

Public-Private Partnerships in Denver, CO: Analysis of the Role of PPPs in the Financing and Construction of Transportation Infrastructure in the USA

Sylvia A. Brady, Andrew R. Goetz, and Andrew E.G. Jonas

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Abstract:

This chapter examines the expanding role of public-private partnerships (PPPs or P3s) in metro transportation projects in the USA through the innovative funding and financing of transit and highway infrastructure. The chapter draws on research undertaken by the authors on the recent use of PPPs in the Denver Regional Transportation District's (RTD) FasTracks program, a 2004 voter-approved \$4.7 billion transit expansion program, and the Colorado Department of Transportation (CDOT) highway expansion. After a shortfall in funding, RTD partnered with several private consortia to enable the FasTracks program to move forward. PPPs were utilized in the building of the first commuter rail in Denver, a highway bus rapid transit project and toll lanes, and Denver Union Station, a multimodal transportation hub.

The chapter discusses what the Denver experience tells us about the success of PPPs in the context of U.S. transportation infrastructure financing, construction and maintenance. We found Denver's PPP projects were rated favorably by nearly all the surveyed respondents, representing a sample of key regional stakeholders. The most important benefits of utilizing a P3 delivery model were accelerated delivery of a project and appropriate allocation of risk. The main shortcoming that we identified was that P3s can be complex and opaque, especially to the general public. Overall, we found that the Denver P3s can serve as a useful model for other transit agencies seeking to expand their transit infrastructure. We recommend that agencies seeking to follow Denver's P3 example invest in specialized legal and financial expertise to ensure the inclusion of appropriate safeguards for project quality and to protect the public interest, and that agencies should fully integrate P3s within existing structures of regional collaboration.

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Introduction

Throughout the United States (U.S.), states and local governments are grappling with the challenges of funding and financing improvements in urban transportation in the context of fluctuating passenger numbers and freight transport demands, aging infrastructure and, most recently, uncertainties associated with the coronavirus pandemic. With responsibility for mass transit infrastructure within their jurisdictions, regional transportation agencies and municipal governments are searching for innovative funding and financing mechanisms to maintain and enhance urban transportation infrastructure. Many are turning to public-private partnerships (PPPs or P3s) to address ongoing shortfalls in public infrastructure funding, secure new sources of finance, accelerate project build-out, and guarantee future revenue for operations and maintenance.

This chapter is based on research which analyzed the role of PPPs in transit infrastructure provision in the Denver, Colorado, metropolitan region. It examines three PPP projects in the Denver Regional Transportation District (RTD) voter approved FasTracks program: Eagle P3 commuter rail; Denver Union Station redevelopment; and U.S. 36 bus rapid transit and high occupancy/ toll (HOT) lanes. Each of these transit projects has employed some form of a public-private partnership to facilitate RTD's transit expansion, and we discuss the nature of each PPP agreement.

Using in-depth interviews and surveys with key stakeholders and decision-makers as well as analysis of data from relevant plans and documents through 2020, we discuss what the Denver PPP experience tells us about the success of PPPs in the context of U.S. transportation infrastructure funding and construction. We analyze the financial and social benefits of the projects for the public and private partners as well as the Denver region public at large. We also discuss the benefits and shortcomings of using the PPP delivery method and the extent to which Denver's use of PPPs can serve as a model for other transit agencies seeking alternative procurement methods. In concluding, the chapter addresses the potential for similar PPP mechanisms and policy implications in other metro areas in the US, reflecting on potential opportunities and likely obstacles.

The growing importance of transit PPPs in financing transportation infrastructure in the U.S.

This section discusses some key features of transportation PPPs in the U.S. It then briefly summarizes the findings of previous studies which have identified some of their benefits and shortcomings.

Transit PPPs in the U.S.

Although PPPs are widely used in many other countries, the U.S. has often lagged the rest of the world in the adoption of PPPs to deliver urban transportation infrastructure. Instead, financing of transportation infrastructure has typically been dependent upon federal and state fuel taxes, local property taxes, local sales taxes, selling municipal and revenue bonds, and additional local funding sources. The principal source of revenue historically has been the federal fuel tax in support of the Highway Trust Fund that has been used to build and maintain highways, as well as transit systems in more recent years. Because the federal fuel tax has not been increased since 1991 and because vehicles have achieved greater fuel economy standards, revenues from the fuel tax have not kept pace with infrastructure and maintenance needs. This has, in turn, led to growing demands for greater state and local sources of funding.

After revenue shortfalls and austerity measures following the 2008 global recession, interest in utilizing PPPs in transportation in the U.S increased markedly. Papajohn et al. (2011: 127) found that 25 of the 32 U.S. states surveyed were either currently adopting or had plans to implement transportation PPPs, while only 7 stated they did not plan to adopt such arrangements. Most U.S. transportation public-private partnerships have been for construction and renovation of highways, bridges, and tunnels, with only about 20% of identified transport PPPs between 1989 and 2011 being rail transit projects (Istrate and Puentes, 2011.)

The definition that best applies to transit PPPs discussed in this chapter comes from the U.S. Department of Transportation (USDOT), which regards PPPs as a form of procurement. According to the USDOT's 2004 Report to Congress on Public-Private Partnerships (FHWA, 2007):

“A public-private partnership is a contractual agreement formed between public and private sector partners, which allows more private sector participation than is traditional. The agreements usually involve a government agency contracting with a private company to renovate, construct, operate, maintain, and/or manage a facility or system.”

The most common types of PPP in transit procurement are design-build (DB) and design-build-operate-maintain (DBOM). These are considered “alternative methods” of project delivery because they differ significantly from the more traditional design-bid-build method of contracting (Thomas, 2014). In a design-bid-build project, the public agency has more control over the design of the infrastructure. The agency either designs it or contracts out the design according to precise specifications, and then companies bid on the construction of that project. In the DB and DBOM models, the public agency develops certain performance specifications for the project, and the detailed design is left up to the private group, which bids for it. DBOM includes operations and maintenance responsibilities in the contract, which is usually for a longer-term of 15 or more years. The Hudson-Bergen light rail system in New Jersey is an example of the DBOM model.

Financing can be an important component of such alternative delivery methods whereby the private sector brings in equity or takes on some of the debt burden of the project. The public

entity will use revenue generated from the project, usually including farebox, toll and/or tax revenue, to pay the private sector or issue availability payments over the course of the operational period. A full design-build-finance-operate-maintain (DBFOM) delivery method can further transfer financial risk to the private sector as well as generate life-cycle cost savings (Thomas, 2014). According to our research, the experts tended to agree that a “full PPP” must include financing, and indeed, basic DB contracts are becoming the standard procurement method.

Mandri and Perrott (2009) reviewed the more common international light rail PPP¹ projects, while in the US such PPPs were fewer but growing in number (Thomas, 2014). Although much of the research on U.S. transport PPPs has focused on toll roads and highway infrastructure (Van der Hilst, 2012), their results are, according to our interviews, often designed and applied to transit PPPs. With the increasing interest in utilizing the private sector in transit infrastructure delivery, more research is needed on the implementation of transit-specific PPP projects in the U.S, especially long-term concessions (i.e., those typically covering 20 or more years) that include a financing element.

