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**“Using PPPs in the US
To Develop, Finance and Operate
Infrastructure Projects”**

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Abstract

Using PPPs in the US To Develop, Finance and Operate Infrastructure Projects

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There is a growing funding crisis in transportation infrastructure in the United States due to the shortfall in public funds and the aging condition of these assets. At the same time there is an ongoing financial crisis and recession in the global economy. These crises are fostering a new importance for public-private partnerships (PPP). PPPs can attract new funding sources and improve project delivery and timing, by utilizing innovative financing and integrated contracting methods. PPPs can vary from a simple design-build contract to a privatization of a facility with many variations in between.

To work best PPPs are structured to share risk and rewards equitably between the public partner and the private partner. In addition, procurement “process changes” available in PPPs can produce significant savings. A project structure must be established that integrates the necessary elements of environmental review, financing, procurement, design, construction and operations. The PPP process can provide for cost-certain and date-certain project delivery through a single accountable “at risk” entity, representing the interests of the entire project and balancing of cost, scheduling and life cycle.

This paper addresses the recent past as well as what is happening in today’s market for PPP’s in infrastructure. The \$5 billion Dulles Metro Rail Extension in northern Va. is a PPP which spent a number of years in the development phase, and now is now under construction. The \$2 billion Hudson Bergen Light Rail in Northern New Jersey was constructed in phases over 10 years and is now in its 10th year of private operation. In addition, three more recent trends in PPPs and innovative finance will also be examined. One promising PPP structure is to have long term payment and performance obligations, by using an “availability” payment over a period of 30 to 40 years.

Another important movement is the effort to enhance the funding of infrastructure projects by capturing the future value of the economic benefits the project will create. In particular this applies to transit oriented development around rail stations. Also examined is the recent trend in Design-Build-Finance (DBF). In DBF, deferred Contractor payments can provide for bridge financing of 5 to 10 years and can be used to cover funding time gaps.

No “one size fits all” and no “silver bullet” exists for providing project delivery of infrastructure assets. However, PPPs can provide an extremely flexible, highly effective project delivery approach in funding, project cost, time to deliver and value added. In short, PPPs should be given serious consideration by all transportation agencies in evaluating their various needs and alternative solutions.

About the Author



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Chris specializes in transaction advisory services and strategic development for participants in large complex infrastructure projects. He has served as primary negotiator of public-private partnerships for development of over \$8 billion in projects including toll roads, rail transit, freight rail and airports. He also has an active practice as a mediator for all types of construction contract disputes.

In 2009, Chris started his own consulting business, as Managing Director, P3 Collaborative LLC based in Princeton NJ and Washington DC, which advises project participants on innovative contracts and financing for infrastructure projects. Recent assignments include:

- Co-Managing Director of **Florida High Speed Rail** LLC in Florida,
- Counsel to Design-Build proposer on \$700m **USACE Flood Control Project, La.**
- Evaluation of sample **Concession Agreement for I-75 PPP, Ga**
- Peer Review of the **Eagle P3 for Denver RTD.**

As Vice President Project Development, Washington Group International, Inc. Chris played a significant role over 8 years in development of the \$5 billion, 22 mile **Dulles Metrorail Extension** in northern Virginia, helping negotiate the Comprehensive Agreement and the \$1.7 billion Phase I Design-Build Contract under Virginia's Public Private Transportation Act. He also led negotiations with the Georgia DOT for the development of the \$1.5 billion **Ga400 HOT Lanes** projects submitted under the State's Public Private Initiatives Statute. Chris was involved with negotiations for privatization of the **Jordanian Railroad**, and a development agreement for **Houston Metrorail's Expansion**.

Previously, he was Vice President General Counsel, Raytheon Infrastructure, Inc. Chris was responsible for all legal affairs and contracts for infrastructure projects, managing contracts such as the \$1.5 billion **Hudson Bergen Light Rail** project's design-build-operate-maintain agreement, labor contracts and an operating agreement for **Addison Airport**. Prior to that, he spent 12 years as a partner in the Washington, D.C., law firms of Bastianelli Brown and Kelley; and Lyon and McManus, specializing in construction and government contracts. He spent many years working as procurement advisor for several utilities including the **Pinon Pine Coal Gasification, Combined Cycle Project** in Nevada.

Before obtaining his law degree, Chris served 5 years in the U.S. Army Corps of Engineers, achieving rank of Captain and managed civil works projects in the Pacific Northwest and at the Army's Engineering School at Ft. Belvoir. He then worked as a facility engineering manager for IBM and George Washington University. He is a licensed professional engineer in Virginia as well as a member of the Virginia, District of Columbia, and New Jersey bars. Chris is active on AAA's Panel of Arbitrators and Mediators. He graduated from George Washington University Law School in D.C. and obtained a bachelor of science degree from the United States Military Academy at West Point. Chris and his wife Tricia have four children and live in Princeton, NJ.

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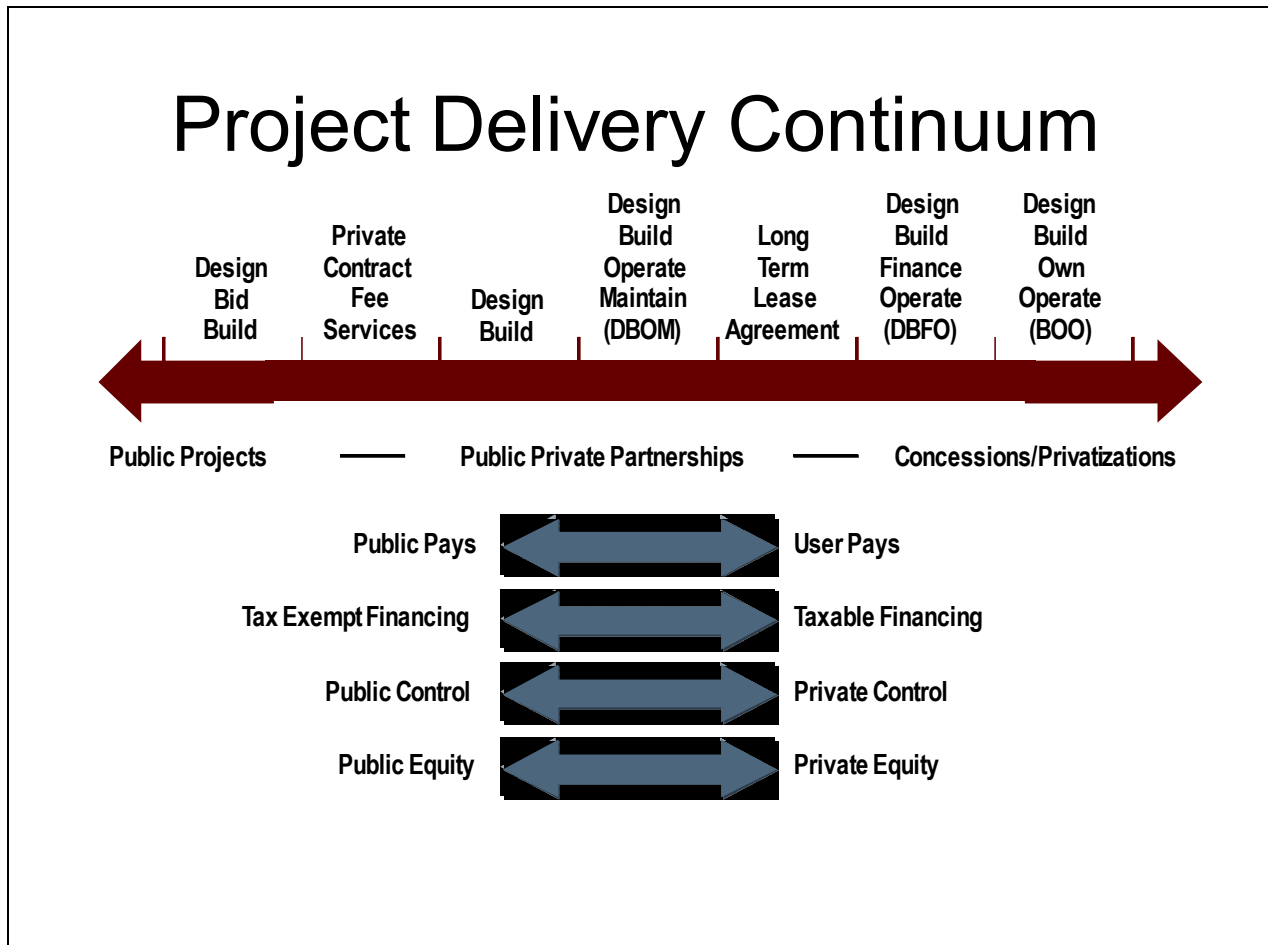
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1.0 INTRODUCTION

The Project Delivery Continuum and PPPs in the US

As everyone is aware, there is a growing funding crisis in transportation infrastructure in the United States due to the shortfall in public funds and the aging condition of these assets. At the same time there is an ongoing financial crisis and recession in the global marketplace. These crises are fostering a new importance for public-private partnerships (PPP). PPPs can attract new funding sources and improve project delivery methods and timing, by utilizing innovative financing and integrated contracting methods. As indicated in **FIGURE 1**, these PPP arrangements can vary from a simple design-build contract to a total privatization of a facility with variations in between.

