

All Aboard!
Implementing Transit Rail Public-Private Partnerships in the United States:
Hudson-Bergen Light Rail (New Jersey, USA) and EAGLE P3 Commuter Rail (Colorado, USA)

John E. Gudgel
(Corresponding author)
Tel: 703-362-2684
Email: jgudgel@gmu.edu
George Mason University, 3351 Fairfax Dr. Arlington, VA 22201, United States

Y. Elle Wang
Tel: 703-993-4390
Email: ywangv@gmu.edu
George Mason University, 3351 Fairfax Dr. Arlington, VA 22201, United States

(DRAFT – MARCH 17, 2014)

Abstract

Abstract: This case study looks at the use of public-private partnerships (P3) on two transit rail projects in the United States. The first, the Hudson-Bergen Light Rail line, which began operation in New Jersey in 2000, was the first modern-era U.S. Design-Build-Operate-Maintain (DBOM) P3 transit project. The second, the EAGLE P3 Project, which is currently under construction in Colorado, is the first modern-era use of a P3 to design, build, finance, operate, and maintain (DBFOM) a commuter rail system in the U.S. Each of these projects demonstrates the variety of ways that P3s have been used on U.S. transit rail deployments and demonstrates both the advantages and the challenges raised in using P3s on complex metropolitan transit projects.

Keywords: public-private partnerships, P3, rail transit, EAGLE P3, Hudson-Bergen Light Rail, HBLR, Colorado, New Jersey.

Highlights:

- Hudson-Bergen Light Rail Transit System:
 - First U.S. Design-Build-Operate-Maintain (DBOM) P3 transit project.
 - Designated Federal Transportation Administration (FTA) “super turnkey” project and participated in FTA Turnkey Demonstration Program.
 - Concession signed with 21st Century Rail Corporation in 1996.
 - Began service in April 2000. Ridership in 2010 less than half original projection resulting in major New Jersey Transit (NJT) operating losses.
 - Project has helped spur billions of dollars in economic development in service area.
- EAGLE P3:
 - First use of a P3 for a design, build, finance, operate, and maintain (DBFOM) commuter rail project in the U.S.
 - Participant in FTA Public-Private Partnership Pilot Program (Penta-P).

- Major part of voter approved Regional Transportation District (RTD) FasTracks Transportation Plan.
- Concession signed with Denver Transit Partners in 2010.
- Construction on schedule for opening in 2016.

1. Introduction

Can a public-private partnership model be successfully implemented on rail transit projects in the United States? This case study looks at how public-private partnerships (P3s) were used to implement two rail transit systems in the United States – the Hudson-Bergen Light Rail Transit system in New Jersey, and the EAGLE P3 commuter rail project in Colorado.

The Hudson-Bergen Light Rail Transit (HBLRT) project was the first modern-era application of design build, operate, and maintain (DBOM) P3 project delivery methods on a transit system in the United States. The HBLRT System (Figure 1), which went into operation in April 2000, runs a total of 18.25 route miles (29.4 route kilometers) and connects the communities of Bayonne, Jersey City, Hoboken, Weehawken, Union City and North Bergen New Jersey.

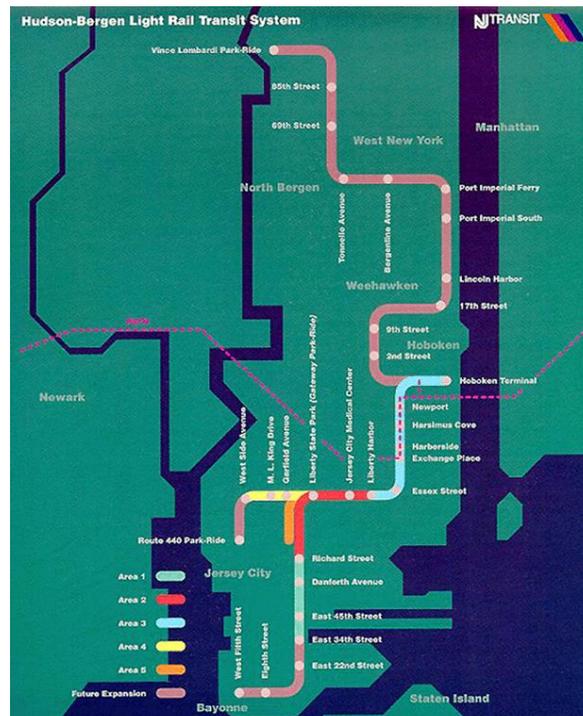


Figure 1: Map of Hudson-Bergen Light Rail Transit System

Source: RailwayTechnology.com [Railway 2013]

The EAGLE P3 Project, located in the Denver Colorado metro area, is the first modern-era design, build, finance, operate and maintain (DBFOM) public-private commuter rail project in the United States [Reinhardt 2010]. In addition, EAGLE P3 is the first availability-based P3 transit concession in the U.S., as well as the first U.S. transit P3 project financed in part by a private activity bond [Russell 2010]. The EAGLE P3 Project (Figure 2) is currently under construction and is scheduled to be completed in 2016. It is an extension of Denver’s 122 mile commuter and light rail system being deployed under Regional Transportation District’s FasTracks Plan. The EAGLE P3 elements include a new East Corridor Line consisting of 22.8 miles of rail from Denver International Airport to Denver Union Station (including five intermediate stations), a new 11.2 mile Gold line, and a new commuter rail maintenance facility.



Figure 2: The EAGLE P3 Project

Source: RTD Facts & Figures website [RTD Denver 2012]

The remainder of this case study will include a brief description of the analytical framework (Section 2), an overview of the U.S. rail historical context (Section 3), review of New Jersey and Colorado P3 policy development and regional planning process (Section 4), detailed descriptions of the design, financing, demand, risk allocation, construction, current operational status, and lessons learned for the Hudson-Bergen Light Rail Transit (Section 5) and EAGLE P3 projects (Section 6), discussion of the key findings (Section 7), and finally conclusions (Section 8).

2. Analytical Framework and Hypotheses

The framework of the case study will follow Yin, who recommends that researchers base their case studies on the theories and previous studies on the subject [Yin 2009].

In terms of the structure of the analysis, this study will follow Levy, who authored several P3 case studies [Levy 2011]. This case study will utilize both primary and secondary data and information from public sources. This includes New Jersey and Colorado state legislative bills, state and regional strategic transit plans, ridership demand and environmental studies, public and private activity bond descriptions, concession and construction agreements, and data from key participant's websites and presentations. This information will be used to look at how P3 models have been implemented in New Jersey and Colorado on rail transit projects and what political, financial, and risk factors have impacted decision-making and project success.

Several hypotheses will be explored. The first hypothesis is that the use of P3 capabilities, including P3 financing and design-build project delivery, makes it possible for U.S. transit rail projects to proceed to financial close, construction, and completion more quickly and cost effectively than conventional public finance and construction of transit systems. The second hypothesis is that, at least in the United States, P3 federal incentive programs can help motivate jurisdictions to consider P3s when planning and implementing transit projects. The third hypothesis is that demand risk is a keen concern of both public and private partners and that, given the uncertainties of future ridership and revenue projections, this risk be shared based on the ability of each partner to manage the risk. The fourth hypothesis is that the public partner may want to consider alternatives to traditional fare or toll based concession agreements such as availability payments or other types of performance based compensation to private partners. Finally, the fifth hypothesis is that economic development and other local community benefits can more than offset demand risk operating losses in determining project success.

3. National Rail Historical P3 Context

There is a long history of using public-private partnerships on transportation infrastructure projects, including rail and transit projects, in the United States. The first toll road in the United States, the Philadelphia and Lancaster Turnpike in Pennsylvania chartered in 1792, was constructed and operated using primarily private funds [USDOT 2004]. Likewise, in the 1850s, a public-private partnership helped to build and operate the first land grant railroad in the United States - the Illinois Central Railroad [KPMG 2007]. The private investors were able to use the land grants as security to issue bonds to raise the funds needed to construct the line that initially connected Cairo to Galena in Illinois in 1856. Ultimately this railroad was expanded to connect Chicago to New Orleans by 1890 [KPMG 2007]. A similar P3 land grant approach between the U.S. federal government and two private railroad companies, Union Pacific and Southern Pacific, was subsequently used to build the first transcontinental railroad completed in 1869 [Loulakis 2003].

Public-private partnerships in U.S. urban transit projects are also not something new. In fact many of the horse-drawn and later electrically driven street car systems prior to the Great Depression were built and operated by private concessionaires [Buttson 2006]. Larger urban transit projects, including the New York City Subway, were also designed, built, financed, and initially operated under P3 concession agreements [KPMG 2007]. However, the depression years of 1929-1934 saw an unprecedented number of street car and private transit concession bankruptcies. Further, the public's growing reliance on the private automobile and the urban migration to lower density suburban areas made it less and less profitable for private companies to invest in public transportation and, by the mid-20th century, virtually all construction, operation and maintenance of transit rail in the United States was done by state and local governments [Ybarra 2008].

The concept of transportation P3s in the U.S. began to reemerge in the late-1980s as state and federal transportation funding became more constrained, and as the need for highly efficient intermodal surface transportation systems continued to grow [USDOT 2004]. In December 1991, the U.S. Congress enacted the Intermodal Surface Transportation Efficiency Act (ISTEA), which included a requirement for all U.S. states to implement a statewide transportation planning process that considers all transportation modes and connections between and within each state [Virginia Statewide 1995]. Further, as part of the ISTEA legislation, all metropolitan areas with populations of over 50,000 people were also required to develop through Metropolitan Planning Organizations (MPOs) economically constrained long-range transportation plans. It was around this time that many states, including Colorado and New Jersey, began to consider legislation to enable their states to enter into P3 agreements, and for municipal regional areas including Denver and northern New Jersey to begin to formulate long range intermodal transportation plans that would eventually consider the use of P3s to help make their proposed projects economically feasible.