Some benefits and shortcomings of transportation PPPs

The benefits of using PPPs to procure new transportation infrastructure have been identified in several research articles and federal publications. Amongst other advantages, PPPs are expected to deliver projects faster and at a lower price than traditional methods (FHWA, 2007; NAO, 2003). Increased innovation resulting from input from the private sector in the construction and operation phases is another benefit of PPPs (Thomas 2014: 6; Papajohn et al. 2011:130-131). PPPs can also stretch limited capital funds of an agency by allowing it to finance a project over a longer period, as well as utilize private financing and capital to build more transportation infrastructure than through public financing alone. PPPs also have the potential to allocate appropriately some risks to the private sector (FHWA, 2007), albeit none of the states in Papajohn et al.’s (2011) survey identified risk transfer as the reason for setting up a PPP. Many states implementing PPPs did so for financing reasons rather than cost-saving reasons (Papajohn et al., 2011).

There are also potential drawbacks to PPP transportation projects. The initial costs at the bidding stage and other transaction costs are much higher for a PPP because of the need to hire experts in PPP contracts (Valila 2005; Vining et al. 2005). Critics of PPPs have further expressed concerns about the lack of public accountability when the private sector takes over the operation of a public asset (Siemiatycki 2006; Forrer et al. 2010) and that profit maximization will come at the expense of the public good. PPPs are not a viable alternative of infrastructure delivery in all cases; each infrastructure project should assess the viability of a PPP delivery mechanism by weighing the costs and benefits in each situation (Reinhardt and Utt, 2012). The remainder of this chapter evaluates specific costs and benefits identified by stakeholders for the three examples of Denver transit PPPs.

¹ We use the acronyms PPPs and P3s interchangeably throughout the chapter, but they are referring to the same thing.

Study area and background on Denver’s transit PPP projects

After a 1997 attempt to pass a voter-approved transit sales tax to expand rail transit in the Denver-Aurora and Boulder Metropolitan areas failed by 57 percent of the vote, a 2004 ballot initiative passed with over 57 percent vote in favor of the measure. The \$4.7 billion plan put forth by the Denver Regional Transportation District (RTD) was called FasTracks, and the approved 0.4 percent increase in the regional sales tax paved the way for the addition of 122 miles of light rail and commuter rail to be built in the Denver metropolitan area (Figure 1). Along with expanding rail transit, a new multimodal transit hub would be built at Denver’s Union Station along with a bus rapid transit line connecting the City of Boulder and Denver.

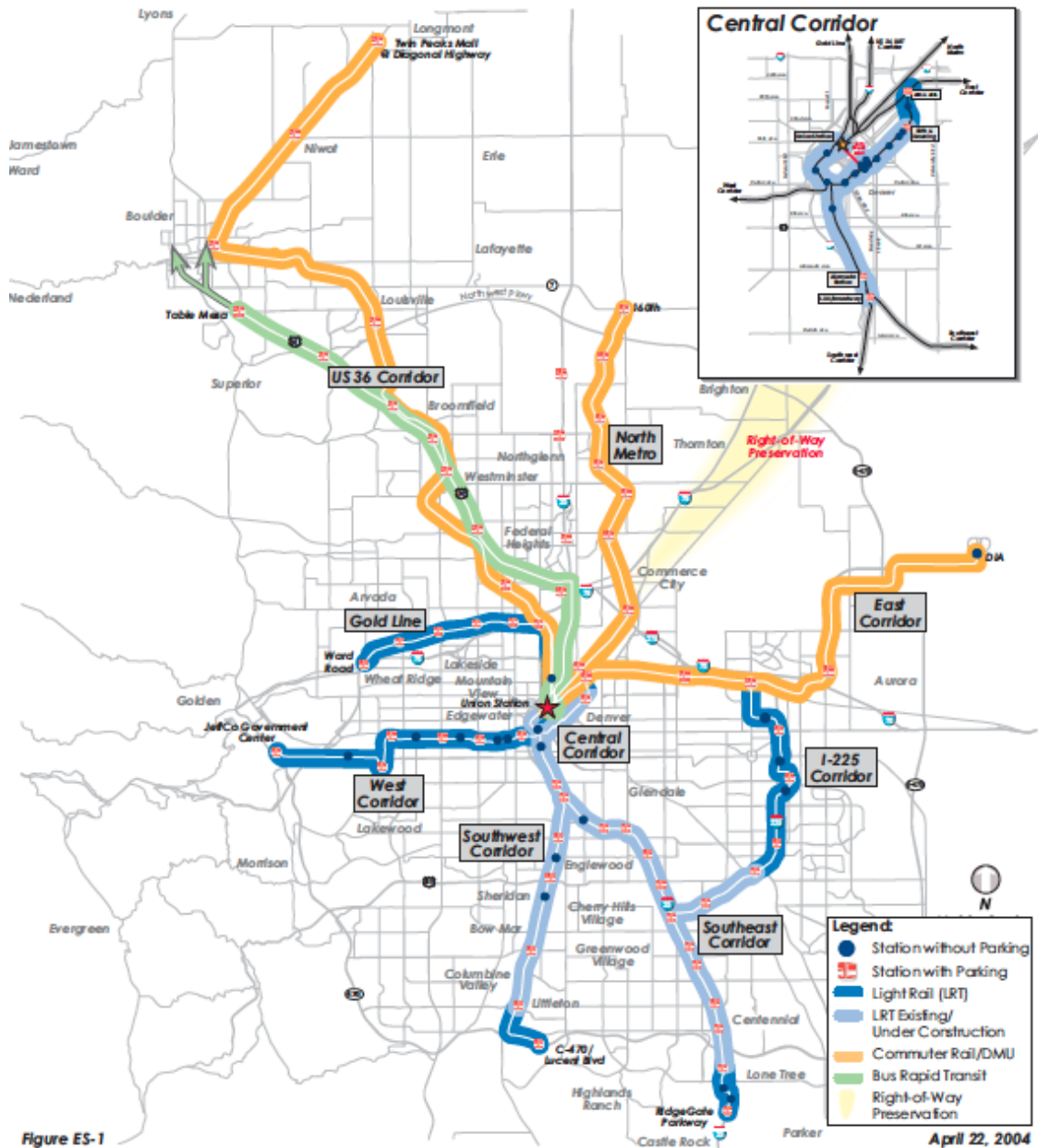


Figure 1: Original FasTracks program map (source RTD 2004)

However, delays in construction soon led to an increase in the costs of the FasTracks projects. Between 2003 and 2008, construction material costs rose much faster than RTD had predicted. The global economic crisis of 2007-2008 further exacerbated the situation by reducing sales tax revenues well below projections. By 2012, the cost estimate for FasTracks completion rose to \$7.4 billion. As regional officials looked to the federal government to help cover the growing gap in funding, it was clear that further measures were required. In 2007, the Federal Transit Administration (FTA) had launched its Public Private Partnership Pilot Program (Penta P) to encourage transit agencies to explore how PPPs could reduce risk on federally funded projects. Denver RTD was one of three agencies selected for the program and the only one that continued with it. In May of 2011, the FTA awarded a \$1.03 billion fully funded grant to the RTD for three major commuter rail corridors in the FasTracks system, packaged as the Eagle P3. In awarding the money to Denver, the head of the FTA praised the RTD's plans as a "model of private-sector involvement in transportation" (Lieb, 2011). The creation of a PPP having access to non-traditional sources of capital was a centerpiece of the RTD's plan (for a detailed analysis, see Jonas et al. 2019).

