

**I-495 Express Lanes Lessons Learned  
During Design-Build Phase**

	A	B	C	D	E	F	G	H
		ISSUE	PROCESS	PURPOSE OF PROCESS	RECOMMENDATIONS	CONTRIBUTOR	WHERE ADDRESSED IN CA - 195 HOT LANES	DISPOSITION
1								
2	VDOT	Scheduling priorities	Scheduling	The Concessionaire/Design-Builder was totally focused on completing the HOT Lanes portion of the project prior to Substantial Completion, since that was the portion of the project that affected the toll revenues. So the General Purpose lanes, ramps, and in particular the storm water ponds were not given priority until after Substantial Completion.	Should look for ways to better delineate completion deadlines, and help ensure that all work is accomplished within the established time frames. The Technical Requirements or the Comprehensive Agreement language could be modified to drive project priorities in terms of element scheduling. The Department should consider all options in this regard.	P Nishimoto/J. Morse	CA Sections 8.07 and 8.08	No CA/TR change required
3	VDOT	VDOT Maintenance	Maintenance	Department maintenance and operational needs were not completely addressed by established Department standards.	Define D-B responsibilities and needs for VDOT maintenance requirements (fencing, handrails, storm water ponds, etc.) in the Comprehensive Agreement and Technical Requirements before the DB contract is finalized in order to make certain recurring issues in construction are planned for during design.	P Nishimoto/ J. Morse		Changes required will be made to the TRs
4	VDOT	Enforcement of contract milestones	Utility Coordination	Design-Builder working on utility coordination and plans one year after final completion.	Need to clarify and enforce the completion of utility requirements as a condition precedent to Substantial or Final Completion.	P Nishimoto	TR's Section 1.7	No CA/TR change required
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6	ROW	ROW Plans compliance with ARCA requirements	Enforcement of contract on Concessionaire and DB	The ROW plans must be in compliance with the VDOT ROW and Survey Manuals before being provided to VDOT for approval. The ROW plans for all seven sections of the project presented to VDOT for review produced more than 700 comments (NOT AN EXAGGERATION) because plans did not comply with the ARCA obligations required of the DB. Substantial time and cost was invested by VDOT/GEC to bring the plans into compliance for the eventual approval by VDOT.	Consider changing language in the Comprehensive Agreement in order to reflect requirements that the Concessionaire independently verify that all submittals are, at minimum, contract compliant before being sent to VDOT. There may need to be an allowance added in order to cover additional VDOT costs with bringing the ROW process into compliance if the Concessionaire/DB team cannot perform adequately.	B O'Sullivan	CA Section 3.01 (D) and TR's 1.2.5	No CA/TR change required
7	ROW	Order of approvals of ROW plans and ordering of appraisals	Parcel Appraisals	Parcel appraisal reports were prepared in advance of VDOT approved ROW plans which increased ROW program costs. In order for the concessionaire to maintain the construction schedule, the DB released appraisers to begin their parcel site investigations and prepare appraisal reports prior to VDOT plan approval. Appraisals were completed prior to VDOT plan approval only to be revised due to VDOT/GEC required design changes that impacted the ROW and review time required by VDOT to approve the ROW plans. Parcel appraisals were performed twice on 51 parcels (four parcels required 3 appraisals each). Multiple appraisals for a parcel result in additional costs to the project (fees for appraiser, appraisal technical review, appraisal review, VDOT review and approval of just compensation). Repeat appraisals also prove bothersome to landowners who must be contacted for each appraiser site visit.	VDOT ROW plan approvals should precede parcel appraisal reports. The Department should consider an allowance to cover additional VDOT costs associated with this process.	B O'Sullivan	TR's 1.6 and Attachment 1.3 Section 1.7 (IV)	No CA/TR change required
8	ROW	Government and quasi government parcel acquisitions	Special acquisitions	Although the ARCA required the Concessionaire to acquire the project right of way, the acquisition of parcels owned by government or quasi-government agencies would have been better handled by VDOT. Acquisitions from MWAA, Dominion Virginia Power, Fairfax County Park Authority and other agencies should be acquired by the Special Negotiations Unit in the ROW Section at VDOT Central Office. The Special Negotiations Unit is charged with acquiring ROW from such agencies and has the procedural knowledge, experience and agency contacts required to efficiently acquire those types of properties.	Allow VDOT to acquire those parcels where VDOT has a working relationship through the Special Negotiations Unit	B O'Sullivan	TR's 1.6	No CA/TR change required
9	ROW	Qualifications/expertise of DB ROW personnel	Personnel Selection	The DB ROW Manager did not possess adequate knowledge of VDOT ROW policies and procedures. Time was spent by the VDOT ROW Manager throughout the project instructing the DB ROW Manager and its ROW subcontractor about processes and requirements needed to complete ROW tasks.	Create a vetting process/protocols to screen DB personnel in ROW acquisition, or create a team approach to parcel acquisition involving GEC/VDOT experienced ROW personnel. Reference the point based performance evaluation system recommended below on Row XX as a possible remedy.	B O'Sullivan/ J. Morse	CA defines Key members not Key personnel - need better explanation	Need to define Key Individuals expected to remain on the Project during construction or operations. Replacements must be approved by VDOT.
