Design-Build Environmental Compliance Process and Level of Detail: Eight Case Studies

Requested by:

American Association of State Highway
and Transportation Officials (AASHTO)

Standing Committee on the Environment

Prepared by:

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Acknowledgements

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Design-Build Environmental Compliance Process and Level of Detail: Eight Case Studies

Introduction

State transportation agencies are under increasing pressure to improve the delivery and performance of their transportation programs and projects. Both the Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA) and the Transportation Equity Act for the 21st Century (TEA-21) included provisions that identified the development and application of techniques to better manage the costs, duration, and quality of transportation projects. One of the methods being considered and employed more frequently in this regard is the use of Design-Build contracts. This method, which was specifically identified and discussed in Section 1307 of TEA-21, involves a system of contracting in which the engineering and construction for a given transportation project is procured under a single contract with a single team.

Currently, there is national interest in better understanding the environmental data and design detail needs for the Design-Build process to make transportation programs more cost-effective and efficient. Section 1307(a)(3)(B) of TEA-21 specifically states that "Final Design under a Design-Build contract…shall not commence before compliance with Section 102 of the National Environmental Policy Act of 1969 (NEPA)." This clearly implies that preparation of an environmental document pursuant to NEPA must be completed in advance of performing services under a Design-Build contract. Although the temporal relationship between NEPA and Design-Build is clear based on the legislation, the relationship of other environmental processes and Design-Build is less clear since it is left to the individual State transportation agencies to decide an appropriate level of environmental integration on a case-by-case basis. For instance, Design-Build contracting may be employed following the completion of all or most environmental activities and procedures required for the project, such as permitting, or Design-Build may incorporate all or some of these elements as part of that contracting process. In this regard, an understanding of the methods and levels of environmental integration that State transportation agencies are currently using in their Design-Build contracts would be useful in effectively and efficiently advancing such contracts in the future.

Specifically, there are two environmentally-related components for which an understanding of their relationship to the Design-Build process can influence the degree of success of Design-Build contracting. The first is an understanding of the level of environmental permitting and identification of environmental mitigation commitments needed to be completed prior to initiating the services of a Design-Build Contractor. The second is an understanding of the appropriate level of conceptual or preliminary design detail to be prepared prior to retaining a Design-Build Contractor, especially as it relates to environmental impacts identification and permits compliance. An understanding of both of these components also enhances the ability of a given project to be more streamlined in terms of reducing agency review time, schedule delays, Contractor design changes/claims, and risks to mitigation commitments.

At the outset of the Design-Build contract, the level of information known regarding environmental issues and mitigation requirements, coupled with the level of design completed and available, can influence the ability of the Contractor to absorb the risk and efficiently design and construct the project. Failure to adequately understand the relationship of these elements and to link them in an appropriate manner can result in substantial frustration for all parties involved in the Design-Build contract. This frustration can lead to friction in the working relationship between these parties and can result in a substantial impact on the timely completion of the project. The key to achieving the goal of improved knowledge regarding environmental procedures and the Design-Build process is to clarify the practical costs, benefits and risks of their integration.

Basic Elements of the Design-Build Process

Design-Build differs from the traditional Design-Bid-Build delivery method in a variety of ways. With Design-Build, the State transportation agency typically completes only 15 to 30 percent of the preliminary design before it is released to a Design-Build team for completion, unlike traditional Design-Bid-Build, where 100 percent of the project is designed in advance of the project advertisement. Often with Design-Build, the State transportation agency conducts a risk assessment workshop with key members from the State team and resource agencies to identify risks (technical, political, environmental, etc.) to project goals and determine if the project scope should be adjusted to adequately address identified risks. The State transportation agency often conducts a follow-up risk assignment workshop to assign identified risks contractually to the party (State or Design-Build Contractor) that is best able to manage that risk.

A benefit of the Design-Build delivery method is that it provides an opportunity for the Contractor to incorporate alternative technical concepts at the design and construction phases to more efficiently deliver projects and provide cost savings. In addition, since the State transportation agency and the Design-Build Contractor assume new roles, once the contract is in place, the State will generally conduct audit and oversight responsibilities while maintaining project control with fewer staff.

Identification and Development of Case Studies

Cambridge Systematics, Inc. / The Louis Berger Group, Inc. was contracted by the National Cooperative Highway Research Program (NCHRP) to identify and prepare case studies that highlight diverse measures used to advance projects through the Design-Build process, with a focus on the environmental aspects of each project. The case studies were selected upon consideration of Design-Build projects exhibiting the following basic characteristics:

- Either a Categorical Exclusion (CE), Environmental Assessment (EA), or Environmental Impact Statement (EIS) had been previously prepared for the project pursuant to the requirements of NEPA;
- Environmental permits/compliance were required for the project;
- Innovative strategies were implemented either by the relevant State transportation agency or the Design-Build Contractor; and

- Preliminary design drawings were prepared to some level of completion in order to demonstrate to the permitting agencies that the potential project impacts could be taken into account, and/or to provide to the Design-Build Contractor for its use in preparing environmental permit applications.

An initial list of fifteen (15) potential case study projects was identified. Upon further research and analysis and concurrence received from the NCHRP 25-25(12) panel, the list was narrowed to the final list of eight (8) case studies that best provided geographical diversity and exemplified a variety of measures and techniques for which there were identifiable lessons learned and which could be applicable for other states nationwide.

Eight Case Studies Demonstrating Successful Efforts in Design-Build Project Delivery

The eight case studies selected for demonstrating successful efforts in integrating or complying with environmental permitting requirements as part of the Design-Build process are:

1. Davis Dam – Kingman Highway (SR 68), Mohave County, Arizona;

2. Transportation Expansion (T-REX) Multi-Modal Project, Denver, Colorado;

3. Interstate 95 Widening from Duval County Line to Flagler County Line, St. Johns County, Florida;

4. Widening of I-4 from SR 535 (BeeLine) to SR 528 (Sand Lake Road), Orange County, Florida;

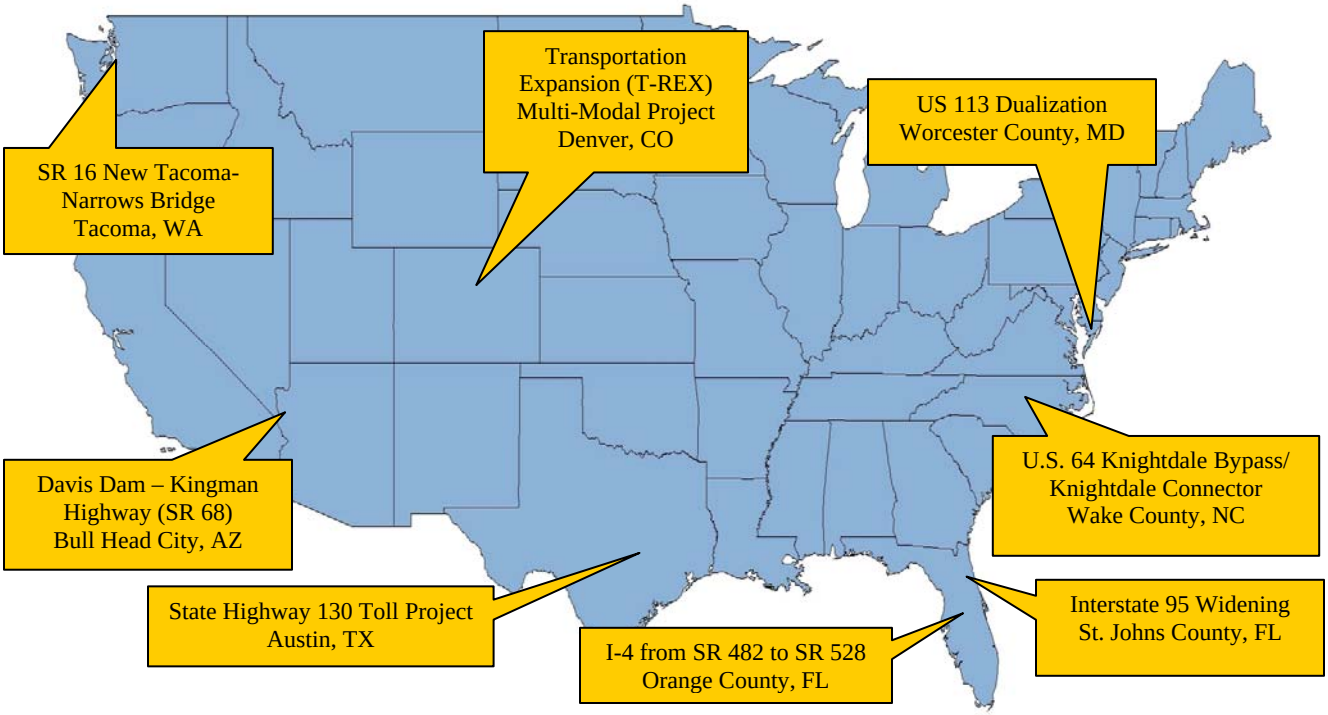
5. U.S. 113 Dualization, Worcester County, Maryland;

6. U.S. 64 Knightdale Bypass and Knightdale Connector/Eastern Wake Expressway Project, Wake County, North Carolina;

7. State Highway 130 Toll Project, Austin, Texas; and,

8. State Route 16: New Tacoma Narrows Suspension Bridge, Tacoma, Washington.

The general locations of these eight case studies are depicted on the map on the next page:



Each case study has been prepared following a uniform format, including: a discussion of project background; a discussion of how the project advanced through the Design-Build process; a discussion of environmental permit requirements and responsibilities; a discussion of status of contract design drawings at the time that the Design-Build Contractor was retained; a summary of lessons learned; and a list of references who are knowledgeable about the project and who provided input to the development of the particular case study.

These case studies were prepared using a variety of information sources, including a review of the relevant NEPA environmental documents and other associated project reports. Conversations with knowledgeable individuals regarding each project, including staff from the relevant State transportation agency and the Design-Build Contractor, as applicable and available, were also conducted. Additional information, including available photos and graphics, was also obtained from project websites.

Investigative Approach

Once data was collected for each of the eight projects, individual case studies were prepared. Several prominent factors led the analysis, including the type of NEPA involvement (i.e., CE, EA, or EIS), the degree of risk involved in each project, the permitting timeline, and status of contract design drawings at the commencement of the Design-Build contract. It was important to note for each case study to what degree the NEPA and environmental permitting processes ran concurrently in advance of the Design-Build Request for Proposals (RFP). Other factors that were examined in the analysis were the methods applied by the State transportation agencies and Contractors to ensure compliance with all mitigation strategies and permit conditions.

The combination of these major factors was different for all eight case studies; however, each project was delivered or is in the process of being delivered successfully with both cost and time savings. Therefore, the analysis also included an investigation into the interplay among these variables (such as type of NEPA document, permit submissions prior to Design-Build RFP, and contract design drawing percentages prior to Design-Build RFP) to produce a successful Design-Build project delivery.

Summary of Lessons Learned

Based on the case studies prepared, some general findings have been noted regarding the Design-Build process and its integration with environmental permitting and mitigation requirements. Design-Build has proven itself to be a tool for delivering both public and private projects of varying size, complexity, and costs ranging from a few hundred thousand dollars to over a billion dollars. Design-Build allows the construction process to begin, in some cases, shortly after the Design-Build contract is awarded rather than waiting until the entire project is 100 percent designed, due to the advanced preparation of preliminary design packages and early action permitting by the sponsoring State transportation agency. Projects have been successful in using existing contract models for preparation and project implementation while modifying them to suit the project's parameters. Design-Build is not intended to replace traditional Design-Bid-Build delivery options from the construction process. Rather, Design-Build is intended to be used as an alternative delivery method for the State transportation agency to consider when determining how best to design, budget, construct, and maintain specific projects.

Numerous Design-Build projects have sprouted nationwide, each possessing its own successes and failures. While the Design-Build option is becoming more popular for many State transportation agencies, there is not a standard course of action for streamlining the design and permitting stages. Some State transportation agencies, as the project Owners/Sponsors, have chosen to complete all of the necessary work to gain permit approvals in order to minimize risk to the Design-Build Contractor and cost to themselves. In other cases, State transportation agencies have advanced the environmental documents pursuant to NEPA in advance of the Design-Build contract and then pass the majority of the permit responsibilities onto the Design-Build Contractor. More often, it appears that the State transportation agencies have selected to obtain some of the key project-wide permits, such as Section 404 wetlands permits and Section 401 water quality certifications, as early action permits, while the Contractors are expected to obtain more construction-specific approvals, such as soil erosion and sediment control permits.

While the desire of the State transportation agencies may be to streamline the entire project delivery process through the use of Design-Build contracting, the uncertainty associated with environmental permitting outcomes and mitigation commitments during the Design-Build process makes the ability to link these processes more challenging. This is especially true if the permit conditions result in unexpected additional design and/or construction requirements that are more costly and/or more time consuming. When these conditions are available to the Contractor in advance of entering into the Design-Build contract, there is a reduced element of risk to the Contractor. However, if the Design-Build contract were advanced to a point where it begins immediately after NEPA approval is received, thereby incorporating more of the responsibility for permitting activities into that contract, the overall delivery of the project could potentially be accelerated, although the potential for NEPA or permit reanalysis may be greater.

After reviewing the selection of case studies, what was most interesting about many of these procedures and techniques was the fact that they rely on a common-sense approach and do not involve cutting-edge technology. Therefore, it is likely that many of these procedures and techniques could potentially be employed on other future projects. While individual state statutes only require compliance with the number of proposed projects, cost limitations, and/or reporting requirements, rather than specific environmental procedures, it may only be necessary to refine and tailor permitting procedures and techniques to fit the specific needs of each individual project.

The case studies illustrate that the Design-Build permitting and approval process can flow at an expedited rate for a variety of project types and in a number of diverse project settings. The outcome of each study is relayed in a "Lessons Learned" section that provides a learning tool for future project managers. A comparison of these "Lessons Learned" indicates a number of recurring procedures and techniques that have proven to be effective in practice for various projects. Procedures and techniques that were generally considered to be effective for certain case studies were not necessarily applied to all of the case studies because of the diversity and complexity of the projects evaluated. Some common successful practices among most, if not all, of the projects examined in this study include the following:

- Selection of the Design-Build approach during the EIS phase, followed by a specific, well-written RFP to provide enough detail about environmental conditions and commitments in relation to the finished product, without being too rigid that it would preclude innovation on the part of the Contractor.

- Solicitation of the assistance of environmental agencies early in the design process for their approval and coordination (interagency coordination);

- Provision for incentive payments to the Design-Build Contractor for the reduction of impacts to the environmentally sensitive areas within the project boundaries (i.e., in an effort to reduce the level of impact previously approved by the regulatory agencies during the permitting process);

- Preliminary 15 to 30 percent level of highway design to provide enough detail in regard to the early action permit processes, demonstrate constructability, identify impacts, and minimize project risk (in two cases, greater than 30 percent level of design for certain components of the project was prepared);

- Acquisition of the most critical permits by the State transportation agency for the highest risk activities prior to the issuance of the RFP, with responsibility transferred to the Design-Build Contractor for any amendments and changes that must be approved by the sponsoring or regulatory agency;

- Provision for a qualified on-site construction engineer or manager by either the State transportation agency, the Design-Build Contractor, or an independent entity to ensure

environmental compliance and to be responsible for reporting to the State transportation agency on management plans and environmental issues in order to minimize violations;

- Stipulation in the RFP that environmental violation costs are the responsibility of the Contractor; and,

- Co-location of staff to improve responsiveness, coordination, and interaction.

Depending on each State transportation agency's coordinating efforts with permitting agencies early in the process, and the time- and cost-savings goals of each project, different approaches to expedite necessary permitting activities were taken. In one case, in response to regulatory agency request, the State transportation agency combined multiple project segments into one contract to eliminate the need for multiple permit submissions, while in another case the State transportation agency divided the project due to geographic variations and subsequent permitting differences. State transportation agencies who obtained early-action permits in advance of the RFP for the Design-Build contract were generally able to include in the RFP all permit conditions and mitigation measures required and clearly transfer this responsibility to the Contractor for compliance and implementation. Project design criteria, as part of the RFP packages, were also developed to include all permit terms and conditions. In most of the case studies examined, all or most permits were obtained prior to the Design-Build contract. In one case, however, all permits were obtained by the Contractor since the project had previously required only a Categorical Exclusion pursuant to NEPA, with no significant environmental impacts and minimal potential risk to the Contractor. In this case, the decision to defer permitting to the Contractor expedited the process significantly as the permitting and design timelines ran concurrently.

In summary, depending on the degree of impact and risk associated with each project, the State agencies involved in these case studies took a different approach in the acquisition of permits, and advancing the project to the Design-Build phase. In general, the three environmental permitting practices found in the eight case studies include:

1) The State transportation agency secures permits and the Design-Build Contractor is responsible for modifying and/or complying with permits;

2) The State transportation agency secures some early action high risk permits and the Design-Build Contractor is responsible for modifying and complying with those permits as appropriate, as well as for obtaining the remaining permits; and

3) The Design-Build Contractor is responsible for obtaining and complying with all permits.