The completion of the FasTracks system was primarily hindered by the failure to build the Northwest rail line. Because of the increased construction and right-of-way costs, decreased sales tax revenue, and lack of federal funding, full completion of the Northwest commuter rail line to Boulder and Longmont was delayed to get the rest of the system built. RTD officials have put a date of 2042 on the full completion of the Northwest rail line. Nonetheless, the first six miles of the Northwest rail link, from Denver Union Station to the suburb of Westminster, was included in the Eagle P3 project, one of three projects that have recently attracted novel PPP arrangements.

Eagle P3 Project

Central to the Eagle P3 project is the delivery and completion of three key components of the FasTracks project (see Table 1), namely, the East Rail Line (now the University of Colorado A Line)², the Gold Line (now the G Line), and the first segment of the Northwest Rail Line (B Line), along with the Commuter Rail Maintenance Facility (a site for storing and maintaining the commuter rail vehicles that serve parts of the FasTracks system). These lines are significant because they connect downtown Denver to major urban and suburban developments, including the Central Park (formerly Stapleton) neighborhood and Denver International Airport (DIA), as well as the cities of Aurora, Arvada, Wheat Ridge and South Westminster (Figure 2). They are integral to ongoing regional efforts to retrofit mass transit to the new metropolitan geography of urban development, to promote smart growth, and to encourage transit-oriented developments throughout the Denver region.

² The University of Colorado acquired naming rights for the commuter rail line to Denver International Airport as part of a 5-year, \$5 million deal with RTD.



Figure 2: RTD map of Eagle P3 rail project. (John Laing 2015)

Table 1: Major transit corridors covered by the Eagle P3 PPP project

Corridor name	Distance (miles)	Corridor description	Local jurisdictions and major developments served
East Rail Line (A Line)	22.8	Electric commuter rail linking Denver Union Station and Denver International Airport (DIA)	City/County of Denver, downtown Denver, DIA
Gold Line (G Line)	11.2	Electric commuter rail linking Denver Union Station and Wheat Ridge	City/County of Denver, Adams County, Arvada, Wheat Ridge
Northwest Line (first segment only) (B Line)	6.2	Electric commuter rail linking Denver Union Station and Westminster	City/County of Denver, Westminster

Source: RTD 2015c.

The Eagle P3 Project is an example of the Design, Build, Finance, Operation and Maintenance (DBFOM) PPP model (FasTracks, 2015c) insofar as it involves the private sector participation in all stages from project construction to financing and maintenance. Some \$2.2 billion in capital has been committed to the project, which is comprised of \$1.03 billion in grant funding from the FTA, regional sales tax bonds, and private equity of at least \$450 million raised by the private consortium, Denver Transit Partners [DTP] (Table 2; RTD FasTracks, 2015a, and 2015c.) The RTD makes payments to the private partners over the lifetime of the project whilst retaining ownership of all assets relating to the FasTracks system. Phase 1 of the project began in August 2010 while the remaining construction phase of the project (Phase 2) was completed in 2016. The A Line portion of the project opened as scheduled in 2016 and the B Line portion in July of 2016. The G Line was significantly delayed, until April of 2019, because of crossing-gate

issues that also affected the A Line and B Line. DTP, the private consortium, will continue to operate the project thereafter and for the remainder of its contracted lifetime of 29 years.

DTP represents in the Eagle P3 project a consortium of private concessionaires, including Fluor Enterprises, Inc., Denver Rail (Eagle) Holdings, which is a subdivision of John Laing PLC, and Aberdeen Infrastructure Investments, a unit of Aberdeen Global Infrastructure Partners LP (DTP 2015; Jonas et al. 2019). John Laing and Aberdeen Infrastructure Investments are the majority partners in DTP, each with a 45% interest (John Laing 2015). Concessionaire arrangements legally bind together the Eagle P3 project into a consortium, but it is important to note that this arrangement has already undergone some significant changes over the course of the project.

Table 2: Sources of capital funding for Eagle P3

Funding and financing sources	Amount (\$US millions)
Regional: RTD funds including bonds raised against regional sales tax revenue	684
Federal: Federal Transit Administration Grant	1,030
Global: private equities and revenue bonds	486
Total investment in Eagle P3 project	2,200

Data sources: various including RTD FasTracks, 2015a, 2015c.

Other FasTracks PPP Projects

Table 3 provides a description and overview of the two other FasTracks projects that include private financing: Denver Union Station and U.S. 36 HOT lanes.

Table 3: Overview of PPP projects in the FasTracks program

	Aims	Partners	Funding sources	Type of PPP
Denver Union Station <ul style="list-style-type: none"> • Eight-track commuter rail station • Relocation of light rail station • 22-bay underground bus concourse • MetroRide downtown circulator • Renovation of historic Union Station building with hotel, retail, and dining 	Create dense, mixed-use transit-oriented development around the station Create an intermodal hub for light rail, commuter rail, Amtrak, bus, taxi, pedestrians, and bikes Renovate historic Union Station building	RTD, DRCOG, CDOT, City and County of Denver, Union Station Neighborhood Company, Kiewit	RRIF and TIFIA loans, FHWA grant, ARRA grant, FTA grant, Senate Bill 1 (CO) funds RTD property sales and FasTrack funds	DBF
U.S. 36 bus rapid transit/	To reduce	CDOT, RTD,	RTD funds,	DBFOM

HOT lanes <ul style="list-style-type: none"> • Bus rapid transit (BRT) Flatiron flyer service • Express HOV and toll lanes • U.S. 36 Bikeway • Intelligent transportation system solutions 	congestion on U.S. 36 corridor Offer transportation choices	HPTE, Plenary Roads, Aims Granite Joint Venture	TIGER grant (USDOT), Colorado Bridge Enterprise funds, DRCOG, TIFIA loans, CDOT funds
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Sources: RTD 2016 a,b,c,d; FHWA 2014, n.d.; CDOT 2012, 2014; Khorkhyrahova, 2013; Lien 2014; USDOT 2016

Denver Union Station

Denver Union Station (DUS) is different from other FasTrack PPP projects because it utilized innovative financing through real estate and development value. The DUS public-private partnership included four public agencies: RTD, Colorado Department of Transportation (CDOT), Denver Regional Council of Governments (DRCOG), the City and County of Denver; and one private group, Union Station Neighborhood Company (USNC), a joint venture of Continuum and East West Partners. The private sector was engaged in the project as a “master developer.” DUS is the intermodal hub of the RTD transit network, where light rail, commuter rail, bus operations, and Amtrak service all converge. In addition, the historic Union Station building and great hall were refurbished, and now house a boutique hotel as well as popular retail and dining options.

The financing of DUS came from several sources including federal and state grants, property sale proceeds, and federal Transportation Infrastructure Finance and Innovation Act (TIFIA) and Railroad Rehabilitation and Improvement Financing (RRIF) loans (see Table 4). The money to repay these loans came from FasTracks sales tax revenue and tax increment financing (TIF) revenue. DUS opened the light rail facilities in 2011, the bus concourse and great hall in 2014, and commuter rail service began in 2016.

