Capital Beltway HOT Lanes Project

SEP 14: Annual Report 2009

Submitted to: **Federal Highway Administration, Virginia Division**

Submitted by: **Virginia Department of Transportation**
Northern Virginia District
Virginia MegaProjects Program Management Group

Prepared by: **Roger Boothe, Jr.**
Deputy Project Manager

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1 INTRODUCTION

1.1 Project Overview and Background

The Capital Beltway HOT Lanes Project is being undertaken by the Virginia Department of Transportation (VDOT), in partnerships with Capital Beltway Express, LLC (CBE), under the auspices of Virginia's Public-Private Transportation Act (PPTA). This project will deliver four new lanes on the Capital Beltway (two in each direction), from the Springfield Interchange in the south to Old Dominion Drive in the north. Major interchanges along this 14-mile segment will be reconstructed; ultimately, the two existing inner lanes in each direction will be repaired, instrumented, and operated by CBE as high occupancy toll (HOT) lanes. Detailed information on the Project can be found at www.virginiahotlanes.com and www.vamegaprojects.com.

1.2 Purpose of SEP 14 Annual Report

VDOT submitted its initial SEP 14 Report for the Capital Beltway HOT Lanes Project in the third quarter of 2008, and it is publicly available at http://www.fhwa.dot.gov/programadmin/contracts/sep14va2008.cfm . The purpose of the initial report was to document the history and progress of the project since the Initial SEP-14 Work Plan approval in April 2005. The intent of the initial report was to review and analyze the differences between this project and traditional contracting methods.

After submitting the initial report, VDOT is to submit Annual Reports prior to January 31st of each year. These Annual Reports are to provide additional details in the areas of schedule, cost, risk, and other elements of project management. A "Lessons Learned" section will be developed as part of the Annual Reports. VDOT will solicit input to the "Lessons Learned" section from the PPTA developer, Federal Highway Administration (FHWA), and other appropriate parties involved in this effort. The Annual Report also will include an evaluation of the cost, schedule, and quality aspects of the project.

2 PROJECT STATUS

This section provides an overview of milestones achieved in 2008 and a detailed discussion of the status of project scope, schedule, and budget.

2.1 Chronology of Project Milestones

Notice to Proceed	December 20, 2007
Design Work Commencement	December 20, 2007
Baseline Schedule Approval	May 15, 2008
Design Public Hearings	May 20 and 21, 2008
Construction Start	July 22, 2008

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2.2 Scope

In 2008, VDOT, Fluor-Lane and CBE significantly advanced the design portion of the project scope, developed right-of-way (ROW) plans, performed preparatory work for ROW acquisition, and initiated project construction.

2.2.1 Design

The design portion of the project scope includes approximately 197 design packages. At the time of Design Public Hearing in May 2008, the project design could be characterized as 30 to 40 percent complete. Throughout the remainder of 2008, the project team undertook a concerted effort to move design packages to Approved for Construction (AFC) status, thereby providingsigned mylars and approval to proceed with construction.

To accelerate progress, an Interdisciplinary Coordination/Prioritization Group was developed and met weekly. The purpose of this group, composed of VDOT representatives, the principal design firm HNTB, Fluor-Lane, and CBE, was to ensure that design packages were being advanced in accordance with the construction schedule, and that individual packages did not lose momentum while awaiting input from designers and reviewers from other technical disciplines. For example, many bridge submittals required input from roadway designers to ensure that roadway geometry was accurately coordinated with the structural design. This group was successful in improving coordination and prioritizing the design. The design/builder also prioritized the packages by sequence of construction, therefore focusing the designer on completing these prioritized packages first.

In December 2008, as a result of the project quarterly partnering meeting, it was agreed that the pace of design needed to be further increased, so a goal was set of achieving 100 signed AFC mylars in 100 days, ending March 15, 2009. As of the date of this report, the project team is on track to reach this goal, as illustrated in Exhibit 1. To facilitate achieving this ambitious goal, project partners agreed to establish a senior review team to facilitate correction and approval of those packages for which design was 100 percent complete in the design/builder's estimate, but still contained issues of concern to the VDOT and General Engineering Consultant (GEC) reviewers. This team, which includes the VDOT Project Manager; FHWA Project Manager; Fluor-Lane Construction Manager; CBE General Manager; and senior design and management staff from Fluor-Lane, HNTB, and the VDOT GEC, is fully empowered to make the necessary decisions to move design packages forward to final AFC approval.

Following is a more-detailed status of project design as of the date of this report.

Approved For Construction Packages

Through the reporting period shown in Exhibit 1, 68 design packages have been designated as AFC:

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EXHIBIT 1
Signed Mylars (AFC) by February 19, 2009

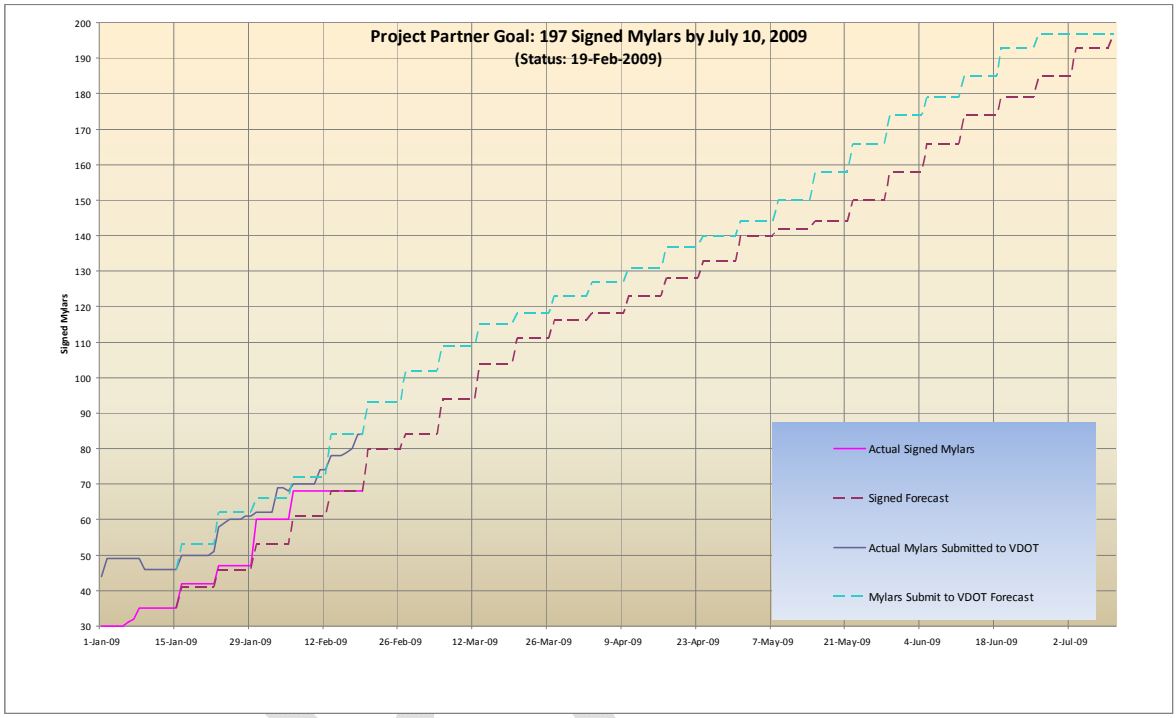

Exhibit 2 lists the progress on AFC packages as of mid-February, 2009.

