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Boston's Big Dig Project:

A Cautionary Tale

Wendy Haynes

INTRODUCTION

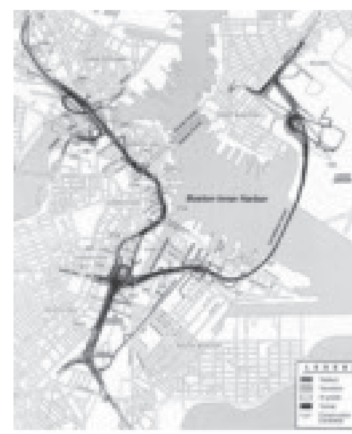
Little did I know as I moved from Oregon to Massachusetts in 1988 that I would soon be witness to one of the most complex and expensive megaprojects in North America. Actually, I'd never heard of the term "megaproject," a point of ignorance I shared with most of the planet's population. I've since found that experts in the field define a megaproject as a publicly funded infrastructure project that costs in excess of a billion dollars and requires more than a decade to plan, design, and construct. Boston's $15 billion Central Artery/Third Harbor Tunnel (CA/T) Project still hits the top of the chart for cost and complexity on the list of megaprojects undertaken in the last two decades of the twentieth century. The CA/T Project provides a rich laboratory for studying the inner workings of these mammoth and costly undertakings.

My 13-year stint in the Massachusetts Office of the Inspector General would expose me to many things, including the interior machinations of planning, designing and constructing Boston's CA/T Project. In fact, then Inspector General Joseph Barresi and his First Assistant, Steve Cotton, eventually tasked me with creating a multidisciplinary team to monitor what would become known as the "Big Dig" project. I soon learned that the structural and civil engineering aspects of the project paled in comparison to the political and social engineering that was needed to sustain momentum toward completion. Now, 20 years after my first introduction to the Big Dig, I still marvel at the audacity of the project champions. I hope that, by the end of this article, I've succeeded in peeling back some of the layers of the Big Dig's complexity and piquing the reader's interest in the megaproject phenomenon.

ON MEGAPROJECTS AND THE BIG DIG

Across the nation, taxpayers (and toll and rate-payers) pump billions of dollars into public works megaprojects. The projects range in type and location from the Alameda Corridor (Los Angeles, California) to the Denver International Airport (Colorado) to the Woodrow Wilson Bridge (connecting Virginia, Maryland, and DC). Beyond our borders, we marvel at the $16 billion 30-mile English Channel Tunnel and the Chinese government's $25 billion dollar hydroelectric dam project on the Yangtze River. But the Big Dig project holds its own in the megaproject hall of fame, or infamy, as the case may be.

Although Bostonians may think of the Big Dig as one unified project, it is actually three separate projects rolled into one by the vagaries and vision of public officials seeking advantage in the politics of the federal transportation appropriations process. The Big Dig boasts three related but distinct design and construction projects:



- Bridging the Charles River with an asymmetrical cable stay structure (The Leonard P. Zakim-Bunker Hill Memorial Bridge);
- Reconstructing the downtown central artery (I-93) underground and demolishing the old elevated artery; and
- Extending the Turnpike (I-90) across Fort Point Channel through South Boston, and across Boston Harbor to Logan International Airport by way of a newly constructed (1995) immersed tube tunnel.

Maintaining the impetus for the Big Dig required a prodigious display of political engineering that rivaled and surpassed the remarkable civil engineering expertise on display throughout the 7.5 mile stretch of roadway, bridge, and tunnel. According to state documents, the massive project was designed to improve traffic flow, safety, and air quality in one of the national's oldest and most congested cities. Big Dig proponents also promised to promote economic development in the region. Some even describe the undertaking as a beautification project envisioned by transportation guru Frederick Salvucci mid-way through the twentieth century.