Conclusions

According to the Design-Build Institute of America (DBIA), the benefits of the design-build method of project delivery include:

- *Singular Responsibility*: With both design and construction in the hands of a single entity, there is a single point of responsibility for quality, cost, and schedule adherences.

- *Quality*: The singularized responsibility inherent in Design-Build serves as a motivation for quality and proper project performance.

- *Cost Savings*: Value engineering and constructability are utilized continuously and more efficiently as the designers and contractors work as one team.

- *Time Savings*: Since design and construction overlap, and bidding periods and redesign are eliminated, total design and construction time can be significantly reduced.

- *Potential for Reduced Administrative Burden*: During design and construction, the Owner/Sponsor is not required to invest time and money coordinating and arbitrating between separate design and construction contracts.

- *Early Knowledge of Firm Costs*: Guaranteed construction costs are known much earlier than on other project delivery systems.

- *Improved Risk Management*: Performance aspects of cost, schedule, and quality are clearly defined and responsibilities and risks are appropriately balanced.

The results of the eight case studies indicate that these assertions by DBIA are on target, as all projects examined appear to have been or are scheduled to be completed earlier and at a lower cost than if a more traditional Design-Bid-Build approach were pursued. In at least one case, however, the project participants believe that further improvements to the schedule and cost could have resulted if certain modifications to their approach (e.g., developing preliminary plans to a more detailed level than 15 percent prior to the Design-Build RFP) had been incorporated. Although that project is still considered to be on or ahead of schedule, the reduced level of early design resulted in required NEPA and permit re-evaluation.

As State transportation agencies investigate alternative delivery methods, a modified Design-Build approach (or owner-facilitated Design-Build) is emerging, based on individual project constraints and requirements. This modified approach has a greater comfort factor for the State agency, as the agency maintains a greater degree of control over the project through early action permitting. In addition, with the modified Design-Build approach, the preliminary engineering consultant maintains a traditional role of working directly for the State transportation agency, not the Contractor as with a regular Design-Build model. This allows the owner and State agency an optimal relationship with the preliminary design consultant and Design-Build Contractor. The eight case studies examined reveal that each of the State agencies modified the Design-Build model to some degree as necessary, all maintaining a comfortable level of control through the process.

As a result of this study, a *Best Practices Decision Tree* has been developed in an effort to maximize efficiency, minimize project costs, and streamline the environmental permitting and design processes through the Design-Build project delivery method. Since each project is different, and the case studies examined in this report illustrate a variety of approaches, there is

clearly no one definitive approach to the Design-Build process. However, it has been noted that according to several variables and criteria involved in each project, certain optimum decisions can be made. The *Best Practices Decision Tree* at the end of this discussion outlines the key decision-making points in the process and illustrates a general approach for decision-makers when choosing the Design-Build method of project delivery.

As the Decision Tree illustrates, there are three major levels of project risk and impacts to be assessed when pursuing the Design-Build delivery method. The lowest level of project risk is a minimal impact project that qualifies for a Categorical Exclusion pursuant to NEPA. In this case, the NEPA process has the potential to be brief. As a result, the State transportation agency may choose to defer all design and environmental permitting responsibility to the Contractor to expedite project delivery.

The next two levels of risk are associated with projects that would require lengthy and comprehensive NEPA Environmental Assessments or Environmental Impact Statements. Such projects determined to have little or no high risk elements (such as significant wetlands, water impacts, stormwater and drainage issues, Section 106 issues, etc.) would prepare as many of the permits before the Design-Build Contractor is retained, concurrently with or immediately following the NEPA process. Since the permits are secured in advance of the Design-Build phase, this approach saves valuable time and resources, as there is reduced risk of design changes resulting in permit modifications and NEPA re-evaluations. The State transportation agency would prepare sufficient level of detail in the contract design drawings to acquire the permits (generally between 15 and 30 percent), but allow the Contractor flexibility to complete the design of the project, according to specifications in the RFP package, within scheduling and budget constraints. The Contractor would be required to comply with the previously-obtained permits and acquire any construction-related permits and approvals as necessary.

If an EA or EIS project incorporates high-risk elements that may require special attention, it is recommended that the State transportation agency secure the early action permits associated with the high-risk elements, such as wetlands or water quality) in advance of the Design-Build RFP. The State transportation agency may prepare contract design drawings at a level greater than 30 percent, at least for those specific elements of design that are critical for ensuring the acquisition of the environmental permits and minimizing the need for permit modifications. Once the Design-Build Contractor is retained, any permit modifications as a result of project design would then become the responsibility of the Contractor. The Contractor would also be required to obtain any other permits as necessary, including all construction-related approvals. In this scenario, the State transportation agency is encouraged to provide incentives to the Contractor to minimize environmental impacts beyond those previously identified and evaluated in the permits.

The amount of risk to be transferred to the Design-Build contractor is not the only factor that determines the percentage of completion of design drawings furnished in the RFP documents. State transportation agencies can allow for more or less innovation in design by the Contractor by providing a lower or higher level of project detail, respectively (i.e., design drawings at the 10 to 15 percent level or at the 30 percent or higher level) in the RFP documents. Other factors that may drive the percentage of completion of design drawings furnished in the RFP documents can include the project goals and the use of performance specifications.

Although the above-stated approach and the corresponding *Best Practices Decision Tree* can be used as a general guide for proceeding with environmental elements and their relationship with the Design-Build process, the application of this approach should be assessed on a case-by-case basis.

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Additional Reference

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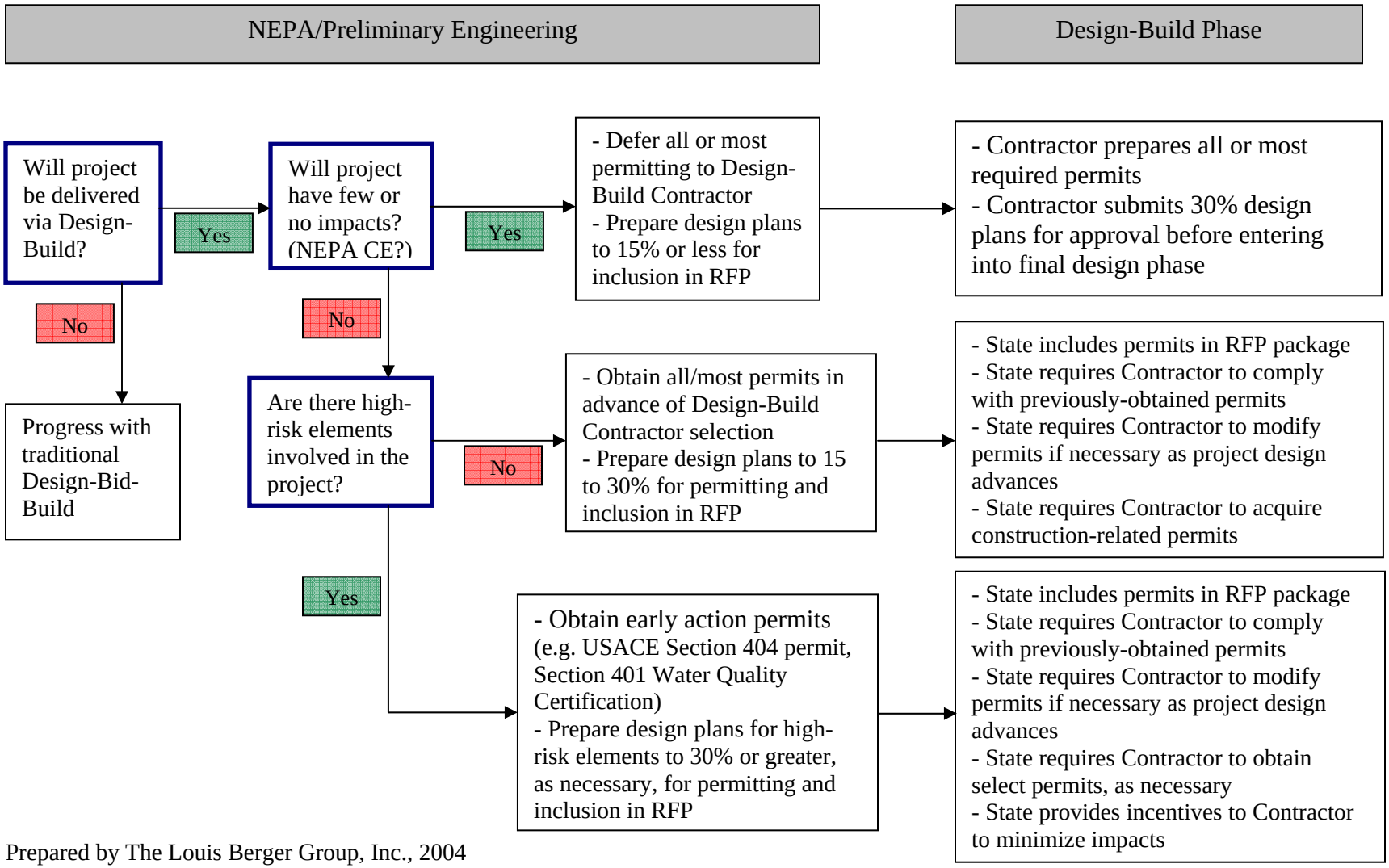
Design-Build Best Practices Decision Tree



Prepared by The Louis Berger Group, Inc., 2004

Design-Build Environmental Compliance Process and Level of Detail Required

Appendix: Individual Case Studies

- Davis Dam – Kingman Highway (SR-68), Arizona Department of Transportation, Mohave County, Arizona

- Transportation Expansion (T-REX) Multi-Modal Project, Colorado Department of Transportation and Regional Transportation District, Denver, Colorado

- Interstate 95 from Duval County Line to Flagler County Line, Florida Department of Transportation, St. John's County, Florida

- Widening of I-4 from SR 535 (BeeLine) to SR 528 (Sand Lake Road), Florida Department of Transportation, Orange County, Florida

- U.S. 113 Dualization, Maryland State Highway Administration, Worcester County, Maryland

- U.S. 64 Knightdale Bypass and Knightdale Connector/Eastern Wake Expressway, North Carolina Department of Transportation, Wake County, North Carolina

- State Highway 130 Toll Project, Texas Turnpike Authority/Texas Department of Transportation, Austin, Texas

- State Route 16: New Tacoma Narrows Suspension Bridge, Washington State Department of Transportation, Tacoma, Washington

Davis Dam – Kingman Highway (SR-68)
Arizona Department of Transportation
Mohave County, Arizona

Project Background

State Route (SR) 68 represents one of northwest Arizona's largest transportation improvement projects, located amidst mountainous desert terrain, with elevations ranging from 700 feet (ft.) to more than 3,500 ft. above sea level in the Union Pass area. The Davis Dam – Kingman Highway (SR 68) is classified as a principal rural arterial highway on the National Highway System (NHS) within Bureau of Land Management (BLM) and State lands. It is the only east-west roadway linking the Laughlin / Bullhead City area along the Colorado River with U.S. 93, and serves heavy recreation and commuter-related traffic. The projected traffic volume for the year 2020 is 23,500 vehicles per day. The purpose of this Project is to improve the capacity, public safety and operational characteristics of this segment of SR 68, in order to adequately serve the continuous growth in the recreation and gaming industries, as well as the associated commuting traffic.

The Project limits are located in Mohave County, between Milepost 1.23 and Milepost 14.50, extending east from Bullhead City to Golden Valley. The work consists of approximately two miles of new two-lane divided roadway and 11.7 miles of converted two-lane to four-lane divided roadway. Several major drainage structures, placement of wildlife/ bridge crossings, utility relocations, and other incidental work items are also included in the Project.

How Project Development Advanced Through Design-Build

Unlike the Design-Bid-Build process that has traditionally been used by the Arizona Department of Transportation (ADOT) for constructing its projects, the improvements to SR 68 followed the Design-Build contracting process. In the summer of 1998, Arizona's state legislature approved SR 68 as one of three pilot projects to examine the benefits of using the Design-Build method, even though it had been originally slated as a Design-Bid-Build project.

Some of the challenges that were expected for this Project related to the fact that it required a six percent construction grade. These challenges included:

- Construction of major drainage structures at approximately five locations;
- Excavation of several areas of rock, which then required aesthetic treatments such as rock staining and sculpting;
- Procurement and delivery of water to the Project Area, a difficult prospect due to the scarcity of water in the area;
- Accommodation of existing traffic throughout the construction period; and,
- Maintenance of the existing runaway truck ramp and brake check area during their reconstruction.

Prior to release of the Request for Proposal (RFP) soliciting a Design-Build Contractor, a team-oriented approach was established by ADOT to maintain relations between all Project partners and key stakeholders. Numerous partnering workshops were also conducted immediately after the release of the RFP in an effort to develop goals, a means of communication, and a Project Charter, and to discuss any issues and action plans that were anticipated. Workshops continued to be held periodically as the design and construction of the Project progressed.

Kiewit Western was awarded the $42.2 million SR 68 Design-Build Contract on July 9, 2000. The nine-month design process began immediately. Then on August 21, 2000, the Project team received Notice to Proceed with construction.

Project Chronology

Contract date: July 2000
Construction Notice to Proceed: August 2000
Completion: 100% complete (May 2002)

Budget: $42.2 Million

During the Design-Build process, the design was completed while portions of the construction were already proceeding. Project design was divided into two phases to minimize traffic disruption. Phase One involved constructing a new westbound roadway along the entire Project length, while Phase Two included the rehabilitation of the existing roadway as an eastbound roadway. For scheduling purposes, the Project was also divided into five segments: Segment A (2.27-mi. long); B (3.3-mi. long); C (1.5-mi. long); D (3.9-mi. long); and E (2.7-mi. long). While construction of Segment A was progressing, Segments C and D were simultaneously built and completed. After Segment A was completed, Segments B and E were then built and completed concurrently. Once all five segments were completed, the existing two-lane roadway had been transformed into a four-lane divided highway along its entire length.

Relationship of Environmental Compliance Requirements and the Design-Build Process

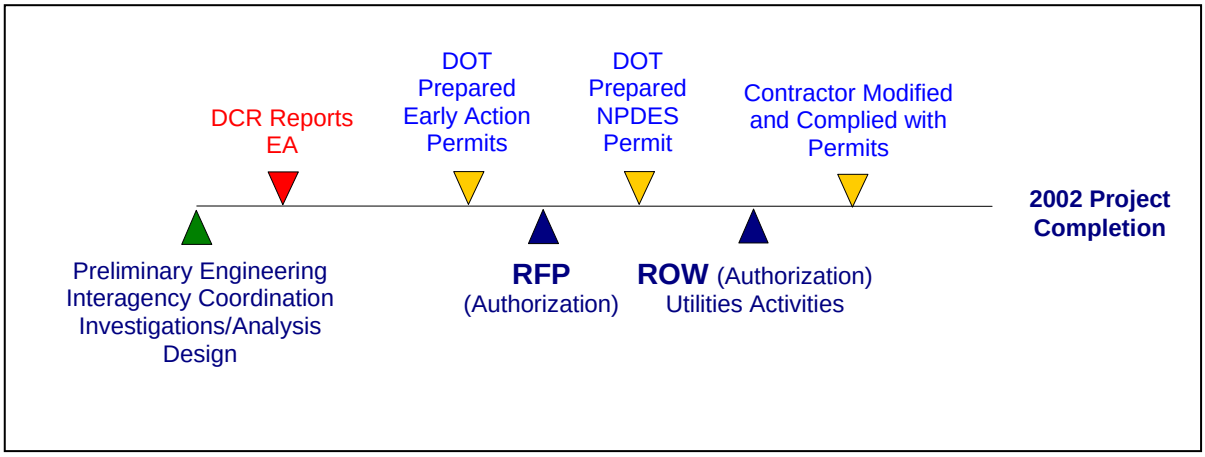
The Project's major environmental issues, all of which were addressed by the Design-Build Contractor, included:

- Location of wildlife bridge crossings;

- Issues regarding rock walls;
- Preservation of a historic feature, and,
- Replacement of native cacti and trees.

The figure below exhibits the temporal relationship of the environmental compliance requirements of the Project, particularly environmental permits, to the overall Design-Build process, with work flow proceeding from left to right. This figure clearly identifies ADOT's insertion point for environmental permits into the logical sequence of steps for this Design-Build Project.

Temporal Relationship of Environmental and Design-Build Processes



The Design-Build Contractor was responsible for incorporating all mitigation measures identified in the Final EA document and the SR 68 Mitigation Notebook, as prepared by ADOT, into the Project design. Although ADOT had the responsibility for obtaining all of the key environmental permits for the Project, including those early action permits completed prior to the issuance of the Design-Build RFP, the risk was then transferred to the Contractor for any modification to those permits, and for compliance with the permit requirements. Any violations or citations received while construction was in progress were the responsibility of the Contractor.

The following environmental permits were required for the Project. The tables on the next page clarify the responsible party for each Project-specific permit, or certificate, including type, issuer, and purpose.