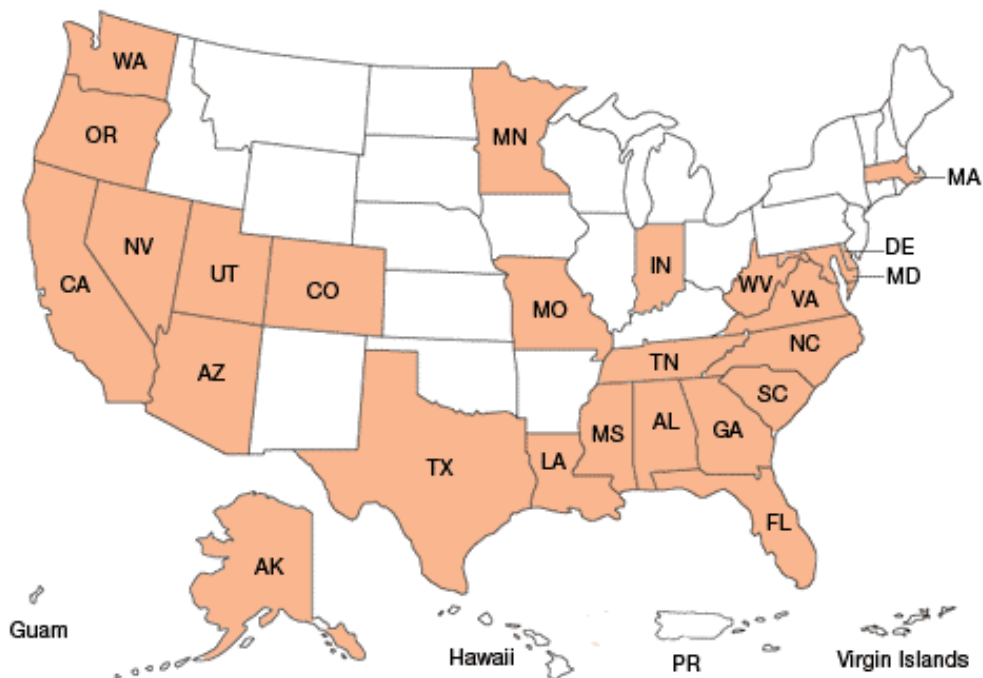
FIGURE 1



What is required in order to implement these PPPs is some form of enabling statute within each state that wishes to implement such a program. Normally state procurement for construction and design services are governed but state procurement laws which frequently only provide for low-bid construction contracting and may or may not allow for design-build contracts, which are critical in a PPP structure. **FIGURE 2** is a map found on the US DOT website which indicates states that have enacted such legislation, which is over half the states. Puerto Rico actually should be added to the list having recently passed very comprehensive legislation, which it is beginning to implement. Other states have pending efforts to enact legislation and states will be added to this list.

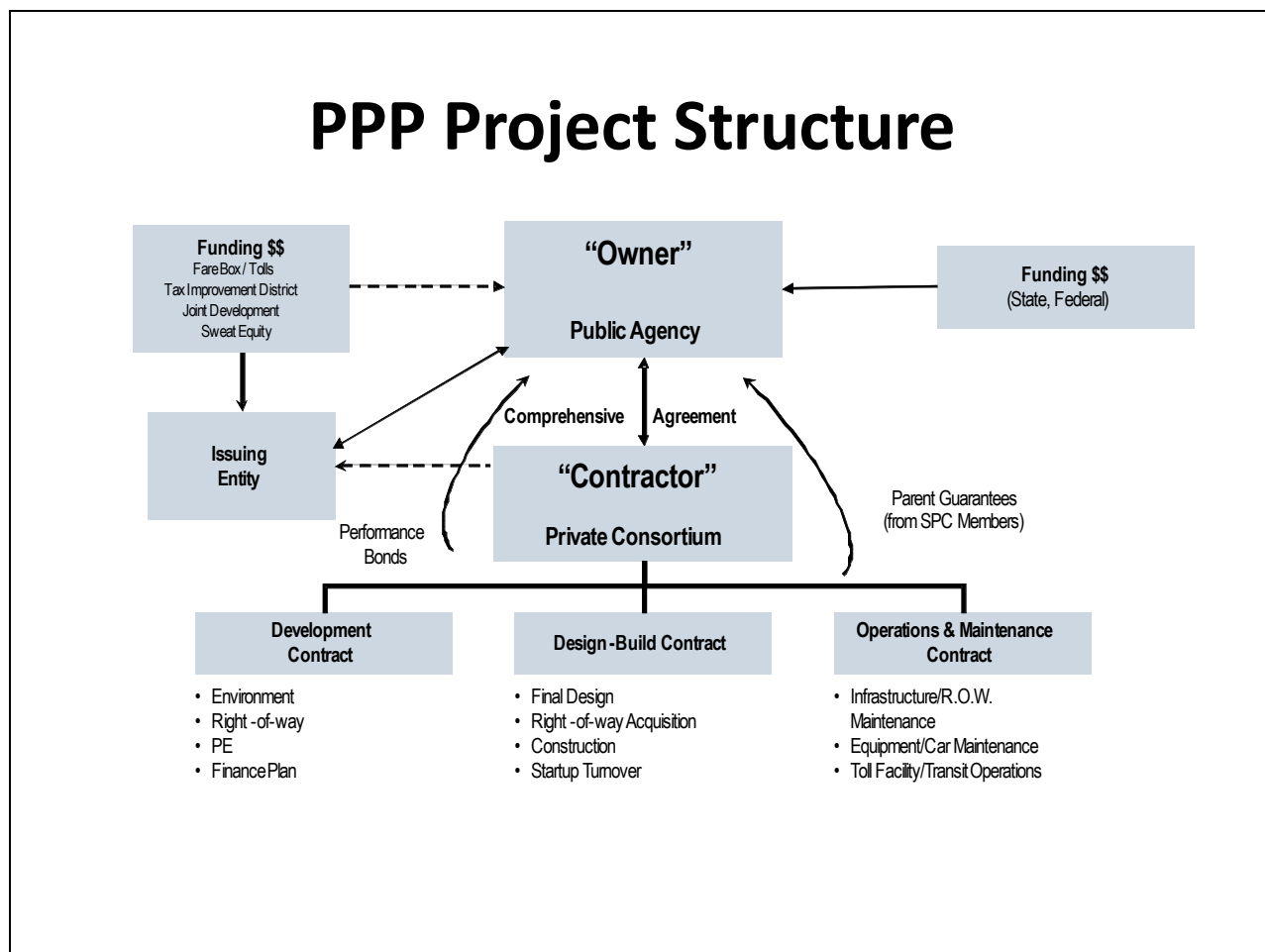
Considerations in choosing the delivery approach include such things as: the extent to which the public sector is willing to give up control; whether the financing should be taxable or tax-exempt debt; what is the best source of funding (beneficiaries, users, sales or property taxes); who controls fee setting; who should control the details of design; and whether prescriptive specifications or performance specifications are most beneficial. The structure of the PPP contracts also needs to define the relationships and responsibilities among the parties.

FIGURE 2
States With PPP Laws



The PPP process can provide for cost-certain and date-certain project delivery and is structured to share risk and rewards equitably between the public partner (“Owner”) and the private partner (“Contractor”). In addition, procurement “process changes” available to Owners using PPPs can produce significant savings. **FIGURE 3** indicates how a typical PPP might be structured. A project structure must be established that integrates the necessary elements of environmental review, financing, procurement, design, construction and operations. The Owner is better served working through a single, accountable “at risk” entity representing the interests of the entire project and delivering it with optimum balance of initial cost, scheduling and life cycle cost.