4. State Transportation Regional Planning and P3 Legislation

This section describes the regional planning and P3 legislation activity in New Jersey and Colorado.

4.1. New Jersey State Regional Transportation Planning and P3 Legislation

In July 1966, the New Jersey legislature passed the *Transportation Act of 1966* establishing the New Jersey Department of Transportation (NJDOT) – the first state transportation agency in the United States [NJSA 1966]. Under Section 5 of this 1966 statute the NJDOT was authorized to develop and maintain a comprehensive master plan for all modes of transportation development, with special emphasis on public transportation [NJSA 1966]. The plan was to be revised and updated at least every five years. Subsequently, the *Public Transportation Act of*

1979 established the New Jersey Transit Corporation (New Jersey Transit) – a new agency within the NJDOT charged with the authority to “plan, design, construct, equip, operate, improve and maintain, either directly or by contract with any public or private entity, public transportation services” [NJSA 1979]. Thus, inherent in New Jersey Transit’s charter is the implied ability to enter into P3 relationships.

New Jersey Transit was initially only responsible for bus transit services; however on January 1, 1983 the agency also assumed responsibility from Conrail¹ for operation of all of New Jersey’s light rail services. Today, New Jersey Transit is the 3rd-largest public transit agency in the United States operating 711 daily trains with 162 stations on 11 rail lines over 530 route miles; 2,027 buses on 236 routes throughout the state; and providing 223 million passenger trips annually [CityData 2013].

As previously noted, ISTEA requires that all MPOs produce regular constrained regional transportation long range plans containing transportation projects that can reasonably be expected to receive funding. New Jersey is unique in that it is the only state covered entirely by MPOs [NJT & NJDOT 2012]. NJDOT and New Jersey Transit are members of all three of the MPOs covering New Jersey. New Jersey Transit is also a non-voting member of the New York Metropolitan Transportation Planning Council, the MPO for New York City and five of the surrounding New York suburban counties [NJT & NJDOT 2012]. The Hudson-Bergen Light Rail Transit Project fell with the jurisdiction of the North Jersey Transportation Planning Authority (NJTPA) and since the early-1980s had been identified in the strategic plans of the NJDOT, New Jersey Transit, and municipalities along the proposed route [Fitzsimmons & Birch 2003].

¹ Conrail was created in 1976 by the federal government to help maintain the economic solvency of railroads in the northeast and Midwest regions of the U.S.

ISTEA, in addition to requiring all MPOs to generate constrained long-range transportation plans, also contained goals to foster the use of new more efficient delivery mechanisms to decrease the costs to implement new transit systems. Section 3019 of ISTEA included provisions for a Federal Transit Administration (FTA) Turnkey Demonstration Program and authorized FTA to select two or more transit projects to participate in the program [U.S. House of Representatives 1991]. In April 1993, New Jersey Transit's Hudson-Bergen Light Rail Transit System, identified by the FTA as a "super turnkey" project was selected as one of four transit projects to participate in the program [U.S. House of Representatives 1998]. Subsequently, in 1997, the New Jersey Senate and General Assembly authorized the NJDOT to select up to seven transportation projects to participate in a New Jersey P3 demonstration program to test the viability of the concept [NJSA 1996]. The Hudson-Bergen Light Rail Line Transit System was the first and only project completed under this legislation. In 2002, after the expiration of the original five-year pilot period allowed by the General Assembly, this P3 legislation was not renewed [NJT and NJDOT 2012]. The State of New Jersey does not currently have any active P3 enabling legislation; however there may be renewed interest P3s to help rebuild some of the transportation infrastructure destroyed by Hurricane Sandy in 2012.

4.2. Colorado State and Regional Transportation Planning and P3 Legislation

Within the State of Colorado responsibility for statewide intermodal transportation resides with the Colorado Department of Transportation (CDOT). The Colorado legislature created CDOT in 1991 to replace the Colorado Department of Highways with a more robust entity that would manage all modes of transportation and "enhance the state's prospects to obtain federal funds by responding to federal mandates for multi-modal transportation planning" [Colorado Legislature 1991]. The legislation also created within CDOT the Transportation Commission with the responsibility to "formulate the general policy with respect to the management,

construction, and maintenance of public highways and other transportation systems in the state” [Colorado Legislature 1991]. These responsibilities include coordinating with eleven transportation districts within the state to create strategic plans and transportation budgets.

Under the *Public-Private Initiatives Program Act of 1995*, the Colorado legislature granted CDOT the authority to enter into Public-Private Initiative (PPI) agreements for transportation system projects including turnpike and other infrastructure activities [Colorado Statute 1995]. The legislation allowed for solicited and unsolicited proposals for P3s and created a statewide tolling enterprise to finance, build, operate and maintain toll highways. In 2009, Senate Bill 108 subsequently strengthened the Act by abolished the existing Colorado Tolling Enterprise (CTE) and putting in its place the High-Performance Transportation Enterprise (HPTE) within CDOT whose mission is to seek out and evaluate potential PPPs [Colorado Senate 2009]. Current law also allows for multiple types of project delivery, including design-build, permits the public agency to hire consultants; exempts P3 projects from state procurement laws; and allows long term leases to the private sector and the outsourcing of operations and management [Iseki et al 2009].

Within the Denver Metropolitan area two groups play an important role in regional transportation planning. The first is the Regional Transportation District (RTD), which was created by the Colorado legislature under the Regional Transportation Act of 1969 to develop, operate and maintain a mass transportation system that today serves 2.6 million people in Denver and eight surrounding counties [RTD 2013]. RTD currently operates the bus and commuter rail system, and is the owner of FasTracks, a multi-billion dollar public transportation expansion program that consists of six rail lines with a combined length of 122 miles (196 km) that includes the EAGLE P3 project. In 2008, the Colorado legislature in order to “maximize public and private participation in federal funding opportunities and opportunities for transportation

infrastructure development” granted RTD additional authority to enter into loan agreements with private companies through private activity and exempt facility bonds [Colorado Legislature 2008]. Such bonds were subsequently utilized to fund the building of the EAGLE P3 project.

The second regional group is the Denver Regional Council of Governments (DRCOG), which is the designated MPO responsible for creation of the Denver metropolitan area regional constrained strategic transportation plan. Both CDOT and RTD, through formal agreement with DRCOG, are active participants in the strategic planning process and are ultimately responsible for carrying out the projects proposed by the plan. The DRCOG, beginning with the *Metro Vision 2020 Regional Transportation Plan*, has been producing five-year fiscally constrained plans since 1998. Each of those five year plans included transit rail services for the east corridor, from the Denver Central Business District to Denver International Airport; and recognized the need for local and private sector investment in order to have available the reasonably expected funding required by ISTEA for fiscally constrained transportation plans [DRCOG 2013].

This combination of state P3 legislation, the creation of the HPTE organization, RTD and DRCOG regional planning focused on P3 development, and both political and voter support has created what a CDOT spokesperson believes is a growing sense of “collaborative regionalism” in Colorado, where local, regional, state and federal agencies work together to implement P3 transportation projects [Halai 2011].

5. Hudson-Bergen Light Rail Transit (HBLRT) Project Case Study (New Jersey, USA)

During the 1980s, the population in Hudson and Bergen counties in northern New Jersey had been rapidly growing, while existing transit such as the Port Authority Trans-Hudson Corporation known as PATH train and NY Waterway ferries did not connect those areas. In the 1990s, New Jersey Transit Corporation (NJT) decided to solve this problem by building a light-

rail transit system in the Hudson riverfront communities to increase connectivity and to better serve business and residential needs.

5.1. HBLRT Project Planning & Demand

During the early 1980s the Hudson County waterfront in New Jersey across the river from New York City had deteriorated with many vacant lots and abandoned buildings. In order to revive the area, a transportation study was conducted in 1984, and a draft transportation plan released in 1985 recommending “a new north–south transit system stretching between Bayonne, Jersey City, Hoboken, and other New Jersey municipalities to the north” [Fitzsimmons & Birch 2003]. New Jersey then- Governor Thomas Keane, recognizing that transit would aid the economic development of Hudson River waterfront directed NJDOT to study what transit services might best serve the area. As a result, NJDOT then commissioned Parsons Brinckerhoff Quade & Douglas to prepare three reports: 1) Hudson River Waterfront Transportation Study: Draft Transportation Plan (November 1985), 2) the Draft Transportation Plan technical Report (April 1986), and 3) the Conceptual Engineering Report (September 1987) [Gorewitz & Ohland 2006]. Subsequently, an Alternatives Analysis and Draft Environmental Impact Statement (AA/DEIS) was begun in 1989 and completed in 1992 [Fitzsimmons & Birch 2003]. As part of this study, NJDOT developed a new set of traffic forecast models for northern New Jersey including commute traffic into New York City [Killen & Adler 2005]. Sensitivity tests showed the unique travel patterns of the New York City metropolitan area including heavy reliance on transit over automobiles, especially during work day commutes: 57% of workers preferred using transit for commutes into Manhattan versus 43% who preferred cars. This transit preference increased to 65% for those commuting to the New Jersey waterfront [Killen & Adler 2005]. The study showed that transit lights had a value of time of \$15 per hour (\$18 in 2013 dollars) and were highly sensitive to transfers. However, forecasters also factored in future waterfront land

development that was anticipated to increase employment and residential housing significantly by 2010 [Killen & Adler 2005]. Construction was to take place in three phases and, based on various factors, initial usage at opening in 2000 was forecasted to be 20,000 riders per work day, growing with completion of phase 3 to 92,560 riders per work day in 2010 [USDOT Office of the Inspector General 1999].

