

**CHALLENGES AND OPPORTUNITIES IN ENVIRONMENTAL PLANNING
AND PERMITTING ON TRANSPORTATION DESIGN-BUILD PROJECTS**

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By

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Michigan DOT

Sheila Upton - Environmental Clearance Coordinator

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Washington DOT

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NOMENCLATURE

AASHTO	American Association of State Highway and Transportation Officials
AN	Advance Notification
ATC	Alternative Technical Concepts
CDOT	Colorado Department of Transportation
CEPP	Comprehensive Environmental Protection Plan
DBIA	Design-Build Institute of America
DEQ	Department of Environmental Quality
DOT	Department of Transportation
DNR	Department of Natural Resources
ECAI	Environmental Compliance Assurance Inspector
ECM	Environmental Compliance Manager
ECP	Environmental Compliance Plan
EDC	Every Day Counts
EMP	Environmental Management Plan
EPA	Environmental Protection Agency
EPP	Environmental Protection Plan
FDOT	Florida Department of Transportation
FHWA	Federal Highway Administration
FONPA	Finding of No Practical Alternative
GDOT	Georgia Department of Transportation
IA-DOT	Iowa Department of Transportation
MDOT	Michigan Department of Transportation
Mn/DOT	Minnesota Department of Transportation
MoDOT	Missouri Department of Transportation
NYDOT	New York Department of Transportation

NCDOT	North Carolina Department of Transportation
NEPA	National Environmental Policy Act
NMFS	National Marine Fisheries Services
PD&E	Project Development and Engineering
PDP	Plan Development Process
PET	Price Evaluation Team
PM	Project Manager
ODFW	Oregon Department of Fish and Wildlife
ODOT	Oregon Department of Transportation
OTIA	Oregon Transportation Investment Act
RFP	Request for Proposals
RFQ	Request for Qualifications
ROW	Right of Way
SEP-14	Special Experimental Project No. 14
SEPA	State Environmental Policy Act
SHPO	State Historic Preservation Office
TexDOT	Texas Department of Transportation
USDA	United States Department of Agriculture
UDOT	Utah Department of Transportation
USACOE	United States Army Core of Engineers
USFWS	United States Fish and Wildlife Services
VDOT	Virginia Department of Transportation
WashDOT	Washington State Department of Transportation

SUMMARY

Environmental planning and permitting for transportation projects is often seen as one of the top reasons for project delay. On design-build projects, this process is often treated as the critical path to advertising the project and on all transportation projects many critical phases of the project such as right of way acquisition, final design, and construction cannot begin until the environmental planning process is complete.

The objective of this research is to identify challenges to the environmental planning and permitting process and opportunities for managing those challenges.

To identify these challenges and opportunities, a synthesis of transportation and design-build research was done along with interviews with agencies leaders at seven State Departments of Transportation (DOTs). Once these challenges and opportunities were identified, example environmental planning documents and requests for proposals were reviewed from various State DOTs to document their usage. Additionally follow up interviews were conducted with environmental planning experts with experience on design-build projects from six of the State DOTs that were previously interviewed.

This research contributes to the state of knowledge through providing comprehensive information on environmental planning and permitting challenges that must be managed on design-build transportation projects and opportunities for managing these challenges. Managing the identified challenges by utilizing these opportunities provides transportation agencies with opportunities to make the environmental planning and permitting process on design-build projects more efficient. This research contributes to the state of practice of transportation agencies through providing opportunities for

streamlining environmental analysis and permitting that is vital to transportation agencies who strive to accelerate the delivery of design-build projects.

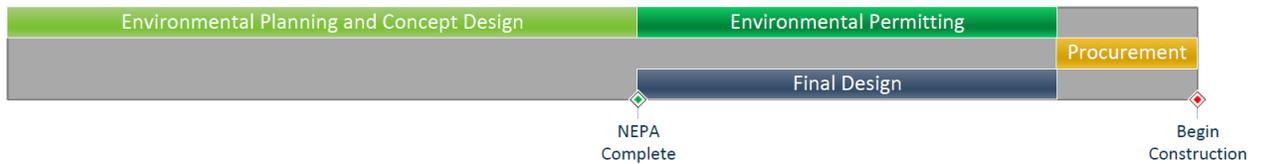
CHAPTER 1 – INTRODUCTION

The FHWA has been allowing State Departments of Transportation (DOTs) to utilize innovative project delivery systems since the introduction of the special experimental project No. 14 (SEP-14) – “Innovative Contracting” in 1990. According to the Design-Build Institute of America (DBIA) currently, 45 State DOTs across the U.S. are authorized to use the design-build project delivery system (DBIA 2013). Since the “Design-Build Contracting: Final Rule” became effective on January 9, 2003, the contracting practices by State DOTs have evolved. Innovative practices for project delivery help State DOTs expedite delivery of projects and overcome the challenges of traditional project delivery; however, delivery of projects by innovative approaches is not without hurdles. State DOTs with experienced design-build programs have encountered various issues and challenges that can hinder and delay delivery of design-build projects. These State DOTs constantly look for appropriate ways to optimize their current processes for design-build project delivery. Proper identification of best practices and opportunities can help State DOTs manage these challenges and deliver design-build projects more efficiently.

One area that has been identified as a source of project delay and as the critical path to delivering transportation projects is the environmental planning and permitting process (American Association of State Highway Transportation Officials et al. 2007). For federally funded projects this includes following the National Environmental Policy Act (NEPA) planning, Federal environmental permitting, post-award NEPA analysis, and environmental re-evaluations (Wood et al. 2011). For projects that do not utilize federal

funding, most State DOTs are required to follow their own state’s environmental planning process which often is similar in scope to the NEPA process. On design-build projects the environmental planning and permitting process, the critical path to delivery, becomes more important as the initiation of some project phases, such as final design, ROW acquisition, and construction cannot begin until the NEPA planning is complete and environmental permits are acquired. NEPA documents for design-bid-build projects have often been very prescriptive which can lead to difficulties when applied to design-build projects where design is not finalized and possible changes are anticipated from the design-build team. The design-bid-build process is typically linear with each activity occurring sequentially and the NEPA document is written to help guide the alternative selected for the project. Design-build innately has schedule efficiencies throughout this process as activities can be overlapped which reduces the overall project schedule as seen in Figure 1:

Typical design-bid-build process



Typical design-build process

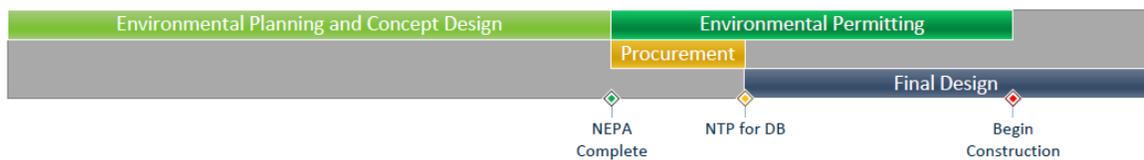


Figure 1: Typical design-bid-build vs. design-build process

Design-build also introduces complications to this process as the design and permitting requirements for the project are affected by the awarded design-build team's proposed design. Any changes to project scope, design, and impact area can cause disruptions to this critical path and delay the overall delivery schedule. For instance, post-award project changes often require modification to environmental permits and re-evaluation of NEPA planning documents that can cause delays to the delivery of the project. Construction is delayed while these documents are reviewed and approved. The environmental analysis and permitting process is typically linear as environmental resources are identified and impacts are avoided or quantified, permitted, and mitigated. All of these steps must be completed in a project area before any project can proceed to the construction stage within that area.

Design-build projects must complete all required NEPA activities and environmental permitting of design-bid-build projects, regardless if activities are overlapped. Environmental analysis activities can be grouped in three categories as the following (Texas Department of Transportation 2004):

1. Identify environmental resources and coordinate with regulatory agencies
2. Perform NEPA or environmental planning and impact mitigation
3. Acquire environmental permitting

These activities, how they are different for design-build contracting, challenges for each activity, and opportunities to overcome those challenges are discussed in greater detail throughout this paper.

CHAPTER 2 – RESEARCH OBJECTIVE

The overarching objective of this research is to identify challenges and opportunities related to the environmental planning and permitting process to expedite the delivery of design-build projects. Specific objectives of this research are:

- a) Identify challenges in environmental planning and permitting for design-build projects that can delay the design-build project delivery schedule, increase project delivery cost, or hinder innovation and integration
- b) Propose opportunities for efficiency enhancement in design-build projects and document solutions in environmental planning and permitting to overcome the challenges identified

CHAPTER 3 – RESEARCH METHODOLOGY

To achieve the research objectives, comprehensive literature review and content analysis and structured interviews were chosen as the research methods. Specific research tasks are designed in order to achieve the research objective as follows:

- Conduct a comprehensive literature review regarding the design-build project delivery system
- Review the current practice of the design-build project delivery system in state DOTs across the U.S.
- Scan and interview design-build programs in seven State DOTs: Colorado, Florida, Michigan, North Carolina, Utah, Virginia, and Washington State
- Perform content analysis of design-build project Request for Proposals (RFPs), interim reports, and project reviews to identify innovative solutions to expedite project delivery
- Identify challenges and opportunities to enhance efficiency of the state DOT in delivery of design-build projects in the environmental planning and permitting
- Perform follow-up interviews with design-build programs in 6 State DOTs (i.e. Colorado, Michigan, North Carolina, Utah, Virginia, and Washington State) to validate the challenges and opportunities

CHAPTER 4 – ENVIRONMENTAL PLANNING AND PERMITTING

4.1 Identifying Environmental Resources and Coordinating with Environmental Agencies

Identifying and quantifying impacts to the environment should be completed during the concept phase of any project. By the completion of the scoping or concept phase, the State DOT should have defined potential impacts to streams and wetlands, endangered species habitat, historic buildings or properties, archaeology resources, air quality, environmental justice, and increased noise volumes (Texas Department of Transportation 2004). These impacts are discovered and documented through coordination and special studies as part of the NEPA process and identified in the project concept report. Proper identification of environmental impacts is a major risk area in design-build projects that can have significant impacts to the project schedule. Therefore, prior to selection of a design-build team, State DOTs should work with regulatory agencies and identify all potential impacts to the environment.

Coordination with regulatory agencies early in the scoping of a project proves to result in better project decisions and more informed project solutions (Council on Environmental Quality 2007). This is beneficial to State DOTs when scoping design-build projects as they can identify potential project solutions and better quantify their impacts to the environment. Coordinating and collaborating with regulatory agencies early in the process reduce the likelihood of litigation as stakeholders are involved in project decisions and more likely to engage in problem solving when issues arise (Council on Environmental Quality 2007). Litigation is a major risk on design-build projects as it can cause drastic schedule delays if it brought on after the contract is awarded.

Unlike design-bid-build projects where the design is being advanced concurrently with the identification of resources, design-build projects during this phase should focus more on identification on project risks than actual design of the project (The Louis Berger Group 2005). This risk identification in regards to the environmental planning and permitting process relies heavily on proper identification of environmental resources and potential environmental impacts.

4.1.1 Challenges to resource identification

4.1.1.1 Improper identification of resources

Identifying impacts to environmental resources is the basic step to environmental studies and permit acquisition. Proper identification or lack thereof influences the design-build team's ability to manage the project environmental risks and to efficiently design and construct the project. Improper identification and failure to adequately link these elements with the project design elements can negatively impact the schedule of the project (The Louis Berger Group 2005).

The goal of environmental resource identification is to identify potential impacts and any environmental permits that may be required to construct the project. Environmental permits vary in complexity and the amount of time needed to acquire them. Identifying required permits early in the project development allows State DOT's to determine how best to manage the acquisition of various environmental permits.

4.1.1.2 State DOT relationships with regulatory agencies

Regulatory agencies are also concerned with the pressure from design-build teams to reduce mitigation requirements. Regulatory agencies that are unfamiliar with design-build may have concerns that design-build teams will increase impacts to the

environment in an effort for cost savings (Jim Cromwell, personnel communication, February 22, 2013).

State DOTs work to maintain strong relationships with regulatory agencies as they work together on numerous projects and will need to coordinate on future projects. These agencies are concerned that design-build teams will not be motivated to maintain good relationships as their motivation is financially related to the current project (The Louis Berger Group and Cambridge Systematics 2007). Several State DOTs that were interviewed maintain an ownership role when coordinating with regulatory agencies. One State DOT interviewed is comfortable with design-build teams coordinating directly with regulatory agencies. A summary of concerns from regulatory agencies in each state is seen below:

- Utah DOTs (UDOT) past experience with regulatory agencies on design-build projects is that they are most concerned about protecting their interests and the environment. These agencies are concerned that design-build teams will not share these concerns and will simply look for cost cutting measures without regards to the environmental impacts (Brandon Weston, personnel communication, March 7, 2013).
- Colorado DOTs (CDOT) past experience with regulatory agencies on design-build projects is that the contract requirements protect their interests (Jordon Rudel, personnel communication, February 26, 2013).
- Michigan DOT (MDOT) past experience with regulatory agencies on design-build projects is that they are not comfortable coordinating directly with design-build teams (Sheila Upton, personnel communication, February 28, 2013).

- North Carolina DOT (NCDOT) is not comfortable with design-build teams contacting regulatory agencies directly. NCDOT has strong relationships with regulatory agencies and is not willing to take a chance that a design-build team could jeopardize this (Theresa Bruton, personnel communication, March 15, 2013).
- Washington DOTs (WashDOT) past experience with regulatory agencies on design-build projects is that they are concerned on what design-build teams may propose and the impacts of their designs on the environment (Christina Martinez, personnel communication, February 27, 2013).
- Virginia DOT (VDOT) is comfortable with the design-build team coordinating directly with regulatory agencies (Jim Cromwell, personnel communication, February 22, 2013).

Each State DOT interviewed had a different comfort level with design-build teams coordinating with regulatory agencies, with most of them maintaining an ownership role in the coordination process.

4.1.1.3 Regulatory concerns with incomplete design in design-build projects

Regulatory agencies have limited staff to review and coordinate on projects (Center for Environmental Excellence 2008; Venner Consulting 2012). This limitation is more apparent on design-build projects where additional coordination and collaboration may be required to appropriately address and mitigate project risks and proposed alternatives. Design-build projects often involve accelerated delivery schedule and typically demand more of the regulatory agency staff time and resources.

Regulatory agencies are not typically involved in the scoping of projects outside of the NEPA process (Washington State Department of Transportation 2004). During the typical NEPA process regulatory agencies are presented with set of known project alternatives or project corridor and provide comments on the alternatives or corridor. The need to properly manage environmental risks and resources on design-build projects may require agencies to identify additional areas of potential environmental resources which can cause a strain on resources.

A jointly held workshop by the Washington State DOT and regulatory agencies highlighted the following staffing concerns of the regulatory agencies:

- Agencies report that they are currently understaffed. They believe the design-build process will make this situation even worse.
- Agencies foresee a need to permit ‘worst case’ or ‘multiple design option’ scenarios, and they do not have the staff to undertake this effort.
- Agencies indicated that project decisions are made before they can become involved and they are not present for key discussions and decisions.” (Washington State Department of Transportation 2004)

These concerns from regulatory agencies are driven by budgetary reasons. Regulatory agencies may lack the staff or travel budgets to attend numerous coordination meetings or to perform site visits (Wood et al. 2011). Similarly, most State DOTs are facing inadequate capacity for delivery of the project. Staffing issues, particularly “the people responsible for managing the NEPA process, and the tools and technology used as part of

the project development process” are generally categorized as internal NEPA risks and should be carefully analyzed prior to environmental planning (Wood et al. 2011).

4.1.1.4 Impact of environmental permitting on project schedule

Environmental permitting is a schedule critical task on most transportation projects. NCDOT has found that obtaining environmental permits is often the critical path to construction on design-build projects (Theresa Bruton, personnel communication, March 15, 2013). Environmental permits vary in complexity and the amount of time needed to acquire them. On design-bid-build projects, all environmental permits are typically obtained prior to advertising and awarding a contract. Design-build provides for environmental permits to be obtained in a few different ways that impact the project schedule (The Louis Berger Group 2005):

- Obtain permits prior to awarding the design-build contract;
- Start the permit process prior to awarding the design-build contract and complete the permit post award;
- Obtain the permits after the design-build team has been selected, utilizing the design-build team’s proposed design.

