee on Private Participation in Toll Projects (2008) presented their final report to Governor Rick Perry. This report, focusing on the needs of Texas, also provides critical insight into highway transportation issues affecting the entire country.

The underlying tone of the report was that the traditional way of financing transportation projects would not fully meet the funding needs of the state and that the state should embrace the private sector to close any funding shortfalls. In the executive summary, the committee noted the following highlights of the report:

- Current fuel taxes do not cover the cost of Texas roadways, nor will they cover future investment requirements. Higher taxation of fuel is not a reliable long-term source of highway funding because technological advances in vehicle design, lower fuel consumption standards, and a change in driving habits will affect this funding source.
- There are limits on relying on traditional public-sector financing as the sole source of highway investment funding, and not all road projects are toll-viable and therefore can be viewed as potential revenue sources.
- Public–private partnerships can be used to best advantage when a number of conditions are met, and the full report elaborates on them.
- There is a need to address the public interest and transparency in all public–private endeavors and set controls over toll rates while avoiding windfall profits accruing to the private entity owning or leasing the concession.

- The public entity must consider a number of policy choices: maximizing toll revenue vs. maximizing mobility, local primacy where overlapping jurisdictions are involved, market valuation of an asset vs. a public-sector comparator, the latter being a more accurate measure of value.

Looking More Closely at Some of the Committee's Observations

Fuel Tax

The existing 20-cent-per-gallon fuel tax in Texas was last raised in 1991 and not indexed for inflation, so that its efficacy today as a funding source remains minimal. The committee offered several solutions, including simply raising the tax or indexing it to inflation by using the consumer price index. A one-cent-per-gallon increase would raise an additional $110 million. But because this source fluctuates, as was evidenced by lower fuel consumption when gas prices topped $4.00 per gallon in 2008, long-range transportation plans based on fuel-tax revenues would be uncertain. The shift in consumer preferences toward more fuel-efficient vehicles, possible federal policies to discourage carbon-based fuel consumption, and more strict clean air requirements will all have an effect on per-gallon fuel tax revenue. Therefore, the fuel tax can be indexed to inflation by using the consumer price index; if that had occurred in 1991, the current tax would have been 29.6 cents, which would have generated about $1.2 billion in revenue. These two solutions are as much political as they are substantive, and invoking either one may not play out well.

Public-Sector Financing

Such sources as tax-exempt municipal bonds, municipal revenue bonds, and bond insurance all have limitations. Tax-exempt municipal bonds issued either as a general obligation of the state or local government rely on the full faith and credit of the entity involved. These bonds are traded in the open market, and the interest on these bonds is exempt from federal income taxes, so they are particularly attractive to retail investors with high tax brackets, but the market for these types of bonds can vary with fluctuations in interest rates. A change in the creditworthiness of the public entity or changes in demand for these types of tax-exempt bonds make this funding source subject to those fluctuations in demand.

The traditional way to enhance public credit was with bond insurance, but the fall of American International Group, Inc. (AIG) and other insurers during the 2008–2009 financial meltdown may leave investors somewhat wary of the ability of insurers to cover any losses. Public employee pension funds, some of which have significant sums and may be seen as a potential market for tax-exempt bonds, are already exempt and therefore have little interest in the lower interest rates paid by municipal bonds.

But on the positive side, the financial market turmoil of 2007–2009 may be beneficial to those public toll authorities that have a history of well-run, high-

quality organizations that may be able to secure financing more readily and at a lower cost when financial markets begin to stabilize.

Using Public–Private Partnerships to Best Advantage

Legislative Committee on Private Participation in Toll Projects (2008) stated the following advantages of using the public–private partnership approach:

- This approach produces greater certainty of budget and time considerations because of the fixed terms of the private entities' contracts and the absence of politically driven scope changes.
- Public–private partnerships have lower life-cycle costs. The private entity must consider the whole project life cycle, even at the expense of higher initial capital costs, for example, using a higher grade of concrete that could cut maintenance costs.
- PPPs transfer risk from the public sector to a private party. The greatest risk in a toll project is that projected traffic count is not achieved after the road is operable. The report states that a study of 23 U.S. toll projects revealed that most did not meet their initial traffic and revenue (T&R) projections. One explanation for this failure was that these projects were scattered all over the United States and rather than having one group gain experience and use that experience to perfect their T&R studies, each particular project was approached by forecasters starting from scratch. The report also mentions a more troubling issue: the fact that financing procedures could drive the traffic projections and not the other way around. They point to some of the scandals uncovered in 2008–2009 where mortgage market valuations were made by appraisers who provided numbers their clients were looking for, even if those numbers were not justified.
- PPPs provide access to new pools of capital that may not be available to public-sector toll agencies. The emergence of infrastructure funds and funding from private equity funds has been used to invest in all types of revenue, producing PPPs around the world.
- Private financing results in an ability to raise large sums because of the use of less conservative financing models. Public financing, by its nature, is conservative and is issued to protect the public interest and reduce risk, hence the low interest provided to investors on risk-averse instruments. The creation of more exotic funding instruments within the private sector based on less-than-conservative models can create highly leveraged funds with huge streams of capital, a source in which public agencies would not participate.

The Report's Conclusions and Recommendations

Public–private partnerships represent a significant tool available to a state's increasing highway funding gap, and they should remain an option when states

consider funding future transportation projects. The current unsettled financial environment highlights the uncertainty and limitations of conventional financing options.

The report cautions that although private capital offers important advantages, the public sector needs to have strong oversight and contractual controls that clearly spell out performance requirements, penalties, and incentives as well as allowable toll-rate increases and the limit on rate of return on the private sector's investment, possibly by some form of revenue-sharing provision.

By focusing on large up-front concession payments, the public sector needs to discern whether this short-term payment increases the risk of the project burdening itself with debt that could lead to failure. The committee is considering revenue-sharing provisions over the life of the project's contract to better align incentives for all parties and to ensure the long-term success of the project.

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CHAPTER 8

Florida's Public–Private Partnership Endeavors

Chapter 7 was all about Texas and its varieties of problems and solutions. This chapter is about Florida and its long history of working out intrastate travel by various modes (focusing here mostly on roads).

Florida's Turnpike was opened in the late 1950s, and authorities in the state have tried to keep its roads and tolling methods up to date in fits and starts. Florida was an early user of public–private partnerships. The large projects elucidated in this chapter are the widening of Interstate 75, the Port of Miami Tunnel project, work on both Interstate 595 and the First Coast Outer Beltway, and the Miami Intermodal Center, each groundbreaking in its own time. The concept of availability payments is also introduced in this chapter, in which concessionaires receive periodic payments during design and construction, based on meeting specified performance criteria.

After World War II, the population of Florida soared, tourism began to increase, and it became apparent that the state's highway system would need significant upgrades and improvements to keep up with the increased traffic generated by those changes. Concurrent with President Eisenhower's interstate highway program, a citizens' group in Florida lobbied for a new road to link north and south Florida. As a result, the Florida Turnpike Act of 1953 was enacted, and two years later a $70 million bond issue was floated so that construction of the Florida Turnpike, a toll road, could commence.

By the early 1960s, Florida's population doubled to almost 5 million, and careful planning of future highways became an essential consideration to be explored by the state's department of transportation.

Florida's Turnpike Enterprise

Management of the turnpike system in Florida rests with Florida's Turnpike Enterprise, which began life as the Florida State Turnpike Authority in 1957 but was absorbed into the Florida Department of Transportation (FDOT) in 1959. It remains today as a separate district within FDOT.

The chief executive officer of Florida's Turnpike Enterprise, James Ely, speaking at the Construction Management Association of America's annual meeting in Orlando in October 2006, said that since 1993, 91% of new highways in Florida were built as user-financed toll roads. He said that one mile of limited-access highway in Florida, at that time, cost $50 million and that conventional funding was inadequate to advance the state's growing transportation needs. Ely was repeating what the state had recognized years before, when they began to look at public–private partnerships as one avenue to explore to engage the private sector in advancing their transportation programs.

Florida Investigates Public–Private Partnerships

Florida did not jump into the P3 movement, as they refer to it, but proceeded at a deliberate pace, enacting legislation, inviting the private sector to participate in Transportation Committee meetings, and holding public forums.

The state identified P3 funding strategies as falling into one of five broad categories:

1. the traditional government model: design–bid–build;
2. design–build with government funding: the turnkey public-financed model;
3. design–build with project-generated funding: the turnkey project-financed model;
4. design–build–operate–maintain, with a primary government-funding model (DBOM); and
5. design–build–operate–maintain, with a project-generated funding and private concession model.

Florida Statute Section 334.30 and P3

The state legislature in 2004 declared that there was a public need for rapid construction of safe and efficient transportation facilities for travel within the state, and they enacted Florida Statute Section 334.30 to permit financial assistance to the private sector to help achieve that goal and modernize the existing Private Transportation Act. This statute was meant to accomplish several things, and it reflected the state's desire to facilitate P3 projects:

- advance projects programmed in a five-year work program previously adopted by the state, using funds provided by public–private partnerships or private entities to be reimbursed from DOT funds;
- allow the Department of Transportation to receive or solicit proposals and enter into agreement with private entities or consortia for the building, operation, ownership, or financing of transportation projects;
- permit the department to exercise any power possessed by it, including eminent domain, with respect to the development and construction of transportation projects as spelled out in Statute Section 334.30;

- allow the department to provide services to the private entity;
- permit agreements that include maintenance and law enforcement, pursuant to Statute Section 334.30, to provide full reimbursement for those services to the state on projects not on the state highway system; and
- permit the department to lend funds from the Toll Facilities Revolving Trust Fund to private entities that construct projects on the state highway system.

The Toll Facilities Revolving Trust Fund

The Toll Facilities Revolving Trust Fund (TFRTF) is a loan program created by the state to develop and enhance the financial feasibility of revenue-producing road projects undertaken by local government officials and Florida's Turnpike Enterprise. The TFRTF provides interest-free loans as "seed" money to pay initial project-development costs for toll facilities. Up to $1.5 million is awarded for each successful applicant; loans greater than $1.5 million require approval by the state legislature. The advantages of using the TFRTF are many. The fund

- allows local exposure, support, and priority setting for revenue-producing projects;
- provides financial alternatives to the state and local government entities;
- expedites projects otherwise delayed;
- increases transportation resources for the state;
- provides a cost benefit to the state; and
- complements the State Infrastructure Bank loan program.

The State Infrastructure Bank Fund

The National Highway System Designation Act of 1995 authorized up to 10 states to establish a pilot state infrastructure bank (SIB) program, and in 1997, Florida was selected as one of the initial states to participate in this program, which was subsequently rolled over into the new Transportation Equity Act for the 21st Century (TEA-21).

This SIB is simply a revolving loan program. Under the program, the state can transfer a limited amount of the state's Highway Trust Fund to the SIB. The SIB can then loan money to assist in financing state transportation projects; on repayment, the SIB loans can be reloaned to support other projects. The amount in which a state can transfer funds to an SIB is limited generally to 10% of its annual highway, transit, and rail apportionments. Loan repayment terms are reduced from 35 to 30 years.

Since 2001, approximately $279 million in equity had been provided to the SIB, as of June 25, 2007, as reported by ADVFN, a U.S. and U.K. financial services reporting agency. About $668 million in loan commitments have been made, with $259 million in disbursements to that point.

SIB loans are entered into and partial disbursements are made before debt issuance and receipt of anticipated equity contributions. Assuming the current

loads at SIB and an additional $75 million in annual commitments to be awarded by 2014, the SIB is expected to make $1.2 billion in loan commitments during that time, of which $397 million will have come from bond proceeds and $180 million from additional state contributors.

SIB loan applications are usually accepted once a year, and loan approval is based on perceived transportation benefits to be provided by the project, the interest rate proposed by the borrower, and the portion of the project to be funded from other sources. A $61.7 million Florida Department of Transportation SIB revenue bond, Series 2007A, was rated by Fitch Ratings as AA, attesting to the state's financial acuity.

Advancing the P3 Movement

As late as January 2007, two key players in P3 made presentations before the Florida House Committee on Infrastructure to promote the role of P3 in the state highway improvement program. Nossaman, Guthner, Knox & Elliott, LLP, the law firm that has worked with more than 30 state departments of transportation involved in infrastructure projects, is also special counsel to FDOT on the Port of Miami Tunnel Project. They presented a concise, positive evaluation of the public–private partnership movement.

Cintra, the successful concessionaire on several U.S. projects, also presented their views on the applicability of P3 and the advantages to the states that have embraced this concept. Their presentation provided the committee with some valuable information, and Cintra did not miss using this opportunity for some public relations work by stating that their company had a $6.3 billion market cap and had 37 years experience in the concession business.

With all of FDOT's background in moving public–private partnerships forward, they have became a strong advocate for this project delivery system. On their website in January 2008, they posted nine projects in play. (FDOT rates the complexity of projects as level 1, 2, or 3. Level 1 projects are rather straightforward and include such work as resurfacing. Level 2 is more complex and might be applied to a rural road-widening job. Level 3 projects are the most complex.) The nine projects are the following:

- First Coast Outer Beltway, posted as Level 1—This is a "greenfield" highway in the First Coast area that will begin west of Jacksonville on I-10 heading south into Clay County and east into St. Johns County, connecting with I-95 south of Jacksonville. The estimated cost is $1.8 billion, with $30 million of state funds to move the procurement forward in 2008.
- I-95 Widening and Interchange with Pineda Causeway, posted as Level 3—This project would advance projects in the Adopted Work Program (which lists construction projects scheduled over a five-year period) to widen I-95 and improve the I-95/Pineda Causeway interchange in Brevard County. The total capital cost is budgeted at $211 million.

- I-595 Improvements, posted as Level 3—A series of projects to widen I-595 and improve interchanges from Florida's Turnpike west to I-75/Sawgrass Expressway. This project will include adding express lanes in the center of I-595; the project is valued at $1.3 billion. A short list of concessionaires was posted in late 2007. On March 3, 2009, a contract was awarded to I-595 Express LLC, a consortium composed of concessionaire Actividades de Construccion y Services (ACS) and designer-builder Dragados. The highway has been divided into five segments in Broward County, designated A through E. Construction started in November 2010 on the A and B segments, which extend from SW 136 Avenue to Hiatus Road, and is slated for completion in 2014. Segment C extends from Pine Island Road to Florida's Turnpike; construction began in February 2010 and is scheduled to be complete in the third quarter of 2014. Segment D extends from I-441 to I-95; work began in June 2010 and is scheduled for completion in the third quarter of 2014. For segment E, the tie-in to Florida's Turnpike will begin in March 2011 and is to be completed by the third quarter of 2014.
- I-95 Express Lanes, posted as Level 3—Phase 1 will reconfigure the existing footprint of I-95 from I-395 to the Golden Glades Interchange in Miami, creating two new lanes and combining them with the existing HOV lanes to form two HOT lanes. Buses, vanpools, and HOVs with three or more passengers will drive in the 95 express lanes at no cost. Others will pay a toll based on the congestion level at the time of day to ensure that the express lanes move at a maximum targeted speed of 50 mi/hour or higher. A design–build–finance project for Phase 1 valued at $136 million was scheduled to move forward in late 2007. Introduced on this highway will be 23 low-emission buses, which will reduce congestion, increase traffic speed, and be much more environmentally friendly. Phase 1A began in 2008, and electronic tolling was launched in December 2008 on the northbound lanes from SR 112/I-195 to Golden Glades north of 151st Street. Phase 1B commenced in the summer of 2008, and electronic tolling began in January 2010 for southbound I-95 lanes from Golden Glades to north of SR 836. Phase 2 is scheduled to extend the express lanes from Golden Glades to Broward Boulevard in Broward County. Work is to commence in early 2011 and be completed in either late 2013 or early 2014.
- Palmetto Expressway, posted as Level 3—Total cost for this $232 million project would advance the last segment of the Palmetto Expressway (SR 826) widening to Miami from north of Bird Road to south of Don Shula Expressway (SR 874) and includes interchange improvements at Bird Road and the Don Shula Expressway.
- Port of Miami Tunnel, posted as Level 2—This project is also an "availability payment" type project that would widen MacArthur Causeway and add a tunnel connection from Watson Island to Dodge Island at the Port of Miami. As of midsummer 2008, this project was awaiting completion of the government funding, but since that time the project was aborted. However, it was resurrected again in June 2009.

- U.S. Route 1 Improvements, posted as Level 3—In an area called the "18 Mile Stretch" (28 km), which goes from Florida City to Key Largo, is a series of road-widening projects on U.S. Route 1 south of Miami. Three lanes are involved, and an unsolicited proposal was received to advance certain segments by as much as four years. This is a $113 million project.
- I-75 Design–Build–Finance Project, posted as Level 1—In Lee and Collier Counties, this project will widen 30 mi (48 km) of I-75 from the Golden Gate Parkway at State Route 80 and includes several bridge structure enhancements. Two new lanes will be added, and several interchanges will be reconstructed at Immokalee Road, the Golden Gate Parkway, and Alico Road. This project was estimated to cost $469 million and was under contract to a joint venture known as ACCI/API.
- I-4/Crosstown Expressway Connector, posted as Level 3—This project would advance a new connector from I-4 to the Tampa South Crosstown Expressway Connector and also include a trucks-only connector from I-4 to the Port of Tampa. Estimated cost is $400 million for this project.

The I-75, Port of Miami Tunnel, I-595, and First Coast Outer Beltway projects are discussed in more detail later in this chapter.

FDOT Accepts Unsolicited Proposals

The Program Finance Section of the Office of Financial Development in the Florida Department of Transportation has a policy of accepting unsolicited proposals from private entities for P3 projects in the state. They publish suggested steps for potential developers to use when considering submitting an unsolicited proposal for these P3-type projects. These steps are listed on their website (www.dot.state.fl.us/financialplanning/finance/P3_Unsolicited_Proposal_Process.shtm, accessed Jan. 13, 2011).

- Proposers should begin conceptual discussions with the Program Finance Manager in the Office of Financial Development, Program Finance Section to gain an understanding of program basics.
- If the proposal meets basic program requirements, proposers should continue conceptual discussions with the District/Turnpike to determine District/Turnpike interest.
- If District/Turnpike is interested, the concept should receive executive direction (Secretary/Assistant Secretary/District Secretary) before proceeding further.
- Central Office will determine if the project involves federal aid and/or is state funded. District/Turnpike should request a Cash Availability Schedule from Central Office.
- Proposer submits to the Project Finance Manager an Unsolicited Proposal with $50,000 deposit. Proposal may be a brief concept statement. If acceptable and within Executive Direction, the department begins 120-day advertisement period.

- During the advertisement period no evaluation or analysis is performed on the proposal(s).
- All proposals must be complete and sufficient for evaluation by the end of the advertisement period or will be rejected and returned.
- At the end of the advertisement period, District/Turnpike and Central Office will evaluate the proposal(s) as may be appropriate and select Best Value Proposal for negotiation.
- If executive direction is to proceed, then award/execute contract with the final selected proposer.
- Project is produced by the District/Turnpike according to the negotiated procurement documents.

FDOT Experiences Delta between Estimates and Bids

The Specifications and Estimates Office of the Florida Department of Transportation in a February 2007 report reviewed their own valuation of projects versus the results of competitive bidding and came to these conclusions:

- The department rejected 54 contracts (10%), which they estimated at $618 million but resulted in bids amounting to $1.04 billion.
- In fiscal year 2005–2006, they rejected 71 contracts because of high bids; several projects advertised at $600 million total, came in at $977 million. All but 43 were relet, deleted, or deferred.
- FDOT concluded that more periodic updates and performance measures needed to be established and that additional cost libraries should be developed using historical unit prices from similar contracts and time durations.

This analysis may have contributed to some new ways of thinking about public–private partnership projects in Florida.

Strategic Intermodal System

SIS Defined

In 2003, the state established Florida's Strategic Intermodal System (SIS) to focus the state's limited resources on transportation facilities critical to its economy and quality of life. The Strategic Intermodal System plan was developed to designate facilities that met that criterion. The SIS plan included airports, seaports, highway corridors, highway hubs, and road connectors in the Jacksonville, Tampa Bay, Orlando, and southeastern and southwestern areas of the state. The plan was a fundamental shift in Florida's transportation policy, and this intermodal concept has now taken on a national imperative. The Strategic Intermodal System would do the following:

- redefine the state's resolve in transportation by focusing on international, interstate, and interregional travel of passengers and goods;

- advance a multimodal approach to planning, rather than focusing on individual modes;
- use state funding to improve connectivity among individual modes, to eliminate bottlenecks and unnecessary delays, to improve travel time reliability, and to expand the options available for interregional travel;
- link the state's transportation planning and investment decisions to statewide economic policies;
- look for services to support Florida's diversified economy by reducing transportation and logistics costs, improving access to markets from urban and rural areas, and supporting growth in trade and tourist flows; and
- shift from reactive to proactive planning of future transportation investments.

Three types of facilities would make up the SIS: *hubs,* such as airports, seaports, and rail terminals; *corridors,* such as highways, rail lines, and waterways; and *intermodal connectors* among these hubs and corridors. In addition, the following factors would be part of the system:

- About 1,500 potential investment possibilities were identified in the SIS that were to be refined, beginning in 2005, with the Florida Department of Transportation (FDOT) and selected partners.
- A prioritization process was to be developed by FDOT, working with partners, to pursue a phased-cost feasible plan with 10- and 20-year components, a plan that will recommend future SIS investments by the state and their partners.
- A financial strategy would be developed in which FDOT's state investment policy would allocate 75% of the state's discretionary transportation capacity funding to the SIS by the year 2015. This situation means that about $2 billion per year will be targeted specifically for SIS and emerging SIS improvement projects, including $100 million per year specifically for the SIS.

This program was not to be static, and various state and local government entities retain the ability to change their priorities, if need be.

How Proposed Changes Are Handled

The state provides a process whereby proposed changes to the SIS program can be made. A change form request allows for these public entities to request a change. FDOT will make the initial contact with the originator of the request at that time and start the process of working with those entities to explore the following:

- communicate the findings of a technical review;
- discuss any special circumstances that explain or lead to better understanding of the designated change;
- if the designated change is determined to be ineligible, provide advice on what would need to be done to make it eligible, if possible; and
- discuss possible alternatives to the designated change if it is not eligible.

Let's look at some of these actual and potential P3 projects to learn more about how FDOT operates, starting with the I-75 widening program that consisted of various segments of work in several FDOT districts; the project is well under way in District 1.

FDOT's Districts

The Florida Department of Transportation divides the state into seven districts and, in addition, Florida's Turnpike Enterprise.

- District 1: Southwest Florida (includes Fort Myers, Sarasota, and Bradenton);
- District 2: Northeast Florida (includes Jacksonville and Gainesville);
- District 3: Northwest Florida (includes Panama City, Pensacola, and Tallahassee);
- District 4: Southeast Florida (includes Boca Raton, Ft. Lauderdale, and West Palm Beach);
- District 5: Central Florida (includes Daytona Beach and Merritt Island);
- District 6: South Florida (includes Coral Gables, Miami, and Key West); and
- District 7: West Central Florida (includes Clearwater, Tampa, and St. Petersburg).

Interstate 75 Widening Project

Interstate 75 is a major link between the Great Lakes region in the upper Midwest and the southeast. In Florida, I-75 leaves Miami and heads toward Naples on the west coast, passing through Big Cypress National Preserve and Alligator Alley, so named because of the alligators that can be observed in the canals and waterways along its route. At Naples, the highway heads toward the Gulf of Mexico until it reaches Tampa, where it veers northeast, bisecting the state, until it exits south of Valdosta, Georgia.

As I-75 continues its northward journey through Georgia, Tennessee, and Kentucky, it crosses the double-decker Brent Spence Bridge to Ohio, on to Indiana, and through Detroit, ending at the Mackinac Bridge connecting the lower part of Michigan with its Upper Peninsula. At the northern terminus of that bridge lies Sault Ste. Marie, Ontario, Canada.

The Florida Department of Transportation was planning to embark on an unusual public–private partnership arrangement to improve 35 mi (56 km) of I-75 from north of the Golden Gate Parkway to south of State Road 80. This work would include several cost-effective innovations:

1. strengthened inside shoulders with a subgrade and base constructed to travel-lane specifications that could easily be converted to travel-lane dimensions in case this six-lane highway is expanded to eight, or possibly ten, lanes at some future date;
2. inside-lane cross-slope design that allows the median to accept some surface drainage;

3. resulting slope-to-median drainage combined with the construction of outfalls that will provide more stringent future basin-specific allowable discharge to obtain a 100-year floodplain criterion;
4. the use of steel vs. concrete structures to reduce girder depths on two bridges, providing increased vertical clearance underneath and allowing for more cost-effective future widening;
5. using a cable barrier system with high-tension median cables, which according to FDOT, is 30% less expensive than extruded barriers; and
6. embedded data collectors (EDCs) to collect, transmit, and process information from the concrete piles at each new bridge location. The EDCs would monitor pile installation as well as its long-term monitoring.

All of these innovations would not only be cost-effective but would also expedite the permitting process because the drainage system would minimize wetland impact and therefore environmental concerns and construction methods would be compatible.

And last, by combining several separate projects into one and requiring a partial financing obligation to be assumed by the bidders, FDOT would be able to make use of economy of scale, allowing multiple projects to be folded into one, with the added intent of minimizing the impact on travelers during the 2007–2010 construction period. FDOT assumed the following inflation factors for the term of the I-75 project broken down into its five phases:

State Fiscal Year	*2006–2007*	*2007–2008*	*2008–2009*	*2009–2010*	*2010–2111*
Inflation factor	4.5%	4.0%	3.5%	3.3%	3.3%

The availability of federal funds by phase over the project was also considered by FDOT as totaling $473,408,359, plus a stipend for the unsuccessful bidder(s).

Risk Management Approaches to the Project

Two unique provisions in the I-75 request for proposal (RFP) were aimed at transferring some risks from FDOT to the successful bidder. The RFP indicated that FDOT would not have funding available to pay for the entire project and that the bidder would have to fund the last portion(s) of the cost of work and wait for the availability of funding from the state. This schedule, in effect, put a lid on any interest-rate fluctuations that might be experienced by FDOT in the years 2010–2012; 2012 was the year when construction was anticipated to be complete and the year when FDOT would release final payment to the contractor.

The other facet of FDOT's risk management approach had to do with the cost of construction. If each of these nine projects would follow the route of the conventional fiscal year funding and bidding process, several of the segments would be subjected to increased costs simply because of the impact inflation would have in years 2008–2012. By combining these projects into one contract, these risks

could be mitigated. And whether it was caused by inflation or the general increase in construction costs, FDOT was keeping a close eye on costs.

The I-75 Project Goes to Contract

The I-75 widening proposal would become a modified design–build project. A joint venture with Anderson Columbia Co., Inc., and Ajax Paving Industries, Inc., was short-listed with Kiewit Southern Company and Granite Construction, Inc., in 2006. In June 2007, Florida's Department of Transportation announced a contract award to the ACCI/API joint venture in the amount of $430 million to widen Interstate 75 between Fort Myers and Naples.

ACCI/API is a group consisting of Anderson Columbia Company, Inc., and Ajax Paving Industries, both Florida concerns. HDR, Inc., would do the design, and Metric Engineering, Inc., would do the engineering. Also, Florida concerns were selected to provide the construction engineering and inspection services.

The contract with ACCI/API would require the joint venture to design, finance, and build additional lanes onto 30 mi (48 km) of the existing, heavily traveled I-75 in one contract rather than accomplishing this feat with a series of lesser value contracts over a longer period of time.

Edward McKinney was procurement manager for District 1 of FDOT (the district responsible for the I-75 project) on Nov. 15, 2007, regarding the ACCI/API joint venture contract. McKinney said that the design–build contract with ACCI/API was awarded in accordance with Florida's P3 legislation. This I-75 highway project encompassed what were initially nine separate road projects. FDOT figured that if these projects had been awarded via nine separate contracts, the cost to the state would have been higher and, as importantly, would have been more disruptive to the traveling public. So FDOT decided to amend a basic design–build contract and add a finance component. This contract was not to be a concession-type contract.

Other Ways to Control Costs

McKinney said that because the state's funding would have required that these nine independent projects be stretched out over several years, FDOT needed a way to provide for what might be called "bridge financing," a way to get the work completed without having the total funding immediately available. The district determined that their amended design–build contract would do the trick.

And because construction labor, materials, and equipment costs generally increase annually, by combining these separate contracts into one, FDOT could expect some economies of scale and some control over inflationary forces. And lastly, a contractor commencing construction would be able to complete all nine projects instead of incurring additional costs to mobilize and demobilize for each separate project. The modified design–build contract would allow FDOT to accomplish all of these goals.

McKinney said that the ACCI/API team got off to a good start and unless the unforeseen happens, they will finish within the 1,150 calendar day contract

schedule. If May 30, 2007, was the date of the notice to proceed, this would place completion somewhere within the third week of July 2010. The project was completed and accepted by the state on Sept. 23, 2010.

Contract Contingency Provisions

The lump contract sum was $430,087,941.11 and included a contingency of $400,000. This contingency was to be used solely in the event that approved work orders were issued against the design–build contract. If no work orders were executed, the funds would revert to FDOT and would be removed from the lump-sum contract price.

McKinney said that there may come a time in the construction project when ACCI/API's invoice for work in place may exceed the funds available from FDOT since full funding won't be available until 2012, so the joint venture will need to fund the cost of construction in that interim, which is almost two years. FDOT, using an innovative venture, accomplished their goal to provide a service to the public at reduced risk by tapping into the private sector, further vindication of P3-type projects. This IROX Project, an acronym representing "I-75 Road Expansion Project," was completed and accepted by FDOT on Sept. 23, 2010.

Florida DOT Breaks Other New Ground

Florida entertained a unique public–private partnership venture when they embarked on the Port of Miami Tunnel (POMT) project. Structured differently from other P3 projects in the United States in 2006, the POMT and the I-595 project were to be "availability payment" projects. This concept differs from the toll revenue approach of the Dulles Greenway in Virginia, the Chicago Skyway, and the Indiana Turnpike projects in that the concessionaire would not use toll revenues as their source of return on investment but would rather receive periodic payments during design and construction, based on meeting specified milestone events and performance criteria.

The Availability Payment Concept

Availability payments are those issued by a government to a private concessionaire for delivering a service. In the case of the POMT project, this service would consist of having the developer provide a tunnel that is safe and one that meets all of the qualifications, restrictions, and demands set forth by that government agency. Projects with availability payments essentially transfer the risk of construction and performance to a private entity and are appropriate where it is apparent that the revenue stream is insufficient to support the consortium's return on investment. In the case of an availability payment project, the government agency retains full control over the toll-rate structure.

As we have seen in the case of a shadow-toll project in Texas, this availability payment concept is yet another mechanism in place that can be used when traffic volume and its subsequent revenue stream cannot be fully assessed.

The Port of Miami Tunnel

The Port of Miami Tunnel project, a billion-dollar project, entailed the construction of two 3,900-ft (1,189-m) long, 36-ft (10.9-m) diameter, two-lane bored tunnels to connect the Miami Seaport with Interstate 95 via I-395.

These tunnels would provide an alternative route to divert cruise ship traffic and freight haulers away from Miami roadways. The POMT would serve as a dedicated roadway connector linking the port with State Road A1A, the MacArthur Causeway, and Interstate I-395. The objectives of the project were threefold:

1. improving access to the port so that it remained competitive as a commercial cargo center and a cruise ship terminal and provided the capacity to handle the expected increase in traffic in both areas;
2. improving safety in Miami by shifting port-related traffic, trucks, and buses away from the downtown area; and
3. allowing for future development plans in the city of Miami to proceed unencumbered by port operations.

Taking a Different Perspective on the POMT Project

Some stories are best told by placing the end of that story at the beginning, and this may be the appropriate way to look at the Port of Miami Tunnel project. The POMT, initially viewed as a major stimulus to Miami-Dade County, was aborted two and a half years after the issuance of the request for qualification released on Nov. 1, 2006.

The project was subjected to various starts and stops by local officials, and the concessionaire was dealt the final blow as a result of those delays when the effects of the world financial market conditions in 2007–2008 caused the private consortium to announce that they no longer had the financial ability to close the deal.

The World Financial Turmoil Hits Florida's P3 Program

On Dec. 12, 2008, a press release from the Florida Department of Transportation stated that the Port of Miami Tunnel project would not close. Gus Pego, the secretary for District 6, was quoted in this news release applauding the team efforts, recognizing that "although everyone has worked hard to bring this project to fruition, we must face the reality that our private partners have been overwhelmed by the effects of the financial market, making delivery unworkable."

A similar press release, issued on Dec. 23, 2008, by FDOT's communications director, Dick Kane, announced that the bid submission date of another P3 project,

the proposed 50- to 75-year concession to widen a 75-mi (121-km) section of Interstate I-75 known as Alligator Alley, would be postponed from Jan. 9, 2009, to May 8, 2009, the delay also caused by the global financial uncertainty.

The POMT project and the I-75 project clearly illustrated the financial peril developers face when preparing costly documents during the submittal, review, short-list, and final proposal process of concessionaire projects, a process that consumes not only dollars but also valuable time from key personnel on their development teams, whose efforts could possibly have been more productively used elsewhere.

The Port of Miami Tunnel Study

The Washington Economics Group, Inc. (WEG), was hired by the state of Florida to analyze the economic impact of the Miami port operations that had been described in a study conducted by the Four Gates Company in May 2006 entitled "The Economic Impact of the Dante Fascell Port of Miami-Dade County."

This study showed, among other attributes of the port, that it had a $5.4 billion impact on the personal income of Miami-Dade County residents during 2005, and that, by itself, would appear to be justification for this project.

The Request for Qualification

This P3 project could not be classified as a conventional concession agreement because the consortium would receive periodic payments based on their performance and not on a revenue stream created by toll collection. The request for qualification (RFQ) was issued on March 28, 2006. This RFQ listed the project description as the following:

> FDOT seeks to enter into a Concession Agreement with Concessionaire to develop, design, construct, finance, operate and maintain the Project. FDOT anticipates that the Concession Agreement will grant a concession to the concessionaire for the operation and maintenance of the O&M segments. The concessionaire will be required to design, build and finance the Project, and then to operate and maintain the O&M segments during an extended concession period. FDOT is seeking a private partner experienced in undertaking large transportation infrastructure projects under a concession approach who is willing to share risks. The successful Proposer must have proven ability to arrange and close financing on favorable terms, as well as demonstrated skills in designing, building, managing and operating complex highway tunnels on behalf of public sector owners.

The First Cut in the Process of Requests for Proposals

The first cut in the evaluation process was a pass/fail ruling in the administration, based on the technical and financial elements received in each proposal.

Three types of pass/fail tests are the administrative, technical, and financial pass/fail tests.

- **The Administrative Pass/Fail:** This selection process involved such items as a properly executed proposal letter, properly executed pro formas, executed partnering and/or consortium agreements, a properly executed proposal bond, and properly executed FDOT forms that came from the request for proposal (RFP).
- **The Technical Pass/Fail:** The technical proposal was supposed to include FDOT's Appendix B, a schedule identifying the construction work, the date of substantial completion, and a subsurface methods plan. One item in the technical section of the RFP references the geotechnical report provided to the bidders and states that

  > Proposers shall note that while FDOT has provided factual geotechnical information, interpretation, and characterization, it has not addressed ground behavior issues. Ground behavior issues would largely be determined by the Proposer's mean and methods for cut and cover, "U Wall" and bored tunnel excavation, TBM selection, and operation and ground support.

- **The Financial Pass/Fail:** This pass/fail test was based on compliance with the documents contained in Appendix C of the RFP. Three short-listed firms were posted on FDOT's website on Apr. 28, 2006, and on Nov. 1, 2006, FDOT formally issued its RFP to those short-listed consortia, all formidable foreign contractors:
  - FCC Construcción, S.A.—Morgan Stanley, Hatchmott Macdonald, and Edwards and Kelcey;
  - Miami Access Tunnel, LLC—Bouygues Travaux Publics, S.A., and ABN Amro Bank, N.V.; and
  - Miami Mobility Group—Dragados, USA, and their international infrastructure group, Odebrecht Construction and their international infrastructure group, Parsons Transportation Group, and DMJM Harris.

The time line included in the RFP contained the following dates:

- issuance of final RFP: Nov. 1, 2006 (first draft of RFP was issued in May 2006, second was issued in June, and third was issued in July);
- last day for FDOT to issue an addendum without affecting the due date: Feb. 15, 2007;
- proposal due: Feb. 15, 2007; and
- selection and award: March 30, 2007.

All respondents were to include a proposal bond in the amount of $10 million or a letter of credit in a similar amount with their response.

Key RFP Provisions

The maximum available payment (MAP) would be a key element in evaluating each proposal, as well as the technical and financial components. FDOT was going to make periodic payments to the successful concessionaire, in essence, an availability payment based on the concessionaire achieving certain milestone events. The lower the MAP, the more favorably that proposal would be viewed, all other considerations being taken into account.

The concessionaire would be provided with $100 million in progress payments after meeting each milestone and an additional $350 million on completion of the project. The term of the concession agreement would be 35 years, and the concessionaire would begin receiving their annual payments in 2013. The payment method to determine availability payments was a complex mathematical equation, and it was explained in Appendix 7 to the RFP.

The concession agreement was released in draft form on Nov. 1, 2006. It included this list of milestone payments:

(a) $20 million on completion and FDOT approval of the design work for the tunnel bore and linings, excluding mechanical, electrical, and plumbing design;
(b) $40 million when the tunnel-boring machine (TBM) commences work on the first bore (The first bore was to take place at a depth of 100 ft (30.4 m) from Watson Island to the mainland.);
(c) $25 million when the TBM commenced work on the second bore but in no event before the completion of the first bore;
(d) $15 million on reaching substantial completion of construction work on the MacArthur Causeway; and
(e) $0 upon final acceptance of the work.

How the Proposals Would Be Evaluated

Technical Criteria

The technical section of the evaluation was worth up to 45 points out of 100. Appendix B in the RFQ contained all of the technical proposal evaluation factors. Tunnel design and construction would receive a maximum of 25 points. A subset to this section was Bridge Administration and Management, with a maximum 10 points to be awarded. The following submittals were to be presented:

(a) preliminary design for the segments that did not deal with operation and maintenance;
(b) the concept plan and approach for the aesthetics of the project;
(c) project schedule and construction phasing or sequencing plan;
(d) schedule of values, in accordance with Appendix D, Form G;
(e) environmental compliance plan;
(f) proposer organization charts for all phases of the project;
(g) the project management plan; and
(h) quality plans.

The operation and maintenance portion had a value of 10 points maximum. The proposers were to include an operation and maintenance plan, a systems integration plan, an organizational chart, and quality plans. The RFP placed emphasis on the respondents' degree of understanding of the scope of work for operation and maintenance that need to be used and the entire relationship between the MAP process and the various components of the processes. In other words, the MAP depends on the performance of the operation and maintenance portion of the project.

Financial Proposal Criteria

The financial proposal criteria were worth a maximum of 55 points out of 100. This section had as a subset maximum availability payments with a maximum of 45 points. The RFP position was that the lower the MAP proposed, the higher the score (Table 8-1 reveals the scores of the short-listed bidders). The proposed MAP should not exceed the upset limit. Proposals that included a MAP in excess of the upset limit would be deemed unresponsive, and the proposer would be disqualified. Box 8-1 sets forth the payment mechanism formula for the availability payments.

FDOT included the formula that would be used to score the MAP. The other 10 points would be awarded on the basis of the feasibility of the financial proposal:

(a) The level of support from lenders would be used to evaluate the proposals. Proposals that included a technical due diligence would receive a higher score. A financial package that was fully underwritten (as judged by FDOT) would receive the maximum scoring.
(b) Commitment of equity members and lead contractors would be evaluated by FDOT, including the depth and guarantees committed by the lead tunneling contractor and the lead nontunneling contractor.
(c) Proposals with a hedging approach more beneficial to FDOT would receive higher scores.

FDOT also included a penalty clause relating to the MAP and nonconforming work. If the concessionaire failed to correct nonconforming work, FDOT

Table 8-1. Summary of Proposal Scores for POMT Project

	Annual MAP Amount (in 2007 dollars)	*MAP Score (of 45 points)*	*Average Technical Score (of 45 points)*	*Average Financial Feasibility Score (of 10 points)*	*Composite Score (of 100 points)*
FCC/Morgan Stanley	$63,250,000	0.00	33.305	5.125	38.430
Miami Access Tunnel	$33,234,692	45.0	38.578	8.938	92.515
Miami Mobility Group	$39,794,750	9.471	40.834	8.688	58.992

Source: Florida Department of Transportation.

Box 8-1. Payment Mechanism for Availability Payments

The annual payment and the quarterly payment shall be calculated as follows:

$$AP_y = \sum_{q=1}^{4} QP_q \leq MAP_y \qquad QP_q = \sum_{d=1}^{dq} DP_d$$

where

AP_y is the annual payment for contract year y,
QP_q is the quarterly payment for quarter q,
DP_d is the daily payment for day d, and
dq is the number of days in quarter q.

MAP_y is the maximum availability payment for that year indexed for inflation according to the following formula:

$$MAP_y = MAP_{2007} \times (CPI_y/CPI_{2007})$$

where CPI_y is the consumer price index at the commencement of year y (for the avoidance of doubt, CPI_y shall apply to all calculations relating to year y regardless of the date on which CIP_y is officially published) and y is the year for which the inflation-adjusted MAP is being calculated (the last year of the series).

The annual payment will never be less than zero or greater than the MAP for the given year. If the first quarterly payment occurs on a day other than on the first of the year, the first quarterly payment and the first annual payment shall be prorated.

might deem it appropriate not to correct the nonconforming work, and if that were the case, they would adjust the MAP by either the reasonable cost of correcting the work or diminution of the value of work as the result of the existence of the nonconforming work.

The RFP included handback provisions (Table 8-2) establishing the remaining life that was expected for each asset in the project, e.g., masonry structures were to have a remaining life span of 15 years after the project was turned back to the port authority. What this "life remaining at handback" provision created was a signal to the concessionaire that high-quality standards were expected in the supply and construction of every component of the project. Table 8-2 also lists the various components and their expected remaining life.

Interest Rate Fluctuation Risk

Section 5.5 of the RFP set the criteria for responsibility for changes in the interest rate, placing this responsibility on FDOT. FDOT assumed the interest rate risk between the benchmark interest rate and the base interest rate at the financial close for the period between the proposal due date and the earlier of (i) six months after the effective date (as defined in Appendix A of the agreement) or (ii) the date of financial close. The MAP quoted in the financial proposal form

Table 8-2. POMT Handback Provisions for Various Components

Asset Description	*Asset Subsystem Description*	*Handback Evaluation Tasks*	*Handback Evaluation Criteria*	*Life Remaining at Handback (Years)*
Mechanical and Electrical Systems				
HVAC systems for ancillary facilities, emergency egress, and cross passageways		Performance testing and inspection of all system elements	FHWA 2005, design drawing performance specifications, and good industry practice	7
Access control and intrusion detection system		Performance testing and inspection	Manufacturer's recommended life, equipment maintenance records, and equipment operating history	4
Internal and external telephone system		Performance testing and inspection	Manufacturer's recommended life, equipment maintenance records, and equipment operating history	4
Tunnels, Roadways, and Physical Structures—Structural Condition				
Portal flood gates		Leakage and functional performance testing and inspection	Design testing specifications, manufacturer's recommended life, equipment maintenance records, and equipment operating history	8
Rigid pavement and roadway condition	Tunnel and other roadways operated and maintained by concessionaire	Inspection	FDOT 2009, ride quality of 8 or better, skidding resistance, and rutting	6
Flexible pavement and roadway condition	Applicable roadways operated and maintained by concessionaire	Inspection	FDOT 2010	6
Concrete structures	U-wall sections and tunnels	Inspection	FHWA 2005	115
Steel structures	Sign supports and all steel structure in O&M segments	Inspection	FHWA 2005	15

(continued on next page)

Table 8-2. Continued.

