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INFRASTRUCTURE OUTSOURCING: LEVERAGING CONCRETE, STEEL, AND ASPHALT WITH PUBLIC-PRIVATE PARTNERSHIPS

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Infrastructure Outsourcing: Leveraging Concrete, Steel, and Asphalt with Public-Private Partnerships

BY ADRIAN T. MOORE, GEOFFREY F. SEGAL, AND JOHN MCCORMALLY

Executive Summary

Record economic growth has fueled a growing desire to rebuild and improve the nation's infrastructure. State and local governments traditionally have relied on public-works agencies or departments for project delivery, but the growing number of vital infrastructure projects has led these agencies to seek outside help. With increased participation by the private sector, innovative outsourcing has changed the face of infrastructure delivery.

The outsourcing wave continues to swell, affecting many different types of public-works agencies across the nation. Surveys show that at a minimum (not all agencies responded to the surveys):

- Natural-resource and environmental-protection agencies in 18 states outsource engineering services;
- General-services agencies in 22 states outsource architectural, building-construction, or facility-maintenance functions;
- Transportation agencies in 34 states outsource highway design, road and bridge construction, road maintenance, architectural services, or airport projects;
- Correctional agencies in 26 states and dozens of counties and cities have outsourced designing, building, and/or operating correctional facilities; and
- Virtually all local governments outsource the design and construction of roads, bridges, solid-waste facilities, schools, and water and wastewater facilities.

Public agencies have entered into these partnerships because strain on their budgets, need for additional personnel for a limited duration, project delivery demands, and lack of personnel or expertise have left them

unable to meet the infrastructure demands of thriving economies. In 1998, the American Society of Civil Engineers estimated the cost of repairing and updating the nation's infrastructure to be \$1.3 trillion.

A wealth of evidence demonstrates that outsourcing can be an effective tool that governments can use to deliver infrastructure projects and capture a broad range of benefits. Outsourcing part or all of infrastructure projects helps governments to:

- Achieve improved quality;
- Accommodate peak demand;
- Speed project delivery and meet deadlines;
- Gain access to expertise;
- Improve efficiency;
- Spur innovation;
- Better manage risks; and
- Cut or contain costs.

The first seven benefits are often overlooked in the public debate, but research shows that they often drive actual outsourcing decisions. This study provides the first systematic overview of all the potential benefits of outsourcing infrastructure projects, with both research summaries and case studies to help public officials find solutions they can use themselves.

A wealth of evidence demonstrates that outsourcing can be an effective tool that governments can use to deliver infrastructure projects and capture a broad range of benefits.

Given the dominance of cost issues in so many public debates, we also thoroughly examine the cost comparison literature. One disconcerting feature that emerges from studies of cost savings from outsourcing road and bridge projects (the only real body of infrastructure outsourcing cost literature) is the range of findings they exhibit. Most are conducted by the state transportation departments, and they tend to find themselves to be cheaper than consultants. But the findings range from consultant costs that are "cheaper" than in-house design in one study to 240 percent more expensive in another: mixed results at best. The picture only gets murkier if you bore down into the details.

Underlying these discrepancies are inconsistent methodologies, poor data, the exclusion of important cost factors, and widely varying measurements. Moreover, almost all of the literature examining cost savings from infrastructure outsourcing examines transportation projects. The evidence of costs savings from outsourcing the designing, building, and maintaining of water and sewer projects, public buildings and facilities, prisons, landfills, and the like is largely ignored.

Upon thorough examination of the data, it is clear that the use of consultants is beneficial in some areas. It is not a magic wand to solve all infrastructure delivery problems; however, creating a competitive environment in which public-works agencies work in tandem with private partners, shows tremendous promise for improving infrastructure delivery. The literature shows that (a) design costs were lowest in states that used a

mix of private- and public-sector work and (b) states that used contracting had a slower growth of design costs than did states that did not use contracting.

Most important, cost is almost never the only reason for outsourcing; nor is it always the most important—a number of other factors have become key drivers of outsourcing. Council of State Governments data indicate that flexibility, access to personnel or skills not available in-house, increasing political support for outsourcing, and tapping of private-sector innovation are all important drivers of outsourcing.

Consider fixed staffing levels with changing project demands. Infrastructure development naturally ebbs and flows, but public employees, protected by civil service, remain at steady levels. The problem of having fluctuating workloads but steady staffing levels can be solved through outsourcing, using consultants as a resource pool that can adjust to address needs. A 1990 study by the Wisconsin Legislative Audit Bureau concluded that outsourcing was used primarily for two reasons: to provide expertise unavailable to in-house staff and to meet short-term, or “peak,” demand levels, for which the addition of permanent staff would be uneconomical. The National Cooperative Highway Research Program surveyed state transportation departments and found that half of the states are using consultants to accomplish 50 percent or more of preconstruction engineering and that the primary reason for contracting for design work is constraints on staff size, or the desire to avoid staffing peaks.

We conclude that in order to keep up with growing demand and changing environments, public-works agencies must employ additional cost-effective resources to ensure delivery of all necessary services, and that outsourcing is one method of achieving best value for each dollar invested.

The use of the private sector in the delivery of infrastructure is a vital component of economic development. In order to keep up with growing demand and changing environments, public-works agencies must employ additional cost-effective resources to ensure delivery of all necessary services. That means recognizing the value of private-sector involvement and capitalizing on opportunities for outsourcing.

We conclude that in order to keep up with growing demand and changing environments, public-works agencies must employ additional cost-effective resources to ensure delivery of all necessary services, and that outsourcing is one method of achieving best value for each dollar invested. Improvements in the cost accounting of state agencies through implementation of new accrual accounting standards—and further moves toward full-cost accounting—will help decision makers obtain a clearer picture of project costs. And we make four specific recommendations to policy makers:

- 1. Recognize the rich and varied potential benefits of infrastructure outsourcing.*
- 2. Recognize the problems with cost comparisons.*
- 3. Recognize the rich variety of types of outsourcing and project delivery.*
- 4. Understand the importance of utilizing private-sector industries for delivery of public infrastructure.*

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Part 1

Introduction

An important element of a city or region's economic prosperity and viability is adequate infrastructure. Roads, water, sanitation, and other types of public works constitute an integral component of municipal service delivery. City and regional transportation networks consisting of roads, railways, airports, and harbors foster a vibrant, interconnected business climate by providing the avenues through which trade takes place. In the digital economy, telecommunication links have reduced the importance of location, making the development of high-tech infrastructure vital to growth. Fiber-optic cables, spanning loops, and satellite farms are now as important as traditional public infrastructure. The Information Age has also created an increased emphasis on quality of life, while parks, schools, and recreational facilities serve to make a community more attractive to potential residents and businesses, all demands that place further stresses on infrastructure. Infrastructure renewal and maintenance is vital to sustained growth and development.

These projects require financial and personnel resources to design, engineer, construct, and maintain. Traditionally, state and local governments have relied upon taxes and bonds for funding and on public-works departments or agencies for project delivery. Recently, there has been an increased reliance on the private sector for all facets of infrastructure projects, from design and engineering to construction and on to operation and maintenance. These outsourcing arrangements, often called public-private partnerships, range from small contracts for a limited scope of services to very large contracts for turnkey delivery of completed facilities and beyond. Their proliferation has increased participation by the private sector in infrastructure projects and changed the face of infrastructure delivery.

Public agencies outsource because strains on their finances, project delivery schedules, and personnel resources have left them unable to meet the infrastructure demands of thriving economies. In 1998, the American Society of Civil Engineers estimated the cost of repairing and updating the nation's infrastructure to be \$1.3 trillion (see Table 1).¹ The estimates may be a bit self-serving, but similar figures come from a variety of sources: the U.S. Department of Transportation estimates that our highways and bridges need over \$56 billion per year in investment over the next 20 years;² the General Accounting Office in 1995 estimated \$112 billion in immediate needs for school maintenance and upgrades;³ the National Education Association

¹ American Society of Civil Engineers, *1998 Report Card for America's Infrastructure* (Washington, D.C.: American Society of Civil Engineers, 1998).

² Federal Highway Administration, *1999 Status of the Nation's Highways, Bridges, and Transit: Conditions and Performance* (Washington, D.C.: U.S. Department of Transportation, 1999), p. ES-11, www.fhwa.dot.gov/policy/1999cpr.

³ General Accounting Office, *School Facilities: The Condition of America's Schools* (Washington, D.C.: General Accounting Office, 1995).

estimates school modernization needs at over \$262 billion;⁴ the Water Infrastructure Network estimates that an additional \$23 billion per year for the next 20 years is needed to upgrade existing drinking-water and wastewater treatment facilities to comply with environmental standards and to build new facilities to accommodate growth.⁵ Finally, under new state and local government accounting standards (taking effect between 2001 and 2004), all government entities must determine the value of their infrastructure facilities and reflect that value in their books. They then must either maintain the facilities to sustain their value or depreciate the value in their accounts.⁶ This is likely both to improve the data on infrastructure values and needs and to create new incentives to avoid deferring maintenance.

Recently, there has been an increased reliance on the private sector for all facets of infrastructure projects, from design and engineering to construction and on to operation and maintenance.

Table 1: U.S. Infrastructure Condition and Investment Needs		
Facilities	Condition	Investment Needs
Roads	Poor to inadequate	\$263 billion to fill backlog and maintain \$94 billion for improvements
Bridges	Mediocre to poor	\$80 billion to fix currently deficient bridges
Transit	Mediocre	\$39 billion to maintain \$72 billion to improve
Aviation	Mediocre to poor	\$40–\$60 billion to expand to meet growing demand
Schools	Inadequate	\$112 billion to modernize \$60 billion for new schools to meet growth
Drinking Water	Poor	\$138.4 billion to improve
Wastewater	Poor to mediocre	\$140 billion to improve
Dams	Poor	\$1 billion to fix unsafe dams
Solid Waste	Mediocre to poor	No estimate
Hazardous Waste	Poor to inadequate	\$750 billion to clean up identified hazardous sites
Total		At least \$1.3 trillion

Source: American Society of Civil Engineers, "1998 Report Card for America's Infrastructure," (Washington, D.C.: American Society of Civil Engineers, 1998).

The magnitude of the importance of infrastructure delivery has led some public-works agencies to seek new solutions. Private firms, building upon a long history of providing design and construction services to other businesses seeking expansion of their infrastructure, now offer state and local governments an alternative to traditional project delivery, through outsourcing and innovative partnerships. Governments are coming to

⁴ National Education Association, *Modernizing Our Schools: What Will It Cost?* (Washington, D.C.: National Education Association, 2000), p. 9.

⁵ Water Infrastructure Network, *Clean and Safe Water for the 21st Century* (Washington, D.C.: Water Infrastructure Network, 2000), p. 3-3, www.wef.org/publicinfo/NewsRoom/PressReleaseArchives/2000/041200.htm.

⁶ See Governmental Accounting Standards Board Statement No. 34, www.rutgers.edu/Accounting/raw/gasb/repmodel/index.html.

adopt a modified role and mission with respect to infrastructure—one of stewardship. Government often has a necessary oversight role, sometimes has a necessary management role, and often is the “purchaser” of infrastructure facilities, but designing, building, and operating infrastructure facilities are increasingly tasks that can be accomplished by private firms in competitive situations.

Expanding the use of outsourcing for infrastructure projects has not come without controversy. Battles over measurement of cost savings, public-employee jobs, and other issues have swirled around outsourcing in most states. In 2000, California is one of the front lines of these battles.

In 1998, California voters rejected an anti-outsourcing initiative sponsored by the Professional Engineers in California Government (PECG), a group representing engineers employed by the state. An analysis of the PECG initiative issued prior to the election emphasized: “Contracting out in California has been used to speed project delivery and to help government secure needed expertise without having to incur the expense of overstaffing when workload is at a cyclical low.”⁷

Unique Public-Private Partnership Delivers School to District of Columbia



In December 1999, District of Columbia Public Schools (DCPS) entered into a unique partnership with LCOR, a firm specializing in developing and managing facilities, to rebuild the James F. Oyster School. The new school will replace the deteriorating 73-year-old school in the Woodley Park neighborhood of Northwest Washington. LCOR will build the new school in exchange for excess land on which a new privately owned 211-unit apartment building, named the Henry Adams House, will be located.⁸

The new school will be the first new public school built in the District in 20 years.⁹ The current school has a leaky roof, does not have a cafeteria or gym, and cannot be wired for computers. The new school will be twice the size of the old one and will have a gym, kitchen, cafeteria, and common space.

A creative financing structure, made possible through the partnership, helped make the new school possible while realizing the value of an undervalued asset, the school’s excess land. The new school is being financed by an \$11 million, 35-year tax-exempt bond issue underwritten by Paine Webber. The bonds will be retired by means of PILOT (Payment in Lieu of Taxes) payments made by the private owners of the Henry Adams House project. Under the unique PILOT program, the apartment building owners will make these payments in place of real-estate taxes.

“DCPS had an asset they could not properly utilize without a venture of this sort.”¹⁰ The partnership has brought a much-needed new school, as well as housing, to the D.C. area. Most important, the unique financing structure has brought these projects to fruition with little or no cost to the taxpayers—truly a win-win situation.

D.C. school officials started out skeptical but eventually got behind the project when the benefits became obvious. Mary Filardo, former head of the Oyster PTA, said after she helped arrange the deal: “It is important for other communities to do what we have done.”¹¹

⁷ William Hamm et al., *An Analysis of the PECG Initiative* (Emeryville, Calif.: Law and Economics Consulting Group, November 1997), p. 3.

⁸ Tim Smith, senior vice president, LCOR, interview with author, March 2000.

⁹ Susan Ferrechio, “School Saved by Private Funding,” *Washington Times*, December 11, 1999, p. A-8.

¹⁰ Smith, interview with author.

¹¹ Ferrechio, “School Saved by Private Funding,” p. A-8.

An earlier (1995) report by the Little Hoover Commission had pointed out the problem of backlogged infrastructure projects, arguing that restricting state agencies' ability to contract for services undermines the public interest in efficient and timely infrastructure project delivery.¹² The report specifically recommended allowing contracting with private firms to do public work. "The state needs to find more cost-effective ways of doing business, and it cannot be precluded from looking to the private sector for that efficiency."¹³ However, the state courts, in a series of rulings capped by the 1997 California Supreme Court decision in *Professional Engineers in California Government v. Caltrans*, have held that the language in Article VII of the state constitution—"in the civil service permanent appointment and promotion shall be made under a general system based on merit ascertained by competitive examination"—means that if state employees have ever performed a job, it cannot be outsourced. This puts California markedly out of step with national and international trends and best practices in outsourcing infrastructure projects.

Public agencies outsource because strains on their finances, project delivery schedules, and personnel resources have left them unable to meet the infrastructure demands of thriving economies.