EXHIBIT 2
Design Packages

No.	Design Submittal Package	SIGNED MYLAR (Project Director)	Status
1	Clearing & Grubbing - Section 4 (partial)	7/21/08	Approved
2	Clearing &Grubbing - Section 1	7/21/08	Approved
3	Clearing &Grubbing - Section 2	7/21/08	Approved
4	Clearing &Grubbing - Section 6	7/21/08	Approved
5	Maintenance of Traffic - Section 1	7/21/08	Approved
6	Maintenance of Traffic - Section 3	7/21/08	Approved
7	Maintenance of Traffic - Section 4 (Phase 1)	7/21/08	Approved
8	Maintenance of Traffic - Section 5 (Phase 1)	7/21/08	Approved
9	Maintenance of Traffic - Section 7	7/21/08	Approved
10	Maintenance of Traffic - Section 6	7/23/08	Approved

EXHIBIT 2
Design Packages

No.	Design Submittal Package	SIGNED MYLAR (Project Director)	Status
11	B603 Superstructure	7/30/08	Approved
12	Clearing &Grubbing - Section 3	7/30/08	Approved
13	Clearing &Grubbing - Section 7	7/30/08	Approved
14	B603 Substructure	8/4/08	Approved
15	B609 Superstructure	9/11/08	Approved
16	B616 Substructure	9/11/08	Approved
17	B616 Superstructure	9/11/08	Approved
18	Clearing &Grubbing - Section 5	10/7/08	Approved
19	B653 Superstructure	10/23/08	Approved
20	Maintenance of Traffic - Section 2	10/23/08	Approved
21	B656 Superstructure	11/21/08	Approved
22	Clearing & Grubbing - Section 8	11/21/08	Approved
23	Retaining Wall RW616	11/21/08	Approved
24	Section 8 MOT	11/21/08	Approved
25	B601 Superstructure	11/24/08	Approved
26	Sound Wall: 3-SW6B and 7A	11/24/08	Approved
27	B647 Superstructure	11/26/08	Approved
28	Grading and Drainage - Section 3	12/10/08	Approved
29	Retaining Wall 3-RW5	12/10/08	Approved
30	Retaining Wall: 3-RW2	12/10/08	Approved
31	B641 Superstructure	12/19/08	Approved
32	B633 Superstructure	12/24/08	Approved
33	B657 Superstructure	12/24/08	Approved
34	B601 Substructure (No Walls)	1/8/09	Approved
35	B640 Superstructure	1/8/09	Approved
36	B609 Substructure & Retaining Walls	1/15/09	Approved
37	B647 Substructure & Abutment Walls	1/15/09	Approved
38	B653 Substructure & Retaining Walls	1/15/09	Approved
39	Right of Way: Section 2*	1/15/09	Approved
40	Right of Way: Section 3*	1/15/09	Approved
41	Right of Way: Section 4*	1/15/09	Approved

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EXHIBIT 2
Design Packages

No.	Design Submittal Package	SIGNED MYLAR (Project Director)	Status
42	Grading and Drainage - Section 4	1/15/09	Approved
43	B614 Superstructure	1/23/09	Approved
44	B608 Substructure and Retaining Walls	1/23/09	Approved
45	B608 Superstructure	1/23/09	Approved
46	Right of Way: Section 5*	1/23/09	Approved
47	Right of Way: Section 6*	1/23/09	Approved
48	B618 Superstructure	1/28/09	Approved
49	Section 7 Retaining Walls: 7RW18A & 19A	1/28/09	Approved
50	B633 Substructure & Retaining Walls	1/30/09	Approved
51	B657 Substructure	1/30/09	Approved
52	B680 Superstructure	1/30/09	Approved
53	B610 Substructure & Retaining Walls	1/30/09	Approved
54	Grading & Drainage Section 2	1/30/09	Approved
55	B655 Superstructure	1/30/09	Approved
56	Retaining Wall: 6-RW8	1/30/09	Approved
57	Grading & Drainage Phase VIII	1/30/09	Approved
58	Section 5 - Wall Package- 5-RW20, 21, 22	1/30/09	Approved
59	Sec 4 RW Package 1 - 4-RW1A,1B,2A,2B (MSE)	1/30/09	Approved
60	B629 Superstructure	1/30/09	Approved
61	Sound Wall: 6-SW10A & 6-SW10J	2/6/09	Approved
62	Sound Wall: 4-SW7A	2/6/09	Approved
63	Retaining Wall: 6-RW7	2/6/09	Approved
64	B614 Substructure & Retaining Walls	2/6/09	Approved
65	B682 Superstructure	2/6/09	Approved
66	B615 Superstructure	2/6/09	Approved
67	B632 Superstructure	2/6/09	Approved
68	Section 5 Retaining Wall Package 3 : 5-RW8 , 13 & 28	2/6/09	Approved

Structures - Bridge Structures Packages

Since the January reporting period, one additional bridge structure package has progressed to 100 percent, for a total of 44 AFC packages to date. A total of 22 other

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packages have increased progress percent complete. Bridge structures packages suspended and/or stopped work due to VDOT Directive Change(s) are indicated.

Roadway (Clearing & Grubbing, and MOT)

Clearing and Grubbing plans for all sections are 100 percent complete. Phase 1MOT plans for sections 1 – 6 and 8 are 100 percent complete. Final roadway design for each section continues to be progressed, ranging from 31 percent to 91 percent complete at the time of this writing.

Grading and Drainage

Section 7, Grading and Drainage, has been placed on hold due to coordination needs with Metropolitan Washington Airport Authority (MWAA). The remaining seven section packages have reached 100 percent through this period.

Walls

Walls include both retaining walls and soundwalls. Eight wall packages have reached 100 percent completion, including one retaining wall package and seven soundwall packages. However, at the time of this writing, selected soundwall work has been put on hold pending VDOT's review of citizen requests, via the Design Public Hearing, to raise the height of soundwalls in certain locations. Additionally, final wall design and locations required refinement of design data to ensure compliance with requirements.

2.2.2 ROW Acquisition

As of late February 2009, ROW design packages for Sections 2 through 6 have been signed. Sections 2 through 6 have been approved for ROW acquisition, There is no ROW to be acquired in Section 1. Section 7 ROW plans have advanced to 100 percent and approvalI is expected soon. There are 138 parcels to be acquired, and currently one has been cleared. All parcels are scheduled and expected to clear by January 2010.