Design-build allows flexibility in this process as the State DOT have options on how to acquire the required permits; however, these options each come with their own set of challenges. State DOTs must determine which option is most beneficial to the project schedule. Incorrectly assessing the amount of time required to obtain permits can lead to poor choices in assigning the responsibility to obtain permits and can result in delays to the project schedule (The Louis Berger Group and Cambridge Systematics 2007). Several State DOTs that were interviewed identified environmental permits as on the critical path

of the schedule for delivery of design-build projects. A summary of State DOT approaches to permitting and their perception of obtaining permits impact to the project schedule is seen below:

- UDOT obtains all required environmental permits in advance of advertising and awarding a design-build contract. This allows the design-build team to expedite construction as they are not waiting on these to begin construction (Brandon Weston, personnel communication, March 7, 2013).
- CDOT rarely obtains permits in advance of advertising and awarding a design-build contract and often waits as long as possible to acquire permits to reduce the risk of needing permit modifications (Jordon Rudel, personnel communication, February 26, 2013).
- MDOT obtains most permits in advance of advertising and awarding a design-build contract. MDOT does not have experience with design-build projects with complex permitting, so this hasn't been an issue to date (Sheila Upton, personnel communication, February 28, 2013).
- NCDOT does not acquire any permits in advance to not limit design-build innovation by permit requirements. This has led to NCDOT identifying environmental permitting as the critical path on typical design-build projects (Theresa Bruton, personnel communication, March 15, 2013).
- WashDOT obtains most permits in advance of advertising and awarding a design-build contract. This often results in the need for permit modifications after the

design-build team is on board which causes delays to the project schedule (Christina Martinez, personnel communication, February 27, 2013).

- VDOT views environmental permits as a critical element to the design-build project delivery schedule. VDOT has the design-build team obtain all permits after they are awarded the contract so that they can manage the schedule risk (Jim Cromwell, personnel communication, February 22, 2013).

State DOTs may inadvertently place environmental permits on the critical path by not advertising or awarding design-build projects until all permits have been obtained. Based on interviews with State DOTs, this challenge seems to exist regardless of the approach for managing permit acquisition.

4.1.2 Opportunities for enhancement in environmental resource identification and environmental agencies coordination

4.1.2.1 Opportunity for efficiency enhancement: State DOTs should partner with, fund positions, or co-habitat with regulatory agencies

State DOTs should partner with regulatory agencies to overcome fears that regulatory agencies will be pressured into lessening mitigation requirements (The Louis Berger Group and Cambridge Systematics 2007). The partnering process will ensure that the State DOT and the agency are in alignment on the goals for the project. State DOTs and regulatory agencies have also found that the consultants on design-build teams that conduct the actual coordination with the regulatory agencies have incentive to maintain strong relationships with these agencies on future design-build and design-bid-build projects. These relationships help establish trust between regulatory agencies and the design-build team (The Louis Berger Group and Cambridge Systematics 2007). Regulatory agencies have also stressed the importance of communication to keep them

actively involved in the project and keep them updated on changes to the project. Keeping frequent communication helps overcome regulatory agency concerns that design-build teams are not motivated to maintain a similar strong relationship that they have with the State DOT (The Louis Berger Group and Cambridge Systematics 2007). Early and consistent coordination has been identified as a best practice on any project with complex environmental permitting (Venner Consulting 2012).

State DOTs interviewed also identified that through partnering and coordination with regulatory agencies, they had achieved flexibility in the NEPA process and in some cases the permitting process. A summary of each State DOTs approach and successes in partnering with regulatory agencies is seen below:

- UDOT has worked with regulatory agencies to allow for permitting based on approximately 30% design plans. Originally regulatory agencies were uncomfortable with permitting based on an incomplete design, but through coordination and experience on design-build projects they have developed a comfort level with this approach. UDOT values this relationship and maintains a role as a co-permittee on construction related permits that the design-build team acquires (Brandon Weston, personnel communication, March 7, 2013).
- CDOT coordinates early and often with regulatory agencies on design-build projects to keep them informed of the project status and decisions. This coordination and partnership has resulted in permit agencies focusing their efforts on the mitigation process instead of the actual strategy proposed by design-build teams or CDOT (Jordon Rudel, personnel communication, February 26, 2013).

- MDOT works with regulatory agencies to streamline the NEPA or environmental planning process where possible (Sheila Upton, personnel communication, February 28, 2013).
- NCDOT has developed a strong relationship through partnering with regulatory agencies and is the main point of contact to these agencies even after a design-build team is under contract. NCDOT extends this partnering to the awarded design-build team by coordinating a partnering session with all the regulatory agencies and the awarded design-build team to allow each agency to share their ideas and concerns on the project with the design-build team. This partnering session helps to establish trust between the regulatory agencies, NCDOT, and the design-build team and speeds up the permit process as the design-build team knows what is important to the regulatory agencies when they are preparing the permits (Theresa Bruton, personnel communication, March 15, 2013).
- WashDOT has worked with regulatory agencies since they started using design-build project delivery. WashDOT reached out to regulatory agencies to document their concerns related to design-build and have worked to mitigate these concerns. This coordination and outreach has led to regulatory agencies willingness to analyze project impacts without detailed design. One example of a regulatory agency issuing a permit based on 30% plans is the 401 permit for the Clean Water Act with the Environmental Protection Agency (EPA). WashDOT has committed to implementing a Post-Award Permit Management plan that becomes part of the design-build contract. This approach has allowed WashDOT to be less

prescriptive in the permit and avoid modifying this permit once the final design is known (Christina Martinez, personnel communication, February 27, 2013).

- VDOT has worked with regulatory agencies on design-build projects for a number of years to the point where regulatory agencies are comfortable with the design-build process. Regulatory agencies in Virginia have been pleasantly surprised as design-build teams often reduce impacts over what is anticipated during the conceptual design for projects (Jim Cromwell, personnel communication, February 22, 2013).

A review of publications by State DOTs including design manuals and conference presentations has identified the following examples of early coordination success stories, opportunities, and State DOT requirements:

Early coordination with regulatory agencies by WashDOT

WashDOT has identified that working with regulatory agencies during the scoping and concept phase of the project is invaluable for building trust, properly identifying resources, and evaluating potential environmental commitments (WashDOT 2004).

WashDOT has identified several best practices for working with regulatory agencies on design-build projects as identified below:

- *“Coordinated Meetings with Agencies - WashDOT will provide project updates and obtain input from resource agencies and jurisdictions at regularly scheduled meetings.*
- *Mitigation Task Force – As project effects become better defined, WashDOT will invite resource agency participation in identifying appropriate project mitigation.*
- *Project Design Presentations – WashDOT will invite resource agencies to provide input on design outcomes during the project preliminary design.*
- *Project Scoping Meetings – WashDOT will record resource agency concerns about the project and identify natural resource protection objectives.*

- *Discipline Reports – WashDOT will invite cooperating agency comment on project environmental documents.*
- *Commitments Database – WashDOT will track project environmental commitments during the life of the project and incorporate them into the design-build contract. Environmental commitments will be performance based.”*

WashDOT started early partnering with the permitting agencies on the SR 520 project to streamline the NEPA and SEPA (State Environmental Policy Act) processes. This early partnering provided WashDOT with inputs on the project concept development and preliminary design. Partnering with the permitting agencies and working with them to develop a list of anticipated environmental commitments accelerated the delivery of the SR 520 design-build project (Hammond et al. 2011).

Early coordination with regulatory agencies by Florida DOT (FDOT)

FDOT regularly develops an Advance Notification (AN) package that is distributed to all project stakeholders including regulatory agencies early in the plan development process. The AN provides basic project information and anticipated permits required for the project. FDOT has found that the preliminary coordination process with regulatory agencies takes six (6) to twelve (12) months (Florida Department of Transportation 2011).

Funding positions at regulatory agencies for large projects or the entire design-build program can overcome agency staffing worries (Venner Consulting 2012). This will also ensure that agency staff priorities will align with State DOT priorities to keep project critical activities moving forward (Center for Environmental Excellence 2008). This can be especially critical on large projects where several alternatives are being considered and the project corridor is extensive.

Co-locating resource agency staff with the State DOT can allow the resource agency to be involved early-on in project development and scoping decisions (Venner Consulting 2012). This helps ensure agency and DOT goals are in alignment and decisions can be made quickly and effectively while managing environmental concerns (Washington State Department of Transportation 2004).

Co-location or other staff and resource intensive methods to coordinate with regulatory agencies are not appropriate for all projects. The council on environmental quality has established four levels of collaboration in NEPA decision making. These four levels are defined below (Council on Environmental Quality 2007):

- Inform: provide sufficient objective information for regulatory agencies to understand the goals and issues of the NEPA process;
- Consult: obtain feedback on issues, goals, alternatives, and analysis from regulatory agencies;
- Involve: consistently solicit and consider regulatory agency's input throughout the NEPA process to ensure their concerns are understood and addressed in the NEPA planning;
- Collaborate: engage regulatory agencies in development of NEPA alternatives and work with them throughout the entire NEPA process.

The appropriate level of coordination should be utilized for various regulatory agencies, with the higher levels of coordination being utilized for agencies most affected by the proposed project. These higher levels of coordination can be achieved through regular coordination meetings or co-location.

These strategies will increase costs and the amount of resources required at the early planning phases of a project. These cost increases result in benefits later in the project development as the State DOT has better relationships with regulatory agencies, more project information, and a design alternative that likely has fewer impacts (Venner Consulting 2012). These benefits should reduce costs in later project development phases and may offset the increased costs of earlier phases.

FDOT has experimented with various methods for expediting permitting on design-build projects including:

- *“Coordinate with the permitting agencies and keep them involved in the decision making during the Project Development & Environment (PD&E) process. Having one-on-one periodic meetings with the agencies is recommended in addition to the submission of the Preliminary Coordination Package. Obtaining “preliminary” commitments from the agencies in writing during the PD&E process helps to expedite the permit application during design.*
- *Perform enough design work upfront to obtain permits during the PD&E process instead of having to apply for permits during the design phase. This would eliminate part of the permitting work from the Design-Build scope of work. Written prior concurrence from the permitting agencies will have to be obtained.*
- *Identify construction activities that can begin before final permits are received. This would enable the design consultant to start design in project features that do not require permits. The Contractor could start working in those areas while the design consultant is working in other design and permit application activities.”*

These three permitting options are implemented by most State DOTs and utilizing a combination of these is considered a best practice. Early coordination should be done on all projects with complex permitting issues and as FDOT notes, permits that have lengthy acquisition times should be acquired by the State DOT prior to advertising the project in an effort to accelerate the construction for the design-build team.

4.1.2.2 Opportunity for efficiency enhancement: State DOTs should examine alternative solutions during the concept phase by clearing additional areas for each environmental special study to allow for innovation

An advantage of design-build project delivery is that it provides design-build teams the opportunity to propose alternate design solutions to more efficiently deliver the project or to provide cost savings (The Louis Berger Group 2005). The opportunities for innovation may be limited if the environmental studies completed as part of the NEPA planning process are limited to clearing or defining a preferred alternative. On design-bid-build projects the same consultant team typically performs both the environmental analysis and the final design. This typically leads the design team to advancing the design further than required during the NEPA process once a preferred alternative, other than the “no build” alternative, has been identified. In design-build this work is unnecessary and can result in some undesirable consequences as found by New York DOT (NYDOT) (New York Department of Transportation 2011):

- “Artificial constraint of options and opportunities for DB innovation and creativity;
- Elimination of potential qualified Proposers or creation of a competitive disadvantage if a Proposer’s preferred means and methods are eliminated in the design process; and/or
- Duplicative design efforts and associated duplicative expenses, if the selected Design-Builder opts for a different design solution.”

State DOTs should work to clear an environmental corridor as opposed to a specific design solution. This allows proposing design-build teams to work within that corridor

without violating or reopening the NEPA document. Examples from several State DOTs who were interviewed can be seen below:

- UDOT allows flexibility in the environmental planning process in areas where there is minimal risk of impacts to environmental resources. This increases the importance on the necessity to properly identify these resources early in a project's development (Brandon Weston, personnel communication, March 7, 2013).
- CDOT strives to define maximum anticipated impacts for a project in their "Base Design" which is the basis for the environmental planning document. This allows the design-build team to work within the predefined maximum impacts without having to re-evaluate the environmental planning document (Jordan Rudel, personnel communication, February 26, 2013).
- MDOTs local FHWA office has pushed for projects to be classified into the appropriate level of NEPA planning document very early in a project's development. This has led to the incorporation of non-prescriptive NEPA documents, as the design is not advanced enough to provide detailed design information as the NEPA document is developed (Sheila Upton, personnel communication, February 28, 2013).
- NCDOT clears a wider than necessary environmental footprint on all highway projects regardless of the delivery method. NCDOT does this so that the design is not limited to a specific solution regardless of who completes the final design (Theresa Bruton, personnel communication, March 15, 2013).

- WashDOT works with regulatory agencies to allow maximum flexibility in the environmental planning document. WashDOT describes possible construction methods, potential impacts, and clears a wide project footprint in their environmental planning document. This allows the design-build team to propose innovative solutions that may not have been considered during the environmental planning without requiring the document to be re-evaluated (Christina Martinez, personnel communication, February 27, 2013).
- VDOT clears as large of a design footprint as possible during the environmental planning process to provide maximum flexibility for design-build innovation (Jim Cromwell, personnel communication, February 22, 2013).

These State DOTs have realized that by clearing as wide of a footprint as possible as part of the NEPA process they can allow for maximum innovation by design-build teams. Each State DOT interviewed takes a slightly different approach to expanding the NEPA corridor. These differing approaches are driven by each State DOTs comfort level with the risks associated with allowing the design-build teams design to determine a project's environmental impacts as well as the comfort level of their local.

4.1.2.3 Opportunity for efficiency enhancement: The State DOT should be flexible to utilize several strategies for acquiring environmental permits

State DOTs have identified that early initiation of environmental permitting tasks that are known to have a long lead time in the concept phase will reduce their impact on the critical path of the project (The Louis Berger Group 2005). When permitting is acquired in advance by the State DOT, risks associated with changing the permit should be transferred to the design-build team (The Louis Berger Group 2005). This allows the

State DOT to coordinate and gain approval from environmental agencies early in the process and follow through on commitments made at those early stages. This can help build trust between the State DOT and environmental agencies and may allow additional flexibility and risk transfer on future design-build projects.

There are three strategies that State DOT's can employ to obtain environmental permits (The Louis Berger Group 2005).

- Acquire the permit in advance of the procurement of the design-build team and require the design-build team to comply with all commitments of the permit;
- Acquire the permit after procurement of the design-build team and coordinate the impacts and permit requirements based on the design-build team's proposed design (additional requirements of the design-build team can be managed through a Supplemental Agreement);
- Require the design-build team to prepare all permits on behalf of the State DOT and to incur any fees, mitigation requirements, or construction alternatives associated or incurred as a result of the permit requirements.

All three of these options are valuable to State DOTs and one or multiple options can be used on the same project based on differing complexities associated with the permitting. On most design-build projects, expedited project delivery is an important project goal; with this in mind, State DOTs should employ the strategy that allows for the fastest delivery of the project while not incurring or transferring additional or unnecessary risks to the design-build team. When considering obtaining permits in advance, State DOTs should consider the implications and probability of the permits needing to be modified

after the design-build team is on board. If this modification process will reduce or eliminate the schedule benefit of obtaining the permit in advance, then the State DOT should look for opportunities to add flexibility into the permit or consider waiting to acquire the permit after the design-build team is procured (The Louis Berger Group and Cambridge Systematics 2007).

Several environmental permits, such as the 404 and 401 permits that are normally completed by the State DOT during a design-bid-build project may be better managed by the design-build team on design-build projects as the mitigation and impacts will be affected by the design-build team's proposed design (Hammond et al. 2011). This strategy is particularly useful on permits that can be obtained while the design-build team is completing the final design of the project or constructing certain phases or sections of the project while permits are being obtained on other areas of the project (The Louis Berger Group and Cambridge Systematics 2007).

Interviews with State DOTs indicated that each State has an accepted strategy for some or all permits and applies that strategy to all projects. If the State DOT employs multiple strategies, they typically utilize the same strategy for the same permit or types of permits. State DOTs that allowed design-build teams to obtain permits typically maintained an ownership role in the permit process as the permittee or co-permittee. A summary of these interviews is shown below:

- UDOT obtains all non-construction related permits in advance of advertisement of a design-build contract. This allows them to manage their relationship with the regulatory agencies and provide assurance to the regulatory agencies that their interests will be protected. UDOT does allow the design-build team to acquire

construction related permits, but maintains an ownership role as the co-permittee (Brandon Weston, personnel communication, March 7, 2013).

- CDOT rarely obtains any permits in advance of awarding a design-build contract. CDOT reduces their risk and regulatory agencies concerns by coordinating the contract language with regulatory agencies to ensure they are comfortable with the requirements the design-build team must comply with. Construction related permits are obtained by the design-build team, while more complex permits are only prepared by the design-build team and CDOT maintains ownership by reviewing and submitting the permits to the regulatory agencies. (Jordon Rudel, personnel communication, February 26, 2013).
- MDOT obtains all permits in advance of advertising and awarding a design-build contract. MDOT obtains all permits in advance to mitigate regulatory agencies concerns that the design-build team will push them to permit environmental impacts that they are not comfortable with (Sheila Upton, personnel communication, February 28, 2013).
- NCDOT used to acquire all permits in advance of advertising and awarding a design-build contract. They found that acquiring permits in advance limited design-build innovation as design-build teams were more eager to comply with the existing permit requirements than take the schedule risk for permit modifications. NCDOT now requires the design-build team to prepare all permits and submit them to NCDOT for review and submittal to regulatory agencies. NCDOT maintains the permittee role for all permits (Theresa Bruton, personnel communication, March 15, 2013).