Asset Description	*Asset Subsystem Description*	*Handback Evaluation Tasks*	*Handback Evaluation Criteria*	*Life Remaining at Handback (Years)*
Masonry structures		Inspection	FHWA 2005	15
Tunnel liner		Inspection	FHWA 2005	115
Tunnel finishes	Finish panels, railings, etc.	Inspection	FHWA 2005	25
Fixed signs and structures	All within the O&M segments	Inspection	FHWA 2005	8
Section joints		Inspection	FHWA 2005	8
Fixed signs and structures	Sign structures and panels	Inspection	FHWA 2005	8
Traffic Services, All Roadways				
Guardrails and attenuators		Inspection	FDOT 2010	7
Lane markings, striping, and symbols	All within the O&M segments	Inspection	Per applicable portions of Section 2 of Appendix 4	2
Signs		Inspection	FDOT 2010 with 100% functioning as intended	5

Source: Florida Department of Transportation.
Note: O&M, operation and maintenance.

would be adjusted (upward or downward) to reflect the financial impact of the actual change, if any, between the benchmark interest rate and the base.

Sharing in Any Refinancing Gains

FDOT anticipated that the concessionaire might refinance their debt and stipulated that they are to receive 50% of the benefit of any refinancing that produces gains, if the gains are greater than those assumed or advanced in the concessionaire's proposal. FDOT must be notified in advance of any refinancing proposals, their refinancing dates, and the closing of the deals. The refinancing gain would be calculated as follows, using

$$(A - B) - C - D$$

where

A = the net present value of the distributions to be made over the remaining term, following the refinancing;
B = the net present value of the distributions to be made over the refinancing term after the refinancing, projected immediately before the refinancing;
C = any adjustment required to raise the prerefinancing equity internal rate of return (IRR) to the base-case equity IRR described therein (FDOT would only be entitled to share the refinancing gain if the concessionaire were projected to achieve the base-case equity IRR before taking the refinancing gain into account); and
D = FDOT recoverable costs paid by concessionaires in connection with the refinancing.

Drayage Drivers Would Benefit

Poole (2007) looked at the impact this tunnel could have on a typical drayage trip (drayage is the pick up or delivery of an ocean-borne container). According to information gleaned by Poole from the Port of Miami Terminal Operating Company, the breakdown of a typical drayage trip is the following:

Port entry + waiting time + departure = 63 min
Round-trip travel time = 70 min (a weighted average of 2.6 mi one way)
Customer arrival and departure = 20 min
Total round trip = 153 min, or 2.55 hours

In a typical eight-hour day, the average drayage driver could make only 3.1 trips. Now if the round-trip travel time is reduced from 70 min to 25 min, look at what happens:

Port entry + waiting time + departure = 63 min
Round-trip travel time = 25 min
Customer arrival and departure = 20 min
Total round trip = 108 min, or 1.8 hours

In a typical eight-hour day, the average drayage driver could make almost four and a half trips. The port authorities stated that a typical drayage driver made $147 per round trip, and because of the shorter trip cycle these drivers had the potential to increase their gross earnings by another $147 per day.

Nondrayage trucks would also benefit from the time savings incurred from port to destination by using the new route created by the port tunnel. A truck-only toll study in the Atlanta area revealed that time savings for heavy trucks was based on a rate of $35 per hour and $18 per hour for light trucks. The FHWA had somewhat higher values, but assuming an average of $26 per hour saved, this change would still be a significant savings to large fleet owners.

So in terms of economics, lessening congestion, and a positive effect on safety, this port deal appeared to have ample justification. This project was being undertaken by FDOT, Miami-Dade County, the Port of Miami, the city of Miami, and other local stakeholders.

Project Financing

The financing of the project, as put forth by the POMT Public Affairs Program Office, was precise: The POMT deal was being offered as a public–private partnership designed to transfer the responsibility to design, build, finance, operate, and maintain the project to the private sector. It was to be a high-risk, technically challenging project. Under the concession contract, the concessionaire would finance the project based on the expectation of earning annual availability payments once the project opened for service. Essentially, these payments would come from FDOT, contingent on actual lane availability and service quality. Local partners in Miami-Dade County were committed to share 50% of the capital cost of the project.

The total estimated funding obligations of FDOT, Miami-Dade County, and the city of Miami were listed, as of July 17, 2007, as follows:

- construction costs, $609,888,888;
- soft costs, $54,836,582;
- direct costs, $50,000,000;
- geotechnical contingency reserve, $150,000,000; and
- reserve for relief events, $50,274,530.

A July 24, 2007, memorandum from the Miami-Dade County manager to the Board of County Commissioners contained a supplement to the POMT triparty master agreement (FDOT, Miami-Dade County, and the city of Miami) and provided more specific dollar commitments:

- A portion of the county's commitment will be funded from bonds in the amount of $114 million, payable from a portion of the state transportation funds allocated to the county ($8 million in 2018, $17 million per year from 2019 to 2042).
- The state will provide $45 million of right-of-way credits for land and easements provided by the county for the project.

- The total of $1 billion for the project cost includes capital cost to design and build the project and also for operation and maintenance over a 35-year period.
- FDOT will bear 100% of the cost of operation and maintenance over a 30-year period.
- The percentage total cost of the project to be funded through potential tolls and tariffs from the port will be between 6% and 15%, the difference arising from a minimum contribution of $43.5 million and no expenditure from the contingency reserve to a maximum of $143.5 million contribution and full expenditure of all contingency reserve funds.

The Short-Listed Developers

The three short-listed developers were evaluated, and their scores were posted on May 2, 2007 (Table 8-1), with the caveat that the notice of intent to select would be postponed until FDOT realized all financial arrangements with their organization and related local governments; the latter endeavor almost scuttled the project.

The Project in Jeopardy

On Aug. 1, 2007, a majority of the city commissioners voted against using any redevelopment money for the tunnel unless the city would ultimately be repaid. And in September 2007, the Miami City commissioners refused to put up their $50 million portion of this billion-dollar project.

This action occurred just days before the Sept. 30 deadline to finalize the financing with the consortium. Bouygues and Babcock & Brown had already extended the financing deadline once before, and state negotiators were concerned that the consortium would not hold their price into late November or December 2007.

On Oct. 16, 2007, Miami Mayor Manny Diaz asked FDOT to extend their deadline for the city's share until mid-December. The city commission had until their Dec. 13 meeting to come up with their $50 million portion. FDOT now had the unenviable task of trying to convince the Bouygues group to extend their proposal to Dec. 15, 2007.

The Project Is Saved

On Dec. 14, 2007, congratulations were exchanged after the Miami city commissioners voted 3–2 the previous day to provide the $50 million needed to keep the project going forward. FDOT would provide $457.5 million, along with $200 million for operation and maintenance. Miami-Dade County would commit $402.5 million, and the next step would be a formal agreement with FDOT and the execution of a contract with the Miami Access Tunnel group. However, as of Feb. 1, 2008, the project was still unsettled. The city of Miami agreed to fund the port tunnel and included their share of the financial commitment as part of a global agreement with Miami-Dade County. As of late June 2008, negotiations

were still under way between the Bouygues consortium (the Miami Access Tunnel group) and FDOT, but the proposed timetable for a fall 2008 contract signing was delayed, and the project was in jeopardy of being aborted.

These long delays can be the death knell of a project. In October 2008, Miami city commissioners were combing through the contract to finalize language; in December 2008, purportedly, Florida was going to pull the plug on the project because of global economic conditions. As late as March 2009, the city commissioners had not given the project the go-ahead. This delay put the consortium's financing arrangements right in the middle of the world financial crises, and when Babcock & Brown pulled out of their original 90% equity position, Bouygues Travaux Publics was able to save the project by bringing in Meridiam Infrastructure Finance, their new French partner, and FDOT had put the project back on stream for an Oct. 1, 2009, closing.

ENR (2009) revealed that Bouygues Civil Works Florida would pay up-front $607 million, Miami-Dade County would provide $402 million, and the city of Miami would put $50 million into the project, so the financing would now allow the project to proceed. The $45 million tunnel-boring machine was ordered from Herrenknecht AG in Germany, where it will be assembled on Watson Island to begin boring the tunnel scheduled to start in the summer of 2011.

A June 14, 2010, press release from Governor Crist's office formally announced that the groundbreaking ceremonies were proceeding, and a June 11, 2010, photograph posted on line by Miami television station WSVN showed seven dignitaries in their requisite hard hats turning over the first shovels of earth. Completion of the project was scheduled for 2014.

The $1 Billion + Interstate 595 Corridor Improvements Project

The I-595 corridor was opened to traffic in 1989, tying the movement of high traffic volume between two developed areas in the western portion of southeast Florida to the north–south roadways to the east: I-75, Florida's Turnpike, State Roads 5 (U.S. Route 1) and 7 (U.S. 441), and I-95.

During the early 1990s, traffic demand within that corridor increased dramatically, and in 1994 a report on the I-595 corridor was undertaken at about the same time that a master plan for the I-95 corridor was in the works. These two efforts were combined, and in 2003, the I-95/I-595 master plan study was completed, followed by a project development and environmental (PD&E) study for the I-75/Sawgrass Expressway Interchange east of I-95. The I-595 PD&E study had four objectives:

1. updating the locally preferred alternative for the I-595 corridor;
2. satisfying the National Environmental Policy Act (NEPA) to allow federal funding;
3. developing a reasonable phasing for the individual segments of the project; and

4. coordinating other ongoing I-595 projects: the Central Broward East–West Transit analysis, Florida's Turnpike Mainline Widening, and the Broward County Greenways.

In 2005, public workshops were conducted to present project alternatives. In 2006, the PD&E study was completed and the FHWA granted location design concept approval for Preferred Alternative Concept 2A, with a total cost of $1.216 billion, which included construction, utility costs, and contaminated material removal, and added in other fees, such as design and a risk premium of 5% of construction cost. The cost, as of March 2008, became $1.410 billion.

This elevated roadway concept drew many complaints from a series of concerned citizen groups, and FDOT listened. The approved alternative had included three reversible lanes on an elevated platform in the median strip. On Sept. 24, 2007, FDOT District 4 Secretary Wolfe issued a press release stating that at the urging of many communities and with additional engineering, they had developed a ground-level alternative.

Alicia Gonzalez, of the Public Relations Department of FDOT's I-595 project, confirmed that FDOT responded positively to citizen comments; the reversible lanes would be built on grade in the median strip.

When first considered as a design–bid–build project in FDOT's District 4, the project would have required 15 separate contracts, and construction time was estimated to be 20 years. FDOT now anticipated that going with a P3 contract would accomplish the following:

- accelerate the schedule by providing the I-595 improvements 10 years sooner than if FDOT proceeded with a conventional design–build project;
- improve efficiency of design and construction by combining a majority of the projects into one;
- transfer substantial risk for both project cost and time overruns; and
- provide a financing mechanism to cover the project's shortfall.

The I-595 Request for Qualifications Goes Out

For the FDOT request for qualifications dated Oct. 1, 2007, the scope of work was as follows:

- reconstruction, widening, and resurfacing of the I-595 mainline;
- modification and construction of auxiliary lanes, braided ramps, cross-road bypasses, and various geometric improvements to eliminate operational deficiencies caused by merge, diverge, and weaving segments along the corridor;
- reconstruction and resurfacing of the SR-84 frontage road;
- construction of three reversible express toll lanes in the median serving express traffic to and from I-75/Sawgrass Expressway to and from east of SR-7 with a direct connection to Florida's Turnpike;

- geometric improvements to the I-595/Florida's Turnpike interchange and widening and reconstruction of the mainline of Florida's Turnpike to integrate the express lanes' direct connection;
- deployment of various intelligent transportation system elements for the express lanes and general-purpose lanes;
- preservation of an envelope within the right-of-way that would accommodate construction of a future transit system; and
- other improvements, including construction of noise barriers, bridge works, drainage, utility relocations, signing and pavement marking, lighting, and landscaping.

The reversible lanes would be operated as managed lanes with variable tolls. The state anticipated having motorists maintain a 50 mi/hour speed during this work, and this requirement could possibly form one of the milestones affecting the availability payment.

The Timetable

The schedule in the RFQ initially indicated a proposed due date of June 13, 2008, later changed to July 11, 2008, with a contract execution date of November 2008, later changed to December 2008, with construction to start in the summer of 2009 and a completion date in the summer of 2014.

Although the right-of-way clearance would not be consummated until 2010, a year after the proposed start of construction, FDOT assured bidders that this clearance should have no significant impact on construction. Financial close and issuance of private activity bonds was scheduled for January 2009.

The Short List

The Florida Department of Transportation short-listed four concessionaires for consideration in this design–build–finance–operate–maintain highway project in Broward County, a concession agreement with a term of 35 years. FDOT would retain the toll revenue, and the project would provide a return on investment to the successful bidder via "availability payments." It was anticipated that toll rates would vary depending on time of day, i.e., congestion pricing. The availability payment was selected because the highway will remain in operation during the process of widening and improving the I-595 mainline linking I-75/Sawgrass Expressway to I-95. Table 8-3 reveals the anticipated schedule of availability payments.

Of the six groups submitting bids, FDOT short-listed four teams on Dec. 3, 2007, which were headed up by the following groups:

- Babcock & Brown Infrastructure Group,
- ACS Infrastructure Development,

Table 8-3. Final Acceptance Payments Planned for the I-595 Project

Amount (million dollars)	*Final Acceptance Date or July 1, Year*
$69.680	2012
$103.631	2013
$71.712	2014
$95.434	2015
$123.173	2016
$217.622	2017
$162.444	2018
$78.756	2019
$13.098	2020

Source: Florida Department of Transportation.

- OHL Concessionaires, and
- Skanska Infrastructure Development.

Contract Award and Construction Start

FDOT announced selection of ACS Infrastructure Development (ACSID), the U.S. subsidiary of Grupo ACS in Spain, as the successful concessionaire. The ACSID team is composed of Dragados USA as the design–build contractor; GLF Construction Corporation of Miami, which will build the 17 bridges; and RS&H of Jacksonville, which will provide preliminary drawings. Design consultant AECOM Technology Corp. of Los Angeles also provided design input.

This $1.8 billion, 10.5-mi (17-km) project will link the Fort Lauderdale–Hollywood International Airport, Port Everglades, I-95, Florida's Turnpike, the Sawgrass Expressway, and I-75 together. In Bernos and Stutts (2008), FDOT Secretary Stephanie Kopelousos stated that although the concessionaire is a Spanish firm, the firms providing the engineering, construction, and supplies would be American. And she estimated that for every $1 billion spent on highway support, 28,000 jobs would be created. Gerry O'Reilly, FDOT's Director of Transportation Development for District 4, where this project is located, was quoted in this same article as stating that the project could serve as a challenge to all state governors to accelerate their construction projects to stimulate the economy and keep people working.

FHWA administrator Victor Mendez joined with Florida's Governor Crist on Feb. 26, 2010, to announce the groundbreaking for the 595 Express Corridor Improvement project. An I-595 Express Construction Update Bulletin dated Nov. 1, 2010, indicated that the project has been divided into five segments, A through E. The bulletin indicated that construction began on Segment C on Feb. 26, 2010, and the contractor will continue to work east to west installing drainage, barrier wall, and bulkhead wall, constructing travel lanes along SR 84 within the median

of I-595. During the summer of 2010, roadway construction began on Segments B, D, and E. The I-595 project is scheduled for completion in 2014.

The First Coast Outer Beltway

This project is in FDOT's District 2 and involves building a four-lane, limited-access highway from Interstate 95 in St. Johns County, a 10,000-ft (3,048-m) crossing over the St. Johns River near the existing Shands Bridge, and connecting to Interstate 10 in Duval County. The total length of the project is 46.5 mi (73.6 km), and it is divided into two segments: Branan Field–Chaffee Road and the St. Johns River crossing corridor. Branan Field is one of Florida's little-remembered military airfields; it served as a naval outer landing field in World War II.

FDOT would seek to enter into a concession agreement with a concessionaire to develop, design, construct, finance, operate, maintain, and toll the project. FDOT expects the concessionaire to receive compensation by means of the collection of toll revenue, and they added in their RFP that FDOT may also compensate the concessionaire through other mechanisms, not specifically stated.

The Project Scope

The two components of the First Coast Outer Beltway are the following:

- First, they wish to improve Branan Field–Chaffee Road to a four-lane, limited-access roadway. The Brannan Field–Chaffee Road project was designed and constructed in segments because of a lack of funds, and now several segments have been constructed while others are either under design or in construction.
- Next, they wanted to build a four-lane, limited-access highway from the proposed I-95/First Coast Outer Beltway interchange westward across the St. Johns River and then heading northward to the proposed Branan Field–Chaffee Road (SR 23) and Blanding Boulevard (SR 21) interchange.

FDOT had acquired most of the right-of-way for the Branan Field–Chaffee Road portion. And whereas FDOT may proceed with securing more parcels for the St. Johns River crossing portion, the successful concessionaire is expected to fund the right-of-way acquisitions.

Environmental Issues

The Florida manatee and the shortnose sturgeon inhabit the St. Johns River, and the gopher tortoise is an inhabitant of some dry sandy uplands in the project corridor. Tortoise eggs, burrows, and habitats are not be destroyed and will require a relocation plan and permit. Although this tortoise species has been spotted, its quantities have not been ascertained. The successful concessionaire is sure to have

interested citizens and environmental groups watching their every move when work commences in any areas inhabited by these endangered species.

The Request for Qualifications

The request for qualification dated Dec. 4, 2007, required the respondents to identify and secure all necessary regulatory, construction, and operation permits. FDOT had initiated the identification of wetlands along the corridor (not including interchange areas or storm retention ponds) that may be affected by the project and will be coordinating with the appropriate environmental regulatory agencies to secure jurisdictional determinations of the identified wetlands.

All costs for permitting and mitigation of wetlands impacts are to be borne by the concessionaire. FDOT will work in partnership with the concessionaire to acquire the necessary properties, and the concessionaire will be responsible for funding the required right-of-way acquisitions.

In pursuing this project, FDOT's goal is the transference of construction and operating risk to the concessionaire; the concession agreement will specify the allocation of certain risks, and all risks not identified would be borne by the concessionaire.

Team Member Qualifications

The RFQ contained a provision that at least one team member for the following classes of work be included:

- major bridge (a bridge of conventional construction over a water opening of 1,000 ft (305 m) or more;
- intermediate bridge;
- minor bridge;
- grading;
- drainage;
- flexible pavement;
- Portland cement concrete paving;
- hot plant-mix bituminous; and
- intelligent transportation systems.

Proposal Evaluation

The evaluation process would involve both pass/fail components and weighted components. The pass/fail components relate to the proposer's ability to

- provide a payment and performance bond;
- demonstrate that they had not been disqualified or suspended from bidding on federal, state, or local work;
- demonstrate that they had not failed to propose qualified equity members, lead contractors, lead engineering firms, and lead operation and maintenance firms; and
- show proper references or bank letters of support.

The weighted criteria are divided thus:

- 45%, financial qualifications and capacity;
- 45%, technical qualifications and capacity;
- 5%, statement of financial approach; and
- 5%, statement of technical approach.

Stipends Offered

FDOT is offering a stipend in the amount of $1 million as partial compensation to "each fully responsive but unsuccessful short-listed proposer for the work product it produces in developing and submitting a detailed proposal." In doing so, FDOT reserves the right to use, as it deems appropriate, any of the concepts or ideas contained in those detailed proposals.

The Segmented Construction of the Branan Field–Chaffee Expressway Project

One of the considerable advantages in using a public–private partnership for highway construction is that it is a way around the need to build a project in segments because of fiscal year funding restrictions. Quite often, this method requires constructing one segment in one fiscal year, another in the next, and so on. Besides the economy of scale in constructing the entire roadway in one continuous project, the P3 approach also provides a hedge against inflation. This Branan Field–Chaffee Expressway Project is a case in point. A search of the Branan Field–Chaffee Expressway Project website (www.bfcxpress.com/segments) on Dec. 30, 2010, revealed the following status of these 10 segments:

Segment 1: U.S. 90–Beaver Street to South of I-10. This project's design is 60% complete, but the remainder is unfunded. Construction is unfunded.
Segment 2: I-10 Interchange with Branan Field–Chaffee Road. This project was completed on Oct. 1, 2009.
Segment 3: South of I-10 to 103rd Street. This segment was also completed on Oct. 1, 2009.
Segment 4: New World Avenue to 103rd St. This segment's design is 60% complete and holding. Construction is scheduled for 2017.
Segment 5: 103rd Street to Argyle Forest Boulevard. This segment is completed.
Segment 6: Argyle Forest Boulevard to the Clay County line. Design on this segment is 90% complete and holding.
Segment 7: Duval County line to Kindlewood Drive. The design of this segment is also 90% complete and holding.
Segment 8: Kindlewood Drive to Blanding Boulevard (southbound lanes). This project is unfunded.
Segment 9: Kindlewood Drive to Blanding Boulevard (northbound lanes). This project is unfunded.

Segment 10: Kindlewood Drive to Blanding Boulevard (frontage road). The design of this segment is 60% complete, but no schedule to advance the project has been announced as of this writing.

Project Objectives

The primary objectives for the project that links I-95 with I-10 are the following:

- accommodate planned development while minimizing the impact to existing residences, businesses, and community facilities;
- provide additional capacity to improve the current and future transportation network deficiencies;
- promote employment and economic development needs;
- provide compliance with local, regional, and state growth management plans and policies; and
- improve emergency evacuation to those areas not effectively served.

The timeline for the project was the following:

- present the request for qualifications, December 2007;
- present the request for proposal, summer 2008;
- select the concessionaire, fall 2008; and
- execute the agreement, spring 2009.

However, it has since been modified to the following:

- draft environmental impact study, winter 2008;
- public hearing, summer 2009; and
- record of decision for four lanes has been completed.

In a July 2007 design conference conducted by Brandi Vitor of FDOT, it was announced that the project cost would be $2 billion, and the concessionaire's ability to raise tolls would be limited by the concession agreement. The concessionaire would be required to make an up-front payment, but no amount was specified at the time.

FDOT would be responsible for the following:

- permitting,
- right-of way acquisition,
- contamination issues,
- reimbursement of utility relocation, and
- wetlands mitigation.

The Issuance of the RFP Is Delayed

On Apr. 29, 2008, FDOT issued a bulletin saying that the issuance of an RFP has been postponed pending resolution of potential property taxes and environmental studies associated with this $1.8-billion-dollar project. Charles Baldwin, FDOT

District 2 secretary, stated that FDOT was still committed to serving the needs of the region and providing a transportation system that was safe and efficient. In the meantime, FDOT will continue with preliminary design, environmental issues, property acquisition, and related activities.

On May 5, 2010, the FDOT First Coast Outer Beltway Private–Public Partnership Forum was held in St. Augustine, Florida, to update the PPP community. They set aside May 5, 6, and 7 for interested bidders on the project. The forum presenters indicated that the change from the 2007 forum included 4.7 mi (2.9 km) of right-of-way that was donated by Clay County. Environmental 7 preliminary design was also progressing. The estimated cost as presented in the PowerPoint presentation was listed as $1,929,810,277.

- Construction: $1,211,463,946;
- Right-of-way: $421,500,000;
- Mitigation: $103,012,100;
- Design and inspection: $115,089,075;
- Miscellaneous: $78,745,156;
- Total: $1,929,810,277.

On June 24, 2010, FDOT issued a Request for Qualifications List–Conflict of Interest for the First Coast Outer Beltway project and named those firms or individuals who would be barred from participating in the project due to a conflict of interest as defined in FDOT's conflict of interest policy. Of the 61 firms listed, only 21 were "allowed." No reason was given for those excluded.

The First Coast Outer Beltway website, www.fdotfirstcoastouterbeltway.com/index.asp, when accessed on Nov. 3, 2010, listed the Request for Qualifications (RFQ), Request for Proposal (RFP), Selection of Concessionaire, and Execution of Contract all as "To Be Determined."

The Miami Intermodal Center

The heavy volume of traffic entering and exiting Miami International Airport (MIA) reached unacceptable levels in the mid-1990s, and the airport required roadway modifications and updates to improve the flow and connectivity to other modes of transportation. The proposal to fix MIA's problems was included in Miami-Dade County's long-range transportation plan, which envisioned creating a regional hub for public transportation modes near and integrated with the airport to permit taxis, cars, pedestrians, and bicyclists mobility around this congested area.

The Miami Intermodal Center (MIC) project incorporated the following components:

- a rental car center,
- Miami Central Station,

- Le Jeune Road improvements,
- MIC terminal access roadways,
- the MIC/MIA Interchange,
- the MIA Mover Station, and
- Le Jeune Road landscaping.

The U.S. Department of Transportation designated the MIC program as a major project, which meant that it could apply for two loans under the TIFIA Act for the 21st Century, one in the amount of $260 million, and up to $170 million for the other. Construction is under way on several portions of the project and will continue through 2010, but none of the components of the MIC project are being built as PPPs.

Florida continues to upgrade its highway system, and P3 continues to offer a viable alternative to sole reliance on state and federal funding. With approximately $1.347 billion in federal funding for highways and bridges expected under the American Recovery and Reinvestment Act of 2009, FDOT will be able to get more projects under way and provide jobs and other economic benefits while doing so.

The major MIC roadway improvements were completed in May 2008, the rental car center opened for business on July 13, 2010, and the MIA Mover is scheduled to be operational in the fall of 2011.

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CHAPTER 9

What Some Other States Are Doing

Chapters 5 through 8 covered individual states and the unique situations with which they contend in maintaining old roads (and other travel routes, in at least one state) and building new ones. This chapter covers several states with disparate projects in the pipeline: Pennsylvania, Oregon, Minnesota, New Jersey, and Colorado.

The Pew Center on the States, a division of the Pew Charitable Trusts in Washington, D.C., in early 2008 published a report (2008) grading the infrastructure of each of the 50 states. Using an A to D grading system, they found that 23 states received a grade lower than C+, the national average. Ten states earned a B− rating, and 17 states were graded B and above. The states of Washington and Utah received an A−, Texas a B+, and at the opposite end of the scale, New Hampshire was given a D+ rating.

The Pew Center on the States used a prison riot as an example of the infrastructure plight facing many states. In April 2007, there was a full-scale riot at the New Castle, Indiana, medium-security men's prison. This facility, built to accommodate 2,200 inmates about 43 mi (69.2 km) east of Indianapolis, was constructed in 2002, but the state had provided funding that only allowed the prison to operate at 25% capacity, so some inmates had to be shipped to out-of-state prisons. In 2005, inmates started to return, and the following year the Indiana Department of Correction hired a private company to manage and operate the prison.

To fill the unused capacity, the GEO Group, Inc., the private contractor, imported some inmates from the Arizona prison system; those prisoners rioted against the more restrictive rules at New Castle. Because of a lack of sufficiently trained staff, GEO needed county and state police to quell the riot.

This example of capital versus operating and maintenance costs is similar to construction of a highway, where capital costs are provided but an insufficiency in maintenance costs creates trouble.

State Revenues Experience Shortfalls

Many states reported large budget shortfalls because of the economic downturn in 2008. Tax revenues were lower because of a drop in consumer spending,

resulting in lower sales tax collections. The stalled housing market, increased foreclosures, and abandonment by some homeowners reduced the amount of real estate taxes paid to municipalities and states. Also, high energy prices had sharply reduced travel, further reducing the amount of state and federal fuel-tax collections.

Several states, including Maryland, Michigan, Kentucky, New York, and California, were looking to raise taxes to avoid deep cuts, and 17 other states were proposing to cut social programs that could affect children, the elderly, and the disabled. Infrastructure projects would take a back seat to social needs, such as emergency health care and school funding.

Building America's Future Coalition

On Jan. 19, 2008, Judith Rodin, president of the Rockefeller Foundation, announced that the foundation would provide funding for a nonpartisan coalition known as Building America's Future to advance federal infrastructure investment. This coalition was the brainchild of three outstanding public officials, California Governor Arnold Schwarzenegger, Pennsylvania Governor Ed Rendell, and Mayor Michael Bloomberg of New York City.

The goal of the coalition was to bring state and local elected officials from across the nation together and become a repository of best practices for infrastructure funding issues. Governor Schwarzenegger, speaking in California, said that he was passionate about infrastructure, having recently introduced a $37 billion bill to improve his state's roads and bridges. Before introducing the other two speakers, he emphasized Governor Rendell's commitment to public–private partnerships and Mayor Bloomberg's $3 billion bridge inspection initiative.

Rodin said that the foundation would provide funding to seek, implement, and model nonpartisan solutions for the country's national transportation and infrastructure crisis (her word). While referencing the staggering sums for infrastructure improvements put forth by the three speakers, she said that she'd like to add three more:

> I want you to remember three more: 1, 2, and 3. For the last several decades, the United States population has grown at about 1 percent a year. The number of vehicles on our roads has grown by about 2 percent a year. And the total mileage traveled by cars has increased by almost 3 percent a year. So a static number of people are buying more cars and traveling further distances—with increasingly negative outcomes for our climate, health, and communities. If only the solutions were as simple as 1, 2, 3. Still, if we don't adequately plan and prepare for even greater increases, the costs and consequences will overwhelm us all.

This meeting preceded the rapid increase in fuel prices that quickly escalated to $4.00 a gallon for premium gas and higher in many parts of the country, result-

ing in less mileage driven. In fact, according to the Federal Highway Administration (FHWA), Americans drove 12 billion fewer miles in the first quarter of 2008 when compared with a similar period in 2007.

Building America's Future is composed of elected officials around the country serving in both executive and legislative positions at both the city and state levels. Acting as a think tank, they will work closely with the National Governors Association, the U.S. Conference of Mayors, the National League of Cities, the National Association of Counties, and the National Conference of State Legislatures.

Building America's Future's 2009 Survey to Obtain the Country's View on Infrastructure

On Jan. 8, 2009, Building America's Future issued a new release of their survey of the views of Americans on infrastructure, their priorities, and their willingness to pay for it. The survey was conducted by Luntz, Maslansky Strategic Research, a market research and communication consultancy. Its key findings were the following:

- Almost 94% of Americans are concerned about our nation's infrastructure.
- Some 81% of Americans are prepared to pay 1% more in taxes to rebuild our infrastructure.
- Accountability is the highest priority (61%), and Americans care most that projects are built on time and on budget (31%) and that they can see exactly where the money is being spent (24%).

According to Frank Luntz, the survey shows that the public sees the need and is ready to lend a hand financially to ensure that this infrastructure work gets done, but they want it done correctly. A summary and a memo from Frank Luntz can be viewed at http://investininfrastructure.org/newsroom/press.html. The Building America's Future coalition will perform analysis, offer opinions on emerging infrastructure issues, and include federal, state, and local legislative proposals.

The Chicago Skyway and Indiana Toll Road concession agreements have opened the eyes of government officials in many other states around the country. Some governors looked at the options these types of arrangements provided with interest, whereas other looked askance. The proponents and opponents of toll-road concession agreements can get a sample of actions and reactions by looking at what has been happening around the country, beginning with Pennsylvania.

BAF (2010) emphasizes the importance of infrastructure investment. Among its four key benefits which, strangely, did not mention the impact on employment, except as "underutilized resources," the Department of Treasury, with the Council of Economic Advisers, highlighted these four benefits in infrastructure investment:

1. Well-designed infrastructure investments have long-term economic benefits;
2. The middle class will benefit disproportionately from this investment;

3. There is currently a high level of underutilized resources that can be used to improve and expand our infrastructure; and
4. There is strong demand by the public and businesses for additional infrastructure investments.

State and local officials were to meet with President Obama to discuss a six-year transportation bill and an additional $50 billion for our roads, railways, and runways in the short term, an amount that most agree is clearly insufficient.

The Pennsylvania Turnpike: America's First Superhighway

Although the commonwealth of Pennsylvania has the distinction of operating the first toll road in America, it faces the same tugs and pulls of creating new toll roads that many states across the country face. A political scene accompanied by special interest groups, a public sometimes ill informed or lacking sufficient facts, and the Internet, which allows dissidents their electronic "day in court," can delay, or possibly kill, any objective process for evaluating the need for new tolled highways. As with so many endeavors by state governments around the country, the twists and turns experienced by Pennsylvania only emphasize the travails that accompany any attempts to satisfy funding shortfalls while best serving the public interest.

The Pennsylvania Turnpike was the first major toll road in the United States built during the era of the modern automobile, and it served as a model for President Eisenhower's interstate system.

The Turnpike's History

This highway actually began as a two-track railway as part of William Vanderbilt's railroad empire. Work began in 1884, when thousands of workers started to excavate the many tunnels through which rail tracks were to be installed. Even with wages of $1.25 per day for a 10-hour day, costs soared to $10 million (in 1884 dollars), and work ceased in 1885, when board member J.P. Morgan sold the right-of-way to George B. Roberts, president of the Pennsylvania Railroad. This venture, which also cost the lives of 26 workers, was referred to as "Vanderbilt's Folly."

In 1934, the idea of building a toll highway using the abandoned roadbed and tunnels was presented to Pennsylvania's legislature, and House Resolution 138 was enacted, authorizing a feasibility study. At the time, construction costs were estimated to be between $60 and $70 million.

Financing Issues

Financing had not yet been completed, but a contract for the removal of water from the tunnels was issued to a Pittsburgh contractor. Four days later, the first contract for construction was awarded to L. M. Hutchison Company of Mount Union, Pennsylvania. But at the time, not one stretch of right-of-way had been purchased, so John D. Faller, the turnpike's general counsel, began the process

by going out to Cumberland County and negotiating the first deal with one of the farmers out there. The Pennsylvania Turnpike Commission (PTC) relied on funds from the federal government and the federal Department of Highways, along with loans from engineers in the private sector to get the project moving.

Construction was somewhat hampered by the fact that the tunnels were initially bored for double-track width but were narrowed to single-track width as funds began to slow down. None of the tunnels were "holed through," and that switch from double to single track width resulted in the entrances to the tunnels being wider than the ensuing bore.

The First Pour

The first concrete poured on a superhighway in the United States occurred in Pennsylvania on Aug. 31, 1939, and by the spring of 1940, 15,000 workers were on the project. Unskilled laborers were earning 52.5 cents per hour, and heavy equipment operators were making $1.40 per hour.

The engineering standards at the time were also groundbreaking:

- a four-lane configuration with 12-ft (3.65-m) wide concrete traffic lanes, a 10-ft (3.05-m) wide median strip, and 10-ft (3.05-m) wide shoulders;
- a maximum grade of 3% compared to other highways with hills as steep as 9% to 12%, such as those on the William Penn Highway (U.S. 22) and the Lincoln Highway (U.S. 30);
- a maximum curvature of six degrees, but most were only 3%–5%;
- substantial banking on the curves;
- limited access, with 1,200-ft (365-m) long entrance and exit ramps for acceleration and deceleration;
- a minimum 600-ft (183-m) sight distance; and
- no cross streets, driveways, crosswalks, or rail crossings. All vehicular or pedestrian traffic would go over or under the turnpike.

The Turnpike Opens to the Public

On Aug. 6, 1940, the 108th Field Artillery Battalion of the Pennsylvania National Guard made a ceremonial trip on the turnpike from the Indiantown Gap military reservation north of Harrisburg to Bedford, Pennsylvania. As of Sept. 1, however, the toll-rate structure had not been finalized, but on Sept. 11, 1940, the first schedule was approved, setting the rate of a penny per mile for the entire 160-mi (256-km) length, with the toll not exceeding $1.50, and $2.50 for a round trip. Tolls for trucks were based on weight, which was determined by the truck's tire size, and ranged from $3 to $10.

On Sept. 30, it was announced that the turnpike would open for business at 12:01 A.M., Oct. 1, and motorists from as far away as West Virginia made a special trip to drive this new superhighway. One couple from Virginia who wanted to be first in line spent five hours waiting for the official opening, left the line to get something to eat, and when they returned found that they were back in third

place, forfeiting their 15 minutes of fame. It became a mighty celebration at both ends of this new engineering marvel.

Many years later, in December 2006, the newly reelected Pennsylvania Governor, Ed Rendell, indicated that he was seeking offers for the sale or long-term lease of the 66-year-old Pennsylvania Turnpike. However, the governor was quick to clarify that any solicitations would be "feelers" to determine the potential market value of the highway. This move was prompted in part by a severe shortfall in the state's transportation system brought about by the high cost of operating the Pittsburgh and Philadelphia transit systems. One solution to the revenue shortfall would be to increase the gasoline tax and a realty transfer tax. The words "tax increase" are difficult for any politician to swallow, so Keystone State officials looked to the private sector and the possibility of a public–private partnership deal.

Considering Leasing the Pennsylvania Turnpike

On May 21, 2007, the text of a statement was issued from the governor's office in Harrisburg, indicating that the lease of the Pennsylvania Turnpike was likely to generate the highest level of funding to repair roads and bridges in the state. Governor Rendell, quoted in that press release, said that the lease option could provide the most money to fill the commonwealth's $1.7 billion gap needed to repair their roads and bridges and keep public transportation moving in all 67 counties.

Concessionaires Visit the Turnpike

In September 2007, the Pennsylvania State Police picked up three Spanish citizens with cameras and laptops walking about on the turnpike, according to *TOLLROADSnews* (2007). After receiving reports from motorists of suspicious activity, the suspects were detained because their work visas did not show up on the U.S. government database, but they were released when it was determined that they worked for the Spanish concessionaire Cintra and were merely gathering information. According to that article, Jose Lopez, president of Cintra North America, said that his company had more than 100 people surveying the turnpike, so at that time it certainly appeared that the commonwealth was looking to the private sector to answer a call to action.

On Sept. 5, 2007, the governor's office issued a press release (Governor's Office 2007) with the date of Oct. 1 as the date for bidders to respond to the RFQ. And on Oct. 1, 2007, a press release listed 34 developers that had responded, interested in qualifying for a concession agreement to operate the Pennsylvania Turnpike. However, this quest for a concession agreement for the Pennsylvania Turnpike would take some unusual twists and turns.

The State of the State

The Pennsylvania Department of Transportation (PennDOT) was responsible for operating and maintaining more than 44,000 mi (70,400 km) of highways, the

fifth highest of any state in the union. In a September 2007 report, PennDOT indicated that an average investment level of $1.04 billion per year was required for pavement and bridge needs over the entire 1,229-mi (1,966-km) statewide interstate system. Only $380 million per year was available, per the report, and that consisted of interstate maintenance federal-aid apportionments and state matching funds.

The arithmetic was simple: there was an annual shortfall of slightly more than $660 million in transportation funding and a turnpike concession plan had been under consideration since Governor Ed Rendell took office in 1996.

As reported in *ENR* (2007), Governor Rendell proposed to solve PennDOT's yearly deficit by taxing oil companies and leasing the Pennsylvania Turnpike to a private concessionaire, garnering fees of approximately $12 billion.

Morgan Stanley, in the meantime, had been hired by the commonwealth to analyze various financial models for both private concession and conventional funding: a long-term lease; a tax-exempt public benefit corporation under the IRS 63-20 rule, similar to the one Transurban used on their Pocahontas Parkway project in Virginia; and a proposal by the Pennsylvania Turnpike Commission (PTC) to include new tolls on I-80, another interstate, along with a congestion tax to be applied to the most heavily trafficked exits. While these financial explorations were taking place, public opinion was being investigated.

Major Flaws in Pennsylvania's Effort to Lease the Turnpike

Pew Center on the States (2009) studied the unsuccessful effort to lease the Pennsylvania Turnpike after the state received an up-front offer of $12.8 billion in return for a concession agreement from Albertis and Citi Infrastructure in that same year.

Pennsylvania state legislators refused to support the plan over concerns about the state's financial assumptions and oversight. After looking at the pros and cons of this PPP deal, Pew prepared "lessons to be learned" that other states might find useful when considering the feasibility of public–private infrastructure deals. According to this Pew analysis:

- "Passage of enabling legislation that establishes the state's general interests and terms for a public–private partnership before negotiations begin can help set the ground rules and be a valuable tool as a state considers a specific proposal."
- "Transparency and inclusion are crucial to achieving buy-in from stakeholders."
- "A state's decision makers must have a clear understanding of the principal goals for a public–private partnership in the area of infrastructure, because different goals will require different tradeoffs."
- "A proposed deal must be based on realistic financial assumptions."
- "A well-planned public–private partnership proposal must thoughtfully and specifically describe how the revenues leases will generate will be invested and spent, and how the private operator's performance will be monitored."

- "A long-term deal deserves a long-term perspective. Long-term infrastructure deals are often debated with a short-term perspective," says Michele Mariani Vaughn, a Pew Center on the States researcher.

The I-80 Toll-Road Proposal Solution

Interstate 80, on its eastern terminus, picks up where I-95 ends at New Jersey's Palisades Interstate Parkway, cuts straight across Pennsylvania, and continues across the United States, ending in San Francisco, Calif.

This highway, dubbed the Keystone Shortway when it was first proposed in 1938, was to be a toll road along a future I-80 corridor. The project was delayed because of World War II, but with the passage of the Federal Aid Highway Act of 1956, construction of a 300-mi (480-km) section from Stroudsburg to Sharon commenced and was completed all the way to New Jersey in 1970.

The portion of I-80 in Pennsylvania costs PennDOT an average of $80 million per year, $50 million of which is for capital improvements and the balance for maintenance. The current condition of the I-80 project may also be representative of most of the heavily traveled roadways in the United States:

- 50% of the paving structure is older than 35 years;
- 20% of highway pavement is out of cycle and 64% of ramp pavement is also out of cycle;
- 19% of pavement has a ride quality less than good, 4% is poor, and 6.5% has medium- to high-severity rutting;
- 8% of its bridges are structurally deficient, another 15% are functionally obsolete, and another 8% are weak links, which refers to those bridges that have a load-carrying capacity within 10% of requiring posting;
- of the highway's 59 interchanges, 63%, or 37, have one or more ramps with deficient acceleration and deceleration lanes; and
- along the 311-mi (497-km) length of I-80, several areas were identified as needing truck climbing lanes, which are basically safety issues because it results in significant speed differentials between cars and trucks.

Dealing with the Problem

In December 2006, Governor Rendell proposed three options to deal with the deficiencies in the state's highway funding:

1. impose higher taxes,
2. increase state borrowings, or
3. monetize the Pennsylvania Turnpike via a long-term concession-type lease.

About that time, the governor said that he had talked to the investment firm Goldman Sachs and concessionaire Macquarie and felt that a turnpike lease could net the commonwealth as much as $10 billion. Three teams of top-level concessionaires expressed an interest in a potential concession agreement. Tolling of

I-80 was proposed by the PTC as an alterative to leasing the turnpike, and the governor signed legislation to that effect in mid-2007.

House Bill 1590, Known Simply as Act 44

House Bill 1590 created Act 44, which was signed into law by Governor Rendell on July 18, 2007, and provided for a lease of Interstate 80 between PennDOT and the Pennsylvania Turnpike Commission. Under the terms of the lease, the commission would maintain I-80, and the two agencies would jointly seek to collect tolls on I-80 commencing in 2011. The act required PennDOT and the commission to enter into a lease before Oct. 15, 2007, that would include the terms and conditions of the conversion of the highway into a toll road for at least 50 years.