2.2.3 Construction

In 2008 the project team initiated and ramped up the construction scope. Ongoing elements of this effort are as follows:

- Detailed planning for the major construction effort. The construction group continues to support the public relations effort by attending the various public meetings as requested.
- Constructability Reviews
- Equipment acquisition
- Schedule refinement
- Installation of MOT (lane shifts, installation of temporary concrete barrier)
- Set-up of staging areas

Construction activities in the specific construction areas are described below.

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Area 1 (South of I-66 Interchange)

- Erosion and sediment (E&S) control installation and maintenance (ongoing).
- Continued clearing and grubbing performed on I-495 NB between Little River Turnpike (LRTP) and Gallows Road, and Pedestrian Bridge and LRTP. Also performed clearing and grubbing at Braddock Road interchange area.
- Continued excavating fill material from I-495 NB from Pedestrian Bridge at Section 2/ 3 border to LRTP and from LRTP to Gallows Road.
- Continued placing fill material on LRTP for EB widening and temporary detours per plans.
- Placing temporary concrete barrier between I-495 NB and SB immediately north and south of LRTP and demolition of existing median barrier for new Pier 3 construction.
- Setting up MOT and demolishing median barrier at Arlington Boulevard (Route 50) at I-495 for construction of piers for new Bridges B609 and B653.
- Clearing and grubbing I-495 SB from Braddock Road South and I-495 NB between the pedestrian bridge and LRTP.
- Excavating and hauling earth from I-495 NB from pedestrian bridge to LRTP.
- Constructing Embankment for LRTP and ramps.
- Constructing temporary detours at Braddock Road for future bridge demolition.
- Installing Pier 3 drilled shafts and Bridge B603 (LRTP EB) substructure, specifically Abutment B walls, Pier 4 cap, and Abutment A piling installation and footer.
- Pursuing pricing for installation of Segment 1 waterline at Braddock Road and Gallows Road and installation of temporary traffic signals for Braddock Road and Gallows Road.
- Expedite Support of Excavation designs for the Abutments at Bridge B609 and B653.

Area 2 (I-66 Interchange)

- Global positioning system base station setup complete.
- Bridge B616 test shaft installation complete.
- Bridge B610 deck demolition complete.
- Route 29 Lee Highway traffic loop installation complete.
- Clearing/grubbing and E&S Control, I-495 NB from Route29 to I-66, I-66 NW, and I-66 WS.
- Load area-wide attenuators with Liquidow (CaCl).
- Clearing/grubbing and E&S Control, I-495 SB from 875+00 to 862+00.
- Bridge B610 steel girder removal.

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- Bridge B616 test shaft CSL and O-cell testing.
- Constructing Embankment at I-66 W west of Bridge B616 abutment A.
- Topsoil stripping at I-66 NW and I-66 WS.
- Coordinating design at bridges B612-B615, B617, B618, B620-B623, drainage, and retaining/soundwalls.
- Early third party utility relocation design.

Area 3 (North of I-66 Interchange)

- Continuing clearing and grubbing activities.
- Conducted constructability reviews for Design Area 7 grading and drainage package, with the Area 6 package currently under review by VDOT.
- Area 3 MOT - continued the installation of the barrier at Route 7 and Route 123.
- Awarded the bridge subcontracts for the Area 7 bridges. D.W. Lyle (SWaM) was awarded Group 1 and 2 bridges; Martins Construction (DBE) was awarded Group 3 bridges.
- Began the structural excavation for the abutments for Bridge B647.
- Began the design development for the support of excavation for Bridge B657 abutments.
- Traffic control plans continue to be drafted.
- Coordinating with Dulles Metro Rail project for B647 (Chain Bridge Road) and Pier 59 at Westpark Bridge (B649). Cleared and graded the area and waiting on Dulles Metro to start construction.
- Metropolitan Washington Airports Authority (MWAA) coordination: MWAA denied the work permit request for the clearing and grubbing activities within its ROW.
- Continue coordinating with mechanically stabilized earth (MSE) wall representatives.
- Analyzing sign structures.
- Conducting feasibility study for possible early construction start of soundwalls.
- B650 flyover bridge at Leesburg Pike study continues.
- Conducting Area 3 construction schedule review, including the time impact analysis and study of the I-495 NB bridge change over Chain Bridge Road.
- Conducting MOT and overall schedule analysis of the Directive Change for construction of a NB I-495 bridge over Route123, in coordination with the Dulles Metro requirements.

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- Conducting Meetings with VDOT/GEC to identify the option to resolve the MWAA 'weave' requirements in Design Area 7.
- Continue meetings with the Macerich property owners to define utility, retaining wall, and drainage requirements in this area.

Area 4 (Springfield Interchange)

- Conducting Construction schedule review.
- Field office set up completed.
- Ongoing Constructability reviews.
- Locating conflicting existing VDOT utilities.
- Locating and start removal of conflicting VDOT partially demolished structures.
- Permitting.
- Constructing E&S control, grade, and install base course for Staging Areas 1-4.
- Installation of MOT traffic signage.
- Installation of slope drains and drainage culverts.
- Installation of concrete barrier along Outer Loop of I-495.

2.3 Schedule

The initial baseline schedule submitted on February 8, 2008 and was approved by VDOT on May 15, 2008 to become the baseline schedule. This schedule has a total of 4,502 activities, with 57 activities on the longest/critical path and meets the contractual completion milestones - substantial completion by December 20, 2012, and final acceptance by March 19, 2013. It was agreed that the schedule updates would include details as they become available, particularly in the ROW area and in construction activities of longer than 30 days' duration. An explanation was to be provided for critical construction activities with durations longer than 30 days in these updates.

Baseline schedule updates have been submitted every month, starting in June 2008, and are included as part of the invoicing process between the design-builder and CBE. The updates have provided additional activities to show greater detail of the work and have had logic changes.

VDOT does not approve the updates, according to the Amended and Restated Comprehensive Agreement (ARCA). The ARCA allows VDOT to request a revised baseline schedule. VDOT made such a request after reviewing the July 2008 baseline schedule update for the following reasons:

- After the July update, the schedule contained an additional 2,300 activities.
- Significant changes were made to the longest/critical path and logic with little or no explanation.
- Lack of progress was evident in reducing the number of activities with a duration greater than 30 days,
- No explanation was given for critical activities with a duration longer than 30 days.
- Work was being performed out of sequence with the updates.

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In September, CBE and Fluor-Lane agreed to make the adjustments and incorporate them into a baseline schedule update. Once approved, this update would become the revised baseline schedule. As of January 27, 2009, CBE/Fluor-Lane has not submitted a baseline schedule update that is ready for VDOT approval to become the revised baseline schedule.

A Time Impact Analysis (TIA) was submitted to VDOT on January 16, 2009, relating to a proposed change order to replace the existing I-495 NB bridge over Chain Bridge Road, Route 123. According to the ARCA, VDOT is to approve the TIA before it can be incorporated into the next baseline schedule update. This TIA was deficient in that it did not meet the requirements of the ARCA and would not allow complete analysis by VDOT. A revised TIA is now pending resubmission by CBE/Fluor-Lane.