10	ROW	ROW Reporting for use by VDOT	ROW Reporting	Reports and spreadsheets prepared by the DB subcontractor, approved by the DB and submitted to VDOT/GEC were not readily useable by the VDOT/GEC for ROW reporting needs. Because of the amount of information contained in these weekly reports (much of it not useful to VDOT/GEC) VDOT/GEC was required to interpret and generate useful reports for VDOT/GEC managers.	Uniform reports provided by the DB would have provided a more efficient means of reviewing and tracking ROW processes. The Department should consider employing a standardized format and prescribe that report format to the DB and Concessionaire.	B O'Sullivan	TR's 1.3.2 and Attachment 1.3 Section 1.7 (IV)	No CA/TR change required
11	ROW	Communication between DB ROW and GEC/VDOT	Communications	More efficient means of communications between the DB's ROW subcontractor and the GEC/VDOT would have provided greater efficiencies during the GEC/VDOT ROW review tasks. For instance, the GEC/VDOT was required to communicate directly with the DB rather than dealing directly with the DB ROW subcontractor when requesting revisions to ROW offer/acceptance/refusal packages (prepared by DB subcontractor). Less time required to review/revise the packages would have produced a more efficient process for delivery of the various packages to the end user (landowner, VDOT, VDOT fee counsel, etc.).	Establish communication protocols in the Comprehensive Agreement and/or Technical Requirements.	B O'Sullivan	Attachment 1.3 Section 1.7	No CA/TR change required
12	CIVIL RIGHTS	Compliance: Lack of Sufficient Support. The CR original scope (I wrote it) "copied" the WWB project: one Program Manager, one inspector/engineer to provide technical assistance, and one clerical support. It was assumed construction inspectors would provide the standard compliance support function for labor, EEO and DBE program areas.	DBE/SWaM Compliance	Three CR inspectors had to be brought on for compliance support and regular CR staff had to stay engaged in the projects because construction inspectors were not available for standard (at the time standard) support. This proved to be more beneficial, as the CR inspectors specialized in DBE, EEO and Labor compliance and allowed them to "catch" more deficiencies than a construction inspector may have otherwise. An engineer had to be brought on to provide expertise to the CR consultants on design and construction standards, means and methods because other VDOT/GEC staff on board to review contractor's plans did not have the time to "educate" the CR GEC. The Commissioner contracted with another consulting firm, not part of the GEC at the time, to help early because the Concessionaire was ready to start before the GEC was up and running. The consultant was later added to the GEC but had no knowledge or experience in construction or the DBE program (area of expertise was in business management). The DB caught onto the lack of knowledge and started the "education", a very dangerous method of learning (thus the need for the engineer). This also made proper "vetting" of firms nearly impossible until the regular GEC consultants started. Additional staff was added: to provide workshops in bidding, contracting, business management, etc. Huge success!	Ensure appropriate and experienced staffing levels upfront based on size of projects and other staff available to you.	L Martin	Addressed in I-95 HOT Lanes CA	No CA/TR change required

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	CIVIL RIGHTS Ensuring DBE/SWaM goals are met at every level of the contracting process.	DBE/SWaM Goals	Deals were made by the DB with primary subcontractors years in advance. The ability to flow down the goal to the subcontractors after the fact was a huge obstacle to overcome. (As the 95 DB was the same, they understood the expectation and went back to their primary subs in advance of executing their contracts to ensure they were on board). The sheer size of the contract requires that the goals are passed down, as the goal setting process considers any subcontractable item. Outreach efforts, as a joint effort between the DB or short-listed DBs, their primary subs, and VDOT/GEC Civil Rights, should occur as early as possible – preferably before the execution of an agreement. This will provide greater opportunities for DBEs and SWaMs to get on board and/or prepare for upcoming opportunities. While one large event was done for all the mega projects at the time, it was too late to have a major impact on Fluor-Lane because of their plan to advertise large packages only. Specific Scope of Work (SOW) sessions were jointly provided (DB/VDOT/GEC) for vetted firms with the capability and capacity to perform the planned contracted work, as the design work progressed and construction work opportunities became available. The vetting required the GEC consultant to ask pertinent questions to ascertain the level of experience of the DBEs in a particular area (asking a basic, “can you do this?” almost always receives a “oh yes” response regardless of the actual experience). This allowed opportunities for questions to be asked regarding the scope, schedule and other details in a small group setting, albeit with competitors, but not unlike a typical VDOT project showing. And it allowed for the DB to provide specific contract and bonding requirement information, procedural expectations, and areas of flexibility the DB was willing to grant as well as allowing the GEC and VDOT to speak of other requirements, expectations, and available assistance. The DBE had planned to hire one contractor to all underdrain, one to do all SIP forms, one to do all seeding/landscaping, etc. These packaged contracts were too large for DBEs especially to handle alone. It most likely cut into some of their profit, but to meet the goal, the DB had to change its plan and de-bundle the packages as VDOT suggested. It required far more management and oversight from the DB, as well as from the VDOT/GEC team, but the end result success was worth it, as the DBE came to admit.	Ensure the expectation of DBE and SWaM goals, and the approximate anticipated percent, is communicated at the outset of a possible P3 project.	L Martin	Addressed in I-95 HOT Lanes CA	No CA/TR change required