Urban legend has it that former Secretary Salvucci was as a young man greatly disturbed by the treatment his immigrant grandmother endured at the hands of MassPike officials as they cleared the way for an urban highway earlier in the century. According to Thomas

P. Hughes, an avid megaproject historian, Salvucci's grandmother was ordered to vacate her house in the Brighton section of Boston within ten days and never received fair compensation for her property or mental anguish. Salvucci vowed not to follow the Robert Moses tradition of leveling neighborhoods in the name of progress.

The Big Dig, a project funded by federal and stated monies (about 60/40), was substantially completed late in 2007 for nearly $15 billion. Informed observers question the definition of "substantially completed," especially in light of the *Boston Globe*'s recent report of a 2,000-item list of things yet to be done on the project. That's a far cry from statements in the mid-1980s when project managers estimated the cost at $2.6 billion and looked for completion some time toward the end 1998.

BIG DIG STAKEHOLDER

The list of people and organizations with a stake in the Big Dig would fill volumes—the business community, neighborhood organizations (North End, Chinatown, etc.), highways users, environmentalists, design and construction firms, property owners along the Big Dig corridor, and on and on. But few had a bigger stake in the project than four high-stakes players:

- Bechtel/Parsons Brinckerhoff (B/PB) the joint venture hired by the Commonwealth in 1985 to manage Big Dig design and construction;
- Federal Highway Administration (FHWA—in the U.S. Department of Transportation), the federal funding agency for the Big Dig and many other highway projects across the United States;
- Massachusetts General Court (the Legislature), which would be on the hook for funding whatever FHWA refused to pay; and
- Massachusetts Turnpike Authority (MassPike), the quasi-independent state entity that took over the Big Dig in 1997 from MassHighway and assumed responsibility for maintaining the project into the future.

The chart below—taken from the most recent material available from MassPike (May 2007)—shows what funding sources pay how much of the Big Dig costs. In June 2000, under pressure from Congress, the FHWA dug in its heels and froze the amount it would pay toward the Big Dig at $8.549 billion. Today, that covers just under 60 percent of the 2007 project cost estimate of $14.798 billion. Various state revenue sources will pay about 40 percent of the total cost of the project—far more than the 10–20 percent projected by project enthusiasts in the 1980s and 1990s.

KEY EVENTS IN THE RICH AND TURBULENT HISTORY OF THE BIG DIG

1970s and early 1980s. Massachusetts officials seek local support, federal funding, and environmental approvals for the Big Dig

1985–1995. Commonwealth hires B/PB to manage the Big Dig and moves ahead on the megaproject

In the early 1980s, Transportation Secretary Fred Salvucci assigned responsibility for the Big Dig to the Massachusetts Department of Public Works (MDPW—later to be named the Massachusetts Highway Department), the department that was also responsible for overseeing the design and construction of road and bridge projects throughout the state. There appears to have been general, though not unanimous, agreement that if the project were to be undertaken, there was no alternative but to rely heavily on consultants to manage the megaproject under the Commonwealth's direction. Transportation officials and some political leaders were concerned that scarce in-house resources would be diverted to the Big Dig from road and bridgework outside the Boston metropolitan area. Their concerns, shared by federal highway officials, buttressed the decision to rely heavily on hired expertise from the private sector.

In 1985, MDPW hired the joint venture of Bechtel/Parsons Brinckerhoff Quade and Douglas (B/PB) to manage design and construction of what was then known as the Central Artery/Third Harbor Tunnel Project. Between 1985 and 2006, the Commonwealth would pay B/PB more than $2 billion through a series of

SOURCES BY FUNDING	Cumulative Actual through SFY 2006[1]	Budgeted SFY2007	Budgeted SFY2008	Budgeted SFY2009 and beyond	TOTAL
Federal	6,913	135	0	0	7,049
GANS (grant anticipation notes)[2]	1,500	0	0	0	1,500
State Bond/Notes	1,589	50	61	10	1,710
[State] Transportation Infrastructure Fund	2,337	0	121	25	2,482
Massport via State	301	0	0	0	302
Turnpike Authority [MassPike]	1,401	47	4	0	1,451
State Interest on MTA Funds	24	0	0	0	24
MassPike Direct	81	59	0	0	140
Insurance Trust Revenue	59	5	75	0	140
TOTAL	14,206	296	261	35	14,798

[1] *SFY=state fiscal year (July–June), which is different from the federal fiscal year (FFY. October–September).*

[2] *MassPike documents explain this funding nuance in more detail.*

open-ended consulting contracts to manage the project from stem to stern.