In November 2000, California voters will revisit the issue. The "Fair Competition and Taxpayer Savings Initiative," put forward by the private engineering industry but supported by many other groups, including local governments, would allow the state to contract with private firms to help meet the growing backlog of infrastructure improvement projects.¹⁴ Allan Zaremborg, president of the California Chamber of Commerce and chair of the coalition supporting the initiative, calls its passage vital:

Already we're facing an almost \$3 billion bottleneck in transportation projects. This is work that needs to be done, work that's ready to be done, but work that is on hold because the state does not have the staff to do it, and we can't contract with the private sector to design and engineer any of this work. This isn't just a transportation issue. We need new schools, water projects and wastewater systems. We need work to be done to upgrade existing infrastructure. But the way it stands right now, California won't be able to use private sector architects and engineers. That means we'll wait longer for that work to be done, we'll pay more for those public works projects when they are built, and we'll have to do the work without having the freedom to use the best people for the job.¹⁵

Amid the battles over outsourcing in California and elsewhere around the nation too often filled with administrative bias, union pressures, and flawed research, one clear fact is that outsourcing is a management tool that can work well in appropriate circumstances and not so well in others. Like any policy tool, outsourcing is no panacea. There can be pitfalls, and prudent public officials will strive to use best practices and learn from others' experiences. Done right, outsourcing creates competition in infrastructure project delivery, fostering an environment in which the best-quality project is delivered in the most efficient manner. To understand how outsourcing fits into the mix of infrastructure project decisions and how it can be used to further public goals of improved infrastructure, we have to understand the trends in its use and the policy debates that have surrounded it.

¹² Little Hoover Commission, *Too Many Agencies, Too Many Rules: Reforming California's Civil Service*, Report No. 133 (Sacramento: State of California, April 1995), www.lhc.ca.gov/lhcdir/133rp.html.

¹³ *Ibid.*, p. 50.

¹⁴ See www.celsoc.org/TFC%20Pages/main_koi.htm.

¹⁵ *Ibid.*

Part 2

Trends

Responsibility for elements of our infrastructure is spread across so many state and local governments—and agencies within those governments—that it is difficult to determine precisely the extent of outsourcing’s role. However, surveys of state and local governments, recent outsourcing-enabling legislation, and the observations of industry and government officials all give an indication of how prevalent outsourcing has become in infrastructure projects.

To begin with, outsourcing trends in the United States are rooted in an international context. Countries throughout the world are using outsourcing to develop infrastructure. In the United Kingdom, more than 250 projects have been completed or are under way under the Private Finance Initiative, which outsources to private firms the financing and delivery of a broad range of public projects.¹⁶ The World Bank argues that in less-developed countries, the solution to poor service delivery, waste, and mispricing of infrastructure facilities is greater private investment in facility development and operation, and it reports that in 1997 \$40 billion in private capital was invested in developing nations’ infrastructure.¹⁷

A. State Governments

In the United States, a 1998 survey by the Council of State Governments (CSG) asked state agencies about past and future privatization and the use of outsourcing, including outsourcing design, engineering, construction, and maintenance of facilities.¹⁸ Not all agencies responded, and all states have historically outsourced many aspects of infrastructure projects, so the results are only a baseline, but they include:

State Administration and General-services Agencies:

- Twenty-two states report outsourcing architectural, building-construction, or facility-maintenance functions;
- Seventy-seven percent of outsourcing agencies say that their use of outsourcing increased in the 1990s (none decreased);
- Sixty-nine percent say it will increase in the 2000s (none expect a decrease); and
- Cost savings, flexibility (versus red tape), and lack of agency personnel and expertise are the dominant reasons for increased outsourcing.

¹⁶ Arthur Andersen and Enterprise LSE, *Value for Money Drivers in the Private Finance Initiative* (United Kingdom: Treasury Taskforce, 2000).

¹⁷ “Private Goes Public,” *The Banker*, October 1, 1999, p. 33.

¹⁸ Keon Chi and Cindy Jasper, *Private Practices: A Review of Privatization in State Government* (Lexington, Ky.: Council of State Governments, 1998).

State Natural-resource and Environmental-protection Agencies:

- Eighteen states report outsourcing engineering services;
- Seventy-eight percent of outsourcing agencies say their use of outsourcing continued or increased in the 1990s (none decreased);
- Eighty percent say it will continue or increase in the 2000s (2 percent expect a decrease); and
- Cost savings, increased support of political leadership, increased innovation, and lack of agency personnel and expertise are the dominant reasons for outsourcing.

State Transportation Agencies:

- Thirty-four states report outsourcing highway design, road and bridge construction, road maintenance, architectural services, or airport projects;
- Seventy-six percent of outsourcing agencies say their use of outsourcing increased in the 1990s (none decreased);
- Ninety-seven percent say it will continue or increase in the 2000s (none expect a decrease); and
- Lack of agency personnel and expertise, cost savings, and increased support of political leadership are the dominant reasons for outsourcing.

Table 2: 1990 Estimated Percentage of Total Highway Engineering Projects by Consultants

State	Percentage
Arizona	80
Indiana	80
Pennsylvania	75
Florida	74
Louisiana	70–80
Illinois	50
Wisconsin	35
California	15
Michigan	15
Iowa	<10
Minnesota	<10

Sources: Wisconsin Legislative Audit Bureau, *Evaluation of Use of Engineering Consultants: Department of Transportation, 90-9* (Madison: State of Wisconsin, April 1990); and Chester Wilmot et al., "In-House Versus Consultant Design Costs in State Departments of Transportation," *Transportation Research Record* 1654, Paper No. 99-1403, p. 159.

Preliminary results from a survey by the National Cooperative Highway Research Program, under the auspices of the Transportation Research Board, found that half of the states are using consultants to accomplish 50 percent or more of preconstruction engineering, and that most states expect growth in this type of outsourcing to continue.¹⁹ Furthermore, the study notes that the primary reason for contracting out design work is constraints on staff size, or the desire to avoid staffing peaks.²⁰ This process is accelerated since many state departments are moving in-house engineers into project management of both in-house and consultant projects²¹ (see Table 2). Since 1990, outsourcing by state departments of transportation has likely increased. The study also indicates that those states that outsource 50 percent or more of their design services have lower overall costs.

¹⁹ Loren Kaye and Richard Kreutzen, *Meeting California's Infrastructure Challenge: Assuring Cost-effective and Timely Project Delivery* (Sacramento: California Taxpayers' Association and California Chamber of Commerce, May 1999), p. 5, www.caltax.org/RESEARCH/infrastructure.design.5-99.htm.

²⁰ Ibid.

²¹ Ibid.

B. Local Governments

Information on municipal infrastructure outsourcing is harder to come by than information on state agencies, but service-specific information also indicates growth in outsourcing.

1. Water and Wastewater

While many cities own and operate their water and wastewater facilities, most outsource design, engineering, and construction of new facilities, and they increasingly contract for operation and maintenance as well. A 1997 service-delivery survey by the International City/County Management Association (ICMA) showed that 1 in 15 cities outsources operation of water or sewer systems.²² Revenue projections for firms that design, build, and/or operate municipal water and sewer systems indicate expectation of increased outsourcing.²³ Typically, cities and counties “have a small dedicated engineering group to handle day-to-day environmental problems and monitoring. . . . [A]ll significant designs are outsourced.”²⁴

A 1998 survey by R. W. Beck found that the greatest operational concern of water and sewer utility officials is meeting environmental regulations.²⁵ The survey paints a more complex picture of capital-investment concerns. Public officials were asked what were the most important drivers of water and sewer capital improvements. For 40 percent it was growth in demand, for 30 percent the age of existing capital, for 27 percent it was environmental regulations, and three percent indicated other reasons.

Keeping up with economic growth and coping with aging facilities are currently the greatest concerns.

Keeping up with economic growth and coping with aging facilities are currently the greatest concerns. But that may change. Over the last two decades, through the Clean Water Act, the Safe Drinking Water Act, and their subsequent amendments, standards governing the quality of drinking water and cleanliness of effluent discharged into waterways have become ever more stringent. To meet these increasing standards, many local water and wastewater systems require improved technologies and upgraded infrastructure. The Environmental Protection Agency, the Association of Metropolitan Sewerage Agencies, the Water Environment Foundation, and others proffer varying estimates of the capital investments needed to bring all U.S. water and sewer systems into compliance, but the total is likely between \$500 billion and \$1 trillion. Planned federal and state funding will likely amount to less than one-quarter of the need; the rest will have to come from local taxpayers or from private investors.

²² Lawrence Martin, *Contracting for Service Delivery: Local Government Options* (Washington, D.C.: International City/County Management Association, 1999), pp. 40–41.

²³ *Public Works Financing*, March 1999.

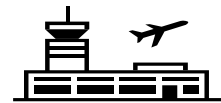
²⁴ Jim Walsh, senior vice president, SCS Engineers, interview with author, March 2000.

²⁵ R. W. Beck, *1998 Water Resources National Competitiveness Survey* (Seattle: R. W. Beck, 1998).

2. Jails and Prisons

Private contractors have long designed and built jails and prisons. In a relatively new development, some governments have accelerated completion of projects by delegating more authority to, and reducing regulatory requirements on, private design-build teams. Even more recent is the appearance of prisons wholly financed and built by the private sector, which offer their bed space on a per-diem contract basis to jurisdictions experiencing an overflow of prisoners. This will be increasingly important not only to provide space for new prisoners, but also to replace existing aged facilities as needed. Nearly 300 prisons in the United States are over 50 years old, and more than 50 are over 100 years old.²⁶ These facilities will need replacement or thorough renovation as they decay or become obsolete and inefficient to operate.

Outsourcing for Airports



New York City. In an outsourcing touted as the largest in the nation, the Port Authority of New York and New Jersey has contracted with a consortium (including LCOR) for the renovation, expansion, and operation of the International Arrivals Terminal at John F. Kennedy International Airport. The project's estimated value is \$1.2 billion.²⁷

Several benefits will accrue to the port authority. Outsourcing the massive project has enabled the port authority to refocus on its core mission. The project has also created predictable cost and revenue streams. Also, the new terminal will be on-line sooner—the consortium is on track to complete the project an estimated 18 months faster than the port authority had projected.²⁸ Dave Sigman, vice president of LCOR, suggests that the budget is much closer to the original estimate than it would have been had the port authority undertaken the project.²⁹ The project was financed using credit from the port authority, via special project bonds based on the future cash flow of the project.

Private operation of the new Terminal 4 has led to other advantages. The consortium not only has been able to control operating expenses, but also has been able to boost revenues from the project, primarily through innovative management techniques. For example, the consortium has greater flexibility in terminal pricing, such as peak and off-peak pricing for terminal use.³⁰

Los Angeles. The most extensive upgrade at Los Angeles International Airport (LAX) since the 1984 Olympics has been launched as a design-build project. A bridging delivery strategy will also be employed on the \$112 million project, known as Gateway LAX. LAX decided to depart from traditional contracting procedures to meet a "tight schedule, reduce overall change orders and minimize interpretation problems." Contractors were given extensive performance specifications, and the contracts were awarded to low bidders. Work has begun on the \$75 million Phase One, which will run three separate construction contracts simultaneously.³¹

²⁶ Alex Singal and Raymond Reed, *An Overview of the Private Corrections Industry* (New York: Legg Mason Equity Research, 1997), p. 24, citing Bureau of Justice Statistics.

²⁷ www.lcor.com/jfkairterminal.html

²⁸ Dave Sigman, vice president, LCOR, interview with author, March 2000.

²⁹ Ibid.

³⁰ Ibid.

³¹ *Design-Build*, December 1999, p. 5

3. Solid Waste

The percentage of all solid-waste facilities owned by the public sector declined from 83 percent in 1984 to 73 percent in 1997 and to 64 percent in 1998. A 1998 R. W. Beck survey showed that 27 percent of municipalities with populations greater than 100,000 were considering privatization as an option to fulfill their disposal needs.³² Moreover, the design, engineering, and construction of solid-waste facilities are “almost exclusively” outsourced.³³ (Day-to-day environmental operations, such as monitoring and permitting, are largely provided by in-house engineers.)³⁴ Reliance on the private sector is easily understood. Major expansions of facilities are needed only every 5 to 10 years and major constructions every one to two years, while the designs for these projects take between one and two months.³⁵ If they were handled in-house, the engineer would be without work for a majority of the time.

4. Highway and Street Maintenance

According to ICMA data, one-third of cities outsource street repair, up 5 percent between 1982 and 1997.³⁶ Another study found that in 1995, 37 percent of cities outsourced street repair, up 19 percent from 1987.³⁷

Outsourcing Brings Hi-tech Laboratory to Florida State University



The 290,000-square-foot National High Magnetic Field Laboratory at Florida State University, in Tallahassee, Florida, is an example of a competitive, networking-oriented procurement strategy. The \$75 million facility houses the most powerful research magnets in the world.

A guaranteed maximum price (GMP) contract was negotiated for building the facility, creating incentives for the contractor based on cost savings, quality, technical performance, time savings, or a combination of those.³⁸

The project team brought the initially \$8 million over-budget architectural and engineering plans back into line; brought a 50-megawatt electric substation to serve the facility on-line; and coordinated record numbers of concrete trucks to pour continuously a three-foot-deep mat of concrete, free of seams and cracks, as the foundation for a crucial part of the laboratory.³⁹

The facility was built in the record time of 18 months and was within budget. “A sense of camaraderie and purpose was evident in the complex interactions of the core team and nearly fifty subcontractors—working in a team environment, for the same goal.”⁴⁰

³² Jonathan Burgiel, *Trends in Privatization and Managed Competition: National Survey Results* (Seattle: R. W. Beck, 1998), www.rwbeck.com.

³³ Steve Menoff, IT Consulting, interview with author, March 2000.

³⁴ Walsh, interview with author.

³⁵ Ibid.

³⁶ Martin, *Contracting for Service Delivery*, pp. 40–41.

³⁷ William D. Eggers et al., *Cutting Local Government Costs Through Competition and Privatization* (Los Angeles: Reason Public Policy Institute, 1997), p. 41.

³⁸ Margaret C. Bowden and William E. Klay, “Contracting for 21st Century Infrastructure,” *Public Budgeting and Financial Management*, vol. 8, no. 3 (1996), pp. 384–405.

³⁹ Ibid.

⁴⁰ Ibid.

C. Legislation

Trends in the practice of outsourcing are reflected in legislation. The last few years have seen a growth in enabling legislation that promotes infrastructure outsourcing. For example, California’s government code (section 5956, chapter 14) and Georgia’s code (section 36-10-2) enable a broad range of infrastructure project outsourcing, and Florida, New Jersey, and Minnesota have passed similar laws in recent years. (California’s law applies only to local governments, not to state agencies.)