13	CIVIL RIGHTS Outreach to DBE and SWaM firms occurred once the ARCA was signed. Goals were set as one of the last items to occur in the process.	DBE/SWaM Compliance	This type of assistance had been provided on a limited basis on the WWB project. However, it became clear very quickly the need to ensure there were enough firms that could be vetted and invited to attend the SOW sessions. The GEC was consequently tasked with 1) providing assistance to firms seeking certification as a DBE or SWaM, 2) providing assistance to firms whose business was not set up correctly and legally, 3) providing assistance to firms who were not prequalified with VDOT but needed to be 4) reviewing existing contracts with the DB to see if any firms already on board met certification qualifications and 5) monitoring the expiration dates of these firms’ certifications and prequalifications to ensure there was no hiccup in the project’s progress as a result. Throughout the life of the project, the GEC continued to find firms not certified and would help them through the process and help expedite the certification process itself. It was discovered that many owner-operator hauling firms had set up corporations without all the necessary steps in keeping a corporation. This disqualified them as DBE and SWaM firms. The GEC took unprecedented steps to help these businesses correct this error and keep them eligible. Mega projects attract firms from across the nation. Standard VDOT processes catch any firms not prequalified before the work can start. P3s were not set up similarly; thus, CR GEC took it upon themselves to ensure all DBE and SWaM subcontractors were prequalified. While allowing the DBE or SWaM certification to lapse has no impact on any currently executed contract, it does prevent additional contracts from being granted to the firm. A lapsed prequalification status requires immediate removal from the project site. Therefore, the GEC monitored the expiration dates to prevent issues, which did pop up near the beginning of the project before the monitoring was enacted. Luck Stone, one of the three quarries utilized on this project, was asked by the DB to help meet the goal. Consequently, VDOT was asked to assist with getting their owner-operators certified. As a result, a major, multi-day event took place at each of their local quarries. A translator was provided, and the certifying agency, DMBE, provided two employees. DMBE was able to provide instant SWaM certification and technical assistance on filling out the application for DBE certification, followed up by assistance from the GEC. VDOT presented program requirements, and the GEC provided business management advice. It was during this event that the illegal corporations were discovered to be the rule rather than the exception for Hispanic owners (they had all received bad advice from the same source). The other two quarry companies followed suit, and this same effort eventually was undertaken in other parts of the Commonwealth.	Ensure there are sufficient numbers of DBE and SWaM firms capable and available to perform the work.	L Martin	Addressed in I-95 HOT Lanes CA	No CA/TR change required
14	CIVIL RIGHTS Communications to the impacted communities and with the DB and their subs was an integral part of the original plan. However, the DB was not clear on VDOT policy and expectations.	DBE/SWaM Compliance	A Community Resource Board (CRB) was established to provide the community leaders with information regarding the project to pass on to the communities. This information would not only provide project status information but more importantly provide businesses with potential contracting opportunities. For example, if a dry cleaning business feels their business is suffering because of construction, the DB can ask for an employee discount in return for recommending that business to the employees. The other component is to provide information on employment opportunities on the project. Historically, this is a major component for contractors in this area, as workers are challenging to find; this was a major resource on the WWB projects. However, the DB stated they were encouraged to use Union workforce which limited opportunities for non-union employment. Thus, the CRB had limited requests. Instead, the primary focus was on business needs. A CRB for mega projects remains a primary necessary function. An early understanding of the requirements of the DBE program are essential. In order to reduce or eliminate the scope of a DBE contract (or terminate a DBE), the prime must have approval from the CR Manager (me), and certain steps must be taken. As the goal is to have DBEs successfully complete their contracts, prior to a reduction, we must try to “fix” the issue. This is the reason for a GEC technical assistance inspector/engineer; in case the DBE is struggling in the field with means and methods, or struggling with getting shop drawings approved or submitting invoices accurately. Otherwise, we require a meeting with both parties to limit accusations, get to the bottom of the issue quickly, get it resolved and get the project back on track as quickly as possible (mediation, negotiation). The DB insisted on meeting with the DB without VDOT present to try to resolve it without us getting into their business. They quickly learned it was easier to pull us in immediately, as we were there to resolve the issue fairly (resolution for two firms ended up being “termination is approved”; for the rest, we all worked in concert to negotiate barriers facing the DBE and seek win-win solutions). Originally not planned, Workgroup meetings were held every other week with the DB, VDOT and GEC. Awarded contracts, upcoming opportunities for bidding (and SOW sessions), goal progression, and DBE/SWaM issues were discussed regularly. The DB fought the “invasion” into their business for much of the time but eventually came to see us – mainly with the placement of the right person as their DBE/SWaM Coordinator and with limiting the number of participants from the GEC – as a partner in helping them to achieve their goals fairly rather than an adversary. These meetings continue with 95, but as the project progresses and disagreements are rare, the need for meetings lessens.	Ensure the DB is aware of community involvement expectations for opportunities as well as the expectation/requirement of joint efforts in ensuring successful DBE/SWaM performance.	L Martin	Addressed in I-95 HOT Lanes CA	No CA/TR change required
15	CIVIL RIGHTS Flexibility in Program requirements	DBE/SWaM Compliance	With almost 200 different contracts, some of them tiered, for DBEs and over 200 for SWaMs, the information does not fit on a standard C-111 form; Joint check arrangements for DBEs and their suppliers/manufacturers are only allowed under certain conditions. Due to the magnitude and fast pace of the project, a discussion with FHWA resulted in a waiver to allow for blanket approval of joint checks; The DB is required to provide a discussion paper of the plan for when DBEs are scheduled to perform in relation to the project progress. In discussion with the DB, it was recognized this would require much work from both sides, in revisions and reviews, in the required format. Instead we agreed to use the DB’s three-week look ahead schedule as long as the names of the firms were included on the document, a win-win situation.	Look for ways to allow for flexibility in program requirements while ensuring the overall program remains in compliance.	L Martin	Addressed in I-95 HOT Lanes CA	No CA/TR change required