As part of the preparation of the AA/DEIS, New Jersey Transit considered nine transportation alternatives for the waterfront corridor including seven build alternatives, a do-nothing alternative, and a low-cost alternative to expand and modify existing transportation systems [USDOT Office of the Inspector General 1999]. The preferred alternative was released to the public in 1992, but immediately ran into public opposition to an alignment through Hoboken. Further, the original proposal had the HBLRT ending in Jersey City and there was local consensus that the line should be extended to Bayonne [Robbins & Wells 2008]. Ultimately a Supplemental EIS was issued in 1995 moving the alignment to the west side of Hoboken, and the recommendation was made to extend the line to Bayonne. Subsequently, the Final Environmental Impact Statement (FEIS) for the full HBLRT was issued in August 1996. FTA issued a Record of Decision in October 1996, and later that same month signed a Full Funding Grant Agreement (FFGA) committing \$604.09 million of Section 5309 New Start funds to support the building of the first phase of the project [FTA 1998].

5.2. HBLRT Procurement and Concession Agreement

During the planning process NJT made the decision to use a turnkey design-build-operate-maintain (DBOM) procurement strategy. The decision was due in part to then-Governor Christie Whitman's directive to involve the private sector public sector projects and services [NJDOT 1996] and also the opportunity to participate in the FTA's Turnkey Demonstration Program. The goal in implementing the project using a turnkey approach was to reduce the time and cost of

construction, simplify oversight procedures, and allocate risk to those project entities best able to manage it.

NJT issued a Request for Qualification (RFQ) in June 1995 and in August received responses from five consortia. An Invitation to Bid/Request for Proposal (RFP) was extended to the five consortia in November 1995 and the final proposals were received from three bidders on May 9, 1996 [Decker 1996]. One bidder was rejected as non-responsive because it was unwilling to support operations and maintenance of the system for a period longer than six years. The two remaining bidders were 21st Century Rail Corporation and Garden State Transit Group. The proposals were evaluated on both price (60%) and technical approach (40%) [Miller 2002]. 21st Century Rail Corporation's bid for design, construction, and 15 years of maintenance was \$1.28 billion, significantly lower than Garden State Transit's bid of \$1.8 billion [Miller 2002]. The winning bidder was 21st Century Rail, 70% owned by Raytheon and 30% owned by a joint venture of Itochu Rail Car Inc. and Kinkishsharyo (USA) Inc. which was selected in September 1996 and issued a Notice to Proceed in November 1996 [USDOT Office of the Inspector General 1999].

The initial concession agreement included \$992 million for Phase 1 land acquisition, design-build, rolling stock, and financing; and a guaranteed \$412 million (in 1996 dollars) for operations and maintenance of the system over 15 years subject to increases in the consumer price index (CPI) and other inflation indices [FTA 2007]. 21st Century was obligated to guarantee the Phase 1 completion date and meet minimum service reliability and availability criteria based on a service delivery quality index that includes incentives for exemplary service and penalties for deficiencies [Decker 1996]. The contract was later adjusted to include additional design and construction, extension of the operations and maintenance term to twenty years, and a decision to

incorporate bond financing that reduced first phase financing costs by \$43.2 million [USDOT Office of the Inspector General 1999].

5.3. HBLRT Financing & Risk Allocation

The Hudson-Bergen Light Rail Transit project is one of the most costly public projects in the history of the State of New Jersey. The project was eventually approved for three phases for a total around \$2.3 billion. Minimum Operating Segment One (MOS-1) and MOS-2 were two main phases which cost about \$2.2 billion, and MOS-3 cost around \$100 million. , the detailed funding and financing mechanism is below. The total cost of MOS-1 was \$992.1 million, funded through [FTA 2003]:

- An Full Funding Grant Agreement (FFGA) for \$604.1 million in Federal Section 5309 New Starts funds
- \$281.7 million in Section 5307 Urbanized Area Formula funds
- A \$106.4 million local share provided by the New Jersey Transportation Trust Fund

The cost of MOS-2 was \$1,215.4 million, funded by [FTA 2005]:

- An FFGA for \$500.0 million
- \$153.7 million in Section 5307 Urbanized Area Formula funds
- \$530.4 million from the New Jersey Transportation Trust Fund
- \$31.3 million from the PANYNJ and Utility reimbursements

Originally, the project delivery approach was intended to be Design-Build-Operation-Maintenance-Finance to set off any difference between funding and expenditure during the project design and construction phase. However, NJT later realized that it was cheaper for public agencies than private companies to apply for loans. Subsequently, NJT decided to finance the project itself and issued \$284.9 million in Grant Anticipation Notes (GANS) in 2000 to refinance

the outstanding debt on MOS-1, and \$452.5 million in GANS for MOS-2 [USDOT Office of the Inspector General 1999].

The main sources of revenue for the light rail system include passenger fare revenues consisting of the sale of tickets, monthly passes and motor fuel tax receipts; other operating revenues consisting of contracted service revenues, rental income, station and vehicle advertising, facility leases, parking lot operations; and non-operating revenues that include the State of New Jersey operating subsidy and governmental reimbursements from the state transportation trust fund, the New Jersey casino revenue fund and various federal grants for specific activities [NJ Transit Projects 2013]. Additionally, NJT also issues revenue bonds system-wide, and some bond proceeds are allocated to fund the cost of constructing extensions of the HBLRT [Moody's 2000].

While the DBOM contract provides many benefits in terms of delivery timeframe and cost-effectiveness, there are also certain risks associated with such project delivery mechanisms that cannot be ignored. For instance, since service performance by the private partner was not guaranteed in the contract, both parties bear risks of low capacity of generating revenue. The Hudson Bergen light rail shares use of portions of the railroad with CSX Transportation and Norfolk Southern Railroad, which creates premises and legal-related risks. A risk matrix to illustrate the specific kinds of risks shown in Table 1:

Risk Category	Description	Risk Allocation		
		Public	Private	Shared
Political	Intergovernmental Agreement needed for award of concession	X		
Financial	Appropriation risk for Const. Milestone Payments and Avail. Payments	X		
	Equity and debt funding (financial close, interest rate and currency risk)	X		
	Credit Risk (from bonds)	X		
Right of-Way	Areas within Preliminary Right of Way			X
	Areas outside Preliminary Right of Way			X
Permits	Obtaining Federal, State and local Permits		X	
Utilities	Agreements, schedules and relocations			X
Procurement	Legislative and regulatory authorities for award of concession			X
Construction	Unforeseen conditions			X
	Impacts on vehicle traffic and POM operations beyond agreed levels			X
	Impact to adjacent communities during construction above agreed levels			X
	Unforeseen increases in material costs and labor			X
Operations & Maintenance	Meeting availability and O&M criteria			X
	Inflation during the Operating Period			X
	Traffic exceeding specified levels			X
Hand-Back	Return O&M segments in specified condition when concession ends	X		
Force Majeure	Specified events not covered by insurance or performance specifications			X

Table 1: Hudson-Bergen Light Rail Transit Risk Allocation

5.4. HBLRT Construction

Construction on the first phase Minimum Operating Segment One (MOS-1) of the HBLRT began in December 1996. MOS-1 (Figure 3) is a 9.3-mile (15.3-kilometer) segment running from East 34th Street in Bayonne through Jersey City to the Hoboken Terminal; and sixteen stations, four of which have park-and-ride facilities providing 3880 parking spaces [Railway Technology 2013]. Construction of an initial operating segment connecting Bayonne 34th Street and Exchange Place was completed in late-1999 and, following a short commissioning period, was opened to public use on April 22, 2000 [GetThereBy Train 2013]. An additional segment was completed in late-2000, and the final MOS-1 segment to Hoboken Terminal was completed in 2002 [GetThereBy Train 2013].

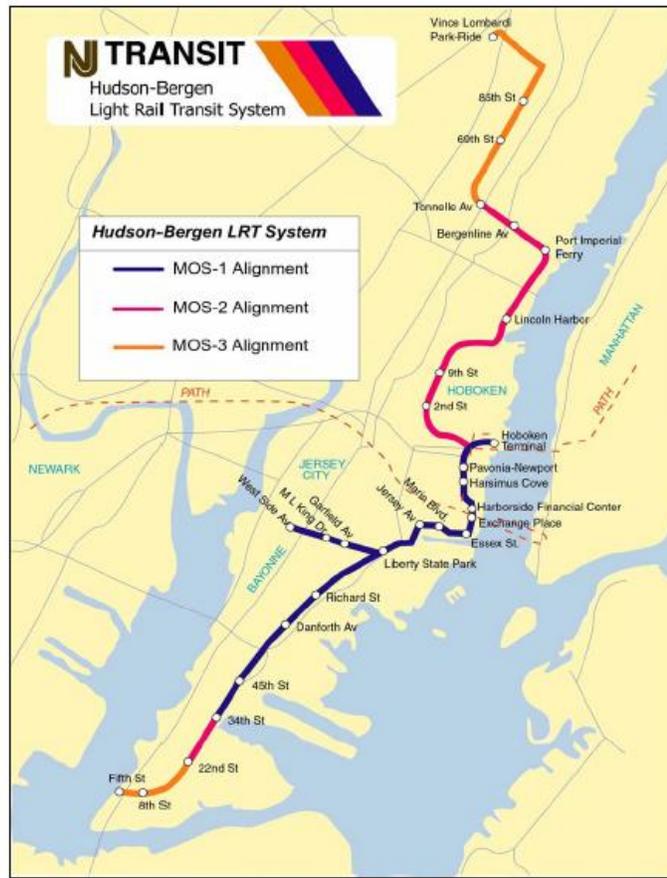


Figure 3: HBLRT Construction Segments
 Source: Fitzsimmons N. and Birch, W. [20]

The second phase of construction (MOS-2) was a 6.1 mile (9.8-kilometer) extension north from Hoboken Terminal to Tonnelle Avenue station in north, and a small segment south to 22nd Street (Figure 3). The \$1.2 billion MOS-2 project included the construction of seven additional stations and park-and-ride facilities for 1000 additional cars [Railway Technology 2013]. The original northern path of MOS-2 was designed to run on the east side of Hoboken along the Hudson River. However, in January 1997, due to concerns about the impact the original path would have on Hoboken traffic and parking, the decision was made to reroute this path to the west side [USDOT 1999] of town using the right-of-way of the former New York Central West Shore Railroad [GetThereBy Train 2013]. As part of this realignment, the FTA required NJT to conduct a new environmental assessment, which was subsequently completed by NJT in

November 1998 and approved by FTA in June 1999 [USDOT 1999]. MOS-2 construction was then begun in late-1999. The realignment did impact the schedule but, also, lowered the system's cost by reducing the need for street embedded track and by decreasing right-of-way land acquisition costs [USDOT 1999]. Like MOS-1, MOS-2 was completed in segments with southern service being completed to 22nd Street in Bayonne in 2003, west and north of Hoboken Terminal into Weehawken in 2004 and 2005. The final segment of MOS-2 through Union City to Tonnelle Avenue in North Bergen was completed in late-2005 with full MOS-2 service commencing on February 25, 2006 [Wikipedia 2013].