ADOT Permit / Approval Responsibilities

Type	Issued By	Purpose
Section 404 Permit	US Army Corps of Engineers (USACE)	Required for filling in wetlands and filling in streams
Section 401 Permit	Arizona Department of Environmental Quality (ADEQ)	Assures water quality is maintained
Section 402 Permit	ADEQ	Required for dewatering of construction areas, as necessary.
National Pollutant Discharge Elimination System (NPDES)	ADEQ	Required to assure the quality of storm water runoff

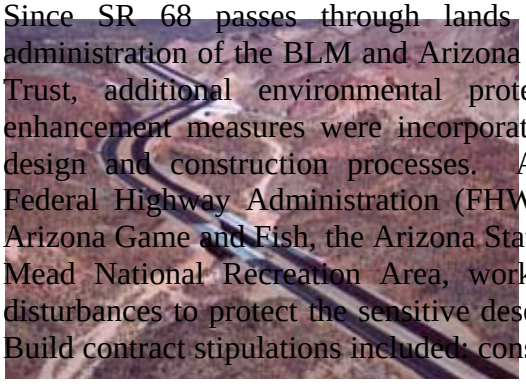
Contractor Permit / Approval Responsibilities

Type	Issued By	Purpose
Only required to modify and comply with permits prepared by ADOT.	NA	NA

The Contractor was also responsible for securing environmental clearances prior to utilizing any alternative off-site location as a material, waste and/or staging area. Contractor material, waste, and staging sites for the phased construction segments were required under the Federal Clean Water Act, State Aquifer Protection Program, State Water Quality Standards, and other agency requirements listed in the preceding table. Activities that required soil and/or vegetation disturbance such as geotechnical investigations, surveys, etc., could not begin until the appropriate environmental clearances were issued for cultural resources, hazardous materials, and biological evaluations. ADOT's Environmental Planning Section, in coordination with the affected Federal, state, and local agencies and jurisdictions, issued these clearances.

Participants in the Design-Build Environmental Process

- Arizona DOT
- Federal Highway Administration
- Bureau of Land Management
- Arizona Department of Water Resources
- Arizona Department of Environmental Quality
- Arizona Game and Fish
- Arizona State Land Trust
- U.S. Army Corps of Engineers
- U.S. Fish & Wildlife Service
- National Park Service



Since SR 68 passes through lands under the administration of the BLM and Arizona State Land Trust, additional environmental protection and enhancement measures were incorporated into all design and construction processes. ADOT, the Federal Highway Administration (FHWA), BLM, Arizona Game and Fish, the Arizona State Land Trust, and the National Park Service in the Lake Mead National Recreation Area, worked together to mitigate any vegetation and wildlife disturbances to protect the sensitive desert ecosystems of the SR 68 corridor. Specific Design-Build contract stipulations included: construction of wildlife bridge crossings and replacement of

native cacti and trees; rock wall staining and/or rock slopes painting; and, provision of crossings constructed with materials designed to blend in with the natural environment. In addition, a 1,300-ft.-long wire basket wall was installed by the Contractor to contain and prevent fill from encroaching into historical areas. The BLM also requested that a seven-ft.-high, six-mile-long animal fence be erected along either side of the roadway to minimize land disturbances and maintain existing vegetation. The fencing was also expected to encourage the use of bridge crossings by animals, thereby facilitating migration of bighorn sheep and wild burros through the Black Mountains.

In order to prevent work delays and provide timely decisions on behalf of the BLM, the Design-Build Contractor authorized a $200,000 payment to the BLM to provide a dedicated staff member to serve as the day-to-day BLM Coordinator for permits, aesthetic requirements, mitigation adherence, and other work authorized by ADOT. Any money that was not ultimately utilized by the BLM in funding the BLM Coordinator's services during Project construction was later refunded to the Contractor.

"Effective Partnering on a Design-Build project is an absolute necessity — it can make or break a project…"

"We pledged a cooperative effort and we lived up to those expectations. We all worked well together and were committed to Partnering, which, in turn, led to a successful project."

-Larry Olsen, Kiewit Design Team

The Contractor's own Environmental Coordinator, a position that was created pursuant to ADOT's contract requirements, was responsible for identifying existing and predictable effects of the operations upon the landscape, and delivering monitoring reports to ADOT and BLM. The Environmental Coordinator was authorized to promptly implement corrective measures to minimize or eliminate any adverse effects of the Project. ADOT and BLM also conducted construction activity spot checks with the Environmental Coordinator to verify proper coverage of all areas. These monthly evaluations included summaries and critiques of communications, problems resolution, teamwork, scheduling, design quality, safety, environmental protection, and community relations.

In order to better assist the Contractor's Environmental Coordinator and the BLM Coordinator once they were identified, the SR 68 Mitigation Notebook was developed by ADOT for this Project in advance of the release of the RFP. The purpose of this document was to further clarify the mitigation measures that had been briefly defined in the Final EA. This document was prepared in order to ensure that the Design-Build Contractor would be well aware of the parameters involved in any mitigation process.

In addition to the requirement for an Environmental Coordinator to ensure work quality, ADOT implemented a Quality Workmanship Program. This program consisted of a maximum $500,000 incentive to be paid to the Contractor once the earned amount was determined via a series of checklists and performance criteria. The Design-Build Contractor's construction and quality management personnel were required to team with ADOT's inspection personnel to create and revise checklists that detail the requirements for the various items of work to be inspected. In the RFP documents, ADOT provided bidders with a detailed Construction Inspection Checklist related to the plans and specifications to be used as a sample. Each checklist was assigned a criticality goal percentage to provide a quantitative reference for payment of incentives. The conformance goal was developed based on the type of work expected to be performed. Checklist items classified as "critical", those essential to the preservation of life or operation of the facility,

were assigned a goal of at least 95 percent conformance; those classified as "major", or essential to the durability of the facility or prevention of substantial economic loss, were assigned a goal of 90 percent conformance. For example, work on a guardrail would be expected to meet 97.5 percent of the conformance criteria.

During construction, the inspector and the workmanship supervisor were required to fill out the checklist based on the work performed. Analysis of the results would determine the percent conformance for that unit of the construction phase. If the inspection checklist did not indicate that those criteria were being met, the item would need to be reworked and another checklist prepared. If a second checklist showed conformance to the expected criteria, then the job would only receive half the points available for calculation of the incentive. If the checklist failed the second time, the item would be reworked until it met the required criteria and no points would be earned towards the incentive. During this Project, the Contractor earned approximately 96 percent of the available incentive award.

There were also a number of other incentive programs featured by ADOT; however, they are not relevant to permitting and design.

Contract Design Drawings

The Design-Build process for this Project was based on the Final Design Concept Report (DCR), the Final EA, and the SR 68 Mitigation Notebook, which were all provided by ADOT. For this Project, ADOT completed a preliminary 10 to 15 percent level of design in the DCR, which was incorporated as part of the RFP. A design exception occurred in this Project for an unapproved design speed and vertical curve near Union Pass for a wildlife bridge crossing. However, the Design-Build Contractor was able to adjust the alignment in order to eliminate the need for the design exception. This flexibility of design and construction was one of the benefits of the Design-Build process. No additional exceptions were considered at that time; however, the teamwork of the Design-Build Team allowed them to innovatively meet approval for the design speed and curve by moving the necessary bridge.

Lessons Learned

Design-Build allowed ADOT to complete this highway in a shorter period of time than the traditional Design-Bid-Build approach. Constructed in five segments, the Project reached substantial completion on May 15, 2002 – four months ahead of ADOT's two-year maximum time allowance.

The SR 68 Design-Build Project received a 2002 *Globe Award* from the American Road & Transportation Builders Association in recognition of the team's commitment to protecting and enhancing the environment, and the *Over $15 Million National Civil Design-Build Award* from the Design-Build Institute of America.

In summary, ADOT and the Design-Build Contractor worked well at promoting the efficiency of the Design-Build process. The following is a summary of key factors that enabled this process, and its integration with environmental compliance requirements, to be innovative and successful:

- Co-location of staff to improve responsiveness, coordination and interaction;
- Provision of both an on-site Environmental Coordinator and a BLM Coordinator by the Design-Build Contractor in order to minimize impacts and violations, as well as streamline agency permit review;
- Stipulation in the RFP that violation costs are the responsibility of the Contractor;
- Establishment of a Quality Workmanship Program Innovation whereas the Contractor and ADOT jointly developed a quality checklist that helped to enhance project quality, teamwork, and employee ownership pursuant to a $500,000 maximum incentive payment program;
- Preliminary design at a 10 to 15 percent level was determined to be an adequate level of design to identify Project constructability and impacts, and to ensure minimal changes and cost add-ons for the Project; and
- Partnering workshops built camaraderie through shared goals, open communication, problem identification/solving, and conflict resolution. However, earlier coordination with BLM to develop scope of work would further enhance items such as the preliminary designs for the location of wildlife crossings.

References

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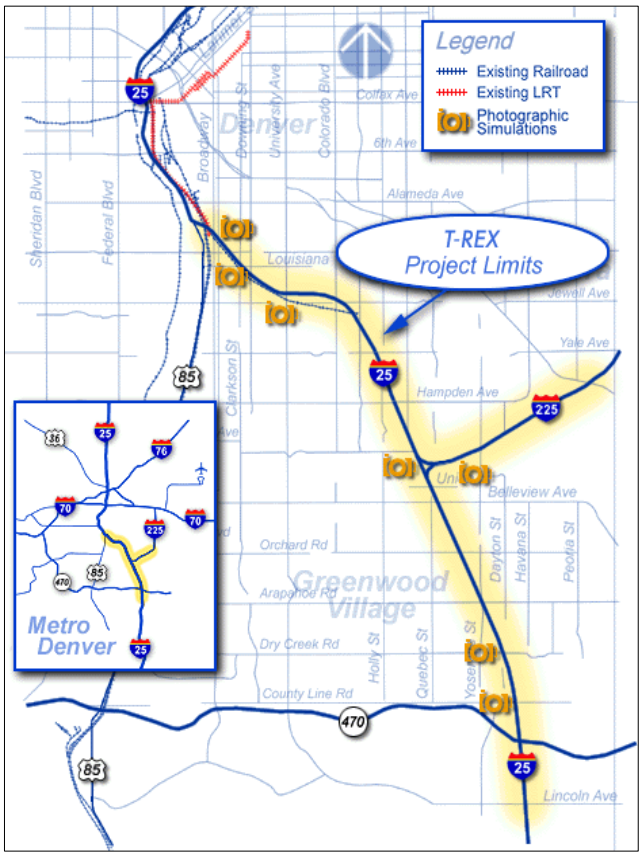
Transportation Expansion (T-REX) Multi-Modal Project
Colorado Department of Transportation and
Regional Transportation District
Denver, Colorado

Project Background

The 19-mile Transportation Expansion, or T-REX, Multi-Modal Project (formerly known as the Southeast Corridor Project) includes sections of I-25 and I-225, which are the most heavily used roadways in Colorado, carrying more than 230,000 vehicles per day. These corridors provide access to I-70, the region's major east-west freeway, and connect the two largest employment centers in the region (i.e., downtown Denver and the Southeast Business District).



The Project includes 19 miles of double-tracked Light Rail Transit (LRT) and 17 miles of highway improvements to I-25 and I-225. The Project limits on I-25 are between Broadway in the City and County of Denver and Lincoln Avenue in Douglas County, and on I-225 from I-25 to Parker Road in the City of Aurora. In addition, the Project includes 13 LRT stations, eight interchange reconstructions, replacement of numerous bridges, and drainage upgrades.

T-REX has progressed through the Project Development Process in three phases:

- *Phase 1* – Began with a Major Investment Study (MIS) in 1995 and continued through December 1999 when the Final EIS pursuant to NEPA and preliminary engineering were completed.

- *Phase 2* – Included early action permitting, the procurement of Design-Build services, and commencement of right-of-way acquisition for the entire Project.

- *Phase 3* – Began with the 2001 award to the selected Design-Build Contractor and will continue to the completion of the Project's construction.

How Project Development Advanced Through Design-Build

Prior to completion of the Final EIS in Phase I, it was determined that the Project would be constructed using the Design-Build approach. In order to proceed with the Design-Build delivery of the Project, several legislative measures were enacted. State legislation was adopted during the 1999 legislative session, which allows the Colorado Department of Transportation (CDOT) to use a Best Value Selection process rather than a Low Bid process on Design-Build projects. In addition, Colorado Senate Bill 00-203 on Utility Legislation was initiated in the spring of 2000 (discussed later).

The on-going cooperative effort of CDOT and the Regional Transportation District (RTD) continued during Phase 2 by combining staff from both agencies working on the T-REX Project at one location. This co-location of staff would later be expanded to include personnel from CDOT, RTD, consultant staff, legal support, and other specialized areas (public information and right-of-way support as examples).

Continued coordination with local governments (City and County of Denver, Arapahoe County, Douglas County, City of Lone Tree, City of Aurora, Greenwood Village, City of Centennial, and the Joint Southeast Public Improvement Association, which is a partnership of local businesses and metropolitan districts in the southern section of the Project limits) was a key to the success of the Project. All local agencies were included in the planning and design process since a primary goal was to improve mobility throughout the business corridor. The inclusion of these agencies was essential in establishing a team culture and a "project first" mentality.

Project Chronology

Contract date: May 2001
Completion Date: September 2006

Budget: $1.67 Billion ($795 Million of which is for Highway component)

In addition, an Intergovernmental Agreement (IGA) between CDOT and the RTD provided the foundation for the working partnership to combine resources to finance and construct the overall Project using the Design-Build contracting process. During this time, the Federal Highway Administration (FHWA) and the Federal Transit Administration (FTA) also entered into the IGA and recognized themselves as "One DOT," to seamlessly implement statutory, regulatory, and administrative procedures pertaining to the Project.

In May 2001, Southeast Corridor Construction (SECC), a joint venture between Kiewit Construction and Parsons Transportation Group, was selected as the Design-Build Contractor. SECC has committed to completing the Project 22 months ahead of schedule and portions of the LRT service are scheduled to begin operations by the end of 2004. The entire T-REX Project is to be substantially completed by 2006. Based upon the recent progress of the Project, construction remains on schedule.

Relationship of Environmental Compliance Requirements and the Design-Build Process

The Project's major environmental issues, as identified in the EIS, included:

- Relocation of six single-family residences, one duplex, 112 units in three multi-family buildings, and 26 commercial buildings;

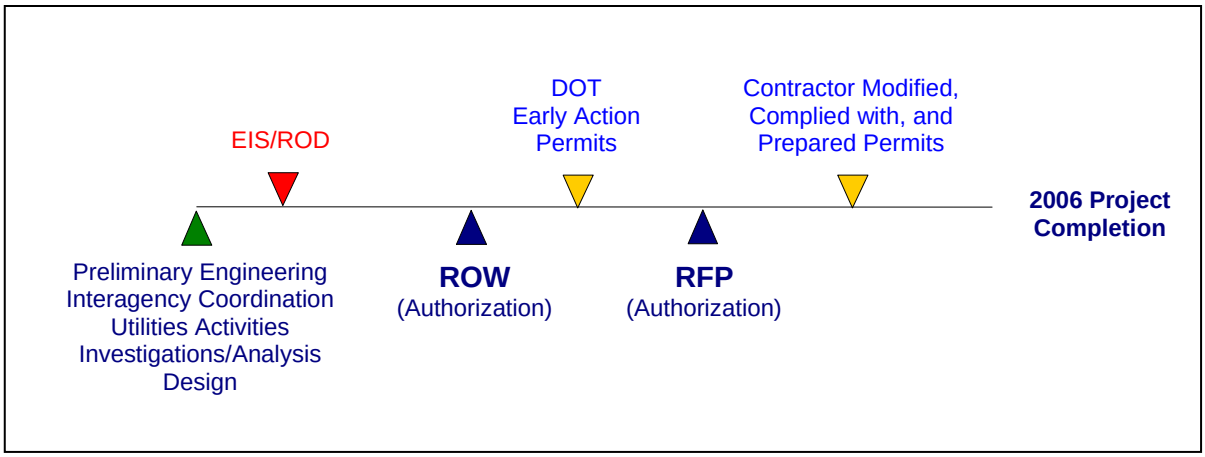
- Approximately 3.45 acres of wetlands would be permanently impacted. Replacement wetlands would be provided;

- Fourteen sites of concern regarding potential contaminated materials; and,

- Limited property acquisitions required from three parks and five historic sites.

The figure below exhibits the temporal relationship of the environmental compliance requirements of the Project, particularly environmental permits, to the overall Design-Build process, with work flow proceeding from left to right. This figure clearly identifies CDOT's insertion point for environmental permits into the logical sequence of steps for this Design-Build Project.

Temporal Relationship of Environmental and Design-Build Processes



Portions of the T-REX Design-Build contract were modeled after the successful Utah Department of Transportation I-15 contract. For instance, the environmental scope of the Request for Proposal (RFP) soliciting a Design-Build Contractor provided detailed language stipulating that the Contractor would be responsible for compliance with all Governmental Approvals, and that all such Governmental Approvals shall be binding on the Contractor. The Contractor would also be responsible for obtaining all Governmental Approvals that were not obtained by CDOT / RTD as early action permits. The RFP also clarified the mitigation measures presented as part of the Final EIS and the Record of Decision (ROD). These measures were stated in tabular form, and the responsibilities and approval requirements needed for compliance with NEPA and early action permits were specified.