Arizona is considering expanding the design-build pilot program of the Arizona Department of Transportation (DOT) via house bill 2274. The bill will allow design-build projects for structures, facilities, and other specified building types. Arizona DOT construction engineer Ron Williams sees consultant involvement in infrastructure design as inevitable. “When you don’t have the people, you’ve got to go outside to get them.”⁴¹ Williams cites declining college enrollment in civil-engineering programs and the ability of private-sector companies to offer civil-engineering graduates more-lucrative salaries as factors contributing to dwindling resources that leave state agencies unable to keep up with infrastructure demand.

D. Project Delivery Methods

The new climate of outsourcing has created several new project delivery models, rooted in traditional modes:

1. **Design.** Contracts to use architectural and specialty designers range from single project delivery to retaining staffing levels over a specified contract period.⁴²
2. **Engineering.** Often, engineering consultants are called in on a project to address special concerns in areas where public-sector agencies do not have expertise. Again, contracts range from single project delivery to yearly contracts to retain staffing levels.
3. **Construction.** In traditional methods of design-bid-build, the private sector played an integral role—a role it still maintains. More recent and innovative practices call for the integration of design/engineering and construction phases into design-build (DB) by a single firm (or consortium).
4. **Maintenance.** Similar to construction services, private-sector firms have been contracted to maintain public infrastructure for years. Now they are being asked to play a more integral role by actually guaranteeing maintenance services when the project is built. DBM (design-build-maintain) and DBOM (design-build-operate-maintain) are contracting alternatives that shift greater risk and responsibility to the private sector.
5. **Operation.** A long history exists between private firms and municipalities in the outsourcing of municipal services. However, as with maintenance, operation is increasingly integrated with design and construction—DBO (design-build-operate) contracts are more prevalent now than ever.
6. **Turnkey.** These are usually combinations of the above, often in the form of BOT (build-operate-transfer), BOOT (build-own-operate-transfer), and the like. With a turnkey project, the private sector delivers a complete project ready to operate, or even owns and operates it for a set time before transferring it to the government.

⁴¹ Ron Williams, ADOT construction engineer, interview with author, March 2000.

⁴² Both design and engineering service contracts that seek to retain expertise to rapidly respond to contingencies are usually called indefinite-delivery/indefinite-quantity, or ID/IQ, contracts.

Part 3

Policy Issues of Infrastructure Outsourcing

The public debate over outsourcing often revolves around whether outsourcing saves money. Costs are easy to grasp, the figures are usually large, and other issues are more subtle and less sensational for proponents or critics to use in arguments. But cost alone is rarely used to determine whether design, engineering, or construction work should be outsourced. Council of State Governments data indicate that flexibility, access to personnel or skills not available in-house, increasing political support for outsourcing, and tapping of private-sector innovation are all important drivers of outsourcing.⁴³ Indeed, best practices for government procurement and service contracting are steadily moving toward “best-value” techniques, where, rather than selecting a private partner based on low cost alone, governments choose the best combination of cost and quality.

Governments are starting to realize what every shopper knows—sometimes if you pay more, you get more; that is, the best value is not always the cheapest. Indeed, the idea that selecting firms to provide complex services or projects should be based on qualifications and technical merits, as long as the price is a value for what is promised, is becoming mainstream.⁴⁴ The Federal Acquisition Regulations were amended in 1996 (FAR 2.101) to allow best-value source selections in outsourcings. Federal Acquisition Regulations define “best value” as “the expected outcome of an acquisition . . . providing the greatest overall benefit in response to the requirement.” And the American Bar Association’s revised *Model Procurement Code* incorporates best-value procurements as the standard.⁴⁵

This is not an entirely new concept. In a 1984 Transportation Research Board survey of all state transportation departments, two-thirds of the respondents said they did not use or only occasionally used design cost as a factor in deciding whether to contract for design work.⁴⁶ The respondents indicated that design cost is not a major factor when compared to other factors and that cost data for *internal* operations, especially overhead charges, are not sufficiently accurate to make meaningful comparisons.⁴⁷

⁴³ Chi and Jasper, *Private Practices*, p. 8.

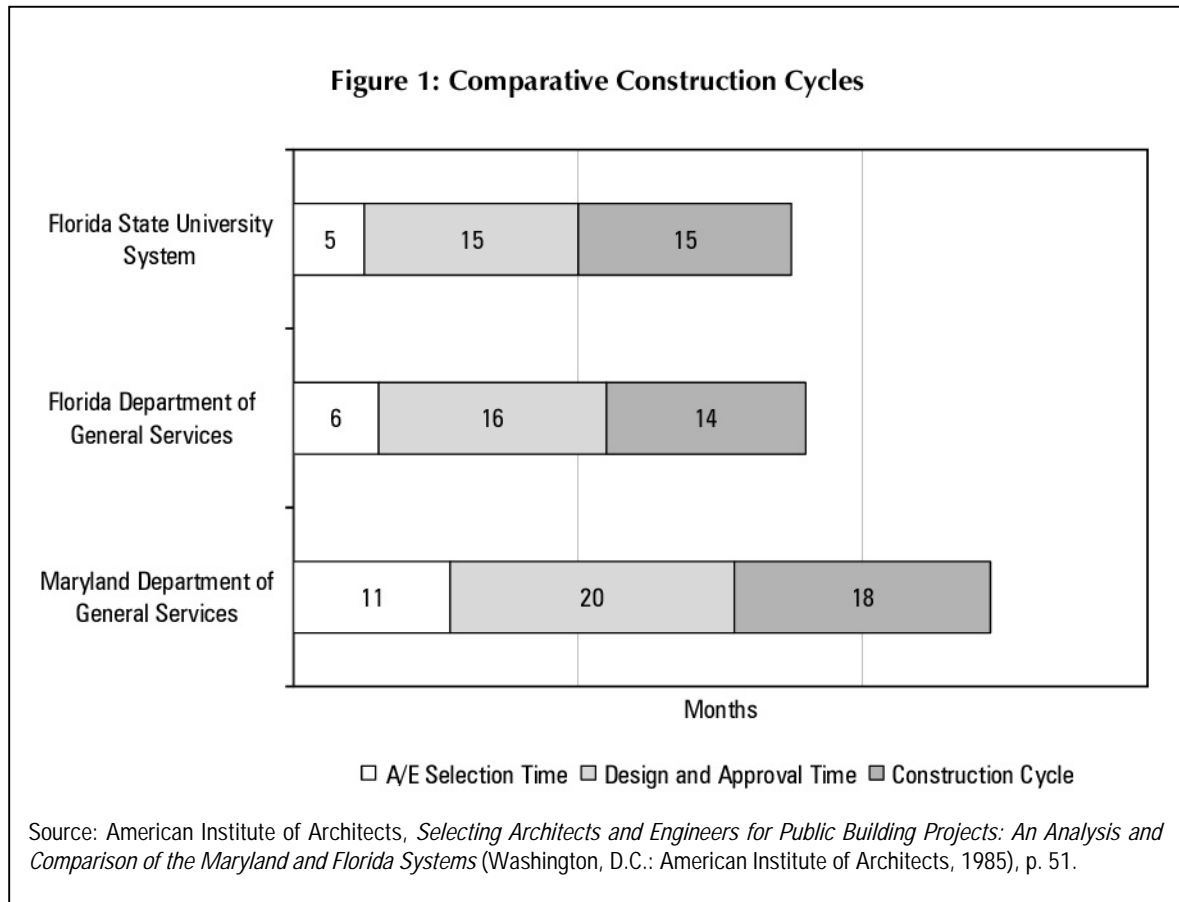
⁴⁴ Associated Soil and Foundation Engineers (ASFE), *Establishing the Cost of Public-Sector Design*, ASFE White Paper No. 2 (Silver Springs, Md.: ASFE, 1999), p. 14.

⁴⁵ web.mit.edu/civenv/idr/MPCPage.htm.

⁴⁶ K. E. Cook, “Use of Contract Services by State DOTs,” *TR News*, no. 121 (November–December 1985), pp. 24–29.

⁴⁷ Chester Wilmot, Donald Deis, Helmut Schneider, and Charles Coates Jr., “In-House Versus Consultant Design Costs in State Departments of Transportation,” *Transportation Research Record* 1654, Paper No. 99-1403, p. 158.

A contemporaneous study by the American Institute of Architects examined the facility project selection process for Maryland and Florida. Florida law allows agencies to select architectural/engineering (A/E) contractors on the basis of technical competence or other quality-based criteria. In Maryland, the procurement laws meant that price had to be the dominant selection factor. The study found that in Maryland, it took 33 percent longer to complete a project.⁴⁸ The total project delivery cycle was 49 months in Maryland and 36 and 35 months, respectively, for the Florida Department of General Services and the Florida State University System (see Figure 1).⁴⁹ In 1985, Maryland legislators recognized that longer schedules mean higher total costs and reformed their procurement laws to allow more quality-based selections. Though there has not been a follow-up study, there is general satisfaction that project schedules and costs are within reason.⁵⁰



The ascendance of best-value selection criteria is rooted in the simple concept of value—recognizing that the cheapest is not always the most desirable. Requiring the government to always buy the cheapest assumes all other things are equal—which they rarely are. The more complex the procurement or outsourcing is, the more important issues besides lowest absolute cost will be. With infrastructure, a range of issues are central to best-value selections, starting with quality but including flexibility, speed, expertise, efficiency, innovation, and risk management. We will discuss all of those factors and their role in infrastructure outsourcing, and we will finish this section with a detailed look at the messy issue of cost savings.

⁴⁸ American Institute of Architects, *Selecting Architects and Engineers for Public Building Projects: An Analysis and Comparison of the Maryland and Florida Systems* (Washington, D.C.: American Institute of Architects, 1985), p. 51.

⁴⁹ Ibid.

⁵⁰ Jim Otradovec, executive director, Consulting Engineers Council of Maryland, interview with author, June 2000.

A. Outsourcing to Achieve Improved Quality

With the increased private responsibility inherent in outsourcing, there is increased incentive for the consultant to produce high-quality work and to ensure proper performance of facilities. According to CSG data, over 18 percent of state agencies indicate that high-quality service is one reason why they have outsourced.⁵¹

One of the most important determining factors for the awarding of contracts is past performance, and delivering a low-quality product could inhibit a consultant from procuring future work. As a result, the consultant and the facility owner work together to plan quality into the project. Reliance on private-sector initiative to enforce quality has the added benefit of not relying on quality enforcement through restrictive specifications or inspection, since quality has been planned into the project since its inception.⁵²

Project quality is hard to measure in head-to-head comparison studies, but Carl Monismith, professor of civil engineering at the University of California, Berkeley, argues that private engineering and construction firms are where innovations in techniques and materials come from. He goes on to claim that state and local governments could dramatically improve road construction, cut maintenance costs, and improve the longevity of street surfaces by outsourcing.⁵³

In water and wastewater projects, outsourcing has brought measurable benefits. A 1999 report examined outsourcing of water and wastewater systems in 29 cities serving over 3 million customers throughout the United States, including asset transfers (acquisitions), leases, operational and maintenance contracts, and specific-service outsourcing contracts.⁵⁴ The study found that outsourcing improved compliance with environmental standards. Prior to entering into a public-private partnership, 41 percent (12) of the facilities surveyed were not in full compliance with the federal Safe Drinking Water Act. One year after entering into a public-private partnership, all were in compliance with federal water standards.⁵⁵ Outsourcing also improved customer service. Investor-owned utilities have been able to provide a higher level of customer service at a lower cost by integrating customer-service functions such as call-in centers, billing, and collections into parent-company systems.⁵⁶

Quality outcomes from outsourcing arise from appropriate safeguards that governments write into contracts. Contracts can be performance-based (focusing on outputs or outcomes) and can include quality assurances or quality control assurances.⁵⁷ An increasing trend in contracting is the employment of warranty concepts—a further safeguard for quality projects.⁵⁸

⁵¹ Chi and Jasper, *Private Practices*, p. 8.

⁵² *The Design-Build Process for the Civil Infrastructure* (Washington, D.C.: Design-Build Institute of America, July 1999).

⁵³ Carl Monismith, “Requiem for Potholes,” *Access*, no. 15 (1999), pp. 6–7.

⁵⁴ National Association of Water Companies (NAWC), *A Survey of the Use of Public-Private Partnerships in the Drinking Water Utility Sector* (Washington, D.C.: NAWC, 1999).

⁵⁵ *Ibid.*, p. 39.

⁵⁶ *Ibid.*, p. 41.

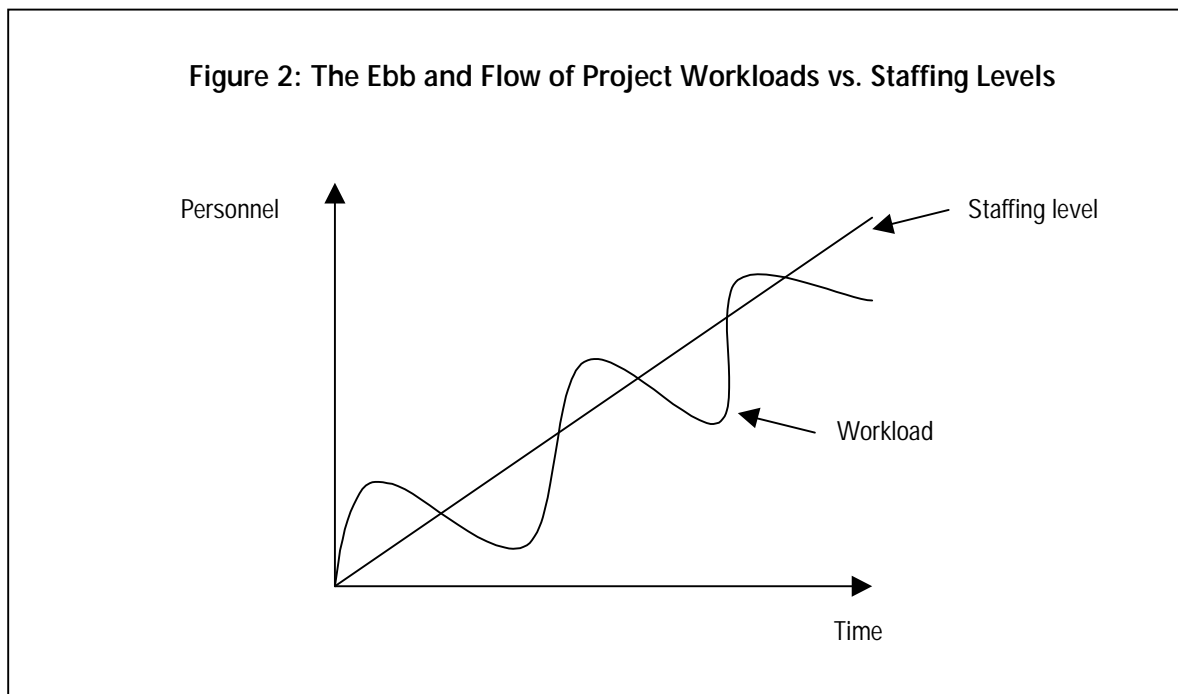
⁵⁷ Corey Boock, partner, Nossaman, Gunther, Knox & Elliot, interview with author, April 2000.