PennDOT, the lessor, and the Pennsylvania Turnpike Commission, the lessee, created the following terms of this lease:

- The commission would make payments of $750 million in fiscal year 2007–2008, $850 million in fiscal year 2008–2009, $900 million in fiscal year 2009–2010, and would increase that payment by 2.5% for each fiscal year thereafter, for a total of $83.3 billion.
- Of these payments, $450 million would be designated for roads and bridges in fiscal year 2007–2008, $500 million in fiscal year 2008–2009, $500 million in fiscal year 2009–2010, and that sum would increase by 2.5% for every year thereafter.
- Of these payments, $300 million would be deposited in the Public Transportation Trust Fund to be used exclusively for mass transit in fiscal year 2007–2008, $350 million in fiscal year 2008–2009, $400 million in fiscal year 2009–2010, and that sum would increase by 2.5% for every year thereafter.
- If I-80 were converted to a toll road, any surplus in the state General Reserve Fund would be paid to PennDOT at the end of each year. If the conversion of I-80 did not take place, the commission would only make annual payments of $450 million, $200 million of which would go to roads and bridges and $250 million to be deposited in the Public Transportation Transit Fund for mass transit use.
- Toll levels would be fixed to generate revenues sufficient to pay the amount due to PennDOT pursuant to the terms of the lease.
- The lease would authorize the issuance of special revenue bonds, up to $5 billion, backed by the state's Motor License Fund with debt service paid by the commission and with the proceeds to be used for roads and bridges.
- Motor License Fund revenues were pledged in the event that the commission defaulted on a payment.
- PennDOT would use design–build arrangements for projects financed with special revenue bonds.

The Proposed Conversion of Interstate 80

The commission had the option to convert I-80 to a toll road any time within the next three years, with an option to extend for three one-year periods. After the

conversion to a toll road, I-80 would come under the direction and supervision of the commission. The commission could contract with PennDOT for any portion of maintenance of the toll road at an agreed-on cost. And the commission was authorized, in cooperation with PennDOT, to apply to the Federal Highway Administration under one of its tolling pilot programs for the right to operate and toll Interstate 80, which they did.

Based on studies of traffic volume for the years 1982 to 2006 for both truck and nontruck traffic, tolls could indeed result in significant revenue for the Commonwealth. Except for the segment from the New Jersey line to I-380 (showing a growth rate of 67.9%) and two other segments with 84.8% and 92.3% growth, the other five sections of I-80 experienced growth rates of 122% to 171%. The commonwealth looked to the federal government for assistance in writing this tolling proposal.

Application to the Federal Highway Administration

On July 22, 2008, the secretary of transportation for Pennsylvania, Allen D. Biehler, submitted an application to FHWA requesting approval under the Interstate System Reconstruction and Rehabilitation Pilot Program (ISRRPP) to toll I-80, and they later filed an amendment incorporating consultations with the metropolitan and rural planning organizations along the I-80 corridor.

In a letter from U.S. DOT division administrator Renee Sigel on Sept. 11, 2008, to Biehler, the FHWA concluded that the agency was unable to move their application forward under ISRRPP at that time. Attached to that letter was a memorandum from King W. Gee, associate administrator for infrastructure at FHWA to Renee Sigel, setting forth the reasons for this rejection. The Gee memorandum stated:

- Section 1216(b)(5)(A) of TEA-21 "limits the use of toll revenue to only (1) debt service, (2) reasonable return on investment for a private entity financing the project, and (3) the costs necessary for the improvement and proper operation and maintenance of the facility." The lease payment plan did not meet statutory requirements.
- The lease payments had no rational relationship to the market value of I-80.
- The payments had been "predetermined by the Pennsylvania General Assembly based on considerations largely unrelated to the true costs of a leasehold interest in I-80."
- Because the FHWA had no indication that the lease payments were related to the true costs of the leasehold interest, they could not determine that those costs were legitimate and valid operating costs.
- There did not appear to be an arm's-length transaction to set the price of the lease, nor were there any indications that the price of the lease had been tested competitively.
- FHWA was also concerned that "the absence of sufficient traffic and revenue studies" would not support their financial plan.

Although they rejected the resubmitted application, FHWA expressed their interest in finding other ways to fill the funding gap.

The Backlash Firestorm

Both public opinion and legislation opposition would come into play at this time. On Nov. 12, 2007, an article in the Philadelphia *Inquirer* criticized Act 44 as being unable to raise enough money for Pennsylvania's transportation problems; for failure to address the $1.7 billion annual transportation funding needs, for not reconsidering Governor Rendell's initial plan to lease the turnpike to a private-sector partner and receive a large influx of funds; and for rewarding the turnpike commission with even more power, size, and authority, an authority that is "hardly a model of transparency," according to the article, and with a long history as a "patronage playground." Public opinion, including trucking interests, was not in favor of additional tolls.

A Dec. 4, 2007, letter from John R. Gordner, state senator from Pennsylvania's 27th District, to Mary Peters, Transportation Secretary of U.S. DOT, offered his opinion. He questioned the validity of the federal program requested by the commission, wondering whether it was appropriate. His concerns had to do with the validity of the federal program requested by the commission:

> It is noteworthy that in prior communications with the United States Department of Transportation, the Chairs of the House and Senate Transportation Committees received conflicting answers as to whether this proposal is permissible under existing federal tolling programs. The Department foreclosed the possibility of authorizing this proposal through the Interstate System Reconstruction and Rehabilitation Pilot Program (ISRRPP) because tolls collected through that program can only be used for purposes related to the tolled Interstate and not for other highway or transportation purposes.

The Continuing I-80 Toll Issue

Levy and Scolforo (2010) reported that the federal government rejected Pennsylvania's application to turn I-80 into a toll road. Although greeted enthusiastically by residents and businesses throughout the state, it left Governor Rendell with the dilemma of how to replace the expected $450 million plus per year that these tolls were expected to produce.

The Future of PPP in Pennsylvania

Pennsylvania has 7,000 mi (11,340 km) of roads in poor condition and 5,600 "structurally deficient bridges," as indicated by state transportation secretary Allen Biehler in Bumsted and Santoni (2010). They went on to state that although PennDOT received $400 million in federal stimulus money in 2009 and through the

state's $1 billion accelerated bridge program, according to Mr. Biehler, the number of structurally deficient bridges has been reduced for the first time in a decade, but the state will still need $3 billion for additional replacement and repair work.

Public–private partnerships are an option, as are raising the state's gasoline tax, increasing motor registration fees, and increasing public transportation fares. "The only thing that is not an option is to do nothing," Governor Rendell was quoted as saying in Bumsted and Santoni (2010).

Oregon's Search for Highway Revenue

In Oregon, the problems were different. Fuel taxes made up between 60% and 70% of all Oregon road revenue, but even with a tax increase in 1983 and another in 1991, the state remained woefully short of funds. And because the fuel efficiency of passenger vehicles had increased from 11.8 mi/gal. in 1970 to 19.7 mi/gal. in 2002 and continued to improve, these revenue declines per gallon were projected to erode even further.

House Bill 3946 passed by the 2001 Oregon legislature created the Road User Fee Task Force, whose mission it was to develop a revenue-collection process for the state to replace the gas tax system. In the task force's report to the 2003 legislative assembly, four potential revenue sources were outlined:

1. A mileage fee could be based on distance traveled, a tax based not so much on gallons purchased but miles traveled on that tank of gas. Collection of the fee could be arranged at service stations as motorists fill their tanks or at an independent collection center, at Driver and Motor Vehicle Services centers, or as part of some sort of statewide spot-tolling system.
2. Congestion pricing could be implemented, whereby vehicles were charged fees for using certain roadways during periods of congestion.
3. New facility tolling could be used, whereby only new transportation projects amenable to tolling would be tolled, e.g., roads and bridges.
4. A studded tire use fee could be used for those drivers using studded tires because their use contributes to road damage.

A decision was made to proceed with the mileage fee-based system, and as such, the state authorized a road user fee pilot program that extended from Apr. 1, 2006, to March 25, 2007. This pilot program involved several public agencies (Oregon Department of Transportation [ODOT], FHWA, Portland State University, and Oregon State University) and some private entities (HDR, the architecture, engineering, and construction consulting firm, and a private gasoline service station chain, Leathers Fuels).

The pilot study required the installation of prototype on-vehicle devices in the vehicles of private volunteers, and by applying some database statistical material onto jury-rigged equipment at a few Leathers Fuels gas stations, this pilot program was launched.

The Program Concept

This mileage fee program is a distance-traveled charge imposed according to the amount of travel a vehicle owner or operator performs on Oregon roads only; it does not apply to travel outside of the state. If approved after this pilot program is concluded, this system would phase in over 20 years as the conventional state fuel tax is phased out, but, in the interim, motorists would only pay one fee or the other. For nonresidents and motorists driving vehicles without the required technology, the old fuel tax would continue to be collected. For those in the mileage fee program, they would get a credit to offset the fuel tax. So how does this system work? Mileage fees would fall into one of three categories:

- zone 1: travel within the state of Oregon;
- zone 2: out-of-state travel, not taxed; and
- zone 3: rush hour traffic within zone 1, taxed at a higher rate.

To make this work, automobiles would be fitted with an on-vehicle device and tracked by a global positioning system (GPS), which would transfer data to a mileage reader at a gas pump. When a motorist pumps gas at a service station, this GPS information would be transferred to a central computer that calculates the tax and transmits the amount back to the pump. A receipt is printed out for the motorist while creating an in-store transaction.

The breakthrough of an electronic accounting and communications system, which ODOT referred to as "vehicle miles traveled collected at retail" (VMTCAR), allowed the pilot program to function as conceived. The mileage payment process follows these steps:

1. When a motorist begins the fueling operation at the pump, electronic readers verify that the vehicle has the on-vehicle device for mileage-fee collection, and a central reader at the gas station detects the presence of a vehicle with that mileage-fee technology. If no such technology is detected, the point-of-sale (POS) equipment charges the motorist based on the gas tax.
2. If the central reader detects the mileage-fee technology, it instructs the wireless device on the fuel pump to broadcast a message to the vehicle's device. The vehicle's on-board device communicates the signal strength of the message from the fuel pump to a central reader, where this signal reads the mileage from the on-board equipment and passes this information and the vehicle's identification number on to the fueling station's POS system.
3. The mileage-fee system will then query the central database to determine the vehicle's last mileage reading for each zone.
4. The mileage-fee system then extracts the fee rate from the central database and applies that number against the vehicle's last and current mileage readings. This information is passed on to the POS system, which deducts the gas tax from the fuel purchase.
5. The final printed receipt shows the amount involved in the mileage-fee transaction as the cost of the fuel, the fuel tax deducted, and the mileage fee

applied. When this transaction is complete, this information is passed along to the central database to be used for the next fueling.

The Results of the Pilot Study

Participant surveys reflect the initial public concerns (Table 9-1), and the satisfaction with the program (Table 9-2) provides some insight into the experiences of the participating motorists, most of which were overwhelmingly positive.

The operating costs of the system were projected to be $1.6 million annually, $1 million of which would be for auditing enforcement and administration and $600,000 for communication costs. Capital costs to install the necessary equipment at service stations were estimated to be $35 million. This system would not be implemented quickly. ODOT assumed that a time frame from 2008 to 2013 would be required for development; 2013 to 2020 would allow for the statewide implementation program; and it would not be until 2030 to 2040 that full implementation could occur. The phase-in period extending from 2013 to 2030 would find new cars sold in Oregon being fitted with the necessary devices, and the cost

Table 9-1. Initial Concerns, Survey 1 (Number and Percent)

	Great Concern		*Some Concern*		*No Concern*		*N/A*	
Concerns with the Program	*No.*	*%*	*No.*	*%*	*No.*	*%*	*No.*	*%*
Fear of burglary due to visible equipment	11	6	81	42	101	52	1	1
Having to purchase gas at Leathers	9	5	62	32	123	63	0	—
Whether payment will be worth effort	9	5	55	28	126	65	4	2
Accuracy of mileage readings	14	7	44	23	135	70	1	1
Impact of equipment on vehicle	9	5	50	26	135	70	0	—
Privacy associated with equipment	6	3	29	15	159	82	0	—
Ability to participate for full year	9	5	21	11	164	85	0	—
Getting full household participation	6	3	8	4	172	89	8	4
Going to reader station three times[a]	2	1	17	9	174	90	1	1
Friends' and neighbors' opinions	2	1	15	8	175	90	2	1

Source: Reprinted with permission from ODOT 2007.

[a]Participants were concerned that they might have to go to the reader station more than once to have their mileage recorded.

Table 9-2. Satisfaction, Survey 2 (Number and Percent)

	Satisfied		*Neutral*		*Dissatisfied*		*N/A*	
Features of the Program	*No.*	*%*	*No.*	*%*	*No.*	*%*	*No.*	*%*
Getting information about the program	182	96	6	3	0	0	2	1
Having questions answered	175	92	9	5	3	2	3	2
Privacy associated with equipment	159	84	23	12	3	2	5	3
Having to purchase gas at participating stations	154	81	9	5	26	13	1	1
Out-of-pocket costs for fuel	152	80	23	12	8	5	7	4
Where the display was positioned in vehicle	145	76	6	3	39	20	0	0
Accuracy of mileage readings	142	75	15	8	5	3	28	15
Functioning of the equipment	143	75	8	4	37	20	2	1

Source: Reprinted with permission from ODOT 2007.

of the installed system would be included in the auto manufacturer's or dealer's selling price. ODOT was of the opinion that 80% of the state's vehicles would be covered by that time.

The pilot program revealed good results: vehicle identification was 85% accurate, transmission accuracy was 100%, and acceptance of the system was 91%. Although the entire system admittedly needs more work and lots of fine-tuning, it represented itself as a viable system that could supplant the current fuel tax in Oregon. ODOT has applied for additional FHWA funding under the Value Pricing Pilot Program to carry this study another step closer to fruition.

The Final Report

In November 2007, the final report of Oregon's mileage fee concept and Road User Fee Pilot Program (ODOT 2007) was released, posting their key findings:

- The concept is viable. Ninety-one percent of participants would agree to continue paying the mileage fee in lieu of a gas tax.
- Paying at the pump works with minimal difference compared to how participants paid the gas tax at the pump.
- The mileage fee can be phased in, allowing non-equipped vehicles to continue to pay the gas tax.
- Integration with current systems can be achieved: the service station point-of-sale system and the current systems of gas tax collection.
- Congestion and other pricing options are viable. An area pricing strategy applied in the pilot program produced a 22% decline in driving during peak periods.

- Privacy was protected.
- The system would place minimal burden on business.
- Potential for evasion is minimal.
- Cost of implementation and administration is low.

The Road User Fee Task Force Conducts Further Hearings

When contacted by e-mail on March 2, 2009, Jim Whitty at the Oregon Department of Transportation stated that the next step for Oregon's mileage-fee program was to refine the system and related technology to the point where it attains commercial viability. The pilot proved the concept, but the system in its present form is not ready for implementation. For one thing, it will be essential to consider working with automobile manufacturers. Whitty stated that Oregon's governor had put funding into the fiscal year 2009–2010 budget for this program but that it still needed approval by the state legislature when they were to meet in July 2009.

RUFTF Exploration Continues

A Road User Fee Task Force meeting open to the public was held all day at the state capitol building in Salem, Oregon, on Oct. 28, 2010. Various topics ranging from road pricing experiments and programs in the world, to a vision for implementation and options, to resolving the impending funding gap were presented. Public testimony was held before adjournment, and some basic policy questions for RUFTF were presented:

- Shall the task force proceed with development of legislation for application of a metered road use charge?
- Shall the metered road use charge be designed as a tax or a fee?
- Shall the road use tax/fee be imposed on all vehicles or a smaller group of vehicles?
- Shall the first application of the road use tax/fee be imposed on plug-in hybrids and electric vehicles?
- Shall ODOT have the opportunity to offer voluntary participation in a road use fee/tax in substitution for payment of the gas tax?
- Is the approach of authorizing ODOT to develop the metered road use tax/fee according to certain directives a satisfactory approach to development of legislation or does RUFTF want to design the systems from scratch or recommend that the legislature do so?

The public concerns about the Oregon mileage fee concept were the following:

- Confidence in the system: Will it be efficient, fair? It creates a perception of a large and costly bureaucracy.
- Privacy and fear of technology: Will this result in a government-mandated GPS device?

- Motorist class wars: Will there be disagreements over the rate structure, rate equity issues, and rural driving?
- Concern about the flexibility of road pricing.

At this same meeting, staff member Jack Svadlenak discussed the economics of fuel taxes and options to resolve impending funding gaps. The Nov. 4, 2010, meeting focused on a matrix-based user tax/charge legislation; a further meeting was planned for Dec. 2, 2010, to continue the discussion of rate structuring and a mileage-based user tax. No further information was available as of Dec. 31, 2010, as RUFTF ponders the economics of putting the user fee program into effect.

Oregon's Solar Highway

The Oregon Department of Transportation entered into another groundbreaking public–private partnership to create what may be the nation's first solar highway. The 2007 state legislature instituted policies to arrest the growth of greenhouse gas emissions by 2010. By entering into several public–private partnerships and tapping some state and federal funding sources, they installed a 104-kW ground-mounted solar array at the interchange of Interstate 5 and Interstate 205. The roadway portion of I-5 has been designated one of the nation's Corridors of the Future projects. The solar network provides about one-third of the energy for illumination at that site, which is a small start, but an important one.

SunWay 1, a limited liability company managed by Portland General Electric, owns and operates the solar plant. Partners in the project include SolarWorld AG, the firm that supplied the solar panels, and PV Powered Inc. of Bend, which supplied the inverter. SolarWay, a turnkey solar energy consortium consisting of four Oregon firms, engineered, designed, and constructed the project with the help of Aadland Evans Constructors Inc., Moyano Leadership Group Inc., Advanced Energy Systems, and Good Company.

The Oregon Innovative Partnerships Program welcomes potential project developers to meet with their staff and share project concepts on a confidential basis until the Oregon Transportation Commission makes a determination about going forward. A solicitation scheduled for August 2009 seeks to procure at least 2 million kWh per year of renewable energy from ODOT-owned rights-of-way, facilities, and other built assets.

Minnesota and Their Mileage-Based User Fee Study

Minnesota studied how much consumers understand about infrastructure funding. Various states are also considering alternative funding sources for their transportation programs; some programs include applying heavy truck fees, gas tax increases, vehicle and passenger car taxes and fees, general tax revenue increases, debt financing, credit assistance, and asset leases. The Minnesota Department of Transportation in 2007 decided to create a series of focus groups to test the via-

bility and acceptance of a mileage-based user fee (MBUF). They used a panel of key experts on the topic along with consumer groups, and the concerns and opinions raised by each group were distinctive and may guide other states that are considering this revenue option (Mn/DOT 2007).

The Expert Panel Findings

This group was of the opinion that an MBUF would not be necessary nor feasible for about 10 years, quite a difference from Oregon's DOT findings. The expert panel concluded that the fuel tax is viewed as an accepted and efficient option for funding transportation and that the adequacy of the funding is a political issue and depends on the willingness of politicians to increase the fuel tax.

Perhaps the MBUF could be used to supplement rather than replace the fuel tax. The experts suggested that a gradual transition from an electronically collected toll system using technology that motorists are familiar with might be a better approach than a mileage-based program.

Experts viewing a vehicle miles traveled tax cited the following advantages. The miles-based tax

- reduces the effect on gas taxes from increasingly fuel-efficient vehicles;
- links taxes to usage;
- equips vehicles for future pricing initiatives, such as congestion pricing and HOT lanes; and
- increases the efficiency of any toll-collection process.

Experts also recognized some disadvantages:

- increased transaction and administrative costs,
- privacy concerns,
- reduced incentives for driving more fuel-efficient vehicles,
- vulnerability to fraud,
- cross-border conflicts if fees are only state based, and
- politically it may be difficult to sell.

The Consumer Focus Group Findings

Two scenarios in the form of questionnaires were presented to the consumer group participants:

> **Scenario F:** Vehicles would have a small device installed, like an odometer, which would tally miles driven. It would also record **where** the travel occurred and **when** it occurred. User fees would vary for different types of travel, during peak congestion periods and off-peak periods. Travel on freeways could be more expensive than travel on local roads, and the rate

could vary according to the size and weight of the vehicle. Billing would emanate from an on-board computer and would be downloaded via cell phone technology to a billing center, where the motor fuel tax paid would be subtracted from per-mile charges. All funds would go to local and state road needs.

Scenario Q: Vehicles would have that small, odometer-type device installed, which could tally the number of miles driven. When the drivers buy gasoline, the mileage information would be transferred from the pump through a wireless transmission that replaces the per-gallon gas tax. The rate charged would be a per-mile-driven fee and could vary with the size and weight of the vehicle. Again, all funds would be used for local and state road work.

Other Consumer Opinions

The consumer study also revealed the following:

1. The consumer participants did not fully understand the amount of transportation tax dollars they spend per year, nor did they recognize the sources through which these monies originate.
2. Drivers would be more accepting of a change in funding sources if the reason for the change were clearly explained.
3. Participants to the study also expressed a willingness to pay more in gas tax if they could be sure that those monies would actually be spent on transportation work.
4. After the mileage-based user tax was explained, participants were generally comfortable with the idea of a tax based on mileage. They viewed this as similar to the way they pay for electricity and water.
5. There were mixed feelings about the need for more money for transportation projects, and a small portion of those surveyed were convinced that funds were adequate but mismanaged.

The Conclusions and Recommendations of the MBUF Study

It would appear that based on the response from the consumer group, there was a need to educate the public on how transportation funding works, how funding is raised, and how the amount of funding either meets actual transportation needs or shows a shortfall.

The Minnesota Department of Transportation (Mn/DOT) saw the need to elevate the topic of transportation funding to frame any future debates about the need and cost of funding changes. Mn/DOT would also need to explain the objectives of change that could frame the requirement for future communication before change begins. One way to gain consumer attention would be to put a notice on

every gas pump showing the tax per gallon and the connection between that tax and road construction and maintenance requirements.

The majority of consumer respondents did not recognize that the current system of funding roads using the motor fuel tax approach had several shortcomings, i.e., increased fuel efficiencies and reduced miles traveled. If the purpose of the MBUF was to move away from the gas tax, Mn/DOT discerned that the model must very clearly explain how that will happen.

The 2010 Symposium on Mileage-Based User Fees

On Apr. 20 and 21, 2010, a symposium on mileage-based user fees was held at the University of Minnesota's Hubert H. Humphrey Institute and Center for Transportation Studies in Minneapolis, Minnesota. It was also hosted by the Texas Transportation Institute.

On the panel were a battery of transportation experts from the American Association of State Highway and Transportation Officials (AASHTO), the National Surface Transportation Policy and Revenue Study Commission, the Federal Highway Administration, and various universities. The purpose of the symposium was to discuss mileage-based user fees as an option for future transportation funding. Three basic questions were presented:

Question No. 1: What are the greatest challenges or barriers to transitioning from the fuel tax to a per-mile fee?

Answer: From the public's perspective, there is no compelling argument to transition to a new revenue collection system. Public trust in government today is at a low ebb. One panelist summed it up thus: "If the public does not have confidence in the way money is being spent now, they are not going to have confidence in a new system." So it appears that a strong public relations effort is required to acquaint citizens with the problem and provide alternative solutions.

Question No. 2: What would the transition look like and who would lead it?

Answer: The consensus of the participants was a vision of a transition to a user-fee system as voluntary and evolutionary. One participant said that the federal government should lead, whereas others thought that state departments of transportation ought to show the way.

Question No. 3: What additional research, testing, and demonstrations are needed?

Answer: The responses represented a mixture of technology and policy research needs. Develop privacy standards, identify enforcement approaches, conduct large-scale trials, conduct national polling and market research data, and develop potential concepts of operation with system costs.

The symposium dealt with these issues in more detail, and for those interested in accessing the full report, it is available at http://utcm.tamu.edu/mbuf/2010/proceedings/.

The University of Iowa Study

The move to find alternate revenue sources received another boost when the University of Iowa's Public Policy Center was awarded a federal grant to study and conduct a national evaluation of mileage-based, road user charge highway funding. The research was funded through a consortium of the Federal Highway Administration and 15 state departments of transportation: California, Connecticut, Iowa, Kansas, Michigan, Minnesota, Missouri, North Carolina, Ohio, Oregon, South Carolina, Texas, Utah, Washington, and Wisconsin.

The Two-Part Study: Part I

The study was composed of two parts: Part I, which was concluded in 2002 and looked at the basic operations of a mileage-based road user charge, and Part II, which was to test and refine this new approach to assessing and collecting road user charges.

On Nov. 1, 2007, a report was issued on both parts of the study. The Part I study was completed in 2002 and was based on the use of an on-board computer to triangulate the participant's vehicle using GPS. The computer would apply a per-mile charge to the miles traveled within a given polygon containing a geographic information system to define boundaries of the state and substate regions. These data would be stored in the vehicle's on-board computer and downloaded via cellular technology on the 15th of each month to a billing and dispersal center that would bill the vehicle owner and apportion revenue collected among the jurisdictions within the travel area of the vehicle. Payment options could be either automatic or billed from a debit account.

The Two-Part Study: Part II

The Part II portion was supposed to test and refine this new approach, to look at the appropriateness of the technology, and to evaluate user acceptability. As of the November 2007 report, six sites were selected for testing (San Diego, California; Austin, Texas; Baltimore, Maryland; North Carolina's Research Triangle; Boise, Idaho; and Eastern Iowa-Cedar Rapids, Dubuque, and the Quad Cities). The testing commenced in 2009. Jon Kuhl, director of the road user study group at the University of Iowa, had received responses from all of the participants in the tests. According to Lori Jarmon at the University Media Center, when contacted on Jan. 5, 2011, Kuhl was in the process of preparing a report that would be available later in 2011.

The New Jersey Turnpike Challenge

The New Jersey Turnpike begins shortly after the I-95 split at the Delaware Memorial Bridge and travels through the heartland of industrial New Jersey before providing access to New York City via the Holland and Lincoln Tunnels

and the George Washington Bridge and points north. Summer and holiday traffic on this tolled road is very heavy.

New Jersey, like many other states, faces serious deficits in several government departments, and concession-type agreements offer the potential to fill some coffers. In mid-February 2007, Nancy Feldman, then-director of New Jersey's Office of Public Finance, reported that she had received proposals of up to $30 billion of up-front money from private companies interested in leasing the New Jersey Turnpike and its parallel sister highway, the Garden State Parkway. The term "monetization" was used, a term that financier-turned-governor Jon Corzine would know, but others may not.

Monetization

Monetization, as defined by Wikipedia, is the process of converting government debt into legal tender, much like the practice of alchemy. The definition goes a little further and states that in some industries, monetization is the process that adapts non-revenue-generating assets into generating assets. However, because the turnpike *does* generate revenue via tolls, this term does not seem to fit the definition of monetization as it relates to that highway.

On June 28, 2007, the office of the governor released then-Governor Jon Corzine's 11 core principles relating to the state's financial restructuring and debt reduction. His statement at that time was that any asset monetization proposal put forth by his administration would adhere to the following transportation core principles:

1. New Jersey's roadways would not be sold; nor would they be leased to a for-profit or foreign operator.
2. Allowable uses of proceeds (reducing state debt and capital investments) would be identified up front and subject to public and/or legislative approval, with safeguards against diversions for other uses.
3. New Jersey citizens would retain ownership and benefits from both initial proceeds and ongoing operations.
4. Safety, maintenance, and operating standards would be provided at current or improved levels.
5. Sufficient funding to meet long-term capital needs required to improve roadways and reduce congestion would be provided.
6. Terms and conditions of employment for current employees and contractors would remain unchanged, with prevailing wages and competitive contracting procedures retained.
7. Toll schedules would be open, predictable, and available to the public.
8. There would be a substantial, open, and public discussion before any transaction. The state would first hold 21 public meetings in 21 counties.
9. The government would work to reduce the state's bonded debt by at least 50%.
10. New systems would provide permanent funding for the Transportation Trust Fund.
11. Changes would establish new limits on state borrowing.

The governor went on to state in that release that the one option that is new and that they are studying is asset monetization. The economic potential from restructuring the state's interest in their asset portfolio was too significant to ignore, whether that asset is the turnpike, the lottery, naming rights, air rights, or other assets.

Toll the Turnpike?

Quinnipiac University, in Hamden, Connecticut, frequently conducts public opinion polls; in one such poll issued by Clay F. Richards, dated Sept. 25, 2007, they polled New Jersey residents about a number of issues. Two of the questions referred to the New Jersey Turnpike:

1. Do you support or oppose selling or leasing the New Jersey Turnpike and the Garden State Parkway and using the money to reduce the state's debt and possibly providing money for tax relief?
   In support: 29%
   Opposed: 59%
   No response: 12%

2. Do you support or oppose raising the Turnpike or Parkway tolls and using the toll money to help balance the state budget?
   In support: 32%
   Opposed: 57%
   No response: 11%

The Regional Plan Association Report

The Regional Plan Association (RPA) is an organization devoted to addressing the needs of the three-state area encompassing New Jersey, New York, and Connecticut. These three states exhibit great mobility within the corporate world and financial institutions because of the fluidity of travel between workplace and home by rail and road in this area. The RPA was formed in 1922 to address the concerns of this growing metropolis, and it has released three regional plans; the one previous to their latest appeared in 1996.

The RPA conducted a study of New Jersey's transportation system (2005). Although the report was prepared for the situation existing in that state at that time, the report could be viewed as generic and timely because its findings and suggestions could apply to many other states.

The executive summary of the report is blunt and to the point. Referring to the New Jersey Transportation Trust Fund (TTF), it states that New Jersey will have exhausted almost all of the revenue sources it currently used to pay the capital costs of building and maintaining its roads and mass transit systems by June 2006. In fact, starting in July 2005 almost all of the state's gas tax would go toward debt relief. The report indicated that in 2004, New Jersey spent $4.1 billion on

transportation, of which $2.7 billion was for capital projects and $1.4 billion was for operations. Thirty percent of these funds ($1.2 billion) came from the TTF; 30% from federal sources, many of which required matching funds; and $1.7 billion from revenue generated by the Port Authority of New York and New Jersey. By 2006, when the TTF was projected to run out of money, that condition would also affect the federal government's matching funds.

How Did This Situation Happen?

New Jersey's transportation system is heavily used and old. It includes more highway miles per square mile of geographic area than any other state in the union. An average of 2 million mi (3.2 million km) are traveled for each mile of streets and highways in the state. The average age of the state's bridges is 47 years, with 40% older than 50 years. Almost one in seven of New Jersey's 2,300 bridges is structurally deficient. Truck traffic volume continues to grow by 2.7% per year, translating to 80% more trucks by 2020, as compared with a 1998 count, and trucks are the biggest contributor to bridge and highway wear and tear.

Bus and rail via the PATH rapid transit system in the state are vital to the health of not only New Jersey, but also of Manhattan. New Jersey has the second highest transit use of any state except New York, and the NJ TRANSIT system carries two-thirds of the agency's 223 million passengers each year.

The state's capital program was five times larger in 2005 than in 1985, but during those 20 years, the gasoline tax increased only once, by 2.5 cents per gallon in 1985. To make up for the added funds required, the Transportation Trust Fund Authority (TTFA) increased its use of bonds and issued more bonds with longer maturity dates. Government leaders, RPA (2005) suggests, chose short-term solutions such as tax cuts, one-shot remedies, and no toll or fare increases, which would be politically unattractive. With all of the TTF's revenues in 2006 pledged to repay the bonds, New Jersey faced an $805 million debt service each year until 2021. The report's recommendations of what to do are worthy of consideration and have applicability for states other than New Jersey:

- Regularly increase transit fares to keep pace with expenses.
- Fully fund DOT and transit operating budgets and eliminate capital-to-operating transfers.
- Constitutionally dedicate all originally intended resources to the Transportation Trust Fund.
- Create an independent, five-person financial policy review committee.
- Issue six-month reports from the director of the division of taxation.
- Restore long-term bondability to New Jersey's transportation financing system by limiting bond maturities to 10 years until permanent fiscal stability is achieved.

The four reasons the TTF went awry, according to the report, would also serve as a notice to state departments of transportation across the country:

- growth of capital programs without commensurate increases in revenue,
- insufficient funding from non–trust fund sources for operations,
- leaking funds from the trust fund into the general fund, and
- lack of accountability and independent oversight.

In discussing privatization in their report, they listed the following pros and cons:

- **Pros:** A leasing arrangement similar to that of the Chicago Skyway would create the infusion of a large sum of money into the New Jersey Turnpike Authority. The introduction of the private sector might also inject freedom from bureaucracy to permit the use of new technologies to lower operating costs.
- **Cons:** The creation of a concession program, with all of its intricacies, would probably take too long to implement to save the TTF in its 2006 crisis. There may be an opportunity to restructure one of the highway authorities to create a publicly traded company that could sell shares to private investors, and the state could remain in control by purchasing 51% of the shares. However, tension between shareholders expecting a fair return on their investments and the state authorities' reluctance to increase tolls may result in so much tension as to make this option impractical.

Raise the Tolls?

Governor Corzine was weighing another approach to fund New Jersey's highway program: simply raising tolls and having those funds support a multibillion-dollar transportation bond issue. Corzine proposed in early 2008 to create an independent nonprofit entity that would issue $37 billion in bonds, retiring this debt by increasing tolls in the state periodically until 2022. After 2022, tolls would increase every four years to reflect inflation. This plan would have the effect of an 800% increase over that period of time. These increases would apply to the Garden State Parkway, the New Jersey Turnpike, and the Atlantic City Expressway. These three toll roads carried 748 million vehicles in 2006: 428 million on the Garden State Parkway, 252 million on the turnpike, and 68 million on the expressway.

Governor Corzine stated that his plan would permit all money earned by the nonprofit corporation to stay in the state and to be used for the benefit of New Jersey's citizens. He conceded that it would have been easier to seek a highway lease, as other states have done, but his concept would keep the state in control of their highway system and keep all profits earned.

James S. Simpson, then administrator of the Federal Transit Administration, speaking at a transportation conference in the state on March 1, 2008, encouraged the governor and his program, stating,

> Many view the governor's plan to introduce the new toll-road charges and create a public company to issue the necessary bonds as controversial. But

> we can't expect 20th-century solutions to solve 21st-century problems. There aren't too many other solutions. This is one that works, and we're behind it (*New York Times* 2008).

The planned toll increases, however, did not materialize after public outcries from both businesses and commuters who travel the turnpike were heard.

Infrastructure Spending for Job Creation

Governor Corzine issued a news release from his office on Nov. 26, 2008, which appeared to focus on job creation. He planned to institute a $2.8 billion infrastructure program through December 2009, which would directly create 26,000 jobs. He claimed that an almost $1 billion investment of that total would be either new capital allocated toward projects that were previously unfunded or revenue allocated to projects that would be accelerated. His news release contained no statements about where this funding would come from.

The American Recovery and Reinvestment Act of 2009 would provide the state of New Jersey with $894 million to advance some of their transportation projects, thereby relieving some of their financial woes and putting some people back to work.

Increase Tolls If Privatization Is Defeated?

Turnpike and parkway tolls in New Jersey raised the price of the average trip in December 2008 by about 40%, with the majority of the revenue to be used to improve and repair roads and a small amount going to a planned second Hudson River crossing rail tunnel to Manhattan.

In November 2009, Corzine was voted out of office, and Chris Christie, a conservative, was voted in. Not only were further discussions about "privatizing" the New Jersey Turnpike ended, but according to *TOLLROADSnews* (2010), Christie was aiming at all-electronic tolling.

The five-person New Jersey Privatization Task Force, as reported in this article, concluded that manual toll collection cost the New Jersey Turnpike Authority about $85 million per year, about 50% more per hour per employee than a private vendor might charge, resulting in a potential annual savings of between $35 and $42.5 million. Another commission was proposing eliminating cash collection on the Atlantic City Expressway and moving to an all-electronic tolling system, another cost-saving measure.

The proposed Hudson River tunnel project, deemed essential by the Tri-State Transportation Campaign, projected to cost between $9.78 and $12.71 billion, was also scrapped by Governor Christie since New Jersey would have to commit $2.7 billion to the project while the federal government and the Port Authority would allocate a total of $6 billion. Although $600 million had been spent as of mid-2010, mostly on design and planning, the governor made it clear during his campaign that he was opposed to the project, in part, anticipating that the

inevitable overruns would be shouldered by New Jersey taxpayers. Governor Christie officially cancelled the second Hudson River crossing on October 7, 2010.

The Colorado Tolling Enterprise and the R2C2 Study

Colorado's House Bill 02-1310, a transportation bill, created a statewide tolling enterprise to accommodate the needs of the public traveling through and within the state. The legislation directed the general assembly to authorize the Transportation Commission to create, under the supervision of the Transportation Commission, a statewide tolling enterprise that had the power to impose tolls, issue revenue bonds, and exercise other powers necessary and appropriate to carry out these purposes.

The CTE

The Colorado Tolling Enterprise (CTE) was a government-owned nonprofit business operating under the Colorado Department of Transportation (CDOT) whose mission was to enhance mobility in Colorado by increasing capacity through the creative development of a statewide system of toll facilities.

Peggy Catlin, deputy director of CDOT and the first acting director of CTE, in 2007 stated that CTE was established as an enterprise: a nonprofit business and a division of the state government alike.

Colorado passed a constitutional amendment several years ago limiting taxation and spending, and this amendment was referred to as the TABOR (Taxpayer's Bill of Rights) Amendment. An entity defined as an enterprise (e.g., CTE) is exempt from some of the TABOR provisions. For example, an enterprise can issue debt without requiring a vote from the people, which the state government cannot. But to maintain CTE as an enterprise, it cannot receive more than 10% of its annual revenue from state or local taxes.

Section 43-4-801 of the Transportation Bill, added in 2002, stated the following:

> The general assembly hereby finds and declares that, in order to finance, construct, operate, and maintain additional highway capacity and accommodate the needs of the traveling public through and within the state of Colorado through safe, efficient, convenient, and modern vehicular traffic, it is necessary and in the public interest to provide for the financing, construction, operation, regulation, and maintenance of a statewide system of toll highways that are interoperable, that incorporate the benefits of advanced engineering design, experience, and safety, and that will reduce traffic congestion, delays, hazards, injuries, and fatalities. The general assembly further finds and declares that it is necessary to authorize the transportation commission to create, under the supervision of the transportation commission, a statewide tolling enterprise that has the power to impose tolls, issue revenue bonds, and exercise other powers necessary and appropriate to carry out these purposes.

The Interstate 25 Project

The Interstate 25 Project was one of the first Colorado Tolling Enterprise–sponsored highway projects. A $6 million loan was made to CTE in the 2005–2006 fiscal year to fund construction and procurement activities so that 7 mi (11 km) of I-25 north of the E-470 Denver Beltway could be converted to high-occupancy toll (HOT) lanes.

The I-25 HOV–tolled express lane project opened in June 2006, and single-occupant vehicles could then legally access HOV lanes by paying a toll. Carpools, buses, and motorcycles could continue to use lanes designated as toll-free. The HOV lanes had congestion pricing, with the lowest rates from 5:00 to 6:00 A.M. and the highest during evening commuting time (Table 9-3). Tolls are collected electronically and are deducted from an active EXpressToll account. Toll enforcement is handled via license plate photo technology.

The purpose of the I-25 project was to maximize the highway by allowing single-occupancy vehicles to enter the HOV lane, at a price. In an Apr. 19, 2007, news release by CDOT Region 6, the department stated, "The purpose of the I-25 Express Lanes is not to generate revenue but rather to cover expenses such as maintenance and snow removal that was previously paid for by taxpayers. The underutilized HOV lanes are now being maximized, giving motorists another option to escape traffic congestion."

In a June 7, 2007, report to the State House Committee on Transportation and Infrastructure, Peggy Catlin's testimony was about the success of the I-25 HOV–tolled express lane project. The projected 500 toll payer usage during peak hours turned out to be 1,400, and the summer months produced extraordinary participation. CTE was forecasting $800,000 in revenue in the first year of operation of the I-25 operation, and more than $1.8 million had been collected to date.

Table 9-3. The I-25 Congestion Toll Rate Schedule

Time	*Cost*
3:00–5:00 A.M.	$0.50
5:00–6:00 A.M.	$0.50
6:00–6:45 A.M.	$1.75
6:45–7:15 A.M.	$2.75
7:15–8:15 A.M.	$3.25
8:15–8:45 A.M.	$2.75
8:45–10:00 A.M.	$1.25
10:00 A.M.–Noon	$0
Noon–3:00 P.M.	$0.50
3:00–3:30 P.M.	$1.50
3;30–4:30 P.M.	$2.00
4;30–6:00 P.M.	$3.25
6:00–7:00 P.M	$1.50
7:00 P.M.–3:00 A.M.	$0.50

Source: Colorado Department of Transportation.

Toll revenues collected would cover operations, snow removal, and maintenance and would create a reserve for eventual reconstruction, a total cost of $2 million.

Catlin considered the I-25 concept something other state agencies might want to consider. "By thinking about the issues in a new manner, we took an asset we already had, developed it in a different way, and created an additional source of revenue without raising taxes. Instead of building out, we focused our resources inward and built better."

Colorado's PPP Legislation

The Federal Highway Administration reviewed PPP legislation in Colorado and pointed out the following responsibilities and obligations of CTE:

1. CTE can receive solicited and unsolicited proposals for PPP projects.
2. CDOT can grant a public benefit, which includes a payment for services or any other benefit specifically authorized by law.
3. Rate setting can be proposed by the private entity, but it is subject to agreement with CTE.
4. CTE cannot convert an existing free road to a toll road except for the conversion of HOV lanes to HOT lanes.
5. The authority to enter into PPP is restricted to Colorado DOT and CTE.
6. Revenues from PPP projects are to be deposited in the state highway supplementary fund and used for transportation projects. However, CTE does not have to comply with that ruling.
7. CTE is exempt from the state's general procurement code.
8. CTE has the authority to issue toll revenue bonds and notes.

E-470 and the Northwest Parkway Concession Agreement

The need for a beltway around the greater Denver metropolitan area generated the concept for E-470, which would be an extension of the existing C-470 south of the city. The ensuing E-470 Public Highway Authority caused legislation to be enacted giving to the authority the power to plan, design, finance, build, and operate this new toll road. Financed with a series of bond issues that paralleled the four segments of roadway that in the end cost $1.213 billion, the E-470 was a success from its opening day on June 1, 1991. It operated as a four-lane highway, with portions expanded to six lanes in 2003. Future widening had been planned to accommodate mass transit and/or HOV and HOT lanes. Toll revenues grew from $275,000 in 1991 to $100 million in 2006. To further the loop around the greater Denver metropolitan area, a northwest extension had to be constructed: the Northwest Parkway.

Like so many other highway projects, economic development follows their completion. By midsummer 1997, more than $1.3 billion worth of new projects were announced along this corridor, including 8,000 new homes, several hotels, three golf courses, and various industrial and office buildings.

The Northwest Parkway Segment

The Northwest Parkway opened in November 2003 and was an 11-mi (17.6-km) toll road that connected E-470 and I-25 at 157th Street, west and south to 96th Street. When completed, this became a privately financed toll road funded by $386 million in bonds; the final cost of the highway project was about $415 million. Actual revenue did not meet expectations when the toll road opened and revenue continued to remain at low levels.

In late 2006, the Northwest Parkway Public Highway Authority attempted unsuccessfully to refinance the project to stretch out the debt. The authority decided to solicit interest in the highway from private concessionaires, and in October 2006, they received responses from 11 concessionaires.

The team of Brisa Auto-Estradas de Portugal and Companhia de Concessões Rodoviárias (CCR) was successful in obtaining a 99-year lease on the Northwest Parkway in consideration of a payment of $603 million. This payment would allow the authority to retire all outstanding bonds, pay all preexisting obligations, and transfer all other financial and operational responsibility associated with the toll-road operations to Brisa and CCR.

Brisa, founded in 1972, is the largest motorway operator in its native Portugal, where it operates 11 motorways. Brisa is capitalized at 4 billion euros (approximately US$6 billion) and has an interest in Abertis, the Spanish concessionaire, and also their CCR partner in this project. CCR started in business in 1998 and today is Brazil's largest toll-road operator, with six concession agreements, managing a highway system with a total distance of 907 mi (1,452 km).