FIGURE 3



This paper addresses the recent past and what is happening in today’s market for PPP’s in infrastructure. It also discusses some of the lessons learned from two projects I have been involved with for the past 10 years in U.S. transportation PPPs. The \$5 billion Dulles Corridor Metro Rail Extension (“Dulles Metrorail” or the “Dulles Project”) in Northern Virginia is a PPP which, after over 5 years in the development phase, is finally under design-build construction. The \$2 billion Hudson Bergen Light Rail in Northern New Jersey was constructed over a 10 year period and is now in its 10th year of private operation.

In addition, three more recent trends in PPPs and innovative finance will also be examined. One is a promising move toward structuring PPPs to have long term payment and performance obligations, by using an “availability” payment over a period of 30 to 40 years. Another movement is the effort to enhance the funding of infrastructure projects by capturing the future value of the economic benefits the project will create. In particular this applies to transit oriented development (TOD) around rail stations. Also examined is the recent trend in Design-Build-Finance (DBF), with deferred Contractor payments where bridge financing of 5 to 7 years is used to cover funding time gaps.

2.0 MAKING PUBLIC FUNDS GO FURTHER WITH PPPs

The development phase of PPPs is an often overlooked part of a PPP, since the Owner typically will contract to perform much of this activity before the PPP is put out for proposals. There is however, big cost savings potential in selecting your PPP Partner early in the development process to provide project planning and engineering that can achieve great efficiencies in cost and time. This might include conceptual or preliminary engineering, value planning and/or competitive negotiation of the design-build and O&M phases.

2.1 Reducing Costs

Early Project Feasibility Review and Pricing

In the development phase, the PPP Contractor can perform the conceptual and preliminary engineering (“PE”) in a manner that reduces the extent and therefore the cost of PE required. As the eventual design-builder, the Contractor will only perform PE necessary (1) to satisfy the Owner that its standards and performance specifications will be met and (2) to provide adequate engineering in order to provide a firm fixed price to the Owner to complete design and to construct the project. Based on actual project experience, this reduction in the required level

of PE can be an order of magnitude less than what would have been required under a more traditional approach, thus saving millions of dollars.

Other benefits from the Contractor performing the PE include: more opportunity for the Contractor to incorporate construction efficiencies and value planning into the PE (lowers cost, increases quality); a reduction in the possibility of disputes and claims during construction since the Contractor will be the single source of responsibility for PE and design-build (reduces Contractor's and Owner's risk exposure); and more confidence in the firm fixed price for the design-build contract (resulting in lower cost and less contingency). Furthermore, by having a single entity perform the PE and pricing along with preparing a financing plan, a realistic project feasibility analysis can be performed early in the process.

In proceeding in the PPP process, the Contractor will provide to the Owner early fixed pricing for an agreed to scope for the various phases of the Project. This will greatly limit the price risk to the Owner and the other stakeholders. The same project economizing and fixed price risk management can be performed for the financial planning and development activities that remain. The Contractor would also have the ability to provide an early firm fixed price for the total project completion of the final design and construction phase of the Project allowing for an accelerated financial closing.

Overall Savings from Process Changes

As stated above, the traditional approach to project delivery involves the Owner hiring multiple consultants (e.g., environmental consultants, program managers, preliminary engineering consultants, detailed engineering consultants, construction managers) and in turn – multiple prime contractors. Hiring multiple consultants and contractors also requires multiple time-consuming procurement cycles. In addition, using this traditional process, the construction

manager and other consultants are typically not at risk. This puts the destiny of the project in the hands of those least at risk for a successful outcome and thereby increases the chance of conflicts. For large complex projects, such traditional processes can result in much higher project costs and significantly longer implementation schedules. This also places the maximum risk on the project Owner and may impose requirements that the project likely will neither need, nor be able to afford.

Much of today's project delivery system still tends to separate the individual design (even if only PE) from construction functions on a project, creating fertile ground for conflicts. The design function tends to emphasize minimizing its costs, while the construction function focuses on minimizing field costs. Fine-tuning the individual parts does not yield the most successful project. However, having the Contractor involved in the PE as well, integrates and improves the process.

Design-build is a construction delivery process in which all of the design and construction responsibilities are placed in a single entity. The engineer and the builder, if not the same company, typically enter into a joint venture or subcontractual arrangement and the resulting single entity contracts directly with the Owner. The primary advantage of design-build is the single point of responsibility for all aspects of the design, procurement, and construction of the project. The designer-builder takes responsibility for completing the project in accordance with the Owner's time and budget requirements. It also guarantees that the project will perform as designed.

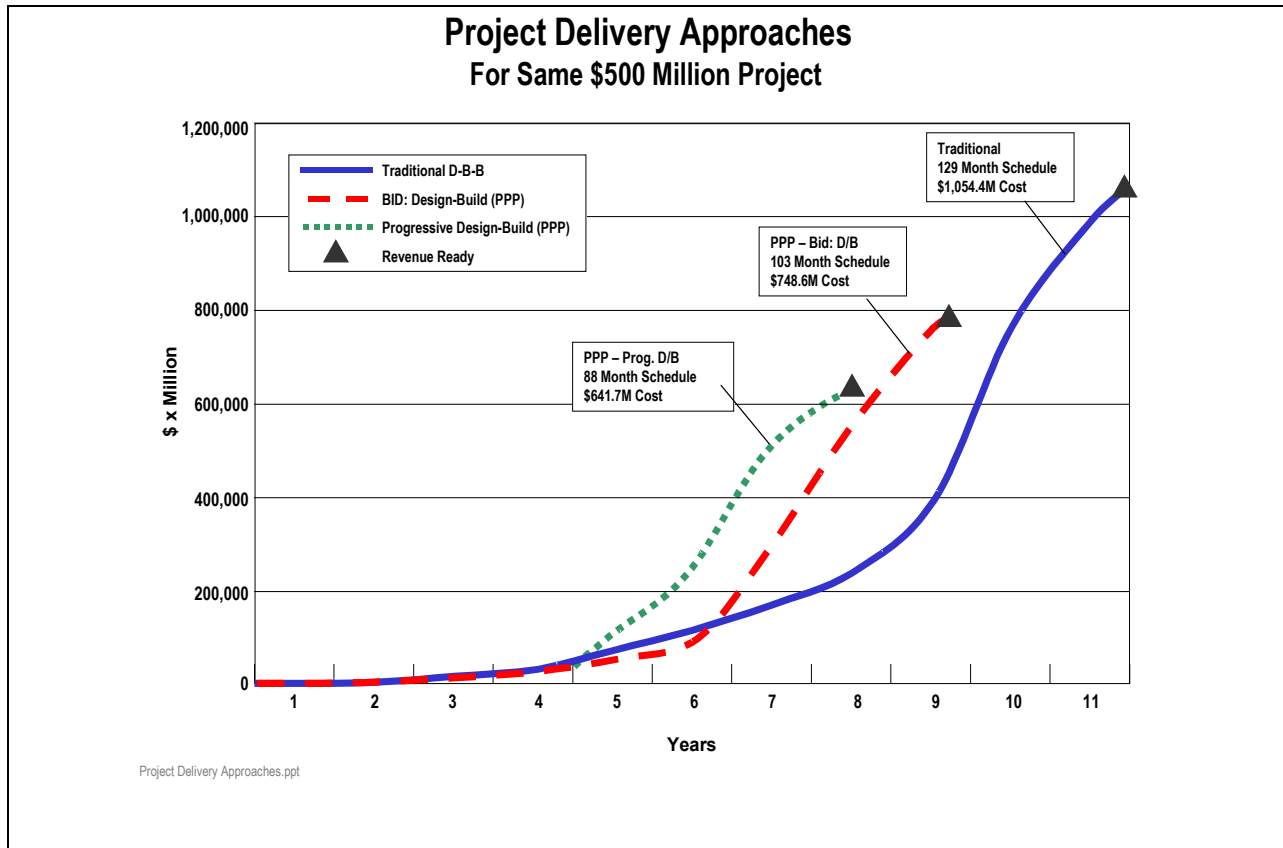
When problems arise on a design-build project, the Owner is not faced with sorting out who is at fault – whether it is the engineer, consultants, the construction manager, or one of the numerous prime contractors. Another advantage of design-build is a shortened overall design/

construction schedule. Design-build puts the maximum risk on the Contractor in terms of project costs and guarantees of performance, reliability and availability.