16	RISK As-Built Data (including schedule)	Recording of as-built data in the Project Schedule (by VDOT)	Because the Design Builder controls the project schedule, they consequently also control how the schedule is updated, progressed, changed. Few professional schedulers would argue that a schedule is easily manipulated and in some cases impossible to detect certain key changes. Case in point: the DB for 495, despite serious delays (by even its own admission), never went behind schedule. Instead through manipulations to float values, activity successor and predecessor and float suppression techniques, kept the critical path from going negative. Further, virtually none of the DB Contractor- caused delays ever showed as impact; proof of the manipulation. The as-built data program implemented by the GEC was used repeatedly in meetings with the DB to counter its allegations of issues, defend VDOT against allegations of delay, or simply in their rendition of what occurred and when.	Require monitoring and recording of as-built data in the Project Schedule by VDOT in VDOT’s management procedures to prevent 1-sided view of contemporaneous historical recording.	M Williams	TR’s 1.4; Tr 1.4 covers the Concess/DB responsibilities, but gives little protection to VDOT in event of delay claim defense	No CA/TR change required; Adding to current PPTA Risk Analysis Guidance

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18	RISK	Access to Concessionaire and Design-Build Documents	VDOT right to access Concessionaire and Design-Build documents at any time	Though the governing contractual documents provide for access to specific files in the course of construction, they fall short of the FOIA rights of the Concessionaire and Design-Builder to obtain all but privileged documents in the event of a dispute/legal matter. Adding such language would level the playing field with regard to access of files. Of particular concern would be subcontractor files and business files, all important in the event of defending a claim.	Modify the Comprehensive Agreement to include VDOT rights to access all DB files, with particular emphasis on subcontractor and supplier records, contracts, etc. Include mandatory flow-down provisions from DB to subs and supplier contracts including lower tier subs and suppliers.	M Williams	CA Section 18.07 Inspection and Audit Right - review (f) in section to see if still necessary	Add and modify language from VDOT's Design-Build contract Section 103.08
19	RISK	Standardized Contract Documents	Project Development Plans, Comprehensive Agreements, Technical Specifications, etc.	The key advantages to standardization are a streamlined procurement process that is less expensive and less time consuming, uniform identification of standard risk factors, universal knowledge of base VDOT comprehensive agreements and technical specifications.	Form a committee of experts within and outside VDOT comprised of attorneys, consultants, engineers to develop a single base document for CA, Tech Specs, PDPs, etc. Use the base documents for each P3 project, modifying each as needed to apply to unique aspects of each P3 project.	M Williams		No CA/TR change required
20	RISK	Time-Based Claims	Evaluation procedure for presenting time based DB/Concessionaire claims.	Time Impact Analysis ("TIA"), the means by which the Design-Builder was to present any time-based claims, is an inappropriate and outdated means of determining whether a current delay the Design-Builder is claiming will actually cause a compensable critical path delay in the future. TIA is more appropriate for vertical construction that is less tolerant to alternate work areas.	Disallow use of TIA for evaluating delay, disruption claims. Review the latest accepted methods available and recommended by organizations such as the AACE and modify the appropriate sections of the CA and tech specs to provide a better means of evaluating, presenting and negotiating delay, disruption, types of claims in a transportation infrastructure construction environment.	M Williams	TR's 1.4.7	Using I-95 as base, suggesting changes to TR's 1.4.7 Time Impact Analysis, CA 13.02 Delay Events During Construction and a modification to the definition of Time Impact Analysis(TIA) - See separate sheet (Comprehensive Agreement Consideration Changes).
21	RISK	Protection of rights of subcontractors and suppliers to payment	Payment Bonds	For the I-495 Express Lanes Project, the Design-Builder required payment and performance bonds from the majority of its subcontractors, providing one-sided coverage meant to protect the Design-Builder. Conversely, the subcontractors were not protected from payment issues of the Design-Builder as the Design-Builder was only required to post Letters of Credit, which does not protect subcontractors. While the subcontractors maintain the right to sue in the event of a payment dispute, it has no lien rights to assert to assure its interests are protected. An additional benefit of bonding is public perception of the value and security of Public-Private Partnerships.	Consider a surety bonding type of program in lieu of Letters of Credit for protection of subcontractors/suppliers.	M Williams	Very Large Projects - Surety Bonds previously either not available or very costly. Contract only with Concessionaire	Reviewing the Miller Act and Virginia's 'little' Miller Act, it would lead one to accept the premise that working with the State of Virginia, a subcontractor, supplier or others should have some protections other than suing the Design-Builder. Additionally, Payment and Performance Bonds are now available, at least in partial amounts. Therefore, P3 contracts should require Payments and Performance Bonds or some type of combination with the Letters of Credit. Recommending
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23	RISK	100% inspection rights by VDOT for critical items of construction	QC Inspection	Precludes the necessity of accepting out-of-spec in place work that would be extremely difficult to repair after the fact (such as concrete placement)	Modify the Comprehensive Agreement to include a VDOT mandate to inspect work at critical points/types of work. Create hold points in the work similar to submittal reviews wherein VDOT has x number of days to inspect predefined critical work.	M Williams	TR's 3.2 gives VDOT right to inspect	No CA/TR change required
24	RISK	VDOT control of the field processes to stop work where it is deemed unacceptable, while economically feasible solutions are engineered	Stop Work Orders	The governing contract for the I-495 Express Lanes project had no provisions for a work stoppage except for safety reasons.	Modify the CA to allow VDOT intervention during the construction phase for items of the work deemed appropriate. Provisions for implementing such work stoppages should be authorized only by the VDOT PM, to limit the triggering of a Delay Event.	M Williams	CA 10.07 and TR's 3.2.2 (C)	No CA/TR change required; 10.07 was added to the 95 language and adequately addresses VDOT's ability to stop work for non-conformance issues