⁵⁸ *Ibid.*

B. Outsourcing to Accommodate Peak Demand

Consultants can accommodate fluctuating demand more easily than government departments can because of their more flexible staffing policy—they can be “turned off and on.” Consultants have many clients to balance expertise and workloads. Infrastructure development naturally ebbs and flows, but public employees, protected by civil service, remain at steady levels (see Figure 2).⁵⁹ When staffing exceeds the workload, the space between the workload curve and the staffing level represents waste—staff with nothing productive to do. When the workload exceeds the staffing level, the space between the workload curve and the staffing level represents projects not being completed, delays, backlogs, and costs imposed on would-be users of the new facilities.

The problem of having fluctuating workloads but steady staffing levels can be solved through outsourcing, using consultants as a resource pool that can adjust to address needs. A 1990 study by the Wisconsin Legislative Audit Bureau concluded that outsourcing was used primarily for two reasons: to provide expertise unavailable to in-house staff and to meet short-term, or “peak,” demand levels, for which the addition of permanent staff would be uneconomical.⁶⁰ The National Cooperative Highway Research Program surveyed state transportation departments and found that half of the states are using consultants to accomplish 50 percent or more of preconstruction engineering and that the primary reason for contracting for design work is constraints on staff size, or the desire to avoid staffing peaks.⁶¹



⁵⁹ ASFE, *Establishing the Cost of Public-Sector Design*, p. 15.

⁶⁰ Wisconsin Legislative Audit Bureau, *Evaluation of Use of Engineering Consultants: Department of Transportation, 90-9* (Madison: State of Wisconsin, April 1990), p. 10.

⁶¹ Kaye and Kreutzen, *Meeting California's Infrastructure Challenge*, p. 5.

For example, after the Loma Prieta and Northridge earthquakes, California began a massive seismic retrofitting of all state highways. Caltrans, the state transportation department, purchased 450 person-years in fiscal year 1996 and another 800 person-years in fiscal year 1997 for seismic design work.⁶² Once the work was completed, the consultants were “turned off,” avoiding the massive layoffs that might have occurred had the person-years been obtained by expanding Caltrans staff with highly specialized seismic engineers.

Another example is road-building projects being adjusted to meet Clean Air Act requirements. If a municipal area goes out of compliance with clean-air standards, due to increased standards or changes in compliance plans, one of the first actions it is likely to take is to stop all road-building projects which would permit more vehicles to travel and possibly increase emissions. If the work is outsourced, the transportation department can more easily adjust the staffing assigned to the project.⁶³

A final example is Santa Clara County, California, which in 1983 passed a special tax to fund a series of road improvements and new roads.⁶⁴ The county was chagrined to find that Caltrans could not accommodate the staffing demands to design, engineer, and construct the projects. Caltrans at first estimated that the work would take 23 years but, when pressed, revised the figure down to 14 years. That was still too long for the county, so it outsourced all phases of the projects, finishing the last of them in 1996.⁶⁵ It took the contractors only seven years and cut engineering costs by \$64 million, and changes to the project from Caltrans plans cut total project costs by \$131 million.⁶⁶

Self-help County Outsources for Timely, Cost-effective Project Delivery



In the early 1990s, Santa Barbara County, California, wanted to accelerate the delivery schedules for its sales-tax-financed road projects. Originally, the county solicited the state transportation department (Caltrans) for design and engineering work, but Caltrans was unable to meet local delivery schedules because of a lack of resources, resulting in the outsourcing of projects to private consultants. The county quickly realized that it had “more control and more effective management with private design and engineering consultants” than with Caltrans.⁶⁷

At the end of 1998, 10 of 14 projects had been completed. Of the 11 private contracts, six were on time or accelerated and five were delayed; all three projects designed by Caltrans were delayed at least a year.⁶⁸ Furthermore, the original project cost estimate was \$133 million, but now it is \$125 million—a saving of \$8 million.⁶⁹

County staff give most of the credit to the consultants themselves. “[Consultants] are more motivated to work within budgets and find value engineering.”⁷⁰ They also point to Caltrans’ lack of flexibility, contrasting with consultants and private contractors employing innovation and flexible methods for project delivery.

⁶² Steven Moss et al., *Fiscal and Economic Impact Analysis of the Fair Competition and Taxpayer Savings Initiative* (San Francisco, CA: M.Cubed, 1999), p. 18.

⁶³ Steve Stagner, executive director, Consulting Engineers Council of Texas, interview with author, May 2000.

⁶⁴ Will Kempton, “Status Report on the Measure A Program in Santa Clara County,” presented to the California Transportation Commission, September 1989.

⁶⁵ Santa Clara County Traffic Authority Coalition for Project Delivery, presentation, November 1996.

⁶⁶ Santa Clara County Traffic Authority, June 2000.

⁶⁷ Kaye and Kreutzen, *Meeting California’s Infrastructure Challenge*, p. 11.

⁶⁸ *Ibid.*, pp. 11–12.

⁶⁹ *Ibid.*, p. 12.

⁷⁰ *Ibid.*

C. Outsourcing to Speed Project Delivery and Meet Deadlines

Closely related to the issue of using consultants during periods of peak demand is the issue of meeting deadlines in a timely manner. CSG data show that over 21 percent of state agencies say that speedy implementation is an important reason for outsourcing.⁷¹ “Consultants represent a larger reservoir of manpower resources . . . and consultants usually have greater freedom to marshal resources at short notice.”⁷² Furthermore, consultants are more sensitive to deadlines than in-house staff; their selection for future projects depends on how they handle current projects.

The flexibility of private-sector staffing enables consultants to shift resources more readily to meet time constraints. Time savings are especially seen in design-build and similar types of project delivery—because design and construction are overlapped, time can be significantly reduced. With design-build, materials and equipment procurement and even construction work can begin before construction documents are fully completed—resulting in time savings, lower costs, and earlier utilization of the facility.⁷³ As officials in Washington State and South Carolina told *Governing* magazine, without outsourcing, their major infrastructure projects would “still be theoretical doodles on paper.”⁷⁴ The same is true of projects in other nations. A World Bank study of outsourcing infrastructure projects found that outsourced projects are 60 percent more likely to be fully completed, take on average 9 months less to complete, and are more than four times as likely to be rated successful by project managers and financiers.⁷⁵

Using consultants allows for the completion of more work. In-house resources are limited to staff on hand. The fast-paced economy requires constant maintenance and development of new infrastructure. Coupling in-house resources with consultant resources means more work can be completed and allows for innovative project structures. For example, a number of states and the Federal Highway Administration sometimes use a construction procurement method in which construction contractors submit two bids—one the price, the other the number of working days to complete the project. The winner is the one with the best combination of price and speedy delivery.⁷⁶

Outsourcing prison projects shows how speedy project delivery translates into cost savings. Since the final payment does not come until project completion, private firms have an incentive to complete construction more quickly. Construction of a prison or jail takes governments an average of two and one-half years—private firms complete the same type of project in about half the time.⁷⁷ The United Kingdom’s National

⁷¹ Chi and Jasper, *Private Practices*, p. 8.

⁷² Wilmot et al., “In-House Versus Consultant,” p. 158.

⁷³ Gregory G. Henk, “Privatization and the Public/Private Partnership,” *Journal of Management in Engineering*, vol. 14, no. 4 (1999), p. 28, citing studies by Oklahoma State University and University of Florida; and *An Introduction to Design-Build* (Washington, D.C.: Design-Build Institute of America).

⁷⁴ Diane Kittower, “The Practice of Partnering,” *Governing* (May 2000), p. 79.

⁷⁵ F. Humplick and T.O. Nasser, *An Econometric Assessment of the Impact of Service Contracting on Infrastructure Provision*, World Bank Research Project No. 678-64, cited in Frannie A. Leautier, “Private Partnerships and Delegated Management,” in *Business Briefing: World Urban Economic Development in 2000* (London: World Markets Research Centre, 2000), p. 47.

⁷⁶ D. F. Runde and Y. Sunayama, *Innovative Contractor Selection Methods: Alternatives to Traditional Low Bid in Massachusetts Public Construction*, Policy Analysis Report, John F. Kennedy School of Government (Boston: Harvard University, 1999), p. 18.

⁷⁷ Samuel J. Brakel, *Privatization and Corrections*, Reason Foundation Policy Insight No. 107 (Los Angeles: Reason Foundation, 1989); Charles H. Logan, *Private Prisons: Cons and Pros* (New York: Oxford University Press, 1990), p. 79 (see www.ucc.uconn.edu/~wwwsoci/proscons.html for an excerpt); Bill Proctor, “Prison Crowding in the West,” *Government West* (January/February 1998), p. 12; and a case study in Idaho in Mark Carnopis, “Idaho’s First Private Prison Is on the Fast Track,” *Government West* (January/February 1999), pp. 6–8.

Audit Office reports that the first two privately built prisons there were built 45 percent faster than usual.⁷⁸ In the United States, one company may have set a record, constructing a new facility in less than 90 days. The firm purchased land, got zoning clearance, lined up financing, and designed, built, and completed a 100-bed maximum-security juvenile facility in just three months.⁷⁹ A more representative example is Delaware County, Pennsylvania. A group of private firms financed and built a new prison in two years less than it took the state to build a similar prison in a neighboring county, built it for only \$55.84 million rather than the \$93 million estimated cost if built by the county, and is saving the county \$1.5 million per year in lower debt costs.⁸⁰

As officials in Washington State and South Carolina told *Governing* magazine, without outsourcing, their major infrastructure projects would “still be theoretical doodles on paper.”

D. Outsourcing to Gain Access to Expertise

Most engineering departments cannot afford to retain specialized design experts on their staffs for complex designs that arise infrequently. In these cases, it is more cost-effective to rely on consultants to provide these services. According to CSG data, over 32 percent of state agencies say that lack of state personnel and expertise was an important reason for outsourcing.⁸¹ The Wisconsin Legislative Audit Bureau study attributed much outsourcing to need for special skills,⁸² and a study for the Texas DOT found that one of the key reasons given for outsourcing was lack of in-house expertise.⁸³ “A common theme heard throughout the study is the importance of partnership between TxDOT and private sector consultants, because the use of [engineering] contractors has changed from merely cyclical to regular involvement for virtually all major projects.”⁸⁴

Consultants have the advantage of drawing from a “larger pool” of projects to become proficient on more-complex designs, while government agencies may not. In California, after court decisions virtually eliminated outsourcing of state engineering work, Caltrans has been on a hiring binge, and 40 percent of the staff has less than three years of experience.⁸⁵ At both local and state levels, consultants have much more opportunity to build up expertise, because except for road and bridge projects, major facility projects for government employees come along rarely. Consultants, not tied down to one jurisdiction, move immediately to another project when they finish one; thus, they can build up much greater experience and more diversified expertise.

⁷⁸ National Audit Office, *The PFI Contracts for Bridgend and Fazakerley Prisons* (London: Comptroller and Auditor General, 1997), p. 5.

⁷⁹ Cathy Lazere, “Privatizing Prisons,” *CFO: The Magazine for Senior Financial Executives* (February 1997), p. 41.

⁸⁰ Paul Kengor, *Prison Privatization in Pennsylvania: The Case of Delaware County*, Allegheny Institute Report No. 99-09 (Pittsburgh: Allegheny Institute for Public Policy, 1999), p. 9.

⁸¹ Chi and Jasper, *Private Practices*, p. 8.

⁸² Wisconsin Legislative Audit Bureau, *Evaluation of Use of Engineering Consultants*, p. 10.

⁸³ PricewaterhouseCoopers, *Highway Design Cost Comparison* (Austin: State of Texas, February 1999), p. 55.

⁸⁴ *Ibid.*, p. 56.

⁸⁵ Julie Tamaki, “Engineer’s Feud May Stall Plan to Unsnarl Traffic,” *Los Angeles Times*, July 11, 2000, Section A.

Choosing an Engineering Consultant



If the goal of outsourcing is acquiring crucial expertise, governments have to think ahead about what they are looking for from their private partners. Some things to consider are:⁸⁶

1. **Expertise.** Make sure the consulting firm, or at least some key personnel, has experience on the type of project you are hiring it for. Checking references for past projects is important.
2. **Personnel.** Forming a partnership begins with the proposal phase. Get to know the people you are considering partnering with early on. And make certain that the partnership agreement includes the personnel named in the proposal.
3. **Reputation.** Use all available resources to establish a real grasp of the reputation and service quality record of a potential private partner. Do not neglect in-house records from past contracts and industry and government professional organizations.
4. **Accessibility.** Communication is the heart of a successful partnership. This does not mean that a consultant has to be local, but it does mean that good potential partners will have a reputation for good communication and will be readily available and timely during the selection process.
5. **Customized Approach.** You should feel like a unique customer. Consultants who treat a project with a cookie-cutter approach may be fine in some cases but may be problematic in long-term, innovative, or high-profile projects.

Using qualification-based selection of consultants not only serves to ensure quality of consultant design work, but also serves to reduce the degree of departmental supervision needed.⁸⁷ Indeed, many counties and municipalities around the nation use consultants as an ongoing extension of their own workforce, where consultants work side by side with public-sector employees in agency offices. This allows for easy adjustment of the workforce to serve changing demand, promotes smaller departmental staffing, and introduces competition in the workplace.⁸⁸

E. Outsourcing to Improve Efficiency

With proper contracts, consultant projects have tighter time, budget, and scope-of-work constraints than in-house projects. Besides inadequate monitoring, in-house projects often show changes in scope, unforeseen design complications, and unexpectedly high levels of public involvement—in contrast to contracted work, which tends to be better defined in project scope and relatively predictable as to potential problems that could increase costs.⁸⁹

⁸⁶ Based in part on Fredrick Bloetscher, “Looking for Quality in an Engineering Consultant,” *American City & County* (December 1999), p. 28, and on RPPI research.

⁸⁷ Helmut Schneider, Donald Deis, Charles Coates Jr., and Chester Wilnot, *Louisiana Department of Transportation and Development In House Versus Consultant Design and Cost Study*, Report No. 309 (Baton Rouge: Louisiana Transportation Research Center, May 1998), p. 73.

⁸⁸ *Ibid.*, p. 159.