The latest baseline schedule update, December 2008, contains 7,347 activities; 28 of the 68 activities on the longest path are new activities added since the baseline schedule approval. This update also contains 420 construction activities with durations longer than 30 days, compared to the baseline schedule with 376 of these activities. The longest/critical path runs almost exclusively through Design Section 7. It should be noted that the Chain Bridge Road proposed change order is located in Section 7. Throughout Section 7 and the rest of the project, Fluor-Lane has continued to "consume" float in the schedule and/or adjusted logic because of delays in design approvals and ROW activities. VDOT is very concerned with the progress and the ability of CBE/Fluor-Lane to successfully complete the work within the contractual completion milestones.

2.4 Budget

In a PPTA project, both the Concessionaire and VDOT have a financial interest in the project. In this case, the Concessionaire is looking to make improvements to generate revenue from HOT lanes, and VDOT is interested in adding capacity to a congested section of freeway. Because both parties share an interest in completing the project, the funding for the project is split through a negotiation process.

The I-495 HOT Lanes project was initiated through an unsolicited proposal from the Concessionaire. In conformance with Virginia law, VDOT advertised for competing proposals for 120 days, but an alternative proposal was not developed. Therefore, for this project, the Concessionaire developed the concept for design and construction without competition. In a traditional design-build (D/B) project, alternative D/B proposals and bid prices are always requested from multiple bidders, and the winning team is selected from a "best value" scoring system. This process allows the overall price to be driven by competitive market forces.

VDOT is providing project oversight for this project through a combined VDOT/General Engineering Contractor (GEC) project office. The GEC during Design Phase is providing approximately 120 full or part-time technical professionals to support Project Oversight. The level of effort required to manage a PPTA project is extremely difficult to predict because the State does not have direct control over the submittal schedule and day to day management of the project. Consequently, the State is in a reactive mode to addresss design, public involvement, and coordination efforts

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expediently in the interest of project, even if those efforts are not specifically scoped and budgeted at the project outset.

2.4.1 Design/Build Budget

As of mid-February, dollars expended by the Design/Builder are less than planned, as illustrated by the Exhibit 3, Schedule of Values, and Exhibit 4, Comparison of BCWP to BCWS. This is attributed primarily to construction work running behind schedule. Ultimately, the Design/Builder can invoice for no more than the agreed fixed price of the contract, so variances in design/build expenditures from planned to actual are far more meaningful to the Design/Builder than they are to the Concessionaire or to VDOT.

EXHIBIT 3
Schedule of Values

Work Item	In Millions		Phys. Prog. % Cmplt.		Remarks
	Scheduled Value	Work Cmplt.	Last Mo.	Current	
GP Lanes – Discrete	$651.342	$78.202	11.2%	12%	Excludes PM and Quality
GP Lanes – PM	$113.218	$23.776	20%	21%	
GP Lanes – Quality	$21.549	$2.370	10%	11%	
Subtotal GP Lanes	**$786.109**	**$104.348**	**12.4%**	**13.3%**	
HOT Lanes – Discrete	348.842	$34.921	9.6%	10%	Excludes PM and Quality
HOT Lanes – PM	$60.728	$12.753	20%	21%	
HOT Lanes – Quality	$12.078	$1.328	10%	11%	
Subtotal HOT Lanes	**421.647**	**$49.002**	**11.1%**	**11.6%**	
Phs VIII – Discrete	$109.618	$9.739	9%	9%	Excludes PM and Quality
Phs VIII – PM	$16.808	$3.530	20%	21%	
Phs VIII – Quality	$3.378	$0.372	10%	11%	
Subtotal Phase VIII	**$129.804**	**$13.963**	**10.4%**	**10.8%**	
Totals	**1,337.560**	**$167.313**	**11.8%**	**12.5%**	

EXHIBIT 4
Budgeted cost of work performed versus the budgeted cost of work scheduled

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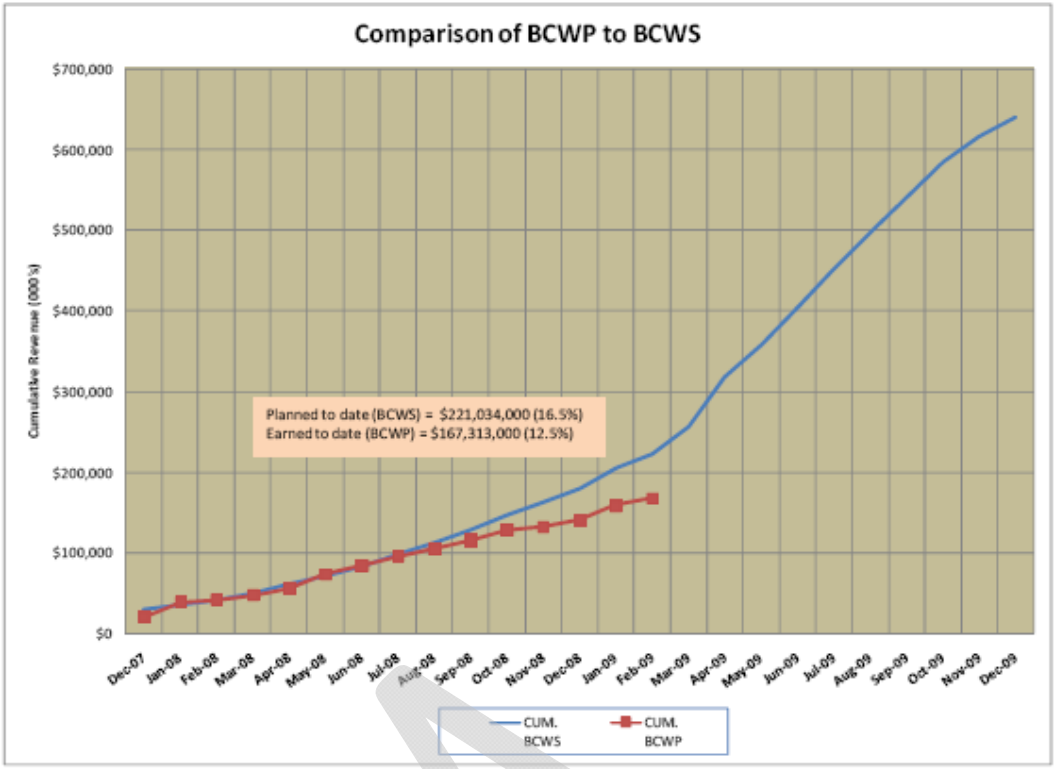