Table 4: Sources of capital funding sources for Denver Union Station

Funding sources for Denver Union Station	Amount (\$US millions)
Federal: Railroad Rehabilitation and Improvement Financing (RRIF) loan	155
Federal: TIFIA loan	145
Federal: FHWA grant (CDOT)	50
Federal: American Recovery and Reinvestment Act funds (ARRA) (DRCOG and RTD)	28.6
Federal: Federal Transit Administration Grant	9.6
Federal: Transportation Improvement Program (TIP) funds (DRCOG and RTD)	2.5
State: Senate Bill 1 (CO)	18.6

Regional: Property sale proceeds (RTD)	37.4
Total investment in Union Station project	446

Data sources: FHWA n.d.; Khokhryahova 2013; Lien 2014; USDOT 2016; RTD 2016a.

U.S. 36 Bus Rapid Transit and HOT lanes (Phase 2)

Phase 1 of the U.S. 36 improvements was a DB agreement, while phase 2, including BRT, bikeway, and High Occupancy/ Toll (HOT) lanes, was a DBFOM PPP with the private partner Plenary Roads and the High-Performance Transportation Enterprise³ (HPTE) within CDOT. Plenary Roads has a 50 year concession agreement to operate the toll lane and maintain the toll lane and general purpose lanes. Also known as the Flatiron Flyer (FF), the bus rapid transit service operated by RTD runs 18 miles between Boulder and Denver Union Station. The BRT service was included in the original FasTracks plan in conjunction with CDOT’s highway improvements, and began service in 2016, after the 2015 opening of the HOT lanes.

Total cost of phase 2 construction was \$208.4 million. Plenary Roads assumed the TIFIA loan from phase 1 (over \$50 million) as well as issued a new TIFIA loan for \$60 million. In addition they issued \$20 million in private activity bonds (PABs) and contributed over \$20 million in equity (FHWA 2014b, Plenary Roads 202). Other funding sources included state, federal, and local funds as well as RTD sales tax revenue (see Table 5). The contract gives the toll revenue to Plenary Roads, with the state sharing in revenues that are generated higher than expected rates of return. CDOT pays Plenary for maintenance according to the contracted requirements. The terms of the contract include financial penalties for not meeting maintenance or operation standards (CDOT 2014a, CDOT 2014b). Table 6 provides a summary of principal contract elements for all three Denver P3 projects.

Table 5: Sources of capital funding for U.S. 36 improvements

Funding sources for U.S. 36 (phase 2)	Amount (\$US millions)
Plenary funding	
• PABs	20.6
• TIFIA Loan	60
• HPTE capital payment	49.6

³ The High-Performance Transportation Enterprise is a government-owned business within CDOT that was formed to pursue innovative means of more efficiently financing important surface transportation infrastructure projects.

• Equity	20.6
• Subordinated Debt	20.6
• I-25/ U.S. 26 toll revenues	8.6
• Other	3.4
HPTE/ CDOT funding	
• State funds	18.9
• Federal Funds	15
• RTD sales tax revenue	30.5
• Local funds	10.8
Total investment in U.S. 36 improvements (Phase 2)	208.4

Data sources: FHWA 2014a, FHWA 2014b, CDOT 2012, CDOT 2014, RTD 2016d, Plenary Roads 2020.

Table 6: Overview of contract elements for Denver P3 projects

Eagle P3	<ul style="list-style-type: none"> • DTP was paid lump sum for the design and build portion • DTP operates and maintains the Eagle P3 lines for 29 year contract period • RTD makes availability payments to DTP at the start of service • DTP guarantees condition of the asset after the 29 year O&M period • RTD retains ownership of all assets after the 29 year O&M period • RTD controls fares and fare revenue risk; availability payments provide certainty for DTP • Contract includes provisions that allow the public agency to retain or reassume control of strategic assets if the private sector fails to deliver on their contractual duties • Quality of service is specified in the contract with penalties if performance requirements are not met by DTP
U.S. 36 highway toll lane and BRT	<ul style="list-style-type: none"> • 50 year concession agreement for Plenary Roads to operate and maintain toll lane and general purpose lanes • Plenary Roads earns toll revenue; State of Colorado shares revenues if they exceed projected rates of return • Financial penalties imposed for not meeting maintenance or operation standards of contract
Denver Union Station	<ul style="list-style-type: none"> • The master developer, Union Station Neighborhood Company (USNC), agreed to pay for real estate that RTD owned in the area in return for right to develop the land • Development fee was paid to USNC to develop a new master plan and transit solution • Master developer led planning and design efforts of the public and private spaces including the transit components

Research methods

The study utilized multiple research methods. First, we conducted a desktop analysis of transportation and transit public-private partnerships in the U.S. Second, we collected and

analyzed data, plans, and relevant documents from Denver RTD through 2020 for each of the selected projects. Third, we conducted a survey and a sample of face-to-face interviews with at least twenty strategic actors and policymakers in Denver to elicit their views on the structure and nature of the transit PPPs in the region. The survey was administered face-to-face to control its dissemination and preserve the quality of the data. We identified potential interviewees through personal knowledge and past work with RTD, and we then asked these interviewees to suggest additional participants for our study. We interviewed and surveyed a variety of stakeholders, with responses from members of the business community, local, state, and federal government, community and advocacy groups, transit agency representatives, and private contractors.

We then input the survey responses into survey analysis software called Qualtrics. We used this software to analyze the survey data and generate summary statistics for the close-ended survey questions. The survey used a Likert-type scale for close-ended questions, and it also included several open-ended questions. We audio recorded, transcribed, and coded the interview responses to identify common themes.

Findings: The benefits of PPP projects in Denver

In this section, we examine how survey respondents and stakeholder interviewees evaluated the major benefits of the three PPP projects described above. Respondents tended to highlight the financial benefits.

Financial benefits

Overall, the financial benefit for the private consortium involved in the PPP projects is generally regarded as favorable. Respondents were more conservative in their assessment of the concessionaire's finances because most stakeholders (except for representatives from the private consortium) have no real way to know if they are making money, but the consensus is that they are. The global investment firms involved in the Eagle P3 have experience with these types of long-term infrastructure projects and are looking for a "steady, long stream revenue source with fairly predictable and manageable risk" for investors like the California School Board retirement group and the Australia Teachers Union. The consensus is that DTP got "a good deal, but not a smoking deal," and "nobody is walking away broke," even with significant unexpected expenses for the private sector, such as having to rebuild the Jersey Cutoff bridge in the Eagle P3 project at the cost of \$10 million.⁴

The most important factor for DTP to make a sufficient return on their investment in the Eagle P3 project was to complete the project on time to begin receiving availability payments to service their debt. Although construction was completed on time, all lines were not in service according to the anticipated schedule. Since the interviews were conducted before all the Eagle P3 lines entered into revenue service, the responses were colored by the assumption that the lines would open on-time. There have since been several battles over the contract agreement and payments because of several issues relating to increased costs of operation and delayed opening

⁴ This bridge goes over the BNSF railway tracks just south of I-70 along the Gold line/ Northwest line alignment in the Eagle P3 project (Source: Eagle P3 update presented at RTD board update Sept. 2, 2014: http://rtd.ig2.com/Citizens/Detail_LegiFile.aspx?Frame=&MeetingID=1954&MediaPosition=&ID=2051&Class=).

of the G line. The A Line and B line opened on-time in April of 2016 and July of 2016 respectively, but the lines were operating under a waiver from the Federal Railroad Administration (FRA) for safety issues with the crossing gates. The Eagle P3 lines were the first rail transit lines to implement wireless signaling to the crossing gates, and it was integrated with the federally mandated positive train control (PTC) technology⁵. As a first of its kind system, there have been glitches. According to the FRA, the crossing arms were going down too soon and staying down too long. The waiver from the FRA required DTP to station human flaggers at every grade crossing, and DTP continued to do so on and off for over three years. While the exact cost to station flaggers at road crossings for nearly 24 hours a day for three years is not known, it is estimated that tens of millions of dollars have been spent by DTP to keep the A Line in operation.