CDOT and RTD have traditionally taken responsibility for obtaining any permits necessary for Design-Bid-Build projects. CDOT / RTD applied the same rule to this Design-Build Project and was proactive in starting the process by obtaining what they perceived to be the most critical early action permits for the highest risk activities before the RFP was advertised. For example,

the permit required for the soil disposal area at the south end of the Project was an important "early action" item for the T-REX Project. Excavated material not meeting reuse specifications could be stored at this location temporarily until it could be disposed of off-site. However, once the Design-Build Contractor was chosen, permits obtained by CDOT were transferred to the Design-Build Contractor for compliance and modification, including the early action permits. As stipulated in the RFP, the ownership of these permits remained in CDOT's name but the risk was transferred to the Contractor for any violations or citations that may be incurred while work was in progress. To complete their proposed early start / early finish schedule, the CDOT / RTD submitted additional permit applications to the appropriate state and local agencies shortly after a Notice to Proceed (NTP) was issued to the Contractor.

The following environmental permits and approvals were required for the Project. The tables below clarify the responsible party for each Project-specific permit, or certificate, including type, issuer, and purpose.

CDOT / RTD Permit / Approval Responsibilities

Type	Issued By	Purpose
CDOT's MS-4 Municipal Separate Storm Sewer System	Colorado Department of Public Health and the Environment (CDPHE)	Specific State requirement to assure the quality of storm water
Section 404 Permit	US Army Corps of Engineers (USACE)	Required for cutting and filling in wetlands and streams
Section 401 Permit	CDPHE	Assure water quality is maintained
SB 40 Certification	Colorado Division of Wildlife (CDW)	Assure the mitigation of endangered species. None were present.
Section 402 Permit	CDPHE	Required for dewatering of construction areas, if necessary.
SB99-111 / CDOT Region 6 Policy	CDW	Required for the relocation of prairie dogs
Depredation Permit	U.S. Fish & Wildlife Service (USFWS)	Assure the mitigation of migratory bird nesting for barn owls, swallows, robins and magpies
Section 106 of the National Historic Preservation Act	State Historic Preservation Officer (SHPO)	Responsible for any listing and/or data recovery required for historical and archaeological findings

Contractor's Permit / Approval Responsibilities

Type	Issued By	Purpose
National Pollutant Discharge Elimination System (NPDES)	CDPHE	Required to assure the quality of storm water runoff
Conditional Letter of Map Revision and Letter of Map Revision	Federal Emergency Management Agency (FEMA)	Conditional Letter of Map Revision for impacts to 100-year floodways and/or floodplains of designated waterways
Construction Dewatering Permit	CDPHE	Project-wide authorization for contamination remediation
Air Quality/Dust Control Permit	CDPHE	Required for dust control and mitigation
Groundwater Clean-Up Permits	CDPHE	Required for individual dewatering operations where groundwater is contaminated
Construction Access, Utility, Eminent Domain, or Survey Permits	CDPHE	Required authorizations to perform construction activities (e.g., street occupation and construction of the CDOT Patrol Facility and LRT Maintenance Facility)
Contaminated Subsurface Materials (rock & soil)	CDPHE	Ensure appropriate and effective remediation of contamination encountered during Project
Noise Variance	City and County of Denver	Required for noise mitigation

Substantial coordination has occurred with representatives from the SHPO, CDOT, FTA, FHWA and RTD and the City and County of Denver. All efforts were made during the conceptual design process to avoid the use of protected resources. CDOT / RTD initially applied for a noise variance from the City and County of Denver prior to the issuance of the RFP. However, based upon the review of the preliminary designs, it was the permitting agency's determination that the Contractor would be able to provide more accurate data for assessing and mitigating construction noise. Therefore, CDOT / RTD postponed this permit application until the Contractor was under contract and could provide the requisite information.

As part of a stringent T-REX Oversight Methodology, monitoring plans, early permitting actions, and detailed proposal mitigation requirements for each environmental category were discussed. These regulatory compliance plans were to be provided by an on-site Environmental Compliance Manager supplied by the Contractor pursuant to a requirement of the Design-Build Contract. This position filled a crucial role for this Project in addressing unexpected problems that were encountered where an immediate response was needed by either CDOT / RTD or the Contractor.

A year after Project construction began, the U.S. Environmental Protection Agency (USEPA) increased its administration and enforcement of erosion control and stormwater management across the country. The implications of this enforcement meant that the Contractor's Compliance Manager was obligated to request a change in the Contractor's standards in order to be in compliance. Since this Project was already underway, a change in standards resulted in increased in-house training in an effort to bring work procedures into compliance with regulatory stormwater requirements. This was a new permit condition that the Contractor had to rapidly initiate.

Participants of the Design-Build Environmental Process

- Colorado DOT
- Federal Highway Administration
- Regional Transportation District
- Federal Transit Administration
- Colorado Department of Public Health and the Environment
- Colorado Division of Wildlife
- U.S. Army Corps of Engineers
- U.S. Fish & Wildlife Service
- Federal Emergency Management Agency
- State Historic Preservation Officer

An air quality/dust control permit was also initiated by the Contractor. Any dust movement across the right-of-way line to an off-site location would require immediate mitigation. This occurred during construction in the summer months when the project area was arid. In order to rectify this situation, a Best Management Practices plan developed by the Contractor was implemented. This plan included the provision of water trucks along the right-of-way lines to keep the soil moist and to minimize the opportunity for further off-site transport of fugitive dust.

Environmental issues pertaining to hazardous materials can arise unexpectedly. Several events occurred where the Contractor encountered asbestos utility pipes during construction. It was stipulated in the RFP that after the NTP was received, job manuals on Health and Safety and Contaminated Materials Management would be developed by the Design-Build Contractor and approved by CDOT / RTD. When this event occurred, the Environmental Compliance Manager was contacted and construction was halted until the Contractor's environmental team could dispose of the asbestos and minimize further contamination.

"Flexibility within Design-Build development is based on communication and trust."

– Dan Ryan, SECC

The cost of remediation for environmental clean up issues was addressed when CDOT / RTD planned ahead in budgeting for the T-REX Project. An internal budget of $11 million was set aside from the Design-Build contract to cover unexpected remediation costs outside of the base Project scope. This financial contingency was packaged knowing that certain cleanup activities would be likely. It was felt that it would be best handled on a case-by-case basis upon each discovery.

Even though Utility Relocation is not necessarily important to environmental permitting, it is an important component for surveying and preliminary design drawings. The T-REX Project is the State of Colorado's and CDOT's innovative use of the Design-Build Utility Legislation, (Colorado Senate Bill 00-203 [Section 43-1-1410 through 1412] entitled "Project Specific Utility Relocation Agreement" [PSURA]). As a result of this legislation, CDOT coordination with the utility companies can occur immediately following the acceptance of the EIS / ROD. Because of this early notification to the utility companies, the PSURA was included in the Design-Build

RFP. This innovative approach requires a new level of cooperation with the utility companies that is essential for expediting the construction process and minimizing schedule delays, risks, and costs. This agreement provides the following:

- Encourages utility companies to use CDOT's Contractor;
- Allows the utility company to negotiate the costs of the relocations and provides the option of allowing the utility company to perform the work themselves if a cost cannot be agreed upon;
- Provides for possible sanctions and liabilities that can be placed on the utility companies if they perform their own work and delay the Contractor;
- Increases accountability / responsibility on the Contractor to speak with a utility company prior to submitting bid; and,
- Authorizes CDOT to purchase / advance funds for easements on behalf of the utility company, and requires repayment with interest from the utility.

In this particular case, CDOT / RTD was able to survey the entire corridor ahead of time to locate all structures in advance of having the Contractor under contract. This proactive approach would limit opportunities for unknown impacts, minimize increased costs, minimize schedule delays, and limit the number of contract drawing changes.

Contract Design Drawings

The Design-Build Contractor was responsible for reviewing the preliminary designs and assessing its adequacy or inadequacy in meeting the Contract requirements during the RFP stage. The Contractor was not required to conform to the drawings included in the RFP package. However, the RFP documents did contain cost-effective design solutions and other information (such as the completed utility survey for the corridor) that would be valuable in meeting the Project requirements and in reducing Project costs.

To maximize the benefit of the Design-Build format of construction, it is important to allow as much innovation and flexibility as possible. The contract documents allow that flexibility, but contain given constraints that must apply to conform to decisions made in the Final EIS and preliminary design stage of the Project. The basic configuration defines the Project within the permitting constraints and gives the Contractor a certain level of tolerance.

Highway

This Project was unique in that the pre-NTP design completion percentages varied by Project element. The preliminary contract drawings for the highway portion were developed as 30

percent design. This level of design was deemed necessary to determine the environmental impacts and to show the entire Project's level of constructability, right-of-way impacts, necessary materials and quantities, and alignments all within typical standards. In terms of additional environmental issues, the Contractor was responsible for the design and construction of the wetland mitigation and revegetation. The Project only required two on-site wetland mitigation locations, totaling approximately 2.5 acres. This mitigation was based on the CDOT / RTD advanced permit coordination with the USACE.

Light Rail

The RTD tailored the specifications required for the light rail portion of the T-REX Project. Instead of using a similar 30 percent design for the entire project, the system and station drawings for the light rail were developed to a 70 percent design, while the tracks and drainage were at a 30 to 50 percent level of design. In doing so, RTD removed some of the cost risk from the Contractor involved with this part of the Project. RTD had addressed many of their specific requirements in the advanced design and did not require the Design-Build Contractor to be as innovative with the light rail construction. This level of design detail was also to the satisfaction of the permitting agencies providing approvals.

Lessons Learned

In summary, CDOT / RTD and the Design-Build Contractor have worked well at promoting the efficient use of the Design-Build process. The following is a summary of key factors that have enabled the Design-Build process to be innovative and successful:

- Selection of the Design-Build approach in the EIS phase;
- Implementation of the innovative streamlining measures with the utility companies using the PSURA agreement to minimize time and cost;
- Acquisition of the most critical permits by CDOT / RTD for the highest risk activities prior to the issuance of the RFP, with responsibility transferred to the Design-Build Contractor for any amendments and changes that must be approved by CDOT / RTD, thereby allowing the permitting process to begin as an early action item and removing much of the risk of violations from CDOT / RTD;
- Determination of preliminary 30 percent design level for highway design as providing enough detail in regard to the early action permit processes, and for showing constructability, identifying impacts, and minimizing changes and cost add-ons for the Project, while also providing sufficient flexibility to allow the Contractor to maximize efficiency and minimize risk;

- Solicitation of the assistance of environmental agencies early in the design process (Phase 2) for their approval and coordination (i.e., IGA agreement);

- Co-location of staff to improve responsiveness, coordination and interaction;

- Provision of a qualified on-site Environmental Compliance Manager as part of the Contractor team, who is responsible for reporting to CDOT / RTD on management plans and issues in order to minimize violations;

- Ensuring that the RFP stipulates that environmental violation costs are the responsibility of the Contractor; and,

- Providing for contingency for additional funds in advance to cover unexpected remediation costs.

References

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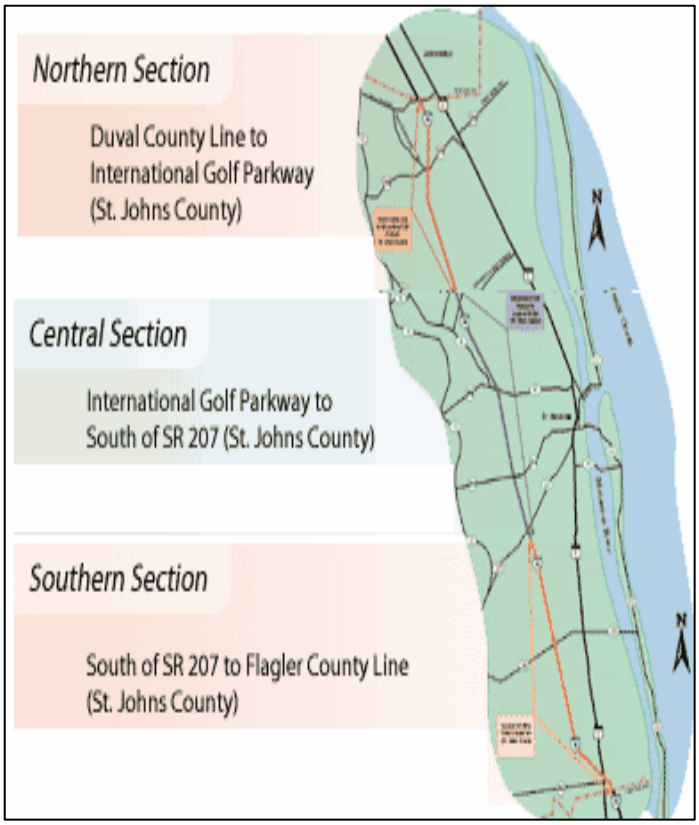
Interstate 95 from Duval County Line to Flagler County Line
Florida Department of Transportation
St. John's County, Florida

Project Background

The Florida Department of Transportation (FDOT), District Two is completing the widening of 35 miles of Interstate 95 from four to six lanes in St. John's County, Florida. The corridor is in need of an additional median lane in each direction in order to address poor level of service, improve traffic operations, and meet current safety criteria and other requirements. Other Project improvements include:

- Constructing a lower grade at S.R. 206 in order to accommodate larger trucks;
- Replacing the overpass at C.R. 210 with a new bridge that will accommodate six lanes of traffic on Interstate 95 and six lanes of traffic beneath the overpass on C.R. 210;
- Milling and resurfacing of all existing lanes and shoulders; and,
- Landscaping the entire corridor.



The Project corridor crosses the entire length of St. Johns County from the Duval County line to the Flagler County line. For construction purposes, the Project was broken down into three segments:

- *Northern segment*, from the Duval County line to International Golf Parkway.
- *Central segment*, from International Golf Parkway to just south of S.R. 207.
- *Southern segment*, from just south of S.R. 207 to the Flagler County line.

How Project Development Advanced Through Design-Build

FDOT has become a national leader in Design-Build while the Florida Division of the Federal Highway Administration (FHWA) has been very proactive and successful in partnering with FDOT to develop a Design-Build process. FDOT is using the Design-Build process for this Project, in part, to fulfill its obligation in a $660+ million Economic Stimulus Package for transportation projects approved by the Florida Legislature and Governor in 2002. FDOT invested approximately $380 million in Design-Build projects between March and June of 2002, including portions of this Interstate 95 Project. Although the entire Project was to be constructed using the Design-Build process, only the Northern and Central segments of the Project were to be constructed using funding from the Economic Stimulus Package. This Project was set up in a more traditional format since the criteria were fairly straightforward and this was one of the first Design-Build projects for FDOT District Two. In this regard, many of the typical procedures applied in Design-Bid-Build projects were utilized for this Project as well.

Project Chronology

RFP Date: May 2001
Completion: October 2004

Total Cost: $83.7 million

In March 2002, three separate Design-Build teams were selected for each portion of the Project. The Northern segment is being designed and built by the team of Parsons Transportation Group and Superior Construction Company, both of Jacksonville, Florida. The Central segment is being designed and built by the team of Connelly & Wicker of Jacksonville, Florida and Anderson Columbia Company, Inc. of Lake City, Florida. The Southern segment team is comprised of Jacobs Civil, Inc. of Jacksonville, Florida and Ranger Construction Company of Daytona Beach, Florida. Construction of two of the three Project segments has been completed on schedule (September 2004), with the third segment proposed to be finished by the end of October 2004.

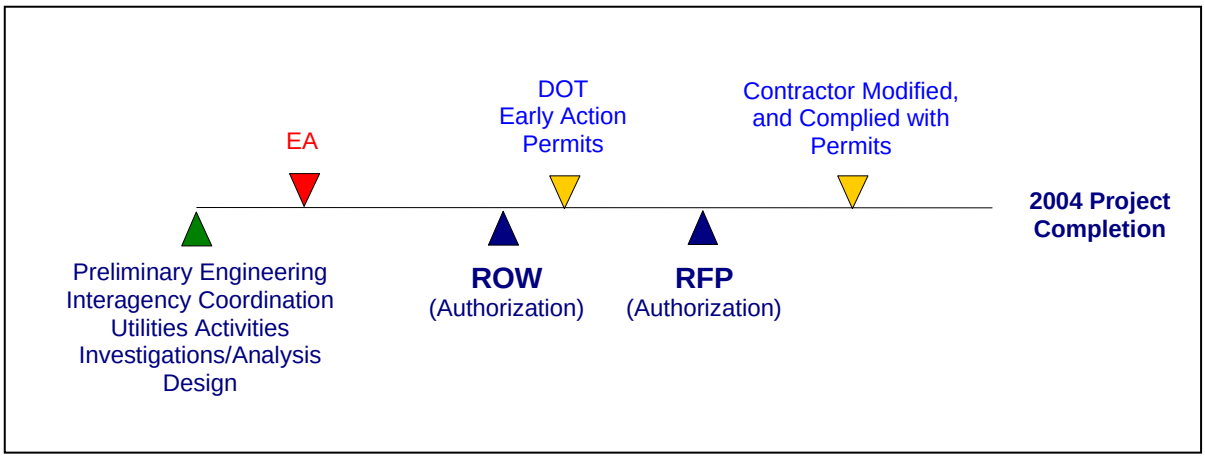
Relationship of Environmental Compliance Requirements and the Design-Build Process

The Project's major environmental issues, as identified in the EA, included:

- Impacts to 8.44 acres of wetlands and 12.38 acres of State Waters; and,
- Preservation of potentially impacted threatened and endangered species and historic resources.