2.4.2 VDOT Oversight Budget

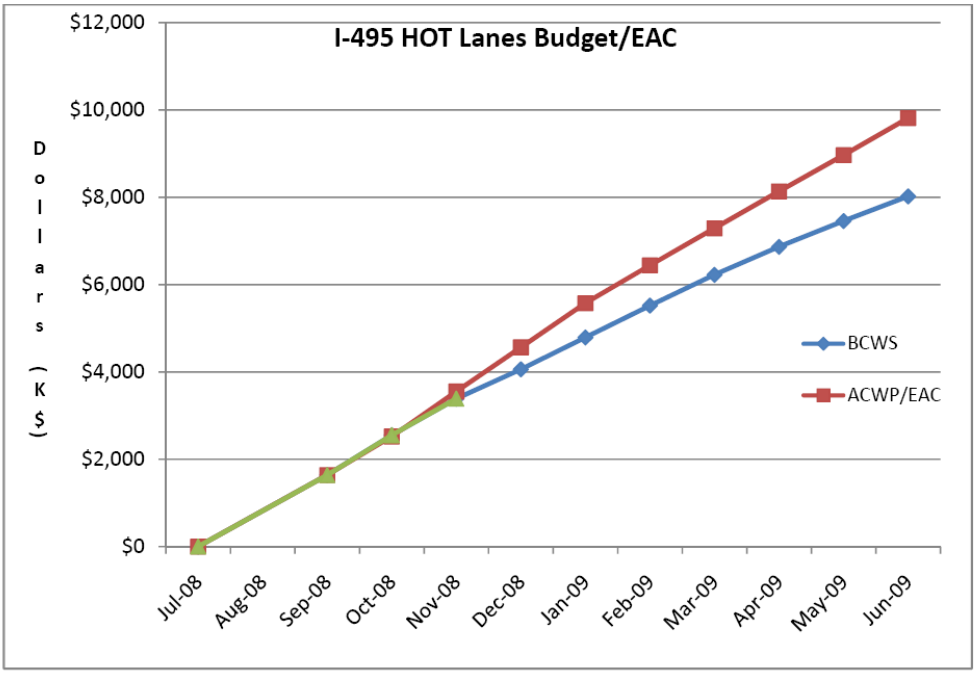
Annual Work Plan (AWP) Year 1 for VDOT project oversight began July 1, 2008. The budget for this AWP was just over $8 million and was designed to deliver limited oversight and independent assurance/independent verification (IA/IV), as agreed in the ARCA. Through January 2009, VDOT has spent considerably more than was budgeted for oversight. This is attributable to the following:

- Poor quality of design submittals from the Design/Builder, requiring oversight at a quality assurance/quality control (QA/QC) level rather than an IA/IV level
- The addition of "Special Studies" to address areas of contention between VDOT and the Design/Builder in order to move the project forward and maintain schedule.
- The need to accelerate design reviews in response to the "100 in 100" goal

As noted in Exhibit 5, VDOT currently projects its AWP 1 expenditures at $9.8 million, representing an overrun of nearly 25 percent.

EXHIBIT 5
GEC Expenditures

EXHIBIT 5
GEC Expenditures



	Jul-08	Sep-08	Oct-08	Nov-08	Dec-08	Jan-09	Feb-09	Mar-09	Apr-09	May-09	Jun-09
BCWS	0	$1,637	$2,552	$3,387	$4,060	$4,790	$5,520	$6,225	$6,866	$7,457	$8,022
ACWP/EAC	0	$1,637	$2,521	$3,552	$4,563	**$5,574**	**$6,442**	**$7,289**	**$8,135**	**$8,965**	**$9,814**

With a total of approximately $24 million budgeted for oversight over the life of the project, VDOT will, at the end of AWP 1, have spent nearly $10 million and will have only $14 million remaining for the ensuing 3.5 years of the project. This is a serious issue that VDOT will need to address. Means of addressing the issue may include:

- Recovering QA/QC expenditures from the Design/Builder
- Finding additional funding
- Finding efficiencies and perhaps curtailing oversight activities during the construction phase.

2.5 Approved Changes to Scope, Schedule and Budget

As of the writing of this report there are no approved changes to scope, schedule, and budget. There are some 85 items on an issues list. (D/B's potential change order (PCO) log), all of which are in some stage of negotiation between the project partners. Of these, 28 issues involve VDOT and Fluor-Lane and the remaining involve Fluor-Lane and CBE. There are currently four change orders under negotiation and subject to FHWA approval.

3 INSTITUTIONAL AND PROJECT MANAGEMENT ISSUES

3.1 Community Involvement and Coordination with Elected Officials

Project Partners recognize the importance of regular interaction and proactive communications with citizens and elected officials. Accordingly, over the past year the Project Team has held more than 35 meetings with Fairfax County Supervisors and their staffs.

Additionally, Since March 2008, the project team has held over 175 meetings and continues to perform monthly outreach, including:

- Over 60 Community Meetings
- Over 80 Business Meetings
- Direct Impact Mailings and Door-to-Door Communications
- Continuous Interaction with Elected Officials
- Project Updates, Fact Sheets, News Releases, and FAQ's on Web sites
- Paid Advertising – Radio and Print Ads

Each month the project sends electronic communications to over 1000 individuals including elected officials, staff and interested stakeholders. The e-mails include:

- Weekly Construction Activity and Lane Closure Reports
- Weekly Megaproject Calendar Updates
- Weekly Megaproject Bulletins
- Monthly Northern Virginia Project News
- VDOT News Releases

3.2 Soundwalls

Noise protection and soundwalls have become touchstone issues for communities bordering the project and their elected officials. Soon after clearing began in summer 2008, affected communities began raising concerns to VDOT and to local elected officials regarding both the pace of soundwall construction and the height of the soundwalls. Residents wanted the new soundwalls to be built earlier in the project, and many communities expressed a desire for higher soundwalls, particularly where the sound receptors were high-rise residential buildings.

In response, VDOT has worked with the Commonwealth Transportation Board to fund some additions to soundwall construction Additionally, the Design/Builder is revisiting the project schedule to determine where soundwall construction can be accelerated.

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3.3 Issues

The proliferation of PCOs on the Design-Builder's list has become a significant management issue for all parties involved in the project. Currently, some 85 PCOs are identified by the Design-Builder, 28 of those involving the Department. The remainder are to be resolved between the Design/Builder and Concessionaire.

Immediately after financial close in December 2007, the project partners developed an "Issues Resolution Ladder," consisting of five or six levels of progressively higher responsibility, to be used in resolving issues that had the potential to become change orders. The Resolution Ladders for Design and Construction are depicted Exhibits 6 and 7, respectively.