In addition, RTD has withheld over six million dollars from the availability payments to DTP for failure to meet contract terms in getting the G line open. Because of the issues at the crossing gates, the G line opening was delayed until April of 2019, and it also operated with flaggers under the FRA waiver until August 2019. In the fall of 2018, DTP sued RTD for \$80 million for reimbursement of the costs of the flaggers and withheld payments, arguing that federal regulations changed, and they should not be liable for the additional costs due to FRA's decision (Minor, 2019). RTD threatened to end its contract with DTP and countersued DTP for millions of dollars, claiming they had defaulted on their contract and rushed the testing phase of operation. The net effect on the private sector partner's finances is not known, but it is clear that their operation costs have increased, and the delayed opening of the G Line has affected their access to the availability payments from RTD, enough to warrant a lawsuit. The contract is based on availability payments to the private consortium, so the decline in transit ridership experienced in the COVID-19 pandemic does not affect the payments to DTP. Risk of low farebox revenue falls on the transit agency.

Denver Union Station was assessed somewhat more favorably for the financial benefit of the private sector because the property values of the real estate that was sold around the station are known and published. The successful and explosive redevelopment of the Lower Downtown (LoDo) area in Denver is evident to all the respondents. A representative of the private master developer, however, did comment that while the private group did make a profit, it was only due to market conditions and not from any money that RTD was paying them. The real estate developers had a difficult time early on when the real estate market was still recovering from the 2007-8 financial crisis, and they had to wait until the end of the deal to realize any profits. They assumed a lot of risk but ended up making money with a combination of historical luck and effective solutions of the transit hub problem.

The US 36 toll lane project financials remain to be seen, and it is too early to tell what toll revenues will be. Many respondents think this will be one of the last toll road projects that transfers the toll revenue risk to the private sector because toll project revenue projections can be "wildly inaccurate." Recently, several large U.S. toll road projects have gone bankrupt, notably the Indiana Toll Road in 2014 and the Texas Toll Road/ SH 130 in 2016. The private sector is increasingly less likely to bear the toll revenue risk in these arrangements.

⁵ Positive Train Control was mandated by Congress in the 2008 Rail Safety Improvement Act. The technology is designed to automatically stop a train to avoid accidents. For more information see: <https://www.aar.org/campaigns/ptc/>

Nonetheless, most respondents recognized the financial benefit for RTD in the U.S. 36 project because RTD was able to leverage about \$200 million in investments to get \$500 million in improvements through the PPP. One even saw this as the best financial deal for RTD because of the comparatively low investment in exchange for high quality of service improvements. The highway improvements were achieved 20 years before they would have been without a PPP (CDOT 2014a, Plenary Roads 2020). CDOT will also share in the toll revenue if it achieves higher than projected revenues (CDOT 2014b). A few people did, however, see the US 36 BRT project as financially unfavorable for RTD because it did not add much to the service while sacrificing a lot of political goodwill.

In addition, DTP's \$54 million private equity that was used to finance a quarter of the Eagle project reduced the debt burden of RTD so they could complete other projects. Since the actual debt rates for the private financing were higher than RTD could have raised itself (assuming strong bond ratings), the private financing is not necessarily cheaper in the long-term. There is not really a cost savings through private financing, but if the public sector needs capital from elsewhere because they have reached their debt capacity, as was the case with RTD, then the financing element is an important benefit. Private equity also gives the private sector "skin in the game." For the Eagle P3, if the private consortia walk away from the deal, it loses its \$54 million equity. One person noted that the financing element of the PPP is overrated, and "if you (the transit agency) are doing it for money, you are doing it for the wrong reasons." The respondents were careful to point out that as a transit agency, RTD does not financially profit from running their services. The financial benefit of a PPP comes in the way of "bang for the buck" in spending on transit projects. The FTA full-funding grant agreement awarded points for cost effectiveness or "bang-for-buck" efficiency, and the PPP financing structure helped RTD score well on that part of FTA's assessment for federal funding.

One key to realizing the full financial benefits of a PPP is to include financing, operations, and maintenance in the partnership. The public sector benefits by being able to pay for the full life-cycle cost of operations and maintenance. In a DB contract, some construction savings may be reaped but possibly at the expense of operations and maintenance. With a full DBFOM contract, the private sector is incentivized to build a better product that will require less maintenance to increase their profit over the long-term concession lease. There is also a guaranteed condition of the asset in the Eagle P3 that requires the infrastructure to be returned to the agency in a certain condition after the 30-year O&M period. Instead of building a system to last 50 years and using it and abusing it, this contract funds a mid-life overhaul of the system.

Overall, the biggest financial benefits for RTD in utilizing the PPP structure were a lower total cost of the projects, reducing their debt burden, and financing the projects over a longer timeframe. The PPP projects were viewed as financially favorable for RTD since all three came in under the internal cost estimates for RTD to complete the projects itself. The Eagle P3 project came in \$300 million below internal cost estimates, and savings allowed RTD to fund more projects and accelerate the delivery of the FasTracks program. Denver Union Station produced the highest return on RTD's investment according to some experts because RTD ended up getting a half a billion-dollar project for half the cost. RTD was able to make use of the real estate value of their property surrounding the station to fund DUS and make use of federal loans and private sector investment. Therefore RTD had to invest less upfront cash to complete the project. The revenue from DUS TIF is already ahead of performance schedule to pay back the TIFIA loans.

Other Benefits of Denver's approach to PPPs

The three most important and most cited benefits of the PPPs were accelerated completion of the project, appropriate allocation of risk, and private sector expertise. Denver RTD was able to deliver more infrastructure sooner than it could have with traditional revenue streams. The private sector has a better ability to deliver multiple projects on-time and on-budget because of incentives such as availability payments that take effect when the project is complete. Most of the interviewees believe that the private sector is “faster, smarter, and better,” and through their operating efficiencies plus incentives for profit, they can complete projects faster than the transit agency alone. Even a design-build project, without the financing, operating, and maintenance agreements, gets built faster than a traditional design-bid-build because of private sector efficiencies, such as utilizing the connection between the designer and the contractor for smoother and faster implementation.

A few named allocation of risk as the primary reason to conduct a project as a PPP. The risks must be shifted appropriately, with the private concessionaire (and its constituent firms) assuming those risks that they can manage better and cheaper than RTD. For example, the private sector is much more equipped to assume construction risk or interest rate risk, while the public sector is better equipped to handle risks such as environmental hazards and public utilities. Shifting some of the risk to the private sector is a significant financial advantage in a PPP contract. However, the distribution and allocation of risk should not undermine control of public assets. The contracts negotiated in these PPPs had provisions that allowed the regional public agency to retain or reassume control of strategic assets should the private sector fail to deliver.