⁸⁹ Wisconsin Legislative Audit Bureau, *Evaluation of Use of Engineering Consultants*, p. 3.

For example, contractor management practices can reduce costly personnel problems and improve labor productivity. Milwaukee's 10-year outsourcing of management of its wastewater system led to decreases in job injuries by 60 percent, employee grievances by 33 percent, and sick days by 20 percent.⁹⁰ In outsourcing of water and wastewater utilities in general, the most comprehensive study to date found that outsourcing reduced the rate increases that were planned prior to privatization, and at 17 percent (five) of the facilities, outsourcing brought cost savings of between 10 percent and 40 percent, allowing them to avoid large increases in water rates.⁹¹

By not being tied down to one jurisdiction, consultants can move to another project upon completion, thus building up much greater experience and more diversified expertise.

F. Outsourcing to Spur Innovation

Competitive outsourcing can produce innovative solutions to infrastructure delivery. The freedom to invent “allows for old processes to be discarded in favor of entirely new ones—processes that integrate relevant technological advances and streamline communication channels.”⁹² Furthermore, “partnered projects have the potential to discover and eliminate redundant efforts, reduce supervisory activities, and expedite processes.”⁹³ According to CSG data, at least one in five state agencies says that increased innovation is one of the top reasons for outsourcing.⁹⁴

Why is outsourcing necessary for innovation? One answer is that the system does not always reward government employees for innovative ideas. Consider the plight of a government employee with an innovative idea. She can face crushing institutional barriers to change. Government agencies rarely face competition, and government employees have no property rights in their jobs or missions and rarely have independent authority to make changes. A professional or political committee, sometimes more than one, often must approve an innovative new approach. At the end of the day, even if the employee's idea is accepted, she is not likely to reap any professional reward—and one of the individuals or committees higher in the decision process may well have stolen credit for the idea. Private firms have far more opportunity and incentive to encourage and foster innovative ideas at all levels.

When Virginia contracted for the design, construction, and operation of two new prisons, the Department of Corrections (DOC) strove to specify only outputs and leave the details to the private bidders. One result was that the winning bidders chose to have food delivered to the kitchen every few days, rather than the traditional practice of having food warehouses with 30 days' worth of food on hand. Russell Boraas, the state's private-prison administrator, describes a meeting of the state's prison wardens when they were asked *why* every state prison had an expensive warehouse and staff to store 30 days' worth of food. The response was a long

⁹⁰ City of Milwaukee, Metropolitan Municipal Sewerage District, April 1999.

⁹¹ NAWC, *A Survey of the Use of Public-Private Partnerships*, pp. 41-43.

⁹² Paul Thompson and Steve Sanders, “Partnering Continuum,” *Journal of Management in Engineering*, vol. 14, no. 5 (September/October 1998), p. 77.

⁹³ *Ibid.*, p. 73.

⁹⁴ Chi and Jasper, *Private Practices*, p. 8.

silence—it simply had never occurred to any of them that there might be another way to manage the groceries. Ultimately, Boraas and others at the Virginia DOC decided that the practice went back to the days of mule trains, when all the state’s prisons were in remote locations and resupply could be delayed for weeks.⁹⁵

Technology had changed, but practices did not until competition brought motivations for innovation. The private correctional firms saw in the state’s prison warehouses an opportunity to cut costs and improve their bids. State prison wardens and facility designers had no incentive to buck “the way it’s always been done.” Now, thanks to the private firms’ innovation and the pressure of competition, all state prisons are eliminating their food storage warehouses, reducing overall prison costs.

The power of the contract is often a power overlooked by public officials, who thus ignore the opportunity to build quality assurances and/or quality controls into project delivery as a means to manage risk.

G. Outsourcing to Better Manage Risks

Outsourcing allows governments to shift risks to contractors, which both helps achieve the most efficient risk allocations and allows risk to be used as a management tool, rather than just something to fear. The power of the contract is often a power overlooked by public officials, who thus ignore the opportunity to build quality assurances and/or quality controls into project delivery as a means to manage risk.⁹⁶ Public agencies and contractors can share risks and assign to consultants the risks that the consultant has the best control over, such as design functions. This arrangement also can help avoid “buck passing” and finger pointing, since each role of the process should be clearly defined.

In the United Kingdom, outsourcing infrastructure has reduced the project risks retained by government by a value of from 3 to 18 percent of the total capital investment of projects.⁹⁷ Indeed, an evaluation of completed projects shows that the more risk was transferred to the private sector, the greater were cost savings for the government.⁹⁸ In the United States, the growth of performance-based contracting as the best practice has led to deal structures and incentive schemes that shift risk for success to the contractor.⁹⁹ That risk motivates contractors to “discover ways to improve quality of the final product or to reduce the costs of producing it.”¹⁰⁰

Hence the growing popularity of contracts like that of the Virginia DOT with VMS to maintain a portion of the state’s highway system, which assigns to VMS all risk for necessary maintenance over the course of the

⁹⁵ Russell, L. Boraas, *Structuring Successful Privatization Projects* (Richmond, VA: Virginia Department of Corrections, 1997).

⁹⁶ Boock, interview with author.

⁹⁷ Arthur Andersen, et al., pp.52-58, and “Auditors Like UK’s PFI,” *Public Works Financing* (April 2000), p. 18.

⁹⁸ Ibid.

⁹⁹ Roger D. Behn and Peter A. Kant, “Strategies for Avoiding the Pitfalls of Performance Contracting,” *Public Productivity and Management Review*, vol. 22, no. 4 (1999), pp. 470–89.

¹⁰⁰ Bowden and Klay, “Contracting for 21st Century Infrastructure,” p. 392.

contract.¹⁰¹ And in the arena of water and wastewater utility outsourcing, the advent of long-term management contracts has “placed the issue of capital risk at center stage.”¹⁰² Long-time water utility outsourcing consultant Eric Petersen argues that especially for turnkey projects, outsourcing can shift much of the risk to the contractor, increasing accountability and efficiency.¹⁰³

H. Outsourcing to Cut Costs

Research shows that cost saving is not always the motivation for outsourcing, that it is becoming less central as governments become more adept at outsourcing,¹⁰⁴ and that best value is increasingly the goal of outsourcing. Still, the issue of cost saving often dominates the debate.

The growth of outsourcing has provoked controversy in the public-works industry. Some state agencies and state-employee unions have been loudly critical of the use of consultants, while senior management of many state agencies desire the flexibility to use the private sector as needed to deliver projects on schedule and within budget. Institutional bias has clouded study of outsourcing, with much of the in-depth research on the efficacy of private-sector involvement in infrastructure delivery undertaken by its most fervent critics, the state agencies that find themselves challenged to compete. And the largest and most comprehensive studies have looked mainly at one narrow area—the impact of outsourcing in highway planning and construction.

Comparing in-house projects to consultant projects is like comparing apples to oranges: the two use different methods of service delivery and cost accounting, among other things.

These studies have employed widely varying methodologies and produced a murky picture of cost savings from outsourcing, with an implausible range of modest cost savings to 240 percent higher costs from outsourcing.¹⁰⁵ Not only is this literature focused on highways alone out of all infrastructure projects, but the same analytical problems keep turning up, making it difficult to rely on the data.

First, it is virtually impossible to properly calculate overhead costs for in-house projects, evidenced by the widely varying overhead rates used by states in their studies. Second, comparing in-house projects to consultant projects is like comparing apples to oranges: the two use different methods of service delivery and cost accounting, among other things. Third, rarely do comparisons go beyond the grossest level of project comparison—for example, comparing a bridge project to another bridge project. They neglect the possibility that there may be huge differences between two bridge projects in the level of innovation, risk shifting, personnel expertise, or any of the other benefits of outsourcing we have discussed so far.

¹⁰¹ A. V. Bailey, “Virginia’s Interstate Maintenance Contract,” presentation to AASHTO Contract Maintenance Workshop, Nashville, Tennessee, September 1999.

¹⁰² Eric Petersen, “Allocating Capital Risk in Water System Management Contracts,” *Public Works Financing* (April 2000), p. 24.

¹⁰³ *Ibid.*, p. 25.

¹⁰⁴ Chi and Jasper, *Private Practices*, pp. 4–5.

¹⁰⁵ Based on an analysis of 19 government and academic studies comparing in-house and consultant costs for highway projects. A list of studies can be obtained from the authors.

With those limitations in mind, we can at least make a broader survey of the evidence on cost savings from outsourcing infrastructure projects and further explore problems with the existing literature.

1. The Evidence on Cost Savings from Outsourcing Infrastructure Projects

There are a fair number of studies of cost savings from outsourcing infrastructure projects, as well as a great deal of case study evidence. We will only touch on some highlights of this wealth of evidence—enough to demonstrate that if cost saving is the goal of outsourcing, it can be achieved. How much import cost saving should have in driving an outsourcing issue depends on the case.

International Infrastructure Outsourcing. Various forms of outsourcing dominate much of the infrastructure development going on worldwide. In 1999, one survey documented 789 road, rail, airport, seaport, water/wastewater, and electric-power projects (costing a total of over \$363 billion) under construction and being delivered under some form of outsourcing arrangement, and nearly three times that many outsourced projects were being planned or financed.¹⁰⁶ The World Bank has advocated outsourcing and privatization as crucial tools for developing infrastructure in less-developed nations while keeping costs down.¹⁰⁷ And specific evaluations show cost savings from outsourcing—for example, the United Kingdom’s Private Finance Initiative led to average savings of 17 percent from outsourcing infrastructure financing and project delivery.¹⁰⁸

The World Bank has advocated outsourcing and privatization as crucial tools for developing infrastructure in less-developed nations while keeping costs down.

Water and Wastewater Utilities. A number of studies have shown that outsourcing water and wastewater utility management and facility development can cut costs by 10 to 40 percent.¹⁰⁹ Usually, outsourcing reduces the rate increases that were planned prior to privatization, and it sometimes supports rate decreases.

In Milwaukee, outsourcing cut the city’s annual wastewater operating costs by 30 percent, for projected total savings of over \$148 million. After one year, those cost savings allowed the city to cut sewer fees by 15.5 percent.¹¹⁰

Atlanta’s outsourcing produced even more dramatic results. The city water system was significantly out of compliance with environmental standards, and the water utility’s own estimate of the cost to upgrade the system and achieve compliance called for a water rate increase of more than 100 percent. Instead, the city chose to outsource upgrading, operating, and maintaining the water utility for 20 years. The agreement cuts the cost of upgrading and operating the utility by 44 percent and reduces the water rate increase for the

¹⁰⁶ “1999 International Major Projects Survey,” *Public Works Financing* (October 1999), p. 10.

¹⁰⁷ “Private Goes Public,” p. 33.

¹⁰⁸ Arthur Andersen, et al., p. 53.

¹⁰⁹ Studies surveyed in John Hilke, *Cost Savings From Privatization: A Compilation of Study Findings*, Reason Foundation How-to Guide No. 6 (Los Angeles: Reason Foundation, 1993), pp. 16–17; and NAWC, *A Survey of the Use of Public-Private Partnerships*, p. 36.

¹¹⁰ City of Milwaukee, April 1999.

upgrades to less than 30 percent. The city's annual cost was \$49.5 million. The winning bid was only \$21.4 million per year; however, the city will also pay roughly \$6.1 million per year to cover the costs of electricity, natural gas, and insurance for the facilities, as well as contract monitoring costs.¹¹¹

Buildings. The U.S. General Accounting Office (GAO) examined outsourcing and partnerships between federal agencies and private developers in building projects.¹¹² The GAO highlighted the case of the Department of Veterans Affairs (VA). Congress passed special legislation in 1991 allowing the VA to use Enhanced Use Leases (EULs) to outsource elements of projects. EULs let the VA manage underutilized property through leasing arrangements with state or local governments or private-sector organizations in ways that generate income.

The GAO report explains that by 1998, the VA had implemented 10 EULs for buildings worth a total of over \$50 million, and the EULs saved the VA an estimated \$25 million through lower construction, operation, and maintenance costs. Public-private partnerships through EULs reduced the time needed to design and develop new buildings. One project alone saved \$6 million in design and construction costs and will save another \$10 million in operation and maintenance costs over the 35-year term of the EUL. The project won one of Vice President Gore's National Performance Review "Hammer Awards" in 1995 for its contributions to the VA's efforts to improve business practices and provide better services to veterans.

Prisons. The per-bed cost of prison space is influenced by many factors, including the security level, location, and jurisdiction of the facility. Coming up with useful average costs for government construction is difficult. However, the Criminal Justice Institute has calculated that the average cost of government construction is \$70,909 for a maximum-security cell, \$49,853 for a medium-security cell, and \$29,311 for a minimum-security cell.¹¹³

Private companies can build prisons and jails for considerably less than these figures and in less time. Firms in the industry often contend that they can cut between 10 percent and 40 percent off construction costs, with 30 percent being the most common savings estimate.¹¹⁴ Independent estimates of the cost savings show a similar range of 15 to 25 percent.¹¹⁵ In addition, private construction can shift a number of risks, including those of cost overruns, to the private sector.

Allowing private operating firms to design facilities can lead to considerable long-term operating-cost savings as well. Operating costs are 75 to 85 percent of the overall cost of a prison, and about 60 percent of the operating costs are for personnel.¹¹⁶ This means that designing a facility to require less staff, while providing the necessary security, can dramatically reduce operating costs.

¹¹¹ Adrian Moore, *Annual Privatization Report, 1999* (Los Angeles: Reason Public Policy Institute, 1999), p. 36.

¹¹² U.S. General Accounting Office, *Public-Private Partnerships: Key Elements of Federal Building and Facility Partnerships*, GAO/GGD-99-23 (Washington, D.C., February 3, 1999).

¹¹³ Camille Camp and George Camp, *Corrections Yearbook 1998* (Middletown, Conn.: Criminal Justice Institute, 1998), p. 79.

¹¹⁴ Industry annual reports; Singal and Reed, *An Overview of the Private Corrections Industry*, p. 16.

¹¹⁵ Charles W. Thomas, *Private Adult Correctional Facility Census, 1994* (Gainesville: University of Florida, 1994), p. 2; and Charles H. Logan and Bill W. McGriff, "Comparing Costs of Public and Private Prisons: A Case Study," *NIJ Reports*, September/October 1989, p. 7.

¹¹⁶ Charles Mahtesian, "Dungeons for Dollars," *Florida Trend* (October 1996), p. 80, highlighting the differences between the personnel and maintenance costs of a private medium-security prison and state prisons.