25	RISK	Delay/Potential Delay Issues of DB/Concessionaire	Delay Event Log	<ul style="list-style-type: none"> <li>Should be used to record negative field issues of the Design-Builder (i.e., any items that do or could negatively affect the project schedule)</li> <li>This process is particularly important regarding issues with subcontractor problems as the Design-Builder has no incentive to disclose subcontractor issues when the Design-Builder is liable for the project schedule.</li> <li>Useful in the event of a serious delay claim allegation</li> </ul>	Develop a DB/Concessionaire Event Log and procedure early in the Construction Phase using existing field monitoring personnel, cost engineer-types (who could also monitor schedule simultaneously) to record issues contemporaneously. This was implemented in the I495 program w the information used in meetings and negotiations w the Concessionaire/DB to counter claims of delay, disruption, out of sequence work.	M Williams	VDOT Policy Decision	No CA/TR change required; Adding to the current PPTA Risk Analysis Guidance
26	RISK	Risk Mitigation--all phases	Risk Register Development and Implementation	FHWA requires incorporation of a risk-based approach and mandates that it become a management tool to assist in decision making and problem solving during the construction phase. Develop the Risk Register during the project development phase, add to it during the design development phase, and monitor it during the construction and operations phase. VDOT's own policies require the use of a Risk Register as well, developed early in the development stage.	Develop a Risk Register during the project development phase, add to it during the design development phase, and monitor it during the construction and operations phase.	M Williams	Requirement in new P3 Implementation Guidelines	No CA/TR change required
27	RISK	The need to fund changes that inevitably will occur during these P3 projects	Contingency Funds	This is self-explanatory but runs to major issues in particular for changes required to the work to keep the work flowing without delays. The potential cost of delays to a project of the size of a typical P3 could easily exceed the cost of the change itself, and without contingency funding in place a delay to a critical path component is imminent.	Engineer the estimated need for additional funds for changes, capital additions, additional engineering for evaluating changes, additional consultant costs, etc. Include these funds in the VDOT budget.	M Williams	VDOT Policy Decision	No CA/TR change required
28	RISK	Evaluating Performance of Concessionaire--means of: PDPs	Performance evaluations during construction	There currently is no formal process for evaluating the Concessionaire or DB during the Construction Phase. The PDPs are commitments from the Concessionaire to perform during certain aspects of the work. This data that could be gathered and presented by VDOT or its consultants would help monitor the Concessionaire for use at, say, partnering, where the Concessionaire as part of its proposal to build the concession, committed to a number of performance issues. Further, this information could be used as specific examples of whether to consider using this Concessionaire/DB again on future projects.	Use performance metrics as means for evaluating the performance of the Design-Builder and Concessionaire during design, construction, and operation phases.	M Williams	Operation Phase already has Performance Point Structure	Need to develop Performance Point Regime for the construction period for both the Concessionaire and Design-Builder
29	RISK	Aerial photography and video recording as a means for documenting periodic progress often and at regular intervals.	Documenting the project progress	In the event of a delay, disruption, or similar claim, the contemporaneous information on these provides undeniable visual proof that all parties can use. This data should record information as to the amount of equipment working, crews and location of work, progress, etc. All parties benefit from the aerial photographs taken at regular intervals and can be used in planning as well.	Aerial photography at regular intervals, in particular, should be either a standard contractual requirement of the Concessionaire/DB, or a VDOT budgeted procedure. Modify the CA/Tech Specs to require aerial photography at monthly intervals, critical points in the schedule such as interim milestones, NTP, Substantial Completion, Toll Day 1, Final Completion, etc. Other options include GoPro video and drone technology that allows incredible video perspective of the project at much greater detail levels and record keeping purposes.	M Williams/ J. Morse		Need to include a requirement from the Concessionaire to provide aerial photographs as the job progresses; TR 1.4.3 B; Depending on the technology used, either monthly w the progress report if flown, or every other week if drone tech is used.

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30	RISK	Need for Interpretation of unique P3 contract documents, training of VDOT personnel, and source of contract information	Resident expert of governing P3 contract documents	VDOT (or any DOT) is accustomed to its own procedures, specifications and protocols. CAs are unique, remarkably different, and complex, and are the governing documents for the design, construction, and operation of these P3 projects. The consequences of not conducting itself in strict compliance can be costly for these Departments. Formal training on each project's agreements should be conducted for key personnel at all phases.	Create VDOT position, or task outside entity to be the ongoing source of contract interpretation, particularly during construction phase and the first 5 years of operation.	M Williams	VDOT Policy Decision	No CA/TR change required
31	RISK	Management Personnel Turnover	Maintaining as much personnel continuity as possible	This factor is important to allow for more efficient and comprehensive contract compliance and interpretation. Elevated attrition rates of key positions greatly increases risk in the form of institutional, historic knowledge important in defending claims, negotiating solutions to issues, and efficiently prosecuting construction processes.	Where continuity of personnel is not possible or practical, develop procedures that will supplement the loss of key personnel, such as the Delay Event Log, Owner's As-Built Schedule, aerial photography, personal logs/diaries, Who, What, Where, Why and When logs, etc. Ensure personnel are complying fully by holding formal and informal tutorial luncheons, classes.	M Williams	VDOT Policy Decision	No CA/TR change required. Add to the current PPTA Risk Analysis Guidance