1996–1997: LEGISLATURE CREATES METROPOLITAN HIGHWAY SYSTEM (MHS); BIG DIG MANAGEMENT SWITCHES FROM MASSHIGHWAY TO MASSPIKE

Public officials faced a major financial bind in the mid-nineties. By 1996, about $4.7 billion had been obligated for the Big Dig—$4.1 billion in federal funds (86 percent) and about $650 million in state funds. FHWA demanded proof that the Commonwealth would have the wherewithal to handle its part of the deal. The primary source for transportation funding in Massachusetts is state transportation bonds, supported by fuel taxes and other sources. Typically, the State has borrowed funds by issuing general and special obligation bonds. Proceeds from these bond issuances, which are authorized by the Legislature through transportation bond bills, cover the State share of federal-aid projects, and pay for non-federally funded projects.

In his cover letter to the Legislature, Governor William Weld noted that the MHS bill "answers the challenge set forth by the FHWA to implement a strategy for payment of the Commonwealth's share of future CA/T [Big Dig] Project costs by April 1, 1997." The bill moved quickly through the Legislature and the Governor signed it on March 20, 1997. A companion transportation bond bill, passed by the Legislature and signed into law by the Governor in May 1997, ensured that funds would be available to cover the Big Dig cost, then estimated at $10.8 billion.

MassPike and MassHighway wasted no time entering into a management agreement, effective July 1, 1997, whereby MassPike would manage completion of the Big Dig, provided that MassHighway would continue to be the recipient state agency for federal funds and "remain fully liable for paying all costs of the CA/T Project not otherwise paid from the $700 million to be paid" by MassPike. Shortly thereafter, Governor Weld resigned and Paul Cellucci, his Lieutenant Governor, stepped into the Governor's office, assuring the public that the Big Dig would come in on time and under budget under the continuing direction of James J. Kerasiotes.

ESTIMATES, LIES, AND COST OVERRUNS

Stunning increases in megaproject schedule and cost estimates have caused political observer David Luberoff and others to pose a troubling question: is our political system so flawed that those who build infrastructure cannot tell the truth about costs? While I hesitate to pin the problem on our political system, there's ample evidence that megaprojects routinely exceed time and budget estimates trotted out by proponents when they're pursuing public and legislative support. The Big Dig is no exception. Indeed, cynics could learn much from the Big Dig play book about creative accounting and financial manipulations.

2000–2001: DECONSTRUCTING THE TRUE COST OF THE BIG DIG

In March 2001, State Inspector General (IG) Robert Cerasoli issued a report to the Treasurer of the Commonwealth alleging that Big Dig officials had beginning many years earlier deliberately misrepresented huge increases in Big Dig costs. Here's an excerpt from the executive summary of the IG's report. "B/PB" refers to Bechtel/Parsons Brinckerhoff, the joint venture hired in 1985 to manage Project design and construction.

Anxious to avoid the sticker shock effect of B/PB's total cost estimate, Big Dig officials undertook a nine-month initiative between June 1994 and March 1995 to decrease B/PB's total cost estimate from $13.8 billion to $8 billion. At this time, the Secretary of Transportation and Construction publicly announced that the on-time and on-budget figure would not exceed $8 billion. Documents cite a directive from Big Dig officials telling B/PB to "hit the target" of $7.98 billion. To hit the target, state, B/PB, and local FHWA officials began an extensive cost reduction initiative that consisted of the following:

- Reducing every B/PB "to-go" contract estimate across the board—including material, labor and overhead—by a 13 percent "market discount" despite the recommendation of B/PB officials by letter from the home office in San Francisco not to do so….
- Reducing every to-go contract estimate by eliminating the 18 percent contingency allowance for construction growth during design.
- Excluding all management costs from the estimate after the year 2002 [note that the management team did not close up operations until 2007!]….
- Excluding more than $1 billion in costs defined as "non-project" costs.
- Stating all estimates in 1994 dollars and excluded to go escalation (inflation costs) from the total cost. Later, they insisted that the budget exclude all escalation since 1988….