The original plan for the third phase of project (MOS-3) called for the extension of the HBLRT north to the Vince Lombardi Park-and-Ride and south to 5th Street in Bayonne. However, to date, only a small \$100 million extension in the south to 8th Street in Bayonne has been completed, opening to public use in January 2011 [Wikipedia 2013].

5.5. HBLRT Operations

For Fiscal Year 2012 (July 1, 2011 to June 30 2012) the HBLRT provided over 13.3 million unlinked trips totaling 2 billion passenger miles, with 44,027 average workday trips [NJT 2012]. With the completion of the initial MOS-3 extension in 2011, the total length of the HBLRT is 18.25 miles (29.4 kilometers) or 36.5 miles (58.8 kilometers) bidirectional running nearly a thousand trains per week [NJT 2012]. There are now a total of 24 stations, five of which are equipped with parking facilities with parking spaces for nearly 5000 cars [NewJerseyTransit.com 2013].

As part of the initial concession agreement, NJT purchased electrically-powered light rail vehicles, built by Kinki Sharyo of Japan. Each vehicle is 90 feet (27.4 meters) long and has four sets of double-opening doors on each side, with seats for 68 passengers and standing room for another 122 passengers [GetThereBy Train 2013]. NJT currently owns 52 of these trains that are

operated and maintained by 21st Century Rail Corporation under the concession agreement [NJT 2012].

HBLRT operates seven days a week, including holidays. Trains at most stations operate between 4 AM and 2:30 AM on weekdays and from 5 AM to 2:30 AM on weekends and holidays. The service provides connections to PATH trains, other NJT light trains, to various piers for trans-Hudson ferry service, and to local buses serving many of the HBLRT stations [NJT 2013].

The 2010 ridership of the HBLRT was less than half of the average work day estimate of 92,560 riders originally estimated in 1999 on completion of MOS-3 [USDOT 1999]. Part of the reason is that MOS-3 was never fully completed. Further, NJT has reported that the HBLRT had an annual operating loss of over \$20 million for the years 2008 through 2010 [The Jersey Journal 2010]. However, since its official opening on April 22, 2000, the Hudson-Bergen light rail has noticeably contributed to transforming disconnected neighborhoods into modern communities by bringing in continuous commercial and residential development projects. Smart growth has taken place with large amounts of underutilized land around stations being reclaimed for productive use. One report conservatively estimates that new housing within walking distance of HBLRT stations is valued at over \$5 billion [Robbins & Wells 2008]. The system has also resulted in generally shorter commute times and the reduction in the use of automobiles.

While 21st Century Rail Corporation has generally received high marks for operation and maintenance services under the concession agreement, some concerns have been raised that the agreement did not adequately address the quality of service to the traveling public. While there are penalties for lack of on-time performance, there were no incentives for station cleanliness or customer notification of service changes or other announcements. As a result, suggestions have

been made that future concession extensions or new agreements include detailed performance standards and proper incentives for performance [USDOT 2007].

5.6. HBLRT Lessons Learned

In the case of the HBLRT project, the case study analysis found that both public and private partners were highly committed to the success of what ended up being the largest public works project in the State of New Jersey. The case study also revealed that DBOM delivery approach greatly incentivized the contractors to perform and deliver high quality results in a timely fashion because they were ultimately responsible for design, build, operation and maintenance of the project in a specified time. In the HBLRT case, the project delivery timeframe was shortened by 1-2 years under DBOM contract. NJT successfully managed this P3 contract with help from external consultants even with very limited previous P3 experience. In addition, NJT was flexible about the finance mechanism. The initial P3 delivery was intended to be Design-Build-Operate-Maintain-Finance (DBOMF), but NJT was willing to take on financing since it was more cost-efficient. Overall, as the first DBOM contract to deliver a transit project, HBLRT is an example for many subsequent P3 projects in other U.S. states.

There are also some key lessons that could be pinpointed in this project, including unspecified performance requirements, quality of architectural design and service, sanitation issues, etc. More importantly, despite fare hikes, HBLRT has operated with operating losses totaling tens of millions of dollars annually over the past few years and, in this way, the public sector keeps bearing most of the financial burden under this contract. Yet, the HBLRT project has also resulted in significant economic development conservatively estimated at over \$5 billion near stations that the line serves. As the first DBOM contract on a transit system, the HBLRT project is overall a good example for future similar P3 projects. The project sponsor was generally satisfied with the project operation and delivery throughout the process as well. The

light rail service itself has gradually drawn increased ridership and enhanced economic conditions in the connecting communities.

There are also quite a few lessons that policy makers and those who have staked interests in P3's can learn from this project. First, quality of construction and service should be specified in a DBOM contract. For example, there was no requirement on the cleanness of the stations or timely notifying passengers of schedule changes. Also the entire operations and maintenance fee was guaranteed upfront, thereby possibly reducing the concessionaire's incentive to maintain quality service. Although at first quality control may not be the most important element that project sponsor considers in a contract delivery, in the long run it serves the public interest to require the private partner to maintain high quality of service and maintenance. Hence, it is strongly recommended to specific requirements and terms on quality, safety and performance in the contract.

Second, for such a major construction project, financial responsibilities are better shared than born by one party. In this project, after the 21st Century Rail Corporation won the contract, they were supposed to finance the project. However, NJT found out that they could save almost \$43.2 million in cost if they issued GANS themselves compared to the private partner's projected private debt. The fact is that NJT annually lost more than \$20 million operating the HBLRT in fiscal years 2008 to 2010 and ridership is not as high as expected. This situation resonates with some of the critics of P3 project costs. If the public sector could finance a public project most cost-efficiently, it seems less imperative for private firms to get involved.

Finally, it is best if public and private partners could advance the learning curve before the project takes place so that agencies could be prepared for contingent issues and needed support during the innovative project delivery like DBOM. NJ Transit relied heavily, if not solely, on external consultants in all matters related to DBOM. Furthermore, hiring external consultants can

significantly increase costs associated with the project. Therefore, an agency could enhance its intellectual capacity by equipping agency staff with the necessary knowledge.

6. EAGLE P3 Project Description (Colorado, USA)

The East and Gold Line Enterprise (EAGLE) Public-Private Partnership (P3) Project in the Denver, Colorado metropolitan area is currently constructing two transit rail segments – the East Corridor Line (Figure 4) and the Gold Corridor Line (Figure 5) – as well as a commuter rail maintenance facility (CRMF). The project’s primary sponsor is the Regional Transportation District (RTD) and is part of RTD's FasTracks (www.rtd-fastracks.com) initiative, a voter-approved program to expand rail and bus transit throughout the Denver metropolitan region. It is the first modern-era use of a P3 to design, build, finance, operate, and maintain (DBFOM) a commuter rail system in the U.S. and is an extension of RTD’s vision to create “transit oriented communities” reflected in a series of rail projects that were begun by RTD in 1994 [Flynn 2011].

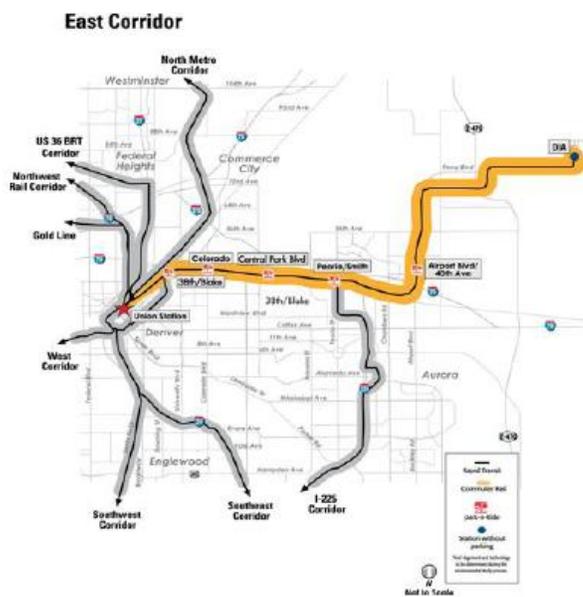


Figure 4: EAGLE P3 East Corridor Line Figure 5: EAGLE P3 Gold Corridor Line
 Source: RTD FasTracks EAGLE P3 Project Procurement Lessons Learned [RTD FasTracks 2013]

6.1. EAGLE P3 Project Planning & Demand

The Regional Transportation District (RTD) is empowered by the Colorado legislature to develop, maintain, and operate a mass transportation system within its boundaries that includes eight counties in the Denver metropolitan area where over half the state's residents reside [DTP 2010]. Beginning in 1994, RTD, in partnership with the Colorado Department of Transportation (CDOT) and the Denver Regional Council of Governments (DRCOG), embarked on the first phase of an ambitious "light rail station development program" created to encourage transit-oriented development and mixed-use around transit rail stations [Nichols 2013].