- WashDOT tries to acquire all permits in advance of awarding a design-build contract which could result in WashDOT becoming responsible for long term mitigation and/or maintenance such as the Section 401 permit for the Clean Water Act. WashDOT allows the design-build team to acquire all construction related permits and WashDOT typically does not maintain a role in obtaining these permits (Christina Martinez, personnel communication, February 27, 2013).
- VDOT transfers the requirement for all permit acquisition to the design-build team. VDOT is not involved in the permit process and is not the permittee. VDOT requires the design-build team to manage the permit process. VDOT maintains an oversight role requiring the design-build team to provide evidence that all permits have been acquired prior to issuing Notice to Proceed (NTP) for land disturbing activities (Jim Cromwell, personnel communication, February 22, 2013).

It has been cited a best practice to identify and select a permit acquisition strategy that best fits a specific project or permit requirement. However, our interviews with leading State DOTs indicates that each State seems to have a general permit acquisition strategy that is based on the type of permit with most State DOTs maintaining an ownership role in all but the basic construction related permits.

4.2 NEPA and quantification and mitigation of environmental impacts

The NEPA of 1969 established a national policy to “encourage productive and enjoyable harmony between man and his environment (1994).” This act created the Council on Environmental Quality (CEQ) and set policy on how the Federal Government must evaluate the impacts of a project on the environment. This process was further guided by

the CEQ in 1978 which issued Regulations for Implementing the Procedural Provisions of the National Environmental Policy Act (40 CFR §§ 1500–1508) (Federal Highway Administration). These procedures established three levels of environmental actions, documentation requirements, commenting and public involvement processes, and document filing requirements. The CEQ relations also required each federal agency to develop its own regulations to comply with NEPA (Utah Department of Transportation 2009). To be eligible for federal funding for transportation activities agencies must comply with the following activities (Utah Department of Transportation 2009):

- *“Comply with all applicable environmental requirements, including NEPA and Section 4(f) of the Department of Transportation Act of 1966.*
- *Prepare documentation of compliance to a level appropriate to the undertaking’s potential to cause significant harm to the environment.*
- *Evaluate alternatives (including a no-action or no-build alternative) and make decisions that balance the need for the project with the social, economic, and environmental impacts of the project.*
- *Inform governmental entities and the public and give them an opportunity to be involved in decision-making.*
- *Implement measures to avoid, minimize, or mitigate environmental impacts.”*

Federal guidelines, 23 CFR 771.115, have established three classes of action that determine how agencies must comply with NEPA. The three classes of action are (Utah Department of Transportation 2009):

- *“Class I – Environmental Impact Statement (EIS) is prepared for projects that would cause a significant adverse effect on the environment.*
- *Class II – Categorical Exclusion (CE) is prepared for projects that would cause minimal social, economic, or environmental impact.*
- *Class III – Environmental Assessment (EA) is prepared for larger-scale projects that do not meet the requirements for a CE or those for which the significance of the environmental impact is not clearly established. If the environmental analysis and interagency review during the EA process find that a project would have no significant impacts on the environment, a Finding of No Significant Impact*

(FONSI) is issued. If the review finds that the project would have significant impacts, an EIS must be prepared.”

State DOTs work with FHWA to determine which class of environmental action is appropriate for each project. Once a class of action has been determined, State DOTs begin navigating the NEPA process. Completing the NEPA process is the major goal of the preliminary phase of a project.

NEPA documents for design-bid-build projects have often been very prescriptive in each of the “special studies” that compile the document as well as in the alternative selected for the project. Several State DOTs, such as Colorado, Washington, Virginia, Michigan, and North Carolina have learned that adding flexibility to NEPA documents can prevent the need for NEPA re-evaluations after letting and accomplish the goals of the project without limiting innovation opportunities by design-build teams (ICF Consulting 2008).

State DOTs currently follow Federal Guidelines in regards to NEPA planning and design-build project delivery. The guidelines that control design-build contracting are listed under the Code of Federal Regulations (CFR) Title 23: Highways, Part 636 – design build Contracting; section 636.109 of this title indicates the rules that State DOTs must follow when completing the NEPA process with respect to design-build delivery method (2009). These guidelines allow a State DOT to advertise and award a design-build contract prior to the completion of the NEPA document provided that the following stipulations are met:

- Only Preliminary Design is advanced until the completion of the NEPA planning process

- The design-build contract must include appropriate provisions ensuring that all environmental and mitigation measures identified in the NEPA document will be implemented
- The design-build team must not prepare the NEPA document or have any decision making responsibility with respect to the NEPA process
- Any consultants who prepare the NEPA document must be selected by and subject to the exclusive direction and control of the contracting agency
- The design-build team may be requested to provide information about the project and possible mitigation actions, and its work product may be considered in the NEPA analysis and included in the record
- The design-build contract must include termination provisions in the event that the no-build alternative is selected

4.2.1 Challenges NEPA and quantification and mitigation of environmental impacts

4.2.1.1 Conventional prescriptiveness constraints of NEPA

Regulatory agencies have been working with the NEPA process on design-bid-build projects for over 40 years. On a typical design-bid-build project, as the project design develops the design parameters are written into the NEPA document and corresponding “special studies” to document the exact impacts of the project’s design on the environment. Design-build lends itself to the final design differing from preliminary design as the design-build teams propose innovative ideas or work to design and construct a more cost-effective project while meeting the project goals. Design-build team’s innovation is often constrained by the requirements written into the NEPA

document that limit innovation opportunities or trigger a NEPA re-evaluation (Wood et al. 2011).

Several studies have been conducted to identify sources of project delay related to the NEPA process. The NEPA process is a wide reaching process that is based on evaluating alternatives and balancing environmental impacts across alternatives and resources (American Association of State Highway Transportation Officials et al. 2007). Individual statutes governing the special study areas of air, water, parks, historic properties, rare and endangered species, and other resources are narrowly defined. This narrow definition is further complicated by a lack of guidance on how to compare and balance impacts across areas (American Association of State Highway Transportation Officials et al. 2007). This coupled with inconsistent mandates and variations and rigid interpretations in policy and regulations compound the time required for the NEPA planning process (American Association of State Highway Transportation Officials et al. 2007; Venner Consulting 2012).

4.2.1.2 Mitigation of NEPA impacts while not limiting innovation

As part of the NEPA process, State DOTs are required to identify and evaluate all relevant and reasonable measures to mitigate the impacts to the environment caused by transportation projects (Federal Highway Administration). The CEQ has defined mitigation as:

- *“Avoiding the impact altogether by not taking a certain action or parts of an action.*
- *Minimizing impacts by limiting the degree or magnitude of the action and its implementation.*
- *Rectifying the impact by repairing, rehabilitating, or restoring the affected environment.*

- *Reducing or eliminating the impact over time by preservation and maintenance operations during the life of the action.*
- *Compensating for the impact by replacing or providing substitute resources or environments.”*

These approaches should be evaluated sequentially with avoidance being considered the first option and compensating for the impact as the final option (Federal Highway Administration). The documentation of mitigation measures is referred to in the NEPA process as a commitment. Environmental commitments can be generated under different laws, regulations, or procedures which may overlap. The overlap of laws, regulations, and procedures can cause challenges when developing commitments as they can become unclear, inconsistent, or contradictory (Utah Department of Transportation 2009). Examples of additional environmental laws, regulations and procedures can be seen below:

- Title VI of the Civil Rights Act of 1964
- Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970
- Americans with Disabilities Act
- Executive Order 12898 (Environmental Justice)
- Section 4(f) of the Department of Transportation Act
- Clean Air Act
- Safe Drinking Water Act
- Farmland Protection Policy Act
- Resource Conservation and Recovery Act of 1976

- Comprehensive Environmental Response, Compensation, and Liability Act
- National Historic Preservation Act
- Archaeological and Historic Preservation Act
- Section 6(f) of the Land and Water Conservation Act
- Endangered Species Act
- Executive Order 11988 (Floodplain Management)
- Executive Order 11990 (Protection of Wetlands)

State DOTs must work to ensure that mitigations measures do not conflict with one another and do not limit opportunities for the design-build team to provide innovation (American Association of State Highway Transportation Officials et al. 2007). AASHTO has written recommendations on ways to optimize the current process and ways that the current process can be improved by reforming environmental laws to integrate them and eliminate conflicts (American Association of State Highway Transportation Officials et al. 2007). To date it does not appear that current transportation legislation has attempted to take into account these recommendations.

4.2.1.3 Permit agency concerns about pressure from design-build teams

Permitting agencies are also used to seeing permits and mitigation being written to mitigate for exact impacts to the environment. To be able to permit a project, agencies desire the same level of design information that they are used to seeing (Washington State Department of Transportation 2004). Agencies are concerned that the effects of the project that must be known and understood to allow permitting to occur will not be available under design-build if the design is not developed to the level of detail required

for permitting. Agencies prefer to permit for actual impacts and not for hypothetical situations that a design-build team may or may not comply with (The Louis Berger Group and Cambridge Systematics 2007).

Resource agencies will consider permitting for the worst case scenario is a solution, but in these cases they often want the level of mitigation to remain the same even if the environmental impacts are decreased. Regulatory agencies have a history of working with State DOTs and there is a familiarity and level of trust between the two (The Louis Berger Group and Cambridge Systematics 2007). Agencies are worried that design-build teams will attempt to reduce permitted mitigation requirements if their proposed design reduces impacts. By performing advance permitting, agencies want assurances that the design-build team will comply with the agreed mitigation regardless of the impacts of the final design (Washington State Department of Transportation 2004). Additionally, resource agencies that are inexperienced working with design-build teams may worry that design-build teams will not complete the mitigation requirements of the permits or will try to substitute alternate mitigation measures (The Louis Berger Group and Cambridge Systematics 2007). Interviews with State DOTs identified that each has received input from regulatory agencies on their comfort level with design-build projects and the role of the State DOT and the design-build team. A summary of these interviews is below:

- UDOT works with regulatory agencies to obtain permits based on approximately 30% plans. This level of plan development for permitting makes regulatory agencies uncomfortable, but they have been willing to permit projects with this low level of design. UDOT would like to utilize incentive based permits on

design-build projects, but regulatory agencies have been unwilling to allow this to date (Brandon Weston, personnel communication, March 7, 2013).

- CDOT has worked with regulatory agencies for a number of years on design-build projects and has established a comfort level with them. CDOT works with agencies to establish contract requirements and permits are obtained using the detailed design plans prepared by the design-build team (Jordon Rudel, personnel communication, February 26, 2013).
- NCDOT has a strong working relationship with regulatory agencies. NCDOT does not allow the design-build team to coordinate directly with regulatory agencies and acts as the main point of contact. Regulatory agencies are comfortable with this process (Theresa Bruton, personnel communication, March 15, 2013)
- WashDOT has had problems with the design-build team complying with permit requirements for construction related permits that are acquired by the design-build team. WashDOT is seeing that design-build teams are not always motivated for strict permit compliance and that typical monetary fines are seen as the cost of doing business. Regulatory agencies are pushing for WashDOT to play a larger role in enforcing compliance (Christina Martinez, personnel communication, February 27, 2013).
- VDOT originally encountered fears from regulatory agencies that design-build teams would increase impacts to the environment in an effort for cost savings. Regulatory agencies have been surprised as design-build teams have typically

reduced impacts vs. what was originally anticipated (Jim Cromwell, personnel communication, February 22, 2013).

State DOTs with experienced design-build programs seem to have overcome the fears of regulatory agencies. However as WashDOT has learned, State DOTs must be involved in enforcing permit compliance.

4.2.2 Opportunities for enhancement in NEPA and quantification and mitigation of environmental impacts

4.2.2.1 Opportunity for efficiency enhancement: The State DOT should add flexibility to the NEPA document and special studies by identifying alternative mitigation strategies, maximum impacts, and performance mitigation measures.

State DOTs can encourage innovation in design-build teams by adding an appropriate level of flexibility to the NEPA document specifications. State DOTs have found that flexibility in the NEPA document and being less prescriptive in terms of design solutions results in higher levels of innovation (Kross 2007). This means that the focus of the NEPA document should be to clear a footprint for the construction of the project and not to design a solution to the project's need and purpose. This innovative solution often leads to lower project cost and win-win outcome for the State DOT and the design-build team. State DOTs have identified that by using performance mitigation for NEPA commitments, they can increase design-build innovation. A common form of performance based mitigation is for sound barriers for noise abatement.

Use of Performance specification for Noise Abatement

Design-bid-build projects often layout prescriptive parameters for noise abatement walls, often providing a station range, wall height, and centerline offset for the noise walls. This level of prescriptiveness can limit design-build team's opportunities to modify the

design as shifting the noise walls would require a re-evaluation of the NEPA document. FHWA has identified that Transportation Departments can instead determine the level of noise abatement required for the project but let the design-build team determine how best to achieve that level of noise abatement (Alexander 2009). This requirement can be included in the RFP as a performance specification that the Department can verify by modeling the design-build team's proposed solution and conducting an after construction noise assessment to confirm that the impacts were abated as required by the NEPA document. This flexibility saves time in the delivery of the project by reducing the chance for the project to need a re-evaluation of the NEPA document and reduces the level of design required by the State DOT prior to project advertisement and award to a design-build team. Innovation is also promoted as design-build teams are not limited by the specific requirements for the location and height of the noise abatement barrier and are able to propose locations for the noise abatement barrier that may differ from the NEPA planner or State DOT's initial ideas for their location. Without this flexibility, a shift in the location and change in the height of a noise abatement barrier would cause the NEPA document to be Re-Evaluated and potentially delay the project.

Some examples from various RFPS of several State DOTs are shown below:

Transfer of design and construction of noise barriers in VDOT

VDOT transfers the design and construction of the noise barriers to design-build teams. They require that the design-build team follow the mitigation guidelines established in the Noise Analysis completed as part of the NEPA process. The basic design process is described below:

The Design-Builder will provide permanent noise mitigation in compliance with the Virginia State Noise Abatement Policy and the Highway Traffic Noise Impact Analysis Guidance Manual. The final barrier location(s) and dimension(s) will be determined during the final design noise analysis. A Noise Abatement Design Report (NADR) shall be furnished by the Design-Builder at its sole cost and expense. The final noise mitigation design will utilize the design year traffic volumes defined in the reevaluation of the Preliminary Noise Analysis (date to be determined) and associated noise levels.

Once the design of the noise barriers is complete and has been approved by VDOT and FHWA, VDOT requires the design-build team to provide a copy of the design report to all beneficiaries of the noise barrier. This includes coordination and completion of citizen survey which also requires concurrence from VDOT.

Transfer of design and construction of noise barriers in Texas DOT (TexDOT)

Texas DOT also transfers the design and construction requirement of noise barriers to the design-build team. They do this with minimal contract language and instead rely on their design manuals to govern how the wall is designed and constructed. The main requirement of the contract is for the noise barrier to comply with the decibel reduction requirements of the NEPA document as seen below:

*Design-Build Contractor shall design and construct the noise/sound walls to achieve the decibel reduction requirement in the NEPA Approval(s).
Panel design and construction shall limit the risk of falling debris resulting from traffic impacting the sound wall.
Timber sound walls are not allowed.*

Transfer of design and construction of noise barriers in NCDOT

NCDOT requires the design-build team to design and construct the noise barrier, but their RFP language implies that they provide more than just a decibel reduction requirement. They only require the design-build team to design the wall envelopes which implies that the noise report documents the height requirements of the noise barrier. NCDOT does transfer the risk of design changes that impact the noise barrier to the design-build team

by requiring them to revise the noise report if necessary and design and construct the noise wall as necessary. Example language from an NCDOT RFP that includes noise barriers is shown below:

The Design-Build Team shall design and construct the sound barrier walls listed in the April 4, 2012 Design Noise Report and perform all geotechnical investigations necessary to design the foundations. The Design-Build Team shall be responsible for the wall envelope details. If the Design-Build Team revises the horizontal and/or vertical alignments such that greater noise impacts are possible on surrounding receptors, the Design-Build Team shall reanalyze and complete a revised noise report, if necessary, for NCDOT and FHWA review and acceptance. The April 4, 2012 Design Noise Report will be provided to the Design-Build Team to assist in their determination of anticipated additional noise impact on current receptors due to design changes. If adjustments to, or addition of, sound barrier walls are required as a result of design deviations, the Design-Build Team shall be responsible for all costs associated with the adjustments and/or additions.

Transfer of design and construction of noise barriers in Missouri DOT (MoDOT)

MoDOT transfers the responsibility for designing and constructing noise barriers to design-build teams without providing any documentation or any noise analysis. The design-build team is responsible for determining where noise barriers are feasible based on a cost per benefited receptor requirement. This contract language may be considered too risky for design-build teams as it may be difficult to bid without knowing if noise barriers are feasible or not. Contract requirements of the design-build team are:

The Contractor shall provide noise mitigation in accordance with MoDOT's Traffic Noise Policy for a Type I Project and with 23 CFR Part 772. Noise analysis shall be performed using FHWA's Traffic Noise Model version 2.5. Existing noise levels have been determined and are provided in Book 4.