In May 2009, Brisa bought out CCR's 10% interest in the Northwest Parkway project, making it the sole owner, and they will continue to operate this 11-mi (6.6-km) highway. The economic slowdown of 2008–2009 has been felt by toll-road operators and many concessionaires worldwide, and Brisa is no exception. At the time of the buyout, they had experienced a 10% slowdown in the toll roads they own and operate in Portugal, thereby reducing their first quarter 2009 revenues by 8.5% when compared with the same period in 2008.

The State of CTE

The Colorado Tolling Enterprise annual report dated Jan. 15, 2009, indicated that in fiscal year 2008, $4.73 million in revenue was paid back to the Transportation Commission. Under way as of January 2009 were development requests for a public–private partnership proposal for U.S. Route 36 and one in Colorado Springs. The process was expected to take six months to develop, and CTE would be working with local partners to develop a request for proposal.

Colorado Rail Relocation Implementation Study

The Colorado Front Range is the area east of the foothills of the Front Range of the Rocky Mountains; it contains some of the state's largest cities: Fort Collins,

Boulder, the Denver–Aurora metro area, and Colorado Springs, to name a few. As this area has grown, much discussion has been raised about relocating the through-train traffic away from some of these communities, while still maintaining local rail traffic. CDOT initiated a public benefits and costs study in 2005 to identify the benefits to the public and the costs for the proposed project. That study suggested that there would be enough public benefit to justify those rail infrastructure improvements and that further investigation should pursue a public–private partnership. This study has been named the Rail Relocations for Colorado Communities (or R2C2) Study, and it has been under way for several years.

Growth of the Front Range

By the year 2030, population in the Denver metropolitan area has been projected to increase from its 2007 count of 2.46 million to 3.2 million people. The Federal Highway Administration and the Colorado Department of Transportation were looking at long-range solutions to their transportation needs, including moving freight rail through-traffic from its existing location along the Front Range to new lines east of Interstate 70, where there was sparse population. The Front Range rail lines could then be used for commuter rail, with the potential to accept a high-speed line at some future date.

The Benefits Accruing to R2C2

The study team included representatives from CDOT; their consultant Parsons Brinckerhoff; CRL Associates, a public outreach team; and PB Strategic, which works on funding and assistance with financial benefits and cost analysis. An executive oversight committee included representatives from the Union Pacific and BNSF railroads. The study identified the following benefits:

- an increase in rail efficiency costs and avoidance of new capital costs for any new grade crossings;
- reduction in the number of rail-related vehicle accidents;
- reduction in delays at rail crossings;
- increased economic development in western and eastern Colorado and along the Front Range;
- improved air quality and property values because of noise reduction;
- capital cost savings for any new passenger rail lines; and
- isolation of hazardous shipments from passing through major metropolitan areas.

In April 2008, the Rocky Mountain Rail Authority began its own $1.2 million feasibility study to assess the cost of a future commuter rail line. According to a June 30, 2008, article in the Douglas County *News-Press*, representatives of five railroads came to CDOT expressing interest in some form of public–private partnership.

Tamela Lang of CDOT updated the following information on R2C2 in July 2008:

- The first round of open houses was completed, and a second round would be scheduled in the near future.
- The cost and benefit estimates based on any assumptions or revisions to the public benefits and cost study completed in 2005 would be revisited.
- The steps to be carried out to form a public–private partnership would be determined.
- A matrix of funding alternatives would be established, and potential sources of funding would be investigated.
- A determination of how costs can be shared based on benefits and related factors would be pursued.
- Strategies for carrying out the necessary environmental clearances would be determined.

Ms. Lang said that CDOT was in the process of completing their modeling efforts, updating the benefits and costs, and looking at what type of funding and financing could be made available.

The High-Speed Rail Feasibility Study

In February 2010, Transportation Economics & Management Systems, Inc., of Frederick, Maryland, in association with Quandel Consultants LLC, a rail and transit consultant with offices in Illinois, Pennsylvania, and Ohio, produced their *High-Speed Rail Feasibility Study* business plan, conducted with financial and technical support from CDOT over a period of 18 months. In March 2010, they issued their executive summary. The full report runs to more than 350 pages and can be accessed in full at www.infrastructureUSA.org/colorado-high-speed-rail-feasibility-study. The study looked at a full range of options to determine whether high-speed rail was feasible in Colorado's I-70 and I-25 corridors, two corridors that play a significant role in the state's commercial and recreational centers.

The conclusion, as expressed in the executive summary, states that high-speed rail in these corridors can provide an efficient and cost-effective means of connecting Colorado's commercial centers with one another, along with the national and international destinations served by the state's airports.

The costs to implement these high-speed rail systems were estimated as between $16 and $21 billion, but the advantages could far outweigh the costs, possibly bringing in as much as $33 billion in benefits to the state. Could this be a candidate for PPP since PPP was tapped to build and operate the Denver commuter rail project?

Denver's Eagle P3 Project

On June 15, 2010, the Regional Transportation District (RTD), the transit authority for the Denver metropolitan area, awarded Denver Transit Partners, a part-

nership among Fluor Enterprises Inc.; Denver Rail (Eagle) Holdings, Inc., and Uberior Infrastructure Investments (No. 4) USA, a $2.1 billion portion of Denver's 122-mi (197-km) transit rail system, a 30-year concession project referred to as Eagle P3.

The concession agreement calls for the partnership to design, construct, finance, operate, and maintain the project, which includes a new 22.8-mi (36.7-km) east corridor, an 11.2-mi (18-km) gold line electric commuter rail corridor, a 5.2-mi (8.4-km) northwest electrified segment, and a new maintenance facility, all part of RTD's $6.9 billion FasTrack transit program. Denver Transit Partners' groundbreaking took place on Aug. 26, 2010.

Aaron Epstein, chief financial officer of Denver Transit Partners, stated that return on investment would be obtained via availability payments. These service payments will be based on operating performance and availability of the project and will not be dependent on ridership levels or fare collections. The service payments are calculated based on a fixed base monthly amount for each of the commuter rail services, adjusted for availability factor, performance deductions, and special events adjustments.

The Regional Transportation District will be issuing tax-exempt private activity bonds Series 2010 as follows:

$62,490,000: 6.50% Series 2010 term bonds, due Jan. 15, 2030
$79,970,000: 6.00% Series 2010 term bonds, due Jan. 15, 2034
$175,050,000: 6.00% Series 2010 term bonds, due Jan. 15, 2041

The Prairie Falcon Parkway

Some projects initiated by visionaries in the private sector pique the public interest for a time, but the interest of both the public and their public agencies wanes if that project lingers in limbo for a considerable period of time. The Prairie Falcon Parkway is one of those projects.

Formerly known as the Front Range Toll Road, the Prairie Falcon Parkway was an ambitious public–private partnership plan to create a 210-mi (336-km) long multimodal private toll road linking seven Colorado counties. Originally planned by its private developer as a 12-mi (19-km) wide corridor, it quickly assumed the name of Super Slab.

A revised proposal narrowed the corridor to 3 mi (4.8 km), and some local elected officials wished to have it reduced even further to 1,200 ft (366 m). The project presented two potential roadblocks: an extensive environmental review process and the procedures needed to acquire land from private owners.

The Private Developer

The Prairie Falcon Parkway was conceived about 20 years ago by developer Ray Wells. Two corporations formed in 2004 had been established to pursue his vision of a cross-county corridor: Front Range Toll Road Ltd., and Front Range Toll

Road Management, LLC, together doing business as the Prairie Falcon Parkway Express Company, PTR.

Wells was quoted in the *Denver Business Journal* in August 2006 stating that the project was about connecting communities, preserving habitat, and strengthening commerce on Colorado's short-grass prairie. It was intended to reduce traffic along the I-25 highway; decrease rail traffic through Colorado Springs, Denver, and other municipalities; strengthen economic development opportunities along the corridor; and preserve open space and wildlife habitat.

The proposed start of the parkway was about 14 mi (22.4 km) north of Fort Collins and was to end about 8 mi (12.8 km) south of Pueblo; the route was 25 mi (40 km) east of and roughly parallel to Interstate 25.

On Aug. 28, 2006, an official property owner notice went out from the Prairie Falcon Parkway Express Company, which must have shaken a number of residents within this proposed 3-mi (4.8-km) wide corridor. It quoted Colorado's revised statutes, Title 7, Article 45, as amended by the Colorado legislature in House Bill 06-1003 and advised property owners in the area of the project that the Front Range Toll Road Company, PTR, doing business as the Prairie Falcon Parkway Express Company, PTR, recently filed private toll road (PTR) formation documents with the Colorado secretary of state's office.

The notice to acquire private property stated that county assessor records showed that the recipient owned real property within the 3-mi (4.8-km) wide, 210-mi (336-km) long corridor that was being considered for a private toll road. The notice stated that under Colorado law, Prairie Falcon Parkway Express Company was notifying the property owner that their property was within this proposed corridor.

The notice also stated that a multimodal transportation project was contemplated, and under Colorado law a public process was in place to review the project, and that an extensive environmental survey and analysis were also required by law. Also, the Prairie Falcon Express Company did not have the power to condemn private property, which can only occur through the Colorado Department of Transportation, a statement that was probably little salve to the thousands receiving this notice.

Needless to say, several blogs sprouted up overnight, saying, "They'll confiscate my land by eminent domain, whatever that is, over my dead body." "You come try to steal my land and you will find out why we believe in the Second Amendment," another person wrote. A blogger said, "I get e-mail from little old ladies who just went out and bought shotguns. Some of what I'm hearing from them is unprintable."

The Prairie Falcon Parkway Fades Away

At a Colorado House Committee on Transportation and Energy meeting on March 4, 2008, relating to HB 08-1343, which amends sections of the state law pertaining to the public process for the construction of private toll roads, one rep-

resentative of the Prairie Falcon Parkway Express group expressed his concern over the problems the company faces as the state law on private toll roads changes from year to year.

As of June 29, 2008, the Prairie Falcon Parkway was still listed on CDOT's website, under "other" projects, but a regular meeting of the Elbert County Planning Commission on Aug. 14, 2008, made reference to the project, which remained on their agenda.

Some public concerns were voiced, mentioning that the Prairie Falcon Parkway remaining in the commission's plan lends a certain degree of legitimacy to investors and results in free advertising for the project. The commission agreed that the Prairie Falcon Parkway plan should be stricken from their plan.

The Corridors of the Future Program

The U.S. Department of Transportation, under Secretary Mary Peters, introduced a program to develop multistate corridors to reduce traffic congestion across the nation and improve the efficiency of freight delivery. A year-long competition ended in September 2007 after the department received 38 applications from both the public and the private sectors. The concepts presented included building new roads; adding lanes to existing ones; building truck-only lanes (referred to as TOLs); and integrating real-time traffic technology for lane management. The state of Colorado would have a stake in the Corridors of the Future program since one road would pass through their state.

Six interstate routes were selected from 14 proposals located in the following eight major transportation corridors to be the first to participate in this new federal initiative. First the semifinalists:

1. I-95 between Florida and Maine;
2. I-15 in southern California and Nevada;
3. I-80/94 and I-090 linking Illinois, Indiana, and Michigan;
4. I-5 in California, Washington, and Oregon;
5. I-70 from Missouri to Ohio;
6. I-69 from Texas to Michigan;
7. I-80 in Nevada and California; and
8. I-10 from California to Florida.

The six interstate routes reaching the finals in September were the following:

1. I-95 from Florida to the Canadian border (to receive $21.8 million);
2. I-70 in Missouri, Illinois, Indiana, and Ohio (to receive $5 million);
3. I-15 in Arizona, Utah, Nevada, and California (to receive $15 million);
4. I-5 in California, Oregon, and Washington (to receive $15 million);
5. I-10 from California to Florida (to receive $8.6 million); and
6. I-69 from Texas to Michigan (to receive $800,000).

A U.S. Department of Transportation performance report (http://www.dot.gov/par/2008/GCSG.htm) revealed that six agreements had been signed in 2008 directed toward I-5, I-10, I-15, I-69, I-70, and I-95. U.S. DOT indicated that they will continue to provide assistance in advancing the corridor concept and priorities identified by the Corridors of the Future Program (CFP) coalitions. They will also outline the anticipated role of the private sector and how partners will handle financing, planning, design, construction, and maintenance of their respective corridors.

The extent and complexity of the Corridors of the Future program is significant enough to warrant a separate chapter, and the one that follows does just that.

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CHAPTER 10

The Corridors of the Future

Within the past several decades, the U.S. Department of Transportation has become increasingly concerned with traffic congestion countrywide. We've all experienced frustration on congested highways, and the impact is much greater than that of just being late for a business appointment or having the kids wait outside school in the cold. The economic and environmental issues relating to highway congestion are at the heart of some of this country's core concerns:

- How do we reduce our dependency on foreign oil?
- How do we remain competitive in a global economy?
- How do we protect the environment?
- How do we grow the economy?

The Shift from Passenger to Freight Concerns

During the post–World War II era, our transportation system appeared to focus on moving people as our interstate highway system expanded under the Eisenhower administration, bringing with it the rush to suburbia, expanding and connecting smaller urban areas into megalopoli, and creating a more mobile society. As globalization developed in the latter half of the 20th century, it brought the United States into a new environment, and the movement of freight connected with America's growing imports and exports took on new importance.

Between 1960 and 1999, U.S. exports and imports grew from 9% of gross domestic product (GDP) to 24% and were forecast to reach 37% of GDP by 2025. Much of this trade involved NAFTA, Japan, China, Germany, and Great Britain. Among just our NAFTA trading partners, our trade with Canada increased 67% between 1994 and 2000 and our trade with Mexico increased approximately 240% during that same period.

Concerns about the environment, the increasing cost of foreign oil, congestion, and safety had to share the spotlight with national security after Sept. 11, 2001. Understanding and improving the security and flow of goods in and out of the country became a high priority in both public and private sectors, along with

retaining our competitiveness in the global market. Numerous studies began to uncover some weaknesses in our transportation system. There arose an immediate need to upgrade our highways and railways to meet the coming challenges and to do so under severe budget restraints on both a federal and state level. The word *intermodal* crept into our vocabulary.

According to the U.S. Department of Transportation, the transportation system in this country moved 53 million tons of freight, worth $36 billion, each day in 2002, and they forecast that this tonnage will double by 2035, with international shipments growing faster than domestic shipments.

U.S. DOT (2010) revealed that after declines in freight traffic during 2008 and 2009, preliminary estimates indicate that 2010 indicated a return to growth, and projections show that tonnage will increase by 1.6% per year, reaching 27.1 billion tons by 2040, representing a 61% increase.

Trucks are the dominant method of moving freight for distances less than 500 mi (810 km). Intermodal (rail, truck, and ship) goods movement accounted for 18% of freight transported in 2007 and is forecast to grow by almost 27% by 2040.

The American Trucking Associations (ATA 2008) stated that the trucking industry hauled 69% of the total volume of freight transported in the United States in 2006. This amount equated to 10.7 billion tons, totaling $645.6 billion in revenue and representing 83.8% of the entire nation's freight bill. The trucking industry employs 8.7 million people and owns 26 million trucks, of which 2.9 million are operated by 750,000 interstate motor carriers. The nation's truck fleet consumed 52.8 billion gal. of fuel and spent $111 billion on diesel fuel in 2007. Commercial trucks paid $35.2 billion in federal and state highway user taxes in 2005.

The Strategies to Improve Our Transportation Productivity and Security

The Federal Highway Administration's Office of Freight Management and Operations is responsible for promoting cost-effective infrastructure to enhance the efficient movement of freight. They run four programs for that purpose:

1. Projects of National and Regional Significance,
2. the National Corridor Infrastructure Improvement Program,
3. the Freight Intermodal Distribution Pilot Grant Program, and
4. the Truck Parking Facilities program.

That agency focused on international gateways and their gateway communities to improve throughput, ensure national security, and mitigate congestion and its impact on affected communities.

Cambridge Systematics, Inc., conducted a study (2007), in which it was estimated that $148 billion (2007 dollars) over the next 28 years for rail infrastructure expansion would be needed to meet the U.S. Department of Transportation's demand forecast; $135 billion for Class 1 freight railroads and $13 billion

for the short-line, regional railroads. Without moving this program forward, by 2035, the Association of American Railroads estimated that 30% of all rail miles in the country's primary corridors would be operating above capacity, and that situation would potentially shift more freight movement onto an already stressed highway system.

Focusing on these gateway and corridor programs was a way to balance the load between rail and truck movement and involve federal-aid programs and public–private partnerships to come up with innovative ways to cope with these future demands. The U.S. Department of Transportation pointed to the Alameda Corridor project in California as one successful pilot program.

The Alameda Corridor

The Alameda Corridor is a 20-mi (32-km) long rail expressway linking the port of Long Beach and Los Angeles to a transcontinental rail network near downtown Los Angeles. The corridor relies on grade separation to promote safety and minimize truck drayage and traffic conflicts around the port. This port complex is the busiest in the United States and the fifth busiest port complex in the world. The corridor encompasses a series of bridges, underpasses, and overpasses, including the Mid-Corridor Trench, a 10-mi (16-km) long open trench, 33 ft (10 m) deep and 50 ft (15 m) wide, running between State Road 91 in Carson to near 25th Street outside downtown Los Angeles.

This trench allows freight trains operated by BNSF Railway and the Union Pacific Railroad to travel through Alameda Street without disturbing traffic and to return to street level at its southern end. As of April 2008, 100,000 trains had passed through this high-speed expressway, mostly carrying containerized freight. This trench was a $2.4 billion project funded through public and private sources, including user fees paid by the railroads to retire debt.

Intermodal Shipping Units

The first ship designed to handle containerized freight was built in Denmark in 1951. Fully 90% of all nonbulk cargo worldwide is shipped in containers, and the ships carrying them were designed around containers that measured 20 ft (6.1 m) long by 8 ft (2.4 m) wide so that there was no wasted space. This standard size is referred to as one TEU (20-foot-truck equivalent unit). Since 1951, larger ships have been built in other countries. Today, the largest container ship can carry 15,000 containers. However a 22,000-TEU ship is on the drawing board. A container ship carrying 15,000 TEUs is equivalent to a 100-car, double-stacked intermodal freight train.

Although there are a number of other container sizes, ranging from 20 ft (6.1 m) to 53 ft (16 m) long, the most popular size is the 40-ft (12-m) long container, which is referred to as a 2TEU. Most of the containers shipped around the world today are 2TEUs.

TEUs Shipped through the Alameda Corridor

Initially, $15 was charged the railroads for each loaded TEU, $4 for all empty TEUs, and $8 for other types of cargo, such as loaded trailers. As of April 2005, the Alameda Corridor Transportation Authority stated that by their third anniversary, they had collected $173 million in revenue from a total of 45,000 trains, with 5 million containers passing through the corridor. The environmental results were also impressive: There was a reduction of 49 tons of nitrogen oxide (NO_x) and particulate matter pollutants as a result of train versus truck traffic. On Jan. 1, 2009, the rates charged to rail users for loaded TEUs, empty TEUs, and other types of cargo increased to $19.31, $4.89, and $9.77, respectively.

As of September 2010, the corridor's daily train counts were 42.6; revenue was $7.8 million, and the daily TEU count was 12,576. The basic financial statements, as submitted by the Alameda Corridor Transportation Authority, reflect that assets exceeded liabilities as of June 30, 2010, and June 30, 2009, by $123,854,033 and $182,136,459, respectively. Of this amount, $409,705,122 and $395,343,921, respectively, were invested in the authority's capital assets, net of related debt. The authority's total revenues and remaining bond proceeds on hand were sufficient to cover debt service payments for the year.

Community Benefits

The community program run in conjunction with the Alameda Corridor construction project provided job training for 1,281 local residents. Thirty percent of all labor hours expended during the Mid-Corridor Trench portion were performed by local residents and minority- and women-owned businesses that competed for contracts worth $285 million.

The Alameda Corridor, completed in 2002, not only created a more efficient flow of rail freight; reduced traffic congestion by eliminating at-grade crossings; cut train idling and auto and truck emissions; lowered noise pollution; and built several community beautification projects; but it also illustrated what government leadership and private participation can produce when they put their heads together.

The Corridors of the Future Program

The Corridors of the Future Program (CFP) was launched by the U.S. Department of Transportation on Sept. 10, 2007. It was designed to accelerate the development of multistate transportation corridors for one or more transportation modes, i.e., intermodal. To accomplish this goal, the federal government encouraged states to work together and invite private partners to participate in their programs. This program commenced by selecting six major transportation corridors in need of investment, from 38 applications received.

CFP Funding

The CFP does not have its own funding source. However, grants are provided to the program from various other U.S. Department of Transportation discretionary grant programs.

- The I-95 Corridor Coalition serves the Northeast, Mid-Atlantic, and Southeast and will receive $21.8 million in interstate maintenance discretionary (IMD) funds to implement their plan for extending I-95 from Florida to the Canadian border. The I-95 Corridor Coalition will also receive $800,000 from the Transportation, Community, and System Preservation (TCSP) fund for the North Carolina Interstate Congestion Detection System program.
- The I-70 Corridor will receive $5 million: $3 million in TCSP funds for its lanes that are dedicated to trucks from Missouri to Ohio and $2 million in IMD funds for supplemental environmental work in Missouri to evaluate the impact of dedicated truck lanes.
- The I-15 Corridor will receive $15 million: $5 million under the Highways for LIFE (dedicated to long-lasting, innovative, and fast construction of efficient and safe highway infrastructure) program for pavement rehabilitation near Ontario in Riverside County, California, and $10 million under the Public Lands Highway (PLH) discretionary program for the I-15/Interstate 215 North to Apex Interchange in Nevada.
- The I-5 Corridor will receive $15 million in IMD funds for the Columbia River Bridge Crossing project between Oregon and Washington state.
- The I-10 Freight Corridor will receive $8.6 million, of which $4 million will come from IMD funds to widen I-10 in Arizona from I-8 to the Gila River Indian Community. The additional $4.6 million will be supplied under the Delta Regional Transportation Development program for the widening of I-10 in Louisiana from I-12 to Louisiana 3246.
- The I-69 Corridor will receive $800,000 from the TCSP fund for an innovative financing study.

Edward Strocko, administrator of the Federal Highway Administration (FHWA), advised me on Feb. 24, 2009, that U.S. DOT had signed four corridor development agreements:

- the I-95 Corridor Coalition,
- the I-95 agreement for five-state coverage,
- the I-70 agreement for four-state coverage, and
- the I-5 agreement for three-state coverage.

The Objectives of the Corridors of the Future Program

As stated in the U.S. Department of Transportation request for application, the primary objectives of this CFP program will be administered in a two-phase process to accomplish the following:

- promote innovative national and regional approaches to congestion mitigation,
- address major transportation investment needs,
- illustrate the benefits of alternative financial models that invite private-sector capital,
- promote a more efficient environmental review and project development process,
- develop corridors that will increase freight system reliability and enhance the quality of life for U.S. citizens, and
- demonstrate the viability of a transportation investment model based on sound economics and market principles.

The Two-Stage Approach

The first phase requires a state or states or a private entity interested in pursuing the CFP to submit a proposal to the U.S. DOT describing the corridor, including its purpose, location, preliminary design features, rough estimates of capital cost, proposed delivery schedule, financing mechanisms, and traffic trends. Information regarding the status of agreement among the states included in the corridor is to be included and, if the applicant is a private entity, an indication that consultation with the relevant state agencies has taken place. The proposal can include new capacity development or upgrades and extensions to existing capacity and whether plans anticipate crossing any federal or Indian lands or involve two or more states.

If the proposal is accepted in the final competition, the applicant will be invited to submit a corridor proposal. Phase II of the application would address these issues:

- First, they will give a physical description of the project, including a map detailing the corridor.
- The applicant is to address existing congestion or future congestion in any transportation mode or modes. For each mode included in the application, the applicant should describe where and how the corridor would reduce current congestion levels or address future expected congestion based on projected travel trends and demographic changes in that proposed corridor. The congestion reduction discussion is to include all relevant data related to the proposed congestion relief. The application should describe how the corridor would provide increased mobility of people and freight.
- The applicant is to describe how the corridor would provide increased mobility, whether the corridor is an existing one or a new one, what transportation technologies would be used to reduce congestion and enhance mobility. Examples of mobility improvements include the use of intelligent transportation systems, traffic condition monitoring, computerized traffic-control systems, traveler information systems, electronic toll collection, or open-road tolling.
- The corridor should support U.S. economic growth, and the applicant should provide an estimate of the percentage of the overall corridor traffic that is likely to be freight traffic.

- Proposers are to state what the benefits of the proposed corridor will be, which can include reduced travel time, increased safety, faster and more convenient access to intermodal rail facilities or port terminals, faster and more convenient access to terminals for commercial vehicles, environmental benefits, truck-only lanes, and potentially increased travel speeds.
- Any innovative financing features are to be included, along with assumed eligibility for credit assistance under the Transportation Infrastructure Finance and Innovation Act (TIFIA) and private activity bonds.
- The applicant should describe any proposed innovative methods for completing the environmental review process and exceptional methods to be taken to mitigate air, noise, or water impacts or impacts to environmental or cultural resources.
- The private sector's likely role is to be included and can be long-term concession agreements, design–build–operate–maintain contracts, design–build–finance–operate contracts, build–own–operate contracts, or design–build contracts.
- The applicant should define the time line for development phase activities, construction and/or reconstruction, and acquisition of real property activities.

The CFP development agreement includes several expediting procedures:

- a request to be added to the Secretary of Transportation's list of high-priority infrastructure projects under Executive Order 13274;
- accelerated review and conditional approval of experimental features under the FHWA SEP-15 process, which is designed to speed up this process;
- an expedited commitment process for TIFIA credit assistance;
- conditional approval for private activity bonds;
- high priority for tolling programs;
- access to DOT experts; and
- help with identifying other discretionary funding sources.

Interested parties could contact the Federal Highway Administration's website: http://www.corridors.dot.gov or e-mail corridorsofthefuture@dot.gov.

The Effect of Freight Movement by Truck

The intrastate and interstate movement of commercial freight by truck has a significant impact on our economy and the environment, and this fact has not gone unnoticed by the Department of Transportation. The U.S. DOT conducted an in-depth study of current federal truck sizes and weights in August 2000, the first such study since 1981. Past studies revealed the adverse impact of increasing truck size and weight limits, which included added infrastructure costs, financial impacts on competing railroads, disruption to traffic flow, and adverse impact on safety.

This study, rather than presenting clear solutions, only highlighted the diversity of opinions among various states, the trucking industry, and other interested

parties. The question seemed to be, "Are the current federal 80,000 gross vehicle weight (GVW) limits for five- and six-axle tractor-trailers appropriate or should they be raised?" Although these limits are placed on interstate highways, there are myriad state and local regulations, grandfathered rights, and special permits that allow truckers to deviate from the federal limits.

The Interstate 95 Corridor

The I-95 Corridor connects 16 states from Maine to Florida and two Canadian provinces. This corridor encompasses a $4.5 trillion economy, representing 40% of the U.S. gross national product while covering only 10% of the country's land mass. This corridor contains 37% of the U.S. population and 33% of the nation's jobs and is responsible for 565 million long-distance passenger trips and 5.3 billion tons of freight movement annually.

The I-95 Corridor Coalition

The initial I-95 Corridor Coalition, established in 1992, included only 12 states—from Maine to Virginia—but this number was updated, and as of 2006 included 16 states and the District of Columbia, plus the Canadian province of New Brunswick, for a total of 1,927 mi (3,083 km) of highway. In this 16-state region there are 40,000 mi (64,000 km) of national highway systems, 22,000 mi (35,200 km) of Class 1 rail miles, 46 major seaports, and 103 commercial airports.

Along with government participation, regional planning groups, and other transportation related associations, the coalition includes Norfolk Southern, CSX Transportation, and Amtrak railroads, which together were the subject of the Mid-Atlantic Rail Operations Study (Cambridge Systematics 2002), a part of the corridor study.

Without any improvements, the average daily traffic in this corridor was projected to increase to 72,000 vehicles in 2002 and to 133,000 in 2035, when virtually all of the urban segments would be heavily congested and congestion in nonurban areas would increase from the current (2002) 26% to 55%.

In 2006, the coalition embarked on the Year 13 project, a follow-up on the Year 12 program, which had just been completed. The Year 12 program investigated a prototype system for multimodal passenger information for long-distance trips in rural areas; the Year 13 program would expand the technologies and institutional relationships developed in Year 12 and advance that one-state information system for use in a multistate application.

As of 2007, the coalition submitted their Phase II application, having focused on the four initiatives developed during their Phase I study:

- Make available real-time traffic information to travelers to reduce congestion and delays by posting accurate travel time information to help long-distance drivers make alternative travel decisions.

- Develop bottleneck financing solutions, including model legislation for multiple state infrastructure banks (SIBs) and public–private partnerships to implement projects that address major highway and rail bottlenecks.
- Expedite incident clearance by adopting quick clearance management practices to reduce congestion and increase safety by clearing accidents more quickly.
- Integrate intercity air, bus, rail, and local transit systems to reduce congestion by making it easier for travelers to combine long-distance air and rail trips with local transit trips.

The Coalition Progresses

The I-95 Corridor Coalition's next annual meeting took place in Orlando, Florida, in May 2008. The keynote speaker, George Schoener, the executive director of the I-95 Corridor Coalition, presented a strategic vision for the coalition, emphasizing some of their objectives to include the following:

- to forecast long-term (30-year) demand related to the movement of passengers and freight in the coalition across all modes;
- to analyze the implementation issues and related costs and benefits associated with scenarios of capacity and operational improvements; and
- to analyze a range of policy issues associated with management and investment strategies, with particular focus on financing and institutional issues.

Mike Meyer, the director of Georgia Tech's Georgia Transportation Institute, discussed the theme of his coordinated incident management program, stating that congestion remained one of the most important issues facing the states and that there was no single solution but rather a package of strategies and initiatives to foster creativity. He suggested the following:

- Enhance capacity by targeting bottleneck points, providing integrated corridor management strategies and a systemwide intelligent transportation system program.
- Look to multimodal transportation investments and improved freight capacity.

The Coalition Continues to Move Forward

On Jan. 16, 2009, the U.S. Department of Transportation's Office of Public Affairs announced the signing of an agreement with Virginia, North and South Carolina, Florida, and Georgia, committing the states to the reconstruction and expansion of a 1,054-mi (1,707-km) stretch of the 1,917-mi (3,105-km) stretch of I-95 to accommodate future demand and increase safety and reliability. The benefits of the agreement include priority access to the department's credit assistance and tolling programs.

I-95 Coalition (2010), a press release, announced its "Vehicle Probe Project" to provide real-time traffic speeds and travel time information for more than 5,000 mi (8,100 km) of roads along the I-95 corridor. This project is a public–private venture between the coalition, the University of Maryland, and INRIX, a provider of traffic and driver services headquartered in Kirkland, Washington.

The objective of this program was to create a seamless traffic monitoring system that would do the following:

1. Calculate travel times and post them on highway message boards.
2. Use real-time data to calculate performance measures and travel time reliability, particularly in congestion-prone areas.
3. Allow coalition members to use the project-monitoring site to observe traffic patterns within its boundaries and across state lines to anticipate incidents and congestion.
4. Produce a long-distance planner that can be accessed, along with variable message signs at airport kiosks, welcome centers along the highway, and regional malls, all with the objective of advising travelers of traffic conditions on the roadways they plan to access. The initial coverage area of 1,500 centerline freeway mi (2,430 km) from New Jersey through North Carolina has been expanded to 4,700 centerline mi (7,614 km) to include North and South Carolina and parts of Florida. (Centerline miles are the actual length of a roadway in one direction. Centerline freeway miles are the actual length of freeway miles, as opposed to the length of toll-road miles.)
5. Install a 511 telephone service in North Carolina, allowing motorists to obtain estimated travel times to major interchanges. Florida has also expanded their 511 network to cover more roadways in their state.

These systems result in faster response time to identify and respond to traffic issues, such as serious accidents and weather related incidents. A side bar on an Oct. 28, 2010, I-95 Coalition press release reminds us of the problems caused by highway accidents:

- Accidents cause 25% of congestion on U.S. roads.
- Every minute a freeway lane is blocked, 4–5 minutes of additional travel time is created.
- The likelihood of a second incident increases 2.8% for each minute of blockage.

A Nov. 8, 2010, e-mail from Kristine A. O'Connor, project planning engineer for North Carolina's Department of Transportation (NCDOT), indicated that a joint application among North and South Carolina, Virginia, Georgia, and Florida in 2007 resulted in a $21 million grant to improve I-95 in those five states. NCDOT is now halfway through a two-year study to define the issues facing I-95 in North Carolina. Although North Carolina is the lead state in this five-state I-95 coalition, this study is independent of that program.

O'Connor indicated that North Carolina is conducting a financial analysis to determine the most practical and feasible solution to fund improvements to I-95 in North Carolina. Though tolling is one of the funding strategies under consideration, it is not the only one under study. NCDOT anticipates having recommendations by the fall of 2011, once the entire study is complete.

The Interstate 70 Corridor

The I-70 Corridor passes through four states, Missouri, Illinois, Indiana, and Ohio, consisting of approximately 800 mi (1,280 km), 240 mi (384 km) of which traverse urban areas. The I-70 Corridor Coalition partners are the departments of transportation from Missouri, Illinois, Indiana, and Ohio and the FHWA. The Indiana department of transportation serves as the lead.

The average daily traffic through this corridor in 2007 exceeded 45,000 vehicles; truck traffic on a daily basis is about 11,000 but exceeded 26,000 on occasion. The projected average daily traffic count by the year 2035 would exceed 100,000 vehicles and include 25,000 trucks. By the year 2035, 97% of the highway will be heavily congested, with nonurban segments increased from their current congestion levels of 16% to more than 87%.

This corridor proposal dedicates segregated truck lanes along I-70 from the I-435 beltway at the eastern part of Kansas City, Missouri, to the Ohio–West Virginia border near Wheeling, West Virginia. Four dedicated truck lanes were proposed to be added to the existing highway, two in each direction, and at least one interchange per county to allow access to those truck lanes. Truck staging areas are also planned along the route. These dedicated lanes would act as a pilot program to analyze truck lengths and weights on a roadway built for truck-only lanes (TOLs). The lanes are viewed as a way to reduce congestion on the general traffic lanes, increase safety, and offset the maintenance costs required for heavy truck travel.

Phase II of the I-70 Corridor application, submitted on May 24, 2007, included a reference to a study by the California-based nonprofit Reason Foundation study, which stated that the relaxation of gross vehicle weight limits on TOLs was essential to making highways safer while improving truck productivity. An example of moving 500,000 lb of freight was inserted by the Reason Foundation to illustrate this point. Moving this tonnage would require the following:

- ten regular five-axle tractor-trailer trips,
- eight trips by a Canadian-style six-axle tractor-trailer,
- seven trips by a Rocky Mountain double,
- six trips by a Canadian B double, or
- five trips by a turnpike double.

Interest in this major cross-country interstate has not been confined solely to the pilot program. The state of Colorado had been concerned about congestion

on their portion of I-70 because it not only linked their recreation centers and most of the state's ski resorts together but also was the primary route connecting their west and east slopes. The Colorado Department of Transportation was aware that this route was the primary one for shipping goods in and through Colorado, and they looked at a plan to widen the highway.

In a May 18, 2008, article in the *Rocky Mountain News*, Kevin O'Malley, Clear Creek County Commissioner, was quoted as saying,

> This proposal will include twin tunnels east of Idaho Springs . . . curve smoothing and interchange improvements. In addition there is a commitment to do the studies needed to determine if high-speed transit is a viable option for the corridor and, if it is, to put together a funding mechanism for consideration.

The I-70 Dedicated Truck Lanes Studies

The I-70 study was divided into two parts: Phase 1, a summary of technical issues, and Phase 2, work on conceptual engineering. The milestone timetable for the entire I-70 trucks-only lane project was the following:

1. The corridor development agreement was set to be completed in December 2008 and executed in January 2009.
2. The memo of understanding was set to be completed in December 2008 and executed in 2009.
3. Requests for proposals for the feasibility study were to be posted in February 2009.
4. The consultant selection process was to take place in March 2009.
5. The consultant contract was to be signed in April and May 2009.
6. The feasibility study was to begin in June 2009.
7. Phase 1 of the feasibility study was expected to be complete in March 2010.
8. Phase 2 of the feasibility study is expected to be complete in March 2011.

The Final Report for Phase 1: The Business Case for Dedicated Truck Lanes

This report was prepared June 2010 for the Illinois, Indiana, Missouri, and Ohio departments of transportation and the Federal Highway Administration, by Wilbur Smith Associates. (The complete 77-page report can be accessed at www.i70dtl.org.) Some of the more important points raised by the study are listed below:

- I-70 Corridor traffic in 2009—Annual average daily traffic (AADT) ranged from 20,000 to 200,000 vehicles.
- Projected for 2030—AADT ranging from 30,000 to 266,000 vehicles.
- I-70 Corridor traffic congestion in 2009—184 mi (298 km) moderate to heavy congestion.
- Projected for 2030—325 mi (526 km) moderate to heavy congestion.

- I-70 Corridor traffic crashes—Trucks crash at rates three times higher in heavy congestion, and 98% of truck-related fatalities involving passenger cars are the car occupants.

The feasibility study considered the following scenarios:

1. dedicated truck lanes on existing alignments,
2. dedicated truck lanes on new alignments,
3. adding general-purpose lanes as warranted,
4. designating and improving parallel roadways,
5. dedicated truck lanes only in rural areas, and
6. creating a totally closed system with only two to five access points.

Scenarios eliminated included the following:

1. new alignment,
2. use of parallel roads,
3. roads only in rural areas, and
4. totally closed system with access at east and west termini only.

Safety Issues Addressed

By creating truck-only lanes (TOLs), the potential I-70 Corridor crash reductions projected would be significant:

- Over 15 years,
  - reduction of 100 to 150 fatalities,
  - reduction of 4,000 to 5,000 injuries,
  - reduction of 8,000 to 10,000 instances of property damage, and
  - $1 billion in savings.
- Over 40 years,
  - reduction of 130 to 180 fatalities,
  - reduction of 9,000 to 10,000 injuries,
  - reduction of 18,000 to 20,000 instances of property damage, and
  - $2 to $2.5 billion in savings.

Shippers perceived the value of TOLs in terms of increases in productivity (+74.2%), safety (+74.2%), reduced costs (+61.3%), service (+54.8%), intermodal ability (+9.7%), and driver interest (+6.5%). Some of these increases would come about because it would be possible to increase the size and/or weight being transported in these TOLs; 93% of the respondents said yes to size and/or weight increase.

The July 16, 2010, MPO update referred to the Corridors of the Future Program (CFP) as a national strategy to reduce congestion, explore innovative financing, improve the flow of goods, and enhance the quality of life. Funding had been

provided out of a $5 million discretionary grant from FHWA: $2 million to the Missouri Department of Transportation and $3 million for the I-70 Corridor Feasibility Study.

The MPO update concluded with the following cost and return projections for a 40-year period:

- Costs: Construction: $40.2 billion + maintenance and operation: $8.8 billion = $49 billion.
- Returns: Safety cost reduction: $2.5 billion, + economic impact: $32.3 billion, + cost avoidance: $32 billion = $66.8 billion without the toll option. Optional tolls would bring in $10.6 billion; thus total returns would be $77.4 billion with the toll option.

Phase 2 work began on conceptual engineering in July 2010. In October 2010, work began on evaluating traffic and potential toll revenues. In November 2010, work began on refining potential cost estimates. Projected for 2011, in February work will begin on assessing financing and funding. Work will begin on document drafting in April 2011, and final document work will be in progress in May, with final documents completed in June. So the I-70 corridor is moving in two directions, not only from the initial four states, but forward-looking Colorado also viewed this corridor as a link to their future.

The Interstate 15 Corridor

This corridor traversing California, Arizona, Nevada, and Utah is 840 mi (1,344 km) long with 220 mi (352 km) passing through urban areas. The average daily traffic through this corridor can range from a low of 56,000 to a high of 250,000. Average daily truck traffic is about 6,000 but at times can exceed 60,000. If no improvements were made, by 2035 it was anticipated that the daily traffic would exceed 150,000, which would include 27,000 trucks; by 2035, 98% of the corridor's urban segments will be heavily congested.

The plan for this project includes both passenger and freight movements from San Diego, California, at the intersection of I-6 through to Salt Lake City, Utah. In 2005, the Union Pacific Railroad opened the country's third largest rail yard just outside Salt Lake City, and both road and rail portions of the corridor were in need of improvement, which would include an intelligent transportation system, a truck parking initiative, interchange reconstruction and modifications, and road and bridge preservation projects. Various studies of the I-15 corridor have been undertaken, but they all appear to be languishing in the "study" phase, as represented by the I-15 final report.

I-15 Comprehensive Corridor Study: Final Report

On Dec. 20, 2005, *I-15 Comprehensive Corridor Study: Final Report* was published by Parsons Brinckerhoff, in association with Cambridge Systematics, Inc., the Tioga

Group, Associated Engineers, Inc., Arellano Associates, Kimley-Horn and Associates, Economics & Politics, Inc., and Counts Unlimited. The study area was confined to California and specifically from the SR-60 interchange in Mira Loma to the Mojave River crossing on the northern edge of the city of Victorville in San Bernardino County. It also incorporated other areas in Riverside County. The purpose of the study was to define this 45-mi (73-km) section of I-15 and whether it should be improved to meet current and future traffic demands.

The recommendations ranged from "no build" to HOV lanes to exclusive truck lanes to reversible managed lanes to dedicated truck lanes. The source of funding was not included in this report.

New Interest in the I-15 Corridor Study

An Aug. 23, 2010, news release from CH2M HILL, the full-service engineering and construction firm headquartered in Denver, indicated that they had been retained by the Nevada Department of Transportation to develop a "master plan for the I-15 corridor and its systemic connectors between Southern California and Northern Utah." The plan is to encompass the 840-mi (1,361-km) route and incorporate a multimodal transportation system. The overall objective of the master plan is the following:

1. Build a unified alliance to set the national standard for cooperative regional mobility.
2. Develop an alliance-driven program vision and brand to transform how people perceive the Interstate Highway System.
3. Create a sustainable regional planning process for the I-15 corridor system that defines potential future transportation improvements.
4. Develop a master plan that is a model for superior program delivery in the United States.
5. Work with the I-15 Mobility Alliance to secure legislative funding and influence transportation policy to advance priority projects.

Nevada Works on Their Portion of the Corridor

Like other states in the I-15 Corridor, Nevada has started construction by widening portions of I-15 in their state: I-15 from the U.S. 95 interchange (sometimes called the Spaghetti Bowl) and Lake Mead Boulevard. This stretch is being widened from six lanes to ten lanes. A design–build contract, the first in the state's history, was awarded to a joint venture between Las Vegas Paving Corporation and CH2M HILL in 2007, with an anticipated completion date set for the fall of 2010. Las Vegas Paving reported that the project was completed ahead of time in December 2009, a very early completion. The widening of U.S. 395 northbound from Moana Lane to the Spaghetti Bowl should be completed by the fall of 2011. The I-15 Corridor program may have gotten a boost from a new high-speed rail program initiated by President Obama and Transportation Secretary Ray LaHood on Apr. 16, 2009.

U.S. Transportation Secretary Ray LaHood's High-Speed Rail Program

The U.S. Department of Transportation announced on Oct. 28, 2010, $2.4 billion to fill the public demand for high-speed rail. The department's Federal Railroad Administration received 132 applications from 32 states, totaling $8 billion, much more than the government has available. This is a part of the High-Speed Intercity Passenger Rail (HSIPR) Program. Some awards shown in the Oct. 28 news release were the following:

- $901 million to California, including $175 million for the construction of a new high-speed rail line in the Central Valley;
- $800 million to Florida for the Tampa to Orlando high-speed rail corridor;
- $230 million to Iowa to create a new intercity passenger rail service between Iowa City and Chicago; and
- $161 million to Michigan for a high-speed corridor connecting Detroit and Chicago.