More heads rolled; Governor Cellucci had already ousted James J. Kerasiotes, who was regarded by many as the primary instigator of this high-stakes shell game. Kerasiotes had arguably been responsible for the Big Dig for many years in various capacities, most recently as head of MassPike. Although little came of it, the Securities and Exchange Commission launched an investigation into whether Commonwealth officials deliberately misled bond-buyers when they failed to identify the magnitude of Big Dig liability in their bond prospectus.

Primarily as a result of their failed oversight on the Big Dig, FHWA issued a series of directives and cautions for megaproject oversight across the nation, demanding more detailed financial reports and ordering regional FHWA offices to keep a much closer eye on large transportation projects in their districts.

CONCERNS LOOM…AGAIN

Much of the Big Dig saga might have faded into the past except for the tragic death of a woman in July 2006 when a falling ceiling tile in a connector tunnel killed Milena Delvalle who was driving with her spouse to Logan Airport in the early morning hours. The incident revived earlier concerns about accountability and oversight on the Big Dig, especially with respect to B/PB's role in facility failures and cost overruns. Recently, B/PB agreed to return about $400 million to the Commonwealth in a settlement agreement approved by U.S. Attorney Michael Sullivan and State Attorney General Martha Coakley. The *Boston Globe* reported that by settling in this matter, B/PB avoided criminal charges in the tunnel collapse and would thus not be disbarred from receiving future federal and state government contracts.

MEGAPROJECT OVERSIGHT POINTERS

So what can we learn from these experiences? As a result of my work in the Inspector General's (IG) office and subsequent research—and the great advice of colleagues—I developed the following pointers for megaproject oversight leaders:

• **Budget oversight costs right along with the project**. Funding for oversight efforts should be allocated as part of the basic project costs, just as one might budget for design costs, project office space, and staff. (The IG appealed to the Legislature for $1/10^{th}$ of 1% of the estimated project costs in the early-mid 1990s, but even that modest amount didn't fly.)

• **Start early**. The earlier you weigh in on management systems, procurement procedures, and design issues, the more likely you are to be able to warn managers and policy makers off the rocks before big problems sail in. Put pressure on management to use such techniques as constructibility reviews and value engineering analyses during the design phase, rather than dealing through change orders with problems that could have been eliminated before construction (or product delivery). Early work increases the likelihood that management (and the IG) will be able to identify opportunities for cutting costs and ensuring a high quality facility, whether that facility be a multibillion-dollar highway or an interagency radio installation.

• **Go for major vulnerable "pulse" points**. Do what internal auditors might do. Take a look at the management controls that are (or should be) in place. For instance, if funding sources require pre/post award audits on contracts (the feds usually do for professional service/consulting contracts), make sure the agency has that function in place. Develop a good relationship with the agency's internal auditors and outside funding agencies. They'll tip you off to problems and opportunities. Also: watch out for proprietary specifications and sole-source contracts. These approaches, if selected, should be fully justified in writing on the basis of agency needs, NOT the ability of one vendor or manufacturer to tilt the specs to their own advantage. AND: assess the overall "control environment." Do the top leaders hold themselves and the organization to the highest ethical standards. Are those standards clearly understood and discussed?

• **Follow the money**. If most of the work will be contracted out, look at specifications, procurement procedures and pre-bid prequalification requirements immediately. The last thing you need is for favored vendors of powerful politicos to get the work without fairly competing for it. And that could happen unless procurement regulations ensure a level playing field for all firms who are qualified to bid on a job (or to submit a written proposal in response to a request for proposals to provide professional services). If anyone or any firm now under contract wasn't competitively procured, you already have a problem.