The figure on the next page exhibits the temporal relationship of the environmental compliance requirements of the Project, particularly environmental permits, to the overall Design-Build process, with work flow proceeding from left to right. This figure clearly identifies FDOT's insertion point for environmental permits into the logical sequence of steps for this Design-Build Project.

Temporal Relationship of Environmental and Design-Build Processes



FDOT, which has traditionally taken responsibility / ownership of any environmental permits required for Design-Bid-Build projects, applied the same rule to this Design-Build contract. The environmental scope for the Design-Build RFP provided detailed language stipulating that the Design-Build Contractor would primarily only be responsible for modification and compliance with the conditions of all previously-prepared environmental permits. All approvals, including expected mitigation requirements, would be binding on the Contractor. The Contractor would also be responsible for obtaining any permits that were not obtained by FDOT in advance, as necessary. The RFP also clarified all mitigation measures identified in the Final EA document prepared pursuant to NEPA.

The following environmental permits were required for the Project. The tables below clarify the responsible party for each Project-specific permit, or certificate, including type, issuer, and purpose.

FDOT Permit / Approval Responsibilities

Type	Issued By	Purpose
Section 404 Permit	US Army Corps of Engineers (USACE)	Individual permit required for filling in wetlands and filling in streams
Section 401 Water Quality Certification	St. John's Water Management District	Assure water quality management and storage is maintained. Florida DEP has delegated authority to Water Management District.

Contractor's Permit / Approval Responsibilities

Type	Issued By	Purpose
National Pollutant Discharge Elimination System (NPDES)	Florida Department of Environmental Protection (FDEP)	Designing the erosion control plan in compliance with Stormwater Pollution Prevention Plan requirements and FDOT Rule 62-25
Generic Permit (Discharge of Produced Groundwater from any Non-Contaminated Site Activity)	FDEP	A dewatering permit required whenever a project results in the withdrawal of groundwater.

All efforts were made during the preliminary design process to avoid the use of any nearby protected resources. Prior to the division of the Project into three segments for construction, the Project had actually been subdivided into only two segments in order to help FDOT obtain Project approval from the permitting agencies. These two sets of environmental permits only pertained to wetlands (Section 404) and water quality (Section 401).

Instead of partnering with the Florida Department of Environmental Protection, water quality management and permitting authority has been delegated to the various Water Management Districts in the State of Florida. These are board-authorities appointed by the Governor of Florida based on the State's watershed basin boundaries. For this Project, FDOT coordinated with St. John's Water Management District to obtain the water quality certification prior to release of the Design-Build RFP. The responsibility for compliance was then transferred to the Contractor once the contract with FDOT became effective.

Participants in the Design-Build Environmental Process

- Florida DOT
- Florida Department of Environmental Protection
- Federal Highway Administration
- St. John's Water Management District
- U.S. Army Corps of Engineers

Due to the permit approvals needed for the preliminary design, Construction Engineer Inspectors (CEIs) were hired by FDOT as internal consultants to ensure environmental and construction compliance in the Northern and Central segments. This technique is part of the traditional oversight methodology used by FDOT. However, as part of a FDOT Design-Build pilot program for this Project, the Design-Build Contractor in the Southern segment was required in the RFP to hire its own CEI. These contrasting oversight methods were used as a means for determining the better approach for ensuring construction compliance. FDOT will be making a final analysis of the relative success of each approach at the conclusion of the Project.

Once the Design-Build Contractors for the three segments were on board, they were each required to obtain two additional permits from the Florida Department of Environmental Protection (FDEP) – the National Pollutant Discharge Elimination System (NPDES) Permit and the Generic Permit for the Discharge of Produced Groundwater from any Non-Contaminated Site Activity. The required FDEP Generic Permit authorized the discharge of produced groundwater from any non-contaminated site activity which discharges by a point source to surface waters of the State.

Contract Design Drawings

Traditionally, FDOT's Design-Bid-Build project drawings are developed and submitted to the permitting agencies at a 50 percent level of design. For the Design-Build process, FDOT hired a design team to complete sufficient design to allow acquisition of right-of-way and permit construction of off-site retention ponds for the Project. After 18 months of design work, the drawings were provided to the short-listed Design-Build Contractors as part of the RFP review process in order to assist the Contractors in their Design-Build proposals. The contract drawings were subject to the Contractor's right to a change order since they were not required to conform to the drawings included in the RFP package.

Highway

The highway drawings were prepared at a 30 percent level of design prior to hiring the Design-Build Contractor. This level of design, which is reflective of the relatively straight-forward nature of the Project, was more than adequate to advance the Project forward because the level of constructability, right-of-way impacts, necessary materials and quantities, and horizontal and vertical alignments provided on the plans were all within accepted design standards. The only major environmental compliance issue presented as part of these drawings became the Contractor's responsibility for implementing the retention ponds.

Drainage

FDOT tailored the stormwater pond specifications within the widened right-of-way as required by the St. John's Water Management District. The drainage and stormwater management plans were completed at a 60 percent level of design. FDOT removed some of the risk and price involved with this part of the Project for the Contractor. The reason for the difference in design level was due to the need for one pond site to be constructed outside of the right-of-way. Prior to the selection of the Contractor, FDOT had some last minute difficulty purchasing this land as a conservation easement from the State of Florida. This resulted in inadequate designs for the Contractor and the need for FDOT to modify its own permit. In order to maintain its fulfillment of District requirements, the Contractor was able to supplement linear ponds along the right-of-way with extended cross drainage. In addition, the Design-Build Contractor was able to perform innovative drainage construction by removing the need for pond liners and raising the water level of the ponds. The Contractor negotiated with the permitting agencies to determine if there were enough cost savings in modifying the existing permits and plans. It was concluded that this innovation not only protected wetlands from drainage issues but also lowered Project costs.

Lessons Learned

In summary, the three teams and FDOT have worked well at promoting the efficient use of the Design-Build process. The following is a summary of key factors that have enabled the Design-Build process to be innovative and successful, especially in relation to the environmental aspects of the process:

- Selection of the Design-Build approach was made in the EA phase;

- Responsibility for acquisition of early-action permits belonged to FDOT who completed the process prior to the issuance of the RFP, while the responsibility for modifying and complying with these permits was transferred to the Design-Build Contractor for any modifications, which must be approved by FDOT (This allows the permitting process to begin early within the Design-Build process, removes the risk of violations from FDOT, and limits construction delays);

- Stipulation in the RFP that environmental violation costs are the responsibility of the Contractor;

- Provision of preliminary 30 percent level of design (60 percent for drainage plans) was more than adequate detail to show constructability, identify impacts, and minimize changes and costs for the Project. In addition, the flexibility of the design allowed the Contractor to maximize efficiency and minimize risk through innovative strategies;

- Design changes during the Design-Build process may be incorporated into the Value Engineering Cost Proposal in the future so that any cost savings will be split between FDOT and the Contractor; and,

- Provision of an on-site Construction Engineer Inspector by the Design-Build Contractor (as a consultant), who is responsible for reporting to FDOT on management plans and environmental issues as a means to ensure environmental and construction compliance.

References

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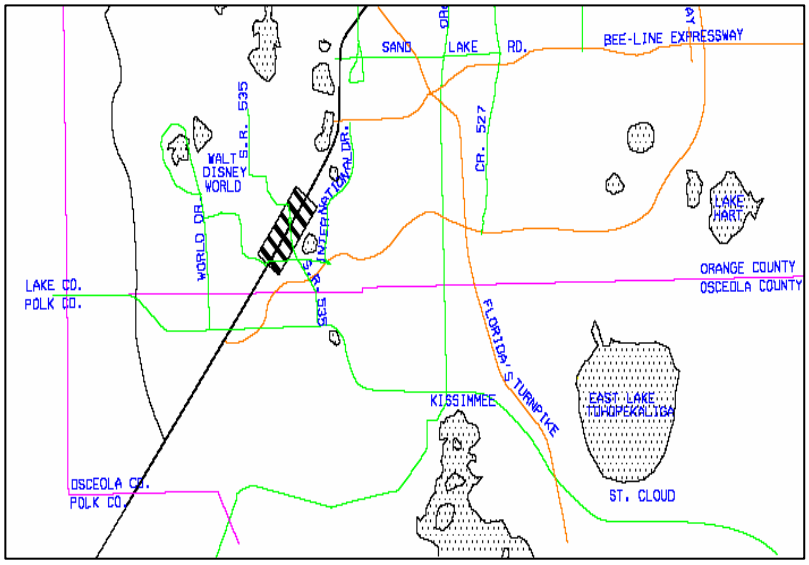
Widening of I-4 from SR 535 (BeeLine) to SR 528 (Sand Lake Road) Florida Department of Transportation Orange County, Florida

Project Background

In response to traffic congestion and poor levels of service, as well as maintenance issues, the Florida Department of Transportation (FDOT) determined that 3.25-mile section of Interstate 4 (I-4) in the City of Orlando, Orange County, Florida needed major improvements. The Project added one auxiliary travel lane in each direction on I-4 between the SR 535 (BeeLine) and SR 528 (Sand Lake Road) Interchanges. In addition, the Project called for the milling and resurfacing of the existing lanes within this 3.25-mile section of I-4.



The Project scope also included:

- Repair and widening of the I-4 westbound bridge (Bridge No. 750142) over the Central Florida Parkway;
- Widening of the I-4 eastbound bridge (Bridge No. 750200) over the Central Florida Parkway;
- Dismantling and removal of all of the rest area facilities at M.P. 4.211 eastbound and M.P. 4.972 westbound; and,
- Construction of associated drainage facilities, intelligent transportation systems, and other miscellaneous items.

How Project Development Advanced Through Design-Build

FDOT has become a national leader in Design-Build while the Florida Division of the Federal Highway Administration has been very proactive and successful in partnering with FDOT to develop a Design-Build process. When large-scale projects are involved, FDOT implements a Design-Build strategy whereby the permitting process and preliminary design begin during the NEPA process; early action permits are obtained in advance of awarding the Design-Build contract. For smaller-scale projects, such as when a NEPA Categorical Exclusion (CE) is

anticipated, such as this one, permitting and preliminary engineering are deferred to the Design-Build contractor.

As part of the Design-Build contract for this Project, the Contractor was required to obtain all necessary permits. The Design-Build Contractor was also responsible for the survey, design, maintenance of traffic during construction, and coordination of all utility relocations, in addition to the required demolition and construction of Project elements. The Design-Build Contractor was provided only preliminary information by FDOT, including a value engineering report, preliminary geotechnical information, preliminary LBR reports, bridge inspection reports, preliminary specifications package, right-of-way maps, 24-hour traffic counts, and pavement design. During the Design-Build contract, FDOT was responsible for design reviews, shop drawing concurrence, and construction engineering and inspection.

Project Chronology

RFP Date: March 2001
Completed: April 2003

Budget: $ 5.9 million

In March 2001, Jones Brothers, Inc. with HNTB was hired as the Design-Build Contractor. The Contractor had full flexibility in Project design and implementation, since it was concluded that minimal risk existed for this Project.

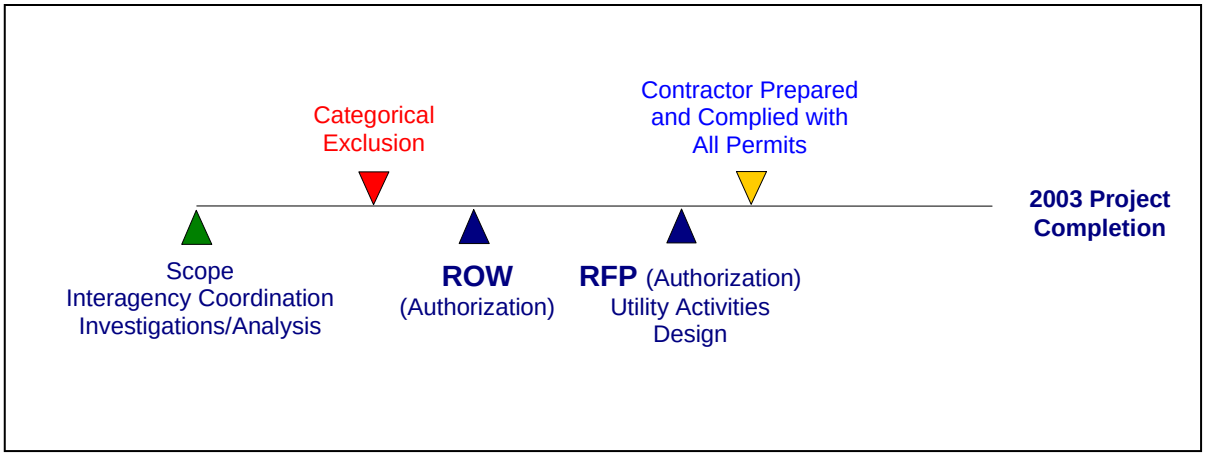
Relationship of Environmental Compliance Requirements and the Design-Build Process

There were no major environmental issues associated with the construction of the I-4 Widening Project. The project did not impact any wetlands; therefore no wetlands mitigation measures were identified. As with all projects, FDOT was required to provide a Stormwater Pollution Prevention Plan, which includes erosion control measures. No other mitigation measures were identified.

During the NEPA CE process, FDOT District Five determined that the Project would be constructed using the Design-Build approach. The environmental scope of the Design-Build Request for Proposals (RFP) provided detailed language stipulating that the Design-Build Contractor was responsible for acquisition, modification and compliance with all environmental permits.

The figure on the next page exhibits the temporal relationship of the environmental compliance requirements of the Project, particularly environmental permits, to the overall Design-Build process, with work flow proceeding from left to right. This figure clearly identifies FDOT's insertion point for environmental permits into the logical sequence of steps for this Design-Build Project.

Temporal Relationship of Environmental and Design-Build Processes



In partnership with FDOT, the Contractor designed the Project in full compliance with all environmental laws and regulations, including Florida Statutes, Section 404 of the Clean Water Act, and parts 114 and 115, Title 33, Code of Federal Regulations. Acquisition of all permits was also the responsibility of the Design-Build Contractor. In addition to the Federal and State permitting requirements, any dredge and fill permitting required by local agencies was prepared in accordance with their specific regulations. The Contractor was required to coordinate all permits with FDOT prior to submittal of each application to the relevant agency. As stipulated in the RFP, the ownership of these permits was to be in FDOT's name. However, the Design-Build Contractor assumed the responsibility for any non-compliance issues, including all fines related to the failure to adhere to specific conditions in the approved permits.

Participants in the Design-Build Environmental Process

- Florida DOT
- Federal Highway Administration
- South Florida Water Management District
- U.S. Army Corps of Engineers
- Florida Department of Environmental Protection
- Reedy Creek Improvement District

The following environmental permits were required for the Project. The tables below clarify the responsible party for each Project-specific permit, including type, issuer, and purpose. As shown in the tables, FDOT did not prepare nor acquire any of the required permits for the Project. Since the Project involved no significant environmental impacts, the responsibility for permit acquisition was deferred to the Design-Build Contractor. All permits were obtained by early 2002, approximately within a year of the Contractor award.

FDOT Permit / Approval Responsibilities

Permit Issued	Issued By	Purpose
None	NA	NA

Contractor Permit / Approval Responsibilities

Permit Issued	Issued By	Purpose
Section 404 permit	U.S. Army Corps of Engineers (USACE)	Individual permit required for filling in wetlands and filling in streams
National Pollutant Discharge Elimination System (NPDES)	Florida Department of Environmental Protection (FDEP)	Designing the erosion control plan in compliance with Stormwater Pollution Prevention Plan requirements and FDOT Rule 62-25
Section 401 Water Quality Certification	South Florida Water Manage-ment District (SFWMD)	Assure water quality management and storage is maintained. Florida DEP has delegated authority to Water Management District.
Drainage permit	Reedy Creek Improvement District	Assures water quality management plans for drainage into their systems

Instead of partnering with the Florida Department of Environmental Protection (FDEP), water quality management and permitting authority has been delegated to the various Water Management Districts in the state of Florida. These are board-authorities appointed by the Governor of Florida, based on the State's watershed basin boundaries. The Design-Build Contractor coordinated with the South Florida Water Management District in a pre-bid meeting and again after winning the Project to obtain the Section 401 water quality certification.