Another way the public sector benefits from partnering with the private sector is the expertise that hired consultants and the private consortia bring to the table. The knowledgeable resources that the private consortia contribute to the design, construction, and operation phases results in a better overall team overseeing the project and more innovation. These specialized individuals and companies are better at executing projects at a higher level of skill and reliability. According to some respondents, the public sector is used to doing things in a certain way, with a “this is the way we have always done it” mentality. A PPP helps “get the bureaucratic bologna out of the way.” The public sector provides robust design criteria for the transit infrastructure, but the PPP model provides flexibility for the private sector to find efficiencies and cost savings by building things the way they know how or by coming up with innovative solutions to design or construction issues. In this way they are not hamstrung by the agency’s design. One example of an innovation from the private partner in the Eagle P3 was including wireless signaling technology with positive train control. However, in this instance, the innovation has resulted in additional regulatory problems and costs since the technology was relatively untested prior to the opening of the Eagle P3 lines. Neither the public nor private partner was able to adequately address the technical issues with the crossing gate software until several years later.

Nevertheless, Eagle P3 was highly rated -- either extremely favorable or generally favorable by all respondents -- because of the economic development and connectivity it will bring to the region. Ridership on the A Line has exceeded expectations, and two new train cars were added to the service in 2019 to meet demand (Tinsley 2018). The ridership increased from 4.1 million passengers’ boarding in 2016 (from April through December) to 6.6 million in 2017 to 7 million in 2018 (Bosselman, 2019; RTD facts and figures booklet). As of December 2018, cumulative ridership had surpassed 16 million, which RTD officials had not expected to reach

until 2020 (Tinsley, 2018). This ridership increase occurred during a time when ridership for RTD's other services declined similar to transit ridership declines nationally, even before the onset of pandemic-induced declines in 2020. RTD expressed their satisfaction with the A Line ridership numbers, as well as their on-time percentage for the A-line of 97 percent. Likewise, the success of the BRT is attributed to high ridership and improved travel time in the corridor.

The interviewees agreed that PPP projects bring other benefits to the wider Denver region. All of the transit projects deliver the benefit of facilitating cost-effective mobility and livability in the region. The PPP delivery model has enabled more transit to get built faster, without having to go back to the taxpayers after the funding shortfall. The consensus is that Denver region taxpayers are getting a good deal with these PPPs and seeing value for their tax dollars, especially since the Eagle P3 contract shifted much of the financial risk to the private sector. The cost of the crossing gate flaggers and the delay of the G line revenue service have been born thus far by the private contractor but they are suing RTD for reimbursement of these costs and withheld availability payments. RTD is having to expend legal fees to fight the lawsuits and may end up paying for some of the expenses, so the true cost of these issues is likely being felt by both the public and private partners.

Major Shortcomings of PPPs in Denver

After considering all of the measures of success, meeting transportation needs, financial success, and public information, the PPP projects overall received high marks from interviewees. Nonetheless a number of shortcomings were identified. Three shortcomings are highlighted here: (1) issues of public accountability; (2) potential loss of local control of key assets; and (3) high upfront costs.

Public accountability and transparency

Our research revealed that transportation PPPs, at least in Denver, are “complex and opaque,” and difficult to explain to the public because PPPs are misunderstood, unfamiliar, and still novel. The agencies most heavily involved in these projects, namely RTD and CDOT, both felt that they did a good job informing citizens of the impacts of the projects. However, the public did not always agree. An audit of the US 36 project found that CDOT failed to provide enough information to the public, “even though all [of the RTD transit projects] provided much less information- a lot less,” according to one interviewee. Interviewees did feel that it is important for the public to understand and be involved in PPPs, but because they are “complex and opaque transactions that are difficult to explain and communicate,” it is hard to know how much the public really wants to know. Keeping the public informed is even harder with a PPP than with traditional projects because everything moves faster.

Toll lanes are inherently more controversial according to some interviewees. With the US 36 project, some of the public got the wrong impression that they were going to have to pay to drive on all the lanes on U.S. 36. People were also confusing CDOT and RTD, thinking that RTD was building toll lanes. Some interviewees also attributed the backlash against the US 36 toll lanes and BRT to the failure of the Northwest rail line to get built. People felt they had voted for rail and now they were getting buses, even though the BRT had always been a part of the FasTracks plan.

The project was politicized at the state level when state legislators stepped in questioning the PPP contract with the Plenary Roads group. Some elected officials interviewed cited a “total lack of transparency” from CDOT, stating that the “agreement was negotiated behind closed doors, nobody including legislators, got to see the agreement until it was signed.” As a result, a few state legislators sponsored a bill to restrict PPPs for CDOT in the future, but the governor vetoed the bill. The public outreach part of the bill was kept, requiring at least two public meetings if a project is delivered using a PPP. In hindsight, a few respondents felt that the private and public partners failed to reach out to key stakeholders, including state legislators, to make sure they understood the procurement process and key contract terms.

RTD’s projects in general received higher marks for public information than the CDOT project. Transit agency respondents also gave themselves high marks for public information, citing RTD’s philosophy of active transparency. Every RTD project has a public information team that is responsible for engaging with the community and local stakeholders. For the Eagle P3 project, RTD held a public meeting in a large auditorium downtown for presentations from the private groups competing for the contract. People were interested in the high profile A Line to the airport, and the public could see it being built along the airport boulevard. Moreover, quite detailed information -- both about the project as well as the concessionaire -- was made publicly available on RTD and other websites. Nevertheless, the public and even some elected officials still did not know many details about the projects, including the procurement model or even the differences between light rail and commuter rail.

Denver Union Station was "a different animal" because the PPP in this instance was more real estate driven. The project had more scrutiny by more people, according to individuals involved in the station redevelopment. The project has had multiple public and private stakeholders involved, so they felt they were always out there explaining the project -- to CDOT, RTD, Lower Downtown neighborhood groups, etc. The project also had a citizens’ group, Union Station Alliance, which has had input into what type of tenants they wanted to see in the station. Although Eagle P3 and Denver Union Station were providing more information to the public, some people were quick to point out that these projects were not controversial. In the end, the public was mostly just glad the projects were being built, and there was little opposition to them. People were not as concerned with the PPP delivery model as they were with the perceived privatization of highways.

Less control by the public agency

Transit agency representatives were asked if they could choose whether these projects would be conducted as PPPs or conducted by the transit agency alone, which they would choose. There were two schools of thought. Some people would prefer the transit agency to conduct the projects as design-bid-build because the agency would have more control and involvement over the project, and the agency’s ability to control costs is better. Most people, however, said it depends on the project and the circumstances surrounding it. For example, for the Eagle P3, it made sense to do a DBFOM PPP because the agency was short on funding, and electrified commuter rail was a new technology that required coordination with the FRA, which RTD did not have experience operating. Despite the benefit of the private sector’s experience with electrified commuter rail, the commuter lines have not been immune to technical issues with the crossing gates and other unfortunate events including lightning strikes and power outages. Furthermore, RTD decided to operate and maintain the North Metro line (N line), another

FasTracks commuter rail line that opened in September of 2020, rather than use a private partner for that purpose (Minor, 2019). The I-225 line (R line), however, would not have made sense to do with an operate and maintain component because it is light rail technology, which RTD already runs in several corridors. The decision to use a PPP as the delivery model should be considered as a part of the cost/ benefit analysis, and if it makes sense, then do it. Even though CDOT had gone with a PPP for the U.S. 36 project, on another highway HOT lane project, C-470, CDOT decided after analyzing the options, that it would make more sense for the agency to build and operate the lanes rather than a private entity. A full DBFOM agreement does not make sense in every case, but DB agreements also allow the agency to benefit from bringing in the private sector through risk transference, efficiencies, lower cost, and the ability to complete multiple projects at the same time.