Current design-build contracting awarded by bidding usually has a 30% PE performed prior to bidding, which to some extent maintains this separation. Often, however, this effort, to some extent, is wasted since the design-build contractor will modify the design, sometimes significantly, to gain cost and schedule advantages for the Owner, prior to construction. Constructability requires making optimum use of a knowledge mix in a project's early stages. Combining construction knowledge and experience in planning, design, procurement, and field operations can improve the ability to achieve overall project objectives concerning cost and schedule. When people with construction knowledge and experience become integrated into the early stages of conceptual planning, maximum benefits can occur.

FIGURE 4 is a comparison of project delivery approaches. Design-build has been standard for PPP projects, often based on bidding with 30% PE (“Bid: Design-Build”). The next step of improvement will involve PPPs with “Progressive Design-Build”, which provides for earlier involvement of the Contractor in the design and planning process. Progressive Design-Build involves the Contractor performing the 30% design and then negotiating a design-build contract on an open book basis. Hudson-Bergen Light Rail Transit project was Bid: Design-Build and Dulles Corridor Metro Rail Extension was a Progressive Design-Build. Compared to traditional processes of design-bid-build (“D-B-B”), substantial savings in cost and schedule are being achieved by these PPP delivery approaches. **FIGURE 4** shows the savings in time and cost are achieved with PPPs over traditional D-B-B.

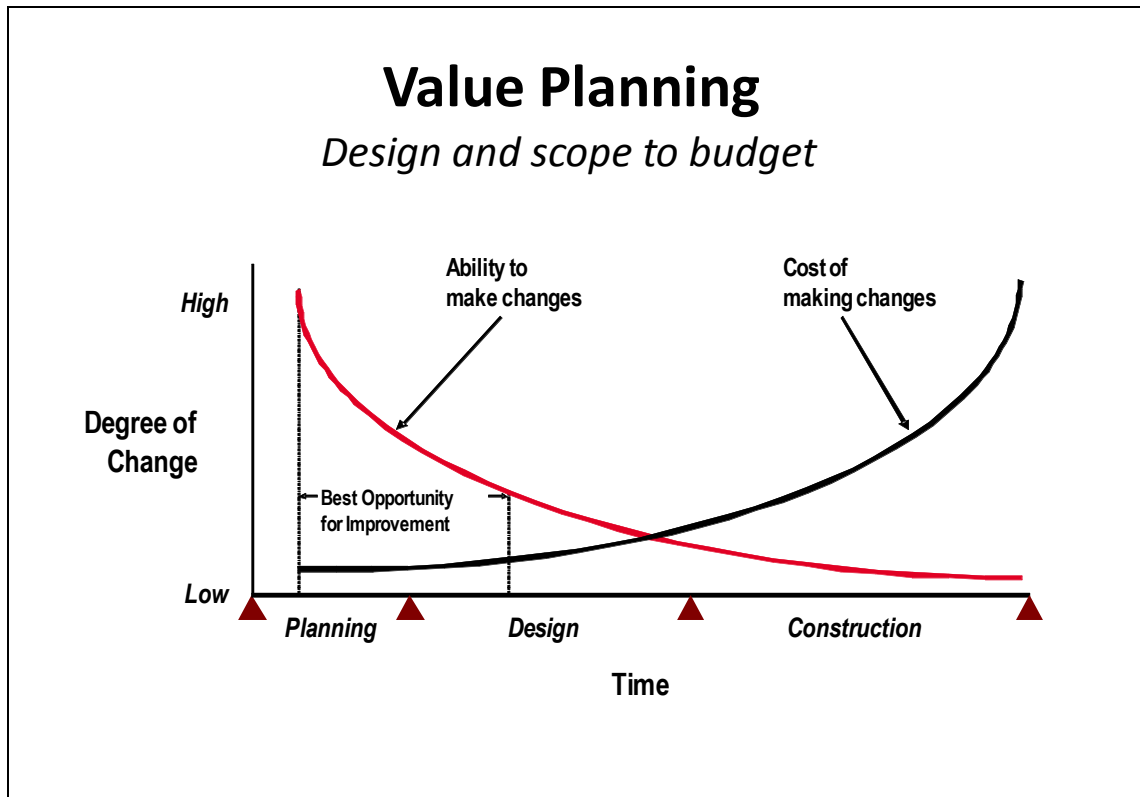
FIGURE 4



Early Value Planning

In a Progressive Design-Build PPP, the Contractor can offer the Owner meaningful value planning services. Value planning is the systematic, multi-disciplined effort directed towards analyzing the functions and level of services of the project, in order to achieve the highest worth at the lowest cost. Value planning is best performed at the end of conceptual engineering and forms a foundation for the more detailed value engineering efforts that follow during PE. Contractor's value specialists act as team leaders and facilitators, working in conjunction with the Owner and its consultants and the existing concept development team.

FIGURE 5



The scope of value planning should include the initial analysis of major cost drivers. The Contractor's experience in organizing and conducting workshops will help to effectively conduct value planning and maximize cost savings, while maintaining the level of future quality, service and maintainability standards of the Owner's system. The value planning methodology is most effective if conducted as a formal review with professional experts outside of the project who have not been involved in the design and not been compromised by earlier design decisions.

On Dulles Metrorail, the Contractor conducted two workshops at the outset of the Project, first to focus on the overall concept design contained in the environmental document, and then to address design concepts for line, track and systems as well as stations and parking components. These workshops followed a strict value "job plan," with "function analysis" components, intended to reduce cost. It was a systematic, multi-disciplinary structured effort,

directed towards analyzing the functions of the project for the purpose of achieving the best value at the lowest cost.

The workshops utilized a team of specialized professionals from the Contractor, Owner, operator and independent third party participants that included design-build professionals, constructors, engineers, estimators, schedulers, and risk analysts all integrated into diverse teams. The objective was to maximize cost savings and reduce project risks for all parties. These teams of experts provided independent value planning reviews of the program requirements and functions established during the draft environmental impact statement (DEIS) phase. Later in the project, after 50% of the PE, similar teams supported value engineering.

The Owner authorized the Contractor to use its certified value specialists to organize and conduct an appropriate program of value planning workshops to validate and/or recommend cost savings modifications to the DEIS Concept Design. The results were then to be presented to a value board composed of senior level executives from the Owner and Contractor for their concurrence.

A series of value planning workshops provide maximum benefits for minimum costs. Similar programs have generated in the range of 4% to 8% capital cost savings for proportionally minimal up-front investments in value planning. Studies show that in order to reach the ultimate ideal total project cost, the value planning and value engineering must be strategically situated in the design - build process to prevent cost growth and schedule slip, as well as meet the goals, objectives and requirements of all stakeholders.

On the Metro Rail Extension, the value planning efforts were completed within the first 90 days of the development effort. The results were far reaching recommendations that included all aspects of the concept design. In total, the dollar value of all final recommendations was

\$190 million, which amounts to 10 percent of the estimated project construction costs. The process demonstrated that large savings were available without reducing the functional and performance requirements of the project.

2.2 Finding New Sources of Revenue

PPPs can also solve part of the funding challenges for new work and expansions. It is widely acknowledged that the federal and state shares of funding transportation projects will continue to decline as a percentage of costs in the future. Make-up of this shortfall of capital and system operating funding can be derived from a variety of private and public sources.

Furthermore, PPP infrastructure projects with adequate user fees, such as tolls, can be largely supported with non-recourse financing, and debt issued on the strength of the project's revenue generation. Other sources of innovative financing are also available, including upfront investment of private capital during the high-risk development phase.

There are also many individual stakeholders that will greatly benefit from the project's development including the state, local counties, cities, local landowners and businesses, major airports, the traveling public and the environment. Obtaining equitable financial contributions from all of these constituencies will contribute to the successful financing of the Project, and the Contractor can assist the Owner in developing these contributions. Some of the innovative financing concepts available to PPPs are described below.

Pre-Construction Financing

The Contractor may be willing to share the cost of development activities and support the Project during the pre-construction phase of each segment. The pre-construction phases are defined as all activities that occur between the issuance of a notice-to-proceed and the close of

financing. This financial support can be provided in the form of a “credit” during the pre-construction phases.

During the pre-construction phases, the Contractor could also provide its development services on a cost-sharing basis with the Owner. These services would be provided subsequent to the execution of a mutually acceptable PPP agreement. The Contractor could provide conceptual and preliminary engineering services, as well as right-of-way acquisition, environmental, permitting, utility coordination, hazardous materials investigations, and cost estimating services to support the plan of finance, and develop the segments to the point of financing. The cost of sub-consultants, such as those required for an investment grade ridership and revenue study, could be shared between the Owner and the Contractor.