Highway Maintenance. Some states have discovered that outsourcing maintenance of urban roads and of highways can cut costs by 25 to 50 percent.¹¹⁷ In Pennsylvania, Hempfield Township outsources road repair and resurfacing for roughly \$40,000 per year, far less than the cost of just one full-time employee and equipment to do the work in-house.¹¹⁸ In Aspen, Colorado, city officials contracted with Koch Materials Company to rehabilitate and warrant roughly one-third of the city's streets, not directly to save money but to cut construction time from six years to one year and to allow the city to shift existing personnel and equipment to rehabilitate and better maintain the rest of the city's streets.¹¹⁹

Massachusetts' Outsourced Highway Maintenance Grows as It Succeeds



In the early 1990s, Massachusetts launched a pilot project, contracting for all routine highway maintenance in Essex County.¹²⁰ The contract was quantity based—the state DOT continued to determine what work would be done and paid only for those specified tasks. The contract greatly improved highway conditions, delivering considerably more work for the same amount of money. The contract saved between \$1.7 million and \$2.1 million in operating costs in its first year. According to a Kennedy School analysis, the contractor was 21 percent more cost-effective than the state had been.

On the heels of the pilot project's success, the DOT decided to expand the program to the whole eastern part of the state. Private firms and existing employees bid on the contracts (seven of them)—private firms won four, public employees three. With the union wins, the DOT was able to keep layoffs down to 150 people. The seven contracts saved the state \$7.5 million the first year and delivered \$10 million more in services than the year before. Since the DOT pays only for services it specifies and the contracts made the firms and employees more productive, both sides won by getting more work done. The new highway maintenance system brought other improvements as well, as competition changed in-house management practices and workers' compensation claims fell 60 percent, overtime decreased 70 percent, and sick leave decreased 50 percent.

The expanded program went so well that in 1996, the DOT moved to competitive contracting of highway maintenance statewide. It offered 14 contracts, and half each were won by public employees and private firms. In 1998, the DOT rebid the contracts, with no media attention—it had become just a way of doing business. The bottom line for the DOT is that between 1991 and 1999, the annual highway maintenance budget fell from \$40 million to \$25 million while the amount of maintenance performed grew.

A 1998 report by the Washington Institute Foundation states that “if managed properly, contracting with the private sector for highway maintenance reduces costs and improves the quantity and quality of service.”¹²¹ The report cites a recent audit of the Washington State DOT finding that contracting with private firms to maintain state highways would cut costs by 10 percent or more, as much as \$25 million per biennium.¹²² The audit pointed to evidence from Massachusetts, British Columbia, Virginia, Texas, and Indianapolis, where

¹¹⁷ Hilke, *Cost Savings From Privatization*, p. 8; and Eggers et al., *Cutting Local Government Costs*, p. 41.

¹¹⁸ “Pennsylvania Local Governments Look to Private Sector for Resurfacing,” *Pennsylvania Privatization Monitor*, vol. 4, no. 3 (February 2000).

¹¹⁹ “Team Concept Succeeds with Pavement Management,” *Public Works* (April 2000), pp. 50–51.

¹²⁰ Based on a presentation by Charles Kostro, deputy commissioner, Massachusetts Highway Department, at the AASHTO workshop “Contract Maintenance: Closing the Gap,” Nashville, Tennessee, September 20–22, 1999.

¹²¹ Dennis Lisk, *Highway Maintenance: Putting the Market to Work*, Policy Brief 98-07 (Seattle: Washington Institute Foundation, September 1998), p. 1.

¹²² *Ibid.*

outsourcing highway or street maintenance dramatically cut costs. In other examples, competition has spurred improvement and innovation in in-house operations, cutting costs without outsourcing.

The cost-saving potential of street and highway maintenance outsourcing is confirmed by other sources. Virginia's highway maintenance contracts cut costs by more than 15 percent the first year, saving the state \$22 million and leaving the state government very pleased with the outcome and with the potential for further savings.¹²³ British Columbia saved money by contracting for all of its highway maintenance in 1989.¹²⁴ The province was divided into separate districts, and contractors competed for three-year, lump-sum contracts with standards that stressed results rather than process. However, once the total privatization was complete, the province laid off its entire maintenance staff and required private contractors to hire most of them back at the same wage rates. The mandated employment policy locked in the original high cost of maintenance delivery, dramatically reducing the cost savings that might have been achieved.¹²⁵

Roads and Bridges. Aggregate studies of outsourcing road and bridge projects support the idea that outsourcing can reduce costs. One study, using Federal Highway Administration data, found that design costs were lowest in states that used a mix of private- and public-sector work and that states that used contracting had a slower growth of design costs than did states that did not use contracting.¹²⁶ Specifically, the study reports that "states with the lowest preliminary and construction engineering costs are states that contract out 50 to 70 percent of engineering work."¹²⁷ Other work by the same researcher in the *Professional Services Management Journal* showed that the cost of engineering services as a proportion of construction cost progressively diminished as the proportion of work conducted by consultants increased.¹²⁸

Studies with a more narrow focus demonstrate that outsourcing often is not aimed primarily at cutting costs. The 1990 Wisconsin Legislative Audit Bureau study concluded that contracting costs were not significantly different from in-house costs.¹²⁹ But it further noted that consultants were used primarily to provide expertise unavailable to in-house staff and to meet short-term, or "peak," demand levels, not to cut costs.¹³⁰

A 1999 study prepared for the Texas DOT by PricewaterhouseCoopers found that outsourcing cut costs only about 40 percent of the time. But again, cost saving was usually not the reason for outsourcing—instead, reasons given were lack of in-house expertise; insufficient in-house staff; ability on the part of contractors to deliver a level of quality and innovation; and faster contractor response time.¹³¹

¹²³ Presentation by Robert Bourdon, VMS, at the AASHTO workshop "Contract Maintenance: Closing the Gap," Nashville, Tennessee, September 20–22, 1999; and Shirley Ybarra, Virginia secretary of transportation, letter to Keith Summers, January 12, 2000.

¹²⁴ Presentation by John Newhouse, manager of maintenance programs, British Columbia Ministry of Transportation and Highways, at the AASHTO workshop "Contract Maintenance: Closing the Gap," Nashville, Tennessee, September 20–22, 1999.

¹²⁵ Dennis Lisk, *Highway Maintenance: Putting the Market to Work*, Policy Brief 98-07 (Seattle: Washington Institute Foundation, September 1998), pp. 1–2.

¹²⁶ William Fanning, *The Effect of Contracting Out on Engineering Costs*, June 1991, as cited in Hamm et al., *Analysis of the PCEG Initiative*, p. 36.

¹²⁷ Kaye and Kreutzen, *Meeting California's Infrastructure Challenge*, p. 6.

¹²⁸ William Fanning, "Contracting Out Engineering Services Is Cost Effective: US Government Data Shows Contracting Out Saves Money," *Professional Services Management Journal* (March 1992), as quoted in Schneider et al., *Louisiana Department of Transportation*, p. 13.

¹²⁹ Wisconsin Legislative Audit Bureau, *Evaluation of Use of Engineering Consultants*, p. 1.

¹³⁰ *Ibid.*, p. 10.

¹³¹ PricewaterhouseCoopers, *Highway Design Cost Comparison*, p. 55.

Innovative Public-Private Financing Brings Warrantied New Highway to New Mexico



In July 1998, New Mexico's governor, Gary Johnson, announced an innovative partnership with Koch Industries. The New Mexico Corridor 44 Project includes the design, construction, warranty, and (at the option of the state) partial financing of the project—the expansion of a 121-mile section of two-lane highway to four lanes.¹³² The project came about rapidly—moving from concept to contract in only 15 months.

Construction will be fast compared to traditional programs. Had it been built in traditional four-mile increments, it would have taken 27 years. Under the contract, the project is scheduled to be finished in 3.5 years. If it is not finished by then, Koch will pay a penalty of \$7,000 per day.¹³³ Furthermore, the contractor will forgo payment until the job is done, creating a significant incentive to finish fast.¹³⁴ Koch's total risk exposure is over \$50 million.

The most significant aspect of the contract is the warranty from the developer. "In addition to assuming subbase-to-surface risk for a major asphalt highway, Koch has guaranteed to pay for the up-keep and repair of a public asset for 20 years without recourse to public funds."¹³⁵ Koch will maintain the road to meet specific performance criteria based on industry guidelines. "The \$62 million long-term warranty will save the taxpayers \$89 million," since the maintenance cost was projected to be \$151 million.¹³⁶

One major factor allowed for success. "The state is not telling [Koch] how to build the road."¹³⁷ Avoiding micromanagement allows the contractor to use innovative practices often not available to the public sector. In this case, Koch will utilize a unique and innovative pavement design. The extremely durable design uses very strict specifications for materials in the asphalt mix but has the benefit of needing 20 percent less pavement and will cost at least \$20 million less to use.¹³⁸

We will discuss below the methodological problems that make cost-saving estimates suspect, but the point to take away now is that both studies showed that outsourcing achieved specific, well-defined goals. Also, recall that DOTs themselves report that planning and design cost is not a major factor when compared to other factors and that cost data for internal operations, especially overhead charges, are not sufficiently accurate to make meaningful comparisons.¹³⁹ In addition, these studies focus only on direct costs, overlooking how interrelated budgets and expenditures are in government. A University of North Texas study of infrastructure outsourcing concludes that while immediate direct cost savings from outsourcing are often small, indirect savings in transaction costs in non-core areas are significant over time, and that satisfaction with outsourcing increases after a three-to-five year period.¹⁴⁰

¹³² New Mexico Highway and Transportation Department (NMHTD), *New Mexico Corridor 44 Project* (Las Cruces, NM: author, 1998), p. 2.

¹³³ *Ibid.*, p. 3.

¹³⁴ Danielle Beaugureau, "Developer Delivers Warranty for 140-Mile New Mexico Route," *Engineering News Record* (June 29, 1998), p. 26.

¹³⁵ "NM Highway 44 Warranty Project," *Public Works Financing* (July/August 1998), p. 1.

¹³⁶ NMHTD, *New Mexico Corridor 44 Project*, p. 3; and Koch Industries, News Release, July 20, 1998, p. 1.

¹³⁷ Beaugureau, "Developer Delivers Warranty," p. 26.

¹³⁸ NMHTD, *New Mexico Corridor 44 Project*, p. 2; and *Public Works Financing*, p. 1.

¹³⁹ Wilmot et al., "In-House Versus Consultant," p. 158.

¹⁴⁰ J. Lynn Johnson and Louis Ponthieu, *The Long-term Impact and Cost Effectiveness of Outsourcing* (Denton, Tx: University of North Texas, 1999).

2. Issues with Cost Comparison Literature and Practices

One disconcerting feature that emerges from studies of cost savings from outsourcing road and bridge projects (the only real body of infrastructure outsourcing cost literature) is the range of findings they exhibit. Most are conducted by the state DOTs, and they tend to find themselves to be cheaper than consultants. But the findings range from consultant costs that are “cheaper” than in-house design in one study to 240 percent more expensive in another: mixed results at best, and the picture only gets murkier if you bore down into the details.

Underlying these discrepancies is the exclusion of important cost factors and employment of widely varying measurements. Office of Management and Budget (OMB) Circular A-76 sets the standards for cost comparisons by federal agencies, standards that many states have adopted and courts have used to assess the “reasonableness” of cost comparison policies. A-76 mandates:

The Federal Government shall rely on commercially available sources to provide commercial products and services. In accordance with the provisions of this Circular and its Supplement, the Government shall not start or carry on any activity to provide a commercial product or service if the product or service can be procured more economically from a commercial source.¹⁴¹

The vague language of the phrase “more economically” has fostered an environment in which different studies have employed different methodologies and considered varying types of data and cost factors. These discrepancies contribute to the different findings. The Council of State Governments reports that

. . . unfair and unrealistic cost comparison procedures can contribute to slow implementation or even failure of privatization. Agencies have been criticized for using techniques to increase contract costs or decrease in-house cost estimates to deny privatization opportunities. Such techniques include requiring performance standards that could not be applied to government performance; including the full costs of social security, retirement, and unemployment in the contracts; and requiring higher qualifications for private workers than for government employees.¹⁴²

Some studies do take a well-thought-out, full-cost approach. The Louisiana DOT commissioned a cost comparison study that made a concerted effort to include all relevant cost factors in the analysis.¹⁴³ In addition, attention was given to ensure that cost items were comparable. For example, office rental and utility costs, often excluded from in-house costs, were included in the study. And insurance, which is usually inflated to cover tort liability for public institutions, was modified to reflect the same sort of professional indemnity covered in consultant insurance plans. The study found that outsourced costs were similar to in-house costs but that outsourcing required additional expenditures to monitor contractors.

However, computation of overhead costs in other state studies calls into question their results. Texas and New York are good examples of the “dueling studies” phenomenon that arises from politicized studies and poor techniques.

¹⁴¹ Office of Management and Budget, *Performance of Commercial Activities*, OMB Circular No. A-76 (Washington, D.C., August 4, 1983, revised 1999), section 5(c). A-76 cost comparison standards are themselves heavily criticized, in particular for a cavalier treatment of overhead cost differences and for allowing distortions and conflicts of interest in cost comparisons. See, for example, criticisms by the Professional Services Council at www.pscouncil.org/westand/westand.htm.

¹⁴² Chi and Jasper, 1997, p. 17.

¹⁴³ Schneider et al., *Louisiana Department of Transportation*.

In Texas, a DOT report prepared by PricewaterhouseCoopers (PwC)¹⁴⁴ generated charges of statistical manipulation from the Consulting Engineers Council of Texas (CECT). The CECT offered to sponsor the study, but the offer was refused. Upon release of the study, the CECT said of the PwC report: “This study has been from the first step less of an inclusive effort to review a controversial problem than a set up process aimed at a desired outcome.”¹⁴⁵ Analysis of the PwC report by Tri Dimension Strategies substantiated CECT claims of statistical deficiencies. This revealed that PwC did not follow the comparison guidelines prescribed by OMB Circular A-76 and that PwC’s calculation of indirect costs associated with in-house design are skewed as a result.¹⁴⁶ PwC attributed discrepancies to difficulties in obtaining the source data from the Texas DOT.

The PwC study’s deepest flaw was lumping together projects that are similar only at the grossest level. It made no effort to look at best value, to see if more-expensive projects had features that would justify higher costs.¹⁴⁷ The Tri Dimension Strategies review highlights this point as well, pointing out that on average, for larger and more-complex projects, using consultants is considerably more efficient than in-house design and preliminary engineering. The analysis claims:

*Throughout its report, PwC states that outsourced [engineering] projects cost more than projects conducted by in-house staff. There are two major methodology problems with this claim. First, PwC did not recognize the disproportionate number of projects classified as an in-house project. Because of the significant variation in size, PwC’s analysis left unexplained the large number of higher-cost PE projects done by in-house staff. Second, PwC’s report never addressed the issue of whether there is a correlation between the complexity of a design project and its design costs. PwC’s methodology completely ignored this strong possibility.*¹⁴⁸

Discrepancies over cost accounting also plague a study by the New York comptroller.¹⁴⁹ An analysis done by PSMJ Resources casts doubt on the study’s claim that private-sector engineering firms have higher overhead costs.