If walls are used for noise mitigation, the cost of a noise wall must not exceed \$30,000 per benefited receptor. The cost index shall be calculated using a cost of \$20 per square foot for a noise wall. The cost per residence shall be calculated over the length of the project. That is, the cost of all noise walls must not exceed \$30,000 multiplied by the total number of benefited receptors from Ballas Road to the easterly project limits.

Further complicating the process, once the design-build team completes the noise abatement analysis the benefited receptors are allowed to vote by simple majority if the barrier will be constructed. This uncertainty is difficult for design-build teams to quantify and MoDOT and other State DOTs may benefit by performing some of this effort in advance of advertising a project. An example of this language is shown below:

The Contractor shall conduct the noise analysis from Ballas Road to the eastern terminus of the Project and determine the need for sound abatement within these limits. Information on proposed sound abatement, including proposed noise levels and the type, size, and location of the abatement measures shall be provided to MoDOT for Approval. MoDOT will present the proposed sound abatement design to the benefited receptors. Each benefited receptor will receive one vote in determining if the sound abatement will be constructed. A simple majority of benefited receptors, for a section from interchange to interchange, will determine if the sound abatement is to be constructed. MoDOT will complete this voting process within 45 days of receiving the sound study and design information from the Contractor. Once MoDOT completes the voting process, MoDOT will then provide the results to the Contractor so the Contractor can proceed with construction of the sound abatement. If a majority of benefited receptors for a section vote “no” on abatement, noise abatement shall not be constructed.

Use of performance based mitigation for other types of environmental impacts

Interviews with State DOTs indicated that there is a desire within State DOTs to push for more performance based mitigation strategies. One area that State DOTs are gaining the ability to use a type of performance mitigation is for stream and wetland impacts. This is done by identifying streams and wetlands within the corridor in the NEPA document and stating that they may be impacted by the project. The design-build team becomes responsible for determining actual impacts and often the mitigation associated with those impacts through the permit process.

State DOTs that were interviewed have had success using broad descriptions of impacts or by using language that describes potential impacts. This approach has allowed design-build teams to propose changes to a project’s design without triggering time consuming

re-evaluations of the NEPA or State environmental planning document. Excerpts from our interviews with various State DOTs who utilize broad descriptions of potential impacts can be seen below:

- UDOT incorporates limited flexibility in their NEPA documents. NEPA documents are vague and flexibility is left for the project's final design in areas where there is minimal chance that the proposed design could affect environmental resources. While this approach does not allow for maximum flexibility for design-build teams, it protects UDOT's and regulatory agency interests while providing for flexibility in areas where impacts to the environment are not as much of a concern (Brandon Weston, personnel communication, March 7, 2013).
- CDOT uses a "Base Design" in the preparation of their NEPA documents. CDOT strives to define maximum impacts in the "Base Design" (Jordan Rudel, personnel communication, February 26, 2013).
- MDOT's local FHWA division has pushed MDOT to identify what level of NEPA document is required for a project at very early stages of a project's design. This has led to very non-prescriptive NEPA documents, as the design has not progressed far enough to quantify exact impacts. Due to the non-prescriptive nature of MDOT's NEPA documents, re-evaluations are not common on MDOT projects (Sheila Upton, personnel communication, February 28, 2013).
- NCDOT tries to examine a wide corridor and describe potential impacts on all projects regardless of the delivery method. This allows for the design to change

without requiring a re-evaluation (Theresa Bruton, personnel communication, March 15, 2013).

- WashDOT has partnered with regulatory agencies and their local FHWA division to allow for maximum flexibility in the NEPA document. WashDOT does not define a worst case scenario, but discusses likely construction methods and their potential impacts. This allows design-build teams to propose innovative designs that may alter environmental impacts. WashDOT strives to clear a corridor for the design-build team to be able to work within (Christina Martinez, personnel communication, February 27, 2013).
- VDOT clears a large footprint for the project so that design-build teams have maximum flexibility when completing the final design and construction. VDOT clears a corridor larger than what they anticipate a design-build team would impact by the proposed project (Jim Cromwell, personnel communication, February 22, 2013).

Each State DOT interviewed has a different comfort level with allowing for flexibility in the NEPA document. For design-build contracts, any flexibility afforded to the design-build team increases the opportunities for innovation.

Use of broad description of impacts in NEPA

While several State DOTs often use prescriptive language in developing NEPA documents, some state and Federal agencies commonly use broad language to describe impacts on their NEPA documents and corresponding “special studies”. This broad language creates flexibility in the final design and construction of the project without

requiring the NEPA document to be updated every time a design change is made. Below is an example from an approved Environmental Assessment, which resulted in a Finding of No Practical Alternative (FONPA), for Robins Air Force Base in Georgia for the construction of basin wide improvements for stormwater drainage. The lead Federal Agency on this project is the U.S. Army Core of Engineers (USACOE) (URS Group 2012). The quote below from the NEPA document describes permit requirements of the agency and contractor without describing actual impacts or mitigation. This allows the agency to finalize these impacts in the final design and permitting stage of the project without needing to re-evaluate the NEPA document:

Adverse impacts to streams/wetlands or floodplains may be acceptable only if there is no practicable alternative, potential impacts have been minimized, and compensatory mitigation is provided for unavoidable adverse impacts. Because of the location of the existing culverts and the need to upgrade the culverts within the same footprint, there is no practicable alternative that would meet the project requirements. Therefore, the Proposed Action must be located within the previously indicated streams. 78 CEG/CEAO has prepared a Finding of No Practicable Alternative (FONPA) to explain the necessity of working in the subject streams. In addition, the construction activities would be minimized to the maximum extent practicable and would comply with appropriate local, state, and federal regulations and permits, as well as an approved Erosion, Sediment and Pollution Control Plan. Therefore, construction of the SWDS improvements would result in insignificant adverse impacts to surface waters on Robins AFB.

This document complies with NEPA and CEQ regulations through language describing how impacts will be mitigated and why the impacts are necessary. This example shows that impacts can be described in general terms (URS Group, Inc. 2012).

The total area of impact to the wetland (estimated to be approximately 0.1 hectare [0.3 acre] of new impact) and required wetland mitigation, if any, would be calculated prior to construction using the final design plans and wetland boundary delineation. Project 27/b would be fully coordinated with the USACE, Savannah District and would comply with the appropriate CWA Section 404 permit. Because the programming date for this project precludes Section 404 coordination at this time, coordination would occur at an appropriate future time prior to construction.

This document was developed prior to final construction plans being finalized as is a commonality on design-build projects. Impacts are approximated and final mitigation and permitting is allowed to stand on their own separate from this document. This strategy allows the USACOE to achieve an approved NEPA document while not describing final project impacts and not requiring the document to be subject to a re-evaluation if the final impacts differ from what is anticipated when the NEPA document is developed. This language discusses impacts to wetlands that will be incurred by the project but the language is broad enough that the design and permitting are able to stand alone as the exact impacts are not described in the NEPA document (URS Group 2012).

Missouri DOT (MoDOT)

MoDOT has identified that incorporating flexibility into the NEPA document allows design-build teams to propose innovation (Kross 2007). Missouri DOT strives to focus on the footprint of the proposed project instead of a design solution. This innovation has led to lower costs and quicker delivery of projects. MoDOT's Safe and Sound Bridge Program also provides an excellent example of identifying acceptable mitigation measures, performance mitigation measures, and defining maximum environmental impacts (Jim Peterson, personnel communication, 2009). This project replaced over 800 structurally deficient bridges in Missouri and obtained a NEPA document for all of the bridges in approximately one year. The NEPA document identified maximum allowable impacts for each bridge and acceptable mitigation strategies based on the actual impacts of the proposed bridge replacement by the design-build team (Jim Peterson, personnel communication, 2009). MoDOT used a Practical Design Guide as guidance for all bridge designs, balancing traditional wants of AASHTO and MoDOT with the needs of the

facility being designed and constructed as quickly and cost effectively as possible (Jim Peterson, personnel communication, 2009). Requirements for impacts to streams and wetlands were included in the RFP as seen in the contract language below:

5.3 Wetlands and Waters of the US

The Contractor shall fulfill the terms and conditions of both the Clean Water Act Section 404 permit and the Section 401 Water Quality Certification, as required by the U.S. Army Corps of Engineers (USACE) and the MoDNR, respectively. The Contractor shall integrate design practices to avoid and/or minimize potential Work impacts to wetlands and waters of the U.S. The Contractor shall participate in the development of all stream and/or wetland mitigation required to fulfill the permitting requirements, as described in Book 2, Section 5.9.

The Contractor shall maintain the natural low flow characteristics of all stream crossings, including temporary crossings.

The Contractor shall provide the following deliverable; cut and fill quantities, location of impacts and bridgework design plans including cross-sections as necessary to secure Clean Water Act Section 404 permits and 401 certificates.

For Work on Project Bridges that have one-tenth or less acre permanent fill in waters of the US and no other environmental impacts, no pre notification to the USACE is required. These preliminary plans do not require cross-sections and can be approved within one month.

This contract language allowed the 401 and 404 permits to stand on their own and for the design-build team to comply with all requirements of these permits. As indicated in the last paragraph, MoDOT coordinated with the United States Army Core of Engineers (USACOE) to streamline the process for impacts under 0.1 acres of permanent impact to streams and wetlands.

4.2.2.2 Opportunity for efficiency enhancement: State DOTs should establish programmatic agreements with federal and environmental agencies to streamline the environmental planning and permitting process and to provide flexibility in the NEPA document

Programmatic agreements with Federal and Environmental agencies can streamline the development of the NEPA document by providing pre-approved mitigation measures for

various environmental impacts. The FHWA Every Day Counts (EDC) Initiative suggests continuous and expanded use of programmatic agreements to save time and streamline the processes for acquiring various permits (FHWA - Every Day Counts 2012). Agreements between State DOTs and Federal and Local agencies result in streamlined project reviews and often lead to improved relationships. When programmatic agreements exist for avoiding, minimizing, and mitigating impacts, projects can be reviewed much more quickly. Equally important, these agreements provide an essential foundation for shared understanding and effective working relationships between State DOTs and regulatory agencies. Expanding the use of programmatic agreements has proven valuable in streamlining project reviews, reducing project implementation time and increasing trust among State DOTs and regulatory agencies (FHWA - Every Day Counts 2012). Programmatic agreements allow for project level decisions to be governed by a larger agreement that expedites decision making and streamlines project level agreements (Venner Consulting 2012).

The State DOTs should have two goals when expanding the use of programmatic agreements (FHWA - Every Day Counts 2012):

- *Identifying situations in which new programmatic agreements will be beneficial; and*
- *Assisting in expanding existing Programmatic Agreements to a regional, statewide, or national level. Divisions and State DOTs should explore which program areas could benefit from using Programmatic Agreements on a regional scale. Divisions should then coordinate with neighboring states to highlight and prioritize opportunities to create multistate and/or regional programmatic agreements.*

There are two common challenges to expanding the use of programmatic agreements (Center for Environmental Excellence 1999):

- Lack of trust between the Agencies; and

- Worries that mitigation will not be adequate for the impacts.

State DOTs can overcome these challenges by initially using programmatic agreements for simple issues and then as the relationships between agencies are strengthened through the trust formed by following through on these Programmatic Agreements, the use of programmatic agreements can be expanded to situations that require more complex mitigation strategies (Center for Environmental Excellence 1999).

Programmatic agreements with federal and environmental agencies can allow the State DOT to create performance measures for the mitigation of environmental impacts. Environmental impacts are typically quantified based on exact impacts according to actual impacts identified by the preliminary design (Venner Consulting et al. 2005). Mitigation measures are then designed specifically for that preliminary design. On design-build projects, quantifying and subsequently mitigating for specific impacts may lead to more frequent re-evaluations of the NEPA document if the proposed design change affects the previously quantified impacts. This limits opportunities for innovation and depending on the aggressiveness of the project schedule may dis-incentivize innovation by the design-build team since they will avoid any changes that may trigger a re-evaluation. Programmatic agreements often are based on performance measures, but can simply be a list of acceptable mitigation strategies based on different thresholds and types of impacts (Venner Consulting et al. 2005). State DOTs that were interviewed identified that programmatic agreements were beneficial to expediting the NEPA and permitting processes, but none of the State DOTs mentioned programmatic agreements that were specific to design-build. Some useful programmatic agreements that were identified in interviews are summarized below:

- UDOT has a programmatic agreement with the State Historic Preservation Office (SHPO) and USACE for history and Section 106 compliance. This programmatic agreement speeds up the overall NEPA process as impacts to historic properties are more efficiently mitigated (Brandon Weston, personnel communication, March 7, 2013).
- CDOT identified that they have programmatic agreements with various regulatory agencies to aid the NEPA process (Jordan Rudel, personnel communication, February 26, 2013).
- MDOT utilizes a programmatic agreement that the Michigan Department of Environmental Quality (DEQ) has with USACE which allows the DEQ to sign off on 404 permits that are not in a Section 10 Navigable Waterway. This results in MDOT being able to obtain 404 permits on average in under 2 months. The 404 permit process in other states can take from six months to over a year depending on the level of permit required (Sheila Upton, personnel communication, February 28, 2013).
- MDOT has programmatic agreements with SHPO that allows MDOTs historians and archaeologists to sign off on most history and archaeology studies without submitting them to SHPO for review (Sheila Upton, personnel communication, February 28, 2013).
- NCDOT has a programmatic agreement with FHWA, USACE, North Carolina Department of Natural Resources (DNR) and several other partnering agencies which allows for the 404 permitting and NEPA environmental process to be done

concurrently. This process includes seven concurrence points where all affected agencies sign off on the project as currently designed and agree to the mitigation and avoidance measures proposed. This process expedites the permit process and requires all agencies to work together towards a common goal (Theresa Bruton, personnel communication, March 15, 2013).

These State DOTs have realized time savings in a project's development and NEPA planning process by using programmatic agreements to expedite the planning and permitting process. While these programmatic agreements aren't written specifically to aid design-build projects, they do allow State DOTs to expedite their delivery.

Programmatic agreements may also include recommendations to include incentives in the contract for reducing impacts to the environment and can allow State DOTs to establish maximum impacts within the NEPA document and special studies (Venner Consulting et al. 2005). These maximum impacts are then quantified and considered in the NEPA decision and design-build team is incentivized to reduce the impacts where possible. This flexibility also reduces the chance that changes proposed by the design-build team will initiate the need for a NEPA re-evaluation or permit modifications.

Use of Programmatic agreements in Missouri DOT (MoDOT)

Missouri's Safe and Sound bridge program which cleared over 800 bridges in approximately one year was made possible largely by the development and implementation of programmatic agreements with environmental agencies that had jurisdiction over environmental resources impacted by the bridges replacement (Jim Peterson, personnel communication, 2009). These programmatic agreements provided

design-build teams will acceptable mitigation strategies based on the level and type of impact to an environmental resource.

Use of Programmatic agreements in Oregon DOT (ODOT)

ODOT has obtained programmatic agreements that they consider applicable to all design-build projects. Below is the language they include in all design-build RFP's to add flexibility for the design-build team:

(5) Programmatic Agreements - *The following programmatic agreements may be applicable to the Project:*

- *Peregrine Falcon Management Plan with Oregon Department of Fish and Wildlife (ODFW)*
- *Programmatic drilling agreement with National Marine Fisheries Services (NMFS)*
- *Programmatic permits and agreements Agency has developed as part of the Oregon Transportation Investment Act III Statewide Bridge Delivery Program, Oregon, including:*
 - *Regional General Permit for ODOT Bridge Repair and Replacement, including 401 certification (US Army Corps of Engineers), July 29, 2004, Permit No. 200400035*
 - *Informal Concurrence and Formal Biological Opinion and Conference & Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat Consultation, OTIA III Statewide Bridge Delivery Program, Oregon (USFWS and NMFS), June 28, 2004*
 - *Memorandum of Agreement with US Department of Agriculture (USDA) Forest Service and BLM, July 2004*

In addition Oregon transfers the risk that if the programmatic agreements are not applicable to the project then it is the responsibility of the design-build team to notify ODOT as such with appropriate documentation.

(6) Environmental Performance Standards - *As part of the programmatic permitting and agreements, environmental performance Standards have been developed which are applicable to OTIA III Bridge projects. These programmatic permits and agreements shall be utilized and complied with, to the extent feasible, in the performance of the Work. If Design-Builder concludes that the programmatic permits*

and agreements are not feasible for the Project, Design-Builder shall submit documentation explaining the basis of that conclusion to Agency PM. The documentation shall address impacts to Project scope, schedule, budget and the ability to meet the OTIA III Program goals. The documentation will be included in the Environmental Compliance Plan.

Use of Programmatic Agreements in Iowa DOT (IA-DOT)

IA-DOT, FHWA, USACOE, US Fish and Wildlife Service (USFWS), EPA, and Iowa DNR have entered into a programmatic agreement to streamline the mitigation process for unavoidable adverse impacts on transportation projects. This process was developed to create more flexible and ecologically responsive mitigation framework for permitting. Since this programmatic agreement is between three major permitting agencies and FHWA, the document allows for the integration of multiple natural resource issues and regulatory requirements into a single process that better facilitates permit compliance and resource management (Center for Environmental Excellence 2013).