Reimbursement to the Contractor for the unbilled costs or “credits” that are incurred during the pre-construction phases of the contract could be due and payable after financial closing and receipt of proceeds. The costs of these services may also be converted to marketable securities at financial closing.

Station or Interchange Development Rights

In the case of transit PPPs, the Contractor can work closely with local real estate developers to maximize station area development so that private developers will contribute capital costs to the project for part or all of the system's stations. The capital cost of each station can be estimated and calculated for determination of a private sector contribution. Private developers may be willing to contribute the entire capital cost of a station, if the total projected real estate development proximate to the station will support this additional cost.

Density offsets and bonuses could also be awarded to station area or interchange developers to incentivize them to maximize development proximate to the stations or

interchanges. The project can also benefit from that development through lease revenues tied directly to real estate valuations. The same type of opportunities can be developed at transit stations as well as interchanges on toll road projects.

Tax Assessment Districts

The Contractor can assist the Owner in the formation of tax assessment, tax increment or special improvement districts along the project, especially in those cities or counties served directly by the project. On the Dulles Project, one of the early members on the Contractor's team was a major landowner and developer in the corridor. Note that land ownership in the vicinity of the project by the Contractor, its affiliates or team members should be disclosed to the Owner under certain circumstances as may be required by local law or prudent business practices. The member helped promote the tax assessment district, which ultimately was approved. Based on the Dulles Project funding experience, this element can contribute significantly to the Project.

These taxes can be accomplished through various alternatives, some of which are:

- Assessment Districts could involve the formation of one or more tax assessment or special improvement districts within a prescribed distance along the corridor's alignment.
- Tax Increment Financing (TIF) could be used to direct a portion of future tax revenues within a sphere of influence for rail-stimulated development to pay for infrastructure and other improvements.
- Special Improvement Districts raise revenue primarily through the special assessment process. They do not levy property taxes. Special assessments are charges applied to individual properties in the amount of the "special benefit" conferred on such property by the rail improvements.

Direct Benefactor Contributions

In some cases, it may be more efficient for certain private or public benefactors to make direct contributions of capital to the project consistent with the benefit they will receive.

Airports served by the project could make direct capital contributions based on their ability to raise funds against passenger facility charges or PFC's. Major metropolitan areas served by the project, could similarly be incentivized to make a direct contribution to the project. Private benefactors such as shopping centers or private entertainment parks may also find a direct contribution more appropriate. This element has the potential to contribute substantial amounts to the project.

Revenues From User Fees

A user fee or toll can provide a significant contribution to financing projects. On highly utilized roads, adding a time of day toll and congestion pricing in High Occupancy Toll (HOT) lanes, will often provide enough funding to completely finance added lanes or other improvements.

Equipment Leases

In the case of transit projects, the Contractor can negotiate an equipment lease for the rolling stock used on the project with a rail car supplier, which would also be a member of the project team. Such equipment leases negotiated with equipment vendors can carry beneficial terms and conditions and contribute to the overall finance plan.

Non-Traditional Revenue Opportunities

The Contractor can conduct financial and legal analysis of the feasibility of pursuing non-traditional revenue opportunities, such as, use of naming rights, advertising, concessions, parking and express parcel service.

3.0 WHERE WE HAVE BEEN: Transit PPPs For Development And Operations

3.1 The Dulles Corridor Metrorail Extension: Combining Development and Design-Build

Rapid mass transit improvements along the Dulles Corridor in Northern Virginia have been under consideration for decades. Failure to enhance the transit capabilities of the Corridor could impede the area's future growth as traffic congestion continues to increase, and threaten the region's ability to attain air quality standards. A ground swell of public support for new transit facilities, coupled with the Commonwealth of Virginia's Public-Private Transportation Act of 1995 (the "PPTA") and the existing Dulles Toll Road, have created a platform for an innovative approach to meeting the regional need for improvements within the Corridor.

As a result of the federal and state legislation and expressions of public support, conceptual proposals were submitted in 1998 and early 1999 under the PPTA for a Dulles corridor rapid transit project. The selection and subsequent submission of a detailed proposal by Dulles Transit Partners to the Virginia Department of Rail and Public Transportation ("DRPT") resulted in the execution of a Comprehensive Agreement in June of 2004, beginning the process of making the Dulles Project a reality. The Comprehensive Agreement includes not only design and construction of the Project, but also assistance with the financing structure and development.

Project Structure

The team of Dulles Transit Partners included: Washington Group International and Bechtel Infrastructure Corporation. Dulles Transit Partners had the capability of marshalling support from the stakeholders in the area, particularly landowners, from the early participation of West*Group, a larger landowner in the corridor. The involvement of West*Group helped produce an innovative funding stream for the Dulles Project through a self imposed tax on commercial property owners.

The Washington Metropolitan Area Transit Authority (“WMATA”) set the specifications and standards for the work. Ultimately, WMATA will accept the Dulles Project into its Adopted Regional System and will operate and maintain the facility. In 2007, the control of the Dulles Toll Road and the Dulles Metrorail Project were turned over to the Metropolitan Washington Airports Authority (“MWAA”) which is now financing and managing the Project as the Owner.

Project Description

The location of the Dulles Project will start at the existing Metro station of East Falls Church in Virginia and continue through Tyson’s Corner and then down the Dulles Access Road and the Greenway Toll Road to Loudoun County. The capital cost will exceed \$5.0 billion and will be 22 miles in length built in two phases, with a total of 11 stations. Phase I will be from East Falls Church through Tyson’s Corner and ending at the Wiehle Avenue Station.

The PE and development services for Phase I are completed. Design-Build contract negotiations took place following PE on an open book, negotiated basis and resulted in a \$1.7 Billion Design-Build Contract with Dulles Transit Partners in 2007 and is now well under construction. The failure to reach a satisfactory agreement on design-build terms would have been an off ramp for both the Contractor and the Owner, so the parties were motivated to enter into a fair and equitable deal.

Plan of Finance

Dulles Transit Partners also supported the Commonwealth in the development of a plan of finance that encompasses all phases of the Dulles Project. The plan was built on three key factors: (1) substantial contribution by the Dulles Transit Partners in cost sharing during the development phase; (2) a Design-Build project delivery strategy that provides for an earlier start, shortens the time to implement and reduces construction completion risks; (3) marshalling

financial support from local beneficiaries, including commercial property owners and the traveling public, and (4) maximizing the Dulles Toll Road financial contributions in order to minimize the impact of the Dulles Metrorail Project's capital requirements on the Commonwealth of Virginia's bonding capacity.

FIGURE 6

Dulles Corridor Metrorail Capital Cost Funding Allocation – Ph I	
FUNDING SOURCE	FUNDING SHARE
Federal Sources – FTA New Starts	36%
Non-Federal Sources	64%
Virginia Transportation Act of 2000	2.1%
Dulles Toll Road Revenues	36.9%
Fairfax County Dulles Tax Districts	16.1%
Loudon County Transportation Fund	0.1%
Loudon County License Fees	4.7%
MWAA Passenger Facility Charges	4.1%
Total	100%
Note: As of 2007, revised since	

Dulles Transit Partners helped early on to develop an innovative plan of finance to deliver the Dulles Project. The plan combines the Commonwealth's desire to maximize funding from the private sector while vigorously pursuing federal funding. Local counties, cities, local landowners and businesses, as well as Dulles airport, the traveling public and the environment will greatly benefit from the Dulles Project's development. By setting forth the strategy for obtaining equitable financial contributions from all of these constituencies, the plan of finance is an important tool that helped the

parties to achieve attractive financing for the Dulles Project. The approximate allocation of the funding is shown on **FIGURE 6**.

Design Build Implementation

The Comprehensive Agreement was executed on June 11, 2004 between the Owner and Dulles Transit Partners. The initial scope includes performing the PE for the entire project and performing development services for the first segment. Development services include the value planning, utility coordination, right-of way planning, community outreach, and financing support. At the completion of the PE, Dulles Transit Partners submitted a proposal for a fixed price contract for the design and construction of Phase I of the project that took the project from the existing Metro lines at Falls Church Virginia and extended it out through Tyson's Corner, onto the Dulles Access Toll Road median strip up to Weihle Ave.