As part of this process, RTD divided its service area into corridors and began to conduct a number of planning and environmental studies that eventually led to the design and construction of three new rapid transit lines for the Central Corridor, Southwest Corridor, and Central Platt Valley Region; and construction with CDOT of a combined transit rail and highway "TRansportation EXpansion" or "T-REX" program for the Southeast Corridor which was completed in 2006 [RTD 2004]. Between 1998 and 2001, RTD also conducted a *Twenty Year Transit Needs Assessment and System Plan* to assess their financial ability to maintain their existing assets and to develop new projects to meet future transit corridor needs [RTD 2004]. In its *Fiscally Constrained 2025 Interim Regional Transportation Plan (RTP)* published in April 2002, the DRCOG predicted that by 2025 the Denver metropolitan region was expected to add more than 900,000 people and 600,000 jobs, vehicle miles of travel were expected to increase from 58 million to 95 million (93.3 million to 152.9 million km.), and that the combination of population growth and vehicle miles traveled would increase severe congestion by 89 percent even with the transportation improvements that were already scheduled for implementation [DRCOG 2002]. Up to that point, RTD's regional transit maintenance and expansion activities

had been primarily supported through a 0.5% (later raised to 0.6%) sales tax in the RTD service area that had been originally approved by Colorado voters in 1973 [RTD 2012].

The findings of RTD's *Twenty Year Transit Needs Assessment and System Plan* coupled with congestion concerns raised by DRCOG's *Fiscally Constrained 2025 Interim RTP* eventually became the basis for the new RTD *FasTracks Plan* adopted by the RTD Board in April 2004, and approved by voters in November 2004. The voter approved plan included increasing the regional sales and use tax by 0.4% to fund a \$4.7 billion 12-year plan to design and implement high quality transit service and facilities in the region. The plan as originally approved (Figure 6) included 122 miles of light rail and commuter rail, 18 miles of bus rapid transit service, the redevelopment of Denver Union Station (DUS), 21,000 new parking spaces, and other improvements [FHWA 2012]. By implementing the *FasTracks Plan*, RTD predicted that by 2025 474,000 fewer vehicle miles would be driven each weekday in the region and that the percentage of people taking transit during the peak hours would increase from 11 percent in 2005 to over 22 percent [RTD 2004]. The plan when announced immediately raised stiff opposition. Critics charged that the costs were underestimated and that FasTracks would not relieve congestion [O'Tool 2004]. Despite these objections FasTracks was approved by 58% of metro Denver voters in 2004 [Mulligan 2013].



Figure 6: FasTracks System Diagram
Source: FasTracks Plan [RTD 2004]

Two key elements of the FasTrack Plan were to implement transit solutions for both the East and Gold Line corridors. Studies conducted by DRCOG in the late-1990s recommended light rail solutions for both corridors. Following the adoption of FasTracks, Environmental Impact Studies (EIS) for both lines were initiated, and eventually finalized in 2009. Subsequently, the Federal Transportation Administration (FTA) issued the Record of Decision (ROD) approving both lines in November 2009 [RTD FasTracks 2013].

In the meantime, in 2007, prior to the FTA’s approval of the RODs, RTD began experiencing financial challenges to the FasTracks program caused by both skyrocketing costs for building materials and declines in sales tax revenue as a result of the U.S. economy slipping into recession [RTD FasTracks 2013]. Somewhat fulfilling critics’ fears, at the height of the economic crisis the cost of the project rose to \$6.5 billion while revenue dropped to \$4.1 billion. In response, RTD began to look at creative ways to raise needed capital including the use of P3 financing. In 2007, RTD applied for and was accepted into the FTA’s Public-Private Partnership Pilot Program (Penta-P), a program that allowed RTD to partner with a private company to

design, build, operate, maintain and finance the East and Gold Line corridor lines and commuter rail maintenance facility (CRMF), collectively known as the EAGLE P3 project, under a single contract [Nichols 2013].

6.2. EAGLE P3 Procurement and Concession Agreement

The P3 aspect of the EAGLE P3 project reflected both the economic reality of the need for new creative public financing mechanisms and the flexibility provided by Colorado P3 legislation. Following RTD's acceptance into the Penta-P program they subsequently issued a request for qualifications (RFQ) in August 2008, followed by a request for proposal (RFP) sent to the three qualified bidders in September 2009. Ultimately, two bids were received and reviewed resulting in the selection of Denver Transit Partners as the concessionaire in June 2010. Commercial and financial close with Denver Transit Partner occurred on August 12, 2010 [RTD FasTracks 2012]. Macquarie Capital Investments Ltd., which acted as the EAGLE P3 Project developer with Fluor, sold its 90% equity position (at the financial close to Uberior Investment (part of Lloyd's Bank) and a unit of John Laing PLC [Reinhardt 2010].

Under the terms of the concession agreement, the EAGLE P3 Project is being both constructed (with completion scheduled for 2016) and then operated under a 34-year concession agreement between RTD and DTP. In addition to this financial partnership, other partners (See Figure 7) include Denver Transit Constructors – the design-builders who include Fluor Enterprises, Inc.; Balfour Beatty Rail, Inc., and Ames Construction; Denver Transit Operators, the operations and maintenance providers including Fluor Enterprises Inc., Balfour Beatty Rail, Inc. and Alternate Concepts, Inc.; and Hyundai-Rotem USA Corporation that will provide the rolling stock.

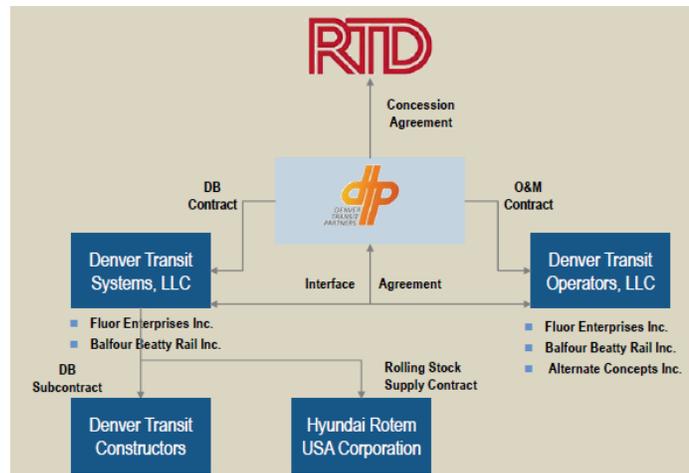


Figure 7: EAGLE P3 Partners

Source: RTD FasTracks [RTD FasTracks 2012]

The EAGLE P3 Project concession agreement requires DTP to design-build-finance-operate-maintain (DBFOM) the East Rail Line, Gold Line, and a Commuter Rail Maintenance Facility project under a single contract. DTP will also provide and maintain the rail vehicles for the three rail corridors. RTD will retain all assets while shifting much of the risk of designing and building the project to DTP [RTD FasTracks 2012]. The total value of the concession over the life of the agreement is estimated by DTP to be approximately \$7.14 billion [RTD FasTracks 2011].

6.3. EAGLE P3 Financing & Risk Allocation

The estimated total design and construction cost of the project is \$2.046 billion, with over 50% of cost being funded by a FTA New Starts Full Funding Grant (\$1.030 billion) awarded in August 2011. Other sources of funding include Private Activity Bonds (\$396.1 million), a TIFIA loan (\$280.0 million), RTD sales tax revenue (\$114.3 million), equity and other sources (\$91.7 million), other federal grants (\$62.1 million), local and Colorado Department of Transportation (CDOT) contributions (\$40.3 million), and net GARVEE proceeds (\$16.6 million) [FHWA 2012].

The tax exempt Private Activity Bond Series 2010, issued by the Regional Transportation District and underwritten by Barclays Capital and Bank of America Merrill Lynch, have a Moody's rating of "Baa3" and a Fitch rating of "BBB-"; and have an average coupon of 6.078% [DTP 2010]. The Fitch rating of BBB- is their lowest investment grade rating. In citing its rating Fitch expressed concern about the high leverage (equity makes up just 12% of the private financing), the debt service reserve account (at 6 months of principal and interest considered low considering six year construction interval and the need to integrate with RTD's existing system), and the possibility that poor performance by DTP could lead to termination of the concession agreement and subsequent default on the bonds [Reinhardt 2010]. A summary of the maturity dates, principle amounts, interest rates, and yield are given in Table 1.