Due to the relationship of preliminary design and permit approval, Construction Engineer Inspectors (CEIs) were hired by FDOT as internal consultants to ensure environmental and construction compliance. While the Design-Build Contractor was responsible for the design of erosion protection and water quality management, an unforeseen permit required by the Reedy Creek Improvement District, the government entity which regulates Disney World, had to be acquired. A number of coordination meetings with this government entity were essential in order to construct the improvements that would affect their drainage system.

Contract Design Drawings

> *"The use of Design-Build allows a straight-forward project like this to be completed, not only on schedule, but more rapidly than using the traditional Design-Bid-Build process".*
>
> *- Jennifer Vreeland, FDOT Project Manager*

While this Project was designated as Design-Build, FDOT did not develop a preliminary design to include as a guide in the RFP package. FDOT determined that since the Project was covered under a NEPA Categorical Exclusion, the bidding Design-Build teams could prepare all of the preliminary design plans without too much risk. The Contractor then prepared a 30 percent level of design in accordance with restrictions / commitments made during the preparation of the Categorical Exclusion and using information obtained during an RFP meeting with the Water Management District. Although these plans provided only a generalized location of right-of-way, they were adequate for obtaining permit approval. Detailed limits of the erosion control items were required in the

RFP, but were not shown on the roadway plan sheets. This process allowed more than enough flexibility to the Design-Build Contractor.

Lessons Learned

In summary, the Project illustrated the efficiency of the Design-Build process. The following is a summary of key factors that enabled the Design-Build process to be innovative and successful:

- A well-written RFP provided enough detail in the Scope of Work to describe the finished product, although it was not so rigid that it would preclude innovation;

- Preliminary 30 percent level of highway design provided enough detail to demonstrate constructability, identify impacts, and minimize changes and costs for the Project (In addition, the flexible design allowed the Contractor to maximize efficiency and minimize risk);

- The Design-Build RFP stipulated that environmental violation costs are the responsibility of the Contractor;

- The RFP contained provision for an on-site Construction Engineer Inspector that is responsible for reporting to FDOT on management plans and environmental issues in order to minimize violations; and,

- Permitting and preliminary engineering were deferred to the Design-Build Contractor for maximum flexibility, due to the smaller-scale nature of this Project, the minimal adverse impacts anticipated and the preparation of only a Categorical Exclusion pursuant to NEPA.

References

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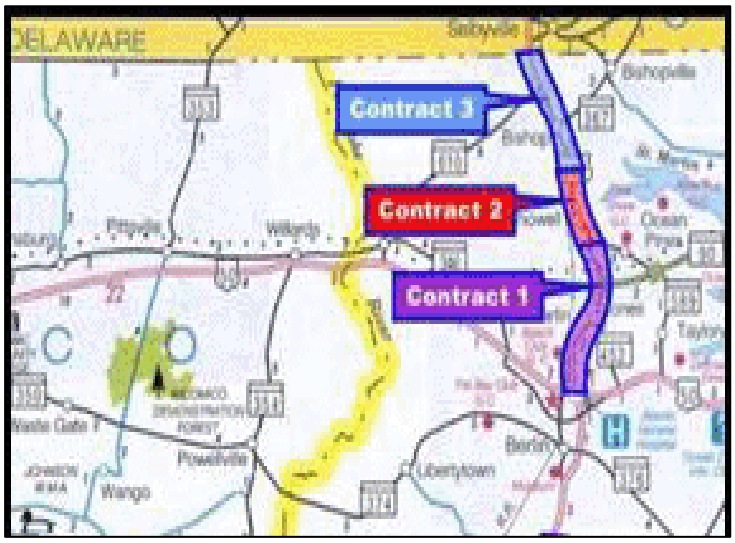
U.S. 113 Dualization
Maryland State Highway Administration
Worcester County, Maryland

Project Background



U.S. 113 is a major north-south artery in Worcester County, Maryland. It serves both local traffic on the Delmarva Peninsula and through-traffic between Virginia and Delaware. U.S. 113 is a major gateway for summer vacationers traveling to popular Maryland beaches located just a few miles east of the highway. An average of 18,100 vehicles per day (14 percent trucks) travels on this northern-most section of U.S. 113 in Maryland. Based upon 20-year projections, traffic is anticipated to reach 30,000 vehicles a day. Significant growth in year-round population, coupled with summer vacation beach traffic over the last few years, has resulted in a rising number of fatal accidents on the highway.

The U.S. 113 Dualization Project totals 7.5 miles in length and follows an alignment from Berlin, MD north to the Maryland-Delaware line. In order to expedite the Project, two contract sections were decided by the Maryland State Highway Administration (SHA) to be advanced as Modified Design-Build projects, to the degree that the Design-Build teams were given preliminary designs to follow. The preliminary plans and permits were developed in accordance with the restrictions that were agreed upon during negotiations with the permitting agencies during the preparation of the Final EIS.

The Preferred Alternatives for the southern (Contract 1) and northern (Contract 3) study areas were similar, consisting of a dual highway with a thirty-four foot wide grassed median with guardrail, including inner shoulders (except at eight sensitive wetland crossings), two twelve-foot travel lanes in each direction, ten-foot paved outer shoulders, and twenty feet of roadside safety grading. This general cross section was proposed wherever feasible and appropriate. For the Southern Preferred Alternative, the widening and dualization was primarily proposed to occur immediately adjacent to the existing two-lane roadway, although the magnitude of widening on each side could be shifted in order to avoid or minimize impacts. In the case of the Northern Preferred Alternative, portions would be constructed on both new and existing alignment.

How Project Development Advanced Through Design Build

The Final EIS document prepared pursuant to NEPA addressed the entire U.S. 113 Dualization Project, including another 16.3-mile portion situated further to the south of the Project that is covered by this case study. The 7.5-mile Project was broken into three separate contracts for purposes of design and construction. Contract 1, the most southerly of the three contracts, is 2.6 miles in length and extends from north of U.S. 50 to south of MD 589. Contract 2, which is also 2.6 miles long, covers the middle portion of the Project from south of MD 589 to Jarvis Road. Contract 3, which is 2.3 miles in length, extends from Jarvis Road to the Delaware State line.

Of the three contracts, only Contracts 1 and 3 were advanced using a Design-Build process. SHA did not advance Contract 2 as Design-Build due to the recent initiation of this methodology within the state and the fact that there were bridges involved along that segment which were anticipated to create complications during bridge design. Therefore, Contract 2 was designed as a traditional Design-Bid-Build Project with 100 percent level of design.

SHA selected a Design-Build method of delivery for Contract 1 in February 1998. Documents to be included in the Design-Build Request for Proposals (RFP) were prepared within eight months of the signed EIS. These documents included 30 percent preliminary plans and design files, preliminary environmental permits, and stringent specifications for the completion of the design and construction of the Project. Contract 1 was then advertised for bids on October 13, 1998 and, in December of that same year, Contract 1 was awarded to the Design-Build Team of R.E. Pierson Construction Co., Inc. and Century Engineering, Inc. Construction began with a Notice to Proceed on March 8, 1999. With a value of $10.4 million, this was Maryland's first major Design-Build Project. SHA has calculated that by using the Design-Build method, the design, construction, and delivery of the first 2.6 miles of this new dual highway is believed to have been expedited by 18 months when compared to using the traditional Design-Bid-Build approach.

Project Chronology

Contract 1 RFP: March 1999
Contract 2 RFP: June 2000
Contract 3 RFP: March 2001

Completion Dates

Contract 1: June 2000
Contract 2: Spring 2002
Contract 3: Spring 2004

Budget: $ 39.7 million (total)

Contract 3, the other Design-Build contract, was advertised for bids on March 27, 2001 with a value of $10.7 million. The documents incorporated as part of the Design-Build RFP included 30 percent preliminary plans and design files, preliminary environmental permits, and stringent specifications for the completion of the design and construction of the Project. In November 2001, Contract 3 was awarded to the Design-Build Team of Johnson, Marion & Thompson, Inc. (JMT).

Contract 1 construction was completed and the facility was opened to traffic in June 2000, just 18 months after Design-Build bid opening, and just in time to accommodate seasonal beach traffic. Additionally, the new 2.6-mile facility was open to traffic just two years and four months after completion of the Final EIS. The second and third contracts of the Project were completed in the spring of 2002 and the spring of 2004, respectively. All three contracts were designed and constructed under a very aggressive schedule, especially in such an environmentally sensitive area as the Eastern Shore of Maryland, which is a low-lying peninsula bordered to the west by the Chesapeake Bay and to the east by the Atlantic Ocean. This timetable of completion was

accomplished through the innovative Design-Build approach and through the formal partnering between local citizens, the Design-Build Team, SHA, and other state and Federal agencies.

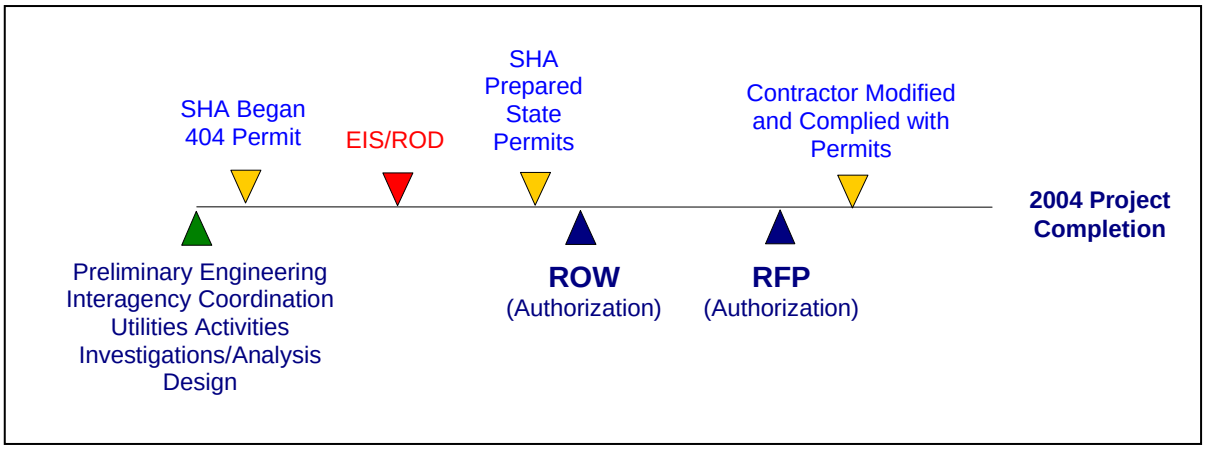
Relationship of Environmental Compliance Requirements and the Design-Build Process

The Project's major environmental issues, as identified in the EIS, included:

- Loss of 26.6 acres of wetlands (mitigated by 67.5 acres of wetland creation);
- Adverse effects to community cohesion, with respect to property values, residential displacements, access issues, and noise levels;
- Impact to an archaeological and historical site (National Register-listed St. Martin's Church);
- Destruction of habitat for two state-listed endangered species – the seaside alder and the blackbanded sunfish; and,
- Loss of approximately 115 acres of farmlands.

The figure below exhibits the temporal relationship of the environmental compliance requirements of the Project, particularly environmental permits, to the overall Design-Build process, with work flow proceeding from left to right. This figure clearly identifies SHA's insertion point for environmental permits into the logical sequence of steps for this Design-Build Project.

Temporal Relationship of Environmental and Design-Build Processes



Traditionally, SHA takes responsibility / ownership of all permits necessary for Design-Bid-Build projects. SHA modified this procedure as part of its Design-Build process by obtaining early action permits before the RFP was advertised. This approach also included the transfer of

responsibility for any necessary permit modifications and compliance with the permit requirements to the Design-Build Contractor after its selection.

The State of Maryland has some of the strictest parameters for wetlands and erosion and sediment control in the country, due to the proximity of the Chesapeake Bay and other coastal bays. Unlike a conventional project, where all permits are obtained by SHA prior to construction, this Project placed the task of obtaining erosion and sediment control and stormwater management permits on the Design-Build Contractor. Because of this unconventional approach, significantly more coordination was needed among SHA, the Design-Build Contractor, and reviewers at the Maryland Department of the Environment (MDE). If the Design-Build Contractor made changes to the plans as approved by MDE, it would result in revocation of this conditional approval, in which case the Contractor was responsible for the complete process of re-obtaining these permits.

Participants in the Design-Build Environmental Process

- Maryland State Highway Administration
- Federal Highway Administration
- U.S. Army Corps of Engineers
- Maryland Department of Environment
- Maryland Historic Trust

During the NEPA process in 1996, SHA began partnering with the review agencies in order to expedite such permits as the Section 404 permit and plan approval from the U.S. Army Corps of Engineers (USACE) prior to soliciting the Design-Build Contractor. During planning and design, there were monthly interagency meetings that focused on issues and problem solving, thereby incorporating the review agencies as partnering team members prior to construction. Once approval was received, the Design-Build Contractor was then held responsible for modification and compliance of the permits. If changes were made, it would result in revocation of the conditional approvals, in which case, the Contractor became responsible for the complete process of re-obtaining these permits.

The following environmental permits were required for the Project. The tables below identify the responsible party for the Project-specific permits, including type, issuer, and purpose.

SHA Permit / Approval Responsibilities

Permit Issued	Issued By	Purpose
Section 404 permit	U.S. Army Corps of Engineers (USACE)	Authorized approval in wetland areas with compensatory mitigation and special conditions
Non-tidal Wetlands and Waterways Permit	Maryland Dept. of Environment (MDE)	Responsible for building of any structure in the non-tidal wetlands and waterways
Section 401, Water Quality Certification	MDE	Assure erosion and stormwater Best Management Practices (BMPs)
Section 106 of the National Historic Preservation Act	Maryland Historic Trust	Responsible for any listing and/or data recovery required for archaeological sites (only required for Contracts 2 & 3)

Design-Build Contractor's Permit / Approval Responsibilities

Permit Issued	Issued By	Purpose
Stormwater Management (SWM)	MDE	Required to receive a Letter of Intent on drainage design
Erosion/Sediment Control	MDE	Required to ensure water quality BMPs

To ensure that the requirements of the environmental permits were followed, and environmental impacts were minimized, SHA hired an independent Environmental Monitor (EM) to be present on the Project site daily. This was also stipulated as a special condition requirement specifically for the Section 404 permit. The accelerated schedule of delivery required this permit to disturb wetlands outside of the right-of-way. For the Design-Build process to be implemented, the Section 404 permit had to be approved before the design was completed. As a result, the USACE wanted to be assured that minimizing the impact on the wetlands would be an important element of the Project design.

The USACE was very concerned about the amount of wetlands that would be disturbed by this roadway and were reluctant to grant a conditional wetlands permit in advance of completing design. SHA addressed the USACE's concerns by providing a monetary incentive in Design-Build Contracts 1 and 3 for $35,000 per acre for each acre of reduced wetland impacts below the amount allowed by the Section 404 permit. As a result of this incentive and the partnering of the EM with SHA and the Design-Build Contractor, there was a net reduction in the area of wetlands that could potentially have been adversely affected by the Project of 2.34 acres, or about 25 percent of the USACE-approved wetlands impact area. In addition, an EM was placed on the site to monitor compliance with environmental regulations and the stipulations of the permits.

An additional incentive was developed in the Design-Build RFP for the on-schedule completion of the Project. If construction was completed prior to Memorial Day of the proposed completion year, then an additional bonus of $300,000 was granted to the Design-Build Contractor. This incentive only applied to Design-Build Contracts 1 and 3.

Construction also involved de-watering of areas for borrow excavation and construction. Best Management Practices (BMPs) were used in embankment construction to allow for temporary and permanent stabilization to occur in a timely manner, so as to minimize impacts of erosion on water quality. The EM assisted the Project's management staff by monitoring water quality to ensure that the water leaving the site did not exceed current standards for turbidity. In the case of storm water management, the high water table, flat topography, and limited right-of-way available made standard measures impractical and ineffective. SHA proposed the use of the innovative method mentioned above to provide storm water management using shallow swales, and MDE accepted. This method has been adopted by SHA for use on future projects as well

Contract Design Drawings

The Design-Build Contractor examined many potential design scenarios to ensure that the preliminary design would be valid in every case. Supplemental design criteria were added as necessary to ensure that the final product would be acceptable to SHA. This process ensured a high-quality final design, while still allowing enough flexibility to benefit from the innovation of the Design-Build process. The preliminary plans were at a 30 percent level of design, in accordance with the restrictions that were agreed upon during negotiations with the permitting agencies during the preparation of the Final EIS. These plans defined locations of right-of-way and detailed drainage design to manage stormwater requirements. In addition, in order to receive early approval from the USACE, forested wetlands within the right-of-way were also marked off for management purposes. To promote expedited design completion, the partners adopted the goal of advancing design drawings much faster than the review and approval process defined in the contract provisions. This expedited review and approval goal was also adopted by review agencies. SHA representatives, along with the Design-Build Contractor, met directly with the MDE to ensure that the permit submittals contained the appropriate amount of information in order to receive approvals.