The Comprehensive Agreement called for open book negotiations to take place to determine if a mutually agreeable Design-Build Contract could be executed. The Owner had the option at any time, as did the Contractor, to end the relationship if an agreement could not be reached. However after many months of negotiation an agreement was reached. The initial development scope of work and PE was then followed by a change order to include a fixed price Design-Build Contract. Key elements of this agreement are as follows:

1. *Responsibility for preliminary engineering and site conditions* - The contract has a standard differing site condition (DSC) clause, but it excludes: what the Contractor knew or should have known as result of PE work; and errors or deficiencies in the contract documents including geotechnical report and utilities report. As a way to share this risk the contract states the parties will share equally the risk of first \$12M of increased DSC costs including costs of delay.

2. *Hazardous Substances Management* - In this Project the Owner shall contract directly with a third party remediation contractor, but the PPP Contractor shall be responsible for scheduling and coordinating the work of the remediation contractor under its fixed price.
3. *Warranties* – The warranty period is two years with a re-performance obligation of another two years all not to exceed 3 years maximum. For recurrent problems a “root cause” analysis can be required to determine whether replacement is necessary. For latent defects there is a clear cutoff of 5 years following substantial completion.
4. *Project Delays* – Force Majeure events are only compensable if it is the sole delay cause and the delay extends beyond the Force Majeure Reserve of 45 days, during which period there is no compensation. For excusable delays in utility relocations, there are no extensions for delays up to 30 days. An early completion incentive is available for \$1.5 million per month up to a maximum of \$6 million.
5. *Contract Price* – This design-build contract has both a fixed price component which is about 70% of the total price, and an allowance component which equates to about 30%. At the time of final price negotiations, there were many subcontractor scopes that were not able to be priced on a fixed price basis due to the level of design or the lead time before starting work. The Contractor’s estimate for this scope was, not surprisingly, higher than the Owner’s estimate. To solve this discrepancy these subcontractor price elements were placed into an allowance and subcontracts would be bid out competitively and the contract price adjusted accordingly.
6. *Escalation* – This Project was expected to take at least 6 years overall and based on the high escalation in commodity prices during the early 2000’s, the Contractor’s

contingency for cost escalation was very high. Therefore, it was decided to use price adjustments for certain equipment and materials items with indexes to adjust the prices over time using producer price indexes (PPI).

7. *Insurance and Bonds* – The Contractor provided a Contractor-Controlled Insurance Program for the Project which will result in cost savings as well as a reduction in potential disputes between carriers. The amount of the payment and performance bond is \$250 million as opposed to 100% bonds still required in many states, but largely unobtainable for contracts over \$600 million. The bonds must remain in place for 3 years after substantial completion, but after one year the amount can be reduced to \$50 million.
8. *Liquidated Damages and Limits of Liability* - Liquidated damages for delay were based on an increasing daily rate starting at \$25,000 per day for the first 90 days and ending at \$100,000 per day, with an overall cap on liquidated damage liability of \$60 million. The overall limit of liability under the Contract is \$500 million, which does not include the cost to complete the project. In addition there is a mutual release from consequential damages.
9. *Dispute Resolution Process* - The disputes process is a multi-stepped process which escalates to higher management levels and has tight timetables (stepped negotiations, mediation, and then litigation). Claims must be certified much like the certification required under Federal contracts. An independent expert is mutually agreed upon for technical issues, and will provide advisory opinions within 60 days.

3.2 *The Hudson-Bergen Light Rail Project: Combining Design/Build with O&M*

The 1996 contract award for the Hudson-Bergen Light Rail Transit project (“HBLRT Project”) in New Jersey was one of the first examples of design-build-operate-and-maintain (DBOM) contracting for new rail starts in the United States. Construction of the first phase of the HBLRT Project was completed in April 2000 under competitively bid design-build approach. This involved a 30% preliminary design by a third party consultant followed by a design-build competitive request for proposals. As an example of design-build savings, construction of a major portion of the initial operating segment of HBLRT system, valued at approximately \$450 million, was completed in 40 months and revenue service began within 42 months. If traditional contracting processes had been employed, agency estimates are that the same portion of the light rail project could have taken another six years and an additional \$435 million to complete. The HBLRT Project is in the 10th year of its operating and maintenance phase.

Project Structure

The 21st Century Rail Corporation (“21st Century Rail”) was created for the sole purpose of the HBLRT Project. After an extensive prequalification process and two-step evaluation process, 21st Century Rail was the selected Contractor to perform the DBOM contract. The HBLRT Project structure is similar to **FIGURE 3** except that the financing is all state and federal grants and there was little development activity. Washington Group International owns 70% of 21st Century Rail in partnership with a joint venture of Itochu Rail Cars Inc. and Kinkisharyo USA.

21st Century Rail was awarded the DBOM Contract on September 27, 1996 based on technical and cost criteria and received its Notice to Proceed on November 1, 1996. Washington Group leads the project execution and is responsible for the facilities and rail system design,

facilities and rail system construction, and fifteen years of the system's operation and maintenance.

Project Description

The first Phase of the HBLRT Project, also known as the Initial Operating Segment (IOS), is a 9.5-mile segment of the planned 20.5 route-mile system. The double-track rail line extends north from East 34th Street in Bayonne, New Jersey into Jersey City, then skirts along the Hudson River waterfront to Hoboken, New Jersey. In addition to this north-south line, an east-west, double-track spur links West Side Avenue in Jersey City to the Bayonne-Jersey City Line at Communipaw Junction, located immediately south of the Liberty State Park Light Rail Station. Seven miles of the system were constructed on dedicated rail corridors, another two miles are on city streets and medians within Jersey City, and the balance of the route is on elevated structures.

There are 16 light rail stations in the IOS, five of which are intermodal. Exchange Place and Hoboken Stations serve regional rail/transit, ferries and buses; Newport Station serves a ferry and rail transit; and Harborside Station and Marin Boulevard serve ferries. Park and Ride facilities are also provided at four stations: East 34th Street in Bayonne, East 45th Street in Bayonne, Liberty State Park, and West Side Avenue in Jersey City, all of which are easily accessible to major highways such as the NJ Turnpike and I-440. There are more than 2300 spaces within these facilities for Hudson-Bergen passengers with monthly and daily tickets.