\$397,835,000
 REGIONAL TRANSPORTATION DISTRICT
 (COLORADO)
 TAX-EXEMPT PRIVATE ACTIVITY BONDS
 (DENVER TRANSIT PARTNERS EAGLE P3 PROJECT), SERIES 2010

Series 2010 Serial Bonds

<u>Maturity Date</u>	<u>Principal Amount</u>	<u>Interest Rate</u>	<u>Yield</u>	<u>CUSIP*</u>
July 15, 2019	\$ 4,600,000	5.250%	4.850%	759151AB9
January 15, 2020	4,835,000	5.250	5.000	759151AC7
July 15, 2020	4,895,000	5.000	5.000	759151AD5
January 15, 2021	5,150,000	5.000	5.100	759151AE3
July 15, 2021	5,210,000	5.000	5.100	759151AF0
January 15, 2022	5,485,000	5.000	5.250	759151AG8
July 15, 2022	5,020,000	5.000	5.250	759151AH6
January 15, 2023	5,335,000	5.125	5.350	759151AJ2
July 15, 2023	5,670,000	5.125	5.350	759151AK9
January 15, 2024	6,025,000	5.250	5.450	759151AL7
July 15, 2024	6,400,000	5.250	5.450	759151AM5
January 15, 2025	6,800,000	5.375	5.550	759151AQ6
July 15, 2025	7,225,000	5.375	5.550	759151AR4
January 15, 2026	7,675,000	6.000	5.600*	759151AS2
\$62,490,000 6.50% Series 2010 Term Bonds due January 15, 2030 Priced to Yield 5.90%*				
CUSIP* Number 759151AN3				
\$79,970,000 6.00% Series 2010 Term Bonds due January 15, 2034 Priced to Yield 6.08%				
CUSIP* Number 759151AP8				
\$175,050,000 6.00% Series 2010 Term Bonds due January 15, 2041 Priced to Yield 6.13%				
CUSIP* Number 759151AA1				

Table 1: RTD Series 2010 Serial Bonds

Source: DTP RTD Private Activity Bond [DTP 2010]

The TIFIA loan, rated "Aa2" by Moody's Investors Service and executed December 1, 2011 is secured by a senior lien gross revenue pledge of RTD's 0.4 percent sales tax revenues and a subordinate lien pledge of RTD's 0.6 percent sales tax revenues. The 0.4 percent sales tax, approved by voters in 2004, may only be used to construct and operate the FasTracks mass transit system [FHWA 2012].

Under the concession agreement signed in July 2010 [Concession Agreement 2010], and the amended service payment contract signed in August 2010 [Service Payment Agreement 2010] a 34-year concession awarded to DTP that includes construction payments that began in 2010 for early work, and ranging through 2021 for successful completion of Phase 1 and Phase 2 of the project. In addition, beginning at the commencement of revenue services in 2016, DTP will also be paid a monthly service fee that will vary depending on performance including service availability. Assuming that the concession is not terminated for poor performance, DTP will be paid this availability-based monthly service fee through 2044 [Service Payment Agreement 2010].

Under the DBFOM P3 concession model (Figure 8), RTD will retain ownership of the project assets; be able to control quality, fares, and service performance standards; accelerate project delivery; transfer construction and operating risk to DTP, and realize cost savings over the life of the project including an estimated \$300 million in construction savings from original RTD estimates [FHWA 2012].

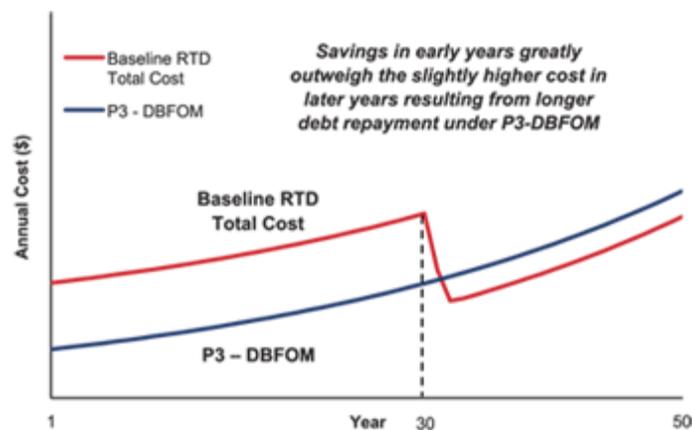


Figure 8 – DBFOM Model
Source: FHWA [FHWA 2012]

Per the terms of the concession agreement, risk is allocated between the project’s primary sponsor, RTD, and the concessionaire, DTP.

RTD's risks include: 1) timeliness of third party design reviews, 2) RTD requested changes to project requirements, 3) delay in gaining access to the site, 4) unforeseen archaeological risks, errors/omissions in environmental reports, 5) unidentified and dry utilities, 6) RTD permits, 7) discriminatory legislative changes, 8) ridership and fare evasion, and 9) interface conflicts between new and established RTD services [Carey 2012].

DTP's risks are multifaceted and outlined in detail in the private activity bond prospectus [DTP 2010]. They include: 1) design failing to meet the specified requirements 2) design delays, 3) construction delays, 4) cost overruns, 5) additional land requirements, 6) compliance with environmental requirements, 7) geological obstructions, 8) safety and security, 9) accuracy of reference data, 10) concessionaire permits, 11) concessionaire or subcontractor default, 12) final completion delays, 13) third party claims, 14) security during the construction period, 15) repairs or maintenance work affecting availability, 16) failure to meet operating performance standards 17) operation and maintenance costs, 18) condition of system at the end of concession period, 19) wet utilities and 20) compliance with railroad agreements [Carey 2012].

Certain risks are also shared by RTD and DTP including third Party design review disputes, non-discriminatory legislative changes and force majeure.

6.4. EAGLE P3 Construction and Future Operations

Phase I of the project, including property acquisition, construction of the East Rail Line, construction of the Maintenance Facility and control center, the purchase of Electric Multiple Unit (EMU) rail vehicles and the electrical systems at Denver Union Station began immediately in August 2010 [RTD FasTracks 2012]. Also in August 2010, the notice to proceed with Phase II, involving construction of the Gold Line to Arvada and Wheat Ridge and the first segment of Northwest Rail Line to south Westminster, was announced. Groundbreaking for construction of a

6-mile first segment of the Northwest Rail Line to the future Westminster Station occurred on June 28, 2012 [RTD FasTracks 2012].

The Commuter Rail Maintenance Facility (CRMF) is scheduled to be completed in November 2014. The rail cars will be delivered by Hyundai-Rotem in late-2014 and early-2015 in coordination with testing and commissioning of all three lines. Opening Day and the commencement of revenue services for the East Rail Line is scheduled for January 2016; for the Northwest Rail Segment in March 2016; and the Gold Line, July 2016. The complete project schedule is shown in Figure 9 below.



Figure 9: The EAGLE P3 Schedule
Source: Carey [Carey 2012]

6.5. EAGLE P3 Lessons Learned

While the EAGLE P3 project is still under construction and not scheduled to be completed until 2016, there are some lessons that can be learned through both observation and members of the EAGLE P3 project team.

From observation we see that the project has received substantial public support; notable funding from local, regional and national sources; and has proceeded to the construction phase in an organized and calibrated manner. Much of the public support and funding diversity appears to be attributable to the initiative and flexibility of Colorado P3 legislative initiatives; as well as the efforts to communicate project goals and status to the public through the project’s updated

websites and organized public conferences and forums. High level officials, including the past two Colorado governors have supported the idea of public-private partnerships and its application in the EAGLE P3 and other P3-related projects. Further officials in the localities served by the EAGLE P3 project have been involved and supportive of the project from its inception.

RTD leadership has already begun to share some of the development, procurement, and delivery lessons that they have learned that has led to the project's success to date. From a development standpoint, Jacobs' Manager of Projects Damian Carey believes that a key lesson was to "develop a plan and stick to it" while, at the same time "be[ing] prepared but be flexible" [Carey 2012]. He also believes that the "third P" (partnership) is key, a thought echoed by RTD's General Manager Phillip Washington who believes that hiring a project director, financial consultant, and legal team with P3 experience was key to early and later project success [Washington 2012]. This is reflected in the ability of RTD to secure multifaceted project financing and in its current status of being on schedule for completion in 2016.

From the procurement point of view, Washington believes that the process that they used worked well. This included releasing an RFQ first, developing a short-list of qualified teams, creating an internal Management Steering Committee and sub-committees to develop various parts of the RFP, and preparing a draft RFP and conducting a detailed industry review [Washington 2012]. Carey believes that the openness of RTD to consider innovations allowed DTP to propose the performance service payment concept and, also to present Alternative Technical Concepts [Carey 2012]. Further, both Carey and Washington believe that communications between the bidders and owners regarding risk and other concerns was key in helping DTP evaluate and develop a proposal that would deliver the "best value" to RTD [Carey 2012].

Finally, from a construction delivery standpoint, which is still in progress, Carey believes that it was important to “lock down the scope early” since lenders do not like changes because simple design changes are perceived as increasing risk to the concessionaire [Carey 2012]. Also, both RTD and DTP realized that it was important for both parties to engage stakeholders and communicate widely, early and often with the public on project activities [Washington 2012]. This included the establishment of a web presence by both RTD (www.rtd-fastracks.com/ep3_2) and DTP (<http://denvertransitpartners.com>) to share project information and status with the community.

While not yet completed, the sponsor, the Denver Regional Transit District (RTD), has been able to successfully use Colorado’s P3 policy and an environment favorable to regional collaboration to fund the \$2 billion project from both public and private sources; negotiate an availability-based concession agreement with Denver Transit Partners; and keep the project on schedule for completion in 2016.

7. Discussion

The findings above offer insights for testing the hypotheses of the case study.

The first hypothesis is that the use of P3 capabilities, including P3 financing and design-build project delivery, makes it possible for U.S. transit rail projects to proceed to financial close, construction, and completion more quickly and cost effectively than conventional public finance and construction of transit systems. For the HBLRT project we saw that, with use of DBOM turnkey P3 processes, MOS-1 was completed one to two years ahead of schedule. Further, MOS-2, despite the need for a major redesign, was able to completed in timely manner and at a lower than projected cost. Likewise, EAGLE P3, due to Penta-P incentives and timely Colorado P3 legislation was able to move to financial close relatively quickly with construction beginning

almost immediately after financial close. Currently construction is on schedule for the planned opening in 2016.

The second hypothesis is that, at least in the United States, P3 federal incentive programs can help motivate jurisdictions to consider P3s when planning and implementing transit projects. This is certainly the case for both the HBLRT and EAGLE P3 projects. The ability to be able to participate in the ISTEA Section 3019 FTA Turnkey Demonstration Program certainly motivated NJT to further consider a P3 DBOM turnkey process and also got the New Jersey legislature to pass temporary legislation authorizing a P3 pilot program. Likewise, the opportunity for RTD to participate in the FTA's Public-Private Partnership Pilot Program (Penta-P) in 2007 helped to develop the idea of utilizing private capital to implement the EAGLE P-3 project at a time when the project was facing tough economic conditions.