*The comparison is apparently based on different methods of calculating overhead. As a result of using different methods, the results are not comparable. It is impossible, with the limited data provided in the report, to show that if the differences in methods were eliminated, in-house overhead rates may in fact be higher than private-sector overhead rates.*¹⁵⁰

¹⁴⁴ PricewaterhouseCoopers, *Highway Design Cost Comparison*.

¹⁴⁵ Consulting Engineers Council of Texas, “Perspective of the 1999 TxDOT/PricewaterhouseCoopers Cost Study,” *CECT Newsletter* (November 1999), p. 1.

¹⁴⁶ Cynthia Thomas, *Analysis of Highway Design Cost Comparison* (Dallas: Tri Dimension Strategies, November 1999), p. 2.

¹⁴⁷ The Texas DOT responded to this criticism: “The PwC study did not address many factors that could explain the cost differences found between the use of consultants and in-house staff to do engineering design. Those factors, such as quality considerations, review of consultant plans, timeliness, the varying complexity of projects designed, etc., are valid reasons to suggest that cost should not be the only factor used in determining whether to use consultants. However, the PwC study has never been purported to be anything more than a cost comparison study prepared by independent experts in the field of accounting.” The DOT went on to assert that PwC adhered to accepted accounting practices and questioned the competence of Tri Dimension Strategies to critique PwC’s methods. James Bass, director of finance, Texas Department of Transportation, correspondence with authors, July 2000.

¹⁴⁸ Cynthia Thomas, *Analysis of Highway Design Cost Comparison*, p. 3.

¹⁴⁹ New York Office of the State Comptroller, *New York State Department of Engineering*, Report 97-S-12 (Albany NY: State of New York, April 1998).

¹⁵⁰ PSMJ Resources, *Comments on Audit Report 97-S-12, State of New York, Office of the State Comptroller* (Newton, Mass.: PSMJ Resources, 1997) p. 2.

One of the chief arguments contained in the New York comptroller’s study is that private-sector salary costs tend to be higher than those for public employees and that this causes overall costs to rise. PSMJ concludes that this effect on costs is less than 1 percent.

Yet another problem with many of the studies is lack of scope. Primarily focused on agencies at the state level—more specifically, state DOTs—the studies fail to take into account other departments or, more important, local governments (cities, counties, regional transportation authorities). This is a problem because “contracting out public work is more common at local agencies.”¹⁵¹

Smaller government organizations may only occasionally support capital projects, and when they do, the projects are frequently of a diverse nature. Due to budgetary, staffing, and recruitment constraints, as well as fewer and smaller projects, lower levels of government are more likely to rely on consultants for project delivery. In order to correct for the lack of data, studies should be undertaken examining the use of consultants for similar projects at the local level, allowing for comparative research between state and local authorities.

Other problems exist with the data itself. First of all, different accounting systems are used in government agencies and the private sector. Government procedures are adjusted to fulfill state and federal fiscal reporting requirements, which are often different from practices used by the private sector. The new accrual accounting standards being adopted by state and local governments over the next few years will go a long way toward helping with this problem.

Second, while it is not difficult to determine the cost of consultants—it is simply the amount paid—the cost of an in-house project depends on accurate recording of time spent on the project, the estimation of overhead, and the accounting of the cost of activities associated with the project (travel and subsistence, materials, supplies, and lab tests).¹⁵² Time sheets are not often a priority in state departments, and since many state employees are required to work on multiple tasks simultaneously, the record of time allocation is not very accurate.¹⁵³ “Department monitoring of in-house work has been inadequate, primarily due to poor time reporting and inadequate tracking in costs.”¹⁵⁴ State agencies need to keep better records of time and materials spent on projects. Again, like the problems with accounting, changes would allow for fair comparisons of the public and private sectors.

Furthermore, the accessibility of data is suspect. Most researchers report that the data needed to conduct their investigations were not easy to access. “The main reason is that the purposes for which data typically are used in state [agencies] usually do not include systemwide analysis.”¹⁵⁵ Databases often serve specific purposes, so using them for other purposes is difficult at best. Data is our most important tool—so long as it can be put to beneficial uses. Agency data is terribly inaccessible. To have proper analysis, agencies need to improve their databases.

¹⁵¹ Little Hoover Commission, *Too Many Agencies*, p. 99.

¹⁵² Wilmot et al., “In-House Versus Consultant,” p. 156.

¹⁵³ Ibid.

¹⁵⁴ Wisconsin Legislative Audit Bureau, *Evaluation of Use of Engineering Consultants*, p. 3.

¹⁵⁵ Ibid., p. 156.



Overhead Costs

“A valid comparison [of public and private costs] must count the cost of central administration, of buildings and insurance, of recruitment and training, and of fringe benefits. Even more important, it must count the cost of capital. These calculations, routine in private businesses, are by no means the norm in public activity.”¹⁵⁶ Full-cost accounting (FCA) provides the basis for comparing costs of government agencies with costs in the private sector. An important feature of FCA is its ability to capture overhead costs. These are the management and support costs of programs, such as accounting, auditing, executive leadership, legal services, insurance, utilities, and cross-subsidizing.

As the table below shows, the state of the art in determining overhead rates is less than perfect. The overhead rates vary widely (53 percent to 307 percent), even when based on similar definitions.

Overhead costs are the indirect costs of completing a project. Indirect costs include staff benefits, recruiting, rent, insurance, utilities, etc. An example of a direct cost is the actual time spent designing or constructing a project. The most difficult aspect of comparisons is establishing equitable, accurate overhead rates.

For cost accounting purposes, in a \$2 million project with a 100 percent overhead rate, \$1 million is said to be attributed to indirect costs and \$1 million to direct costs. If the same project with direct costs of \$1 million was undertaken at a 150 percent overhead rate, the indirect costs would escalate to \$1.5 million, raising the total cost to \$2.5 million.

Another issue is whether to use full costs or avoidable costs in calculating overhead. Avoidable costs are “those in-hose costs that will not be incurred if a target service, or portion thereof, is contracted out.”¹⁵⁷ Avoidable costs set a baseline of what can be saved, given no other changes besides the outsourcing. But officials can decide to trim support agencies and programs commensurate with reduced demand on their services due to outsourcing. For example, outsourcing highway design would reduce design staff, but not directly reduce the cost of agency or government-wide personnel management, legal, and similar costs, so they would not be considered avoidable. A full-cost approach aims to calculate the unit cost of services delivery, and allows officials to calculate how outsourcing the design work reduces demand for overhead services and reduce staff and funding for support agencies accordingly.

Table 3: Literature Review of Overhead Rates	
Study	Overhead Rate Used
Caltrans (Berkeley)	145%, 155%, 175%
Caltrans (PECG: Reply on Berkeley Study)	118% In-house 147% Consultant
Texas State Department of Highways and Public Transportation (Ernst & Whinney)	75%–93%
Texas State Department of Highways and Public Transportation (CTR)	194%–212% In-house 286%–307% Consultant
Texas State Department of Highways and Public Transportation (TTI)	52.97%
Wisconsin Legislative Audit Bureau	111.6% (“avoidable rate”) 156.8% (full absorption rate)
Louisiana Transportation Research Center	186%–212%

¹⁵⁶ Madsen Pirie, *Privatization: Theory, Practice, and Choice* (London: Wildwood House, 1998), p. 21.

¹⁵⁷ Lawrence Martin, *How to Compare Cost Between In-house and Contracted Services*, Reason Foundation How-to Guide No. 4, (Los Angeles: Reason Foundation, 1993), p. 10.

Part 4

Conclusions and Recommendations

The use of private-sector elements in the delivery of infrastructure is a vital component of development. In order to keep up with growing demand and changing environments, public-works agencies must employ additional cost effective resources to ensure delivery of all necessary services, and outsourcing is one method to achieve best value for each dollar invested. The importance of the issue continues to grow, and steps must be taken to create a more receptive set of circumstances for private-sector involvement.

Further study of the cost benefits of private-sector involvement needs to be done. Improvements in the cost accounting of state agencies through implementation of new accrual accounting standards—and further moves toward full-cost accounting—will help decision makers obtain a clearer picture of overhead costs.

Enabling legislation should be passed to lift barriers to infrastructure outsourcing. In those states in which state restrictions limit the use of private-sector elements, legislators must consider the vast need for infrastructure projects and develop definitive guidelines that will help establish a competitive environment.

Establishing this competitive environment will ensure the optimal level of efficiency and quality for public-works projects by allowing market forces to determine the delivery time, quality, and costs of projects. In choosing whether to use outsourcing for delivery of projects, decision makers should:

1. Recognize the rich and varied potential benefits of infrastructure outsourcing. From design through construction and into long-term operation and maintenance, outsourcing can offer cost savings, time savings, project delivery guarantees, access to new skills, increased innovation, or many combinations of these and other benefits. Like any policy tool, outsourcing delivers benefits if it is properly conceived and structured. Cost alone cannot be used to determine whether work should be outsourced. Factors such as quality and the ability to accommodate peak demand and meet deadlines are often key reasons for outsourcing, even if the cost is higher. Furthermore, the private sector has the ability to specialize in different design and engineering fields, and access to those specialized skills often motivates outsourcing—again, even if the cost is higher.

It is not uncommon for outsourced design and construction of, say, a new water treatment plant to cost more than original in-house estimates but be completed in substantially less time and use newer treatment technologies, or for outsourced operation and maintenance of facilities to lower the life-cycle cost of the facility. Government decision makers, as the customers, can choose goals of outsourcing, be they quick project completion or lower costs.

2. Recognize the problems with cost comparisons. One disconcerting feature that emerges from studies of cost savings from outsourcing in infrastructure is the range of findings they exhibit. Until current changes in government accounting systems are fully implemented, differences between government and private-sector accounting will remain large. Decision makers should recognize that these accounting differences mean that cost comparisons are, at best, educated estimates and should not base decisions on small differences. Be sure that comparisons include “overhead,” or “indirect,” costs—a valid comparison of public and private costs must count the costs of central administration, buildings, insurance, recruitment, training, and fringe benefits. Even more important, it must count the cost of capital. These calculations, routine in private businesses, are by no means the norm in public activity. Finally, do not make the common mistake of neglecting differences in quality, reliability, risk, and other factors that affect best value.

In evaluating costs, be mindful of the limitations of the existing literature, evaluate specific needs, develop a full-cost analysis of in-house costs, and evaluate both cost and other benefits of outsourcing. In other words, move away from a narrow focus on cost comparisons and start evaluating the best-value options.

Finally, do not make the common mistake of neglecting differences in quality, reliability, risk, and other factors that affect best value.

3. Recognize the rich variety of types of outsourcing and project delivery. Outsourcing can be simple contracting for design, construction, or other elements of an infrastructure project, or it can be complex partnerships and even joint ventures. Design-bid-build, design-build, design-build-operate, and build-operate-transfer are just a few of the many methods of project delivery. Choosing among the rich variety of types of outsourcing and project delivery can let government officials customize the public-private partnership to meet their particular needs. Evaluate all of the options available, decide which are most likely to meet specific goals, and work with the private partners to create the right structure to achieve those goals.

4. Understand the importance of utilizing private-sector industries for delivery of public infrastructure. An important element of economic prosperity and viability is adequate infrastructure. Transportation networks, schools, and parks all require financial and personnel resources to complete design, engineering, construction, and maintenance activities. Currently, a massive backlog of highway, school, water, and sewer projects plagues most of the nation. Public agencies can ill afford to turn their backs on the ability of the private sector to help meet project demands and manage project costs.

Appendix

Alternative Project Delivery Methods

As the pressures on government agencies to deliver infrastructure projects and maintain existing facilities have evolved—and as the outcomes sought have become richer—the idea that there is always one best way to structure a project has lost its cachet. Speed, flexibility, innovation, and access to skilled personnel have joined cost savings as key motivations for outsourcing elements of project delivery, and project structures have changed as well. Paralleling the evolution of best-value methods for structuring procurements has been the evolution of value-based delivery systems—delivery systems that match the goals of an individual project. “Public agencies recognize that not every project is cut out for traditional DBB [design-bid-build]. Shorter construction time frames and financial and political constraints lead to the use of design-build (DB) or a permutation of DB.”¹⁵⁸ Choosing the right project delivery system is not always easy; it requires evaluating at least four factors:

- Agency’s needs;
- Agency’s expectations;
- Risks that agency is willing to take; and
- Size of agency’s pocketbook.¹⁵⁹

Agencies should be certain they understand the alternative delivery systems available and then consider the weight of the four factors listed above in determining the best option for the project. As an aid, we provide a basic overview of some delivery systems, along with some discussion of their advantages and disadvantages (Table 3 on the following page gives a brief overview, and we discuss some of the options in more detail below).

A. Design-Bid-Build (DBB)

DBB is the traditional project delivery system in the U.S. construction industry—the department contracts with a constructor after the design is finished. The department will either contract with a design company for complete design documents or do the work in-house. Then the department will solicit fixed-price bids from construction companies to perform the work. A department will usually select one contractor that agrees to complete the work in accordance with the plans and specifications. Assuming no changes to the plans, a firm project cost is established. “However, the [department] must perform two selections, first the architect, and second, the constructor—the constructor is selected after the completion of design, thus omitting constructability reviews.”¹⁶⁰

¹⁵⁸ Kenneth L. McGowan, “Value Based Delivery for Public Owners,” paper presented to the National Society of Professional Engineers, July 2000, p. 1.

¹⁵⁹ Ibid.

¹⁶⁰ Kaye and Kreutzen, *Meeting California’s Infrastructure Challenge*, p. 14.