4.2.2.3 Opportunity for efficiency enhancement: The State DOT should acquire time-consuming and high-risk permits early on and leave non-critical permits to be attained by the DB team

Environmental permits are typically required for a State DOT to comply with regulatory environmental agencies, state, federal, and local laws. On a design-bid-build project, the State DOT typically obtains all required environmental permits prior to advertisement and letting. On design-build projects, State DOTs are increasingly choosing to transfer the responsibility for preparing and obtaining environmental permits to design-build teams, especially those permits that are dependent on the final design solution proposed by the design-build team. State DOTs practice three major environmental permitting strategies on design-build projects (Molenaar et al. 2005):

- The State DOT secures permits and the design-build team is responsible for modifying and/or complying with permits.
- The State DOT secures some early action high risk permits and the design-build team is responsible for modifying and complying with those permits as appropriate, as well as for obtaining the remaining permits.
- The design-build team is responsible for obtaining and complying with all permits.

The State DOT should consider acquiring the most critical permits or those with the highest risk prior to the advertisement of design-build projects, with responsibility transferred to the design-build team for any amendments and changes that must be approved by the sponsoring or regulatory agency (The Louis Berger Group 2005). Several State DOT interviews indicated that many State DOTs take the approach of acquiring most non construction related permits in advance to reduce risk to design-build teams and to expedite design-build team's ability to move to construction. A summary of State DOTs that were interviewed who obtain most permits in advance can be seen below:

- UDOT acquires all environmental related permits in advance of advertising design-build projects to allow the design-build team to expedite construction as they are not waiting on these permits to begin construction. Construction related permits that would typically be acquired by a contractor on design-bid-build projects are still obtained by the design-build team (Brandon Weston, personnel communication, March 7, 2013).

- MDOT obtains as many permits as possible prior to advertisement of design-build projects. MDOT anticipates that this reduces risk to design-build teams and results in lower bid prices (Sheila Upton, personnel communication, February 28, 2013).
- WashDOT typically obtains all environmental permits on design-build projects in advance of advertising a project. WashDOTs experience is that acquiring these permits early they often must be modified once the design-build team is on board. WashDOT is attempting to push regulatory agencies to allow for performance based mitigation. The goal of performance based permitting would be to identify mitigation results that regulatory agencies are trying to achieve instead of permitted specific mitigation strategies (Christina Martinez, personnel communication, February 27, 2013).

State DOTs should utilize risk allocation matrices on design-build projects and identify environmental permits that can be transferred to the design-build team that do not include adverse amounts of risk and jeopardize the success of the project. State DOTs can consider transferring the following responsibilities to the design-build team (The Louis Berger Group 2005):

- Require the design-build team to acquire and comply with environmental permits
- Modifications to environmental permits (regardless of which party acquired the permits)
- Compliance with the acquired environmental permits
- Financial costs that may arise from permit violations

- Schedule changes that may happen due to permit violations
- Acquire construction related permits

The State DOT should identify more of these risks that may be traditionally managed by the State DOT but can be transferred to the design-build team and explicitly state them in the RFPs.

Below are examples of contract language from several State DOTs indicating how each assigns risks and responsibilities for permit acquisition:

Maryland DOT

Maryland DOT State Highway Administration Design-Build Manual

Maryland DOT typically acquires all permits for permanent impacts on design-build projects while the design-build team is responsible for temporary and construction permits (State Highway Administration 2013). Maryland DOT does require the design-build team to acquire any permit modifications that are required based on their proposed design and requires them to take on the schedule and cost risk associated with the modification. Modification requirements of their design-build manual can be seen below:

The DBT may elect to modify the Conceptual Plans prepared by SHA, and may, in effect created additional impacts on a regulated resource. However, it is the DBT's sole responsibility to obtain, at their expense, approved permit modifications. SHA will coordinate modified permit approvals but SHA will not be responsible for delays in the project schedule for securing the permit modification.

Maryland DOT appears to allow design-build teams to modify the original permit in such a way that actual impacts and corresponding mitigation is increased. This is unusual in comparison to many other State DOTs who will allow design-build teams to modify permits, but only to reduce impacts and not to increase them. This is likely due to

Maryland DOT's decision to acquire all permits based on the Conceptual Plans prepared for the RFP.

MDOT

MDOT tries to obtain all permits in advance of advertising a design-build contract to reduce risk for design-build teams and to obtain better bid prices. Some examples below are from various MDOT RFPs.

I-94 Reconstruction

For this project MDOT had begun the permit process, but had not acquired all permits prior to advertisement. MDOT used clear contract language to inform the design-build teams the status of the permit process and to maintain the risk associated with delays in the permit process.

4.2.3 Permits

MDOT is in the process of obtaining permits from the MDEQ that are anticipated to cover unavoidable impacts as indicated in Exhibit 2-4-B. MDEQ permits obtained by MDOT to date for the Project are included in Exhibit 2-4-B. The Contractor may anticipate any remaining MDEQ permits to cover impacts as indicated in Exhibit 2-4-B will be approved prior to Award.

Ambassador Bridge Plaza – Gateway Completion

For this project MDOT obtained all permits in advance of advertising the project.

4.2.3 Permits

MDOT has obtained environmental clearance from the FHWA indicated in Exhibit 2-4-A (FHWA Environmental Document). MDEQ permits obtained by MDOT to date for the Project are included in Exhibit 2-4-B.

NCDOT

NCDOT has utilized a variety of permit options on various projects. In the past, some permits were obtained by NCDOT with modification requirements transferred to the

design-build team, while other permits were considered the responsibility of the design-build team. NCDOT used to vary this strategy based on the goals of the project and the amount of time anticipated to acquire each permit and the time impact to the project schedule.

Example language from the NCDOT US 70 RFPs can be seen below:

US 70 New Location:

This project was advertised for the design and construction of 12.5 miles of US 70, a four lane divided highway on new location. On this project NCDOT utilized a combination of the common permit strategies, acquiring some in advance and transferring the acquisition responsibility of others to the design-build team. Contract language regarding the permit requirements can be seen below.

General

The US Army Corps of Engineers Section 404 Permit and the NC Department of Environment and Natural Resources (DENR), Division of Water Quality Section 401 Water Quality Certification have been issued for the R-2554 corridor, which includes the final design permit for the R-2554BA section currently under construction and a phased or preliminary permit for sections R-2554BB and R-2554C.

On this project, NCDOT has obtained several permits in advance of advertising the design-build RFP. This reduces the risk to the design-build team as they are not responsible for obtaining these permits.

The Design-Build Team shall be responsible for preparing all documents necessary for the Department to obtain the environmental permits for the construction requirements of this project. In addition to the above permits, a Neuse Riparian Buffer Authorization, and a Central Coastal Plain Capacity Use Analysis (CCPCUA) Permit will be required. The Design-Build Team shall not begin ground-disturbing activities, including utility relocations in jurisdictional areas, until the environmental permits have been issued (this does not include permitted investigative borings covered under a Nationwide Permit No. 6 and

utility relocation work outside jurisdictional resources noted below). The Design-Build Team shall not be allowed to operate under the Department's Nationwide Permit No. 6.

While NCDOT did obtain some permits in advance, other permits as indicated in the section above are the responsibility of the design-build team. NCDOT requires jurisdictional areas (areas permitted by the US Army Core of Engineers) to have all permits obtained before ground disturbing activities can begin in that area.

Oregon DOT

Base RFP Documents

(8) Permits - Design-Builder shall apply for and obtain all necessary environmental permits not previously obtained by Agency. Design-Builder shall prepare the design and conduct construction activities such that no action or inaction on the part of Design-Builder shall result in non-compliance with the requirements of Laws applicable to the project.

ODOT obtains some permits as they see necessary for each project, but includes a catch all statement as shown above to require transfer the risk and obligation for identifying and obtaining all other required permits.

WashDOT

WashDOT uses a combination of permit acquisition strategies on design-build projects.

I-405 Auxiliary Lane

This project was to design and construct a northbound auxiliary lane on I-405 from 195th St to SR 527.

2.8.4.2 PERMITS AND APPROVALS

2.8.4.2.1 Permit Acquisition

WashDOT has obtained the permits and approvals listed below. WashDOT anticipates that permits will be obtained prior to Contract award and will be incorporated into this RFP by addenda:

- *Section 404 Nationwide Permit – U.S. Army Corps of Engineers; and*
- *Section 402 NPDES General Permit for Construction Activities – Washington State Department of Ecology (Ecology).*

WashDOT states the permits they have obtained or are in the process of obtaining in Book 2 of their RFP documents. Obtaining permits in advance can help expedite the design-build team into construction.

The Design-Builder shall acquire the following permits and approvals (if necessary) and comply with all associated environmental requirements:

- *Noise Variance – City of Bothell;*
- *Notice of Intent for demolition activities – Puget Sound Clean Air Agency Local demolition permit –City of Bothell;*
- *Notice of Intent for geotechnical borings – Ecology;*
- *Notice of Intent for installing, modifying, or removing piezometers – Ecology;*
- *Notice of Intent for installing, modifying, or decommissioning wells – Ecology;*
- *Water Quality Modification Permit – Ecology; and*
- *Administrative Order for Chemical Treatment – Ecology.**

WashDOT transfers the responsibility for permits that are specific to the final design to the design-build team. These types permits do not typically take a long period of time to acquire and can be acquired concurrently with the design phase after award of the contract.

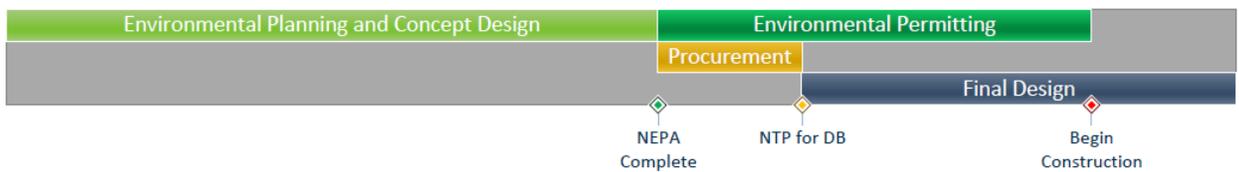
4.2.2.4 Opportunity for efficiency enhancement: Advertising and awarding projects prior to the completion of NEPA can improve project schedule.

Design-build also allows a unique approach to project delivery and the NEPA process by allowing a project to be advertised and awarded prior to completion of the NEPA process (2009). Although this practice is not commonly utilized on design-build projects due to the challenges associated with implementation, this practice is allowed by Federal Regulations.

This unique approach introduces new project risks that a no-build NEPA alternative may be selected and mitigation and permitting requirements for the project are not finalized upon award of the project (Kross 2007).

Procuring a design-build team prior to completion of NEPA can also provide an opportunity to expedite the overall delivery of the project as seen below:

Typical design-build process



Accelerated design-build process

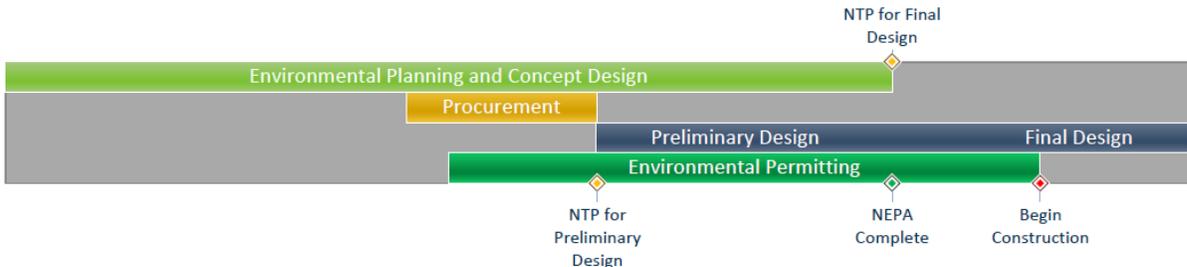


Figure 2: Typical design-build vs. accelerated design-build

Accelerating the delivery of the project by procuring and awarding a design-build contract prior to the completion of the NEPA planning process also introduces additional risks to the project. Some common risks that must be properly managed include (Hammond et al. 2011):

- It can be difficult to establish and meet a project schedule if delays occur in the NEPA analysis.

- Federal funding can be jeopardized if actions are taken that violate NEPA requirements.
- Perception that alternatives are not being properly considered because a design-build team has been selected.

Some of these risks can be managed by properly managing the design-build contract to ensure that NEPA requirements are not violated and that CFR requirements are followed ensuring that no final design or construction activities are begun until the completion of NEPA (2009). Schedule risks are inherent with the NEPA planning process and only projects with relatively certain NEPA completion dates should be considered for procurement prior to NEPA completion. Overall, this opportunity to expedite project delivery through awarding the design-build contract prior to the NEPA completion is considered high-risk for all State DOTs. Our interviews with State DOTs confirmed that the common perception is that the risks associated with this opportunity outweigh the rewards of an accelerated schedule. Some State DOTs indicated that the design-build community is not comfortable with the additional risk and uncertainty associated with NEPA not being complete. A summary of our interviews with State DOTs is below:

- UDOT does not advertise and award projects until NEPA is complete. UDOT is unwilling to take on the additional risks associated with advertising and awarding a project prior to the NEPA document being approved (Brandon Weston, personnel communication, March 7, 2013).
- CDOT does not advertise and award projects until NEPA is complete. CDOT and the design-build community in Colorado are uncomfortable with the additional

project risks that may result if NEPA is not completed until after the project's award (Jordon Rudel, personnel communication, February 26, 2013).

- MDOT does not advertise and award projects until NEPA is complete. Michigan's FHWA Division Office is not comfortable with MDOT's design-build experience and does not want them to introduce the additional risks associated with advertising and awarding a project prior to NEPA document being approved (Sheila Upton, personnel communication, February 28, 2013).
- NCDOT has advertised projects prior to NEPA being complete, but has not awarded projects prior to NEPA completion. When projects are advertised prior to NEPA completion, NCDOT includes a disclaimer in the contract that the scope could change (Theresa Bruton, personnel communication, March 15, 2013).
- WashDOT has only advertised and awarded projects prior to NEPA completion when the project schedule is accelerated to the point where it could not be delivered any other way. WashDOT tries to avoid this opportunity when possible due to the risks associated with it such as schedule uncertainty and additional mitigation costs that may need to be added by supplemental agreement after award. Design-build teams in Washington are hesitant to bid on these projects as they are unsure if the project will advance (Christina Martinez, personnel communication, February 27, 2013).
- VDOT does not advertise and award projects until NEPA is complete. VDOT sees the potential schedule benefits, but has determined the risks associated are

not worth the time savings (Jim Cromwell, personnel communication, February 22, 2013).

To the best of our knowledge, this opportunity has been utilized on only one design-build project, SR 520 by WashDOT.

Concurrent procurement and NEPA in the WashDOT SR 520 project

WashDOT advertised and awarded the SR 520 project prior to the completion of NEPA. Utilization of this opportunity accelerated the construction of the project. The design-build team was able to begin design work while the NEPA document was being completed and was able to begin construction one month after NEPA completion (Hammond et al. 2011). With the complexities associated with the project using the typical design-bid-build process the project would not have started construction for at least a year. Even using the typical design-build process of waiting for the completion of NEPA to procure a design-build team, construction on the project would not have started for six to nine months while the design was being finalized and permits were acquired. WashDOT found several considerations for environmental compliance to be very important in the selection of the design-build team:

- Clearly define WashDOT's leadership role on environmental documentation, permitting and commitments.
- Identify milestone links between the design and environmental processes.
- Incorporate a phased notice to proceed.
- Establish clear and frequent communication to allow the design and environmental processes to proceed in parallel.

- Provide environmental expectations and fully define what constitutes environmental compliance.
- Include qualifications for key environmental staff.
- Provide contract language for how environmental compliance will be monitored and measured.

It is worth noting that concurrent NEPA and procurement are not normal practice for WashDOT on design-build projects. However, this innovative practice can be extremely beneficial in terms of project schedule if associated risks can be properly managed.

4.3 Post-award environmental management in design-build contracts

Design-bid-build projects typically do not have many environmental related risks to consider once the NEPA planning and permitting is complete. Impacts are identified, quantified, and permitted as appropriate and prescriptive mitigation requirements are included when advertising and awarding the construction contract. The only outstanding environmental risk involves contractor compliance with permit requirements. On the other hand, upon completion of the NEPA document, design-build projects typically have 70% of the design remaining. This introduces additional risks that the final design will not match the design considered in the NEPA decision and the design used in permits that were acquired prior to advertisement and award. These risks are magnified when the NEPA document prescriptively quantified actual impacts anticipated based on the preliminary design (The Louis Berger Group and Cambridge Systematics 2007).