The complete list of states and projects selected can be accessed at the U.S. Department of Transportation website: http://www.fra.dot.gov/rpd/downloads/Summary_of_FY10_Selected_Projects_1010.pdf.

The Interstate 5 Corridor

This corridor would commence in California, head north through Oregon and on to Washington state, basically linking Mexico to Canada. The regional freight and passenger rail corridor was also included in the Eugene, Oregon, to Vancouver, British Columbia, Canada, portion of the corridor. Intelligent transportation systems, alternative fuel concepts, and the Columbia River Bridge Crossing, a bridge linking Oregon to Washington, are all part of this corridor project.

The entire I-5 corridor extends 1,350 mi (2,160 km), with about 550 mi (880 km) traversing urban areas. The current average daily traffic (ADT) ranges from a minimum of 71,000 vehicles to a maximum of 300,000, with average daily truck traffic varying from 10,000 vehicles to 35,000 maximum. Sixty-five percent of the current I-5 highway is heavily congested. By 2035, it has been projected that ADT would exceed 150,000 vehicles, including 22,000 trucks and, if no improvements were made, 95% of the highway would be heavily congested.

The Columbia River Crossing

One of the major areas of congestion occurs at the Columbia River Crossing, an existing bridge joining north Portland, Oregon, with Vancouver, British Columbia. The congestion occurring at this juncture affects not only these two entities but is also of interest to the state of Washington because this bridge is considered one of the missing links in failing structures on the entire I-5 north–south freight corridor.

The Columbia River Crossing is a joint project between the Oregon Department of Transportation and the Washington State Department of Transporta-

tion, and together they have formed citizen advisory groups to ensure that the interests of involved communities are reflected in the study. The city of Vancouver, British Columbia, is also one of the sponsoring agencies.

On Aug. 18, 2009, the Oregon Transportation Commission approved spending $30 million to continue the plan for the bridge over the Columbia River. This amount is in addition to the $65 million already spent on this study.

Local Involvement in the Corridor

Local involvement was more than just window dressing, and a series of ideas were considered and dropped when subjected to public scrutiny by the Columbia River Crossing (CRC) Task Force, a 39-member panel. They met for the last time on June 18, 2008, to present and recommend alternatives that met the community's needs. The locally preferred alternative would include a new bridge to replace the existing I-5 bridge to carry vehicle traffic, light rail, pedestrians, and bicyclists across the Columbia River. There would be three through lanes and up to three other lanes to afford entrance and egress from the highway in each direction. Northbound and southbound traffic would be on separate bridges, much like the current arrangement.

A scheduled March 2009 meeting of the CRC was expected to make a final recommendation on the number of auxiliary lanes, and a light-rail workshop was also scheduled for March 10, 2009, in Vancouver.

The National Association of Environmental Professionals awarded the Columbia River Crossing plan its 2009 Environmental Excellence Award for its approach in reducing greenhouse gas emissions and climate change evaluation. Under the Corridors of the Future Program, as outlined above, $15 million would have been designated for this project under the interstate maintenance discretionary funds.

The Cascadia Center for Regional Development

The Cascadia Center for Regional Development (CCRD) is an organization based in Seattle, Washington, whose mission is to develop U.S. and Canadian cross-border issues. CCRD's (2007) position paper listed several ongoing programs that addressed environmental issues relating to the I-5 Corridor:

- Southern California biodiesel network—As of 2007, there were 16 biodiesel vendors or manufacturers within the state. More than 1,400 vehicles had been converted to run on biodiesel fuel in Los Angeles.
- I-5 alternative fuels distribution network planning—A portion of the $15 million grant from the U.S. Department of Transportation for the I-5 CFP would be used to prepare a feasibility study of a pilot program to develop an I-5 alternative fuel distribution network at highway rest areas. There were, as of 2007, 18 biodiesel filling stations in six California counties, and more than 1,400 vehicles had been converted to run on vegetable oils supplied by Love-Craft Bio-Fuels of Los Angeles.
- Oregon Department of Transportation Solar Highway—The Oregon state legislators passed a law in 2007 mandating 25% of electricity generation from

renewable energy sources by the year 2025. ODOT was seeking bids for demonstration projects to generate electrical power via installation of solar photovoltaics on state-owned property, including highway and freeway rights of way. This program is explained in Chapter 9 of this book and is continuing to be explored by Oregon.

- Hydrogen Highway—This is a voluntary network of technology-based companies and institutional partners to look at hydrogen and fuel cell technology demonstration projects in British Columbia, Canada. Several vehicles have been in operation, including five advanced prototype Ford fuel cell vehicles used in daily business operations by selected individuals in both the private and public sectors. Transit buses in Vancouver, along with eight light-duty GMC Sierra trucks, are also in the program.
- Plug-in hybrid electric vehicle development—Toyota, GM, and Ford are working to bring to market plug-in hybrid vehicles within the next few years, and infrastructure to support them is the key to their acceptance as these vehicles go on the market. Plug-in refueling stations will be needed at I-5 tourist stops, restaurants, motels, and park-and-ride facilities along the way.
- Northwest Hybrid Truck Consortium—A $250,000 grant from the U.S. Environmental Protection Agency (EPA) and a $1.5 million contribution from members of the Northwest Hybrid Truck Consortium are to be used to purchase and operate 10 hybrid-electric utility trucks that will yield about 40% fewer greenhouse gas emissions than standard utility vehicles.

Other I-5 Developments

In California, the San Diego Association of Governments is planning a 26-mi (41.6-km) managed lane facility in the north coastal section of I-5, and construction dates range from late 2007 to 2010. Los Angeles requested a feasibility study to be initiated in their 2007–2008 fiscal year to assess the potential of converting existing HOV lanes to HOT lanes and of building some new managed lanes. This program would cover the entire Los Angeles County area. Central Valley counties in California have expressed an interest in using tolls to add capacity to I-5 via new construction and to create truck-only lanes.

The Interstate 10 Freight Corridor

When the National I-10 Freight Corridor Coalition was formed in 2001, its purpose was to look at freight movement along Interstate 10 and assess the need for operational movement of freight through eight states: California, Arizona, New Mexico, Texas, Louisiana, Mississippi, Alabama, and Florida.

In the fall of 2007, the National I-10 Freight Corridor Coalition submitted a corridor application for the I-10 corridor. The application was submitted as a joint effort by the departments of transportation from the eight states in this major freight-hauling highway.

This transcontinental highway will act as a "collector" corridor, connecting some southern metropolitan areas with alternate north–south routes and serving ports, rail lines, airports, and pipelines along the way. It will pass through such major urban cities as Los Angeles, Phoenix, Tucson, El Paso, Houston, New Orleans, Biloxi, Mobile, and Jacksonville, and along the way it will traverse four Indian reservations, five national wildlife refuges, three military bases, one national forest, and some public-domain areas, making this a potentially formidable environmental study.

The Phase I Study

Wilbur Smith Associates (2003a) examined a wide variety of multimodal options to address congestion and the choke points along the corridor. The coalition members identified major capital projects throughout the corridor. Financial requirements were identified and studied for a host of congestion-relief options. Phase I of the study addressed these issues:

- assessed the importance of moving freight along the I-10 corridor and the economic impact on the region and the entire nation,
- identified current and future traffic operations and safety problems that impede freight flows along the corridor,
- identified and evaluated a variety of multimodal strategies that would enhance the efficiency of freight movement within the corridor, and
- analyzed eight freight-oriented alternatives (Table 10-1).

According to Wilbur Smith Associates (2003b), prepared for the National I-10 Freight Corridor Coalition, using 2000 as a base year, almost 400 mi (640 km) in the corridor are operating at unacceptable levels of service (LOSs).

By 2025, it has been projected that 1,500 mi (2,430 km) in the corridor will be deficient. As the LOS declines, congestion increases, travel speeds decrease, and delays become more frequent. Average truck speeds can be expected to fall by as much as 15% by 2025, and during peak travel times, as much as 37%.

We noticed, in the case of the Port of Miami Tunnel project, that the estimated hourly cost per hour, exclusive of driver's wages, ranged from $18 for a two-axle truck to $24 for a tractor-trailer, and this study seems to confirm those costs. The study stated that the loss of 227.5 million annual hours along the corridor was estimated to be $5.5 billion, equating to almost $25 per hour. The estimated delay for cars was more than 837.9 million vehicle-hours, but the value was at a much lower cost.

The Phase I Application

The I-10 Corridor Phase I application also addressed the additional lane miles needed to match the increasing travel demand and found that there are currently

Table 10-1. Analysis of Several Freight-Oriented Alternatives to Reduce Congestion in the I-10 Corridor

Scenario	*Description*
1. Widen I-10 to meet future demand	Adding enough lanes to each segment so that they operate at an acceptable level of service (LOS) was the first approach evaluated, without regard to financial, environmental, or other constraints. Once the additional roadway capacity needs were calculated, costs were determined. Although some roadway segments may never be widened, this scenario demonstrated the need for other alternatives to improve operations.
2. Intelligent transportation systems (ITS)	Using ITSs to manage traffic flow and provide information to drivers can also improve LOSs. Services were identified based on operational needs and issues and analyzed for expansion in 2008, 2013, and 2025. Potential ITS strategies included traffic management, traveler information, incident management, and commercial vehicle operations systems. Integration of state and metropolitan ITS systems across the corridor was also examined.
3. Separation	The concept of separating truck and auto traffic on highly traveled corridors is an emerging approach for improving operations and safety. In this scenario, autos and trucks travel in separate lanes along I-10. Truck and auto separation can be accomplished in several ways, including lane restrictions, constructing new lanes physically separated from existing lanes, or directing truck traffic to one highway and autos to another.
4. Multimodal rail corridor	In this scenario, freight travel in the I-10 Corridor was analyzed to determine the percent of future cargo that is truck or rail competitive, i.e., could be transported by truck or rail. The analysis evaluated the share of the truck–rail competitive trips that have characteristics suitable for intermodal service (such as trip length or time definite).
5. Maritime Intermodal	The multimodal waterway scenario evaluated the amount of freight that could be moved by barge rather than by truck for some portion of a trip. This option was explored for the Gulf Coast section of I-10 and for freight barge service along the gulf.
6. Urban truck bypass	A common strategy heard during the outreach process suggested truck-only bypass routes around major urban areas. Truck-only bypass routes could reduce congestion, improve safety, and reduce emissions in urban areas where there is sufficient truck through traffic to justify the cost.
7. Truck productivity	A policy increasing existing truck weight policies was evaluated at the federal, state, and local level. Truck size and weight policies vary from state to state, and some states allow trucks to exceed federal size and weight restrictions on state routes. Federal law prohibits most size and weight increases over existing interstate limits. Nonetheless, this issue continues to be evaluated as a possible means for improving freight productivity and traffic safety, while reducing facility maintenance costs.
8. Others	The study also evaluated other strategies, such as freight villages and changing hours of operation. Freight villages are multimodal freight facilities located on the edge of urban areas. Truck operating schedules, particularly in large urban areas, typically conform to normal business hours of intermodal facilities or end consumers. This fact often forces trucks to travel during peak traffic periods. If operating hours could be modified for receivers, it may be possible that a sufficient number of trucks could travel during off-peak hours, improving overall traffic flow.

Source: Wilbur Smith Associates 2003a.

12,167.9 mi (19,467 km) of lane existing in the corridor. An additional 995.6 mi (1,593 km) were needed in 2000, 1,819 mi (2,910 km) more were needed by 2008, and 2,568.7 mi (4,110 km) additional were required by 2013, for a total of 5,063.9 mi (8,102 km) by 2025. Of this total, 2,100 mi (3,360 km) would be in rural areas and about 2,900 mi (4,640 km) in urban areas. Several scenarios were pursued in the Phase I study (Table 10-1).

The financial plan for this I-10 Corridor required $21.3 billion but had only $8.6 billion in anticipated funding, leaving a shortfall of $12.7 billion. Partnerships of some sort, between industry and the states or between private investment groups and the coalition, will be required to move this corridor from a study to a reality. Financial tools available for the participating states are revealed in Table 10-2.

Lessons Learned from the Phase I Study Apply Equally to Other Corridors

The I-10 Phase I study brought to light information and trends that applied not only to their corridor but could also be applied to all of the other CFP under consideration in the country.

- Freight transportation is central to the performance of the U.S. economy, and the states have a major responsibility in building, maintaining, and operating the highways carrying the bulk of the nation's freight. Almost 80% of all domestic tonnage and 60% of intercity tonnage travels over state roadways.
- The nation's continued trend toward a service economy places emphasis on reliability, and worsened highway congestion and capacity impose more costs on producers, distributors, and hence the consumer.
- Intermodal and multimodal transportation systems must run efficiently to provide this country with optimum freight distribution and minimize the burden on our highways.
- Increasing the capacity of high-volume freight corridors, such as I-10, was deemed the best method to relieve congestion, based on the results of this analysis.
- Increased funding is essential and requires collaboration between the public and the private sector.
- The demands for freight transportation require state–state and/or state–federal and private sector partnerships to resolve.
- Funding needs to be concentrated on strategic gateways and corridors.

Phase II of the I-10 Study

Phase II, which built on the Phase I study, focused on the development of an initial intelligent transportation system (ITS) with the primary intent to create a corridorwide ITS architecture to bind the states together, allowing them to seek additional funding and the ability to implement the necessary improvements quickly.

Table 10-2. Financing Tools for States in the I-10 Corridor

Program	*California*	*Arizona*	*New Mexico*	*Texas*	*Louisiana*	*Mississippi*	*Alabama*	*Florida*
PPPs	Yes		Limited ability	Yes	Yes		No, but in consideration	Yes
D-B	Yes		No, and does not have legislation	Yes and active	Yes and active		No, but in consideration	Yes and active
TIFIA	Yes	No	No, but will consider	Yes	Yes	No	No, but will consider	Yes
GARVEE	Yes	Yes	Yes	Yes (Proposition 14)	No, but in consideration		Yes	Yes
Tolls	Yes		No, and no legislation	Yes	Only on bridges		No, but four private toll bridges are active	Yes
General obligation bonds	Yes		No, but use some general revenue bonds	No, but legislation is under review	Yes		Yes	Yes
State infrastructure banks	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes
Private activity bonds			No, but in consideration	Yes, and have been successful	No		No, but in consideration	No, but in consideration
Nontraditional funding	Note a		No	Pass-through tolling	Bonds		No	Yes

Note: PPP is public-private partnership; D-B is design-build.
Several other funding categories are used in various states. These categories include pass-through tolling, specialty bonds, and other categories of local financing. Many of these categories are actively in use on, and crossing, I-10 at the moment, including tolling several facilities that feed the I-10 corridor and the use of specialty bonds to pay for freight or safety improvements along the corridor.

a. California has set aside $4.5 billion for the Corridor Mobility Improvement Account and $2 billion for the Trade Corridor Improvement Fund.
Source: I-10 National Freight Corridor Coalition (2007).

A freight-focused survey was conducted by contacting more than 300 trucking companies, and the results revealed the following:

- Most common delays experienced by these truckers were due to congestion, accidents, and construction.
- About 40% of those surveyed share real-time information.
- About 50% of respondents were willing to pay for traffic information.
- Information received within the first four hours was most relevant to the truckers.
- Dynamic message signs were the preferred way to receive this highway information, but Internet and cell phone connections were also acceptable.

The existing and planned traffic management centers in the I-10 Corridor states show that many states are well on their way to creating this seamless corridorwide ITS program. The current timetable anticipates the start of the program late in 2008 and continuing through to completion in 2025. The I-10 program is progressing slowly as states deal with funding and other planning issues; it appears that the 2008 start was optimistic.

Interstate 69 Corridor

With the passage of the North American Free Trade Agreement (NAFTA) in January 1994 and the full implementation that occurred on Jan. 1, 2008, the last remaining handful of agricultural commodity issues included in the agreement were resolved. Restrictions were lifted to allow U.S. exports of corn, dry beans, dry milk, and high fructose corn syrup to Mexico and Mexican exports of sugar and certain agricultural products to the United States.

To the north, trade in U.S. agricultural products and consumer-oriented products with Canada has been growing steadily under the Canada–United States Free Trade Agreement (FTA) inaugurated in 1989, and already-low tariffs dropped to zero on Jan. 1, 2008.

The I-69 Corridor is described by FHWA as a future 2,600-mi (4,160-km) long international and interstate trade corridor extending from Mexico to Canada. The proposed corridor would be built on a new location for about 1,600 mi (2,560 km), extending through Texas, Louisiana, Arkansas, Mississippi, Tennessee, Kentucky, Indiana, and Michigan.

An existing segment from Michigan to Texas is only 360 mi (576 km) long, with 111 mi (177.6 km) running through urban areas. The road is currently divided into 32 segments, and states have varying degrees of development work in place. Texas included their portion in the Trans-Texas Corridor project, and Indiana has begun some environmental clearance work. The Louisiana Department of Transportation and Development anticipated that their record of decision would be signed in late summer or early fall of 2008. The I-69 Corridor Advisory Committee met in Austin on Dec. 6, 2010, and among the topics of discussion

were cost estimates and funding, I-69 Corridor Segment Committee (CSC) updates, and CSC tasks and next steps, so it appears that the planning and implementation stages remain in progress.

The National I-69 Corridor has been identified by Congress as a high-priority project because it now handles a large flow of goods from Texas to Michigan and the proposed changes would have the potential to shift cargo patterns from congested routes I-40, I-65, and I-81 onto this new highway system.

Arguments Pro and Con about I-69: Is It the NAFTA Superhighway?

The I-69 Corridor is not a NAFTA superhighway, as some critics claim. That idea may have originated with the announcement of the Security and Prosperity Partnership (SPP) of North America (http://www.spp.gov), a White House led initiative to seek security and enhance prosperity among the United States, Canada, and Mexico. An agreement signed by President George W. Bush and signatories from Canada and Mexico in March 2005 memorialized the cooperative efforts by all three countries to open trade and crack down on terrorism and crime. Government sources firmly stated that SPP did not include a plan to build a NAFTA superhighway but that the FHWA would continue to work with state departments of transportation as they build and upgrade highways to meet the needs of the 21st century.

Concerns Raised about These Corridors

Those opposed to the plan raised concerns about these types of multistate transportation projects as gateways for illegal immigrants. Dissidents also expressed concerns about adverse environmental impacts; conversion of agricultural and forest land to highway use; more highway blight; likely coverage of the landscape with fast food restaurants, motels, and truck stops; acceleration of the deterioration of aesthetics along the way; and loss of jobs as industries head south. And some citizens see this project as an open invitation to spend taxpayer money on pork barrel projects.

Positive Aspects

Those in favor of these types of corridor projects profess their ability to improve travel distance and times and, of course, to invite the economic development that generally follows routes surrounding or passing through major metropolitan areas. Also, the safety features incorporated into new highway design will most likely result in fewer accidents and fewer fatalities. Fuel savings and improved environmental conditions are also part of the positive side.

The Progress of I-69 and the Trans-Texas Corridor

In Texas, the draft of their I-69/TTC Tier I study was to identify the corridors that provided the best balance between meeting the project's purpose and needs

while minimizing the environmental impact. This evaluation included the following goals:

- identify which path will provide the best opportunity to avoid or minimize the potential for adverse environmental issues;
- analyze how well the highways would perform in meeting the project needs and provide improved access and enhanced mobility to the population centers it would reach and the ports and industrial destinations it would serve;
- look at the engineering considerations—earthwork, bridges, pavement base, and all other elements of construction; and
- assess input from the public and other government agencies.

The timeline for this Tier I draft environmental impact statement (DEIS) was the following:

- Fall 2007: Circulate the DEIS for public and agency review.
- Winter 2007–2008: Hold public hearings to obtain comments.
- Summer 2008: Unveil final environmental impact statement addressing those comments raised at the public hearings and circulate for public review before submission for federal approval.

Public Reaction to I-69

One dozen town meetings and 50 public hearings later, Texans wanted their department of transportation to use existing roadways wherever possible to build their state's portion of the I-69 Corridor, and on June 11, 2008, TxDOT issued a statement confirming this decision.

TxDOT said that this would make the final environmental impact statement much simpler because they would be using parts of existing U.S. highways 77 and 281 in south Texas, State Route 44 and U.S. 59 along the Coastal Bend, and U.S. highways 84 and 59 in east Texas.

TxDOT Efforts to Move the Project Forward

On June 26, 2008, TxDOT made an announcement that could hurry their portion of I-69 along. They recommended the award of a contract to Zachry American and ACS Infrastructure to develop Texas' portion of I-69 and develop the southern portion of U.S. Highway 77 to interstate standards without tolling. The development of this plan would cost no more than $5 million.

In conjunction with their design contract, Zachry/ACS proposed to work with local authorities to construct and operate about seven toll-road projects worth $1.5 billion in south Texas that could be used to generate revenue for the Highway 77 upgrades. Under Texas law SB 792, Zachry would need local government approval for these projects The TxDOT website as of November 2010 did not indicate any project status upgrades.

The Texas Department of Transportation issued their Statewide Long-Range Transportation Plan produced by their Transportation Planning and Programming Division in 2010, and the I-69 Corridor was not specifically mentioned. The public was involved via two rounds of public meetings, one in early May 2010 and the second in early August 2010, and a part of the study was devoted to intermodal transportation, which may be the basis for the rethinking of the I-69 project. The full report can be accessed at http://www.dot.state.tx.us/public_involvement/transportation_plan/report.htm.

The Interstate 81 Corridor and the I-81 Corridor Coalition

On Nov. 12, 2007, about 70 officials from six states—New York, Pennsylvania, Maryland, West Virginia, Virginia, and Tennessee—met in Carlisle, Penn., along with business leaders and transportation planners to discuss the I-81 Corridor. They represented government and nongovernment interests along this 824-mi (1,318-km) stretch of Interstate 81, and they joined together to discuss issues relating to congestion, safety, the environment, aging infrastructure, and ways to seek some solutions to their common problems. Interstate 81 had developed from a regional connector to a major route for long-distance truckers seeking an alternative to I-95 travel. Truck traffic along this route ranges from 22% to 30% on average and reaches about 37% in central Virginia.

When members met in Carlisle, Pennsylvania, they were asked to identify the three most important issues for the entire corridor. There was clear definition between the top three concerns and the next three. The top three issues were

- capacity and congestion,
- safety, and
- freight movement and a multimodal system.

The next three issues addressed the corridor's aging infrastructure, the environment, and economic development and land use. States within this corridor will proceed with their own I-81 projects.

The Coalition Brings Its Case to Congress

Ryan (2010) indicated that the coalition was lobbying Congress for $1.7 million to add staff and expand programs with its partner states along the highway. In its appeal to Congress, it noted that improvements to I-81 could significantly reduce disruptions caused by accidents, making the road more efficient for those truckers transporting billions of dollars of freight over the highway every day. Ryan (2010) said that 83% of the freight tonnage comes through the area by trucks and the value, at last report in 2003, was $1.3 trillion, according to a 2006 study by Cambridge Systematics.

The coalition meets regularly, and the most recent meeting was hosted by Maryland Nov. 15–16, 2010. The general session on the first day covered freight,

with reports from Norfolk Southern Railroad, CSX Railroad, and the trucking industry. The second day featured a report by the secretaries of transportation from New York, Pennsylvania, Maryland, West Virginia, Virginia, and Tennessee. More meetings are planned to define goals and funding issues.

New York

The only current I-81 project in New York involves the Route 11 connector to I-81 north of Watertown. This project was in the final design stage and will improve capacity for all users of transportation systems in that area, specifically Fort Drum. This highway expansion is being undertaken to comply with the U.S. Department of Defense operational needs for rapid deployment of troops, along with the day-to-day needs of personnel stationed at that army base.

Bid opening for this work has been scheduled for the summer of 2009, with construction planned to start in the fall of that year. The estimated cost has now been established by the New York Department of Transportation as $87.2 million.

On Aug. 4, 2010, the New York State Department of Transportation acting commissioner, Stanley Gee, was joined by federal, state, and local officials at a groundbreaking ceremony to mark the beginning of a $55.6 million highway project to link Interstate 81 and the main gate of Fort Drum, thereby improving the mobility along the Route 11 corridor. The project, awarded to Lancaster Development of Richmondville, N.Y., is scheduled for completion in August 2012.

Pennsylvania

A visit to the PennDOT website (www.dot.state.pa.us) reveals multiple construction projects under way on I-81, from bridge preservation projects between Exits 170 and 175, to repairing the bridge over I-81 at Route 39, to a major rehabilitation project on the I-81 George Wade Bridge over the Susquehanna River, to various milling and repaving work.

Maryland

A planning study began in Maryland in 2001 at a cost of $3.5 million and includes the Mid-Atlantic Rail Operations Study, where three railroads—CSX, Norfolk Southern, and Winchester & Western—traverse the state. Although there was no committed state or federal funding as of the third quarter of 2007, some improvements were programmed for the I-81/I-70 interchange in fiscal year 2009. In the meantime, coordination is under way with the National Park Service because of the proximity of the proposed corridor to the Chesapeake & Ohio Canal National Historical Park and some Civil War historical sites. This national park incorporates the old C&O Canal, which extends 184.5 mi (299 km) along the Potomac River.

On March 11, 2010, Maryland Governor Martin O'Malley announced that $11 million in funding will be made available for Maryland's interstate maintenance program, which will include rehabilitation and maintenance work on I-81.

West Virginia

The I-81 highway runs through West Virginia for 26 mi (41.6 km), and their Division of Highways has been replacing and widening bridges, adding new interchanges, upgrading and widening overpass bridges, widening 6.23 mi (9.9 km) to a six-lane configuration and in the process spending $56.45 million between 1999 and 2005. Other I-81 widening and roadway replacements are proposed and await funding.

The 2010 I-81 projects as reported by the West Virginia Department of Transportation included only I-81 joint cracking and sealing work and the installation of traffic signals at the Dry Run Road ramp, along with resurfacing the ramps at that location.

Virginia

The commonwealth-proposed PPP negotiations included the STAR Solution consortium (made up of 25 construction and finance companies) for extensive I-81 road and rail improvements, but this deal fell apart in early 2008 when KBR, a Halliburton subsidiary, pulled out from the group and the Virginia Department of Transportation (VDOT) decided for the time being to proceed with the construction of some truck climbing lanes as part of their total $750 million I-81 improvement package. Norfolk Southern (NS) railway continues its vested interest in the coalition's transportation plans because a majority of their track runs close to the highway in Virginia, and with a net operating revenue in 2007 of about $9.4 billion, NS would like to see some freight movement shifted from I-81 onto their tracks.

Virginia commenced constructing truck climbing lanes on I-81 in Rockbridge County on Oct. 25, 2010. The 1-81 truck climbing lane projects, valued at $74.2 million, was awarded to a contractor on Feb. 5, 2009, and the work zone is just north of Lexington.

VDOT also plans major changes to I-81 in Troutville. Thousands of trucks get off I-81 at Exit 150, causing major congestion. Plans call for creating a roundabout so instead of stopping for a traffic light, cars and trucks would merge into and out of a roundabout traffic circle. VDOT has allotted $21.5 million to make all of these changes.

Tennessee

A study group was established in Tennessee in 2005 to develop a multimodal development plan for their I-40/I-81 Corridor. The group would look at highway capacity, congestion, freight movement, safety and security, intermodal facilities, maintenance and operations, and economic access. Each of these concerns will have three time horizons: 2011, 2016, and 2030. A series of meetings was held in late summer 2007 to present a project overview, list deficiencies, offer an initial plan of proposed solutions, and carry these types of discussions over to the spring of 2008, when the study was scheduled for completion.

The Tennessee Department of Transportation issued their *I-40/1-81 Corridor Feasibility Study: Task 2.0—Assessment of Deficiencies* technical memorandum, dated August 2007. The study area was the I-40/I-81 Corridor extending from Memphis to Bristol, Tennessee, a distance of about 550 mi (891 km), and falls within 12 rural planning organizations and 8 of the 11 metropolitan planning organizations in Tennessee. TDOT also maintains a Long-Range Planning Division composed of three offices: Systems Planning and Policy, Research, and GIS Mapping and Facilities.

The assessment of deficiencies within the study area was concerned with the following topics:

- Capacity and congestion: For 2011, 2016, and 2030, Chapter 2 summarizes travel demand modeling and identifies existing bottlenecks based on field observations by stakeholders.
- Operations and maintenance: Chapter 3 identifies locations where poor geometrics hamper traffic flow and includes recommended improvements to Tennessee's Intelligent Transportation System (ITS) and Incident Management programs.
- Safety and security: Chapter 4 lists segments of both highways that have collision rates exceeding the state's critical accident rate.
- Freight movement and diversion: Chapter 5 identifies segments where steep grades slow truck movements and impact operations.
- Economic access: Chapter 6 lists proposed interchange improvements to improve access to new developments and includes input from stakeholders.
- Commuter travel demand: Chapter 7 shows commuting patterns to Tennessee's urban areas.
- Intermodal facilities: Chapter 8 identifies and locates major hubs in and adjacent to Tennessee.

The technical memorandum included tables of deficiencies for three time horizons: short-range, about 5 years to 2011; mid-range, a ten-year period extending to 2016; and long-range, with a horizon year of 2030.

Although no further action regarding this August 2007 report appears on the Tennessee Department of Transportation website as of mid-November 2010, WCYB, a TV station in Bristol, Virginia, serving parts of Virginia and Tennessee, posted an announcement on Oct. 28, 2010, that the state had met with the other states in the corridor to continue the dialogue about the improvements needed in the corridor.

The Railroads in the I-81 Corridor Present Their Case

The railroads make a strong case for shifting freight from highways to rail tracks, and Norfolk Southern raises this case in its I-81 Crescent Corridor plan.

Norfolk Southern Corporation, headquartered in Norfolk, Va., operates 21,300 mi (34,080 km) of track serving 22 eastern states and is a major factor in

freight movement in the area in which it operates. Fifty-two percent of its business is termed intermodal, handling containerized freight in 20-ft, 40-ft, and 45-ft trailers double-stacked on intermodal rail cars for delivery and pickup at East Coast ports and for distribution along the routes it serves. NS offers premium services called Triple Crown and Thoroughbred Direct, which can provide door-to-door deliveries and pickups. Their network closely parallels the I-81 highway, and NS presents itself as a partner in this transportation corridor.

Norfolk Southern advertises the company's black-and-white trains as a "green railroad" because one train can transport the equivalent of 300 truckloads and in the process can reduce highway congestion, air pollution, and fuel consumption. These kinds of pronouncements are being repeated by other railroads throughout the country to garner new business and gain public support.

Norfolk Southern continues to see improvements in the volume of freight carried and corresponding earnings. Their third quarter 2010 versus third quarter 2009 reports are enlightening:

- Railway operating revenues increased 19% to $2.5 billion.
- Income from railway operations improved 33% to $746 million.
- Net income increased 47% to $445 million.
- Diluted earnings per share rose 47% from $0.81 in 2009 to $1.19.
- The railway operating ratio improved by 3.2 percentage points to 69.6%.

On Oct. 19, 2010, Norfolk Southern broke ground on a new $95 million intermodal terminal in Greencastle, Pa., part of a program they call the Crescent Corridor. This 200-acre (80.94 hectare) site is adjacent to the Antrim Commons Business Park, which, in turn, is adjacent to Exit 3 of I-81. Improvements being made to Exit 3 and this new terminal will, according to Norfolk Southern, create more than 70,000 jobs by 2030 and produce the following estimated annual benefits:

1. Divert 1.3 million long-haul trucks off the interstates.
2. Provide accident prevention savings of $141 million.
3. Reduce CO_2 emissions by 1.8 million tons.
4. Provide $565 million in congestion savings.
5. Reduce highway maintenance costs by $262 million.
6. Save 163 million gallons of fuel.

The Country's Largest Railroad

Union Pacific, America's largest railroad, operates in 23 Midwest to western states, with 32,300 mi (51,200 km) of track, and they also profess their green capability. Union Pacific states the following:

- For every ton-mile, the U.S. EPA estimates that a typical truck emits 3 times the nitrogen oxides and particulate matter that a locomotive does; other studies put this figure at 6 to 12 times more pollutants.

- If just 10% of all freight movement by highway were diverted to rail, the nation could save as much as 200 million gallons of fuel annually.
- According to the American Society of Mechanical Engineers, 2.5 million fewer tons of carbon dioxide would be emitted annually if 10% of intercity freight now moving by truck moved by rail.
- Railroad fuel efficiency has improved by 72% since 1980, when 1 gallon of fuel moved 1 ton of freight an average of 235 mi (376 km); in 2001, 1 gallon moved 1 ton an average of 406 mi (650 km).
- By reducing the weight of rail cars, carrying capacity is now 93 tons, up 15% from the past 20 years.
- If 25% of truck freight were diverted to rail by 2035, almost 800,000 fewer tons of air pollution would result, 16 billion gallons of fuel would be saved, and 2.8 billion fewer travel-hours would be spent on congested highways.

The multimodal aspects of the I-81 Corridor, along with the pace of environmental studies being conducted by each of the participating government agencies, will continue to affect the overall progress of this 824-mi (1,318-km) long corridor.

In a press release dated Oct. 21, 2010, entitled "Union Pacific Reports Record Quarter," the company reported 2010 third quarter net income of $778 million, along with other financial and operating data:

- diluted earnings per share up 545 to $1.56;
- operating income up 46% to $1.4 billion; and
- operating ratio 68.2, up 5.6 points over third quarter 2009.

In their second quarter summary of freight revenue, they indicated that intermodal freight increased 35%, which seems to be a trend among the nation's other large railroads.

Union Pacific, in an Oct. 25, 2010, press release, stated that they are investing $15 million for track improvements to its freight line from Milwaukee to Chicago. They also plan to spend $2.6 billion in 2010 to improve the safety and efficiency of their railroad.

The CREATE Program

CREATE is an acronym for Chicago Region Environmental and Transportation Efficiency. The CREATE program is a multimodal public–private partnership involving the U.S. Department of Transportation, the Association of American Railroads, the Illinois Department of Transportation, and the Chicago Department of Transportation, all coming together to address the current and future movement of rail, highway, and commuter traffic in a region where six of seven Class 1 railroads converge.

Demand for rail service in the Chicago area is projected to almost double over the next 20 years and will require an increase in rail infrastructure to cope with

these demands, improve the quality of life for passengers, and improve the efficiency of freight movement.

The total CREATE program cost is pegged at $1.5 billion, and the first phase requires $330 million; $100 million from Illinois, $100 million from the federal government (of which $26 million was received in 2007), $100 million from the freight railroads, and $30 million from Chicago.

There were 32 projects scheduled for design or construction by 2009 under CREATE's initial three-year plan, but this schedule proved too ambitious, as noted below:

- 6 projects to separate highways and rail-grade crossings;
- 4 projects to separate freight and passenger rail crossings;
- 21 rail infrastructure projects, such as switch, track, and signal improvements; and
- viaduct improvement programs.

The goal of all of these and future improvements is to reduce rail and motorist congestion, produce shorter commute times for Chicago-area rail passengers, eliminate accidents and injuries caused by 25 rail-grade crossings, improve air quality while decreasing noise pollution, and restore some green space along the city's lakefront.

Among the economic benefits to accrue when the full program is in place is sustaining 17,000 jobs and $42 billion in annual economic production within 20 years, saving $40 million in inventory costs (although the reason for the savings is unstated, presumably the savings come by allowing for just-in-time deliveries), and creating 2,700 full-time construction jobs and $365 million in annual materials and services during the period of construction.

As of Jan. 12, 2009, the CREATE status was as follows:

- 10 of 29 environmental rail-related projects have been completed. 7 construction projects have been started, and 2 are complete.
- 1 Metra commuter rail environmental project has been completed, but no construction start has been posted.
- 5 public projects have had their environmental studies completed; 1 has been started, and 1 has been completed.
- A TIGER II grant application has been filed for CREATE. (TIGER II is a discretionary grant program whereby the U.S. Department of Transportation is authorized to award $600 million on a competitive basis to those projects having a significant impact on the nation or a metropolitan area of a region.)

On Aug. 23, 2010, the Illinois Department of Transportation issued the TIGER Grant Application to the U.S. Department of Transportation for the CREATE package of projects. CREATE partners were seeking $85.2 million in TIGER II grants to be used for the following projects:

- in Bedford Park, a village near Chicago, a project involving the construction of double track and crossovers between a Belt Railway Co. of Chicago and

Indiana Harbor Belt Railroad Company/CSX Transportation line, along with two new 7-mi (11.3-km) main tracks around the south side of the clearing yard;
- installation of a bidirectional computerized traffic control system on the CSX line along the Western Avenue corridor in Chicago; and
- connection tracks from CSX Transportation to Norfolk Southern Railway between two Norfolk Southern tracks to a BNSF Railway Co. lead track in Chicago.

The TIGER II grant would fill out a total financing package of $106.5 million and would advance the present relationship between public and private partnerships and significantly improve the long-term efficiency of the movement of people and goods in the region, making it more attractive to potential businesses and employment opportunities.

The Ports-to-Plains Trade Corridor Coalition

Chapter 7 of this book discusses the Trans-Texas Corridor, involving Interstate I-35 (referred to as TTC-35) as part of the Ports-to-Plains Corridor, one of the high-priority corridors planned for the national highway system. The Ports-to-Plains Trade Corridor Coalition, formed in 1998 to participate in this multistate corridor, is composed of Texas, Colorado, New Mexico, and Oklahoma. This group created the Corridor Development and Management Plan (CDMP) in compliance with the Transportation Equity Act for the 21st Century (TEA-21).

The Route of the Ports-to-Plains Corridor

The corridor would extend from the Mexican border via Interstate 27 to Denver, Colorado, which marks the terminus of the Ports-to-Plains Corridor, and from which other corridors will emerge in the future to serve trade to Canada. This highway was a result of the Wilbur Smith Associates (2001) study, which defined a proposed route that traversed Texas, New Mexico, Oklahoma, and Colorado. Starting at the border crossing in Laredo, the highway would join Interstate 83 to U.S. 277 at Carrizo Springs, continue to U.S. 87 in San Angelo and I-27 in Lubbock, and to Stratford, where it will connect to U.S. 287. The route, upon leaving Texas, would proceed to Denver on U.S. 287, U.S. 40, and I-70.

Existing Traffic Congestion Needs Attention

Many sections of these existing highways are congested; border patrol inspection stations on I-35 north of Laredo and U.S. 277 northwest of Carrizo Springs, Tex., slow down traffic. At Eagle Pass, traffic slows to an average of 23 mi/hour, and at Clayton, N.M., traffic movement is just slightly higher, at an average of 26 mi/hour. Boise City in Oklahoma registers, on average, traffic moving at about 35 mi/hour.

The established criteria for improvement throughout the corridor include the following:

- a four-lane highway as a minimum;
- a 68-ft (20.7-m) wide median strip in Colorado, Oklahoma, and Texas and a 34-ft (10.3-m) wide median in New Mexico;
- 4-ft (1.2-m) wide inside shoulders as a minimum;
- 10-ft (3-m) wide outside shoulders as a minimum in Colorado, Oklahoma, and Texas and an 8-ft (2.4-m) wide outside shoulder as a minimum in New Mexico;
- 12-ft (3.65-m) wide lanes as a minimum;
- overpass or underpass rail crossings;
- an access level and design determined by each state;
- replacement of bridges that are considered obsolete or deficient; and
- improved or newly constructed direct connections with primary facilities.

The importance of this highway to the economic well-being of the region lies with the Ports-to-Plains's southern U.S. terminus at the port of Laredo, the largest inland port for U.S. commerce. According to a 2001 Laredo Mobility Plan, this entry port accounts for 50% of the value and 36% of the volume of goods transported between the U.S. and Mexico by truck and rail transport.

The Texas Department of Transportation received a congressional appropriation of $1.7 million in 2002 to complete the CDMP, and in September of that same year, TxDOT transferred those funds to the Colorado Department of Transportation to manage the development of the CDMP. The four states involved in the plan provided the 20% matching funds, and this $340,000 represented each state's pro rata share based on the corridor mileage within that state.

The entire portion of the corridor within Texas is referred to as the Trans-Texas Corridor route. When then-Governor Bill Richardson of New Mexico was in office, he termed their portion of the corridor from U.S. 64 in Raton to Clayton a high-priority project under New Mexico's 2003 investment partnership. The portion in Colorado that extends from Campo to Hugo is one of that state's 28 strategic projects.

Susana Martinez, New Mexico's newly elected governor after the November 2010 elections, may have a different perspective on their participation in the Ports-to-Plains projects.

The Corridor Development and Management Plan

Under the terms of TEA-21, a state or metropolitan planning organization receiving an allocation under this section is to develop and submit to the U.S. Department of Transportation secretary for review a development and management plan for the corridor or a usable component thereof, with respect to which the allocation is being made.

Such plans shall include, at a minimum, the following elements:

1. a complete and comprehensive analysis of corridor costs and benefits;
2. a coordinated corridor development plan and schedule, including a timetable for completion of all planning and development activities, environmental reviews and permits, and construction of all segments;
3. a finance plan, including any innovative financing methods, and if the corridor is a multistate corridor, a state-by-state breakdown of corridor finances;
4. the results of any environmental reviews and mitigation plans; and
5. the identification of any impediments to the development and construction of the corridor, including any environmental, social, political, and economic objections.

The four-state steering committee established the following criteria:

- The highway will have a divided four-lane configuration with a stepped development process to achieve that goal.
- Individual state guidelines will be followed with respect to specific design details, such as highway width and access.
- Planned relief routes and upgrading of at-grade rail crossings will be included in the program.
- Consideration will be given to other major bottleneck improvements.

Recognizing that business and citizen approvals would be a major component of the review and approval process, a communication guide was developed to increase public awareness of the completion of the CDMP, reflect the economic development that could follow completion of the plan, and explain the usage and development of the corridor.

The Program Changes

The departments of transportation from Colorado, Texas, New Mexico, and Oklahoma first looked at the existing conditions and proposed changes included in this 1,400-mi (2,240-km) long corridor, consisting of 511 mi (817.6 km) of four- to six-lane highway, 755 mi (1,208 km) of two-lane roadway, and 113 mi (181 km) of metropolitan area roads. The Ports-to-Plains Corridor changes would include the following:

- widening those 755 mi (1,208 km) of two-lane highways into four-lane divided roadways,
- constructing 15 relief routes around larger cities,
- adding amenities needed for commercial vehicle operators,
- improving or constructing connective interchanges,
- improving or constructing overpasses for railroad crossings,
- replacing obsolete or deficient bridges,

- installing corridor-specific signs, and
- integrating intelligent transportation systems.

This corridor program is scheduled for full implementation within a 25-year time frame.

Costs and Benefits of the Corridor Development and Management Plan

The total costs associated with the plan were estimated at $2.87 billion for construction and $143 million for maintenance and operations, as opposed to the $1 billion cost of maintaining and operating the existing corridor over the next 20 years. The four states are to share in these costs, based on 2004 dollars, thus:

- Colorado, $610.2 million;
- New Mexico, $173.7 million;
- Oklahoma, $177.0 million; and
- Texas, $1.908 billion.

The economic benefits range from added jobs for construction, to hiring at new factories and warehouses, to tourism, and the plan envisions the following job creation:

- construction in person-years, 1,700;
- distribution and some manufacturing, 39,600;
- roadside services, 2,000; and
- tourism, 300,

which results in 43,600 total jobs created.

If these four potential sources of economic benefits develop fully, they will yield $4.5 billion. When measured by income to residents and their economic benefits, those benefits are projected to exceed the cost of the project by a ratio of 3.15 to 1.

Financing the Project

Of the $2.87 billion spent on construction, federal and state funds in the amount of $331 million had been committed in 2004, leaving a requirement for more than $2.5 billion in new funding sources. Four approaches to securing traditional financing sources would include the following:

1. federal highway program funds from motor fuel and vehicle-related tax revenue,
2. special federal highway programs,
3. state highway programs, and
4. local matching funds.