32	RISK	Deliverables Schedule	Project Deliverables Matrix	Contractual responsibilities and obligations are often scattered throughout large contracts, making compliance confusing and risking noncompliance. VDOT personnel are accustomed to managing assets with standard VDOT procedures, making compliance with the governing P3 documents impossible for anyone unfamiliar with them.	Develop a key deliverables matrix immediately following contract execution and a separate construction and operations phase matrix. A matrix was not drafted for the Construction Phase of 495, but is in place for Operations. It has become a simple tool for all parties to monitor responsibilities of the Operations Phase of the ARCA, and is a dynamic tool, constantly updated, and modified each year as needed for clarification and adjustments to regulatory changes.	M Williams	VDOT Policy Decision; this is being done for 195 and 1495	No CA/TR change required; Add to the current PPTA Risk Analysis Guidance
33	RISK	Interim Milestones--lack of in schedule	Schedule	Projects the size and complexity of a typical P3 need to allow for more realistic control of both the progress of the work and sequence of the scheduled work. There were too many instances during the progress of the work where the Design-Builder changed its plans which in turn required VDOT to accommodate creating increased costs for VDOT for design and construction phases.	Suggest the creation of interim milestones in the project schedule that allow a planned interface w VDOT. Modify the tech specs to mandate certain milestones.	M Williams	CA Section 8.07 and TR's 1.4	No CA/TR change required - 8.07 (e) adequately addresses language needed; enforcement at the project level needs to be emphasized
34	RISK	Independent Engineer's role with respect to "independent evaluation" for the CA parties	Independent Engineer's Role	The IE is paid by the Concessionaire and works very closely w the DB for reporting progress and approval of payment requisitions. Under these conditions the IE is not an unbiased, informed neutral. This is particularly problematic with respect to claims where detailed analysis would be a necessary part of the IE's duties. The IE was never close enough to the work details to be capable of performing such an analysis, and therefore a resulting report could be bias and unfavorable for the Department; and once written, would be the first hurdle for the Department to have to get over.	Redefine the IE's role in the CA to exclude any role of independent evaluator in order to remove the appearance of VDOT agreeing with any evaluation by the IE as truly "independent".	M Williams	Not used in I-95 HOT Lanes CA	No CA/TR change required
35	RISK	Dispute Resolution Process--development of	Dispute Resolution Process	Contracts do their best to define every possible scenario and provide solutions to those. But agreement to a dispute resolution process is absolutely essential where every P3 contract is unique and in many cases untested. So disputes are the necessary means of equitable resolution. The partnering process worked on 495 because of the commitments of the decision makers from all sides. Attempts at using a level based dispute resolution process often ended in elevating many issues beyond any technical expertise, to strictly commercial, which on large complex issues drove many to the brink of litigation. Concessions based on the fear of litigation aren't sustainable, and DOTs can't follow this pattern with tightening budgets.	Convene a committee or team to develop a longer-term more sustainable and equitable dispute resolution process in the development stage of the RFP of any P3 contracts.	M Williams	CA Article 21	The Dispute Resolution Board Foundation (DRBF), an international dispute resolution group that advocates use of dispute boards, has formed a task force. This group is developing a better process for dispute resolution, however their preliminary report are not completed and therefore, no recommended changes are being made at this time.
36	RISK	Pass-down of Concessionaire Responsibilities to the DB	Concessionaire Responsibilities-Comprehensive Agreement	In most cases the Concessionaire didn't review any of the submittals, independently investigate quality problems, or independently resolve conflicts. It relied on ambiguous ARCA language to pass on its responsibilities, mandating VDOT's heavy involvement, vs the oversight role contemplated by the contract documents.	Redefine how the Concessionaire is to carry out its duties under the CA, and redefine how any of those may be interpreted in the DB Agreement.	M Williams	TR's 1.2.5	Suggested Language - TR's 1.2.5 A&B change to "shall cause and shall ensure". It's like adding a belt and suspenders  TR1.2.5 11ii - "The Concessionaire certifies or has caused to be certified and ensures the submittal
37	ROADWAY	Definition of Project to precisely define goals	Minimum design requirements	The standards and regulations for Design-Build projects are falling behind, resulting in unnecessary confusion about the minimum design requirements and good industry practices. Today's transportation standards and regulations tend to serve as a guideline and leave more room for creative engineering solutions. This works fine for traditional design-bid-build projects as VDOT can make decisions based upon what benefits the public most. However, for I-495 Express Lanes, the Design-Builder would primarily make decisions based on the cost/schedule and the minimum requirements defined by the contract, instead of the best interests of the public.	To minimize or avoid this approach, a greater definition of the project is required upfront to precisely define goals, objectives, and minimum requirements for project function, appearance, quality, materials, and operations prior to bidding by the Design-Build firms.	Z Feng		No CA/TR change required
38	ROADWAY	The design teams lacked engineering independence	Design decisions	During comment resolution meetings, many engineering decisions were made by the Design-Builders, given to the engineers, and the design team had to accept and defend the decisions.	There must be a balance between the delivery of good engineering within the context of a commercially driven project delivery schedule. The DB team should be encouraged to seek and deliver that balance. The definition of that balance deserves greater discussion and articulation.	Z Feng/ J. Morse		No CA/TR change required
39	ROADWAY	High staff turnover and layoffs	Staff attrition	Disrupts the continuity of quality control, risk management, and program delivery leading to increased field design changes during the construction phase and other issues	The Department should consider options that drive design team continuity, especially in terms of contract term stipulation that requires key individuals to remain engaged on the project from the DB team side.	Z Feng	Key Members defined not Individuals -Need more information	This issue is the same as Risk #9
40	STRUCTURES-DESIGN	Standard Details	Project-standard details for bridges and retaining walls	The project experienced several problems directly related to the DB implementing design details into the bridges and retaining walls that were not consistent project wide. Therefore, several walls and bridges differed from the balance of the project walls and bridges because of this lack of consistency. This led to field crews missing the details because they had just built one wall or bridge a certain way then moved to the next one which was different.	Development of Project-standard details for bridges and retaining walls would contribute to simplifying reviews and construction	R Cox/ J. Morse		No CA/TR change required