EXHIBIT 6
Resolution Ladder – Design

	Issue Resolution Process			
	Design			
Days between Steps	**Fluor-Lane**	**CBE**	**VDOT/GEC**	**Ind. Engineer**
	Discipline Lead	None	Working Group Liaison	None
2	Deliverable: Technical Reference (Identification of Issue)			
	Greg Baker	Fran Mueller	Jim Moorcroft/Roger Boothe	None
2	Deliverable: Summary Statement of Issue(s) plus Technical basis			
	Mitch Lester	Tim Steinhilber	Theresa DeFore/Nick Nicholson	Thomas Kleback
4	Deliverable: Summary Statement of Issue(s) plus Technical and Contractual basis			
	Herb Morgan/Kirk Junco	Tim Steinhilber	Nick Nicholson	Thomas Kleback
7 - 14	Position paper (Maximum of 3 pages)			
	Herb Morgan	CBE Board	Mal Kerley	TBD

EXHIBIT 7
Resolution Ladder – Construction

	Issue Resolution Process			
	Construction			
Days between Steps	**Fluor-Lane**	**CBE**	**VDOT/GEC**	**Ind. Engineer**
	Superintendent	None	Insp./Engineer	None
2	Deliverable: Technical Reference (identification of issue)			
	Area Manager	TBD	Area Manager	None
2	Deliverable: Bullet List			
	Bob Portley	TBD	Larry Cloyed (TBD)	None
4	Deliverable: Summary Statement of Issue(s) plus Technical and Contractual basis			
	Mitch Lester	Tim Steinhilber	Theresa DeFore (TBD)	Thomas Kleback
7	Position paper (maximum 3 pages)			
	Herb Morgan/Kirk Junco	Tim Steinhilber	Nick Nicholson/Morteza	Thomas Kleback
14	Maximum of two page Position paper. (Maximun 2 pages)			
	Herb Morgan	CBE Board	Mal Kerley	TBD

The intent of these ladders was to resolve the majority of issues at Level 2 or below, and to quickly escalate those issues that could not be resolved. The reality proved to be that the partners were generally unwilling or unable to resolve issues at the lower levels, such that most issues made their way to Level 3 or above.

Because this has proven untenable, all parties have now agreed to investigate a modified process for addressing issues.

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4 COMPARISON OF PPTA DESIGN/BUILD WITH OTHER PROJECT DELIVERY METHODOLOGIES

Exhibit 8 presents a summary comparison of PPTA and the traditional D/B project delivery model, which are further described in the following subsections.

EXHIBIT 8
Comparison of PPTA versus Traditional Design/Build Processes

	PPTA Design/Build	Traditional Design/Build
Scope	Contractor develops scope, and negotiates with VDOT to finalize. Scope is negotiated with one Concessionaire.	VDOT develops scope, and adjusts scope to include bid-stage "innovative ideas." Multiple teams propose on the project, and offer ideas.
Schedule	Concessionaire and VDOT both directly benefit from on-schedule delivery (same schedule goal). Contractor controls schedule adjustments. VDOT change orders can cause delay claims.	VDOT benefits from project completion; contractor benefits from the overall project cost (potential conflict). VDOT approves all schedule adjustments. VDOT can adjust schedule to accommodate change orders.
Budget	Funding split is negotiated. One Concessionaire group develops the price.	VDOT provides 100% funding. Innovative ideas from multiple contractors can be included.

4.1 PPTA D/B vs. Traditional D/B

4.1.1 Scope

In a PPTA project, the project scope is developed by the contractor (Concessionaire) team, and in this case, submitted as an unsolicited proposal. For this project, the final scope and contract mechanisms for the project were negotiated between VDOT and the Concessionaire, and documented in the ARCA. Conversely, in a traditional D/B, the DOT develops the project scope, and solicits 30 percent plans, technical documents, and bid prices from a small number (usually three) of bidders. This allows the DOT to select a D/B team that demonstrates both technical competence (design quality and innovation) and overall project value (bid price). Through this process, the DOT is able to fully vet and resolve major technical aspects and receive a competitive bid price prior to contract letting.

The PPTA system also can give the contractor additional design and construction flexibility. As the owner of the project, the Concessionaire is able to negotiate flexibility in terms of plan/design production and format, as well as early construction (e.g., clearing and grubbing) and other construction at risk. In a traditional D/B, the State will typically require full submittals in conformance with normal plan production standards.

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4.1.2 Schedule

In a traditional D/B contract, the Owner can select specific milestones when all or certain phases of the work will be completed. The Owner can add monetary incentives to adjust completion dates and can punish the contractor with liquidated damages. Very specific language relating to schedule deliverables in a traditional D/B contract empowers Owner to enforce contract provisions by withholding monies from progress payments. VDOT does not have the leverage to effect significant schedule changes with the ARCA because it does not have the contract with the Design-Builder and does not directly pay the Design-Builder. Additionally, the contribution structure between VDOT and CBE does not allow schedule issues to be used as leverage by VDOT. With CBE responsible for paying the Design-Builder, it is very difficult for VDOT to get specific changes to the schedule. The ARCA compels VDOT to work with CBE to get schedule changes, but VDOT does not have strong enough contract mechanisms to compel these changes. For example, milestone changes requested by VDOT must be negotiated with CBE; if CBE concurs, it will negotiate and execute a change order with the Design-Builder.

Another major difference with the ARCA is that it does not provide for the monthly approval of baseline schedule updates by VDOT. Only with the baseline schedule and a revised baseline schedule, when agreed to by CBE, does VDOT have approval authority. CBE can be caught between the Design-Builder and VDOT in schedule arguments. It is understandable that CBE will make judgments in its own best interests, which may or may not be aligned with those of VDOT. Nevertheless, CBE has the most to lose from schedule slippage, so it is incumbent on CBE more than VDOT to ensure that milestones are met.

VDOT is particularly vulnerable to self-initiated change orders, delays caused by VDOT, or claims of delay caused by VDOT in a PPTA D/B contract. For example, a TIA for a change order or delay can be submitted by Fluor-Lane based on a baseline schedule update that VDOT has had little or no influence on making correct, accurate, and fair. CBE in turn would not be interested in time delays as they push out the date of revenue generation and paying back loans made to them for the project. CBE would then expect VDOT to cover revenues lost from a later completion/start of revenue.

4.1.3 Budget

As with a traditional D/B project, VDOT provides 100 percent of the funding for a design-bid-build (D/B/B) project -- as opposed to a PPTA project, which is partially funded with private money. Because the PPTA is privately funded, the Concessionaire has an incentive to provide a project that efficiently fulfills the project purpose (generating toll revenue), while delivering the project for the lowest overall cost. This incentivizes the Concessionaire to use innovative solutions and construction techniques to reduce project costs, without degrading the quality of the construction project.

In a D/B/B project, the designer is employed by VDOT, and is typically customer-focused, flexible, and easy to work with. In a PPTA project, the designer is employed by the Concessionaire, is less likely to accept change, and is more likely to charge a premium when out-of-scope change is requested. However, VDOT is not responsible for additional construction cost resulting from plan errors and oversight, and is therefore

not required to provide a detailed plan review (which is typically required for D/B/B projects). In a traditional D/B, the designer also works for the contractor and not for VDOT.

The level of effort required to provide oversight on D/B/B projects is very easy to predict because of a wealth of historical data on the subject. As discussed in the previous subsection, predicting oversight cost is the most difficult for PPTA projects.