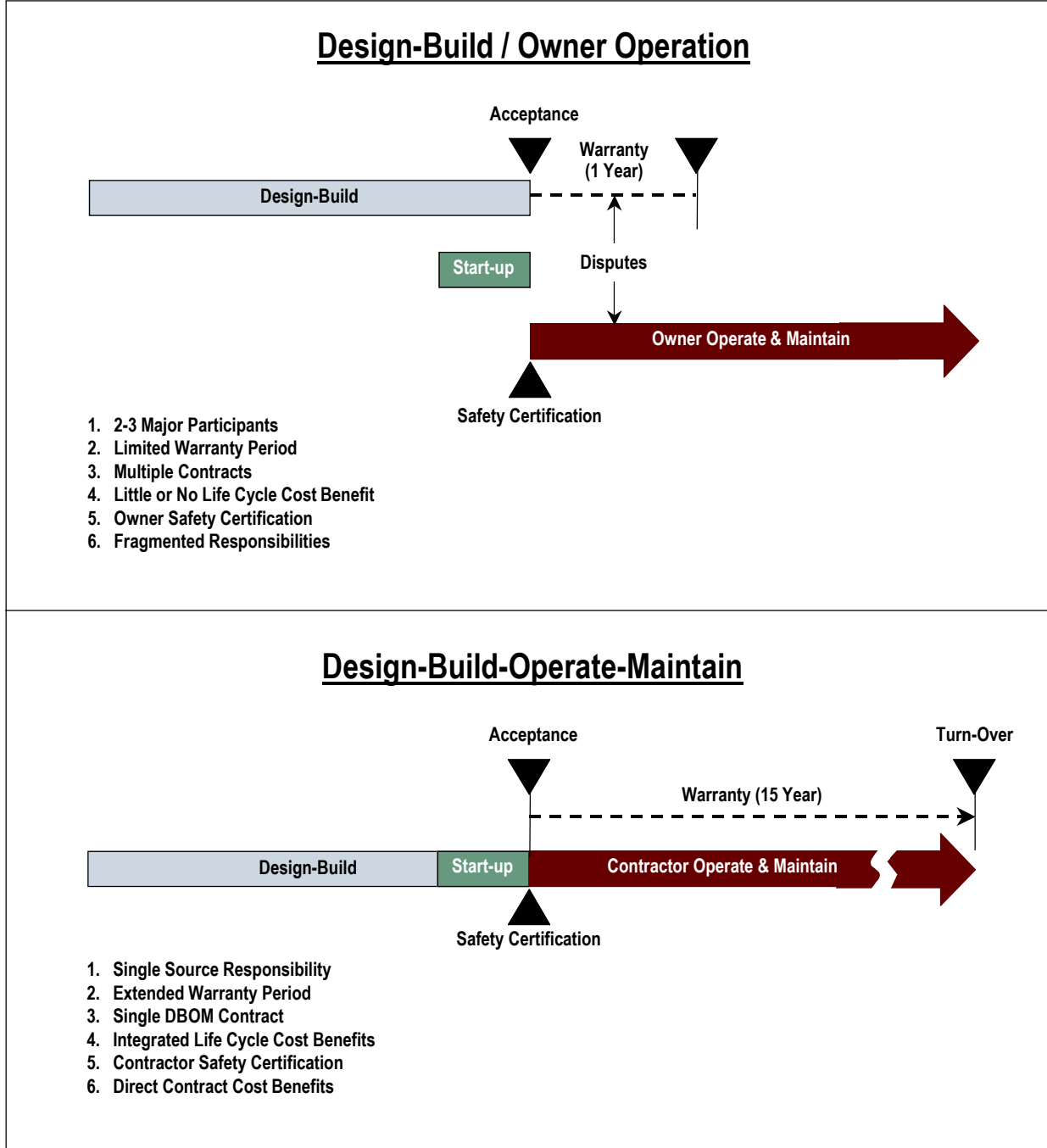
Project Implementation

The HBLRT Project began in 1996 and despite a major realignment of the right-of-way, the first segment IOS opened in April of 2000 on schedule and at this point the entire 20 mile system and stations are constructed and operating. Since that time the project has operated over

an average of 98% service delivery quality index and been a case study in outstanding safety performance. The project has now fully expanded to the north with phased openings at additional stations. This incremental construction and phased opening would have been very difficult without a “public private partnership” approach to the project. By 2007, the entire project was completed and continues operating through the 15 year period. The benefits of combining operations with Design-Build are shown on **FIGURE 7**.

FIGURE 7

Benefits of Including Operations in Public-Private Partnership



Systems Management/Integration

While these are primarily engineering processes, they provide the basis for development of organizational responsibilities, maintenance standards, operating rules, training, etc., which are part of safety certification. This activity began at the conceptual design level in support of operability requirements (headways, capacity, average speeds, and reliability levels). The systems integration (SI) process managed interfaces between predefined systems as well as operating interfaces (man-machine interfaces, e.g., signal previews, operator consoles, maintainers' access). The SI process which continued through construction (field support/resident engineering), created interface control documentation, which directly defined integrated test requirements.

Start-Up

The start-up activity began upon application of energy, generally at the systems level, or at selected sub-systems level. The start-up group performed system level (e.g., signal system, traction power system) checkout, testing and completed documentation for placing individual systems "on-line". Start-up performed integrated testing, which is testing between systems and across sub-contact boundaries within a system. Examples of integrated testing include vehicle braking and acceleration testing, turnout operation (switch obstruction testing), testing of the operations control center, ride quality testing, and more.

Operation Demonstration

The demonstration at HBLRT included all activities including yard operations, maintenance and repair, reporting systems, and coordination with third parties (local police, fire, emergency services, CONRAIL, PATH and other agencies). This demonstration included confirmation that design operability goals (throughput, trip times) had been achieved.

Rail Activation

This activity required development of operating documentation, e.g., the operating rule book, standard operating procedures (SOPs), emergency operating procedures (EOPs), and customer reporting requirements. Rail activation defined and managed the certification, training, and qualification requirements for operational (transportation, car equipment, maintenance-of-way, operations support) employees, and administered certification testing. Rail activation developed service schedules, including evaluation of “what if” scenarios for interim service levels, and coordination with other modes. In conjunction with system safety, rail activation administered and participated in life safety and emergency response exercises. In conjunction with rail operations, rail activation developed the plan for the operational demonstration.

4.0 WHERE WE ARE GOING: New Directions For PPP Finance In The U.S. Market

One of the results of the change in the financial markets during the past two years is that the capital markets have become far more risk averse than they were prior to the near collapse of the financial system. Thus the emerging PPP structure seems to be favoring a long term commitment for O&M after delivering the project, coupled with a long term guaranteed payment with some incentives relating to availability and performance. In addition, in rail transit where revenues from riders can't pay for O&M costs, let alone capital costs, a value capture approach from economic development seems to be getting more and more attention. Also there are many new sales tax referendums providing sources of future funding and requiring bridge financing to get projects started earlier.

4.1 Use of Availability Payments: I-595 Toll Road Project

In March 2009, Florida Department of Transportation (FDOT) signed the agreement to execute the I-595 Corridor Improvements Project, one of the first large PPPs project in Florida.

“The I-595 Corridor Roadway Improvement Project” draft ML-SOC Case 09-H03 (July 2009) prepared by Sachi Nekkanti under the supervision of Professor Michael J. Garvin, Virginia Tech, Myers-Lawson School of Construction provides a very good summary of the project and many of the innovations implemented in the procurement and contracting approach. This report provided the basis for the description that follows.

The I-595 Corridor Improvements Project is a \$1.8 billion program aimed at decongesting the Interstate 595 Corridor by adding tolled express lanes, along with making additional improvements to the roadway. The PPP project was planned to be executed as a Design-Build-Finance-Operate-Maintain (DBFOM) type, adopting an availability payments system. This is the first of its kind infrastructure development project in the US which is totally funded by availability payments.

Project Description

The I-595 Corridor Improvements Project extends from the I-75 to east of the I-595/I-95 interchange in Broward County, Florida for about 10.5 miles. The main improvement is the construction of three reversible lanes in the I-595 median, thus adding express lanes to the general purpose lanes. The reversible lanes, reverse direction during peak travel times, and will be built to operate as managed lanes with variable tolls. The toll lanes will use a variable toll strategy, with a dynamic toll price varying throughout the day in correlation with traffic congestion. Tolls will be collected electronically. Electronic signs will display the current toll so riders will know what they are being asked to pay and can make a choice. Other improvements in the corridor include work on frontage roads, interchanges, ramps and entrances, sound barriers, bus rapid transit express service and creation of a future transit envelope.

Procurement Process

FDOT chose the Design-Build-Finance-Operate-Maintain (DBFOM) model. FDOT will take responsibility for toll setting and collection and traffic management, but operations & maintenance will be performed by the Concessionaire. The Concessionaire would obtain the finance to design-build and operate the facility through the availability payments.

FDOT followed a best value procurement strategy for the project which lasted 15-month and was overseen by a Project Selection Committee, which selected the winning bid through a transparent ranking process. The various stages of the procurement process for I-595 which are common to most PPP procurements were as follows:

- *Issuing Request for Qualifications* - In October 2007, FDOT issued a Request for Qualifications, inviting potential bidders to present a Statement of Qualifications (SoQ). By the closing date, six prospective bidders had submitted a SoQ for the project
- *Issuing Request for Proposals* – Next, requests for proposals were issued to the first four teams in the ranking process. Subsequently, two additional teams decided to drop out of the bidding process, thus bringing the number of final bidders to two
- *Best Value Selection* - The selection of the best value bidder was based on technical and financial merit, as per a ranking system.
 - Experts Panel drafted pass/fail and evaluation criteria, used by the sub-committees to evaluate each proposal and assign scores. The PSC then consolidated these score reports to select the best value bid.
 - Another basis for evaluation was a MAP score, where points were assigned to each proposer based on the Maximum Availability Payment (MAP).

The results showed that ACS Dragados-Macquarie Partnership produced a design having an estimated project cost of \$1.225 billion, with a MAP of close to \$64 million. On the other hand, the second team had a project estimate of \$2.012 billion, with MAPs reaching \$145 million. ACS Dragados-Macquarie Partnership was selected as the concessionaire.

Project Financing

The \$1.79 billion project was financed jointly with public credit and private funds. The project received a federal loan of \$603 million at a 3.64% interest rate under the FHWA's Transportation Infrastructure Finance and Innovation Act (TIFIA) program. The loan's first disbursement was made in March 2009, with the first interest payment due in June 2014. Repayments of principal were not scheduled to start until 2031 and end in June 2042. In addition, a contingency fund of \$9 million was allocated until six months after scheduled substantial completion to cover construction cost overruns and maintain minimum debt reserves.

The project's private funds comprised \$207 million in equity from ACS, \$71 million in the form of capitalized interest and \$780 million loan from a 12-bank consortium on a ten year maturity. The bank consortium issued a bank loan which had two tranches, with a \$255 million tranche to be repaid with FDOT's availability payments and a \$525 million tranche to be repaid through the acceptance payments received by ACS for work completed.