However, recognizing that these traditional financing sources are stretched to the breaking point, the program lists alternative sources that would be required to fully fund this Ports-to-Plains Corridor. This list, rather strangely, does not include any private participation, other than railroad involvement in grade separation projects, but it does include federal earmarks, right-of-way donations, sharing of bridge toll revenues, utility easement revenues, state infrastructure banks, and tolls (direct and/or indirect).

Construction Progress

The Ports-to-Plains website (http://www.portstoplains.com/construction.html) in July 2008 listed the following activities in each of the corridor's four states.

Texas

Texas had $440 million in four-lane expansion projects under construction. An additional $275 million was programmed through 2014 for other expansion projects. Another $458 million was programmed from the same period for reliever routes along the Ports-to-Plains Corridor.

Oklahoma

Oklahoma was focusing construction on the $23 million Boise City relief route, which would allow traffic to avoid their current bottleneck downtown. Additionally, in fiscal year 2008–2009, another $15 million was programmed to reconstruct 11.6 mi (18.56 km) of existing two-lane highway south of the Colorado state line. Finally ODOT had programmed $6.3 million in fiscal year 2007–2008 for right-of-way acquisition and utility relocation for later expansion to four lanes.

New Mexico

New Mexico had the most aggressive schedule of expanding from two to four lanes: 32.6 mi (52 km) from Raton to Clayton, with three segments under construction at a cost of $54.5 million. The final four segments, totaling 48 mi (76.8 km), were scheduled for construction in 2007–2009 at an estimated cost of $83.9 million. At a May 19, 2010, regular meeting of the State Transportation Commission, the city of Raton was included in the $8.8 million of GRIP II (Governor Richardson's Investment Partnership) funding. The project has been let out to bid by the city, but as of January 2011, no further update is available.

Colorado

Colorado continues to upgrade U.S. 287. The new design is being used to provide adequate capacity for the future and keep the flexibility to expand to four lanes. Since 1995, CDOT has expended $147 million upgrading 124 mi (198 km) of U.S. 287. Current projects included an 11.4-mi (18-km) section at $22.2 million and an $8.1 million bridge replacement over the Union Pacific Railway; another 5.1-mi (8-km) roadway section was programmed for 2008 at a cost of $10 million.

The Ports-to-Plains website (www.portstoplains.com) listed no upcoming events on their calendar from January 2010 through November 2010. One of the few events reflecting interest in advancing the Ports-to-Plains concept came from Mexico.

The Ports-to-Plains Alliance on Oct. 22, 2010, welcomed their first Mexican member, the state of Coahuila. Carlos Roman Cepeda, an official with Coahuila; along with the governor of Coahuila, Professor Humberto Moreira Valdés; and the mayors of San Angelo, Texas, and Torreón, Coahuila, took part in a signing ceremony in Torreón.

Governor Moreira stated that Coahuila's commitment to upgrade the corridor from Acuña to Torreón was the state's top infrastructure priority; Coahuila has two border crossings, at Del Rio/Acuña and at Eagle Pass/Piedras Negras. This rural corridor serves America's energy and agriculture heartland, according to these Mexican officials.

With the right mix of financing and some encouragement, and funding, from the federal government and states through which the Ports-to-Plains roads will travel, perhaps the Ports-to-Plains project may yet become a reality.

The Intelligent Transportation System Program

An intelligent transportation system (ITS) program is also part of the Corridor Development and Management Plan and has been identified as costing $32 million, plus $57 million to be set aside for ITS maintenance and operating costs. The ITS systems would include the following:

- traffic management projects, such as upgrades to signal and school zone flasher systems;
- commercial vehicle operations projects, which provide weighing and inspection station improvements, automated truck inspections, fleet permitting, and registration processes;
- emergency and incident management projects, including the promotion of cell phone towers for expanded phone service and oversized mile markers;
- traveler information systems, such as message signs and 511 system upgrades;
- maintenance and construction management systems for road weather information, work zone construction areas, and construction safety systems;
- operational support projects, including additional staff support at transportation management centers; and
- projects funded by other organizations, such as those funded by private trucking organizations.

The economic savings of these programs can be somewhat quantified and total about $933 million, with safety accounting for $381 million, vehicle travel time as $541 million, and vehicle operations costs being reduced by $11 million.

These Corridors of the Future are aimed at improving passenger, truck, and rail travel. If and when they are fully funded, they should provide the design and construction industries with decades of future work.

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CHAPTER 11

Our Neighbors to the South and to the North

Chapters 4 through 10 of this book have dealt exclusively with roads and infrastructure projects in the United States. Some of them have involved financing by groups in other countries, but the United States has not always been a leader in, or even open to, the idea of working with other countries to solve domestic problems of infrastructure. Much of the fear seems to come from the idea that the United States values its independence and doesn't want to owe anyone else or have a part of our infrastructure owned by someone from far away. This chapter will describe the sometimes difficult experiences of Mexico and Canada. Mexico and Canada have pursued public–private partnerships for many years and continue to do so.

Mexico's Experience

Mexico's experience in PPP infrastructure projects got off to a rocky start. The devaluation of the peso and an inflation rate of 45% in 1994 had Mexican construction companies engaged in PPP projects scrambling to restructure their outstanding loans.

The country's program was also undergoing a number of problems, summed up by a top executive of one of Mexico's largest construction consortia. When I interviewed him in 1995 for a book I was writing about the build–operate–transfer project delivery process, Victor Hardy Mondgragon was technical director of Grupo Mexicano de Desarrollo, S.A. (GMD), one of Mexico's largest construction companies. At that time, GMD was also an investor in the country's toll-road concession program. Mr. Mondgragon was candid about the problems that arose during this difficult period in his country:

> Everything went too fast. We found ourselves building highways before everything was in place. Banks were unable to convert their return on investment to net present value. The government was interested in low initial construction costs and based upon the initial short-term (for some, 5 to 10 years) concession periods, these low capital costs would most certainly translate to high maintenance costs.

Combined with high tolls and inflation snapping at the heels of the Mexican worker, these highways were frequently avoided by local citizens, and highway traffic, hence revenue, dropped precipitously. It was against this background that Mexico's revamped PPP program was launched, having learned the lessons from the past.

Mexico Then and Now

A World Bank analyst, as reported in *TOLLROADSnews* (1997), stated that gross miscalculation of costs and revenues by investors and lenders, as well as poorly formulated concession agreements, led to the many failures of the concession road program in Mexico at that time.

One major criticism of the mid-1990s program was the way in which awards were made: a handful of local contractors, sensing profits of 35% to 50%, "were more interested in the construction work than in the long-term viability of the projects." The government exacerbated the problem by awarding concessions with 15-year terms, and if traffic exceeded predetermined levels, the length of the concession agreement would be reduced.

If traffic flow fell below stated levels, the concession agreement would be extended; which only prolonged the misery of those concessionaires saddled with poorly performing projects. When the government approached one concessionaire and offered to extend their concession term, the response was, "Are you asking me if I want to lose money over a longer period of time?"

The rush to start work on the toll roads proceeded, in some cases, without acquiring the necessary rights of way, and when negotiations with property owners began, the concessionaires were almost blackmailed into paying exorbitant prices. Planning of the highway was poor. For example, one highway had originally been approved with four pedestrian crossings, but more than 60 were added; one can imagine what those change orders were like.

Autopista del Sol: What Could Go Wrong Did

The Autopista del Sol was the first of these tolled concession roads, built in 1993. It is a 260-km (163-mi) four-lane toll road running from Cuernavaca to Acapulco, and it represents many of the ills affecting the concession-type projects at that time. If a driver wanted to have an uneventful round trip, they'd have to pay US$81, but if they balked at this price, their alternative would be to use a freeway where potholes could blow tires or wreck suspensions. In light of the poor economy at the time, it was rather easy to foresee that these high toll rates would result in a relatively low traffic count.

Other problems plagued the Autopista del Sol, which appeared to provide a showcase for ineptness. Contractors misjudged the soil characteristics, and several of their cuts created landslides. A banker arranging financing at that time was quoted in a November 2002 *Business Mexico* magazine article stating that the lack of accurate plans and runaway costs inflated the project's budget by 275%.

Because the total project was awarded in three different segments, some design conflicts occurred. A bridge across the Balsas River, midway between Cuernavaca and Acapulco, had to be raised to clear a proposed hydroelectric plant, but the plant was never built because of a legal dispute with a railroad. This Mezcala Bridge debacle (the river is called the Mezcala River in some places) added another 200 million pesos to the turnpike cost overrun. The government launched a 58 billion peso bailout in 1997, took over bank loans, indemnified concessionaires, and lowered tolls by about 15%.

Things Change in Mexico's Toll-Road Concession Program

Mistakes were certainly made in Mexico's early venture into toll-road concession programs. However, the government considered the concept a viable one; a new direction was needed, and it was taken.

In 2002, the Secretariat of Communication and Transport (SCT) published new concession rules requiring a more complete project design. And an extension of concession terms to a maximum of 30 years was included, thereby allowing concessionaires more time to recoup their investment. Toll rates would be made more affordable, and guidelines would be established to regulate toll increases.

The first project in this newly structured approach was the 14-km (8.75-mi) Matehuala bypass in the state of San Luis Potosi. A total of 20 companies received bid documents for this 360-million-peso project. Construcciones Omega was awarded this concession in May 2003.

Standard & Poor's Took a Look at Mexico's Toll-Road Program

Standard & Poor's (2006) cited the reasons for the collapse of these "first wave" concession programs. The purpose of S&P's review was not to revisit history but to document why the early programs failed so that subsequent developments would strengthen the Mexican toll-road program. S&P determined the following:

- Awards were often made to the developer offering the shortest concession period at a time when the government mandated a 15-year maximum term. Most of the developers proposed a 10-year period, making the cost recovery process tenuous at best.
- High toll rates were required for debt recovery, but by their very nature, they reduced traffic count.
- The fast-track nature of the program resulted in poor prequalification standards, lack of transparency, and allegations of corruption.
- Tariff setting was restricted, allowing developers to institute only a semiannual increase tied to the consumer price index.
- Unsophisticated traffic models avoiding the relationship between price and point of use found actual usage about 30% lower than expectations.
- Bid submission dates were unrealistically short and did not require detailed financial or operational details, thereby limiting the government's ability to discern financial and operational shortcomings.

- Bidders were solicited from mainly Mexican construction companies and focused more on the construction aspect than the financial feasibility of the project.
- Experience of the concessionaire was not stressed in the request for qualification.
- Cost overruns caused by incomplete or inadequate design work, limited engineering oversight by the government, or incomplete bid documentation were averaging about 30%, with one project reporting a 200% overrun.
- Because permits were awarded before all right-of-way deals had been consumed, the potential for blackmail was high.
- The financial structures were based on the concept that the value between the peso and the U.S. dollar would not change, and the devaluation of the peso in 1994 was devastating.

This report stated that the mistakes made by the government resulted in a number of reforms that attacked each one of the problems listed above:

- The emphasis on concession term was replaced by emphasis on those bidders exhibiting the most technical, economic, and legal requirements, and those requiring a minimum government subsidy.
- The time frame for submission of a proposal was extended, and the government has provided bidders with more detailed information.
- Toll rates have been addressed by SCT, and they now allow the establishment of average maximum tolls for each type of vehicle according to a toll regulation basis prepared by SCT for each case. The concessionaire will be able to increase the tariff to comply with average maximum tolls, depending on the mix of users.
- The government now insists on high-quality, in-depth traffic forecasts and revenue projections to accompany bids. The SCT commissioned two international experts on traffic studies to compile a guidance manual for the preparation of those studies.
- The bid documents included technical and financial requirements of Mexico's Law of Roads, Bridges, and Federal Trucking. Bidders were to provide more detail in their bids to include the need for public fund assistance. Those proposals with the lowest needs would be considered more favorably.
- The bidders were no longer simply construction firms but more sophisticated joint ventures, which include experienced foreign groups (mostly Spanish).
- Concessionaire experience included operation and maintenance, administrative, and financial expertise and took on more importance in developer selection.
- Construction contracts were still awarded on a lump-sum or stipulated-sum basis, but SCT had specific provisions to deal with scope increases.
- Rights-of-way were now secured before the start of construction.
- Three different supervisory staffs would oversee these projects now; one named by SCT, one by the Technical Committee of the Trust, and a third by the concessionaire.

- A flexible exchange rate, low inflation, and stronger integration with the U.S. economy provided more currency stability.
- Lenders recognized the importance of a financial structure that can withstand stress sensitivities.

Standard & Poor's (2006) rated Mexico's toll-road program. They rated 10 toll roads, and only two had less than an AA rating.

The Mexico–Toluca Road Refinancing Deal in 2006

MBIA Inc., headquartered in Armonk, New York, is a worldwide financial guarantor and bond insurer and provider of fixed-income investment management services. In 2006, they arranged a US$400 million bond structured refinancing program to help shore up Mexico's infrastructure assets, including some of its highways. The Mexico–Toluca toll road, the 21-km (33.6-mi) limited-access highway referred to as Mextol, had been operational for about 16 years and was one of the country's most expensive routes on a per-kilometer basis. This refinancing extended the final debt maturity to 22 years, resulting in lower annual debt service and also allowing for a reduction in toll rates. Increased use of the road was anticipated, along with the addition of five new tollbooths and electronic tolling.

Mexico Infrastructure Funding Looking Up

On Jan. 14, 2010, the Macquarie Group launched their Mexican Infrastructure Fund. Their press release on that date revealed that the Macquarie Mexican Infrastructure Fund (MMIF) had approximately 5.2 billion pesos (US$408 million) in initial commitments from Mexican pension funds, FONADIN, and Macquarie.

With the Mexican government announcing strong support for private investment in Mexican infrastructure, MMIF would offer an attractive investment opportunity and provide a vehicle for investment in local infrastructure.

A Feb. 25, 2010, press release from the embassy of the United States in Mexico announced that the Export-Import Bank of the United States and Mexico's National Bank of Public Works and Services (Banobras) signed a memorandum to provide up to US$1 billion in financing to Mexico's National Infrastructure Program. This amount is in addition to the US$1.7 billion that the Export-Import Bank authorized in fiscal year 2009, which brings the bank's total exposure to Mexico to US$7.1 billion. Furthermore, on Aug. 2, 2010, at the Mexican Infrastructure Conference held at the Shanghai Expo in China, about 100 Chinese companies and 220 entrepreneurs attended this two-day summit. Wang Weidong is the deputy director general of the Global Cooperation Department of the China Development Bank. Wang was quoted as saying,

> China Development Bank will actively support Chinese enterprises to join efforts in developing infrastructure construction in energy, railroad and

hydropower sectors in Mexico. We will further strengthen the cooperation with Mexico in road building and the financial sector and provide good-quality financial services to the enterprises of the two countries.

Mexico Stresses Availability Payments as Part of Their PPP Program

SCT announced a continuation of their availability payment program in a March 2008 PowerPoint presentation containing the characteristics of this particular PPP model:

- Each bidder is to request an availability payment determined as a function of
  - construction, maintenance, and operating costs;
  - rate of return on equity, including financial costs;
  - estimated annual traffic; and
  - duration of the contract.
- The net present value of the periodic payments will be used to award the concession, provided that the successful bidder complied with the technical, legal, and financial requirements.
- When the construction was completed, the modernized road would continue operation as a toll-free road.
- The periodic payment, when applied to a toll-road operation, would be a combination of toll revenue and budgetary funds.
- The service agreement would be fixed, with a term ranging from 15 to 30 years.
- The contract established an association between the ministry and a private firm that would have the responsibility to design, finance, build, maintain, and operate the highway.
- This private firm is to provide this service in exchange for a periodic payment.

Mexico's First Availability Payment Project

The Matehuala bypass project was Mexico's first concession agreement when it was awarded under this initial "periodic" or availability payment program in 2003. It was a 30-year concession contract awarded to Desarrolladora de Concesiones Omega S.A. (DECOMSA) in May of that year for the construction, maintenance, and operation of a 14.2-km (8.9-mi) highway that also included an upgrade and expansion of an 8.4-km (5.2-mi) section of Matehuala Boulevard at a cost of 85 million pesos (US$7.84 million at that time). Financing was obtained from Banco Nacional de Obras y Servicios Públicos S.N.C. (Banobras). The road opened to traffic in November 2004.

The Secretariat of Communications and Transport (SCT) arranged the agreement with concessionaire DECOMSA, which negotiated a loan with Banobras, and SCT would receive 0.5% of the annual toll revenue for the concessionaire's right to operate the toll road. The operator of the road would collect the toll revenue that would be used to repay the senior debt derived from an issuance of bonds.

The Legal Framework for Toll-Road Concession Programs in Mexico

The present Calderón administration planned to convert as many as 16 public freeways into private concession-type toll roads and also to turn over as many as 24 existing government-run toll roads to private operators. In 2007, SCT embarked on a concerted effort to improve and upgrade their strategic highway system, and that effort included a revitalized toll-road concession program.

Laws Relating to PPPs

The Mexican constitution includes specific provisions allowing the federal government to grant concessions for public services, including toll roads. The Ley de Caminos, Puentes y Autotransporte Federal, enacted in 1993, is the specific law authorizing these toll-road concessions. The General Law of Ecological Balance and Environmental Protection is Mexico's equivalent of our Environmental Protection Agency and is also involved in the PPP program.

The Federal Law of Roads, Bridges and Autotransport affords the SCT power to award concession agreements for construction and maintenance of federal toll roads via a public bid that is divided into two parts:

1. First, technical aspects of the project are evaluated, and only those bidders that have met the technical qualifications will be permitted to participate in the second stage.
2. The second stage deals with economic issues. Bidders are to consider the extent of government financial support they will require. The government can contribute via a trust called Fondo de Inversión en Infraestructura (FINFRA), which was created by the government bank Banobras.

Farac

Fideicomiso de Apoyo al Rescate de Autopistas Concesionadas (FARAC) is the government agency whose English translation is "Support Trust for Rescue of Commissioned Highways." FARAC assumed control of highway maintenance and construction of more than US$4.8 billion in bad debts through Mexico's national development bank Banobras.

In August 1997, 23 of the 52 Mexican highway concessions were transferred to FARAC by the Mexican government. FARAC operates under a government umbrella, Caminos y Puentes Federales de Ingresos y Servicios Conexos (CAPUFE), which regulates and maintains all federal and concession roads.

Selling Off the Concessions

In June 2007, the Mexican government announced that they would be selling off operating concessions for the highways they had rescued in the 1994 crisis. The first sale would be for the Maravatio-Zapotlanejo Highway and the Guadalajara-Aguascalientes-León Highway. Banco Santander, an international bank with

a market capitalization of more than 88.4 billion euros, syndicated the deal for 37.1 billion pesos (US$3.34 billion), the largest borrowing in the country's history. The 30-year concessionaire, composed of Goldman Sachs Infrastructure Partners and Ingenieros Civiles Asociados S.A., won the competition in July 2007 with a bid of 44.051 billion pesos (US$3.96 billion).

Brazilian highway concessionaire Companhia de Concessões Rodoviárias (CCR) and Portuguese concessionaire Brisa formed a partnership to bid on this 30-year concession project but failed to submit a competitive bid. This team was awaiting another auction, and they considered Mexico a fertile market, having identified several federal concessions they wished to pursue in the future. This consortium was also looking at similar projects in other nearby regions: the Vespucio Beltway in Santiago, Chile, and highways in the Dominican Republic. CCR and Brisa were also looking at opportunities to participate in some U.S. PPP projects.

The New Model in Mexico

SCT (2008) indicated that each year, Mexico needs about US$5 billion for road construction and maintenance, and that the availability of public funds annually is only half of that amount. To close the gap, the country would be seeking public–private partnerships to attract private capital.

SCT developed three models under their national development plan to provide for the execution of these new public–private partnership models:

1. New highway concession model
    - Concessions are awarded through a public bid approach.
    - SCT provides the final design and rights-of-way and sets the maximum average tolls and rules for updating them.
    - The concession period can be the maximum allowed by law (30 years).
    - The government provides an initial contribution of public funds through FINFRA, the government trust within the public development bank, Banobras.
    - The government offered a minimum revenue guarantee to facilitate the concessionaire's obtaining a loan from a private bank.
2. Service provision contract model
    - The bid documents require each bidder to request a periodic payment to be determined as a function of the following:
    - construction, maintenance, and operating costs;
    - rate of return on equity, including financing costs;
    - estimated annual traffic; and
    - duration of contract.
    - The net present value of the periodic payments will be the factor used to award the concession, provided that the apparent winner complied with the technical, legal, and financial requirements.
    - These periodic payments were to be based on availability of the road and its traffic levels, and the duration of this service contract term could be anywhere from 15 to 30 years.

- After construction had been completed, the new highway would continue in operation as a toll-free road.
- When this model was applied to a toll road, the periodic payment would be made based on a combination of toll revenues and budgetary funds.

3. Asset usage model
   - SCT would terminate the concession of highway assets held by FARAC in exchange for indemnification. (FARAC is the government agency that controlled billions of dollars of bad debts from previous unsuccessful highway programs.)
   - The new concessionaire would be responsible to operate, maintain, and "exploit" (term used by SCT) the existing toll road, as well as to build and later operate any new highways if included in the concession agreement.
   - The concessionaire would receive the revenue from the highway's income, but SCT would not guarantee traffic count, which responsibility is transferred to the concessionaire.
   - No government support is offered.
   - No minimum equity requirements are set.

A concise characteristic of each model prepared by SCT is presented in Table 11-1.

Table 11-1. Characteristics of Models

Item	*New Highway Concession Model*	*Service Provision Contract Model*	*Asset Usage Model*
Revenue source	Highway user	Periodic payment from SCT annual budget	Highway income flow for 30 years
Government support	Initial contribution and revenue guarantee	None	None
Traffic risk	Totally transferred to concessionaire	A small part is transferred to the concessionaire	Totally transferred to concessionaire
Project design	Delivered by SCT	SCT provides conceptual design and list of requirements	Conceptual design of additional projects delivered by SCT
Equity requirements	A minimum is established	No minimum set	No minimum set
Decision criteria	Lowest or largest amount of public funds	Lowest net present value of annual payments	Largest amount offered
Duration	30 years	15–30 years	30 years
Legal document	Concession title	Concession title and service contract	Concession title

Source: Data are from Secretariat of Communications and Transport of Mexico.

The National Infrastructure Program

In 2007, President Felipe Calderón announced the country's National Infrastructure Program (NIP) for the years 2007–2012. According to the World Economic Forum, Mexico ranked 64th out of 125 countries in terms of infrastructure competitiveness. President Calderón planned to change that ranking, and the goal for 2012 was to build or modernize 17,598 km (10,998 mi) of highways and rural roads, plus 100 other projects to be completed during that same time frame. This modernization would increase the percentage of the federal highway network in good condition from 72% to 90%. SCT's February 2009 report included the highway projects in Table 11-2 under preparation.

Completing the Program

To complete this entire 2007–2012 program, a total investment of US$26 billion will be required for highways: US$9 billion for the national corridors, US$10 billion for other roadways; US$4 billion for environmental and conservation projects, and US$3 billion for studies and right-of-way acquisitions. Table 11-3 contains the estimated infrastructure investment for the entire country for the period 2007–2012.

President Calderón's goal during his term in office, which extends to 2012, is to generate the revenue necessary to implement this program by using one of three scenarios:

- Inertial scenario: This situation assumes that the Mexican Congress fails to approve fiscal reform, resulting in decreased infrastructure investment below current levels. (Mexico's infrastructure investment has been decreasing since 1988, from 7% to 3% of gross domestic product.)
- Base scenario: This plan assumes that Congress will pass fiscal reform, resulting in revenue increases in the National Infrastructure Program (NIP).
- Outstanding scenario: This plan envisions not only the passage of fiscal reform but also reforms in the fields of labor, energy, and communication.

These three scenarios would play out as indicated in Table 11-4. The sector that will benefit the most from the NIP is Mexico's highway system. Funds would

Table 11-2. Highway Projects in Preparation

Project	*Length*	*Cost (US$)*
Salamanca–León Highway	85 km (53 mi)	184.3 million
Cuapiaxtla–Cuacnopalan Highway	74 km (46 mi)	133.6 million
Ciudad Juarez bypass and Guadalupe–Tornillo International Bridge	32 km (19.8 mi)	92.2 million
Mexico City southern bypass and Puebla bypass	236 km (146 mi)	1.797 billion
Tula–Ocampo–El Limón	100 km (62 mi)	230 million

Source: Data are from Secretariat of Communications and Transport of Mexico.

Table 11-3. Estimated Investment for 2007–2012 (billions of US$)

Projects	*Public Resources*	*Private Resources*	*Total*
National corridors	2	8	9
Outside national corridors	5	2	7
Complementary works	1	0	1
Rural and feeder roads	2	0	2
Conservation	4	NA	4
Studies, projects, and rights of way	1	2	3
Total	14	11	26

Source: Data are from Secretariat of Communications and Transport of Mexico.

be available for new construction and upgrading and maintenance of more than 40,000 mi (65,286 km) of their highway system.

Under the Inertial scenario, total investment would be US$156 billion; under the Base scenario, total investment would be US$234.8 billion; and under the Outstanding scenario, total investment would be US$312.7 billion. The majority of the projects in the US$50 billion NIP program are scheduled to commence in 2012.

On Jan. 14, 2010, Macquarie Group launched their Mexican Infrastructure Fund with an initial 5.2 billion pesos (approximately US$408 million) in initial commitments. FONADIN has made an initial commitment of 3 billion pesos (approximately US$230 million), and seven of Mexico's leading pension funds have committed 3.42 billion pesos (approximately US$268 million).

FONADIN, the National Infrastructure Bank

FONADIN, the acronym for Fondo Nacional de Infraestructura, was previously known as FARAC. In February 2008, President Calderón announced that a national infrastructure fund, FONADIN, would be created to focus on infrastructure projects. Its first portfolio contemplated five projects for 7.28 million pesos (US$709 million). FONADIN would be the vehicle to coordinate development of several public works programs involving communication, transportation, water, the environment, and tourism in connection with Banobras, the state-owned bank.

Table 11-4. Anticipated Investment in Infrastructure for 2007–2012

Scenario	*Investment as % of GDP*	*Additional Annual Growth of GDP (%)*	*Added Jobs Generated*	*Investment in Infrastructure (Billion US$)*
Inertial	2.5	0	0	150
Base	4.0	0.6	720,000	226
Outstanding	5.5	1.2	1,440,000	301

Source: Data are from Secretariat of Communications and Transport of Mexico.

The planning director of Banobras, Mario Beauregard, announced in June 2008 that FONADIN could approve a US$5.49 billion portfolio of 56 projects that included highway, airport, rail, and maritime projects. However, he said that these projects would not be launched until 2009. Beauregard also stated that an additional 276 projects could be financed between 2008 and 2015.

In 2008, FONADIN released the "Pacific Highways Package," in which a 30-year concession agreement would be offered for the operation and maintenance of three existing toll roads: San Jose del Cabo–Los Cabos Airport: 20.2 km (12.5 mi), Culiacan–Mazatlan: 181.5 km (112.5 mi), and Guadalajara–Tepic Highway: 168.6 km (104.5 mi). In addition, the package includes a concession for the construction, operation, and maintenance of a 400-km (348-mi) new road, the location of which is yet to be announced. SCT valued this package at US$1 billion, but some officials in the organization set the value closer to US$1.5 billion.

A third package was being structured, involving the Reynosa–Matamoros, Monterrey–Nuevo Laredo, and Cadereyta–Reynosa toll roads, along with the Pharr–Reynosa International Bridge, which was to be awarded in late 2008.

How the SCT and the NIP Will Work Together

The Secretariat for Communication and Transport (SCT) will play a major role in this National Infrastructure Program (NIP). Although Mexico's public funds could only provide one-half of the US$5 billion needed annually for transportation, these two organizations plan to close the gap by using the three models stated above: the new highway concession model, the service provision contract model, and the asset usage model.

SCT's role within these models will include the following:

- providing final designs,
- acquiring the necessary rights of way, and
- setting the maximum average toll rate and a formula for updating them.

The concession period will be the maximum allowed by law: 30 years. The government will provide a minimum revenue guarantee to facilitate loans from private banks.

As of 2008, several PPP projects had been awarded and several more were in the bidding stage, in the pipeline, and under study:

- 4 projects were operational,
- 4 more projects were in various stages of operation,
- 12 projects were under construction,
- 4 projects were in the bidding stage,
- bids for 5 more projects were being prepared, and
- 41 projects were under study.

SCT's website (http://www.sct.gob.mx) lists a Call for Tenders and Project Studies. It appears to invite interested parties to click on an icon alongside each project for detailed information, but the information is only available in Spanish.

The Flat-Rate Business Tax Affects Toll Roads

A flat-rate business tax (Impuesto Empresarial a Tasa Única), referred to simply as IETU, took effect in Mexico on March 31, 2008. This tax replaced an existing asset tax and gives businesses the option to consolidate their taxes at the parent level or pay the taxes levied on gross revenues of the asset at the project level. This tax sets the minimum rate at 16.5% in 2008, 17% in 2009, and 17.5% thereafter.

Private toll-road debt structures developed in Mexico in the late 1990s were not structured to absorb this IETU tax, but now they will. This change may affect the credit quality of the project's debt. Companies were required to make a one-time election as to whether they chose the parent-level or project-level tax application.

Fitch Ratings on Apr. 7, 2008, took a look at the effect this tax would have on 10 toll roads and reasoned that if the toll-road owners elected to pay the tax at the project level and alter the structure to incorporate the tax, the effect would be to place a tax obligation before the debt service and potentially reduce the available financial flexibility to pay the debt. In fact, Fitch placed the bonds on one such toll road, the Libramiento Plan del Rio, on a negative watch rating as of Apr. 4, 2008.

USTDA Participates in Mexico: Building Partnerships in Infrastructure

The U.S. Trade and Development Agency (USTDA) announced a US$1.7 million grant to Mexico's National Infrastructure Program in February 2008 to support five high-priority infrastructure programs in that country. U.S. firms were invited to submit proposals for each of these projects as they are announced:

1. Puebla International Airport expansion: This is an airport initiative to integrate and decongest the area's largest airports, including Mexico City's Benito Juarez International Airport. The US$245,580 grant will fund a study to analyze the development of an expanded commercial terminal and cargo facilities and update the current airport master plan.
2. Querétaro International Airport expansion: A US$263,900 grant will analyze this airport's commercial and cargo facilities and provide a master plan similar to the one above.
3. San Luis Potosi International Airport runway expansion and modernization: A US$243,300 grant is to be used to upgrade the airport's existing facilities, including runways and taxiways, to handle larger aircraft.
4. Puerto Peñasco water desalination facility: This US$369,325 grant will be used to evaluate the feasibility of a desalination facility. Groundwater resources in

the area are slowly being depleted, and critical water loss through old and leaky pipes has added to the urgency of exploring new potable water sources.

5. Comisión Federal de Electricidad (CFE) environmental management technical assistance: A US$640,500 grant will provide CFE with PCB (polychlorinated biphenyl) remediation and reduction of sulfur hexafluoride emissions and other contaminated site remediation.

All of these USTDA grants were made with an eye to providing opportunities for U.S. firms to not only submit a proposal for each grant but also open the potential for U.S. firms to participate in any other projects resulting from these studies.

The 2009 PPP Program

The General Directorate of Road Development of SCT issued a new program for PPP in their *Public–Private Partnerships for Highways in Mexico 2009*. This new program reflected the need to modernize and expand Mexico's 357,000-km (223,125-mi) road system.

To satisfy those needs, SCT would require US$6 billion per year (up from the US$5 billion reported previously) for construction and maintenance. With the shortfall in revenue, that agency would implement three public–private partnership models to attract private capital for highway investment.

The Three Models

First are concessions granted through public bids, where SCT will provide final design and rights of way. SCT would set the maximum average tolls and the procedure for updating them. The concession period would be 30 years, the maximum allowed by law. The government would provide some funding through their National Infrastructure Fund, and the government would also offer a minimum revenue guarantee to facilitate private financing. The successful bidder would be the one that requested the lowest amount of public funds.

Second is highway asset usage, in which SCT will prepare the design packages of existing toll roads and new roads to be built by the winning bidder. The winning bidder would operate and maintain existing roads and would build, operate, and maintain the new roads included in the package. There are 35 projects in the National Highway Program 2007–2012 to be considered in this program.

Third are service provision contracts. In this program, a concession is awarded via public bidding that also grants the concessionaire the exclusive right to sign a service contract for a period of between 15 and 30 years. The contract permits SCT to have the private firm design, finance, build, maintain, and operate the highway, and the private firm would provide services in exchange for periodic payments. This arrangement is basically an "availability" contract,

and payments would be made based on the availability of the highway and its traffic levels.

2009 Program Specifics

The new program guidelines published in the *Concessions Model for Toll Road Development in Mexico—February 2009* contains specifics not included in previous program announcements:

- Concession award is made to the bidder that meets all technical, economic, and legal conditions and requests the lowest sum of initial government contribution and net present value of the minimum guarantee.
- In some cases, the winning bidder is requested to create a trust to manage the concession revenues.
- Equity is to be provided by the concessionaire and applied before loans and FINFRA resources, or pari passu if guaranteed by a letter of credit for 75% of the total equity requirements. (Note: *Pari passu* is a term often used in bankruptcy proceedings that refers to creditors being paid pro rata in accordance with the amount of their claim.)
- The winning bidder is to reimburse SCT for certain expenses made in connection with the preparation of the project.
- Changes in design as prepared by SCT are at the expense of the concessionaire.
- Permits are the responsibility of the winning bidder, except for rights of way, environmental permits, and permits from other government agencies that were obtained by SCT.
- A letter of credit is required to guarantee seriousness of the offer (somewhat like a bid bond) in favor of SCT in the amount of 3% of the investment to cover concession obligations, along with a bond worth 17% of the investment in favor of FINFRA to cover construction risks.
- The concessionaire is to set up a fund to cover maintenance as proposed in the concessionaire's program.
- SCT establishes a minimum average toll that is updated annually. The concessionaire sets specific toll rates.
- If project revenues are insufficient to fully service the debt, the federal government, through FINFRA, will provide the concessionaire with the minimum they require that was included in their bid.
- The winning bidder will make a payment to the government of 0.5% of annual gross revenue.
- If the concession performs above expectations, excess revenues will be shared with FINFRA.
- If early termination occurs because of the failure of the concessionaire, a sanction will be levied, and the remaining equity balance will be returned. If the concession is taken over by the government, an indemnification will be paid to the concessionaire.

The full report can be accessed at http://www.sct.gob.mx.

The Mexican Senate Approves a New P3 Law

Statutes for PPP had previously been introduced only at the state level, for example, the states of Chiapas, Jalisco, Tabasco, Tamaulipas, and Veracruz had all adopted specific legislation relating to P3 projects. Although these state regulations had, in the main, proved effective, the need for a national PPP framework was evident, and a proposal by President Calderón sent to the Senate on Nov. 10, 2009, was followed up on Feb. 4, 2010, by a bill presented to the House of Representatives by the Institutional Revolutionary Party.

The president's bill contained these key provisions:

- **Land acquisition:** To provide for a more efficient method of acquiring land for many types of infrastructure projects, or acquiring rights-of-way, government appraisals will be replaced by commercial bank appraisals. The bill also provides simplified procedures for expropriation and negotiation procedures with landowners.
- **Permits and concessions:** Recognizing the long-term aspect of concession agreements, permits will be issued as part of the bidding process and granted and guaranteed for the term of the project.
- **Financing collateral and step-in rights:** The bill will allow service providers to offer the assets and rights in such projects as collateral to lenders.
- **Amending and improving agreements:** Recognizing the long-term aspect of P3 projects, a variety of circumstances may occur that could require the original contract to be adjusted, if, for example, new technologies that may allow a service to be provided differently or other mechanism to adjust the contract and provide adequate compensation to the service provider.
- **Balanced contracts:** The contract must offer a fair deal to all parties, recognizing that a contract that is not well balanced will affect long-term service quality.
- **Dispute resolution:** The bill proposes that parties resolve their disputes by commercial arbitration.

On Oct. 13, 2010, by a vote of 85 to 8, the Senate approved the Law on Public–Private Partnerships that had been proposed by the president in November. The law subsequently was sent to the Chamber of Deputies and as of Nov. 18, 2010, no further word has been posted regarding that agency's actions.

Concessionaires and Funding Change in 2009–2010

The port of Punta Colonet on the Pacific Coast of Mexico has the potential to become a major container port rivaling the ports of Los Angeles and Long Beach in California. Proponents of the need to expand this port in the lightly populated town of 2,500 residents foresee traffic of 6 to 8 million twenty-foot equivalent (TEU) containers per year with the town's population expanding to 200,000.

L.A. Times (2009) said that the government valued the project at US$4.88 billion. The government had planned to release requests for proposal in April

2008, but they had no takers, hence the notification that the entire project would be scrapped.

Between October 2009 and July 2010, the Secretariat of Communications and Transportation (SCT) considered resizing (downsizing) the project and it also appeared that the SCT was putting the project on the back burner.

However, in an Oct. 21, 2010, press release from Jose Rubio Soto, Mexico's executive coordinator of the Punta Colonet multimodal project, he indicated that 19 companies had shown interest in bidding on its construction and operation. There was no mention in the press release as to whether this was to be a P3 project, but Soto indicated that bids would be accepted in the first quarter of 2011, and depending on the final design accepted, the cost could reach US$5 billion.

One of Mexico's largest concessionaires, OHL Concesiones Mexico SA, launched an initial public offering (IPO) in November 2010 expecting to receive US$1.1 billion. Mexico's other giant constructor/concessionaire, ICA and Goldman Sachs Infrastructure Partners, floated an infrastructure trust on the Mexican stock market on Oct. 2, 2010, selling a US$477.3 million stake in toll-road concessions to institutional investors who would thereby have a 32% stake in Red de Carreteras de Occidente, which operates four toll roads in central Mexico. ICA and Goldman Sachs put in US$162.642 million in fresh capital, leaving them with stakes of 55% and 15%, respectively. Proceeds from the sale will be used to increase the toll road operator's capital and pay down a portion of its debt.

The Nov. 10, 2010, *Bloomberg BusinessWeek* announcement of this OHL IPO and the ICA/Goldman Sachs Infrastructure Partners fund indicated that these two concessionaires will be vying for US$14.5 billion in government contracts.

Doing Business in Mexico

The U.S. Department of Commerce maintains a program called BuyUSA; on its website buyusa.gov offers advice on Mexican business and social customs. It stresses the importance of establishing relationships, socializing, and direct communication, rather than, say, using e-mail for most business dealings.

Canada's P3 Program

To the North, Canada could look at Great Britain's Private Finance Initiative (PFI) for guidance in setting up their own PPP agenda. This PFI movement began in England after Margaret Thatcher's election as prime minister in 1983, when the government started to sell off most of the country's utilities and expanded the private sector's investment in schools, hospitals, and highways.

The Private Finance Initiative, formally announced in 1992, used the project's assets as collateral for a nonrecourse loan, and the cash flows generated by the project would serve to repay the loan. PFI transferred the risk to those parties best judged to deal with the risk. In the case of highway and bridge construction, that would be the private-sector contractors, design consultants, and concessionaires.

In mid-1999, the Ontario government in Canada began this highway concession approach by awarding a 99-year lease of Highway 407 to Grupo Ferrovial/Cintra and SNC Lavalin in return for US$3.1 billion, the largest such payment of this type at that time. The Canadian government and their provincial governments have continued to seek private investment in their highway system from coast to coast.

The Canadian PPP Project Database, as of 2010, listed a total of 32 projects, of which 17 were operational, 8 under construction, 6 in RFQ/RFP mode, and 1 with the financials closed.

Canada's Civil Infrastructure System

Canada's infrastructure expansion came with the prosperity of postwar years in 1945, and now that aging sector of their economy, like that of so many industrialized nations around the world, has been neglected. In 1985, it was estimated that the cost to rehabilitate municipal infrastructure projects in Canada, representing 70% of the country's total infrastructure, would exceed C$20 billion. This figure was increased to C$57 billion and was predicted to climb to C$110 by 2027, if left unchecked.

Statistics Canada, the national statistical agency, in January 2006 revealed that the highway network in the country had more than 50% of its life expectancy behind it; federal and provincial bridges had passed halfway in their life spans; and municipal bridges were not in better shape, with 41% of their useful lives behind them.

An Early Advocate of PPP

Canada did not escape the government shortfalls that cropped up around the world in the last decade of the 20th century. Their country's recession in the early 1990s created a C$10 billion budget deficit.

Provincial governments in Canada have a great deal of power relative to the federal government, and they receive transfer payments from the central power to pay for health care, education, and intraprovince transportation projects. However, these transfer payments were not sufficient, in many instances, to fully fund all of the projects proposed by those provincial entities and the Canadian government.

Following some of the practices of Great Britain's private finance initiatives (PFIs), Canada looked to the private sector for participation in selected projects. The degree of participation by the federal government in PPP projects in both the 2007 and 2008 budgets works out as follows:

- C$1.26 billion for National Fund for Public–Private Partnerships (up to 25% of the cost of a project),
- C$8.8 billion for Building Canada Fund (recipients must consider PPPs),
- C$2.1 billion for National Fund for Gateways and Border Crossings (recipients must consider PPPs),

- PPP Canada Inc. (Crown Corporation), which identified federal PPPs, and assesses PPP projects seeking federal infrastructure funding.

Ontario is Canada's province with the highest population, with 12.7 million people, according to a 2007 count, and second-place Quebec has 7.687 million, followed by British Columbia, with 4.35 million. These are the regions where most of the public–private partnerships are and probably where they will continue to be.

The Canadian Council for Public–Private Partnerships

The Canadian Council for Public–Private Partnerships (CCPPP) published a study in the fall of 2007 titled *Public Reaction to PPP: A Four-Year Study*. The CCPPP was formed in 1993 as a member-sponsored organization composed of representatives from both the private and public sectors. The organization's mission was to conduct research on PPPs and publish their findings. They also sponsor an annual conference.

This 2007 survey showed that Canadians overwhelmingly supported this PPP approach. In an opening statement of the survey, CCPPP asked the question, "Is it time to allow the private sector to deliver these types of services (roads, hospitals, schools, public transit, water treatment, and electric power) in partnership with the government?" Responses indicated that nationwide support for this type of private-sector support had risen from 60% in 2004 to 63% in 2007. Other questions in the survey elicited these responses:

- 88% were of the opinion that the government was having trouble keeping pace with the demands for new or improved public infrastructure.
- 63% agreed that it was time to put private-sector capital and expertise to work; this amount was up from 60% in 2004.
- The public support for various forms of public–private partnerships varied: 74% supported hospital services, 73% supported roadways, 55% supported water projects, 60% supported sewage, 66% supported transit, and 57% supported electricity.
- Conservatives voted in the affirmative 72%, and liberals voted 62% in answer to the question, "Is it time to invite the private sector?"

CCPPP defines their P3 program as a cooperative venture between the public and private sectors, built on the expertise of each partner, that best meets clearly defined public needs through the appropriate allocation of resources, risks, and rewards.

The council also made the distinction between how Canada and we in the United States define *privatization*. Canadians use the term *privatization* where there is full divestiture or when a specific function is turned over to the private sector and regulatory control remains a public-sector responsibility. The council says that in the United States, we use the words *privatization* and *public-private partnerships* interchangeably. When Canadians refer to privatization, they look at it as the

"furthest point on the PPP spectrum," where all or most of the assets are held by the private sector. Canada's definition more closely approaches that definition in countries other than the United States.

Building Canada

In 2007, a program called Building Canada was announced by the government. Its purpose was to work with federal and provincial governments to assess current and long-range infrastructure needs and priorities. British Columbia in November 2007 was the first province to sign onto this new national infrastructure plan, and as such, would receive C$2.2 billion from the Building Canada Fund over seven years to invest in roads, bridges, tunnels, ports, and public transit projects, all part of a C$33 billion nationwide program. British Columbia remains an active P3 participant as of 2009.