The third hypothesis is that demand risk is a keen concern of both public and private partners and that, given the uncertainties of future ridership and revenue projections, that this risk be shared based on the ability of each partner to manage the risk. We saw in the case of the HBLRT project that NJT was willing to except the ridership demand risk, ultimately changing the P3 from DBFOM to DBOM. Such a change reduced MOS-1 project finance costs by over \$40 million but also exposed NJT to huge operating losses, especially during the economic crisis. Conversely, the concession agreement that RTD signed with DTP was DBFOM. While the majority of the demand risk still resides with RTD, they were able to reduce construction costs by an estimated \$300 million and negotiate an availability-based operations and maintenance concession that should better guarantee quality of service for system users.

The fourth hypothesis is that public partners may want to consider alternatives to traditional fare- or toll-based concession agreements such as availability payments or other types of performance based compensation to private partners. In both cases, the project sponsors (NJT

and RTD) maintain control over fares and have secured long-term control of operations and maintenance costs through long-term concessions. In the case of HBLRT, the concession included a guaranteed inflation adjusted payment with minimal incentives for quality service or penalties for poor performance. RTD's concession contract with DTP is availability-based with metrics to measure performance, with bonuses for exceeding the metrics and penalties for failure to meet expected quality of service levels.

Finally, the fifth hypothesis is that economic development and other local community benefits can more than offset demand risk operating losses in determining P3 project success. Certainly with the HBLRT project has generally failed to meet expected ridership levels and the system has suffered tens of millions of dollars in operating losses. However, the project has also helped to generate billions of dollars in economic development around its stations and the improved the quality of life for users through better system connectivity and generally shorter commute times. The EAGLE P3 project is still under construction; however much of the goal of the project and in RTD's FasTrack vision is to encourage transit-oriented development and mixed-use around commuter rail stations [Nichols 2013]. Time will tell if this vision can become a reality.

8. Conclusions

The Hudson-Bergen Light Rail Transit project in northern New Jersey and the EAGLE P3 in the Denver, Colorado metropolitan area are both excellent examples of how P3 methods can be used to implement light rail systems in the United States.

The Hudson-Bergen Light Rail Transit project has been heralded as the first Design-Build-Operate-Maintain (DBOM) project on transit in the U.S. [FHWA PPP 2013]. Additionally, it is not only one of the largest public projects in the State of New Jersey, but also the first project that awarded the complete contract to a single contractor—21st Century Rail. [FHWA PPP 2013].

This DBOM contract received a lot of positive feedback because NJT handled this partnership smoothly even though it had virtually no previous P3 experience. The project was also delivered faster than expected timeframe by 1-2 years [USDOT 2007]. It is an encouraging example of how a public agency can engage private sector in more than just design and build, but also operation and management. As discussed at the outset, one of the primary motivations behind the HBLRT project was to increase residential and commercial mobility among communities in the Hudson waterfronts and to encourage economic development in its service area. By achieving this goal, the Hudson-Bergen Light Rail P3 project can be judged to be a strategic success.

By RTD and external assessment the EAGLE P3 project has also, to this point, been a success. During a period of tough economic times between 2007 and 2010, the project sponsors and partners were able to put together an economic package of federal government loans and grants, state and local funds, and private equity to pay for the \$2 billion project. Through the help of experienced P3 financial, legal, and project consultants, as well as perceived good internal and external communications of project activities, RTD and CDOT were able to qualify and bid the project in a timely and efficient manner. As a result, construction has commenced and the project appears to be on schedule to full completion in mid-2016. Also, as a result of the efficient and competitive bidding process, new innovative technical concepts involving the concession were introduced, and RTD believes that it was able to save \$300 million in overall capital costs versus original estimates [Reinhardt 2010]. Consequently, the EAGLE P3 project was awarded the *2010 North American Transport Deal of the Year* by *Project Finance Magazine* [Project Finance Magazine 2011]. Per FTA administrator Peter Rogoff, the entire FasTracks vision, including the EAGLE P3 project and the redevelopment of Denver's Union Station, is "one of the success stories that has remained a success as it relates to public-private partnerships. A lot of other public-private partnerships didn't stand the test of time in the economic downturn."

Acknowledgements:

The authors would like to extend their gratitude to the Commonwealth of Virginia for its support of the research behind this paper, and to the publication Public Works Financing for granting access to its P3 project dataset. Any errors or omissions are the responsibility of the authors.

References

- Booz Allen Hamilton, “Case Studies: The Hudson-Bergen Light Rail Project: Making Tracks in New Jersey,” 2001 <http://www.boozallen.com/media/file/2001-HBLR-case.pdf>
- Buttson, C. “PPP for urban transportation and light rail projects: planning, construction and operation.” TRANSDEV, Washington DC September 5 2006. Accessed at: <http://www.docstoc.com/docs/36749261/PPP-for-urban-transportation-and-light-rail-projects>.
- Carey, Damian “EAGLE P3 Commuter Rail Project.” NCPPP Symposium-Harrisburg, October 2012. Found at: http://www.ncppp.org/publications/Harrisburg_1210/Carey.pdf.
- City-data.com. “New Jersey Transportation.” Accessed July 10, 2013 at: <http://www.city-data.com/states/New-Jersey-Transportation.html>.
- Colorado Legislature “Title 43. Transportation General and Administrative – Article 1 Part 1. Department of Transportation. C.R.S. 43-1-101, July 1, 1991.
- Colorado Legislature (2008). Title 32. Special District Special Statutory Districts Article 9. Regional Transportation District Act. C.R.S. 32-9-128.5
- Colorado Senate Bill 09-108, 2009. Accessed at: [http://www.coloradodot.info/programs/transitandrail/TRACdocumentsFolder/TRACdocument-SB09-108\(FASTER\)](http://www.coloradodot.info/programs/transitandrail/TRACdocumentsFolder/TRACdocument-SB09-108(FASTER)).
- Colorado Statute Public-Private Initiative Act of 1995. COLO. REV. STAT. §§ 43-1-1201 to 1209, COLO. REV. STAT. §§ 43-4-801 to 812, and COLO. REV. STAT. §§ 43-3-201 to 43-3-416 Denver Regional Council of Governments (DRCOG). Metro Vision Regional Transportation Plans. Accessed June 26, 2013 at: <http://www.drcog.org/index.cfm?page=RegionalTransportationPlan>.
- Concession Agreement (EAGLE P3). July 2010. Found at: http://www.rtd-fastracks.com/media/uploads/ep3/Concession_Agreement.pdf.
- Decker, J. “Increased Private Involvement in the Delivery of Private Infrastructure: The State-of-the-Art in Transit System Turnkey Projects.” MIT, June 1996.
- Denver Region Council of Governments (DRCOG). “Metro Vision 2025 Interim Transportation Plan: The Fiscally Constrained Element” adopted April 17, 2002. Accessed July 8, 2013 at: <http://ebookbrowse.com/2025-interim-regional-transportation-plan-4-17-02-pdf-d112211035>.
- Denver Transit Partners (DTP). “\$397,835,000 Regional Transit District (Colorado) Tax Exempt Private Activity Bond (Denver Transit Partners EAGLE P3 Project), Series 2010”.
- Federal Highway Administration (FHWA). “Livability in Transportation Guidebook - Partnerships” 2012 found at http://www.fhwa.dot.gov/livability/case_studies/guidebook/chap05.cfm.

- Federal Highway Administration (FHWA) Office of Innovative Program Delivery: Project Profiles “EAGLE Project” 2012 found at:
http://www.fhwa.dot.gov/ipd/project_profiles/co_EAGLE_project.htm.
- Federal Highway Administration, PPP (FHWA PPP) Case Studies, “Hudson-Bergen Light Rail,” Accessed June 12, 2013 at:
http://www.fhwa.dot.gov/ipd/project_profiles/nj_hudson_bergen.htm.
- Federal Transportation Administration (FTA). “Northern New Jersey/Hudson-Bergen Waterfront Light Rail Transit System Minimum Operable Segment-2 (MOS-2).” November 1998. Accessed July 2, 2013 at: http://www.fta.dot.gov/printer_friendly/12304_2839.html.
- Federal Transit Administration (FTA) “Report to Congress on the Costs, Benefits, and Efficiencies of Public-Private Partnerships for Fixed Guideway Capital Projects.” December 2007.
- Fitzsimmons, N. and Birch, W. “Hudson–Bergen Light Rail System and Economic Development on the Waterfront.” Transportation Research Circular E-C058: 9th National Light Rail Transit Conference, November 16-18, 2003, pp. 205-214.
- Flynn, K. “RTD Fastracks, Public Works Historical Society.” September 19, 2011. Found at: <http://www2.apwa.net/Documents/Meetings/Handouts/Congress/6869.pdf>
- FTA, Annual Report on New Starts, “Hudson-Bergen MOS-1,” November 2003, <http://www.fta.dot.gov/documents/NNJ1AA.DOC>
- FTA, Annual Report on New Starts, “Hudson-Bergen MOS-2,” November 2005, <http://www.fta.dot.gov/documents/NNJ2AA.DOC>.
- GetThereBy Train. “Hudson Bergen Light Rail.” Accessed July 9, 2013 at:
<https://sites.google.com/site/gettherebytrain/home/railroads/njtransit/metro-light-rail/hudson-bergen-light-rail>.
- Gorewitz, C. and Ohland, G. “Communicating the Benefits of TOD: The City of Evanston’s Transit-Oriented Redevelopment and the Hudson Bergen Light Rail Transit System.” Center for TOD. 6/23/06. Accessed July 1, 2013 at:
<http://www.reconnectingamerica.org/assets/Images/CTOD-EPA-Case-Studies.pdf>.
- Halai, I. “Colorado sunrise.” September 26, 2011. Found at:
<http://www.inspiratia.com/transport/insight/read/Colorado-sunrise/>. Details found at:
http://www.fhwa.dot.gov/ipd/p3/state_legislation/colorado.htm.
- Iseki H., Eckert J., Uchida, K., Ryan, D and Taylor, B. “Task B-2: Status of Legislative Settings to Facilitate Public Private Partnerships in the U.S.” UCB-ITS-PRR-2009-32, California PATH Research Report, 2009.
- Levy, Sidney M. 2011. Public-private Partnerships: Case Studies on Infrastructure Development. Reston, VA: ASCE Press.
- Killen, B. and Adler, T. “Sensitivity of Hudson-Bergen Light-Rail Transit System Model Forecasts.” Seventh National Conference on Light Rail Transit: Baltimore, Maryland, November 12-15, 1995.
- KPMG LLP. “America’s Infrastructure Strategy: Drawing on History to Guide the Future.” 2007. Accessed July 8, 2013 at:
http://crgp.stanford.edu/events/presentations/CA/CRGP_KPMG_whitepaper.pdf.
- Loulakis, Michael C. 2003. Design-Build for the Public Sector. Aspen Publishers Online.
- Moody’s Investors Service, “New Jersey Transit Corporation[Bond Issue 2000B and 2000C]” Bond Rating, November 8, 2000,
http://www.innovativefinance.org/projects/rail_transit/pdfs/hudson.pdf.