41	STRUCTURES-DESIGN	Engineer details vs fabricator details	Design details	There were instances when the field construction crews were confused when engineering construction drawing details should take precedence over fabricator details.	Clarify when engineering construction drawing details should take precedence over fabricator details to eliminate field confusion.	R Cox	TR's 1.5.2	Changes required will be made to the TRs
42	STRUCTURES-DESIGN	Compliance with standard requirements	Submittals	There were a number of instances on the project where submittal requirement expectations did not match the contract. Slight ambiguity in the VDOT standards coupled with ambiguity in the ARCA and TR's were resolved as the project evolved.	Expectations of construction submittals should be clearly defined with regard to compliance and standards requirements, etc.	R Cox/J. Morse	TR's 1.2.5	Changes required will be made to the TRs
43	STRUCTURES-DESIGN	Standard level of submittal reviews	Submittals	There were a number of instances on the project during the design submittal review process where the DB would submit design packages for review at an irregular rate. The result was added staffing needs on the GEC that were unrealistic given the contractual submittal review time frames stipulated in the ARCA. This is not an issue where the GEC could not react, but rather a lack of planning on the part of the DB with respect to adhering to a balanced and consistent submittal schedule in keeping with the submitted project schedule.	Establish a standard level of submittal review expected per given time frame and remain consistent for efficiency, and to assist in alleviating potential disputes with the DB. For example, if the contract stipulates the Department can review no more than 10 design packages simultaneously unless a 14 day advance notice is given to VDOT that the DB intends to go above that 10 package limit by 5 packages. This gives VDOT time to prepare for the additional packages so they too can be reviewed in a timely fashion.	R Cox/J. Morse	TR's 1.2.5 (K)	Changes required will be made to the TRs
44	STRUCTURES-DESIGN	Over the shoulder plan reviews	Plan reviews	The project instituted over-the-shoulder concurrent reviews with the DB in order to advance the review of the design submittals and shorten the time it took to get a design package authorized by the Department and into the hands of the field crews to start work. It also allowed for immediate feedback to design options and allowed VDOT/GEC designers the opportunity to guide the DB designers towards compliance with VDOT standards.	Continuous over-the-shoulder plan reviews during the development phase can help reduce final review time and disputes	R Cox	TR's 1.2.5 and 1.2.6	No CA/TR change required

**I-495 Express Lanes Lessons Learned  
During Design-Build Phase**

	A	B	C	D	E	F	G	H
		ISSUE	PROCESS	PURPOSE OF PROCESS	RECOMMENDATIONS	CONTRIBUTOR	WHERE ADDRESSED IN CA-195 HOT LANES	DISPOSITION
1								
45	STRUCTURES-DESIGN	Resolving COs during the design phase	Change orders	Most of the project changes were either related to field constructability issues or they were issues of economic preference, and could have been more easily resolved during the design phase if the DB team was better organized and prepared.	Anticipating the areas of the design that may be economized by the DB will help to forecast where field design changes may occur and how these might impact VDOT.	R Cox/J. Morse		No CA/TR change required
46	TRAFFIC	Traffic forecast model	Traffic approach	The lack of a dependable traffic model that the Department could trust delayed early analysis of traffic movements; Dept had signature issues with using the Concessionaire's Travel Demand Modeling results without access to the model (proprietary)	An independent traffic forecast model should be performed at the beginning of the project; During the project development, independently perform traffic modeling, and don't rely on the Concessionaire's. VDOT/VAP3 needs an independent model.	R Prunty	VDOT Policy Decision	No CA/TR change required
47	TRAFFIC	Traffic analysis studies	Traffic approach		Traffic analysis studies should be as dynamic as the traffic itself	R Prunty		No CA/TR change required
48	TRAFFIC	Comprehensive data collection	Traffic approach	The lack of early comprehensive data related to traffic patterns delayed early analysis of proposed MOT schemes.	Projects of this magnitude require comprehensive data regarding travel times, transit data including multi-modal aspects and transit components, trip patterns, sound data collection plans, TMP monitoring, adjustments to MOT schemes, etc.	R Prunty	VDOT Policy Decision	No CA/TR change required. Same issues as Item 46.
49	TRAFFIC	Interface VISSIM/HCM Forecast	Tools/software	Advanced decision making regarding model selection reduces confusion during the project.	Conflict arose with VISSIM and HCM approaches required by FHWA & differing results	R Prunty	Scoping Framework Document between VDOT and FHWA now in place has resolved	No CA/TR change required
50	TRAFFIC	Transitioning Macro to Micro level use	Tools/software		More effective tools are needed for transitioning from Macro/Project level to Micro/Hot-Spot level use	R Prunty	Resolved w VISUM software pkg	No CA/TR change required
51	TRAFFIC	Management Plan	Project management	Varied and diverse interests manifest themselves during the project causing second guessing and re-evaluations.	Needed stronger cross-agency/stakeholder project management plan defined up front	R Prunty	suggest PMP be revised to reflect needed changes	No CA/TR change required
52	TRAFFIC	Communications	Project management	Having an established protocol in place before the DB phase allows for consistency in project messaging going forward.	Establish consistent team-wide and stakeholder communications protocols	R Prunty/J. Morse	TR's Attachment 1.3 Section 1.10	No CA/TR change required
53	TRAFFIC	Stakeholder interests	Project management		Ensure that stakeholders with approval authority have "bought in" and concurred with Preferred Alternative (i.e. MWAA)	R Prunty	Scoping Framework Document between VDOT and FHWA now in place has resolved	No CA/TR change required
54	TRAFFIC	NEPA-IJR	Project management		NEPA and IJR processes need to be linked, not performed in series with numerous iterations	R Prunty	Scoping Framework Document between VDOT and FHWA now in place has resolved	No CA/TR change required
55	TRAFFIC	NEPA-IJR	Project management		Ensure coordination / consistency between final preferred alternative shown in IJR, NEPA, and design public hearing plans	R Prunty	Scoping Framework Document between VDOT and FHWA now in place has resolved	No CA/TR change required