• **Empower the managing agency**. You are the monitoring agency, not the manager. Make sure that the agency managers charged with making all this happen know they are the "owner" and need strong "owner" representation—that is, tough staff or owner representative under contract, and clear, demanding contract language throughout.

• **Define performance standards in agency mission and contract provisions**. You'll have a tough time holding agencies accountable for holding their staff and contractors accountable (a BIG part of your job, presumably) if the standards for project delivery aren't spelled out and measurable.

•**Push the agency to have reliable, timely reporting systems**. This will be your saving grace. If you can induce the managing agency to have a good reporting system for contract performance, payments, and change orders, you can monitor THEIR reports, periodically test for validity, and then go to the field to find out whether they're reporting what's really happening. There's nothing like a big change order early in construction to signal problems down the road. Be sure to get on the distribution lists for all their routine status reports and minutes of public meetings. No doubt they will be sanitized, but you can still look for big dollar change orders, delays, and disputes. And, finally: scrutinize the assumptions underlying project cost estimates. The bottom line figures provided by the agency may include offsets and assumptions about future savings or aggressive cost control measures that artificially deflate the total project cost. Beware of creative accounting!
•**Have a steady on-site presence**. Spend as much staff time as possible on-site and in the field. Show up at meetings, sit in on pre-bid conferences, talk with staff—BE THERE. Some of our best leads come from hallway conversations with in-house agency staff, vendors, aggrieved bidders, and disgruntled employees.

CONCLUSIONS

In the 1980s and 1990s, public officials were all too willing to cede responsibility for managing public projects to private ventures. Particularly as we moved into the 1990s—with the cry for government reform, "steering not rowing," outsourcing, and privatization—state agencies were not then and probably never were equipped to deal with a project like the Big Dig without significant reliance on private sector expertise. Massachusetts officials operated under the delusion that if they fostered a collaborative and harmonious relationship with B/PB, all would be well. Surely, B/PB would not risk its international reputation with substandard performance on Boston's megaproject.

One need only walk along the greenway that's growing where once the elevated Central Artery cast its shadow to appreciate the Big Dig's contribution to the beauty of downtown Boston. The Zakim Bridge lights up the night and the Ted Williams Tunnel eases our way to Logan Airport. But at what cost do we enjoy these marvels? For many years to come, the Big Dig's $15 billion price tag will siphon state and federal funds from roadways and bridges sadly in need of repair and replacement.

February2004: An aerial view of the old elevated Central Artery (I-93) without its road deck just north of Rowes Wharf.

The Big Dig is, indeed, a cautionary tale. I hope it serves as a reminder to all of us that when we cede responsibility to private entities without ensuring adequate oversight, we also mortgage our grandchildren's future. Our public officials—elected and appointed—have a stewardship responsibility to safeguard public resources. In the case of the Big Dig, some of our stewards fell far short of the mark. In BSC's Master of Public Administration program, I have the opportunity to work with my colleagues in the Department of Political Science to help ensure that we do not repeat the mistakes of the past as we move forward.

I want to share the concluding words from my dissertation. It seems a fitting end to this article:

We ask an extraordinary amount of our public leaders and managers. The visions of others, inherited through administrative changes and the vicissitudes of public life, may place dedicated public servants in the position of overseeing undertakings for which they have neither sufficient organizational strength nor long-term institutional support. And yet they persevere. As we scrutinize, analyze, dissect, compare and contrast their efforts, we should acknowledge the debt of gratitude we owe to those dedicated professionals who work for us every day. They receive too little appreciation for their deeds. We owe them—and the public they serve—our respect and the best thoughtful attention academia has to offer.

Dr. Haynes notes that her fascination with the Big Dig extended beyond the walls of the Office of the Inspector General to her work on a doctoral dissertation on the Central Artery/Tunnel Project and the Boston Harbor Clean up at Northeastern University in the Law, Policy and Society Program.

—Wendy Haynes is Associate Professor of Political Science and Coordinator of the Master of Public Administration Program.