4.2 PPTA D/B vs. Traditional D/B/B

Exhibit 9 presents a summary comparison of the PPTA and traditional D/B/B delivery models, which are further described in the following subsections.

EXHIBIT 9
Comparison of PPTA versus Design/Bid/Build Processes

	PPTA	D/B/B
Scope	Contractor develops scope, and negotiates with VDOT to finalize. Process and contract mechanisms are developed through trial and error.	VDOT develops scope for designer, and design plans fully detail construction scope. Tried-and-true process is used to scope designer and contractor.
Schedule	Concessionaire and VDOT both directly benefit from on-schedule delivery (same schedule goal). Contractor controls schedule adjustments. VDOT change orders can cause delay claims. Project construction may occur concurrently with detailed design.	Contractor has no direct stake in completion schedule. Incentives and/or disincentives are typically used. VDOT approves schedule adjustments. VDOT can adjust schedule to accommodate change orders. Design plans must be completed, approved, and bid prior to construction.
Budget	Funding split is negotiated. Design changes are difficult to negotiate. Plan build-ability is Concessionaire's responsibility. Concessionaire group is incentivized to develop lowest-cost plan. Innovative ideas can be implemented, so long as the contractor agrees plan is constructible. Design only needs to be developed to convey intent for field inspection Budget for oversight and control is difficult to estimate.	VDOT provides 100% funding. Designer is usually cooperative because VDOT is the client. VDOT must pay for plan error/oversight changes. Designer considers cost, but plans are generic, not tailored for the needs of one contractor. Some innovative ideas cannot implemented, unless they are clearly constructible for all bidders Plans must be extremely clear and detailed, to help prevent claims. Budget for project oversight and control is easily estimated, from a wealth of historical data.

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+ PPTA project require a 45-day advertisement for competing proposals. For this project 120 days was provided, competing proposals were not submitted.

4.2.1 Scope

The scope for construction of a D/B/B project is similar to a traditional D/B, in that the scope is developed and defined by VDOT. In a D/B/B project, the project's scope for construction is fully detailed by the construction plans, specifications, and estimates, prior to bidding by the contractor. Although the scope adjustments are typically required during the design stage of the project to fully define the design plan, the design effort is usually less than 10 percent of the overall project cost, and adjustments can be made with relative ease. Like the D/B process, the scope of the work is defined in generalities for a PPTA project, with specific means and methods used to fulfill the scope developed by the Concessionaire team.

In most states, the DOT establishes the standard plans and specifications for D/B/B projects, and the staff is trained and experienced with this delivery system. Non-traditional delivery systems such as PPTA are still being worked out in most states, and consequently, are much more likely to result in more significant scoping issues and more difficult challenges in resolving scope disputes.

4.2.2 Schedule

Many of the differences relating to schedule between a PPTA D/B and a traditional D/B/B are the same as those in a traditional D/B contract. A traditional D/B/B provides the largest amount of control with regards to scheduling, planning, and prosecuting the work.

For VDOT to affect the sequence of work or milestones changes, it is much more difficult to do in a PPTA D/B environment. VDOT could use time extensions as a bargaining chip when negotiating change orders in a traditional D/B/B contract. Because of the financing structure of the ARCA, schedule time extensions cost CBE potential revenue, making it nearly impossible to grant the Design-Builder a time extension in lieu of money. As for re-sequencing work, the CBE must weigh its own interests and the Design-Builder can work with CBE to resist any directed work.

One beneficial nature of the PPTA D/B is that design issues/claims do not affect VDOT directly from a schedule standpoint. The Design-Builder has the freedom to select designs and means and methods to meet the schedule milestones.

In summary, the principal difference between schedules for a traditional D/B/B contract and a PPTA D/B contract is lack of control because of the additional party between VDOT and the Design-Builder.

4.2.3 Budget

As with a traditional D/B project, VDOT provides 100 percent of the funding for a D/B/B project—as opposed to a PPTA project, which is partially funded with private money. Because the PPTA is privately funded, the Concessionaire has incentive to provide a project that efficiently fulfills the project purpose (generating toll revenue), while delivering the project for the lowest overall cost. This incentivizes the

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Concessionaire to use innovative solutions and construction techniques to reduce project costs, without degrading the quality of the construction project.

In a D/B/B project, the designer is selected through a competitive process by VDOT. The designer reports directly to VDOT. In a PPTA project, the designer is employed by the Concessionaire. The Design/Builder interprets the standards. Depending on the language, the standards may afford flexibility that the Department may not normally utilize except in extreme conditions. The flexibility may result in a change order, adding cost outside the original project cost negotiated under the PPTA. However, VDOT is not responsible for additional construction costs resulting from plan errors and oversight, and is therefore not required to provide a detailed plan review (which is typically required for D/B/B projects).

The level of effort required to provide oversight on D/B/B projects is very easy to predict because of a wealth of historical data on the subject. As discussed in the previous subsection, predicting oversight cost is the most difficult for PPTA projects.

5 QUALITY

The quality of the design plans has been an ongoing issue for this project. A few of the specific quality issues are summarized below.

The Design/Builder initiated the design utilizing one nationally known consultant firm. The design work is divided into sections (1 through 8) and designed in multiple offices around the country. There has been plan inconsistency from one design section to the next and lack of quality control/quality assurance from the local office to ensure consistency;

Many project designers are working on VDOT projects for the first time. A significant amount of effort was invested by the Virginia MegaProjects team to train Concessionaire designers to produce acceptable VDOT plans.

The design schedule timeline does not allow adequate time to incorporate comments, cross-check other disciplines, correct coordination issues, and release complete and corrected plans. Frequently, plan sets are resubmitted before previous comments can be fully vetted and incorporated.

The project submissions have gone from preliminary to final, without an intermediate check. Identified design issues that have required significant rework could have been discovered sooner with intermediate review steps.

The ARCA requires limited oversight review. Because of the significant design issues identified, particularly early in the project, the Virginia MegaProjects team was forced to review plans in a full QA/QC capacity.

Over the course of the project, the quality of the design plans has steadily improved. In particular, the bridge, MOT, drainage, retaining wall, and soundwall plans have progressed to a point where limited review is possible, in general. It should be noted that although the Concessionaire is contractually obligated to produce standard VDOT

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quality plans, drafting issues such as line types, typos, and line weights have been relaxed in favor of progressing the overall project schedule.

Moving forward, the Virginia MegaProjects Team will continue to work with the designer to address and improve internal (HNTB) plan coordination errors and geotechnical plans, which continue to exhibit ongoing quality issues.

6 RISK ALLOCATIONS AND MANAGEMENT

One shortcoming of the VDOT oversight budget is that it does not provide contingency funds. Over the first year of the project, various issues would have been far easier to address if contingency funds were available to VDOT. These include:

- Special studies associated with ambiguities in the contractual project scope
- Community desire for additional soundwall protection
- Fairfax County concerns regarding access to iNova Hospital
- MOT issues
- Permit requirements from third parties such as Fairfax County Park Authority, MWAA, and Norfolk Southern Railroad

Ultimately, VDOT was forced to request additional funds from the Commonwealth Transportation Board to address these issues.