56	TRAFFIC	IJR	Design Support	Too many last-minute iterations during IJR traffic analysis, making it difficult to complete IJR approvals		R Prunty	Internal VDOT issue to be resolved within VDOT	No CA/TR change required
57	TRAFFIC	Design/future improvements	Design Support		Design process should be done with the long-term condition in mind so as not to preclude future improvements	R Prunty	TR's 3.1 B	No CA/TR change required
58	TRAFFIC	Design/traffic operations/safety	Design Support	At times, traffic ops or safety was considered secondary in the design, but later resulted in required design changes		R Prunty	Scoping Framework Document between VDOT and FHWA now in place has resolved	No CA/TR change required
59	TRAFFIC	Post design/Construction/MOT	Design Support		Perform a constructability review upfront to identify fatal flaws prior to locking down design	R Prunty	TR 3.1 B	No CA/TR change required
60	TRAFFIC	Post design/Construction/MOT	Design Support	No site-specific plans provided at times for major lane closures or major changes - hinders agency enforcement	The DB should be required to produce specific plans before commencing operations.	R Prunty/J. Morse	TR's 1.9 and Attachment 1.3 section 1.9	No CA/TR change required
61	DESIGN REVIEW				Learn and then document the owner's priorities/values at the very beginning of the program, and adjust the work plan as needed	J Moorcroft	Need to Explain	No CA/TR change required
62	DESIGN REVIEW	Design review comments process	Design review		Categorize design review comments on a fixed comment form (i.e., Contractual, Good Design Practice, Professional Preference, etc.) & document designer's responses. Use follow-on comment resolution meetings as needed to resolve inevitable design review disputes/disagreements	J Moorcroft	Need to Explain	No CA/TR change required
63	DESIGN REVIEW		Design review	The bulk of disputes involved geotechnical/foundations, structural, sound wall designs, and MOT issues		J Moorcroft	Need to Explain	No CA/TR change required
64	DESIGN REVIEW	Communication, informal	Design review		Informal communications between a discipline design lead and the design review lead are beneficial	J Moorcroft	Need to Explain	No CA/TR change required
65	DESIGN REVIEW	Technical reviews, over-the-shoulder	Design review		Regularly scheduled "over the shoulder" technical review meetings for each key discipline can be useful with proper leadership to maintain focus, e.g., biweekly	J Moorcroft	TR's 1.2.5 and 1.2.6	No CA/TR change required
66	DESIGN REVIEW	Quality vs. quantity	Design review	Schedule tends to drive the designer's process – not quality	Strategize on a balance between the economics of the project versus design intent/design options.	J Moorcroft/J. Morse	Need to Explain	No CA/TR change required
67	DESIGN REVIEW	Resolving reviewer conflict	Design review	Technical disciplines need constant/consistent PM leadership and oversight	Consider assigning a lead design review coordinator to coordinate the internal comments, and to coordinate with the designer.	J Moorcroft	VDOT Policy Decision	No CA/TR change required
68	DESIGN REVIEW	Quality of reviews	QC audits design review		Conduct periodic quality audits of the designer's QC processes – then do follow up to determine "process improvements".	J Moorcroft	VDOT Policy Decision	No CA/TR change required
69	DESIGN REVIEW	Setting the design review budget	Design review budget	Budget control of the design review process can be challenging, even when standard hour allotments are established in advance, i.e., design reviewers tend to get lost in the process	Create a flexible budget for the design review process as the requisite labor effort can be difficult to quantify	J Moorcroft	VDOT Policy Decision	No CA/TR change required
70	POST DESIGN ENGINEERING SUPPORT	Resolving reviewer conflict	Post design accept/reject		The individual with authority to accept / reject post-design construction plans (i.e., requests for information, field design changes, notices of design change, etc.) should be clearly stated to help alleviate procedural disputes	R Cox	Isn't this person the Project Manager from VDOT?	No CA/TR change required
71	POST DESIGN ENGINEERING SUPPORT	Disputes re field design changes	Field Design Changes	The FDC process tended to be the most contentious as the contractor felt such changes were within their charge as a means and method and thus did not require owner review/approval		R Cox	Need to Explain	No CA/TR change required

**I-495 Express Lanes Lessons Learned  
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72	POST DESIGN ENGINEERING SUPPORT	Identifying fatal flaws	Constructibility reviews		Perform a constructibility review upfront to identify fatal flaws prior to finalizing the design	R Cox	Need to Explain Isn't this risk the Concessionaires?	No CA/TR change required
73	Construction	Punchlist	Substantial Completion	The Substantial Completion process generated a significant amount of punch list work items. This was mostly a result of poor planning on the part of the DB team, which did not begin a systematic check-out process until it was too late, despite the recommendation of the Department.	Recommend: A. Engineer of Record and Concessionaire perform inspection of each project element with Design-Builder QC/QA lead prior to scheduling an Owner inspection B. Provide documentation of the pre-inspection noted above to the Owner prior to scheduling the Substantial Completion inspection C. The Department should establish a certain threshold that work must be complete before conducting a SC inspection	J. Morse	Need to Explain	No CA/TR change required
74	Construction	Quality Assurance Manager	QC/QA	The QAM role is defined in the Department's Manual for DB Quality; however, large scale projects cannot be managed effectively by a single QAM. The magnitude requires a more elaborate process of staff and defined responsibilities.	The Manual should be revised to allow for an expansion of QAM staff and roles, along with more specific dictates related to QAM authority. The QAM should not be allowed to be marginalized by a Project Manager or Director, and should have more defined authority than the design manager and construction manager of the DB team.	J. Morse	Need to Explain why manual doesn't allow this today	No CA/TR change required
75	Construction	Contract Terms	Stop Work Orders - See above also under Risk	The QAM has the authority to stop the DB work but the QAM does not exercise that option because the QAM is employed by the DB team.	The QAM should be forced to use the stop work authority more frequently or be faced with removal from the project by the Department. A measurement process should be implemented to gauge when and how the QAM performs his or her role related to preventing non-compliant work from being installed, and if the QAM fails to use the authority vested in the position to the benefit of the project, then the QAM should be replaced. The DB PM and CM should also face removal if they do not do what is best for the project.	J. Morse	Need to Explain How do you suggest forcing the QAM?	No CA/TR change required