The worldwide financial crisis has delayed several of British Columbia's P3 projects. The Port Mann/Highway 1 project start was delayed because financing was behind schedule due to the financial fallout of Depfa Bank of Ireland, one of its major funding sources, and several other P3 projects had to seek other lenders. The South Fraser Perimeter Road project was supposed to commence construction in 2009, but fallout from Babcock and Brown, which lost 98% of its market value, and a C$125 million lawsuit against Zachry relating to a Texas high-rise project, pushed completion of this project start to 2010.

This new C$33 billion fund would obtain financing from the following sources for the period 2007 to 2014:

- municipal GST (a goods and services tax) rebate, C$5.8 billion,
- gas tax fund, C$11.8 billion,
- Building Canada Fund, C$8.8 billion,
- Public–Private Partnership Fund, C$1.25 billion,
- Gateways and Border Crossings Fund, C$2.1 billion,
- Asia–Pacific Gateway and Corridor Fund, C$1 billion, and
- Provincial–Territorial Base Fund, C$2.225 billion,

for a total of C$32.975 billion.

The Gateways and Border Crossings Fund is a fund set up to improve the flow of goods from Canada to the rest of the world, including new border crossings with the United States. The Asia–Pacific Gateway and Corridor Fund will provide increased infrastructure to assist British Columbia and other regions in participating in the burgeoning Asian trade business.

Also included in the 2007 budget was C$25 million over five years to create a new federal office to assist in the execution of public–private partnership projects. The office has a mandate to identify opportunities and execute public–private partnerships at the federal level and to oversee the assessment of PPP options for projects seeking funding from federal infrastructure initiatives.

Canada's Civil Infrastructure Community

The Canadian Society for Civil Engineering, Engineers Canada, the Canadian Public Works Association, and the National Research Council Canada prepared a report entitled *Civil Infrastructure Systems Technology Road Map: 2003–2013,* which represented the consensus of efforts to preserve their country's infrastructure. They refer to this approach as a technology road map.

The Road Map

The group set forth the following 10 recommendations to achieve their objectives (the TRM):

1. Request the federal government to establish a National Roundtable for Sustainable Infrastructure to bring all stakeholders together to create a national infrastructure action plan.
2. Develop a cost-effective mechanism to compile data on infrastructure inventory and condition to be collected from municipalities and other infrastructure owners.
3. Include a life-cycle analysis in the selection of civil infrastructure system projects or technologies.
4. Request a national innovative-technologies demonstration program to be developed by Infrastructure Canada.
5. Establish a Network of Centres of Excellence for infrastructure.
6. Request that federal, provincial, territorial, and municipal governments and industry partners dedicate funds to infrastructure research and development.
7. Integrate infrastructure rehabilitation and maintenance content into curricula and into continuing education programs.
8. Establish an infrastructure technology transfer program to encourage the movement of technology from research facilities to the marketplace.
9. Within five years, measure the success of TRM against its objectives and revise and update the road map as necessary.
10. The partnership of professional organizations that lead TRM should offer their expertise to other organizations to help TRM achieve their objectives.

Canada's wide and varied public–private partnership projects include the following:

- Legislative Assembly of Nunavut building in Iqaluit, Nunavut, on Baffin Island, formerly a part of the Northwest Territories. A partnership between Nunavut Construction Ltd. and the federal government to design, build, own, and operate this facility and nine other government buildings in a 20-year lease arrangement began in 2000.
- Skyreach Place (now called Prospera Place) in Kelowna, British Columbia. This is a 30-year design–build–operate agreement with RG Properties Ltd. to

build a 6,000-seat stadium for professional hockey, major concerts, and business functions. Sliding-scale lease payments will end with a C$1 sale back to the city when the lease expires.

- Central North Correctional Centre in Penetanguishine, Ontario. This 1,100-inmate facility, completed in 2001, is the first such correctional institution in Canada to operate under a public–private partnership arrangement. The five-year, C$170.8 million contract with Management and Training Corporation is performance based.
- John Labatt Centre in London, Ontario. This facility is a 9,000-seat entertainment complex built under a design–build–finance–operate–maintain contract with London Civic Centre Corporation LLC. The city created a special-purpose trust for this project and entered into a 50-year lease with the corporation. Capital costs of C$46 million and revenues will be shared on a scale weighted over the life of the contract.
- Greater Moncton Water Treatment Facility in Moncton, New Brunswick. USF Canada designed, built, financed, and now operates this facility, which serves 100,000 people. The C$85 million, 20-year licensing agreement not only improved the quality of the water but also is expected to save the town C$12 million over the life of the contract.
- Teranet Inc. in Toronto. This innovative PPP project works with Ontario's land registration process. A 50–50 ownership between Teramira Holdings and the province of Ontario allows for the rapid automation of land registration and ownership records, which according to the government, would have taken much too long under a program sponsored only by the government.
- Bay of Fundy Ferry in Atlantic Canada operates between Bar Harbor, Maine, and Digby, Nova Scotia–St. John, New Brunswick. Previously a subsidized ferry service, NFL Holdings now operates this system fully independent of subsidies, and because of high-speed catamaran service, reduced the travel time from Bar Harbor to Digby from 6.5 hours to just 2.75 hours.
- Charleswood Bridge in Winnipeg, Manitoba. One of the first major PPPs in Canada, the design–build–finance–own–maintain agreement between the city of Winnipeg and DBF Ltd. is a 30-year contract. The city makes ascending lease payments, and ownership is transferred at the end of the agreement. Not only were capital costs reduced from C$11 million to C$10 million but also the facility was delivered two years faster than it would have been by the conventional design–bid–build process.
- Nav Canada. A countrywide transfer of ownership and operation of Canada's civil air navigation system from the government to a private entity, Nav Canada was the first PPP of its kind when initiated in 1996. The company employs 5,250 people and manages assets valued at C$2.2 million.

A look at three typical PPP projects completed within the last two decades and one currently in the pipeline will illustrate the method of operation of Canadian public–private partnerships.

Highway 104

Highway 104 is the main corridor into and out of the province of Nova Scotia. Road widening on several portions had produced four lanes, but the portion between Masstown and Colchester County, referred to as the Western Alignment, remained two lanes. In June 1994, Nova Scotia's Department of Transportation and Infrastructure Renewal published a call for expression of interest for a new four-lane, divided highway for that portion of Highway 104 in the Western Alignment segment.

Sufficient interest in the project resulted in the issuance of a request for proposal, and Canadian Highways International Corporation (CHIC) won the competition and signed an agreement with the government of Nova Scotia in 1996 to finance, design, build, operate, and maintain the C$116 million tolled Highway 104 Western Alignment project. The design and construction of the highway were completed in a record-breaking 20 months.

CHIC was founded in 1993 and was composed of four major Ontario transportation related companies: AGRA Monenco, Inc., a leading Canadian engineering firm founded in 1907, Armbro Construction Ltd., BFC Construction Corporation, both construction companies, and Dufferin Construction Company, a division of St. Lawrence Cement, Inc. In 2001, both Armbro and BFC were merged into AECOM, currently Canada's largest publicly traded construction and infrastructure development company.

This highway became known as the Cobequid Pass project because it followed the alignment of a 200-year-old stagecoach route through the scenic Cobequid Mountains. It would also become the first highway in Canada to include private financing.

This PPP Saved Time and Saved Lives

Highway 104 is part of the aging Trans-Canada Highway system in northern Nova Scotia. It was also a dangerous and congested segment of that highway, claiming 50 lives over a 10-year period. Although the government was seeking a safer alternative, they were hampered by the lack of funds to do so. It would have taken another 10 years for the government to accumulate enough funding to commence design and construction of a new highway, but a public–private partnership would allow for the design and construction to proceed as soon as a qualified team was selected. This opportunity could possibly save another 50 lives.

Financing for this C$113 million project would consist of the following:

- The government would contribute C$55 million, split 50–50 between the provincial and the federal government.
- Remaining funding would be provided by the concessionaire through the sale of bonds to private investors underwritten by Newcourt Credit Group of Ontario. Newcourt subsequently sold three bond issues, with terms of 15 to 30 years.

- Toll revenues over the 30-year concession period would pay for the private-sector portion of the construction costs, provide investors with a return on their investment, and pay for the toll operations and maintenance.
- The government would provide no financial guarantees for the toll-base portion of the debt.

The Operation of the Cobequid Pass

Atlantic Highways Management Corporation Ltd. (AHMCL) is a wholly owned subsidiary of Canadian Highways International Corporation and the operator of the Cobequid Pass toll plaza since operations began in 1997. An initially targeted daily traffic count of 6,000 vehicles was surpassed by about 25% as of 2007, when daily traffic count averaged about 7,800 vehicles. AHMCL's operations have contributed about C$2 million to the local economy, not only in employment opportunities but also by contracting with local goods and services companies.

This project illustrates the power of a well-executed PPP project:

- It provided an upgrade to a congested and deteriorating roadway with a minimum of government financing.
- It replaced a dangerous segment of highway with safe passage, possibly eliminating or significantly reducing the previous fatality rate of five deaths per year.
- It gave a significant boost to the local economy.

Northumberland Strait Bridge

In 1873, Prince Edward Island (PEI) joined the Canadian Federation, and that island's prosperity depended on links with the mainland. Back in those days, the only reliable method of transportation between island and mainland was by boat, and during the harsh winter months, the operation of the boat in an ice-filled passageway was tricky. A proposed bridge would eliminate the need for the ferry service that was subsidized by the government.

In 1985 and 1986, the government received three unsolicited bids to construct a bridge over Northumberland Strait; on further feasibility studies, an expression of interest was issued and responded to by 12 Canadian companies. On completion, the bridge would allow travel over the strait from Borden-Carleton on PEI to Cape Jourimain in New Brunswick. A group called Strait Crossing Bridge Ltd. was selected for this build–operate–transfer concession project. This group comprised Northern Construction Company Ltd., the Canadian subsidiary of the U.S. firm Morrison–Knudsen; GTMI, a subsidiary of France's GTM Entrepose; Ballast Nedam Canada Ltd., a subsidiary of Ballast Nedam, headquartered in Amstelveen, the Netherlands; and Strait Crossing Development, Inc. (SCDI), the entity that would design, build, operate, and maintain the bridge during the 35-year concession period.

The Bridge

The total length of the bridge would be 13 km (7.8 mi), and the bridge would rise 55 m (180 ft) above the water at the center of the channel, where a clear span

between piers would be 192 m (630 ft). The massive cast-in-place concrete piers would be 22 m (72 ft) in diameter with shear keys drilled into the seabed rock. A special ocean-going crane sailed over from Dunkirk, France, to transport the precast concrete bridge components from the shore to the piers. The bridge was to be designed and built to have a service life of 100 years.

Problems and Solutions

There were a number of problems along the way. High autumn winds caused two barges, each with one crane, to break their moorings and run aground. And there was a fatal accident in December 1994. Morrison–Knudsen began developing financial problems in 1995 and would add to the consortium's other woes when they were forced into bankruptcy. The bridge, however, opened to traffic on June 1, 1997.

During the first year of operation, the tolls were pegged to the cost of a ferry crossing and could increase by no more than 75% of the rate of inflation. The concession agreement ends in 2032, after which the operation, maintenance, and toll collection activities revert to the government of Canada. The capital costs of C$840 million in 1992 dollars and repayment to the developer would take the form of what is now referred to as availability payments. Thirty-five such annual payments in the amount of C$41.9 million would be made to the developer, SCDI, by the Canadian government until the end of the concession period in 2032, and the payments would be adjusted for inflation. The amount of annual payments would be comparable to the estimated payments to support the ferry service, which would no longer be in service when the bridge opened for traffic.

Revenue from bridge tolls would be the second source of revenue for the developer. As of the end of 2007, tolls were US$40.75 round trip for a two-axle vehicle; for each additional axle, US$6.75 is added.

Highway 407

The 400 series highways in Canada constitute a network of controlled-access highways serving the southern portion of the province of Quebec, functioning much like the interstate highway system in the United States. The standards for construction are similar to the U.S. AASHTO design standards. Highway 407, serving the Toronto metropolitan area, would be Canada's first electronic toll road.

Bob Rae, premier of Ontario from 1990 to 1995, wanted to accelerate the construction of Highway 407, known as the Toronto Bypass, to relieve congestion that was purported to cost business and industry C$2 billion annually. This new bypass would tie into a major east–west roadway system.

The Ontario Transportation Capital Corporation was established by the Capital Investment Plan Act of 1993 and allowed for public–private partnership arrangements for transportation infrastructure projects in the province. In September 1993, an RFP was issued, and in May 1994, the consortium known as CHIC was selected as the successful bidder, basically the same group that built Highway 104 in Nova Scotia. The maximum guaranteed price for the project was C$929.8 million, some C$300 million more than the government had estimated earlier.

Highway 407 Then and Now

Highway 407 is a 99-year concession project, and the consortium that owns the contract is the 407 ETR Concession Company Ltd., composed of Grupo Ferrovial and its subsidiary Cintra; Macquarie Infrastructure Group; and SNC-Lavalin. The highway was built to relieve congestion on Highway 401 through Toronto, even though that highway had been extensively reconfigured to 12 lanes. The initial concession agreement was to run for only 35 years, but in 1999 the term of the concession agreement was increased to 99 years when the concessionaire paid the government C$3.12 billion in exchange for this extended term. The concessionaire was to complete the west and east highway extensions and embark on a series of road-widening projects: from six to eight lanes between Highway 427 and 400; from four to six lanes between Highway 401 and 410; and, during 2005 and 2006, the central section was to be increased from six to eight lanes.

Disputes arose in February 2004, when the Ontario government notified the concessionaire, 407 ETR, that they were in default of contract because they failed to obtain government permission before raising tolls. However, in an arbitrator's hearing, also in early 2004, a decision was handed down that the terms and conditions of the contract signed by the government allowed the consortium to set whatever tolls were deemed reasonable until the deal expired in 2098.

The Courts Intervene

In July of that year, the court sided with 407 ETR, but the government filed an appeal. In August 2004, the Spanish government (interceding possibly on behalf of Spanish concessionaire Ferrovial and their affiliate Cintra) threatened to scuttle talks on a Canadian Trade Investment Enhancement Act currently before the European Union unless Canada's government backed down on this toll increase dispute. A perceived threat by the Canadian government to cut off Spanish wine purchases through the provincially owned Liquor Control Board seemed to be a counterbalance to that threat, and the increases remained in effect.

In 2005, the government filed an appeal, which was overruled by the Ontario Supreme Court of Justice, and a subsequent ruling by the Court of Appeal for Ontario granted the government permission to appeal the decision.

A Settlement Is Reached

On March 31, 2006, the concessionaire and the Ontario government settled the dispute between the two parties so that both parties agreed to work together. Enrique Diaz-Rato, CEO of 407 ETR, stated at that time, "We have achieved certainty and stability. In addition, we will improve services to our customers on and off the highway and provide new benefits to our best customers."

407 ETR in 2009

A financial report issued by 407 International, Inc., on Feb. 10, 2009, revealed that revenue collected as of Dec. 31, 2008, was C$546.5 million, compared to C$518.9 million in 2007. Earnings before interest, taxes, depreciation, and amor-

tization totaled C$414.3 million in 2008, and net income increased to C$119 million in 2008, as compared with C$60.3 million in 2007.

407 ETR in 2010

A Dec. 31, 2009, news release from Steve Spencer, director of communications for 407 ETR, announced that effective Feb. 1, 2010, congestion pricing would be introduced. One section, designated Regular Zone, would increase to 021.35 Canadian cents per kilometer (the prior rate structure was not available) for the peak rate. For the designated "Light Zone," peak hour rates would be 20.10 Canadian cents per kilometer. Peak hours were set as 6:00 A.M. to 10:00 A.M. and 3:00 P.M. to 7:00 P.M.. The off-peak rate of 18.35 Canadian cents per kilometer was set for travel on weekdays from 10:00 A.M. to 3:00 P.M., 7:00 P.M. to 6:00 A.M. weekdays, and all day on weekends and holidays. A flat C$20 toll charge per trip is billed to any light vehicles without a transponder or vehicles whose rear license plate is not visible to or recognizable by the toll systems.

The Ownership of 407 ETR Changes

Intoll, the current 30% owner of the 407 ETR concession, is one of the two parts of what was formerly the Macquarie Infrastructure Group, the other half being Macquarie Atlas. In their Aug. 26, 2010, issue, *TOLLROADSnews* reported that Intoll had a good year in fiscal 2010, in which traffic, revenue, and EBITDA increased significantly. The Canadian Pension Plan Investment Board (CPPIB) displayed an interest in purchasing Intoll's 30% share and later agreed to CPPIB paying Intoll stockholders 26.6 times fiscal year 2010 EBIDTA, valued at US$4.5 billion.

The Crossing between Windsor, Canada, and Detroit, Michigan

The Canada–United States crossing has been an important trade artery for many years, accounting for almost 28% of all U.S.–Canadian merchandise shipments. In 2004, an estimated US$5.7 billion of merchandise emanating from the province of Quebec was exported to the United States through this corridor.

This route is also important to the Ontario region, and long-term studies concluded that a new crossing, a bridge, was needed. The 2007 Canadian budget included a financial strategy for this new crossing, and a binational planning process was already under way. The framework for the proposed project would entail the following:

- The Canadian government would be responsible for their half of the international bridge, including the Canadian plaza. Once the precise locations for the bridge and ancillary functions were determined, the government would proceed with land acquisition. The government would create a new entity and, in consultation with the state of Michigan and other parties, would explore some sort of public–private partnership to design, finance, build, and operate the new bridge.

- Linking the bridge to Highway 401 would be the responsibility of the Canadian government, and they would finance 50% of the eligible cost of building a new access road. Their 2007 budget included C$400 million from the new National Trust fund for that purpose. The Windsor border team had also obtained C$8 million for 2007–2009 to support this project.

Currently, the Michigan Central Railway Tunnel, the Detroit–Windsor tunnel for cars and trucks, and the Ambassador Bridge for cars and trucks provide access between the two countries at this point.

The Detroit–Windsor Tunnel

The Detroit–Windsor Tunnel website claims that this tunnel is the only vehicular international subaqueous border crossing in the world, and it was so when it opened. Opened in 1930 at a cost of US$23 million, the tunnel is 5,160 ft (1,573 m) long and 22 ft (6.7 m) wide, with two lanes in each direction. At its maximum depth, it is 75 ft (22.8 m) under the Detroit River. The tunnel carries 27,000 to 29,000 vehicles daily, 95% of which are automobiles, and only 5% are trucks. Cars pay a US$3.75 toll, and trucks pay a minimum of US$3.75 plus US$0.03 per 1,001 lb of gross vehicle weight.

The Ambassador Bridge

When it was built in 1929, at a cost of US$23.5 million, the Ambassador Bridge, with its 1,850-ft (564-m) wide span and a length of 7,490 ft (2,284 m), was the longest suspension bridge in the world. It rises 152 ft (46 m) at its highest point above the river and is 47 ft (14 m) wide with an 8-ft (2.4-m) wide sidewalk on its west side. Tolls are US$4.00 for cars and a minimum of US$4.00 for trucks, with an increase for the number of axles and the weight per 100 lb of gross vehicle weight.

The Ambassador Bridge is noteworthy in another respect: it is privately owned. Its current owner, Manuel "Matty" Maroun, collects an estimated US$60 million per year in revenue from the bridge. The bridge was originally built by Joseph Bower, a palm reader turned financier, but the project went into bankruptcy during the Great Depression and Bower issued stock to survive. In 1970, Warren Buffet acquired 25% of the stock in the bridge, and Matty Maroun, owner of a local trucking company, used his company's credit line to buy out Buffet nine years later. He also bought up the balance of the stock for $30 million. As one of the major U.S.–Canadian crossings, the Ambassador Bridge's value has been placed at a half billion dollars or more, so Maroun and/or his sucessors will undoubtedly have some interest in any new river crossing.

The Detroit River Bridge Project Moves Ahead

On Nov. 28, 2007, Lawrence Cannon, Canadian Minister of Transport, Infrastructure, and Communities, announced that this new project would be pursued aggressively and that a final crossing location should be announced in the spring of 2008 by the Detroit River International Crossing team, the organization that

would spearhead the project. He announced that there was plenty of interest from the private sector and that the anticipated price of the bridge should be between US$1.5 billion and US$2 billion. On Sept. 16, 2008, the 2008 Ohio Conference on Freight was attended by the U.S. Federal Highway Administration, the U.S. Department of Transportation, the Michigan Department of Transportation, and representatives of the Canadian and Ontario governments. The preliminary costs presented at that time were the following:

- U.S. costs: C$1.3 billion to C$1.5 billion, and
- Canadian costs: C$2 billion (US$2.011 billion) to C$2.4 billion (US$2.416 billion),

a total cost of US$3.3 billion to US$3.9 billion. These costs included highway connections on each side of the bridge, the crossing itself, and U.S. and Canadian inspection plazas.

On March 3, 2008, the governments of Canada, the United States, the province of Ontario, and the state of Michigan announced that the technical analysis of foundation investigations for the proposed bridge had been completed. Three locations (A, B, and C) were proposed, of which two required geotechnical evaluation. The foundations for Crossing B, landing north of Zug Island in Detroit, and Crossing C from south of Prospect Avenue in Windsor landing north of Fort Wayne adjacent to the Mistersky plant, were investigated because of a concern over subsurface conditions. A draft of a cost study in August 2007, reflecting 2006 Canadian dollars (Table 11-5), revealed anticipated unit prices for the project.

Foundation Investigation

The foundation investigation centered around the previous salt-mining activities in Michigan, which could affect the proposed foundations for the bridge crossing, The Detroit salt mine operations began in 1906 and continued until 1985. During this time, millions of tons of rock salt were removed from the subterranean

Table 11-5. Projected Unit Costs for Various Components If the International Crossing Option Is a Tunnel (in 2006 Canadian Dollars)

Item	*Unit*	*Unit Price*
Caisson walls with tiebacks	Meters	$185,000 for 58-m-wide tunnel
Slurry walls with tiebacks	Meters	$200,000 for 58-m-wide tunnel
Diaphragm walls with tiebacks	Meters	$214,400 for 58-m-wide tunnel
Support of excavation walls	Square meters	$432
Excavation	Square meters	$11
Hauling and disposal	Square meters	$25
Concrete tunnel	Meters	$215,000
Backfill	Square meters	$73

Source: Data are from Province of Ontario, Canada.

pits that ran through the 30-ft (9.1-m) thick seam of rock salt about 1,135 ft (346 m) below the ground surface. These mine shafts left large, human-made caverns under the city, where they remain today. The Canadian investigations determined the following:

- Bedrock stability in the area of the proposed B Crossing was not influenced by past salt-mining operations.
- Pier locations for the main bridge at Crossing C would also be located in areas not affected by salt-mining operations.
- The approach alignment for Crossing C would pass over a portion of the salt-mining area that might affect bedrock stability, and further consideration would be required to determine the effects on schedule, cost, and risk.

A National Priority for the United States and Canada

This crossing has achieved the status of a high national priority in both countries, and the Detroit River International Crossing (DRIC) study will proceed to an environmental assessment by both countries and move toward design and construction documents. In an announcement in mid-2008, the Canadian government said it would provide C$1.6 billion for a 12-km (7.5-mi) long access road linking Highway 401 to the planned Detroit River International Crossing bridge.

James M. Flaherty of Canada's Ministry of Finance stated in a letter on July 11, 2008, that the program parameters of the P3 Fund have been defined and that implementing this plan will be a high priority of PPP Canada Inc., the new Crown corporation in charge of P3 projects.

The Record of Decision of the U.S. Federal Highway Administration

On Jan. 14, 2009, the U.S. Department of Transportation's Federal Highway Administration issued its final environmental clearance for the DRIC. This record of decision will be the last step, under the U.S. National Environmental Policy Act, to gain project approval. This record of decision allows the state of Michigan to begin right-of-way acquisition and construction planning. Construction was contemplated to start in 2010, with completion scheduled for 2013. The schedule has been delayed somewhat, with a new start of construction planned for 2012.

The Request for Proposal Is Issued

A request for proposal was issued jointly on Jan. 27, 2010, by Transport Canada and the Michigan Department of Transportation. It set the following schedule for the new crossing:

1. Michigan legislative and Canadian cabinet approvals, summer 2010;
2. request for qualification issued, winter 2010–2011;
3. request for proposal issued, summer 2011;
4. bids submitted, winter 2011–2012; and
5. commercial close, summer 2012.

The submittal content requested respondents to provide the following information:

1. contact information;
2. company information;
3. a letter of interest;
4. identification of all elements of the project;
5. a brief description of the public–private partnership business model proposed;
6. terms of the agreement, including preferred length of the concession;
7. identification of other business opportunities, such as operation of duty-free shops;
8. financing, including a proposed funding split (debt/equity), types of debt facilities and main assumptions, and any innovative financing tools;
9. experience in PPP, including local contracting partners; and
10. a description of impediments to the project's successful implementation that should be dealt with before the initiation of the procurement process.

A Resolution Supporting the New Detroit River International Crossing

On June 9, 2010, the executive committee of the Toledo Metropolitan Area Council of Governments forwarded to the president of the Michigan Senate, the speaker of the Michigan House of Representatives, the governor of Michigan, and the Consul General of Canada in Detroit a resolution supporting the additional six-lane bridge over the Detroit River between the United States and Canada. State Representative Rashida Tlaib (Democrat, 12th District) called for the state Senate to take action on a plan to boost the economy and help move forward the Detroit River International Crossing, in her Nov. 19, 2010, message posted on the House Democrat website (012.housedems.com). She called for Senate Majority Leader Mike Bishop to call for an up-or-down vote on the plan, and his refusal effectively stalled the DRIC until the 2011–2012 session.

An article appearing in the Dec. 6, 2010, issue of the *Detroit News*, with no byline, questioned whether the cost of the proposed span could be supported by toll revenues without any state support. Industry analysts, according to this article, suspect that the current toll schedule may have to double to operate without a subsidy. This decision and others await the new legislators in 2011, who will determine the fate of this project.

British Columbia: A Leader in P3 Projects

More than C$5 billion in private investment has been leveraged across British Columbia, according to Partnerships British Columbia (PBC), a company wholly owned by the province of British Columbia to bring together ministries, agencies, and private developers to create projects through the public–private partnership concept.

Founded in 2002, PBC was responsible for the creation of seven currently operational P3 projects; current projects include the Abbotsford Regional Hospital

and Cancer Centre, valued at C$39 million; the William R. Bennett Bridge, with a value of C$25 million; and Phase 2 of the Kicking Horse Canyon highway project, costing C$18 million.

Moody's Looks at Canada's P3 Sector in 2009

Moody's (2009) presented the following conclusions as to Canada's future prospects:

- The sector's credit profile and financial performance are strong and ratings remain stable.
- The P3s will be largely insulated from the consequences of the economic downturn.
- Issuers relying on some financial institutions as key participants may continue to be exposed to the turmoil in the banking industry.
- Moody's expects significant changes in the way P3s are financed in the short term, possibly leading to longer term structural changes.

Moody's acknowledged that turmoil in the financial markets between October 2008 and January 2009 brought considerable change in P3 financial structuring. Based on conditions that continued to unfold in the first quarter of 2009, it appears that the turmoil in financial markets may be with us for some time, and the solutions to these problems advanced by Moody's may be worth noting:

- seeking increased government grants;
- less likely participation from the government by way of debt (subordinated or senior) or by way of equity;
- use of miniperms, a short-term financing method used to pay off income by producing construction projects, usually payable in three to five years and collateralized by the project itself;
- sharing of risks, such as margin risks, between bid time and closing of the finances;
- shorter time frames for financial closing; and
- funding competitions.

The Impact of Financial Uncertainty on P3s

Although Moody's was upbeat about P3 projects in Canada, conditions in British Columbia proved otherwise. The Port Mann/Highway 1 project in British Columbia may have presented a portent on the viability of some projects in process.

The project involved "twinning" the existing bridge, building a new one alongside the present bridge, which was in need of much repair. The request for proposal included designing, building, financing, operating, and maintaining the Port Mann/Highway1 bridge.

Three firms were short-listed on Aug. 15, 2007, and the Correct BC Development Group was selected. This group included Macquarie, Transtoll, Peter Kiewit Sons', and Flatiron Constructors Canada Ltd.

Macquarie was to arrange financing for the C$1.6 billion project, and in June 2008, Barry Penner, minister of the environment, announced that the project had passed its environmental assessment. The project included not only a bridge but also upgrading several interchanges and improving safety along a 37-km (22-mi) stretch of highway.

Gilbert (2009) told about Macquarie requesting a one-month extension to get their financing finalized. Officials from Macquarie felt that they could complete the deal even though their stock had had its biggest one-day loss ever on Sept. 18, 2008.

In early February 2009, however, Macquarie said that it would have to write down equity and investments in toll highways and other interests by about $1.2 billion just one day after the British Columbia government announced plans to increase the scope of the Port Mann bridge to C$3.3 billion.

The government of British Columbia received other bad news on Feb. 8. As reported at NowPublic.com (mike_yvr 2009), the Belgian–French bank that was supplying financing to several P3 projects in their province had exhausted half of the government guarantees it received in a September bailout. The Belgian–French financial group, Dexia, had used up 150 billion euro (C$192 billion) in guarantees from France, Belgium, and Luxembourg, which was supposed to be sufficient through October 2009.

The extent to which proposed or pipeline PPP projects will be financially affected will undoubtedly be closely watched by governments and developers in the coming years.

The Future Looks Bright for Canadian P3 Projects

The Conference Board of Canada, the country's foremost not-for-profit applied research organization, issued a 92-page report on public–private partnerships in Canada in January (Iacobacci 2010). The report calls P3 projects an ever-increasing procurement vehicle for the government to build or upgrade infrastructure assets. The report provides the caveat that the government must select the right projects for P3. The author suggests that factors driving P3 efficiency gains include optimal risk allocation between the public and private partners, up-front assessment of project costs, output-based contracts, and private financing. The current wave of Canadian P3 projects in 2010 seems to support the author's conclusions:

- McGill University Health Centre and Groupe Immobilier Santé McGill, a partnership of SNC-Lavalin and Innisfree Ltd., in July 2010, have signed a 34-year partnership to design, build, finance, and maintain the new Glen Campus in downtown Montreal valued at C$764 million for this 217,500-m^2 (2,340,000-ft^2) project.
- Canada's Ministry of Defence, in July 2010, awarded a 30-year design, build, finance, and maintain concession agreement with Plenary and Innisfree, valued at C$880 million, to build a new 72,000-m^2 (774,936-ft^2) commercial office and an 800-space parking lot.

- Women's College Hospital and Infrastructure Ontario announced on Nov. 16, 2010, a 30-year agreement with Women's College Partnership to design, build, finance, and maintain the 630,000 ft^2 (58,527 m^2) hospital on the hospital's current Grenville Street site in Toronto. Availability payments will be used following construction completion and will total C$941 million after 30 years.
- Ellis Don and Fengate Capital-led Integrated Team Solutions were selected Oct. 24, 2010, as the preferred bidder for the Surrey Memorial Hospital expansion public–private partnership project in Surrey, British Columbia. This C$370.2 million (US$363.7 million) 30-year design, build, finance, and maintain concession agreement is to create a new 151-patient bed critical-care building to be completed in 2014. The grantors will make C$147.8 million in milestone payments during construction.

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CHAPTER 12

Looking Down the Road

Before the worldwide economic crisis occurred in late 2008 and continued through 2009, it would have been a little easier to "look down the road" at U.S. infrastructure needs. Before those events, the federal shortfall funding for roads and bridges might have continued, thereby providing opportunities for domestic and foreign banks and investment houses and private concessionaires to step into the breach.

The financial fallout that spread across the globe not only required governments to rethink their investment priorities but also nearly dried up all financial sources and options for private investments in infrastructure.

Fitch Ratings (2009) summed up the global outlook on infrastructure projects:

- U.S. toll roads—Sector outlook: Negative; Rating outlook: Negative
- Latin America—Sector outlook: Negative; Rating outlook: Stable to Negative
- European Union—Sector outlook: Stable to Negative; Rating outlook: Stable to Negative
- Australia—Sector outlook: Stable; Rating outlook: Stable
- India—Sector outlook: Stable; Rating outlook: Stable

Looking at the American scene, Fitch Ratings drew on their comments back in August 2008 when toll traffic on U.S. highways began decreasing because of the 2007 spike in fuel prices. Although fuel prices dropped considerably, by early 2009, unemployment became another factor in decreased toll revenues. This report included events to watch as the second decade of the 21st century unfolds:

- There may be a possible continuation of lower vehicle miles traveled, causing further reductions in toll-road traffic and making free alternatives less congested and more competitive on a travel time basis.
- Publicly operated toll roads may face increased political resistance to raising toll rates at a time when increases would be important to maintain financial viability.
- An increase in leverage on large regional facilities could materialize as governments use those balance sheets to accelerate their transportation investments.

- Interstate turnpikes with a large commercial traffic component may experience a loss in revenue because of the drop in consumer activity and reduction in retail sales.

The challenge that toll-road managers face, in both public and privately operated facilities, is to maintain some financial flexibility and possibly look to increasing tolls or accelerating the toll increase schedule.

Fitch Ratings anticipated the federal stimulus package that was passed in March 2009, and they cautioned that if significant emphasis were placed on funding transit systems, longer term toll road usage would be affected.

U.S. Transportation Funding

Transportation funding in 2009 was driven not so much by the government recognizing the need to upgrade our infrastructure as it was concerned with creating jobs. And transport-related design and construction do create jobs. The term "shovel ready" was emphasized in both federal and state-sponsored program announcements.

The American Recovery and Reinvestment Act of 2009 (ARRA) provided $46.3 billion in transportation funding, of which $27.5 billion was for highway infrastructure. However, about $550 million was deleted for road projects on federal lands and Indian reservations, leaving just a little more than $26.95 million for other uses.

The 2010 Federal Budget

The prime purpose of this recovery act was to put people back to work and not necessarily to affect the long-term needs of our transportation infrastructure.

The 2010 budget announced by the Obama administration on Feb. 26, 2009, included $72.5 billion for transportation in fiscal year 2010. Both the amount in the proposed budget and the amount in ARRA will fall short of the approximately $1.6 trillion (or the $2 trillion estimated by the ASCE) our highway transportation system actually needs to bring it back to good shape. The portion of the budget related to the Department of Transportation budget had, as its intended purpose, these objectives:

- reforming surface transportation to invest in a more sustainable future;
- generating transit options to make our economy more productive and our communities more livable and to reduce congestion and improve safety;
- initiating a federal commitment to high-speed rail by dedicating $5 billion to a state grant high-speed rail program and adding to the $8 billion in ARRA to create several high-speed rail corridors linking regional population centers;
- providing $800 million for a Next Generation (NextGen) air transportation system to improve efficiency, safety, and capacity of the air traffic control systems; and

- improving rural access to the aviation system by providing a $55 million increase in funding to the U.S. Department of Transportation over the 2009 level for subsidized commercial air service increases.

The Congressional Budget Office Reports

Peter R. Orszag was the director of the Congressional Budget Office (CBO) before his appointment as the head of the Office of Management and Budget (OMB) in the Obama administration. While he was at CBO, Orszag appeared before the U.S. House of Representatives' Committee on Transportation and Infrastructure on May 8, 2008, relating that, at that time, the United States had invested more than $400 billion per year in infrastructure. Infrastructure is defined as an investment in transportation, utilities, and other public facilities. Sixty billion dollars of that $400 billion was federal money spent on highway and other transportation networks. He discussed private-sector involvement in infrastructure through public–private partnerships that lend themselves to roads, rail, water supply, and wastewater treatment facilities and by a government-sponsored enterprise-type investment bank, such as the European Investment Bank.

In the report that was issued by the Congressional Budget Office (CBO) after that meeting, Orszag included a table reflecting the actual and projected Highway Trust Fund receipts, the main source of funding for both the highway and transit accounts (Table 12-1). This table reflects the percentage of gross domestic product (GDP) directed toward the Highway Trust Fund and, although receipts in billions of dollars have increased, the percentage of GDP participation directed to that trust fund fairly steadily declined from 1998 to 2009 and was projected to continue on a downward path to 2018. Figure 12-1 is a graphic display of this trend.

The November 2010 CBO Study

CBO (2010b) reported that in 2009, the federal government spent $87 billion on transportation and water infrastructure, an increase of $6 billion over 2007. Of this amount, $4 billion was made available through ARRA. Federal spending on transportation and water infrastructure under ARRA will total $54 billion through 2013; most of its funding will occur in 2010 (about $10 billion) and 2011 (about $8.5 billion), declining to about $2.5 billion, extrapolating from a chart included in the report.

The sole purpose behind ARRA was to act as an economic stimulus to create jobs and promote investment and consumer spending during the country's recession. Some of the money went to "shovel ready" transportation projects. The $54 billion available for infrastructure is a drop in the bucket when compared with the $1.6 trillion needed over five years estimated by the American Society of Civil Engineers (2009).

CBO (2010a) was a forecast, completed on Dec. 8, 2009, and based on information available at that time. Section D of the report is titled "Trust Funds and Measures of Federal Debt" and looks at the trust funds for Social Security,

Table 12-1. Actual and Projected Highway Trust Fund Receipts, 1998 to 2018

	Highway Account		*Mass Transit Account*		*Total Trust Fund*	
Year	*Receipts (billions of dollars)*	*Share of GDP (%)*	*Receipts (billions of dollars)*	*Share of GDP (%)*	*Receipts (billions of dollars)*	*Share of GDP (%)*
1998	23.1	0.26	3.5	0.04	26.6	0.30
1999	33.8	0.36	5.5	0.06	39.3	0.42
2000	30.3	0.31	4.6	0.05	35.0	0.36
2001	26.9	0.27	4.6	0.04	31.5	0.31
2002	28.0	0.27	4.6	0.04	32.6	0.31
2003	29.0	0.26	4.8	0.04	33.7	0.31
2004	29.8	0.25	4.9	0.04	34.7	0.30
2005	32.9	0.26	5.0	0.04	37.9	0.30
2006	33.7	0.26	4.9	0.04	38.5	0.29
2007	34.3	0.25	5.1	0.04	39.4	0.28
2008	34.1	0.24	5.0	0.03	39.1	0.27
2009	34.5	0.23	5.0	0.03	39.6	0.26
2010	35.4	0.22	5.2	0.03	40.6	0.26
2011	36.4	0.22	5.3	0.03	41.6	0.25
2012	37.1	0.21	5.3	0.03	42.4	0.24
2013	37.6	0.21	5.4	0.03	43.1	0.24
2014	38.2	0.20	5.5	0.03	43.6	0.23
2015	38.6	0.19	5.5	0.03	44.1	0.22
2016	39.0	0.19	5.5	0.03	44.6	0.21
2017	39.4	0.18	5.5	0.03	44.9	0.21
2018	39.7	0.18	5.6	0.02	45.3	0.20

Source: Reprinted from Congressional Budget Office.
Notes: After 2007, revenues are estimated; GDP is gross domestic product.

Medicare, civilian and military retirement, and the Highway Trust Fund. Table 12-2 shows the projected deficits of the Highway Trust Fund for the decade beginning in 2010, but offered no specific measures to cure the problems.

What Other Countries Spend on Highways

The United States devoted 0.76% of its GDP to transportation infrastructure in 2000, per the latest figures from the U.S. Bureau of Transportation Statistics. According to a study by the Transport Sector of the World Bank, industrialized nations typically spend slightly more than 1.0% of GDP on their road projects; the largest industrialized economies spend about 0.4% on road maintenance and 1.3% on new construction. Developing and transition countries spend 0.75% on road maintenance, varying from an average of 0.78% in Africa, to 0.49% in South America, to 0.67% in Asia, and 0.84% in eastern Europe. Based on a comparison

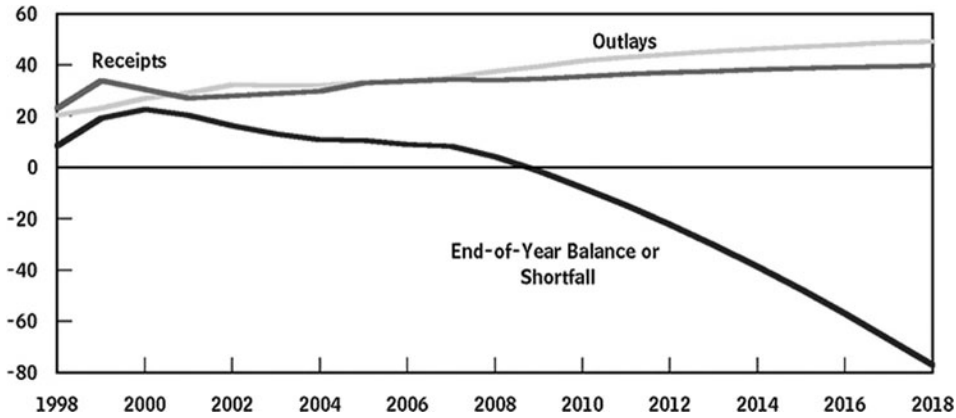

Figure 12-1. Actual and Projected Highway Account Receipts in Table 12-1 in Graph Form (Billions of Dollars). *Source:* Reprinted from U.S. Congressional Budget Office. *Note:* Actual data are in nominal dollars for 1998 through 2007. Data projections for 2008 to 2018 assume that the Highway Trust Fund's taxes, which are scheduled to expire in 2011, will be reauthorized at current levels. Under current law, the Highway Trust Fund cannot incur negative balances. A negative level is a projected shortfall, reflecting the trust fund's inability to pay obligations out of estimated receipts. Assumptions are based on authorization levels for the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users.

Table 12-2. Projected Deficits of the Highway Trust Fund, 2010–2020

Year	*Deficit (billions of dollars)*
2010	8
2011	9
2012	14
2013	14
2014	15
2015	15
2016	14
2017	14
2018	14
2019	14
2020	15

with other industrialized nations around the world, the United States seems to fall slightly short. This report can be accessed at http://web.wordlbank.org/WBSITE/EXTERNAL/TOPICS/EXTRANSDPORT/EXTRAROADSHIGHWAYS/o,,content MDK:2046 as of March 17, 2009. The European Investment Bank and its Trans-European Networks (TENs) may serve as a model for a public–private investment plan in the United States.

The EIB and Trans-European Networks

The European Investment Bank (EIB) was established in 1957 by the Treaty of Rome, and its mission was to be a major lender for projects within the European Union that met the economic, energy, infrastructure, and industrial sector objectives of its members. Each of the European Union's 27 member states would provide funding based on their GDP contribution within the European Union at the time of their joining. Member states would also provide 5% of that amount and make the balance available, as deemed necessary by the EIB, to cover the cost of loan defaults. The EIB is governed by a board of directors, an audit committee, and a management committee, all of which control the integrity and soundness of the bank's operations.

Working with the EIB are the Trans-European Networks (TENs), large infrastructure networks of transportation, energy, and telecommunications covering all of the European Union's 27 member states. The EIB is active in more than 150 countries, including those in Africa, Asia, the Caribbean, the Pacific, and Latin America, and it works to implement the financial pillar of the EU's external cooperation and development policies, which include private-sector development and infrastructure development.

The EIB can provide large, long-maturity loans available with fixed and variable interest rates suited for the large infrastructure investments pursued by TENs. The EIB offers TENs funding through a number of special products: PPP financing by the European Commission and EU member states; the Structured Finance Facility, which aims to match the types of funding to the requirements of large-scale infrastructure projects; and the Loan Guarantee Instrument for Trans-European Transport Network projects, which allows greater private-sector participation in TEN projects. Private infrastructure funds such as the Marguerite Fund are designed to provide direct equity to TEN projects.