Risk items are perhaps best viewed in terms of issues. These represent scope items that are ambiguous with regard to responsibility and inclusion in the contractual scope, as well as items that were unanticipated but are now seen as necessary to advancing the project.

The project team is still refining its approach to addressing and solving these issues, and many remain unresolved at this point. Exhibit 10 presents the Issues Log (Fluor's PCO log).:

EXHIBIT 10
I-495 HOT Lanes Work Order and PCO Tracking Log

Fluor-Lane PCO #	VDOT Work Order #	VDOT Tracking #	Description
1	1	1A	Replace I-495 NB bridge over Chain Bridge Rd. - Initial MOT Study
1		1B	Replace I-495 NB bridge over Chain Bridge Rd. - Design
1		1C	Replace I-495 NB bridge over Chain Bridge Rd. - Construction
42		2A	Disapprove Bridge-mounted Sign Structures - Design Costs
42		2B	Disapprove Bridge-mounted Sign Structures - Construction Costs

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EXHIBIT 10
I-495 HOT Lanes Work Order and PCO Tracking Log

Fluor-Lane PCO #	VDOT Work Order #	VDOT Tracking #	Description
2		3	Continuous Lighting
3		4	ITS - Fiber Optic Cable
5		5	Bike/Pedestrian Extensions
9		6	VES - Vehicle Enforcement Systems
10		7	VOD - Vehicle Occupancy Detection
11		8	HOT OC Location
12		9	Phase VIII Deferred Items
13		10	Bridge Width at LRTP - B603/B654
14		11	Retaining Wall at Macerich/Parcel 092 - Tyson's Corner
15		12	Existing Drainage Rehab Debate per TR 3.4C
17		13	Parcels 134 & 047 - Fairview Property - ROW/Savings Allowance Issue
19		14	Westpark T-Connector over I-495 - B648 widening
25		15	Future DMS and static signs - request from ITS/Tolling working group session
31		16	Design Waiver #9 Denial - HOT Ramps at I-66
37		17	Phase VIII Ops - IJR issue with I-95/I-395
43		18	MWAA Access Rights at Dulles Toll Road
57		19	Existing Drainage Upsize from 15" to 18" per TR 3.4
59		20	Existing Drainage Rehab Issues on Phase VIII Ramps
60		21	Fairfax County Noise Waiver
63		22	Modification to Sign Headers Due to CBE Branding
66		23	Phase VIII As-built Conflicts - Utility?
67		24	Withholding ROW Approval due to Utility Easements not shown
68		25	Phase VIII As-Built Conflicts - Foundations?
69		26	Recovery of estimating and engineering cost - ARCA Ex. N Att. 1.5D 108.9.3
70		27	VDOT 29/Gallows Rd Project Interface
73		28	Noise Barrier 13D
74		29	Noise Barrier 13A & 13E

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EXHIBIT 10
I-495 HOT Lanes Work Order and PCO Tracking Log

Fluor-Lane PCO #	VDOT Work Order #	VDOT Tracking #	Description
75		30	Phase VIII Archeological Find
76		31	Direct Communications between VDOT and Fluor-Lane
77		32	Regional Signing Plan
78		33	Attenuators
79		34	Toll Gantry Design
80		35	2-foot Barrier Offset
81		36	Modify Noise Barrier Heights
82		37	NVRPA and W&OD Bridge Widths
83		38	Re-Analysis of Soundwalls
85		41	Refurbish B602 Wakefield Pedestrian Overpass
84		42	Phase VIII Parapet Height

7 LESSONS LEARNED

Following are "lessons learned" according to the different perspectives of individuals and entities participating in the project. They are presented here in un-redacted format. In future reports, we will focus on specific issues and provide a more in-depth analysis.

7.1 Agency Perspective

- More explicitly define the role and scope of the Independent Engineer
- Provide checklists for design that clearly identify expectations.
- Add language to contract to cover QA/QC issues.
- Identify markup percentages within the contract for change orders.
- Complete a conceptual plan agreed to by all parties prior to pricing and contract negotiation.
- Include VDOT in the conceptual plan development with Design Builder.
- Consider organizing design and design review by teams rather than disciplines.
- Improve definition of scope of work, including better definition of bridge limits as well as bridge width, aesthetics, size, and shape of various bridge elements.

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- Revise / review bridge manuals / guidelines to avoid ambiguous requirements and provide additional guidelines / details.
- Provide minimum standards / details for soundwalls, MSE walls, aesthetics, bridge drainage systems, bridge inspectability etc.
- Provide an independent construction QA / QC team that is compensated by the project and not by the Design-Builder.
- Obviously, bridge / wall foundations on the I-495 project have been an issue and will likely continue to be an issue on future D/B projects. It may be a good idea to hold a facilitated meeting with design-builders to evaluate how foundation design process can be less contentious.
- Better definition / understanding of 100 percent plans submittal. Perhaps what VDOT is looking for is plans with enough details to begin construction (not all t's crossed) and with the goal of 100 percent as-built plans delivered at the end of project.
- On complex projects (such as I-495), it is critical that contractor team and designer team have worked together before (no time for a learning curve)

7.2 Design/Builder's Perspective

- Establish a more-concrete scope of work in the initial contract to avoid squabbles about "is it in or is it out?"
- Ensure that the design review process and time is clearly delineated in the contract
- Provide baseline schedule approval 120 days following notice to proceed (NTP)
- Hold the Design Public Hearing prior to NTP
- Obtain Interchange Justification Report approval as prerequisite to contract
- Ensure that the contract change process (procedure) is established and clearly articulated in the contract
- Provide mandatory free lunches (once a month)
- Make ROW acquisition the responsibility of the State
- Clearly delineate formal communication protocol

7.3 FHWA Virginia Division Perspective

- The VDOT GEC is playing a valuable role for technical support, quick turnaround and serving as VDOT staff. It is important to have them onboard early.

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- Defining a better scope would have reduced a number of issues and discussions. In the future, consideration should be given to the timing of such actions as design exceptions, design public hearing, and interstate justification requests.

- Defining levels of appeals and having an issue resolution process are important.

- Important to understand the role of the various parties that are not normally on projects, such as concessionaire and independent engineer. The concessionaire might be a small organization relying on many contracts for support.

- Partnering and collocation are helpful in developing effective working relationships.

- Technical groups were developed for many disciplines and are important for resolving issues at the lowest level.

- Defining and agreeing to a commenting process for design plans, as well as, the overall comment resolution process is important. Trust and communication need to be developed. Agreeing to how much design is enough is important.

- Project development plans are important and about 10 were developed early in the process by the concessionaire.

- All parties need to examine how best to evolve from a design project to a construction project.

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