The Design-Build process provides the additional benefit of innovative designs which reduce the risk to SHA. It was decided to split Contract 1 into workable grading units to allow for incremental design submittals. In order to reduce the risk to the Design-Build Contractor, SHA chose to prepare preliminary designs for the Stormwater Management, Erosion and Soil Conservation, and Wetland Mitigation processes. These designs received the approval of the environmental permitting agencies on the basis of concept plans. This ensured that the necessary environmental approvals were obtained in a timely manner so as not to delay the Contractor and its proposed grading operations. MDE and its reviewers became part of the team and were a key component of this process. One of the key benefits of this partnered Design-Build process was the elimination of any Contractor-generated claims based on errors, omissions, or changes in conditions.

The limits of work for the first contract were established in a manner that allowed its construction to be integrated into the second contract segment, as necessary, which at the time was still in the permit evaluation process. For example, when it had become necessary under the second contract design to provide a grade-separated interchange at MD 589, SHA was able to transfer the Limit of Work of Contract 1 into Contract 2 by negotiating a change order to Contract 1. This did not absorb Contract 2 into the Design-Build project; rather it just removed the responsibility of the improvements from Contract 1 to Contract 2.

Lessons Learned

According to the SHA, the regulatory agencies were very satisfied with the environmental compliance on the Project and the net reduction of 2.34 acres of wetland impacts from the total impact originally approved by the USACE. This acreage encompassed only 25 percent of the total original wetlands that potentially could have been adversely affected by the Project. As a result of this positive experience, the level of trust between the permitting agencies and SHA has increased dramatically, and the regulatory agencies are now more open to the use of these and other innovations in both process and technique for achieving their common goal of minimizing adverse environmental impacts on future projects.

Design and construction practices, which reinforced the conditions of the environmental permits along with continuous monitoring of construction activities by the Design-Build Contractor and SHA, resulted in the Project receiving several awards, including: the *2000 Award of Excellence* by the Maryland Quality Initiative; the 2001 *Special Recognition Award for Quality in a Small Project* by the National Partnership for Highway Quality (NPHQ); and the 2001 *Achievement Award* by the Consulting Engineers Council of Maryland.

Contract 1 of the dualization of U.S. 113 was Maryland's first major Design-Build Project with a value of more than $10 million. This Project was particularly noteworthy because:

- SHA was able to build on its previous experience with the partnering approach to create new opportunities for innovating and streamlining the Design-Build process (By allowing implementation of a modified process that combined the NEPA and 404 processes, the Project was able to proceed at a faster rate than it otherwise would have, and it is estimated to have saved about a year of time in the Design-Build schedule compared to using separate NEPA and 404 processes);

- Additional time was saved by obtaining approval to use the EIS as an application for the Federal 404 permit, marking the first time that an EIS has been used in Maryland for a project permit application (The significance of this process is that it also allowed SHA to obtain a permit to disturb wetlands within the right-of-way lines, rather than for the specific alignment construction, thereby allowing much more flexibility for the Design-Build Contractor);

- A design process with enough flexibility to benefit from the creativity of on-site modifications for construction was created;

- A feeling of trust was created between the SHA / Contractor and the regulatory agencies by developing a permitting framework for greater than usual flexibility in setting the highway alignment while minimizing impacts on the environment;

- A fast-track delivery of the Project was provided to the motoring public of a critically needed highway project 18 months earlier than using the traditional Design-Bid-Build method;

- In order to accelerate the construction, the Design-Build Contractor chose to submit individual segments of the roadway to MDE for approval as soon as each portion of the design was completed, rather than waiting to complete the entire design (This procedure allowed faster reviews and permitted a "rolling" construction sequence);

- The use of an independent Environmental Monitor on the part of SHA to inspect the Project site on a daily basis ensured compliance with the various permit and approval conditions;

- The use of a monetary incentive program on the part of SHA ensured that the Contractor made every effort to complete its designs in a manner that would further reduce wetland impacts; and,

- Experience in new approaches to Design-Build that could be used in future projects, including Phase 3 of U.S. 113, was gained.

References

John Zanetti
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707 North Calvert Street
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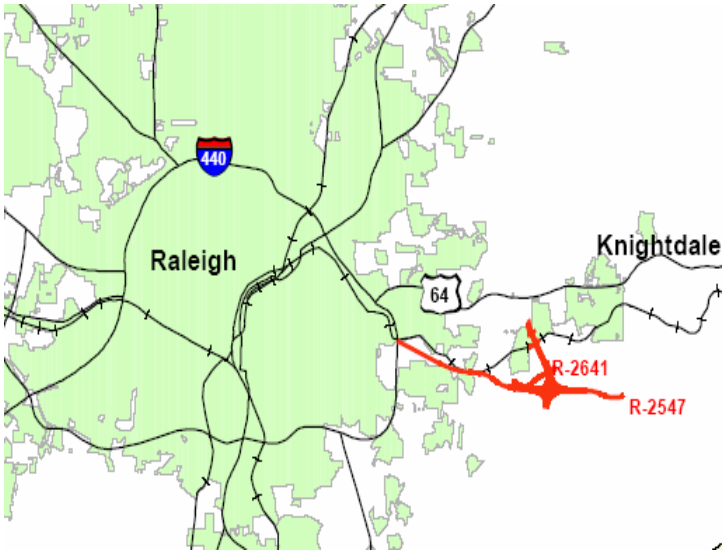
U.S. 64 Knightdale Bypass and
Knightdale Connector/Eastern Wake Expressway
North Carolina Department of Transportation
Wake County, North Carolina

Project Background

Nearly 60,000 motorists travel on U.S. 64 in North Carolina between Raleigh and Knightdale each day. This is approximately one-third more vehicles than the road was designed to accommodate. An increase in commercial development within the corridor in recent years has exacerbated the traffic congestion traditionally caused by commuters living in eastern Wake County and beyond. The North Carolina Department of Transportation (NCDOT) proposed to relieve this congestion with two separate improvements, including a bypass road south and parallel to U.S. 64, and a connector road for additional access to Knightdale.

The U.S. 64 Knightdale Bypass Project (herein referred to as the Bypass Project) and the Knightdale Connector/ Eastern Wake Expressway Project (herein referred to as the Connector Project) are both located in Wake County, North Carolina.



The Bypass (R-2547 on the map to the right) was designed as a new 9.6-mile, six-lane freeway with interchanges, overpasses, and service roads. The Bypass Project begins in the west end at the I-440 Raleigh Beltline between existing U.S. 64 and Poole Road, and continues in a southeasterly direction, crossing the Neuse River along the way. Eight interchanges would be constructed along the route's alignment which traverses old farms and forests. This alignment provides commuters with a direct route to North Raleigh, Cary, Research Triangle Park, and the future Outer Loop Expressway.

The Connector Project (R-2641 on the map), also known as the Eastern Wake Expressway, was designed as 1.47 miles of six-lane, variable median highway on new right-of-way, including interchanges and overpasses. The Project begins at the proposed Bypass Project in the south end, at a location just east of the Hodge Road interchange, and extends northward to the proposed interchange at existing U.S. 64 between Hodge Road and Lynnwood Road.

The goals of both the Bypass and Connector Projects were to provide a route that would:

- Accommodate through regional traffic and local eastern Wake County traffic diverted from U.S. 64;
- Relieve congestion on U.S. 64;
- Enable U.S. 64 to operate at acceptable levels of service under future conditions;
- Reduce regional travel time; and,
- Fulfill local, regional, and state transportation goals.

How Project Development Advanced Through Design Build

State legislation authorized NCDOT to select an annual maximum of 25 Design-Build projects between 2003 and 2009. The 1998 Final EIS process covered both Projects together. The Bypass Project was intended to be constructed as four separate Design-Bid-Build contracts. However, due to NCDOT's early coordination with the permitting agencies, it was determined that only "Project-wide" permit applications for the entire corridor would be granted. Since the permitting agencies would not allow the submittal of multiple applications, NCDOT chose to combine three of the four Bypass Projects into a single Design-Build Project in 2001, and to cover all Projects under one permit application. By making these changes, NCDOT was better able to expedite necessary permitting activities, and to expedite the ability to provide congestion relief to the public. In 2002, it was decided that the Connector Project would also be constructed using the Design-Build delivery method.

Bypass Project Chronology

RFP Date: February 2002
Permit Approvals: April 2002
Contractor Selection: June 2002

Completion:
April 2005 (anticipated)

Total Cost: $131 million

In June 2002, North Carolina Constructors (NCC), a joint venture of HBG Flatiron of Longmont, Colorado and Lane Construction Company, of Meriden, Connecticut, was selected as the Contractor for the Bypass Design-Build Project. The fourth segment of the Bypass, including a two-mile section of road with two interchanges and flyover structures to connect the new Bypass with Interstate 440, was awarded through the traditional Design-Bid-Build process to Vecellio & Grogan's of Beckley, West Virginia. The Connector Project was awarded to Barnhill Contracting Company of Tarboro, North Carolina in October 2003.

Connector Project Chronology

RFP Date July 2003
Permit Approvals: April 2002
Contractor Selection: October 2003
Permit Modifications Necessary for Construction: August 2003

Completion:
April 2006 (anticipated)

Total Cost: $45.7 million

As one of the state's first and biggest Design-Build projects, the $131 million Bypass Project is anticipated to have a total cost of about $29 million less than if the traditional Design-Bid-Build method had been used. While the Bypass construction was approximately one month behind schedule as of August 2004, the completion date for the Bypass Project remains April 2005. Under traditional methods, the Bypass Project would not have been scheduled to be completed until 2008.

Construction of the Connector Project is currently anticipated

to have a total cost of about $11 million less than the estimated $57 million. The completion date for the Connector Project remains on schedule for April 2006.

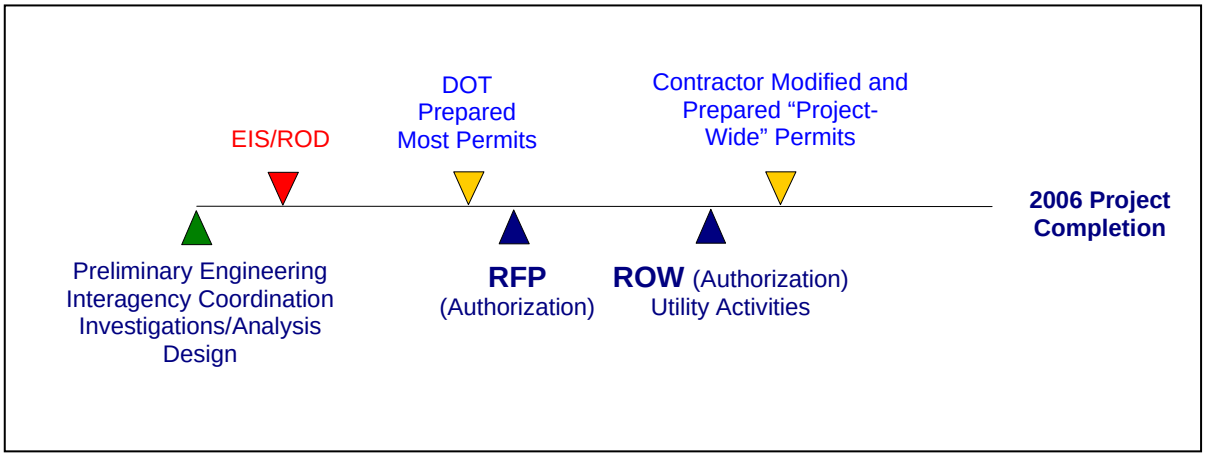
Relationship of Environmental Compliance Requirements and the Design-Build Process

The Project's major environmental issues, as identified in the EIS, included:

- Impacts to 26 acres of wetlands and six acres of open water;
- Two potential hazardous materials sites in or near the corridor;
- Impacts to the human environment, including over 60 receptors with consideration for noise abatement measures; and,
- Two archaeological sites that warranted a data recovery program.

The figure below exhibits the temporal relationship of the environmental compliance requirements of the two separate Design-Build Projects, particularly environmental permits, to the overall Design-Build process, with work flow proceeding from left to right. This figure clearly identifies NCDOT's insertion point for environmental permits into the logical sequence of steps for this Design-Build Project.

Temporal Relationship of Environmental and Design-Build Processes



Traditionally, NCDOT takes responsibility / ownership of all permits necessary for Design-Bid-Build projects. NCDOT applied this same philosophy to its Design-Build process by obtaining most permits before the Design-Build RFPs were advertised. The Bypass Project RFP was issued in February 2002 and NCDOT received permit approvals in April 2002, prior to the selection of the Design-Build Contractor. The Connector Project RFP was issued in July 2003. However, a significant departure from the traditional approach included the transfer of these permits to the Design-Build Contractor for compliance and modification. The environmental scope of the Design-Build RFP provided detailed language stipulating that the Contractor was

responsible for compliance with all permitting agencies and that all of these approvals would be binding on the Contractor. Ownership of these permits would remain in NCDOT's name. However, the risk in terms of responsibility for the necessary modifications would be transferred to the Contractor. The RFP also clarified that the mitigation measures initially presented as part of the Final EIS were now to be advanced as Project commitments.

The following environmental permits were required for both Design-Build Projects. The tables on the next page clarify the responsible party for each Project-specific permit or certificate, including type, issuer, and purpose.

NCDOT Permit Responsibilities

Type	Issued By	Purpose
Section 404 Permit	US Army Corps of Engineers (USACE)	Required for dredge and fill in wetlands and work in navigable waters
Section 401 Permit	NC Department of Water Quality (DWQ)	Assure water quality is maintained and meets State Standards
Neuse River Riparian Buffer Certificate	DWQ	Regulates stormwater discharge and assures that the discharges of fill material into the waters of the River Basin will not result in a violation of water quality
Section 7 of the Endangered Species Act	U.S. Fish and Wildlife Service (USFWS)	Documents compliance for those species requiring such concurrence.

Contractor Permit Responsibilities

Type	Issued By	Purpose
Nationwide Permit #6	USACE	Relates to geotechnical investigations prior to the relocation of utilities
Sediment and Erosion Control	NCDOT Roadside Environmental Unit	NCDOT has been delegated authority to implement Sediment and Erosion Control without other agency approval. Therefore, approved reviews from NCDOT serve as the de-facto permit

Substantial coordination has occurred between representatives from NCDOT, the Army Corps of Engineers (USACE), the City of Knightdale, and Wake County. A Memorandum of Understanding (MOU) was prepared to better implement statutory, regulatory, and administrative procedures pertaining to the Project. All efforts were made during the conceptual design process to avoid the use of protected resources. In order to assure that all parties understood the permit restrictions and requirements, an Environmental and Erosion Control Pre-Construction Meeting was held before construction commenced. Additional environmental

compliance meetings were scheduled periodically to update staff with information and/or train new staff.

Participants in the Design-Build Environmental Process

- North Carolina DOT
- Federal Highway Administration
- U.S. Army Corps of Engineers
- Department of Water Quality
- U.S. Fish & Wildlife Service

The Design-Build Contractors are bound by the terms of the existing permits and accountable for meeting all permit conditions. As previously mentioned, the Design-Build Contractors could only submit one "Project-wide" permit modification for the entire Project corridor. The permitting agencies would not allow the Design-Build Contractors to submit multiple applications for developing a "staged permitting" process for phased construction activities. Any further modification to a permit required the Department of Transportation and the relevant agency's approval prior to the commencement of construction activities. All permits and permit modification requests are always routed through NCDOT.

Oversight Actions

As part of NCDOT's oversight methodology, project commitments, pre-permitted actions, and detailed mitigation requirements for each environmental category were included in the Design-Build RFP. Although not listed as an RFP requirement, an on-site Natural Resource Specialist was voluntarily provided by the Contractor to ensure regulatory compliance plans. This person also served a design oversight function to ensure that any necessary environmental requirements were met during design. This was important since it minimized the number of environmental-related comments generated by the permitting agencies after the design had been submitted for review. As a result, the time frame needed to implement the design was reduced. NCDOT inspectors were also present on the Project, mainly in a QA role.

"From the environment I came from (on the Boston Big Dig), it's just like night and day … Instead of people putting roadblocks in front of you, it's full speed ahead. The DOT has done a good job of monitoring but not hindering."

- Paul Newman, NCC Project Manager

The NCDOT worked together with both Design-Build Contractors to develop the roadway and hydrologic designs, and to identify appropriate environmental staff. Rather than using several separate subcontractors, the "one office" approach to these two Projects allowed for effective and efficient communication between the Contractors and NCDOT that typically did not work side-by-side. This also allowed "over-the-shoulder" design reviews by environmental staff to accelerate the design process. Established relationships between staff working together for several years also increased the level of communication on these Projects.

Environmental Incentive

Extensive impact minimization efforts had been incorporated as part of the procurement of the environmental permits by NCDOT. NCDOT implemented an innovative approach by adding incentives to the Design-Build RFP for the Connector Project that encouraged the further reduction of impacts to the environmentally sensitive areas within the Project boundaries. Incentive payments for such efforts amount to the following:

- $75,000 per acre, or portion thereof, for any reductions in wetland impacts;
- $500 per linear foot for reduction of stream impacts; and,
- $75,000 per acre, or portion thereof for any reductions in impacts to riparian buffer areas.