Key Agreement Terms

- The project is a DBFOM type PPP, with an availability payment concession model. The project will be built, operated and maintained by ACSID during the concession period. In exchange, the concessionaire receives a fixed acceptance payment for building the facility, and variable annual availability payments based on how well it maintained the corridor.

- Starting from the commercial close period, the concessionaire was stipulated to receive a total of \$685 million in the form of final acceptance payments spread over seven years. The acceptance payments would be issued by FDOT only after 100% completion of the corridor improvements according to mutually agreed standards. Possible incentives were available for early completion.
- ACSID will receive availability payments of \$ 65.9 million a year (in 2009 dollars) over the 30 year operating period for maintaining the highway at mutually agreed levels of performance. FDOT held the right to deduct money from the annual availability payments should the corridor fail to meet performance standards. ACS could gain a maximum 12% return on its investment if it meets all the performance goals.
- FDOT will control the toll rates and collected the toll revenue. FDOT subcontracted the toll collection system to Florida's Turnpike Enterprise, which is responsible for installing, operating and maintaining the electronic tolling system.
- *Dispute Resolution* - If the concessionaire objects to any FDOT decision, action or order, then the resulting dispute can be resolved in a three stage manner, as specified in the contract. The three stages are:
 - *Negotiation*: The parties will first try to resolve disputes through negotiation and if they couldn't, then it is referred to a Dispute Review Board.
 - *Disputes Review Boards*: Three neutral, non-binding board members are appointed to resolve disputes. After conducting hearings, the board presents a non-binding ruling of the case, which can be used as evidence in any subsequent proceedings.

- *Litigation*: For disputes that remain unresolved, litigation is the next step in dispute resolution.
- *Handback Provisions*- The contract states the concessionaire's responsibilities for the transfer of operations and maintenance of the toll road to FDOT upon completion of the concession period. This included handing back the asset in a good and operable condition and creating a capital replacement plan for equipment and systems.

4.2 *Value Capture Strategy: Transit Revitalization Investment Districts*

Transit-oriented developments (TODs) are characterized by mixed uses, high density, and pedestrian friendliness. Global climate change, automobile congestion, heightened environmental awareness, transportation infrastructure concerns, and a renewed appreciation for community and urban settings have increased public interest in TOD. In addition the benefits of TOD are of great interest to neighborhoods: greater affordability in housing and transportation costs, increased access to job and retail centers, and enhanced aesthetics at the street level. One of the most important aspects of these TOD projects is the dramatic effect they have on the value of existing property as well as new developments.

The Commonwealth of Pennsylvania's Transit Revitalization Investment District (TRID) Act passed in 2004, is a good example of enabling legislation to facilitate the cooperation and funding that is needed to help TODs work at the local level. TRIDs enable municipalities, transit agencies, and neighborhood groups to better coordinate transportation infrastructure, land use, and private development, and can provide unprecedented flexibility and investment capital in support of TODs. Value capture is now enabled through the ability to tax the future value increases.

A TRID transit-oriented improvement district uses the value capture as one of its funding mechanisms. The transit station is in the middle of the district. Any new tax revenues generated within the district's boundaries are captured for the TRID. It is similar to a tax increment financing (TIF) district. However in addition to tax revenues at the newly developed sites, TRIDs would capture adjacent tax revenues as well, reflecting the enhanced value of being near the transit stations. This is also similar to a business improvement district, which is also beneficial to neighborhoods, by enhancing property values as well as capturing locally generated tax revenues for local use.

Value capture funds are normally not going to be adequate to be the sole source of funds used to implement and maintain a TRID. It is important to seek the joint investment by all involved stakeholders, who will benefit from multi-entity investment and collaboration. Stakeholders' investments are leveraged by the investments of the others. This notion of mutual investment and mutual benefit is embedded in TRID agreements generally.

The TRID Act also recognizes the importance of local participation when making decisions that affect neighborhoods. In addition to the city and transit agency, the TRID management entity that governs the TRID should include representatives from entities located within the TRID boundaries, ensuring that local perspectives are accounted for. Together, the city, transit agency, and local institutions now have a vehicle for coordinating efforts within the TRID, and can work through a list of mutually beneficial projects in a more collaborative manner.

The potential for TRID's funding is beginning to be realized through studies across the country at successful TOD projects. Several of these projects are in the planning stages in Philadelphia and in Pittsburgh, Pennsylvania. To appreciate the potential of these revitalization

districts one strategic development study I was involved with in a northeastern city, analyzed the incremental enhanced development values from a streetcar project over 30 years. The results indicated that the incremental increase in development value, based on putting in the streetcar, could almost completely fund the initial capital investment. Beside the economic values there are environmental and livability values that exist, in addition to the economic property value.

4.3 Design-Build-Finance (DBF): Bridge Financing for LA Metro Gold Line

Many local jurisdictions and states have recently passed sales taxes and other funding initiatives, to provide a dedicated source of funding for transportation. The American Public Transit Association has reported that a majority of the transit related funding initiatives have passed over the past several years. It appears that citizens are not as reluctant to accept new taxes, if they are insured it will be spent on something they strongly support, like transit and regional transportation infrastructure.

One such tax is Measure R in Los Angeles. Measure R is a one-half cent sales tax dedicated to transportation which was recently passed and enacted. Funds from this tax will be available over time but not immediately for projects that are required to start near term. The Metro Gold Line Foothills Extension Construction Authority (“Authority”) is currently in the process of pre-qualifying teams for a design-build-finance procurement of the Gold Line Extension near Pasadena, Calif. The project is estimated to cost at \$450 million and only about 2/3rds of that amount is available. The Authority is asking for proposers who can accept deferred payments of the required \$150 million gap financing for a period of about 7 years. It is likely that contractors will arrange a secondary source of funds to take on the obligation of this gap in funding this work rather than self finance it.

The types of secondary financing that would be available include such things as bank loans, private equity, and government credit supports. Although the TIFIA program might be utilized, this would federalize the program which may not be desirable. The type of bank loans most likely would be commercial loans for a medium term of 5 to 10 years depending on how the Authority's available funds are scheduled to be paid. Private equity or self financing by the Contractor would be available, but typically at a much higher cost and may not be competitive. It will be interesting to see how this gap financing can best be provided, as proposals are submitted and a contract awarded.

For the DBF PPPs, some significant issues are raised in the relationships between the surety companies that will provide a payment and performance bond for the project contractors, and the lenders who will provide the gap financing. Typically the lenders would have the first right to the unpaid deferred receivables from the Authority. This would leave the surety with greater exposure than a traditional project, where the surety would have access to unpaid progress payments and contract balances. This has created a struggle with the sureties and the lenders which, at least thus far, have been resolved in several projects that have been successfully carried out in Florida.

5.0 CONCLUSION

This paper was a brief overview of some past experiences and current considerations and applications of transportation PPPs in the U.S. PPPs can attract new sources of funds and improve project delivery methods, by utilizing innovative financing and integrated contracting methods. PPP agreements can vary from a simple design-build contract to a total privatization of a facility with variations in between. Many factors must be taken into consideration and the public decision-making process must be well guided, thorough and transparent. The structure of

the PPP contracts also needs to be considered defining the relationships and responsibilities among the parties. The Owner is often better served working through a single, accountable “at risk” entity.

Exciting things are happening in today’s market for PPP’s in infrastructure. The \$5 billion Dulles Metro Rail Extension, after over 5 years in the development phase for funding and acceptable preliminary engineering, is finally under construction using an improved form of design-build contract. The nearly \$2 billion Hudson Bergen Light Rail Project in New Jersey was constructed over the past decade is now in its 10th year of highly successful private operation for New Jersey Transit.

PPPs are also making public funds stretch further by using an availability payment structures over 30 to 40 years, like I-595 in Florida. PPPs can add new sources of funding from the value added from economic development and land use changes around transit, such as revenues from TRIDs. PPPs can provide critical bridge financing, like the Los Angeles MTA light rail extensions, to deliver projects and their benefits earlier, while waiting for new dedicated funding sources to arrive.

Although not a “silver bullet” for every project, PPPs can provide an extremely flexible, highly effective project delivery approach in funding, project cost, time to deliver and value added. In short, PPPs should be given serious consideration by all transportation agencies in evaluating their various needs and alternative solutions.

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FIGURE 1 – Project Delivery Approaches - This graphical analysis was developed by Ben Redd, formerly Sr. Vice President Project Development, Washington Group Int., Inc. and is based on various large scale infrastructure projects.