The Marguerite Fund

The Marguerite Fund, set up by long-term institutional investors from both the public and private sectors, specializes in financing greenfield projects (65% is allocated for greenfield projects, and 35% for brownfield projects). Its core sponsors are Caisse des Dépôts et Consignations (France), Cassa Depositi e Prestiti (Italy), European Investment Bank, Instituto de Crédito Oficial (Spain), and PKO Bank Polski (Poland).

Founded in December 2009, headquartered in Luxembourg, with a funding goal of 1.5 billion euros; the Marguertie Fund's targeted rate of return is 10–14% over its 20-year life. The EIB provided 75 billion euros for transport projects for the period 2004–2013 and allocated 11.9 billion euros for transport TENs in 2009, a 20% increase over 2008.

Has the Program Been Successful?

On Oct. 27, 2010, the European Commission Vice President Siim Kallas released a report on 92 high-priority TEN projects cofinanced by the European Commission for the period 2007–2013 that contained a snapshot of each project:

- Fifty-two percent are on schedule for completion by 2013.
- An additional 29 projects are on target to meet both schedule and financing goals when completed by 2015.
- Ten projects required a conditional extension to 2015 but have had a partial reduction in funding imposed.
- Five projects are not credible; for those projects, EU funding will be cut and reallocated.

Based on this analysis, about 311 million euros will be recaptured and injected into new calls for proposals under the current TEN program.

The Congressional Budget Office Report to the U.S. Senate

On July 10, 2008, Peter Orszag appeared once again before Congress, this time before the U.S. Senate Committee on Finance, to discuss the economic returns on public spending for infrastructure and the options for meeting the demand for infrastructure services and financing infrastructure through a special-purpose entity.

Orszag made the point that public spending on infrastructure usually produced a positive economic return, but the amount of that return was questionable. He said that one prominent study (his source was not stated) from the late 1980s came to the conclusion that a 1% increase in transportation, water supply, wastewater treatment, and electrical and gas facilities produced a 0.24% increase in the level of national output. Because annual output was considered to be about four times the estimated value of the stock of those core infrastructure elements, the economy's ability to produce goods and services would generate $1 of output for every $1 spent on infrastructure.

However, according to Orszag, a 2006 study (also unstated) concluded that $1 of capital or maintenance spent on highways in 1996 only reduced the annual congestion costs to drivers by 11 cents. CBO's research pointed out that the payoff from investments in public infrastructure such as highways fell off significantly after its initial impact on economic activity.

In that July 2008 report to the U.S. Senate, four basic approaches were offered to meet the growing demand for America's infrastructure: 1, increase federal spending; 2, improve the cost-effectiveness of tax expenditures; 3, reduce the cost of providing infrastructure; and 4, promote reduction in demand for services to an economically efficient level.

Increase Federal Spending

Because 90% of total revenue going to the Highway Trust Fund comes from fuel taxes and because these taxes have not been increased since 1993, it would make sense to raise the tax on gasoline and diesel fuel. A 1-cent increase per gallon would raise $1.8 billion, and a 10-cent increase would raise $18 billion, annually. CBO estimated that an increase of 25 cents per gallon would raise $44 billion per year.

This tax increase has become not so much a case of economics but rather a political issue. Elected officials are not usually amenable to mention tax increases of any sort (this statement is the author's, not CBO's).

Improve the Cost-Effectiveness of Tax Expenditures

The federal government supports infrastructure by subsidizing the debt financing of local and state governments via federal tax exemptions on income by purchasers of municipal bonds. According to the Joint Committee on Taxation, as stated in this report, these tax-exempt bonds will cost the federal government an average of $31.2 billion per year for the period 2007–2011.

Tax credit bonds are a relatively new debt vehicle; they allow the bond purchaser to receive credits on their tax returns instead of all or partial cash interest payments. Under current law, tax credits are designed to provide the purchaser of those tax credit bonds a credit equal to 100% of the interest that would otherwise have been paid on the bonds. Therefore, the federal government bears all of the cost of borrowing and this form of subsidy is much deeper than the subsidy provided to issuers of tax-exempt bonds. If the outstanding stock of tax credit bonds during the 2007–2011 period had taken the form of tax-exempt bonds, the government would have saved between $3 billion and $6 billion per year.

Reduce the Cost of Providing Infrastructure

By analyzing and minimizing potentially low-value projects, the Department of Transportation estimated that it could save about 15%. Almost $5.7 billion of the $36.6 billion set aside for FHWA projects in 2006 were earmarked, and about $2.4 billion (28%) of the $8.6 billion set aside for the Federal Transit Administration was also earmarked.

The federal government could also encourage the use of asset management, which relies on the principle of monitoring the condition of the equipment and performance of the systems of different investment and maintenance strategies. When constructing new infrastructure facilities, the evaluation of life-cycle costs and capital vs. maintenance costs would not only focus on prioritizing projects but would also ensure that those projects were constructed in a cost-effective manner.

Promote Reduction in Demand for Services to an Economically Efficient Level

When users are asked to pay the full cost of the service provided, that may reduce the demand for certain infrastructure projects. CBO gave congestion pricing as an example. Rather than paying the added costs of highway congestion pricing, users may find alternate ways to travel, such as carpooling, using other routes, or traveling in off-peak times.

To maximize efficiency, users should pay their fair share, and this notion applies to commercial traffic, where trucks with high gross vehicle weights (80,000 lb

or more) are taxed at approximately 33% of the marginal costs incurred on rural interstate highways. A five-axle truck with a gross vehicle weight of 55,000 lb on a rural interstate pays a tax about 20% more than their marginal use of that roadway.

CBO suggests basing charges on axle weight and the number of miles traveled by truck, which would reduce the maintenance costs on our highways by inducing the freight carriers to reconfigure their trucks or to ship them intermodally.

Financing Infrastructure through a Special-Purpose Entity

The Congressional Budget Office cited the European Investment Bank as an example of another funding source and referred to current proposals before Congress for a National Infrastructure Reinvestment Bank, the National Infrastructure Development Act of 2007, and the Build America Bonds Act of 2009.

The National Infrastructure Development Bank

We touched on the Dodd–Hagel proposal for a National Infrastructure Development Bank earlier in this book, and CBO suggested that such a bank could be an independent federal entity with a five-member board of directors appointed by the president of the United States to evaluate and finance infrastructure projects "of substantial regional and national significance." With a potential initial federal investment of at least $75 million, it would be authorized to issue $60 billion in bonds, the proceeds of which could be used as direct subsidies, loans, and loan guarantees. The U.S. Department of the Treasury would pay the interest on the bonds, and the National Infrastructure Development Bank would have the responsibility to pay the principal. Introduced by Senators Dodd and Hagel in 2007, the bill died in the 110th Congress but was resurrected under a different name in the House of Representatives as H.R. 3896.

The National Infrastructure Development Act of 2007

Representative Rosa DeLauro (D-CT) introduced H.R. 3896, the National Infrastructure Development Act of 2007, on Oct. 17, 2007. This bill would create the National Infrastructure Development Corporation (NIDC) and a subsidiary, the National Infrastructure Investment Corporation (NIIC). The NIDC would have five years to develop a plan to convert both entities into government-sponsored enterprises, similar to what Fannie Mae and Freddie Mac were before the federal government took them over completely in 2008. Two days later, the bill was referred to the Subcommittee on Water Resources and Environment, where it remains.

Build America Bonds Act of 2009

The Build America Bonds Act of 2009 would provide $50 billion in new infrastructure funding via the issuance of bonds to empower states and local governments to complete infrastructure projects such as highways, bridges, rail and transit systems, ports, and inland waterways. The act amends the Internal Revenue Code to permit

a tax credit for any Build America Bonds issued by the Transportation Finance Committee.

The BuildAmericaBondsOnline.com website reported on Sept. 3, 2010, that the unit investment trust (UIT) has become the dominant investing vehicle for Build America Bonds, creating taxable municipal debt. It also indicated that Invesco Van Kampen had launched 100 BAB UITs worth $3.3 billion as of that day. The securities pay higher yields than traditional tax-exempt bonds; these yields make them attractive to overseas buyers. Domestic buyers obtain an after-tax yield of 2.32%.

The program has been a success since it was inaugurated and has lowered the financing costs for local governments. It has also drawn interest from pension funds and foreign investors, who normally don't buy municipal debt.

The fate of Build America Bonds remains uncertain after the 2010 midterm election, according to a Nov. 3, 2010, report by Kate Kelly at CNBC.com. Since its introduction in 2009, the Build America program has accounted for about 26% of the municipal bond market, with October 2010 showing its biggest month.

The Congressional Budget Office View of Public–Private Partnerships

The Congressional Budget Office stated the potential advantages of PPPs as the following:

- reduction in investment requirements caused by the more effective management of the project, including cost-based pricing;
- efficiencies created by the private entity charging prices more aligned with real costs; and
- the creation of high-quality projects, thereby reducing life-cycle costs.

The report concluded that PPPs involving transportation and water infrastructure do not yet account for a significant portion of nationwide spending in those categories. Also, the cumulative costs of these types of PPPs in the United States, as of October 2006, totaled slightly more than $48 billion, in nominal dollars. This amount contrasted with the total of $1.6 trillion spent by the government between 1985 and 2004 for those same purposes. CBO did not make a firm statement pro or con regarding PPPs; they merely cautioned that insufficient competition and lack of public oversight could raise the risk of the private entity using their monopoly power to raise prices excessively.

However, as we have seen, these risks can and have been addressed by having state agencies award concession agreements, by limiting toll-rate increases, and by inserting contract language where excess profits are shared with the public agency. These challenges to our transportation system are daunting, and they raise several questions, including these:

- How do we upgrade our public transit system—raise fares or increase subsidies?
- How do we build, sell, and drive more fuel-efficient and eco-friendly vehicles—via tax credits or research dollars to increase the life cycle of batteries—investigate hydrogen power, and pursue other new technologies?

- How do we move freight more efficiently—increase gross vehicle weight limits on truck-only lanes or use intelligent transportation systems to allow for tractor-trailer "trains"?
- How do we repair and upgrade our roads, tunnels, and bridges without sending taxes through the roof?

These are the clear issues that face us, but the solutions are far from clear.

Some Transportation Factoids

The National Surface Transportation Policy and Revenue Study Commission in 2008 presented a series of demographic, goods movement, finance, highway, and transit facts that provide a transportation snapshot:

- Texas, Florida, California, Arizona, Georgia, and North Carolina will account for 63% of all projected added vehicle miles traveled by 2030.
- Only about 25% of the households in the United States have a vehicle deficiency, that is, more adults in the household than vehicles.
- In 2002, trucks hauled about 64% of the value, 58% of the tonnage, and 32% of the ton-miles in total shipments. Trucking dominated shipping distances of less than 500 mi, and rail dominated longer distance shipping.
- Imports from Asia through all coasts and borders were forecast to increase from 114 million tons worth $351 billion in 2002 to 484 million tons worth $2.6 trillion in 2035.

Although world economic conditions may delay some of these statistical projections, the trend is probably one that will prevail in the mid to long term.

Transportation and the Changing Metro Areas

Robert Puentes, senior fellow and director of the Brookings Institution's Metropolitan Infrastructure Initiative, appeared before the House Committee on Appropriations on March 19, 2009, and presented some thoughts and demographics that ought to be considered as we view potential changes to our transportation systems.

The Shifting of Employment Centers

According to Puentes, jobs began to shift away from the city center between 1998 and 2006, and 95 of 98 metropolitan areas experienced a decrease in the number of jobs within three miles of their downtown areas. At the same time, the number of jobs in the outer portions of these metro areas realized a 17% increase in employment, compared to a gain of less that 1% in the center city.

The Impact on Transportation Options

As employees moved from the inner city to its periphery for work, lower income residents would have longer distances to travel to reach their places of employment. Perhaps because of this, car ownership among those lower income households grew much faster than for higher income families. Puentes reported that lower income automobile ownership increased from 67% in 1993 to 73% in 2003, and those owners were spending 6.1% of their income on commuting costs, which was about 150% higher than the 3.8% that other workers spend.

Puentes explained the increase in transportation costs because lower income workers have limited transit options. Although he does not state this in his report, I wonder if these higher costs could be the result of the purchase of older used vehicles, which are usually less fuel efficient and require more maintenance. Also, could the "limited transit options" occur because of the absence of public transit at either end of the commute or schedules incompatible with the workers' schedules?

The Brookings Institution study revealed that household spending on transportation has increased across the board and it is now the second largest expense for most U.S. households, taking as much as 19 cents (almost 20%) out of every dollar. This study adds another dimension to our transportation concerns: How do we reduce the cost to families so that they have more discretionary income to bolster the economy?

A "Transit News" memo issued by the American Public Transportation Association (APTA) on Nov. 9, 2010, noted that their study revealed that switching from driving to riding public transportation can save individuals, on average, as much as $9,515 annually, based on a $2.85 per gallon price for gasoline. The national average for a monthly unreserved parking space in a downtown business district is $161.56.

Defining the Role of the Federal Government

Perhaps as much as anything else, the future of our transportation system may lie with some of the basic principles that bound the original 13 colonies together to form our great nation. What is the role of the federal government, and what rights and responsibilities are, or should be, relegated to the states?

Mary E. Peters, speaking at a press conference in Montgomery, Alabama, in January 2008, when she was Secretary of Transportation, said that she had little confidence that more transportation money sent to Washington would get any better results than in the past. She favored collecting some gas tax money at the federal level but suggested sending the rest back to the states, where it might be put to more effective use. She felt that transportation issues handled at the federal level should be only those in the national interest.

The issue of what is in the national interest can be a topic of much debate. Issues that are certainly in the national interest include reducing our dependency

on foreign oil, improving the quality of our air, reducing nationwide highway accidents that cost citizens both bodily and financial pain, and reducing congestion that affects productivity. All of these issues require national attention. However, each state must provide for new construction and maintenance of its state highway system, along with some work on the interstate highways that bisect their territory. All of these roadways, in one way or another, can be considered in the national interest.

These national concerns appear to be difficult to coordinate on a state-by-state basis. Many experts agree that one of the most important functions that the U.S. Department of Transportation can perform would be to create a carefully coordinated master plan that the states could follow as a guide.

The American Recovery and Reinvestment Act of 2009

The sputtering American economy has accelerated federal stimulus activity, and a major portion of new federal funding has been targeted toward infrastructure, with the full recognition that it will not only create jobs and improve our roads and bridges but also prepare the country to compete in an increasingly competitive market.

The Committee on Transportation and Infrastructure prepared a report, "The American Recovery and Reinvestment Act of 2009 Transportation and Infrastructure Provisions Implementation Status as of Oct. 15, 2010." The full report can be accessed at the transportation.house.gov/ website.

The executive summary sums up the effectiveness of federal government funding:

> Of the $38 billion available for highway transit and wastewater infrastructure formula programs under the Recovery Act, $35.3 billion or 93 percent has been put out for bid on 19,678 projects, as of September 30, 2010. Within this total, 19,195 projects (totaling $34.5 billion or 91 percent) are under contract. Across the nation, work has begun on 18,895 projects totaling $34.1 billion or 90 percent. Within this total, work has been completed on 9,789 projects totaling $8.1 billion.

The report goes on to state that these funds have created 244,000 jobs, payroll expenditures of $4.2 billion and, as a result, caused almost $865 million to be paid in federal taxes.

Market Forces at Work

Market forces in this country can frequently achieve results that legislation cannot, and the change in our transportation priorities, which could have been a prime goal of the federal government in years past, has been preempted, in part,

by the marketplace. As gasoline prices edged up from $3.50 to more than $4.00 a gallon, market forces kicked in, thus:

- Sales of SUVs plummeted. General Motors was considering divesting themselves of their Hummer division.
- Americans drove 11 billion fewer miles in March 2008 than in a comparable period in 2007, a drop of 4.3%, as reported by the U.S. Department of Transportation.
- Mass transit increased, and as an example, public transportation ridership in Maryland increased 10.8% between July 2007 and March 2008, a pattern that many other states experienced.
- Scooter sales jumped more than tenfold over the last decade.
- Amtrak reported a 14% increase in short-distance travel, a 15% increase in long-distance travel, and a 9.2% increase in Northeast Corridor travel since May 2007.
- The highest level of public transit ridership in 52 years was recorded in 2008.

Market versus Government Action

The state of our automobile industry today is an example of market forces creating a change that could also have been accomplished by legislation. When the corporate average fuel economy (CAFE) regulations were enacted by Congress in 1975, they didn't go far enough. Regulations intended to increase fuel efficiency had a few loopholes in them. For example, to be classified as a "truck," the government regulations included seven criteria, only one of which was required to be met to achieve this classification. Being in this classification also permitted lower mile-per-gallon fuel efficiency. According to CAFE language, a truck was a vehicle that "can be converted to an open bed vehicle by removal of rear seats to form a flat continuous floor, with the use of simple hand tools."

Many of the popular SUVs and vans, even though most hauled only groceries and kids, could be categorized as "trucks" with significantly lower mile-per-gallon requirements. Chrysler's popular PT Cruiser sedan and Subaru's Outback wagon fit this light truck category. Once again, political realities overcame rational reality.

In 1990, Richard Bryan, a Democratic senator from Nevada, and Slade Gordon, a Republican senator from Washington state, proposed a bill in Congress to raise CAFE standards for cars to 40 mi/gallon over the next decade. The bipartisan attack on this proposal, along with special-interest opposition, killed the bill. What if that bill had passed, saving the U.S. people bundles of gas money and forcing domestic car manufacturers to change their product lines much sooner? Would General Motors and Chrysler Corporation be thanking Congress now for reconfiguring their fleet then instead of coming to Washington, D.C., for bailout money more recently?

Although we have market forces at work, it appears that the federal government still needs to play a major role in the future of our transportation system and the economic forces that feed off that system—and they have.

The Federal Government Increases CAFE Standards

On Apr. 1, 2010, the National Highway Traffic Safety Administration and the Environmental Protection Agency jointly released new federal CAFE fuel mileage standards and greenhouse gas emission standards that will apply to vehicles manufactured from 2012 through 2016. By 2016, the fuel economy fleetwide standard will be 34.1 mi/gal.; this amount equates to about 250 grams of carbon dioxide per mile. It has been estimated that the average price of a new car will rise by $985 by 2016, partially because of compliance with these new standards, but this rise will be offset by fuel savings over the life of the vehicle.

The National Surface Transportation Policy and Revenue Study Commission

The National Surface Transportation Policy and Revenue Study (NSTP) Commission (2007) looked at our interstate highway system, roads and bridges, and freight and passenger rail service as part of the long-term investment needs of our transportation system. As to why transportation is important, the study responded thus:

> The American economy works, in large measure, because shippers, manufacturers, and service providers have a transportation system that provides many ways to access labor and move raw materials and finished goods. Individuals are able to travel to work places, shopping, educational institutions, recreation, medical care, and other locations critical to their quality of life. Congestion was once a nuisance. Today gridlock is a way of life.
>
> By the middle of the twenty-first century, social and economic forces will have altered the United States in ways that were unimaginable just 50 years ago. The nation's population will swell to 420 million. That is the equivalent of 11 new Los Angeles metropolitan areas spread out on a transportation grid already strained by congestion and disrepair.

Base Case Needs Assessment

The briefing papers prepared by that commission's staff looked at three assumptions and their projected costs: current sustainable funding, maintaining the system, and maximum economic investment.

Current Sustainable Funding

In this assumption, state and federal funding were assumed to match current investment levels, growing only by inflation. Based on projections of federal Highway Trust Fund revenues, an average annual investment of $68.8 billion (in constant 2006 dollars) would result in average traveler delays on principal arteries,

increasing by 13% through 2020 and by 37% by 2035. Pavement condition would worsen, with acceptable ride quality on federally aided highways declining from 85.5% in 2005, to 74% in 2020, and to 64% in 2035.

Maintaining the System

To maintain the system would require an investment level that would maintain or improve all major performance indicators, including traveler delays on principal arteries to provide an acceptable ride level. For bridges, this level would require maintaining the current backlog of bridge deficiencies in constant dollars.

The cost in terms of capital investment for this scenario, relative to 2005 levels over 15 years, would be $143 billion annually, or a total of more than $2.1 trillion (in 2006 dollars). Achieving this level over 30 years would cost $170 billion annually, for a total cost of $5.1 trillion.

Maximum Economic Investment

This scenario assumes a level of investment providing maximum potential improvements. By 2020, vehicle miles traveled on roads with acceptable ride quality would increase to 93.4%. Average delay on urban principal arteries would decrease by 31% through 2020 and to 22% by 2035. But this improvement would come at a cost. Approximately $225 billion annually ($3.4 trillion total) through 2020 and $221 billion annually (total $6.6 trillion) through 2035, in 2006 constant dollars, would be required for this program.

One of the commission's observations—transportation financing will continue to be politicized—does not bode well for the future unless Congress and the White House can shift toward a more bipartisan effort to provide funding for prioritized transportation projects.

Public Transit

Transit methodology developed by the NSTP Commission projected that ridership will grow from 9 billion passenger trips annually as of 2005 to 11 billion trips by 2020, 14 billion by 2035, and 18 billion by 2055. And although ridership increases, transit assets will gradually decline from a 3.9 rating, on a scale of 1 to 5, to 3.7 in 2020, to 3.6 in 2035, and down to 3.5 in 2055, unless improvements are made. Average annual investment to maintain and improve transit transportation was estimated at $14 billion to $32 billion (in constant 2006 dollars).

APTA (2009) is a report that covers 10.7 billion trips. That's awfully close to the 11 billion trips predicted by the commission, concluding that that level would not be reached until 2020. APTA (2009) indicated that public transportation was up 38% since 1995. Trips taken on public transportation increased while vehicle miles traveled decreased. In this report, trips on public transit were shown to have increased 4% over 2007 while vehicle miles traveled declined 3.6%. In 2008, the

president of APTA, William W. Millar, was quoted in that report as stating, "Given our current economic condition, people are looking for ways to save money and taking public transportation offers a substantial savings of more than $8,000 a year. That's quite a savings."

Making an additional case for more public transportation funding, Millar said that public transportation annually saves 4.2 billion gallons of gasoline and reduces our nation's carbon emissions by 37 million metric tons. The full APTA ridership report can be accessed at http://www.apta.com/research/stats/ridership.

The 25 largest transit agencies ranked by unlinked passenger trips are contained in Table 12-3. The 25 largest transit agencies ranked by passenger miles are contained in Table 12-4. The term *unlinked* refers to counting the passenger's initial fare.

The January 2008 NSTP Study Commission Report

On Jan. 15, 2008, the National Surface Transportation Policy and Revenue Study Commission released its final report. Its major findings were as follows:

- Congestion cost the U.S. economy $78 billion in 2005 measured in terms of wasted fuel (26 gallons per traveler per year) and lost productivity (36 hours of additional travel time per traveler per year).
- Highway travel remains dangerous; in 2006, more than 42,000 people were killed and 2.6 million injured in highway accidents.
- The United States needs to invest at least $225–$340 billion annually for the next 50 years to upgrade the existing transportation infrastructure to a "good" state of repair (that's $11.25 trillion to $17 trillion—a staggering number).

Their recommendations are no less daunting:

- Replace 108 existing surface transportation programs with 10 new ones:
  1. repair and maintenance,
  2. gateways and goods movement,
  3. metropolitan mobility,
  4. rural connectivity,
  5. intercity passenger rail,
  6. highway safety,
  7. environmental stewardship,
  8. energy security and alternative fuel development,
  9. federal lands access, and
  10. research and development.
- Increase the federal gas tax by 25–40 cents over 5 years (5–8 cents per year) and index the gas tax to inflation.
- After 2025, transition the gas tax to a vehicle-miles-traveled tax.
- Impose added user fees on freight goods and passenger rail tickets.

Table 12-3. The 25 Largest Transit Agencies Ranked by Unlinked Passenger Trips, Fiscal Year 2006 (thousands)

Rank	*Transit Agency*	*Urbanized Area (primary city)*	*Passenger Trips*
1	MTA New York City Transit	New York	2,803,463.9
2	Chicago Transit Authority	Chicago	494,729.1
3	Los Angeles County Metropolitan Transportation Authority	Los Angeles	482,815.9
4	Washington Metropolitan Area Transit Authority	Washington, D.C.	408,988.3
5	Massachusetts Bay Transportation Authority	Boston	380,260.7
6	Southeastern Pennsylvania Transportation Authority	Philadelphia	323,050.5
7	New Jersey Transit Corporation (NJ TRANSIT)	New York	255,294.3
8	San Francisco Municipal Railway	San Francisco	210,848.3
9	Metropolitan Atlanta Rapid Transit Authority	Atlanta	138,403.3
10	Miami-Dade Transit	Miami	107,094.1
11	Maryland Transit Administration	Baltimore	107,024.1
12	King County Metro	Seattle	106,273.6
13	Bay Area Rapid Transit	San Francisco	103,654.1
14	Metropolitan Transit Authority of Harris County, Texas	Houston	102,477.6
15	Tri-County Metropolitan Transportation District of Oregon (Trimet)	Portland, Ore.	101,575.2
16	MTA Long Island Railroad	New York	99,520.0
17	MTA Bus Company	New York	99,169.4
18	Regional Transportation District	Denver	86,571.4
19	Port Authority Trans-Hudson Corporation	New York	78,283.0
20	Metro-North Commuter Railroad	New York	77,070.7
21	Dallas Area Rapid Transit	Dallas	77,010.1
22	Metro Transit	Minneapolis	73,356.6
23	Commuter Rail Division of the Regional Transportation Authority (Metra)	Chicago	72,064.3
24	Department of Transportation Services	Honolulu	71,168.3
25	Greater Cleveland Regional Transit Authority	Cleveland, Ohio	69,199.2

Source: Reprinted from the Federal Transit Administration's National Transit Database (NTD).

Table 12-4. The 25 Largest Transit Agencies Ranked by Passenger Miles, Fiscal Year 2006 (thousands)

Rank	*Transit Agency*	*Urbanized Area (primary city)*	*Passenger Trips*
1	MTA New York City Transit	New York	10,234,418.5
2	New Jersey Transit Corporation (NJ TRANSIT)	New York	3,201,667.1
3	MTA Long Island Railroad	New York	2,207,016.6
4	Washington Metropolitan Area Transit Authority	Washington, D.C.	2,014,974.3
5	Los Angeles County Metropolitan Transportation Authority	Los Angeles	1,979,256.3
6	Chicago Transit Authority	Chicago	1,897,672.7
7	Metro-North Commuter Railroad	New York	1,785,643.1
8	Massachusetts Bay Transportation Authority	Boston	1,767,605.8
9	Commuter Rail Division of the Regional Transportation Authority (Metra)	Chicago	1,636,188.8
10	Southeastern Pennsylvania Transportation Authority	Philadelphia	1,434,210.2
11	Bay Area Rapid Transit	San Francisco	1,307,104.7
12	Metropolitan Atlanta Rapid Transit Authority	Atlanta	749,676.6
13	Maryland Transit Administration	Baltimore	689,097.6
14	Metropolitan Transit Authority of Harris County, Texas	Houston	605,236.7
15	MTA Bus Company	New York	587,082.8
16	King County Metro	Seattle	538,831.7
17	Miami-Dade Transit	Miami	487,682.6
18	Regional Transportation District	Denver	472,644.2
19	Tri-County Metropolitan Transportation District of Oregon (Trimet)	Portland, Ore.	436,730.2
20	Dallas Area Rapid Transit	Dallas	421,096.5
21	San Francisco Municipal Railway	San Francisco	419,290.8
22	Southern California Regional Rail Authority (Metrolink)	Los Angeles	400,170.6
23	Port Authority Trans-Hudson Corporation	New York	338,486.5
24	Department of Transportation Services	Honolulu	328,124.8
25	Metro Transit	Minneapolis	314,330.2

Source: Reprinted from the Federal Transit Administration's National Transit Database (NTD).

- Remove current barriers to tolling and congestion pricing on existing roads.
- Encourage public–private partnerships to facilitate new project construction.
- Establish a permanent Surface Transportation Commission (similar to the Base Realignment and Closure Commission) to develop performance-based standards in the new federal program areas and make periodic recommendations to increase the federal gas tax.

An Image Begins to Form

A picture seems to emerge based on what we know, what we can expect, and the choices from which we must choose:

- Transportation funding will most likely continue to be politicized and remains at the top of the list to correct. We will need strong leadership to get beyond this roadblock.
- Some new highway construction, remediation, and improvements can commence with assistance from the private sector and the PPP movement, as long as sources of credit and financing are available.
- Inner city transit may always remain transportation's stepchild because of fighting between city and state governments for scarce funds. However, a strong, vocal local citizen movement, coupled with bipartisan politics, may have some effect on these types of decisions.
- Rail freight traffic has many attributes, ranging from economic to environmental, but rail organizations often butt heads with the trucking industry. However, by working together, they may increase each other's revenues and benefit the public in the process.
- Passenger rail service is currently subsidized by the federal government, and questions remain as to whether a one-time infusion of capital will allow these services to stop losing money or other measures will have to be taken to make them return to profitability.

In each of these sectors, there appears to be a place for the profit-oriented private sector.

A Close Look at Our Transportation System—Again

A General Accountability Office Study

GAO (2008) was written in response to requests from the U.S. Senate Subcommittee on Energy, Natural Resources, and Infrastructure, of the Senate Committee on Finance. JayEtta Z. Hecker, director of Physical Infrastructure Issues, presented this material on July 24, 2008. The GAO had been asked to review the benefits, costs, and trade-offs of PPPs and look at how public officials identified and

acted to protect the public's interest when considering these types of projects. The statement on page 2 of that report was not very optimistic:

> The nation is also on an imprudent and unsustainable fiscal path. … Absent significant changes to tax and spending programs and policies, we face a future of unsustainable deficits and debt that threatens to cripple our economy and quality of life.

This report was updated with a Sept. 8, 2008, letter from the GAO to Pennsylvania Congressmen Joseph F. Markosek and Richard A. Geist, majority and minority chairmen, respectively, on the House Transportation Committee. The letter referred to the February 2008 report and presented some concluding observations:

- Highway public–private partnerships show promise as a viable alternative to meet growing and costly transportation demands. However, highway PPPs are not a panacea for meeting our country's transportation needs.
- Highway PPPs are relatively new to the United States, and it is difficult to be confident that the public's interests are being protected where limited up-front analysis of public and national interests has been lacking. Public–private highway partnerships could benefit from more consistent, rigorous, and systematic up-front analysis.
- Benefits from PPPs are *potential* benefits inasmuch as they cannot be ensured and can only be achieved by a careful, comprehensive analysis to determine whether public–private partnerships are appropriate in specific circumstances, and if so, how best to implement them.
- The U.S. Department of Transportation has done much to promote the benefits of PPPs but comparatively little to assist states and localities to weigh potential costs and trade-offs.
- Any potential restrictions on highway public–private partnerships must be carefully crafted to avoid undermining the potential benefits than can be achieved.

The GAO called for weeding out federal programs and policies that are outdated and modernizing those that remain relevant. They concluded that the nation's transportation policy had lost focus and that our country's overall transportation goals must be better defined and married to performance, measuring what those programs and policies actually accomplished.

PPP Plus and Minus Observations

The General Accounting Office put forth both the pluses and the minuses for highway public–private partnerships, stating that overall these arrangements have the potential to provide numerous benefits to the public sector, as well as trade-offs. The pluses of the PPP system, according to the report, are the following:

- increased efficiencies in operation and life-cycle management;
- increased use of innovative technologies;

- pricing highway use via tolls that better reflect the true costs of operating and maintaining highways; and
- although there is no free money, public funding uses tax revenue for debt payment; privately issued money must be repaid to investors.

The minuses for the PPP system include the following:

- Tolls may increase to a greater extent on a privately operated highway than on a publicly operated highway. Travelers could pay higher tolls on a privately operated highway than those applied by a publicly operated highway because the private investors required a reasonable rate of return on their investment.
- The public sector may give up more than they gain if the net present value of the future revenue stream exceeds the payment received from the concessionaire. On the other hand, the private sector may have to absorb potential losses if the payment received from the concessionaire exceeds the net present value of the future revenue stream.
- There may not be any long-term public benefits if progressively higher tolls are instituted over the length of the concession period.
- The costs to form and operate a private concession agreement are higher than a public procurement program because financial, investment bank, and legal expert costs must also be included in the private venture.

Federal Practices Promote PPP Highway Projects

The federal government has reinforced its legal and policy programs to promote public–private partnerships for highway projects. They have done the following:

- developed appropriate publications, such as a public–private partnership manual to inform state transportation officials about highway PPPs (FHWA 2007);
- drafted model legislation for states to consider as they contemplate enacting measures to allow public–private highway partnerships to develop in their states;
- created a public–private partnership website (http://www.fhwa.dot.gov/ipd/p3/index.htm) to act as a clearing house for highway PPP project information to states and transportation professionals, which has links to other related websites containing key policies of the U.S. Department of Transportation, FHWA publications, and summaries of selected highway public–private partnerships;
- made public presentations to states supporting their proposed public–private partnership highway projects, in some cases, cautioning them about the potential implications of some programs on which they have embarked (One notable such letter was from FHWA's chief counsel to the Texas Department of Transportation warning that if Texas lost its initiative on public–private

partnership statutes, that "private funds flowing to Texas will now go elsewhere." The U.S. Department of Transportation has also made public pronouncements stating that expansion of public–private partnerships was one of the most important trends in transportation, a message that should encourage both domestic and foreign developers.); and
- made tolling a key component of highway congestion mitigation. Under the Urban Partnership Agreement, the U.S. Department of Transportation selected certain metropolitan areas for consideration for aggressive strategies to address congestion. Congestion pricing could include networks of priced lanes on existing highways, variable user fees on entire roadways and bridges, and areawide pricing involving charges on all roads in a congested area.

PPPs Are Not Immune to Non-P3 Construction Project Problems

Public agencies partnering with concessionaires need to scrutinize the project as it progresses from start to finish as closely as they would scrutinize any conventional design–bid–build construction project in their domain. This notion was brought home by the bankruptcy of the South Bay Expressway in San Diego County on March 23, 2010. Projected to generate $42 million in tolls, it collected half that amount; projected to have a daily traffic count of 60,000 vehicles by 2009, it averaged only 23,000 per day, possibly because of the housing collapse in the general area and low cross-border truck traffic. Construction completion scheduled for Oct. 26 took an additional 13 months, with the bridge opening for traffic in November 2007.

The project had several unique aspects: the 3/4-mile (1,200-m) long bridge required a double row of columns extending the height to 180 ft (55 m) to limit highway grades to the approach, along with community demands and environmental mitigation issues, which added about $38 million to the project. So the project was hit with a triple whammy: complexity, construction delays, and significantly reduced traffic and resultant revenue.

Claims and counterclaims totaling $740 million were reduced by arbitration to $408 million. So it appears that as the project wends its way through Chapter 11, SANDAG (San Diego's regional planning agency) will seek other investment funds to acquire the assets of the expressway and negotiate the $510 million owed creditors, including $170 million from the federal government, while, according to the bankruptcy court, the company has only $42 million in cash reserves.

Railroads Weigh In

What do freight trains carry?

- 85% of the nation's coal,
- 75% of all automobiles produced in the United States, and
- 33% of our nation's harvest of grain.

U.S. railroads are the world's busiest, moving four times more freight than all of western Europe's systems combined. For short-line, 100- to 500-mi (60- to 312-km) travel, intercity rail passenger service appears to have a competitive edge over plane travel, given airport delays, strict security measures, and susceptibility to weather delays.

ORNL (2005) showed that intercity rail passenger travel consumed 17% less energy per passenger mile than airlines and 21% less than automobiles. These intercity trains emit 60% lower carbon dioxide emissions than automobiles per mile and half of those created by aircraft.

The Association of American Railroads (AAR) views the accomplishments of U.S. railroads as an opportunity to expand their participation in solving our nation's transportation problems. By increasing the use of rail cars to transport freight from port to distributor and vice versa, the number of trucks on our highways could be substantially reduced, and with that reduction, congestion would be lowered, the environment would benefit from less exhaust gases, and of course there would be fuel savings. However, the slight downside to shifting more freight from highway to rail is that there would be reduced government revenue from taxes associated with truck transport.

The AAR makes some strong arguments for expansion of rail service:

- A train can move 1 ton of freight 423 mi on just 1 gallon of fuel.
- Freight rail rates are the least expensive unsubsidized rates in the world.
- A single rail intermodal train can remove 280 trucks from the highway.
- It costs $1 million to $3 million to add 1 mile of rail capacity, as opposed to the $10 million or more it costs to add per mile of one lane to our urban highways.
- Truck fatality rates are four times higher than train fatality rates, so a switch to rail has a substantial safety factor.

The Four Biggest U.S. Railroads

The four biggest railroads in the United States are Norfolk Southern, CSX Transportation, Union Pacific, and BNSF Railway Company. Two major Canadian railroads, Canadian National Railway and Canadian Pacific Railway, also serve the United States. Along with the four large U.S. railroads, the Kansas City Southern operates from Chicago to the Gulf and to the Mexican border and has a significant stake in a line to Mexico City.

The short-line railroads, some locally owned, generate only 9% of railroad revenue, but they haul more than 11 million carloads, about half of the nonintermodal shipments.

Class 1 Railroads

U.S. Class 1 railroads are America's freight haulers, and they have seen intermodal container units increase 16%, from 8.07 million in 2004 to 9.4 million in

2006. But the railroads were not immune to the effects of the economic slowdown, reporting in an AAR news release dated Feb. 26, 2009, that freight traffic on U.S. railroads for the week ending Feb. 21, 2009, remained well below comparable figures for that same period in 2008. U.S. carload freight totaled 278,827 units during that period, down 14.2% from the comparable week in 2008. Intermodal loadings of containers were off 25.3%, and trailer volume dropped 32.3% for that same comparison period. Canadian railroads reported 13.7% lower volume than the previous year during that period, and Mexican railroads were down by 11.3%.

A Nov. 23, 2010, report from the AAR reported that monthly rail carloads were up 8.7% in October 2010, when compared to a similar period for 2009. The average 299,108 carloads for that month were the highest since October 2008. Intermodal traffic increased 14% in October 2010 when compared with October 2008.

Even though thousands of railcars and locomotives were in storage, railroads continue to deliver 43% of the country's intercity freight. And despite the slowdown in rail freight traffic, Edward Hamberger, president and CEO of the Association of American Railroads, urged Congress to support investment incentives that would stimulate the rail network's growth. To that end, he noted that the railroads had committed $9 billion in 2009 for capital improvements.

This rail PPP has worked well for America, and increased funding by the private sector, along with public agency encouragement via tax incentives and other government encouragement, should continue to improve the way we move freight from coast to coast.

Container Shipments in the United States

Intermodal containers come in a variety of shapes, sizes, and capacity, ranging from 20 to 53 ft (6 to 16 m) long and 8.5 to 9.75 ft (2.6 to 2.967 m) high. International container volumes are determined by 20-ft (6-m) equivalent units, or TEUs. For example, a 20-ft (6-m) long container is counted as 1 TEU, and a 40-footer (or 12 m) is counted as 2 TEUs.

Domestic containers for over-the-road truckers are typically 48–53 ft (14.6–16.1 m) long. These containers can be moved on railcars in several ways:

- as containers on flat cars, referred to as COFCs;
- as trailers transported on flatcars, referred to as TOFCs; and
- using double stacking of containers, which are moved on special, low-profile "well cars."
- In addition, automobiles are transported on their own specialized two- or three-level rail cars.

The projected growth of container shipments going through major East and West Coast ports is considerable. The Los Angeles–Long Beach port is one of the nation's busiest, with 2004 volume listed at 13.1 million containers and projected levels for 2020 at 59.4 million.

Ports in New York and New Jersey handled 4.478 million containers in 2004, and this quantity is projected to rise to 15.8 million by 2020. Other East Coast ports in Maryland, Virginia, South Carolina, Georgia, and Florida, as of 2004, had 6.36 million containers passing through their facilities, and their combined total, projected to 2020, is 23.7 million containers. And all of these containers must be trucked or railed or "intermodaled" throughout the country, so these increases should benefit rail and truck owners alike.

What Are the Alternatives?

A study by the American Association of State Highway and Transportation Officials (AASHTO 2007) revealed that the federal highway program would face a crisis in 2009, when it was projected to have a shortfall of $4.3 billion. That organization calculated that a three-cent fuel tax increase could have averted a $16 billion highway program cut.

The economic uncertainties as the 21st century unfolded, although particularly gloomy, may have created an environment in which we could look to make those changes that were not politically or financially viable in previous years. This might be the appropriate time to seriously consider some new ways of looking at our nation's transportation system and several ideas whose time, it appears, has come.

Truck-Only Lanes

By instituting truck-only lanes, we open the potential for bigger loads and longer trucks running on a roadbed constructed for those heavier loads. We get trucks off the general-purpose highway lanes and onto segregated lanes on the interstates and, in the process, create more space for passenger vehicles. Larger loads mean fewer trips, and fewer trips translate into fuel savings, lower truck emissions, and less wear and tear on truck tires, engines, transmissions, and drivers. It might even result in stabilized or reduced freight rates. This option requires public funding but leaves open the potential for private investment as well.

Rail

We have seen how the railroads can transport multiple containers and/or trailers, thereby freeing up the highway while providing savings in fuel, emissions, and truck depreciation in the process. The Association of American Railroads reported that rail rates have dropped by more than half since 1981, whereas productivity has increased 43% on intercity rail moves, 71% on coal shipments, and 35% on grain moved by rail. Private investment of $148 billion (in 2007 dollars) in railroads was anticipated by AAR (2007); $96 billion coming from Class 1 revenue growth, higher volumes, and productivity improvements and $13 billion from short-line and regional railroads, leaving a balance of $39 billion. This shortfall of $39 billion could be addressed by government-sanctioned incentives and pub-

lic–private partnerships. The AAR points to the Alameda Corridor as an example of the benefits accruing to both the public and corporations when these types of PPPs are created. They suggest that more such ventures could be pursued.

Public Transit

Moving more people in one conveyance just makes sense. We showed in Chapter 2 that the operating cost of light rail is $0.544 per passenger-mile versus $0.414 for auto travel and $0.645 for bus, but light rail does offer advantages outside of the cost spectrum. Public transit ridership has increased as gas prices have increased, so might it be possible to reach a break-even point for costs? Construction, operation, and maintenance of new or expanded facilities, as an added benefit, would provide employment opportunities for all of these activities, and residents would be provided with additional commuting options. This mode of transportation is also more environmentally friendly than fossil-fuel powered conveyances. Congestion pricing could benefit public transit by shifting more ridership from automobiles to light rail, subway, and urban bus lines. It may be possible that advances in technology could lower costs for public-transit construction, operational costs, and maintenance costs and reduce or eliminate government subsidies. Research funding may result in improved efficiencies, and that funding would be money well spent if further expansion or upgrades to our current public transit system could provide a revenue stream for the public agency and an incentive for private investment.

The Double-Edged Sword of Automobiles

New vehicles powered by long-life batteries, natural gas, or hydrogen and the use of biofuels in current vehicles certainly address many of the energy and environmental issues relating to automobile travel. However, they create other problems, such as the spike in the cost of food products vying for the corn used to make ethanol. The interstate highway system of the 1950s afforded mobility to millions of citizens and fostered the growth of suburban areas ringing most of the major cities of the country; it also gave birth to the megalopolis. We have almost come full circle: We use highways to escape the city for a more tranquil home life and to take us back to the cities to earn a living, so now both the cities and the highways are increasingly clogged.

Urban Issues

We are a metropolitan society, and our 100 largest metropolitan areas contain more than 65% of the nation's total population. Because we are an urban society, it would make sense to devote much of our transportation money to those urban transportation needs. But because funding is not limitless, we need to make choices and channel funds into those areas of transportation deemed most cost-effective and environmentally prudent.

It appears that the role of public–private partnerships has been accepted and successfully used around the world, and more recently, in the United States, and there is a future for innovative transportation projects where both private and public sectors can flourish.

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