Less control by the public agency means changes can be difficult in a PPP. The public agency loses some flexibility and ability to request changes from their original design. For example, the City of Denver and RTD wanted to add another station at 61st and Pena Boulevard on the A Line to the airport (for the Panasonic Smart City development) very late in the construction phase. While some change orders can be done, it is not usually in the best interest of the private sector. In this instance, the private side was able to add the station, but at a cost. Some people view this loss of control by the agency as a shortcoming. The public entity has less control of the design and building specifications compared to a design-bid-build contract, but one response from RTD was “we have plenty of control over what we should worry about.” RTD does not need to be concerned about the specific way the contractor builds a bridge or station platform, as long as it is safe, reliable, and produces quality transit service.

Higher upfront costs and debt servicing

The public sector does not always have the expertise or experience to negotiate these complex PPP contracts, so they bring together a group of very sharp legal and financial minds to represent them, resulting in a better deal for the agency. The expense to hire private experts in the negotiation phase can cost millions. The public sector does not have the skills to negotiate these complex deals themselves. The risk of ending up with a bad contract is more expensive than the cost of hiring the experts, but there is also a risk that the project will never get to the bid phase and the agency will have spent millions of dollars on lawyers, designers, bankers, consultants, and other experts. There is no standardization of contracts for full DBFOM agreements, so for the Eagle P3, financial and legal experts from Goldman Sachs, JP Morgan, and Freshfields were required to ensure that the public entity was adequately prepared to enter the PPP arena.

There is also the issue of determining cost savings. As discussed in the previous benefits section, PPPs can result in a cost savings in the short term and allow projects to get completed that may have had funding issues. However, over the longer term, the agency will end up paying more for a PPP project because they are paying a higher debt rate through the private sector financing. As one expert put it, rarely will the agency’s “green-visored accountant” in the back room look at the spreadsheets and say that a PPP makes financial sense, because the agency will pay more over time. But the agency should consider all of the other benefits of a PPP, especially the transfer of risk, which also adds to the increased cost. Experts agreed, financing is not funding, and PPPs are not a magic bullet to address the lack of transportation funding in U.S. states and cities.

Policy implications

There are several wider policy implications of our study of PPPs in the Denver region. This section discusses whether Denver serves as a model for other regions interested in exploring PPP mechanisms, the role of regional collaboration, and whether the public interest can be safeguarded in PPP contracts.

Using Denver PPPs as a model for other PPPs in the U.S.

Many people stated that the Eagle and Denver Union Station PPPs could serve as models for other U.S. cities and regions looking to expand their transit infrastructure, especially for transit agencies with constrained revenue streams. In fact, these projects already are serving as models for projects such as the Maryland Purple Line, outside of Washington D.C. RTD has hosted numerous transit officials from other cities that have visited Denver to see how they were able to get these projects done. RTD also produced a “Lessons Learned” document after the procurement phase of Eagle P3 and hope to produce another one after the transition to O&M⁶. They have shared their experiences with others at conferences and shared transit exchanges as well.

Public agencies hoping to copy Denver’s PPP successes should consider whether a PPP is even the right delivery model for them. Not every transit agency needs to do their project as a PPP. Because of revenue shortfalls and the Colorado Taxpayer Bill of Rights (TABOR) law that requires all new tax requests to go to the voters for approval, RTD had to be innovative with their financing structure.

The most common answer to whether Denver can serve as a model was “yes, but...” Respondents cautioned that Denver and RTD had a special set of circumstances with the Eagle P3 and DUS that might not be replicable in other situations. They stressed that every PPP deal is different, and as former RTD general manager Phil Washington was prone to say, “If you have done one P3, you have done one P3.” Perhaps it would be better to call Denver an example, as suggested by some interviewees. As the first full-scale transit PPP (DBFOM) in the United States, the Eagle P3 can serve as a useful example of how a transit PPP can be done. It is considered a good model contractually and financially. The contract was based on toll road and international deals, and the “risk transfer was nearly perfect,” according to one expert. The way these projects were financed is also considered a model for future transit PPPs. Denver and RTD were able to maximize all sources of funding including federal funding and grants as well as private equity.

The federal PentaP program was one of a kind, and while other agencies can learn from RTD by leveraging as much federal funding as possible, they may not be able to replicate the exact circumstances and funding sources. RTD has produced a checklist of things to address in PPP contracts, but not every agency will have to address the issues in the same way as RTD. No one can pick up RTD’s contract and say, in effect, “now we do not have to draft our own.” Transit agencies interested in PPPs can also learn from Denver how transit can court private

⁶ See http://www.rtd-fastracks.com/media/uploads/main/Eagle_P3_Procurement_Lessons_Learned_final_with_cover_letter.pdf

investment. Prior to entering into the Eagle P3 agreement, the private sector already viewed RTD as a good business partner based on their experience with DB contracts and contracting out some paratransit and bus operations. Cities looking to replicate Denver Union Station's success are especially interested in how to use TIFIA loans and Certificates of Participation (COPs) to leverage economic development dollars. The Eagle P3 and DUS projects are also models of intergovernmental cooperation and regional collaboration.

Regional Collaboration

Part of the model of Denver's success is the strong regionalism that has characterized regional governance and economic development for several decades (Jonas et al. 2014). For instance, the Denver model was cited in an important national study of metro regionalism published by the Brookings Institution (Katz and Bradley, 2013)⁷. Regionalism was credited by the interviewees with getting the initial FasTracks ballot initiative passed in 2004. The Metro Mayors Caucus, an informal collaboration of the area's mayors, the Metro Denver Chamber of Commerce, and other regional organizations came together to address issues that cross jurisdictions, including transportation.

After the FasTracks funding shortfall was discovered, it became evident that not all the rail lines would be built on time, and there was potential for the hitherto strong consensus built through regional collaboration to become fragmented based on which corridors would move forward and which would not. The PPP delivery mechanism affected the build-out of FasTracks because RTD made decisions about which lines to build based on the availability of federal funding and private sector interest in the projects. The lines eligible for federal funding in the PentaP project, the Gold Line, part of the B line, and the A line, were packaged together as the Eagle P3. After the Eagle P3 project came together, there were some negative sentiments expressed against the core city (Denver), but most people supported the airport line getting built as a benefit to the region. RTD's ability to get two additional FasTrack lines, the R Line and North Metro line, built with savings from Eagle P3 was "brilliant" because it showed a good faith effort to get something built for surrounding areas like Adams County and Aurora.