The State DOT and design-build team are both at risk for impacts to the environment even in situations where the State DOT transferred all permitting risks to the design-build team. Impacts to the environment typically result in fines and in some cases lawsuits,

State DOTs can be held responsible for noncompliance by the design-build team as the project sponsor or the permittee (Molenaar et al. 2005). State DOTs should work to enforce environmental compliance and incentive design-build teams to work to minimize impacts to the environment (Aufdencamp and Mickelson 2013).

4.3.1 Challenges post-award environmental management in design-build contracts

4.3.1.1 Re-evaluation of the NEPA document triggered by proposed design changes

Many State DOTs and division FHWA offices are quick to assume that any proposed change to the NEPA document requires a re-evaluation of the NEPA document. While this can be avoided by adding flexibility to the NEPA document as discussed earlier, no amount of flexibility will eliminate the need to Re-Evaluate the NEPA document on certain projects. Changes are especially common on design-build projects where the NEPA document is often completed based on 30% or less complete plans. Re-evaluations can be time consuming to complete and when triggered after a contract has been awarded, become a risk that is difficult for a design-build team to manage. Below is an example of language from UDOT that is typically found in most State DOT's Plan Development Process manuals (Utah Department of Transportation 2009).

1. Purpose and Applicability of Re-evaluations

Purpose. *Re-evaluations have the following two purposes:*

- *To ensure that the project design is being developed in a way that is consistent with previous commitments in the CE, FONSI, or ROD*
- *To address changes in the design, projected impacts, or planned mitigation measures*

These blanket statements are designed to limit the risks of the State DOT on a project prior to advertising for construction and are likely written with design-bid-build projects in mind. On design-build projects however, this language limits the ability for a design-

build project to improve a project's overall schedule if any change proposed by the design-build team will trigger a re-evaluation.

4.3.1.2 Permit modification triggered by proposed design changes

State DOTs should determine early in the development of a project which party is best suited to prepare and obtain required environmental permits. In this process, State DOTs will often begin long and complex permitting in the scoping or concept phase of a project. Permits obtained in advance of advertising the RFP for a design-build project are typically procured with plans that are 30 percent complete. While this level of design is preferable to design-build teams to allow them maximum flexibility in the final design of the project, regulatory agencies prefer to issue permits based on actual impacts and a higher level of design completion. State DOTs must balance the design advancement to provide enough information to obtain permits, while advancing the design too far and limiting innovation. The higher level than 30 percent level of design that results from satisfying the regulatory agency can result in the requirement of a permit modification based on the design-build team's proposed design (The Louis Berger Group and Cambridge Systematics 2007). This can lead to project delays while the design-build team or the State DOT prepares the permit modification (Venner Consulting 2012).

Another issue with the State DOT acquiring the permit in advance of advertising and awarding the contract is that the permit may contain mitigation requirements that may be above and beyond what is actually required based on the final design (The Louis Berger Group and Cambridge Systematics 2007). Permitting agencies are concerned that when impacts are reduced that the design-build team may also look to reduce mitigation commitments (Washington State Department of Transportation 2004). These agencies

have agreed to a certain level of mitigation and typically do not wish to allow a lower level of mitigation regardless of if the impacts are reduced (The Louis Berger Group and Cambridge Systematics 2007). In this case the design-build team will typically be responsible for preparing a permit modification that shows the actual impacts but also includes the original mitigation measures.

4.3.2 Opportunities for enhancement in post NEPA and contract management

4.3.2.1 Opportunity for efficiency enhancement: The State DOT should consider allowing the design-build team to accept the risk of NEPA re-evaluations (schedule and cost risks) by requiring the design-build team to complete the re-evaluation or to provide required documentation for NEPA re-evaluation.

Many State DOTs and division FHWA offices are quick to assume that any proposed change to the NEPA document requires a re-evaluation of the NEPA document. While this can be avoided by adding flexibility to the NEPA document as discussed in other sections of this guidebook, one strategy that is currently underutilized to transfer the responsibility of performing the re-evaluation to the DB team. This can expedite the development of the re-evaluation and promote better management of the project design and compliance with the NEPA document. NCDOT currently utilizes this practice on most of their DB projects. NCDOT partners with the DB team in the preparation and review of the re-evaluation to ensure that it complies with the NEPA regulations. For instance, NCDOT has allowed a DB team to propose a new alternative to the NEPA document and then worked with the DB team after letting to get the new preferred alternative approved by the FHWA. State DOTs are often constrained in their resources available to complete these re-evaluations and so the need for one can cause unnecessary delays to the project.

Most State DOTs and local FHWA division offices currently view this practice as against Federal Regulations which state (2009):

The design-builder must not prepare the NEPA document or have any decision making responsibility with respect to the NEPA process;

In rejecting the option of allowing the design-build team to perform the re-evaluation, they are considering the re-evaluation the same as a NEPA document. However, the courts have repeatedly ruled that a re-evaluation is not a NEPA document, but instead is an affirmation that the preferred alternative is still valid or a recommendation for a Supplemental or Updated NEPA document (ICF Consulting 2008). State DOTs that we interviewed had differing comfort levels with allowing the design-build team to perform the re-evaluation. Some State DOTs allow the design-build team to perform the re-evaluation, while others allow them to perform all special study updates and provide all backup information, one State DOT interviewed does not allow the design-build team to perform or take part in the re-evaluation. A summary of these interviews are below.

- UDOT has needed to perform many re-evaluations on design-build projects. UDOT assumes the schedule risk associated with a re-evaluation inhibits design-build teams from proposing changes that would trigger a re-evaluation. When a re-evaluation is required, UDOT performs the re-evaluation but requires the design-build team to provide all supporting documentation (Brandon Weston, personnel communication, March 7, 2013).
- CDOT requires the design-build team to update all special studies and perform the re-evaluation. CDOT maintains an ownership role by reviewing the re-evaluation and submitting it to FHWA. If the re-evaluation determines that the NEPA document is no longer valid, then CDOT re-opens the NEPA process and the

design-build team is responsible for the schedule risk. CDOT has not had a project that required the NEPA document to be re-opened (Jordon Rudel, personnel communication, February 26, 2013).

- MDOT does not allow the design-build team to perform the re-evaluation or update any special studies. MDOT does not have a high number of re-evaluations on design-build projects due to the non-prescriptive nature of their NEPA documents (Sheila Upton, personnel communication, February 28, 2013).
- NCDOT requires the design-build team to update all special studies and perform the re-evaluation. NCDOT maintains an ownership role by reviewing the re-evaluation and submitting it to FHWA. If the re-evaluation determines that the NEPA document is no longer valid, then NCDOT partners with the design-build team to complete the NEPA process. (Theresa Bruton, personnel communication, March 15, 2013).
- WashDOT does not allow the design-build team to perform the actual re-evaluation. WashDOT does require the design-build team to update all special studies and produce all required backup information for the re-evaluation (Christina Martinez, personnel communication, February 27, 2013).
- VDOT does not allow the design-build team to perform the actual re-evaluation. VDOT does require the design-build team to update all special studies and produce all required backup information for the re-evaluation. VDOT then writes the actual re-evaluation and coordinates with regulatory agencies and FHWA using the information provided by the design-build team. VDOT performs a re-

evaluation on all projects prior to a project's advertisement and again before authorizing ROW acquisition (Jim Cromwell, personnel communication, February 22, 2013).

Below is specific language from various State DOT RFPs showing how State DOTs shift the risk of a re-evaluation to the design-build team.

Transferring NEPA re-evaluation risk to the design-build team in North Carolina DOT (NCDOT)

North Carolina transfers the risk of a re-evaluation to the design-build team including all schedule and costs associated with changes to the NEPA document.

North Carolina DOT (NCDOT): The Design-Build Team shall be responsible for any activities, as deemed necessary by the Department or the FHWA, resulting from changes to the NCDOT preliminary design, including but not limited to, public involvement and NEPA re-evaluation. The Department shall not honor any requests for additional contract time or compensation for completion of the required activities resulting from changes to the NCDOT preliminary design.

Transferring re-evaluation responsibility to the design-build team in Washington DOT (WashDOT)

WashDOT also transfers all cost and schedule risks associated with a re-evaluation to the design-build team. WashDOT has additional language indicating they will perform coordination as required as part of the re-evaluation process.

Washington DOT (WashDOT): WashDOT has prepared an Environmental Classification Summary (Appendix E4) in support of a NEPA Documented Categorical Exclusion (DCE) to address the scope, impacts, and mitigation for the Project. In addition, WashDOT has issued a SEPA Determination of Non-Significance (Appendix E5). If the design of the Project is altered by the Design-Builder in such a way that causes additional impacts to the environment and/or surrounding communities, additional environmental analysis and documentation may be required. If required, the Design-Builder shall be responsible for preparing any additional environmental documentation. In addition, the Design-

Builder shall pay all costs and accept all responsibility for any schedule delays associated with securing the additional environmental approvals.

If required, the environmental re-evaluation shall follow the WashDOT Environmental Procedures Manual and 23 CFR 771. It is anticipated that the environmental re-evaluation and related approvals will not be required, provided changes in roadway alignments and grades do not result in additional social, economic, or environmental impacts. WashDOT will coordinate with all previously-involved agencies as part of any re-evaluation process. Final determination regarding the necessity of environmental re-evaluations shall be made by WashDOT and the Federal Highway Administration (FHWA).

All environmental re-evaluations shall be subject to written approval by WashDOT and FHWA.

Transferring NEPA re-evaluation risk to the design-build team in New York DOT (NYDOT)

NYDOT transfers all cost and schedule risks associated with a re-evaluation to the design-build team. Additionally, they require the design-build teams to accept risks associated with other environmental laws.

NYDOT

3.3 COMPLIANCE WITH APPROVED NEPA ACTION

NEPA environmental approval for the subject project has been granted based on analysis and documentation of potential environmental impacts of the identified preferred alternative. This analysis is summarized along with any identified environmental commitments and depicted in the April 2012 Final Design Report/Environmental Analysis (APRIL, 2012 FDR/EA) document for the subject project. If during detailed design and/or construction the Design-Builder introduces design elements, variations, or methodologies that potentially induce environmental impacts that differ from those identified in the approved April 2012, FDR/EA document or is unable to comply with established environmental commitments then the NEPA process for this project will need to be re-evaluated by the Design-Builder and reviewed by the Department prior to proceeding with construction. This requirement also applies to proposed variations which may affect resources covered under Section 106, Section 4(f), Executive Order 11990 (wetlands), and other applicable federal and state environmental regulations. The need to re-evaluate the NEPA process may impact the overall project schedule.

Transferring NEPA re-evaluation risk to the design-build team in Texas DOT (TexDOT)

TexDOT requires the design-build team to be responsible for all environmental studies and the reevaluation. TexDOT's RFP language is unique in that it implies that the design-build team is responsible for any action that was not identified in Environmental Approvals and not only those introduced by the design-build team.

Responsibilities Regarding 4.2.2 Environmental Studies

The Design-Build Contractor shall be responsible for conducting additional and/or continuing environmental studies based on the Project approved NEPA document and Project schematic. The Design-Build Contractor shall be responsible for conducting environmental studies and re-evaluations caused by actions not identified in the Environmental Approvals, actions not covered specifically by existing resource and regulatory agency coordination, or incorporation of Additional Properties into the Project. The Design-Build Contractor shall be responsible for all coordination of environmental studies with appropriate Governmental Entities, except where TxDOT has agreements with Governmental Entities to perform such coordination.

Transferring re-evaluation responsibility to the design-build team in Florida DOT (FDOT)

When a design-build team proposes design changes after the environmental document has been approved, FDOT requires the design-build team to coordinate with FDOT to determine if a reevaluation is required. If FDOT determines that a reevaluation is required, the design-build team is responsible for updating or developing all required special studies and the environmental reevaluation document (Florida Department of Transportation 2011). The requirements of FDOT's Design-Build Guidelines state:

“Prior to the authorization of Design-Build projects under either Federal or State funding, a reevaluation of the environmental impacts shall be made. If a major design change is proposed after the authorization, then a written reevaluation must be produced as required in the PD&E Manual. The Design-Build Firm shall provide the information to the District Environmental Management Office to determine if the proposed design changes warrant a reevaluation. The Design-Build Firm is responsible for conducting any needed environmental studies and completing the documentation for the environmental reevaluation. For Federal-

aid projects, FDOT shall obtain FHWA's approval of the NEPA reevaluation before the Design-Build Firm can proceed."

FDOT has made this a standard practice by including this requirement in their Design-Build Guidelines. This is more progressive than most states which simply include this requirement in their contract language. Including this in their Design-Build Guidelines establishes this as a best practice that should be done on all projects.

State DOTs should allow the design-build team to perform the re-evaluation or provide backup information. This will reduce the burden of the State DOT to perform the re-evaluation and allow the design-build team to partially control the schedule risk associated with the re-evaluation. While not all State DOTs interviewed and State DOT RFPs that were reviewed exercise this opportunity, due to the large number of State DOTs that utilize at least a portion of this opportunity it should be considered a best practice.

4.3.2.2 Opportunity for efficiency enhancement: The State DOT should consider allowing the design-build team to accept the risk of obtaining or modifying environmental permits (schedule and cost risks) by requiring the design-build team to complete the permit application and/or modification or to provide required documentation for the permit modification

State DOTs often obtain most environmental permits in advance of advertising and awarding a design-build contract. Permits are typically written for an exact impact to the environment and when permits are developed based on 30% plans this can lead to the permit not matching the final design prepared by the design-build team (The Louis Berger Group 2005). Regulatory agencies prefer to not permit projects based on hypothetical or estimated impacts (The Louis Berger Group and Cambridge Systematics 2007). Permit modifications are needed to update permits to match the final design impacts. State DOTs, even those who acquire permits in advance, have found that

transferring the responsibility for updating permits to the design-build team is more desirable for all parties.

Design-build teams prefer to have as much control over the permitting process as possible with direct access to permitting agencies. Regulatory agencies are open to allowing the design-build team to prepare and acquire permits with the understanding that the State DOT is involved, all parties practice open communication, and the design-build team is monitored to not cut corners (The Louis Berger Group and Cambridge Systematics 2007). State DOTs vary in their comfort level in how much access to regulatory agencies they are willing to permit to design-build teams have as they value their relationships with regulatory agencies and do not want to jeopardize them.

State DOTs should work with regulatory agencies to establish which permits should be obtained in advance and which should be acquired after award of a design-build contract. This allows State DOTs to evaluate the benefits of early permit acquisition with the risk of permit modifications (The Louis Berger Group and Cambridge Systematics 2007). State DOTs must then assess if the design-build team should acquire the outstanding permits and if they should prepare any permit modifications. State DOT interviews and reviews of design-build RFPs from various States has indicated that most State DOTs do allow the design-build team to acquire or prepare outstanding permits and acquire or prepare permit modifications as necessary.

Our interviews with State DOTs and review of State DOT RFPs indicates that State DOTs do not currently evaluate permits on a project by project basis and determine which party should be responsible for obtaining each permit for a specific project. Instead State DOTs appear to either acquire most or all permits in advance of a project's

advertisement, or transfer all permit acquisition or preparation duties to the design-build team. State DOTs who were interviewed that require the design-build team to prepare or acquire all permits are summarized below:

- CDOT waits as long as possible in a project's development to obtain environmental permits to minimize the risk of permit modifications. CDOT requires the design-build team to prepare all permits and submit them to CDOT to process and coordinate with regulatory agencies (Jordan Rudel, personnel communication, February 26, 2013).
- NCDOT used to obtain most permits in advance of advertising a design-build project. NCDOT found that this limited innovation and now requires the design-build team to prepare most permits and submit them to NCDOT to process and coordinate with regulatory agencies. NCDOT remains the permittee on all projects (Theresa Bruton, personnel communication, March 15, 2013).
- VDOT requires the design-build team to prepare all permits and is not involved in the permit process. VDOT transfers the risks associated with permit acquisition to the design-build team and only require proof that all required permits have been obtained prior to allowing the design-build team to begin construction (Jim Cromwell, personnel communication, February 22, 2013).

Other State DOTs interviewed obtain most permits in advance, but do require the design-build team to prepare any permit modifications and prepare any outstanding permits. A summary of these State DOTs is below:

- UDOT acquires all permits in advance of advertising and awarding a design-build contract. UDOT does require the design-build team to provide all backup information required for permit modifications. UDOT shares the schedule risk with design-build teams associated with permit modifications based on which party caused the need for the modification (Brandon Weston, personnel communication, March 7, 2013).
- MDOT acquires most permits in advance of advertising and awarding a design-build contract. MDOT requires the design-build team to prepare any permits that were not acquired in advance and MDOT acquires the actual permit. MDOT also allows the design-build team to prepare any permit modifications as required (Sheila Upton, personnel communication, February 28, 2013).
- WashDOT acquires most permits in advance of advertising and awarding a design-build contract. WashDOT experience is that acquiring permits in advance almost always results in permit modifications which are prepared by the design-build team and acquired by WashDOT. WashDOT allows the design-build team to acquire construction related permits (Christina Martinez, personnel communication, February 27, 2013).