B. Construction Manager at Risk (CMR)

In the CMR system, the department contracts separately with a designer and a contractor to provide a facility design and to perform construction services. In this system, the contractor usually has significant input in the design process. It is distinctive from the traditional DBB in two ways. First, the department has the opportunity to engage the construction firm much earlier in the design process; and second, the early integration of team players allows for phased design, advanced ordering of items with long lead times, and early construction start dates for critical excavation and foundation packages.¹⁶¹

Lee County, Florida, uses a project delivery method that relies on qualifications-based selection for CMR procurements. The county selects the designer at the same time that it selects the CMR. Each contract is written to provide incentives for cooperation, quality, and timely completion. The CMR competitively bids out the construction work, ensuring free and open competition and competitive pricing. The numbers bear out the success of this project delivery method. Cost growth is negative, time growth is negative, and the unit price of finished construction progressively decreases throughout the project life cycle.¹⁶²

Table A.1: Alternative Project Delivery Options			
Partnership	Description	Advantages	Disadvantages
Design-build	A local government contracts with a private partner to design and build a facility that conforms to the standards and requirements of the local government. Once the facility has been built, the local government takes ownership and is responsible for the operation of the facility.	Procurement flexibility; opportunities for innovation and cost savings; increased efficiency; reduced construction time; single-point accountability.	Reduced owner control; increased costs to incorporate design changes; more-complex award procedures.
Turnkey Operation	The local government provides financing for the project but engages a private partner to design, construct, and operate the facility for a specified period of time.	Places construction risk on private partner; contract can control design and location requirements as well as operational objectives.	Reduced owner control; more-complex award procedures; increased costs to incorporate design changes.
Wrap-around Addition	A private partner finances and constructs an addition to an existing public facility. The partner may then operate the addition for a specified period or until it recovers the investment and realizes a reasonable return.	Public sector does not have to provide capital funding for the upgrade; financing risk rests with partner; time reduction in project delivery.	Future facility upgrades not included in the contract may be difficult to incorporate at a later date.
Lease-purchase	The local government contracts with a private partner to design, finance, and build a facility. The partner leases the facility to the local government for a specified time, after which the ownership vests with the local government.	Increased construction efficiency; lease payments may be less than debt service costs.	Reduced control.

¹⁶¹ Ibid.

¹⁶² Douglas D. Gransberg, *Vertical Construction Performance in Massachusetts Lags Far Behind Other States* (Boston, MA: Pioneer Institute, 2000), www.pioneerinstitute.org/research/policy/piodrc6.cfm.

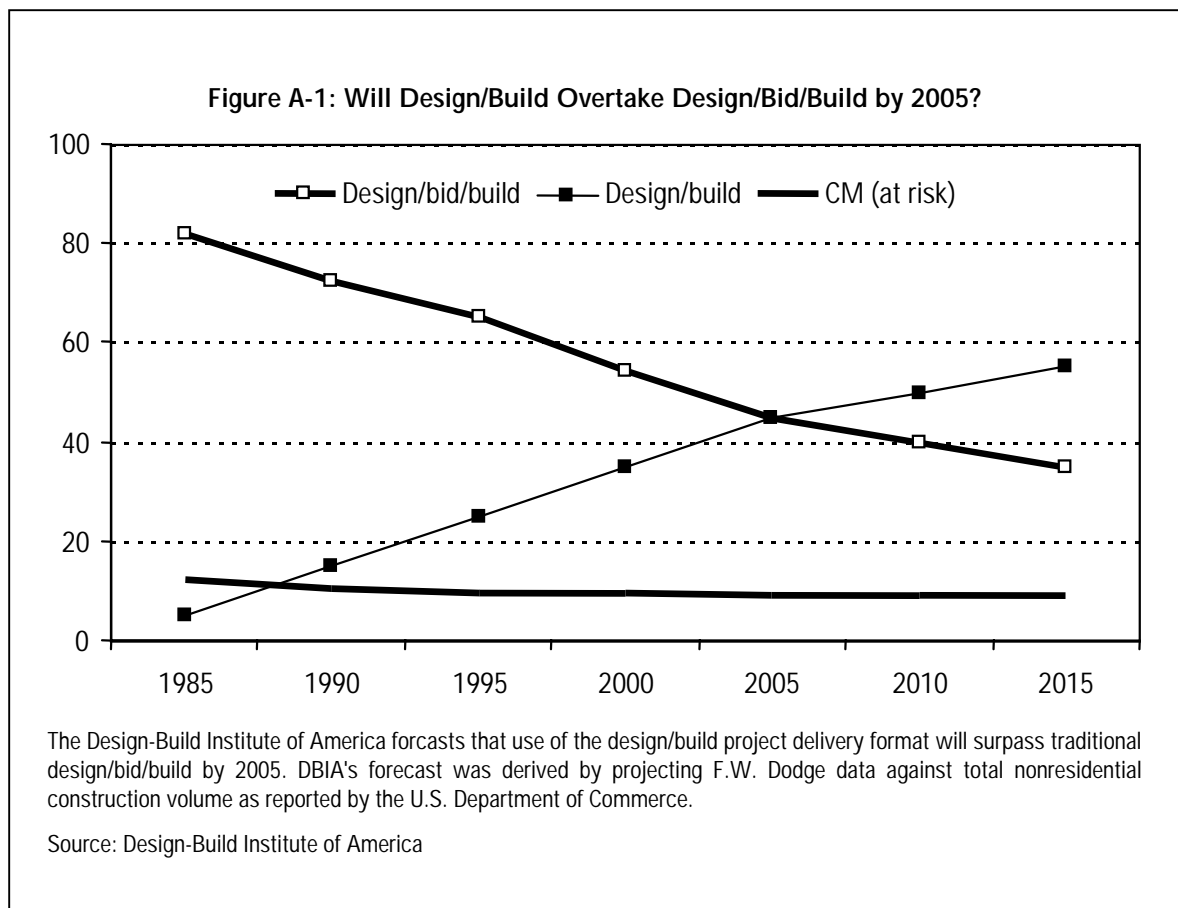
Table A.1: Alternative Project Delivery Options			
Partnership	Description	Advantages	Disadvantages
Temporary Privatization	Ownership of an existing public facility is transferred to a private partner, which expands or improves the facility. The facility is owned and operated by the partner for the length of the contract.	Reduced operational costs; increased efficiency; risk rests with private sector.	Difficulty in replacing private partner in the event of bankruptcy or performance default.
Lease-develop-operate or Buy-develop-operate	The partner leases or buys a facility from the local government, expands or modernizes it, and then operates the facility under a contract. The partner is expected to invest in facility expansion and is given a specified amount of time to recover its investment and realize a return.	Cash infusion for local government; time reduction in project implementation; fast-track construction; no public-sector capital needed for upgrade.	Difficulty valuing assets for lease or sale; reduced control.
Build-transfer-operate	The local government contracts with a private partner to finance and build a facility. Once completed, the partner transfers ownership to the local government. The local government then leases the facility back to the partner under a long-term lease, during which the partner has the opportunity to recover its investment and realize a return.	Maximizes private-sector financial resources; ensures most efficient and effective facility based on life-cycle costs; all "start-up" problems are addressed by the private partner; community is provided with a facility without large up-front capital outlay or incurring large long-term debt.	Loss of public control over construction and initial operation; difficulty in replacing private partner in the event of bankruptcy or performance default; facility may transfer back to public sector at a time in which operating costs are increasing.
Build-own-operate-transfer	A private partner obtains an exclusive franchise to finance, build, operate, maintain, manage, and collect user fees for a fixed period to amortize investment. At the end of the franchise, title reverts to public authority.	Maximizes private-sector financial resources; ensures most efficient and effective facility based on life-cycle costs; all "start-up" problems are addressed by the private partner.	Less public control than build-transfer-operate; difficulty in replacing private partner in the event of bankruptcy or performance default; facility may transfer back to public sector at a time in which operating costs are increasing.
Build-own-operate	Local government either transfers ownership and responsibility for an existing facility or contracts with a private partner to build, own, and operate a new facility in perpetuity.	Private sector operates in the most efficient manner, in both the short run and the long run; long term entitlement is incentive for firm to invest significant capital.	No competition, making regulations for operation and pricing necessary.
Operation and Maintenance	Local government contracts with private partner to operate and maintain a publicly owned facility.	Improved service and efficiency; cost savings; flexibility in securing contracts.	Costs to resume public operation if contractor defaults; reduced owner control and ability to adapt to changing public demands.

Source: "To Partner or Not to Partner—That Is the First Question," *EDCO Newsletter*, October 27, 1999.

C. Design-Build (DB)

In the DB system, the department contracts with a single entity to provide both design and construction services. This offers a single point of responsibility and a single contract.

DB is fast becoming the project delivery mode of choice (see Figure A-1). Forty-nine states (all except Montana) allow DB procurements in some cases, according to the Design-Build Institute of America.¹⁶³ In the mid-1990s, of the \$212 billion U.S. construction market, approximately \$37.2 billion (18 percent) was DB.¹⁶⁴ According to a survey in *Public Works Financing*, over \$6 billion worth of major transportation improvement projects will be awarded as DB in 2000.¹⁶⁵ Of this, \$1.6 billion is for large road and rail projects where DB teams are awaiting further notice. These include a \$390 million monorail in Las Vegas; a \$230 million highway bypass of Myrtle Beach, South Carolina; segment four of Denver's E-470 tollroad (\$250 million); and the \$350 million Tacoma Narrows Bridge in the Seattle area. Five major rail projects being built under DB are (by size) the Alameda Corridor freight rail link between ports in Los Angeles and Long Beach; New York's JFK Airport rail link; New Jersey's Hudson-Bergen light-rail commuter line and Camden-Trenton trolley; and an airport extension via light-rail in Portland.



¹⁶³ David Johnston, director of technical programs, Design-Build Institute of America, interview with author, March 2000.

¹⁶⁴ Jack Rizzo, "Design/Build Alternative: A Contracting Method," *Journal of Management in Engineering*, vol. 14, no. 6 (November/December 1998), p. 44.

¹⁶⁵ "US Transport Design-Build Pipeline Full," *Public Works Financing* (December 1999), pp. 1-2.

Research shows the benefits of DB procurements and why they have become so popular. For example, a study by the University of Florida on DB transportation projects found that design time was 58 percent faster and construction was 18 percent faster than in traditionally structured projects.¹⁶⁶

Following corruption problems in the mid-1970s, Massachusetts imposed restrictions on alternative procurement. A 1999 paper examined the effects of state restrictions on methods of project delivery in the state.¹⁶⁷ After normalizing unit costs for the delivery of public buildings, the report concluded that limiting project delivery methods had created a sharp increase in the cost of construction procurement. Public buildings in Massachusetts cost \$202 per square foot, while comparable projects in Indiana, Florida, and Texas cost \$142, \$128, and \$127 per square foot, respectively.¹⁶⁸ The study found that Massachusetts had the poorest performance in every category. Average cost growth was 30 percent higher than in similar projects in Florida, three and a half times the rate in Texas, and nine times the rate in Indiana.¹⁶⁹ Likewise, Massachusetts projects experienced average time growth (percentage change in length of the contract) of over 55 percent, compared to 17 percent in Florida, 12 percent in Texas, and 6 percent in Indiana.¹⁷⁰

Limiting project delivery methods had created a sharp increase in the cost of construction procurement.

D. Design-Build-Operate-Maintain (DBOM)

DBOM “means a source selection method in which the Purchasing Agency enters into a single contract for design, construction, maintenance, and operation of an infrastructure facility over a contractually defined period.” Funds required to pay for the services of the DBOM contractor during the contract period are appropriated prior to award of the contract or garnered vis-à-vis fares, tolls, or user charges.¹⁷¹

E. Design-Build-Finance-Operate-Maintain (DBFOM)

DBFOM “means a source selection method in which the purchasing agency enters into a single contract for design, construction, finance, maintenance, and operation of an infrastructure facility over a contractually defined period.” It should be noted that no funds are appropriated to pay for any part of the services provided by the DBFOM contractor during the contract period. Many A/E firms are ill-equipped to handle the legal and financial aspects of DBFOM. Involvement with this delivery system requires lawyers, accountants, banks, and principals savvy to the management of risks associated with these issues.¹⁷²

¹⁶⁶ Henk, “Privatization and the Public/Private Partnership,” p. 28.

¹⁶⁷ Douglas Gransberg, *The Cost of Inaction: Does Massachusetts Need Public Construction Reform?* White Paper No. 7 (Boston MA: Pioneer Institute for Public Policy Research, September 1999).

¹⁶⁸ *Ibid.*, p. x.

¹⁶⁹ *Ibid.*, p. 14.

¹⁷⁰ *Ibid.*

¹⁷¹ Directly from McGowan, “Value Based Delivery,” p. 2. Quotes are his, from the American Bar Association’s *Model Procurement Code*.

¹⁷² *Ibid.*

Figure A-2: Risk Distribution in Value-based Delivery Systems

Delivery System	Public Owner	Architect/Engineer	Contractor
Design-Bid-Build	<ul style="list-style-type: none"> ▪ Capital Finance Risks ▪ Legal Liability ▪ Maintenance Risk ▪ Operations Risk ▪ Political Risks ▪ Schedule Risk (Construction)^{1,2} 	<ul style="list-style-type: none"> ▪ Design Liability ▪ Constructed Quality Risk¹ 	<ul style="list-style-type: none"> ▪ Constructed Quality Risk¹ ▪ Schedule Risk (Construction)^{1,2}
Design-Build ³	<ul style="list-style-type: none"> ▪ Capital Finance Risks ▪ Maintenance Risk ▪ Operations Risk ▪ Political Risks 	<ul style="list-style-type: none"> ▪ Constructed Quality Risk¹ ▪ Design Liability¹ ▪ Schedule Risk (Construction)^{1,2} 	<ul style="list-style-type: none"> ▪ Constructed Quality Risk¹ ▪ Legal Liability ▪ Schedule Risk (Construction)^{1,2}
Design-Build-Operate-Maintain ³	<ul style="list-style-type: none"> ▪ Capital Finance Risks ▪ Political Risks¹ 	<ul style="list-style-type: none"> ▪ Constructed Quality Risk¹ ▪ Design Liability ▪ Political Risks¹ ▪ Schedule Risk (Construction)^{1,2} 	<ul style="list-style-type: none"> ▪ Constructed Quality Risk¹ ▪ Design Liability¹ ▪ Legal Liability ▪ Maintenance Risk ▪ Operations Risk ▪ Political Risks¹ ▪ Schedule Risk (Construction)^{1,2}
Design-Build-Finance-Operate-Maintain ³	<ul style="list-style-type: none"> ▪ Political Risks¹ 	<ul style="list-style-type: none"> ▪ Capital Finance Risk¹ ▪ Constructed Quality Risk¹ ▪ Design Liability¹ ▪ Political Risks¹ ▪ Schedule Risk (Construction)^{1,2} 	<ul style="list-style-type: none"> ▪ Capital Finance Risks¹ ▪ Construction Quality Risk¹ ▪ Design Liability ▪ Legal Liability ▪ Maintenance Risk ▪ Operations Risk ▪ Political Risks¹ ▪ Schedule Risk (Construction)^{1,2}

Design-Build-Team

Notes:

¹ Risk is shared among one or more of the participants (not necessarily equal potential liability).

² Schedule risk exists when liquidated damages are involved, or when the late opening of a project delays early revenues.

³ Value-based Delivery System assumes abbreviated design offset and a corresponding increase in Quality risk and Design Liability risk.

Source: Kenneth L. McGowan, "Value Based Delivery for Public Owners," paper presented to the National Society of Professional Engineers, July 2000, p. 6.

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