The opinions about PPP contribution to regional collaboration varied. Some experts either thought that the PPP delivery model itself did not hurt regional collaboration or it did not affect it much at all. Others, however, said that a PPP is the very definition of collaboration. It requires government to be more proactive with regional partners and to think about the regional benefit of the transit lines rather than what a certain jurisdiction wants. Another pointed out that RTD is regional by definition and requires strong collaboration between many government entities. Another felt that the mayors stood by one another and supported each other's projects, not just their own. There were a few people who felt that regional collaboration has suffered more recently because of the presence of a 'corridor versus corridor' mentality, with the southern part of metropolitan Denver arguably getting everything, or so it has been claimed. The fact that the Northwest rail project to Boulder and Longmont was being pushed beyond 2042 contributed to this "Mason-Dixon type line." The FasTracks plan was supposed to be funded as a regional system, but instead was being funded, through FTA funding and private money, corridor by corridor.

⁷ The Brookings study did discuss the FasTracks vote, but it did not assess the role of PPPs in regional collaboration.

Contractual elements that safeguard the public interest

The Eagle P3 contract has robust requirements with default provisions and tender provisions should something happen with the private sector's ability to pay for or run the service. The quality of service is also specified in the contract, with penalties that apply if the service is not performing up to required levels. The contract was negotiated by leading financial and legal experts that RTD hired, so the transit agency felt that the contract fully protected the public interests. On the Eagle project, RTD also had an oversight team of more than 60 people overseeing DTP and conducting quality assurance/ quality control, as well as four inspectors in the field during the construction phase.

The transit agency was not concerned about the concessionaire defaulting because of the numerous levels of protection in the contract. First, it would be incredibly unlikely that the private consortium would intentionally bankrupt the project because of the repercussions to the private firm and its parent company, Fluor. If Fluor (or the other partners) were to walk away from the debt of over \$400 million in private activity bonds, they would never be allowed to work on a federal contract for the next ten years or borrow money from anyone. In addition, they would lose the equity they previously invested in the project.

Second, the contract and financing agreement do not allow the private group to foist its project debt on the transit agency. The bonds specifically state that RTD is not responsible for repayment on the offering statement; all of the debt is with the private sector. Third, even in the worst-case scenario, if the private concessionaire did default or they do not perform up to contract requirements, RTD retains ownership of the infrastructure asset. If they fire the private concessionaire or the private group defaults, RTD has the right to re-tender and sell the lease to someone else or operate the service itself. This is the scenario that would develop if RTD follows through with their threat to terminate its contract with DTP, albeit not without extensive legal wrangling in the courts. There is really no additional risk to the public compared to the case if RTD owned the bonds.

Conclusion

Public-private partnerships have been utilized for public infrastructure projects throughout the world, but they are relatively underutilized in the U.S. However, interest in PPPs is increasing in the U.S., especially in the transportation sector due to lack of sufficient federal, state, and local funding. In this chapter, we have examined the case of the Denver region where Denver's RTD agency used PPPs to deliver several of their FasTracks rail projects. FasTracks has thus far cost over \$5 billion, with significant contributions from taxpayers, and the system has not yet been fully built-out. After a funding shortfall following the global financial crisis and increasing construction costs, partnering with the private sector to use innovative procurement methods allowed the agency to deliver several of the rail lines that were in jeopardy of not getting built. The Eagle P3 project included the region's first commuter rail service and was the nation's first full DBFOM transit PPP.

Our research found that Denver's recent transportation PPP projects were rated favorably by most respondents. Denver Union Station has exceeded expectations in several areas, notably economic development opportunities for the city and financial benefits to the private and public partners. Respondents identified the most important benefits of utilizing a PPP delivery model as accelerated delivery of a project, appropriate allocation of risk, and private sector expertise. In

addition, the projects were delivered at a lower cost than if the transit agency alone had completed them. The incentives for on-time project delivery facilitated faster completion by the private sector. The allocation of risk for maintenance and operations using availability payments incentivized the private partner to build a better, longer-lasting product. The main shortcoming is that PPPs can be complex and opaque, especially to the public. Public accountability and transparency were found to be lacking in the U.S. 36 toll lane and BRT project. Overall, the Denver PPPs, especially the Eagle P3, can serve as a useful model for other transit agencies seeking to expand their transit infrastructure.

The research focused on the development of public-private partnerships and their success thus far. This research was limited in scope by the level of completion for each of the PPP projects at the time of the interview data collection in 2016. In some cases, interviews and surveys were conducted before some of the lines went into service, so the long-term benefits and success cannot be pinpointed from this study. The success of the FasTrack lines was determined in the context of the design-build-finance phases of the partnerships, but the success of the operate-and-maintain phases is yet to be seen. Recent issues surrounding the contractual agreement and obligations of the public agency and private partner in the Eagle P3 suggest that future studies should explore the long-term effects of the Eagle P3 and U.S. 36 toll road projects. These long-term concession agreements stretch over several decades, and the financial benefit of the partnerships may not yet be realized at the start of the service phase.

This chapter has considered whether the PPPs contracted to complete parts of the Denver transit system have been successful, and whether they could serve as models for other transit agencies seeking to expand their infrastructure. It contributes to our wider understanding of PPPs by filling in the research gap of transit PPPs in the U.S. and provides public agencies and policy makers interested in implementing PPPs with an independent critical assessment of the benefits and drawbacks of the PPP approach. Policy makers and public agencies seeking to institute PPPs for transit infrastructure should consider the following wider implications and recommendations:

Wider implications and policy recommendations

- 1. The Denver experience with transit P3s can serve as a useful model.** The Eagle P-3 project was the first full-scale (Design-Build-Finance-Operate-Maintain) transit P3 created in the US. Because the results from this study suggest that these projects have been successful so far, the P3 approach to expanding transit infrastructure should be given full consideration. Denver has been a pioneer in the development of transit P3s, and there is much that other transit agencies can learn from the Denver experience. Denver RTD has produced a "Lessons Learned" guidebook that can be useful for transit agencies considering P3s.
- 2. Invest in specialized expertise if exploring a P3 approach.** P3s are complex and opaque, and require specialized expertise to pursue a P3. Even though it may be more costly for a transit agency to hire specialized P3 experts, it will be worth the expense if the negotiations and contracts are conducted so that the transit agency's interests are ensured. The same can be said for the private sector partner, and the increased scrutiny and attention to detail by experts on both sides should enhance the quality of the final project.

3. **Build in appropriate safeguards in the contracts to ensure project quality and to protect the public interest.** Respondents in our study maintained that appropriate safeguards, such as providing availability payments based on scheduled opening of service, penalties that apply if the service is not performing up to required levels, and default and tender provisions should something happen with the private sector's ability to pay for or run the service, are critical to the success of the P3. The public interest can be protected if the contract is written with these and other appropriate safeguards.
4. **Ensure that P3 structures are fully integrated within existing structures of regional collaboration.** Given the concerns of local jurisdictions and the public about the potential loss of local control of key regional economic development assets, it is important to ensure that safeguards are built into P3 arrangements in a manner that protects locally strategic public assets and does not undermine or threaten existing models of regional collaboration.
5. **Reach out early to stakeholders at all levels about the PPP process.** The public and private entities must spend a lot of time on public information, to ease the suspicion of corruption and concern with the private sector taking over public assets. From the public's perspective, and as evidenced here by reactions to the U.S. 36 project, there is a lack of transparency in PPP agreements and negotiations.

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