- Miller, J. "Case Studies in Infrastructure Delivery: Chapter 8 Hudson-Bergen Light Rail Transit System." Springer Science + Business Media. New York 2002.
- Mulligan, R. "FasTracks – What's Next." Denver Urbanism, May 1, 2013. Accessed July 9, 2013 at: <http://denverurbanism.com/2013/05/fastracks-whats-next.html>.
- New Jersey Department of Transportation (NJDOT) Press Release. "\$1 Billion Light Rail Turnkey; First ever in U.S." November 6, 1996. Access July 3, 2013 at: <http://www.state.nj.us/transportation/about/press/1996/110696.shtm>.
- New Jersey State Assembly (NJSA) "The Transportation Act of 1966." N.J.S.A 27:1A-1. Accessed July 10, 2013 at: <http://law.onecle.com/new-jersey/27-highways/1a-1.html>.
- New Jersey State Assembly (NJSA). "H.R. 2560 – Act Amending Transportation Act of 1966." Introduced December 9, 1996.
- New Jersey State Assembly (NJSA) "New Jersey Public Transportation Act of 1979." N.J.S.A. 27:25-1 to -24. Accessed July 10, 2013 at: http://www.lawserver.com/law/state/new-jersey/nj-laws/new_jersey_laws_27_25-1.
- New Jersey Transit (NJT). "HBLR Route 440 Extension Alternatives Analysis Final Report." February 2011. Accessed July 9, 2013 at: http://hblr440.com/wp-content/uploads/2012/04/00_TableofContents.pdf.
- New Jersey Transit (NJT) and New Jersey Department of Transportation (NJDOT). "New Jersey State Rail Plan." Final Draft December 2012. Accessed July 10, 2013 at: <http://www.njtransit.com/pdf/NJStateRailPlanDec2012.pdf>.
- New Jersey Transit (NYT). "New Jersey Transit Facts at a Glance Fiscal Year 2011 (July 1, 2010 through June 30, 2011)" (pdf). February 2012 www.njtransit.com/pdf/FactsAtaGlance.pdf.
- NewJerseyTransit.com "Hudson-Bergen Light Rail System Map." Accessed July 9, 2013 at: http://www.njtransit.com/pdf/LightRail/sf_lr_hblr_map.pdf.
- NJ Transit Projects, FY 2013 Transportation Capital Program, <http://www.state.nj.us/transportation/capital/tcp13/>.
- Nichols, C. "PPP Profiles: EagleP3, a section of Denver's comprehensive transit expansion, FasTracks." Metropolitan Planning Council. Accessed July 9, 2013 at: <http://www.metroplanning.org/news-events/article/6139>.
- O'Toole R. "The Full Truth About Fastracks." June 2004. Accessed July 9 at: <http://transportation.i2i.org/2004/06/24/the-full-truth-about-fastracks/>.
- Project Finance Magazine. "EAGLE P3: Transit Forward – North American Transport Deal of the Year 2010." February 24, 2011. Found at: <http://www.projectfinancemagazine.com/IssueArticle/2774844/Deals/EAGLE-P3-Transit-forward.html>.
- Railway Technology.com. "Hudson-Bergen, USA" Accessed July 8, 2013 at www.railway-technology.com/projects/hudson/hudson1.html.
- Regional Transportation District (RTD). "FastTracks Plan" April 22, 2004. Accessed July 9 at: http://www.rtd-fastracks.com/media/uploads/main/FasTracks_PlanA.pdf.
- Regional Transportation District. "Adopted 2012 Budget." Accessed July 8, 2013 at: http://www.rtd-denver.com/PDF_Files/Financial_Reports/Adopted_2012.pdf.
- Regional Transportation District. "EAGLE P3 project" Accessed July 9, 2013 at: http://rtd-fastracks.com/main_126.
- Reinhardt, William. "Denver EAGLE P3 Financed, First U.S. Rail PPP." *Public Works Financing*, September 2010.

- Robbins, M. and Wells, J. “Land Development at Selected Hudson-Bergen Light Rail Stations.” April 2008. Accessed July 9 at: <http://policy.rutgers.edu/vtc/reports/REPORTS/HBLR%20Final%20Report.pdf>.
- RTD Denver. “Facts & Figures - EAGLE P3 Project.” 2012 Found at: <http://www.rtd-denver.com/FF-EAGLEP3.shtml>.
- RTD FasTracks. “EAGLE P3 Project.” 2012 Found at: http://www.rtd-fastracks.com/ep3_2.
- RTD FasTracks. “A P3 Success Story” RTD’s EAGLE P3 Project.” STATE WORKSHOP ON PUBLIC PRIVATE PARTNERSHIPS FOR TRANSPORTATION, Washington, DC, September 20, 2011.
- RTD FasTracks. “EAGLE P3 Project Procurement Lessons Learned.” Accessed July 9, 2013 at: http://www.rtd-fastracks.com/media/uploads/main/Eagle_P3_Procurement_Lessons_Learned_final_with_cover_letter.pdf
- RTD LinkedIn. Accessed July 8, 2013 at: <http://www.linkedin.com/company/rtd>.
- Russell, E. “Case Study: Denver’s EAGLE light rail PPP.” *Project Finance Magazine*, September 24, 2010. Article found at: www.projectfinancemagazine.com/Article/2676713/Search-Results/Case-study-Denvers-EAGLE-light-rail-PPP.html?Keywords=%22EAGLE%22.
- Service Payment Agreement (Amended – EAGLE P3). August 2010. Found at: http://www.rtd-fastracks.com/media/uploads/ep3/Amendment_2.pdf.
- The Jersey Journal. “Nearly NJ Transit's 'Biggest Loser' : the Hudson-Bergen Light Rail.” May 16, 2010. Accessed July 10, 2013 at: http://www.nj.com/hudson/index.ssf/2010/05/nearly_nj_transits_biggest_loser.html.
- U.S. Department of Transportation, Federal Transit Administration. “Turnkey Experience in American Public Transit: A Status Report.” FTA-TRI01-98.1, November 1998. Accessed July 10, 2013 at: <http://ntl.bts.gov/lib/17000/17000/17080/PB2000107720.pdf>.
- U.S. Department of Transportation (USDOT) Office of the Inspector General. “Hudson-Bergen Light Rail Transit System Federal Transit Administration.” Report No. RT-1999-123. Issued August 18, 1999. Found at: <http://www.oig.dot.gov/library-item/4829>
- U.S. Department of Transportation (USDOT). “REPORT TO CONGRESS ON PUBLIC-PRIVATE PARTNERSHIPS.” December 2004. Found at: <http://www.fhwa.dot.gov/reports/pppdec2004/pppdec2004.pdf>
- U.S. Department of Transportation (USDOT) Report to Congress on the Costs, Benefits, and Efficiencies of Public-Private Partnerships for Fixed Guideway Capital Projects, Report of the Secretary of Transportation to the United States Congress Pursuant to 49 U.S.C. 5309(c)(6), U.S. Department of Transportation, December 2007, http://www.fta.dot.gov/documents/Costs_Benefits_Efficiencies_of_Public-Private_Partnerships.pdf.
- U.S. House of Representatives. “Intermodal Surface Transportation Efficiency Act of 1991- Section 3019 Special Procurement.” H.R. 2950 – Section 3019. 102nd Congress (1991-1992). Accessed July 10, 2013 at: <http://thomas.loc.gov/cgi-bin/query/F?c102:1:/temp/~c102eMDpHL:e825496>
- Virginia Statewide Intermodal Long-Range Transportation Policy Plan, June 1995. Accessed June 7, 2013 at: <http://ntl.bts.gov/lib/23000/23200/23283/multi-appr-95plan3.pdf>.
- Washington, Phillip. “FasTracks EAGLE P3 Overview.” Presentation by RTD General Manager, March 14, 2012.

Wikipedia. "Hudson-Bergen Light Rail." Accessed July 9, 2013 at:
http://en.wikipedia.org/wiki/Hudson%E2%80%93Bergen_Light_Rail.
Ybarra, S. "Public-Private Partnerships in Transportation." Reason Foundation, June 28,
2008 accessed at: <http://reason.org/news/show/public-private-partnerships-in-1>.
Yin, Robert K. 2009. Case Study Research: Design and Methods. 4th ed. Applied Social
Research Methods Series 5. Los Angeles, CA: Sage Publications.