A review of State DOT design-build RFPs indicates that most State DOTs do require the design-build team to prepare or acquire permit modifications and that some State DOTs require the design-build team to prepare and/or acquire all permits. Below are examples from various State DOT RFPs that were reviewed.

North Carolina DOT (NCDOT)

NCDOT found that when permits were acquired in advance it limited innovation; therefore NCDOT has adopted a strategy of requiring the design-build team to prepare most permits and submit them to NCDOT for review and submittal regulatory agencies (Theresa Bruton, personnel communication, March 15, 2013).

On this project NCDOT transferred the responsibility for obtaining all permits to the design-build team. Schedule assumptions for the amount of time needed to acquire these permits was made by NCDOT. If permit requirements exceed those anticipated by NCDOT the risk to the project schedule and the additional mitigation costs are borne by the design-build team. By utilizing this practice, NCDOT has assumed schedule risks up to a certain point and transferred the remaining risks to the design-build team.

I-485 from I-77 to Rea Road:

This project was advertised for the design and construction for the 9.5 mile widening of I-485 to a six lane divided highway. On this project NCDOT transferred the acquisition responsibility of all permits to the design-build team. Contract language regarding the permit requirements can be seen below.

The Design-Build Team shall be responsible for preparing all documents necessary for the Department to obtain the environmental permits for the construction of this project. Permit applications shall be required for the: US Army Corps of Engineers (USACE) Section 404 Permit, NC Department of Natural Resources (DENR) Division of Water Quality (DWQ) Section 401 Water Quality Certification and NC Department of Natural Resources (DENR) State Stormwater Permit. Based on the anticipated limited impacts to jurisdictional resources, a Nationwide Permit No. 23 is probable. Thus, the timeline for obtaining the permits outlined in this scope of work reflects that a Nationwide Permit No. 23 will be required; and the Department will not honor any requests for additional contract time or compensation for any efforts required in order to obtain an Individual Permit, including but not limited to public involvement, additional design effort, additional construction effort and / or additional environmental agency coordination and approvals.

NCDOT does not always transfer all permit responsibilities to the design-build team. On some project permits are acquired in advance. On these projects risks for permit modifications are still transferred to the design-build team as seen in the example below.

US 70 New Location:

Major Permit Modification Request Process

It shall be the Design-Build Team's responsibility to acquire information and prepare permit drawings that reflect the impacts and minimization efforts resulting from the project as designed by the Design-Build Team. Further, it shall be the Design-Build Team's responsibility to provide these permit impact sheets (drawings) depicting the design and construction details to the Department as part of the permit application. The Design-Build Team shall be responsible for developing the permit modification request for all jurisdictional impacts. The permit modification request shall include all utility relocations that are being coordinated by the Design-Build Team. At a minimum, the permit application shall consist of the following:

Cover Letter

Minutes from the 4B and 4C meetings

Permit drawings (with and without contours)

Half-size plans

Completed Forms (Section 404 ENG 4345, etc.) appropriate for impacts

The Department will re-verify and update, as needed, the required environmental data that expires prior to the completion of the activity causing the impact in the jurisdictional areas. These include, but are not limited to, federally protected species, re-verification of wetland jurisdictional areas, historic sites, archaeological sites and 303d (impaired) streams.

NCDOT states all the requirements of the permit applications and permit modifications as well as their role in the process. This clear contract language allows design-build teams to adequately analyze and bid the risks associated with obtaining environmental permits for the project.

Major Permit Timeframe

The Design-Build Team should expect it to take up to 11 months to accurately and adequately complete all designs necessary for permit application, submit application to the Department, and obtain approval for the permits from the

environmental agencies. Agency review time will be approximately 90 days from receipt of a “complete” package. No requests for additional contract time or compensation will be allowed if the permits are obtained within this 11-month period. With the exception of location and survey work; utility relocation work outside jurisdictional resources that adheres to the aforementioned requirements, and permitted investigative borings covered under Nationwide No. 6 secured by the Design-Build Team, no mobilization of men, materials, or equipment for site investigation or construction of the project shall occur prior to obtaining the permits (either within the 11-month period or beyond the 11-month period). The Department will not honor any requests for additional contract time or compensation, including idle equipment or mobilization or demobilization costs, for the Design-Build Team mobilizing men, materials (or ordering materials), or equipment prior to obtaining all permits. The Department will consider requests for contract time extensions for obtaining the permits only if the Design-Build Team has pursued the work with due diligence, the delay is beyond the Team’s control, and the 11-month period has been exceeded. If time were granted it would be only for that time exceeding the 11-month period. This 11-month period is considered to begin on the Date of Availability as noted elsewhere in this RFP.

The Design-Build Team needs to be aware that the timeframes listed above for review by PDEA, NCDWQ, and the USACE, to review any permit applications and / or modifications begin only after a fully complete and 100% accurate submittal.

NCDOT also allows set amount of time for the design-build team to prepare all required permits and times for agency review of the permits. NCDOT further limits the risk to the design-build team by taking on risks for schedule delays that appear to be outside the design-build team’s control.

Mitigation Responsibilities of the Design-Build Team

The Design-Build Team shall be responsible for examining and possibly providing on-site mitigation for R-2554BB & C (Reference On-Site Mitigation Scope of Work).

The Department has acquired compensatory mitigation for Neuse River Buffer Impacts and unavoidable impacts to wetlands and surface waters due to project construction from the Ecosystem Enhancement Program (EEP). This mitigation was based on the impacts required by the R-2554C Right of Way Plans provided by the Department and the R-2544BB Preliminary Plans provided by the Department.

Should additional jurisdictional impacts result from revised design / construction details, suitable compensatory mitigation for the Neuse River Buffer, wetlands and / or streams shall be the sole responsibility of the Design-Build Team. Therefore, it is important to note that additional mitigation shall be approved by

the agencies and such approval shall require, at a minimum, the preparation and approval of a Mitigation Plan before permits / permit modifications are approved and before construction can commence.

In this project NCDOT allowed modifications to permits that were acquired in advance of the project's advertisement. This again transfers the risk for environmental permitting to the design-build team and conforms the environmental permitting to the specific design of the project. Mitigation was obtained for known impacts that were anticipated to be required regardless of the design-build team's proposed design.

WashDOT

I-405 Auxiliary Lane

This project was to design and construct a northbound auxiliary lane on I-405 from 195th St to SR 527.

2.8.4.2.2 Permit Compliance, Modifications, and Additional Approvals

The Design-Builder shall follow the requirements of all permits and commitments referenced in this Section, and any other permits that are obtained for the Project. The Design-Builder shall provide WashDOT with timely notice of its intent to propose an alternative construction method or a design change that is inconsistent with a particular permit, environmental requirement, or commitment. WashDOT will work with the Design-Builder and will bring final detailed proposals provided by the Design-Builder to the regulatory agencies for permit modifications, to obtain new permits, and to re-initiate ESA consultation as required. The Design-Builder shall be responsible for preparing any additional environmental documentation needed to secure the additional environmental approvals required for implementation of the Design-Builder's alternative proposals.

WashDOT requires the design-build team to adhere to all requirements and commitments for the permits that were acquired in advance and acquired by the design-build team.

WashDOT works with the design-build team and regulatory agencies to obtain any permit modifications as required.

The Design-Builder shall pay all costs and accept responsibility for any schedule delays resulting from a proposed alternative construction method or design change, including, but not limited to, implementation of an approved ATC. Such costs and schedule delays may result from changes in impacts to the environmental resources addressed in Section 2.8.4.3. In addition to the direct costs associated with preparing documentation for and securing additional environmental approvals, the Design-Builder shall be responsible for costs including, but not limited to, WashDOT labor and materials expenses incurred in gaining environmental approvals. The Design-Builder shall also be responsible for additional mitigation costs such as site acquisition, design, and construction should this be required as a result of increased impacts.

WashDOT transfers the risk associated from any permits that are required as a result of an ATC to the design-build team. This risk includes all costs and schedule delays associated with additional permit acquisitions. In this RFP WashDOT indicated which permits it was acquiring and which permits the design-build team would be responsible for. Additional permits not listed in the RFP become the responsibility of the design-build team.

VDOT

VDOT requires the design-build team to obtain all required permits and be the permittee. This is the highest level of risk transfer to design-build teams as they are fully responsible for all risks associated with permit acquisition and compliance.

Route 29 Bypass

This project was to design and construct a bypass around Charlottesville, Virginia on SR 29.

The Design-Builder will be responsible for compliance with pre-construction and construction-related environmental commitments and will be responsible for compliance with preconstruction, construction-related permit conditions, as well as post-construction monitoring if required by regulatory agencies. The Design-Builder will assume all obligations and costs incurred by complying with the terms and conditions of the permits and environmental certifications. Any fines

associated with environmental permit or regulatory violations will be the responsibility of the Design-Builder.

VDOT requires the design-build team to be the permittee and be responsible for all compliance with all permits.

UDOT

UDOT acquires all permits in advance of advertising and awarding design-build projects.

As seen in the example below from the I-15 Core project, UDOT does require the design-build team to prepare permit modifications.

I-15 Core

The project was to widen and reconstruction the I-15 corridor in Utah County Utah. Part Three Section 4 of the RPF contains a summary table of required design-build environmental submittals. Below are the submittal requirements related to permits and permit modifications:

*Table 4D-1
Summary of Design-Builder Environmental Submittals*

<i>Submittal</i>	<i>For Approval</i>	<i>Schedule</i>
<i>UPDES General Permit for Construction Activities (including dewatering)</i>	<i>No</i>	<i>Prior to NTP2</i>
<i>SWPPP (including E&SC Plan)</i>	<i>No</i>	<i>Prior to issuing a NOI for the permit</i>
<i>Remediation Report / No Further Action Letter</i>	<i>No</i>	<i>Report within 30 Working Days of the completion of remediation / NFA letter within three weeks of report receipt</i>
<i>404 Permit Modifications (Nationwide/Individual)</i>	<i>Yes</i>	<i>Prior to submittal to Agency</i>

<i>Stream Alteration Permit(s)</i>	<i>No</i>	<i>Prior to construction in or near streams</i>
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As seen in the table, the design-build team is responsible for preparing the 404 permit modifications. UDOT does require the design-build team to prepare the construction related permits associated with erosion control, stream alteration, and storm water management.

4.3.2.3 Opportunity for efficiency enhancement: The State DOT should consider providing incentives to the design-build team to encourage reduction in the environmental impacts of the project.

Regulatory agencies main goal is to protect the environment and they worry that since design-build teams do not have this same goal that they will increase impacts to the environment. One way that State DOTs have worked to alleviate this concern is to provide incentives to design-build teams to reduce environmental impacts and to promote compliance with environmental permits. Incentive amounts should consider what level of design was used to develop initial impact estimates (The Louis Berger Group and Cambridge Systematics 2007). When impact estimates are based on the worst-case-scenario, incentives should be reduced or based on a lower impact threshold than identified in the worst-case-scenario. Otherwise, when impacts are simply adjusted for the final design they appear to have met the incentives, but in reality the initial impacts were simply overstated (The Louis Berger Group and Cambridge Systematics 2007).

State DOTs may require design-build teams to purchase compensatory mitigation as part of the permitting process. This practice is another way that design-build teams can be incentivized to reduce environmental impacts as reducing impacts reduces the amount of

mitigation that must be purchased (Theresa Bruton, personnel communication, March 15, 2013).

Interviews with State DOTs and reviews of State DOT RFPs indicate that incentives for environmental compliance are becoming more common on design-build projects. Some State DOTs such as Utah are pushing regulatory agencies to utilize incentive based permitting to encourage design-build teams to look for opportunities to reduce impacts during the design of projects. To date regulatory agencies do not appear open to promoting incentives in permitting. UDOT was the only State DOTs interviewed who specifically mentioned the use of incentives. A summary of how UDOT uses incentives can be seen below.

- UDOT uses incentives to reward design-build teams for maintaining a clean construction site and properly maintaining their erosion control Best Management Practices (BMP). On some projects UDOT has allowed the public to comment and score their perception of the design-build team's environmental compliance and tied incentive rewards to the public scoring. This encourages the design-build team to maintain a good working relationship with the public and to control erosion and other environmental activities. UDOT is trying to push regulatory agencies to allow for incentive based permits, but this has not been allowed to date (Brandon Weston, personnel communication, March 7, 2013).

Review State DOT RFPs indicates that the use of incentives for environmental compliance is not a common practice, but does appear to be used by State DOTs with more experience on design-build projects. Examples from design-build RFPs from two States DOTs can be seen below.

WashDOT

WashDOT appears to use incentives for environmental compliance on most of their design-build projects. Seven WashDOT RFPs were reviewed and incentives related to environmental compliance and protection were utilized on six of them. This indicates that WashDOT considers incentives to be a valuable tool to help protect the environment.

An example from WashDOT's I-405 design-build project is below:

I-405/NE 195 St to SR 527 Northbound Auxiliary Lane

1-08.11(2).1 Environmental 1 Compliance

General. Adhering to the environmental commitments, relative to all phases of project development, will prevent environmental degradation, reduce work delays and cost increases, minimize negative publicity and reduce the number of upset citizens/landowners. The portion of the incentive award allocated to Environmental Compliance is up to \$220,000. This is the maximum amount that can be earned from all environmental compliance criteria combined. The amount is divided among the three environmental compliance criteria, as shown in Table 9.

TABLE 9

INCENTIVE AWARDS AND CRITERIA FOR ENVIRONMENTAL COMPLIANCE

Criteria	Test Criteria	Maximum Possible Award
A. Environmental Awareness		\$50,000
B. Environmental Inspections and Compliance Monitoring		\$100,000
C. Reacting to Non-Compliance Events		\$70,000
Total Maximum Award:		\$220,000

Figure 3: Incentive Awards and Criteria for Environmental Compliance in WashDOT

On this project WashDOT included incentives for environmental compliance up to \$220,000 this was approximately 1.2% of the contract price. WashDOT included specific requirements for the design-build team to achieve these incentives and paid the design-build team quarterly for achieving incentive goals.

NCDOT

NCDOT does not appear to use incentives on most design-build projects. One NCDOT RFP that was reviewed included incentives related to compliance with environmental regulations. This project was the US 70 Goldsboro bypass from east of SR 1556 to east of SR 1323. An excerpt from this RFP can be seen below:

US 70 Goldsboro bypass from east of SR 1556 to east of SR 1323

The Design-Build Team will be eligible for an incentive in the amount of \$100,000 if construction operations have been performed in accordance with all environmental regulations and the Specifications, and the Design-Build Team does not receive any violations (ICA, CICA, NOV and / or C&D) at any time during project construction.

This incentive rewards design-build teams for complying with environmental regulations and not receiving violation notices.

4.3.3.1 Opportunity for efficiency enhancement: The State DOT should require the design-build team to have an environmental management plan and an environmental compliance manager to oversee the environmental impacts of the project and ensure compliance with permit requirements

State DOTs should include requirements for design-build teams to develop and enforce environmental management or compliance plans as part of the design-build contract. The environmental management plan establishes procedures of how to manage incidents and accidents to minimize their impact to the environment (Aufdencamp and Mickelson 2013).

Studies and practice from State DOTs has identified that to properly manage environmental compliance, the State DOT and/or the design-build team should have an environmental compliance manager on site at all times during construction (The Louis

Berger Group 2005). The environmental compliance manager serves several important functions on design-build projects (Aufdencamp and Mickelson 2013):

- Permit writer – preparing permits or permit modifications;
- Contingency planner – develops plans for how to manage accidents and incidents that impact the environment;
- Design reviewer – ensures the design meets the contract requirements from an environmental compliance standpoint;
- Regulatory point of contact – provides regulatory agencies with a single point of contact when incidents occur or when they have concerns;
- Stormwater inspector – monitors stormwater runoff to ensure that environmental compliance goals are being met and that erosion control measures are adequately performing; and
- Emergency coordinator – manages the action plan when incidents occur to manage the incidents and coordinate clean up quickly.

Review of various State DOT RFPs indicates that requirements for an environmental compliance plan and an environmental compliance manager is a fairly universal requirements on most design-build projects. Examples from various State DOT RFPs can be seen below.

NCDOT

NCDOT uses an environmental compliance manager or erosion and sediment control supervisor on all design-build projects to ensure that all environmental ordinances and regulations are met. An example of language from two NCDOT RFPs can be seen below:

US 70 Goldsboro bypass from east of SR 1556 to east of SR 1323

Certified Supervisor – Provide a certified Erosion and Sediment Control / Stormwater (E&SC/SW) Supervisor to manage the Design-Build Team and subcontractor(s) operations, ensure compliance with Federal, State and Local ordinances and regulations, and to manage the Quality Control Program.

Similar language is included in every RFP that was reviewed from NCDOT. NCDOT does not appear to require an environmental compliance plan on most of their design-build projects

Oregon DOT

ODOT includes the requirement for the design-build team to prepare an environmental compliance plan on all design-build projects and has this requirement in their design-build RFP template document. ODOT does not include a specific requirement for an environmental compliance manager, but does require the design-build team to comply with all of the responsibilities normally assigned to this individual. Contract language from Oregon's Base RFP can be seen below:

(9) *Environmental Compliance Plan* - *Design-Builder shall prepare and implement an Environmental Compliance Plan by the date required in Subsection (13), and shall update the plan as needed, as new fieldwork is completed, and as new or modified mitigation or environmental compliance strategies are developed throughout the term of the Contract.*

ODOT goes on to identify all of the requirements of the environmental compliance plan:

The Environmental Compliance Plan shall (a) identify all applicable environmental permits, programmatic agreements, orders, opinions, clearances, and authorizations and their requirements; (b) identify key environmental compliance personnel roles and responsibilities; (c) identify procedures for

achieving and documenting environmental compliance; (d) establish procedures for identifying and resolving non-compliance; and (e) establish procedures for emergency response. In addition, the Environmental Compliance Plan shall address the process and procedures Design-Builder's environmental team will employ to ensure 100 percent compliance with environmental permits, programmatic agreements (if using), orders, opinions, clearances and authorizations, and protection of the environment. The Environmental Compliance Plan shall also include a schedule for accomplishment of each activity.

UDOT

UDOT requires design-build teams to establish an environmental protection program on all design-build projects. UDOT does not specifically identify an environmental compliance manager role, but does require that the design-build team comply with the activities typically identified as the responsibility of the environmental compliance manager. An example from UDOT's I-15 CORE project can be seen below:

I-15 CORE

Environmental Protection Program (EPP)

Develop, implement, and maintain an EPP that documents the measures and outlines procedures that will be taken to avoid, minimize, and mitigate impacts to the environment from the Work.

The EPP shall:

- Establish and implement environmental compliance measures that are consistent with permit requirements, agency expectations, and the environmental commitments for the Project listed in the Environmental Summary Table.*
- Implement and document environmental awareness training for all personnel who will be working on the Project.*
- Demonstrate and communicate the Design-Builder's environmental commitment.*
- Demonstrate how the Design-Builder will implement a "zero environmental violation" tolerance on all Project activities.*
- Monitor and report on the Design-Builder's environmental compliance.*

Minnesota DOT (Mn/DOT)

Mn/DOT requires both an environmental compliance plan and an environmental compliance manager on all design-build projects. In addition to requiring the design-build team to have an environmental compliance manager, Mn/DOT also provides an environmental compliance manager to oversee environmental compliance issues. Example language regarding the requirements regarding environmental compliance from Mn/DOT's St. Anthony Bridge replacement project can be seen below:

St. Anthony's Bridge Replacement

4.2.3 Environmental Management Plan

The Contractor shall submit an Environmental Management Plan (EMP) that describes the Contractor's approach to mitigating environmental impacts and contains the following elements:

Environmental personnel and training

Mitigation measures

Weekly and monthly reporting

Environmental notification contact list

Schedule of EMP activities

Spill Containment Plan to describe the Contractor's plans to prevent, contain, clean up, remove, dispose and mitigate all regulated material spills. The Spill Containment Plan shall include a Notification List for containing and reporting.

Construction noise mitigation techniques

Mn/DOT requires that the design-build team have a full environmental compliance team that report's to Mn/DOT's environmental compliance manager. This team consists of all specialty personnel who can monitor specific portions of the construction and ensure that all facets of environmental compliance are met. This requirement is identified in the below language:

4.2.3.1.1 Environmental Personnel

The Contractor shall designate an Environmental Team that reports directly to the Mn/DOT Environmental Compliance Manager (ECM). The Contractor's

Environmental Team shall include those persons responsible for permitting, erosion and sediment control, environmental compliance, environmental monitoring, and hazardous materials.

Specific role and responsibilities include:

- Permitting Specialist
- Storm Water Pollution Prevention Plan Designer
- Wetland Specialist
- Certified Erosion and Sediment Control Supervisor, and
- Installer

These personnel each have a role in ensuring that the design-build team complies with all environmental regulations, requirements, and commitments.

VDOT

VDOT includes a requirement an environmental compliance manager on all design-build projects. While VDOT does not require an environmental compliance plan, the responsibilities of the environmental compliance manager cover all of those requirements typically found in an environmental compliance plan. Example language from VDOT's Route 29 Bypass regarding these requirements can be seen below:

Route 29 Bypass

Requirement for an environmental compliance manager:

(j) Environmental Compliance Manager – This individual should serve as the environmental compliance manager for the Project, responsible for ensuring compliance with all environmental commitments during the construction of the project. The Environmental Compliance Manager shall be available to review designs and suggested modifications to the designs, if necessary, based on field conditions and construction activities.

This individual shall be assigned to the Project full time and required to be onsite for the duration of the Project once construction activities commence.

VDOT makes a point to identify that the environmental compliance manager must be onsite for the duration of the project's construction.

WashDOT

WashDOT requires both an environmental compliance plan and an environmental compliance manager on all design-build projects. Example language from WashDOT's I-405 Auxiliary Lane project can be seen below:

I-405/NE 195 St to SR 527 Northbound Auxiliary Lane

Requirement for an environmental compliance plan:

2.8.3.2 ENVIRONMENTAL COMPLIANCE PLAN (ECP)

2.8.3.2.1 Documentation and Approval

The Design-Builder shall prepare and implement an Environmental Compliance Plan (ECP) that identifies roles and responsibilities of key personnel, procedures for environmental compliance, procedures to identify and correct non-compliance events, and procedures for emergency response. WashDOT's goal is to ensure environmental compliance with no permit violations.

Requirement for an environmental compliance manager:

2.8.3.2.2 Environmental Personnel, Communications, and Training (Part I)

2.8.3.2.2.1 Key Personnel: Environmental Compliance Manager (ECM)

2.8.3.2.2.1.1 Roles and Responsibilities

The ECM shall be responsible for the overall environmental compliance for the Project, and shall function as principal technical advisor and coordinator for environmental issues. The ECP shall identify all critical roles, responsibilities, and authorities of the ECM. The ECP shall identify the roles and responsibilities of other staff, and their roles in assuring environmental compliance. The ECP shall identify how the ECM will interact with WashDOT's Environmental Compliance Assurance Inspector (ECAI), as WashDOT's ECAI will be performing compliance audits and will be working closely with the ECM.

The ECM shall be on site for the duration of the Project. If the Design-Builder replaces the ECM, the Design-Builder shall provide an equally or more qualified

replacement, contingent upon WashDOT's approval. If during the course of the Contract, WashDOT finds that the ECM is not ensuring implementation of the ECP, then WashDOT may require replacement of the ECM in accordance with Section 1-05 of the General Provisions.

TexDOT

TexDOT requires the design-build team to have an environmental compliance plan and an environmental compliance manager on all design-build projects. Example language from TexDOT's IH-35E Managed Lanes project can be seen below:

IH-35E Managed Lanes

Requirement for an environmental compliance plan:

4.1 General Requirements

The Developer shall deliver the environmental commitments required by the Contract Documents and all applicable federal and state Laws and regulations. The Developer shall develop, operate, and maintain a Comprehensive Environmental Protection Program (CEPP) for the Work to ensure environmental compliance with all applicable Environmental Laws and commitments. The Program shall obligate the Developer to protect the environment and document the measures taken during the performance of the Work to avoid and minimize impacts on the environment from the design, construction, maintenance, operation, and rehabilitation activities of the Project.

Requirement for an environmental compliance manager:

4.4.1 Environmental Compliance Manager (ECM)

Developer shall designate a full-time ECM for the Work. The ECM shall report and coordinate all issues directly with TxDOT and the Developer's Project Manager. In the event the ECM, in consultation with Developer's Project Manager and TxDOT, is unable to reach satisfactory resolution of environmental issues, the ECM shall provide written notification to the Developer and TxDOT outlining the concerns, actions taken in attempt to correct the concerns, and provide a recommendation as to the suggested course of action.

CDOT

CDOT requires the design-build team to prepare an environmental compliance plan on all design-build projects. A specific role for an environmental compliance manager is not

identified in the RFP documents, but the environmental compliance plan requires the design-build team to complete all activities normally assigned to an environmental compliance manager. An example from CDOT's I-25 North design-build RFP can be seen below:

I-25 North

Requirement for an environmental compliance plan:

ENVIRONMENTAL REQUIREMENTS

The Contractor shall comply with all requirements of all applicable environmental laws, Regulations, and Governmental Approvals issued there under, whether obtained by CDOT or the Contractor. The Contractor shall prepare an Environmental Compliance Work Plan for the Project, specifically identifying all of the environmental compliance requirements, permits, and environmental mitigation activities for the Project and the Contractor's approach for complying with the requirements. The Environmental Compliance Work Plan shall be submitted to CDOT for Acceptance within 60 Days of NTP 1. The Environmental Compliance Work Plan shall be updated every three months, to show the status of environmental compliance Activities and shall be submitted to CDOT for Acceptance.

4.4 Challenges and Opportunities Utilization Tables

The following tables were compiled through interviews with seven state DOTs on their opinion of the challenges and opportunities that have been identified in this chapter.

Table 1: Challenges Related to Environmental Analysis and Permitting on Design-Build Projects
 Has your State DOT experienced these challenges on design-Build projects?

		State DOT					
		Colorado	Michigan	N. Carolina	Utah	Virginia	Washington
Challenges	Identification of environmental resources and coordination with environmental agencies						
	Regulatory concerns with incomplete design in design-build projects	Yes	Yes	No	Yes	Yes	Yes
	State DOT relationships with regulatory agencies	Yes	Yes	Yes	No	No	Yes
	Improper identification of resources	Yes	Yes	Yes	No	Yes	Yes
	Impact of Environmental Permitting on project schedule	No	No	Yes	No	No	Yes
	NEPA and quantification and mitigation of environmental impacts						
	Conventional prescriptiveness constraints of NEPA	Yes	No	No	Yes	No	Yes
	Mitigation of NEPA impacts while not limiting innovation	Yes	No	No	Yes	No	No
	Permit agency concerns about pressure from design-build teams	No	Yes	Yes	No	No	Yes
	Post-award environmental management in design-build contracts						
	Re-evaluation of the NEPA document triggered by proposed design changes	Yes	No	Yes	No	Yes	Yes
	Permit modification triggered by proposed design changes	Yes	Yes	No	No	No	Yes

Table 2: Opportunities to Enhance Efficiency of Environmental Analysis and Permitting on Design-Build Projects

		State DOT					
		Colorado	Michigan	N. Carolina	Utah	Virginia	Washington
Opportunities	Identification of environmental resources and coordination with environmental agencies						
	State DOTs should partner with, fund positions, or co-habitat with regulatory agencies	Standard practice	Standard practice	Standard practice	Standard practice	Standard practice	Standard practice
	State DOTs should examine alternative solutions during the concept phase by clearing additional areas for each environmental special study to allow for innovation	Standard practice	Standard practice	Standard practice	Utilized on a few projects	Standard practice	Standard practice
	State DOTs should be flexible to utilize several strategies for acquiring environmental permits	Standard practice	Standard practice	Not considered	Not considered	Not considered	Standard practice
	NEPA and quantification and mitigation of environmental impacts						
	State DOTs should add flexibility to the NEPA document and special studies by identifying alternative mitigation strategies, maximum impacts, and performance mitigation measures	Standard practice	Standard practice	Standard practice	Utilized on a few projects	Standard practice	Standard practice
	State DOTs should establish programmatic agreements with federal and environmental agencies to streamline the environmental planning and permitting process and to provide flexibility in the NEPA document	Standard practice	Standard practice	Standard practice	Standard practice	Standard practice	Utilized on a few projects
	State DOTs should acquire time-consuming and high-risk permits early on and leave non-critical permits to be attained by the design-build team	Not considered	Standard practice	Not considered	Standard practice	Not considered	Standard practice
	State DOTs should consider advertising and awarding projects prior to the completion of NEPA to expedite project schedule	Considered for future use	Not considered	Utilized on a few projects	Not considered	Not considered	Utilized on a few projects

Table 2 (continued)

		State DOT					
		Colorado	Michigan	N. Carolina	Utah	Virginia	Washington
Opportunities	Post-award environmental management in design-build contracts						
	State DOTs should consider allowing the design-build team to accept the risk of NEPA re-evaluations (schedule and cost risks) by requiring the design-build team to complete the re-evaluation or to provide required documentation for NEPA re-evaluation	Standard practice	Not considered	Standard practice	Standard practice	Standard practice	Standard practice
	State DOTs should consider allowing the design-build team to accept the risk of obtaining or modifying environmental permits (schedule and cost risks) by requiring the design-build team to complete the permit application and/or modification or to provide required documentation for the permit modification	Standard practice					
	State DOTs should consider providing incentives to the design-build team to encourage reduction in the environmental impacts of the project	Standard practice					
	State DOTs should require the design-build team to have an environmental management plan and an environmental compliance manager to oversee the environmental impacts of the project and ensure compliance with permit requirements	Standard practice	Not considered	Not considered	Standard practice	Standard practice	Standard practice

4.5 Potential Best Practices for Consideration

This research has identified opportunities for efficiency enhancements in the areas of environmental planning and permitting on transportation design-build projects. Some of these opportunities were identified as more widely used than others across various State DOTs and can be considered potential best practice opportunities. These potential best practice opportunities are:

- State DOTs should partner with, fund positions, or co-habitat with regulatory agencies.
- State DOTs should examine alternative solutions during the concept phase by clearing additional areas for each environmental special study to allow for innovation.
- State DOTs should add flexibility to the NEPA document and special studies by identifying alternative mitigation strategies, maximum impacts, and performance mitigation measures.
- State DOTs should establish programmatic agreements with federal and environmental agencies to streamline the environmental planning and permitting process and to provide flexibility in the NEPA document.
- State DOTs should consider allowing the design-build team to accept the risk of NEPA re-evaluations (schedule and cost risks) by requiring the design-build team to complete the re-evaluation or to provide required documentation for NEPA re-evaluation.
- State DOTs should consider allowing the design-build team to accept the risk of obtaining or modifying environmental permits (schedule and cost risks) by

requiring the design-build team to complete the permit application and/or modification or to provide required documentation for the permit modification.

- State DOTs should consider providing incentives to the design-build team to encourage reduction in the environmental impacts of the project.
- State DOTs should require the design-build team to have an environmental management plan and an environmental compliance manager to oversee the environmental impacts of the project and ensure compliance with permit requirements.

CHAPTER 5 – LIMITATIONS OF RESEARCH

This research accomplished its goal of defining challenges, and opportunities in environmental planning and permitting in transportation design-build projects. However, due to the limits of this research, only existing resources were reviewed and synthesized and limited State DOTs were interviewed. Some areas where this research could have been further developed include:

- Quantifying the time and cost savings value of the opportunities identified.
- Identifying and tracking case study design-build projects as they navigate the environmental planning and permitting process and interview and interact with resource agencies and the State DOT as the project develops to better identify challenges and opportunities.
- Interviews with other State DOTs who have experienced design-build programs such as Texas, Minnesota, New York, Massachusetts, and Oregon.
- Interviews with other governmental agencies that utilize design-build and must follow the environmental planning and permitting process to deliver their projects.
- Identifying and analyzing the interrelationships and information exchanges between regulatory agencies and the State DOTs.
- Using new technologies to better navigate and expedite the environmental planning and permitting process.

CHAPTER 6 – FUTURE WORK

This research is a starting point to develop best practice opportunities to expedite environmental planning and permitting on transportation design-build projects. Additional research would provide additional benefits to the design-build community.

Some areas where additional research is recommended include:

- Using case studies, interviews, and statistical analysis to quantify the time and cost savings value of opportunities and best practices in environmental planning and permitting for design-build projects.
- Identify and track interesting and unique case study design-build projects as they navigate the environmental planning and permitting process and interview and interact with resource agencies and the State DOT as the project develops to better identify challenges and opportunities. These case study projects could be experimenting with new opportunities or attempting to promote best practices identified in this and other research.
- Further exploring opportunities in environmental planning and permitting on transportation design-build projects by conducting interviews with other State DOTs who have experienced design-build programs such as Texas, Minnesota, New York, Massachusetts, and Oregon.
- Identifying opportunities in other areas of transportation design-build projects such as rail and airports. Transit and airport agencies must follow similar environmental planning and permitting laws although how they navigate and

manage these processes may be significantly different. Opportunities could be identified in these other transportation areas that could be implemented in highway design-build projects. This research could be done through interviews with other governmental agencies that utilize design-build and must follow the environmental planning and permitting process to deliver their projects.

- There are numerous and iterative information exchanges between State DOTs and the various regulatory agencies that are involved in the environmental planning and permitting processes. Identifying and analyzing these information exchanges between regulatory agencies and the State DOTs could provide opportunities to expedite and streamline these processes.
- Explore the use of new technologies to better navigate and expedite the environmental planning and permitting process. Various regulatory and transportation agencies are likely utilizing new technologies that provide benefit to the environmental planning and permitting process. Research that identifies best practices in technology and how different agencies can use technology to better communicate would provide value to the transportation engineering community.
- Explore and implement decision making tools to promote sound decision making similar to those processes currently used in the building construction industry (Aram Shiva et al. 2010; Koga 2008).

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