The Design-Build Contractor for the Connector Project was further encouraged to continually apply further minimization efforts during the final design. Development of acceptable mitigation that resulted in the restoration of jurisdictional resources would also be considered eligible for incentive payments. Further, the development of any innovative approach implemented to minimize impacts on environmentally sensitive areas for these Projects would be rewarded with an additional one-time monetary bonus of up to $50,000 if they could be implemented for future NCDOT projects.

Contract Design Drawings

Bypass Project

The contract design drawings for the proposed Bypass Project were developed to a 60 percent level of design completion prior to award of the Design-Build contract. The design included 20 bridges at 15 separate sites. Several of these bridges would need to be constructed across highly regulated wetland areas. In terms of constructability, identification of impacts, and subsequent mitigation, this level of design was necessary to procure the necessary permits in advance of the selection of the Design-Build Contractor. The selected Contractor was responsible for reviewing the preliminary design plans and assessing their adequacy or inadequacy in meeting the Contract requirements. A total of seven mitigation sites were required as part of the proposed preliminary design. These sites included three wetland mitigation sites totaling 13 acres, an on-site stream relocation totaling 1,321 linear feet, and three historic sites.

Even though the plans were approximately at a 60 percent completion stage when the Bypass Project was advertised, the preliminary drawings submitted with the original permits to the Contractor had several major drainage design omissions in the wetland designs. The permitting agencies allowed the Contractor to submit more detailed design changes to NCDOT on an ongoing basis. These changes included an increase in the number of impacts at one site, but the overall number of Project impacts was reduced. The mitigation for the proposed impacts had already been agreed upon and implemented before the Project design commenced. However, the minor increase in the number of wetland impacts that were attributed to changes in the final design by the Contractor were addressed through in-lieu fee payments to the State mitigation organization (Ecosystem Enhancement Program).

Connector Project

The preliminary contract drawings for the proposed Connector Project were developed to a 25-30 percent level of design prior to award of the Design-Build contract. The design included six bridges at four sites along new right-of-way. In terms of constructability, identification of impacts, and subsequent mitigation, NCDOT determined that the level of design for this Project

was adequate for use in the original "Project-wide" permits from the Bypass Project in advance of the selection of the Design-Build Contractor. NCDOT decided to let the Contractor have a greater responsibility for reviewing the preliminary design plans, assessing their adequacy or inadequacy in meeting the Contract requirements and ensuring compliance with the same permit conditions developed in April 2002 for wetland and stream mitigation as related to the Bypass Project.

Lessons Learned

The following is a summary of key factors that enabled the Design-Build process to be innovative and successful for both Projects:

- "Project-wide" acquisition of most permits was completed by NCDOT prior to the issuance of the Bypass RFP, reducing the opportunity for delay in the Connector Project;

- Transference of permit modification responsibility to the Design-Build Contractors also allowed the permitting process to begin early within the Design-Build process;

- Provision of preliminary 60 percent design level for the Bypass highway design was necessaryl to identify impacts and minimize changes and cost for the Project (It is anticipated that future projects, like the Connector Project, will most likely continue to be only 25 to 30 percent level of design);

- Assistance of environmental agencies' personnel is essential in preparing the Design-Build RFP;

- A Natural Resource Specialist that is responsible for reporting to NCDOT on management plans and issues in order to minimize violations is very valuable. This specialist also serves in a design oversight function to ensure that any necessary environmental requirements are met during design (This approach reduces the amount of design review comments and reduces the time frame needed to implement the design);

- Provisions for incentive payments for the reduction of impacts to the environmentally sensitive areas within the Project boundaries are productive;

- Ensuring that the Design-Build RFP apportions environmental risks appropriately; and

- Allowance for a 10- to 11-month timeframe for permitting modifications to minimize delays to the construction schedule. However, this is very dependent on the project issues and the environmental agencies involved.

References

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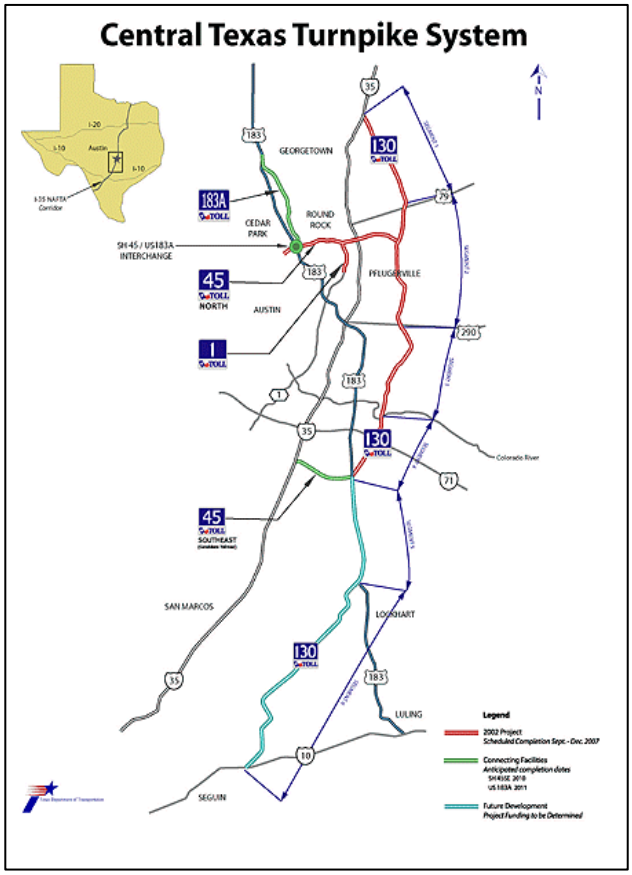
State Highway 130 Toll Project
Texas Turnpike Authority / Texas Department of Transportation
Austin, Texas

Project Background

The State Highway (SH) 130 Toll Project includes approximately 91 miles of new roadway from the intersection of Interstate Highway 35 (I-35) at State Highway 195 (SH 195), north of Georgetown, Texas, at the north end, to the intersection of Interstate Highway 10 (I-10), near Seguin, Texas, at the south end. The new roadway is being constructed generally parallel to, and east of I-35, and through the Counties of Williamson, Travis, Caldwell, and Guadalupe. Initial work is focused on Segments 1 through 4 that extend 49 miles from I-35 at the north end, southward to U.S. 183, located southeast of Austin in Williamson and Travis Counties. The remaining roadway (Segments 5 and 6) will be constructed as additional funding and right-of-way become available.



SH 130 will initially be constructed as a four-lane roadway with toll facilities and major interchanges at I-35, U.S. 79, SH 45 North, U.S. 290, and SH 71. Ultimately, SH 130 will be expanded into a six-lane controlled access facility with a median width capable of accommodating additional transportation modes. The construction of frontage roads will be limited to locations where it is necessary to maintain access to adjacent properties.

The Project is important to the Central Texas highway system because of the rapid rate of development growth experienced in this area of the state in recent years. This importance is compounded by the lack of transportation infrastructure capacity to accommodate the projected increase in traffic. The Capital Area Metropolitan Planning Organization (CAMPO), which is the Metropolitan Planning Organization (MPO) for the region, recognized the capacity limitations of the transportation infrastructure in the area and voted in March 2000 to include the Project in the State Transportation Improvement Plan for Fiscal Year 2002.

How Project Development Advanced Through Design-Build

State Highway 130 is the first highway in Texas to be developed under an Exclusive Development Agreement (EDA) between the Texas Department of Transportation (TxDOT), a Design-Build Contractor, and a variety of regulatory agencies. This EDA specifically allows

property acquisition, design, and construction to be undertaken simultaneously. This toll road could potentially be part of the Trans-Texas Corridor, a proposed 4,000-mile, $180-billion transportation and utility network that would improve overall traffic mobility in the area. Originally initiated by the Texas Turnpike Authority (TTA), a division of TxDOT, the $1.3-billion Design-Build Project was later transferred to the TxDOT Austin District after construction began.

The Project has been divided into logical segments for the purpose of having the Design-Build Contractor complete the work in phases. These segments are sequentially organized, proceeding from north to south, and require utility adjustments, proposed right-of-way acquisitions, associated frontage roads, toll plazas, cross roads and streets, railroads, and environmental mitigation site(s). The segment descriptions for proposed SH 130 are as follows:

Project Chronology

RFP: April 2002

Expected Completion Dates:

Segment 1 (I-35 to U.S. 79): September 2007
Segment 2 (U.S. 79 to U.S. 290): September 2007
Segment 3 (U.S. 290 to SH 71): September 2007
Segment 4 (SH 71 to U.S. 183): December 2007
Segments 5-6 (U.S. 183 to I-10): To Be Determined. Project funding not in place

Budget: $1.3 billion

- *Segment 1* – From I-35 to north of U.S. 79 (including construction of the interchange at I-35 / SH 195);

- *Segment 2* – From the southern terminus of Segment 1 to south of U.S. 290 (including the construction of interchanges at U.S. 79 and U.S. 290);

- *Segment 3* – From the southern terminus of Segment 2 to south of SH 71 (including the construction of the interchange at SH 71);

- *Segment 4* – From the southern terminus of Segment 3 to the juncture with U.S. 183 (including construction of the interchange with I-10 and construction of the transition to existing U.S. 183);

- *Segment 5* – From the southern terminus of Segment 4 to the divergence point with U.S. 183; and,

- *Segment 6* – All work south of the southern terminus of Segment 5 to I-10.

Traditionally, TxDOT projects have been 100 percent designed and all of the rights-of-way have been acquired prior to the selection of a contractor. However in this case, the right-of-way acquisition process and development of the schematic drawings were able to begin as soon as the EDA was approved. With an EDA in place, construction is able to begin on sections that have been designed and that have obtained right-of-way acquisition, while additional design work and right-of-way acquisitions continue to be finalized for other sections of the corridor. The new EDA process has accelerated the pace of highway improvements proposed for SH 130 by allowing the State to hire a single consortium of contractors to perform all of the work on this Project simultaneously. The traditional development process lengthened the timeframe needed

to complete similar projects considerably, since the State divided the funding, design, construction, and maintenance into separate steps.

In April 2002, Lone Star Infrastructure (LSI), a consortium joint venture between Fluor Corporation, Balfour Beatty Construction, and T.J. Lambrecht Co., was hired as the Design-Build Contractor for all six segments. In partnership with TxDOT, LSI is developing SH 130 in full compliance with all environmental laws and regulations.

The Project is currently funded for the construction of Segments 1 through 4, and the designs for those four contracts are nearing completion. The Project's construction phase is anticipated to proceed very rapidly once the designs have been completed. The Project remains on or ahead of schedule at this point, with an anticipated completion of Segments 1 through 4 by December 2007. No schedule has yet been established for Segments 5 and 6, as funding is not yet in place.

Relationship of Environmental Compliance Requirements and the Design-Build Process

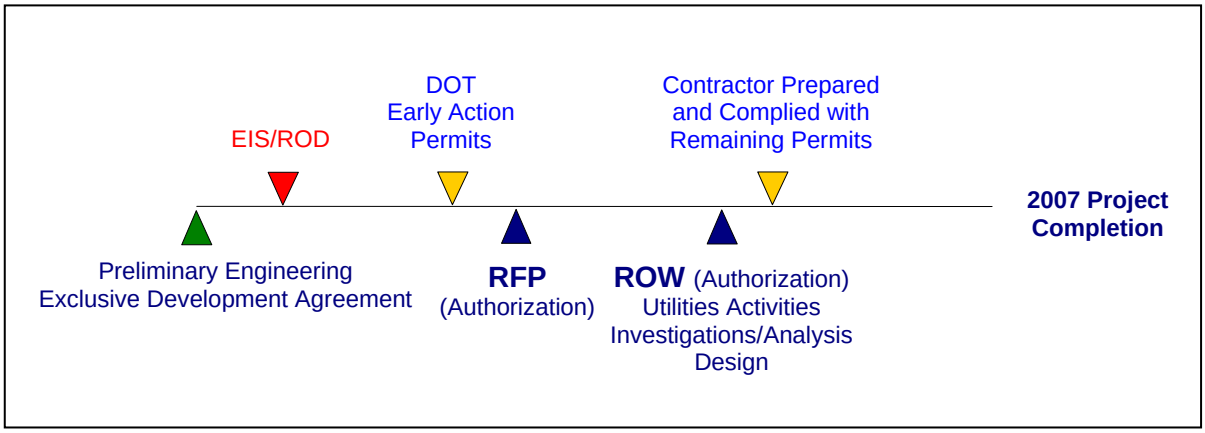
The Project's major environmental issues, each mitigated as discussed in theProject's Final EIS, include:

- Neighborhood impacts – displacement of 168 residences and 22 businesses, and noise impacts at 176 receptor locations; and,

- Impacts to 3,842 acres of farmland and 93.9 acres of wildlife habitat.

The figure below exhibits the temporal relationship of the environmental compliance requirements of the Project, particularly environmental permits, to the overall Design-Build process, with work flow proceeding from left to right. This figure clearly identifies TxDOT's insertion point for environmental permits into the logical sequence of steps for this Design-Build Project.

Temporal Relationship Between Environmental and Design-Build Processes



Through the use of the SH 130 EDA, TxDOT has created an organizational structure that incorporates the objectives of NEPA into the design and construction of the Project. The TxDOT environmental compliance team has scrutinized the details of the Project's design to ensure that it conforms to the findings and commitments stated in the Final EIS. Should the Project's design result in impacts that differ from those documented in the EIS, a compliance team will ensure that modifications to the environmental documentation are made in a timely manner. These actions will allow the SH 130 Project to remain in compliance with environmental regulations and stay within the Project schedule.

The environmental scope for the Design-Build RFP provided detailed language stipulating that the Design-Build Contractor was required to obtain all environmental approvals other than those previously secured by TxDOT. The Contractor, with the support and oversight of TxDOT, was also responsible for application revisions, supplements, reassessment, and coordination with appropriate external agencies to secure or modify environmental approvals on an as-needed basis. Additional costs and delays to the scope of work associated with securing additional environmental approvals are further addressed in accordance with the provisions outlined in the EDA. All approvals, including expected mitigation requirements identified in the Final EIS, would be binding on the Contractor.

The environmental permits and certifications listed in the following tables are required for the Project. These tables clarify the responsible party for each project-specific permit, including type, issuer, and purpose.

TxDOT Permit / Approval Responsibilities

Permit Issued	Issued By	Purpose
Section 404 permit, Clean Water Act (CWA)	U.S. Army Corps of Engineers (USACE)	Authorized under an individual permit with compensatory mitigation.
Sections 9 and 10, Impacts to Navigable Waters, Rivers and Harbors Act	U.S. Coast Guard and the USACE	Responsible for the construction of any structure in the channel or along the banks of navigable waters of the U.S. that changes the course, conditions, location or capacity
Section 401, Water Quality Certification, CWA	Texas Commission on Environmental Quality (TCEQ)	Assures water quality is maintained at pre-construction standards.
Section 106 of the National Historic Preservation Act	State Historic Preservation Officer (SHPO)	Responsible for compliance with Section 106 to provide any listing and/or data recovery required for archaeological sites

Contractor Permit / Approval Responsibilities

Permit Issued	Issued By	Purpose
Water Pollution Abatement Plan and Contributing Zone Plan (CZP)	TCEQ	Responsible for water quality in corridor areas regulated under the Edwards Aquifer Rules
Texas Pollutant Discharge Elimination System	TCEQ	Responsible for storm water pollution discharges from construction sites (prior to commencement of construction activities). This permit includes a Storm Water Pollution Prevention Plan.
Section 7 of the Endangered Species Act	United States Fish and Wildlife Service (USFWS)	Consultation is necessary if new species are discovered in the Project Area or if changes in the Project design lead to impacts to known species that were not addressed in the TxDOT approvals.
Antiquities Code of Texas	SHPO	Authorization required for previously unknown cultural resource sites discovered during construction, or new impacts due to design changes
Section 106 of the National Historic Preservation Act	SHPO	Responsibility for any additional archaeological sites found and/or data recovery
Surface Water Mining Permit	TCEQ/Lower Colorado River Authority	Joint Surface water pumping agreement for water rights
Air Quality Permit	TCEQ	Portable mixing concrete batch plants on Project site
Air Curtain Incinerator Permit	TCEQ	Authorization for a trench burner to incinerate vegetation removed from the right-of-way
National Flood Insurance Program	Federal Emergency Management Agency (FEMA)	Conditional Letter of Map Revision for impacts to 100-year floodways and/or floodplains of designated waterways

Even though TxDOT secured the Section 404 permit, the Design-Build Contractor continues to be responsible for any ongoing coordination with the USACE to secure permit special conditions and any permit amendments, as they are needed. The Design-Build Contractor is also responsible for implementing the mitigation plan for impacts to Jurisdictional Waters. The Section 10 permit was addressed by the USACE during the Section 404 process and the Coast Guard determined that Section 9 approval was not required. TxDOT initiated coordination with the Texas Commission on Environmental Quality (TCEQ) for Section 401 certification and

special permit conditions. The Contractor was responsible for developing 16 National Register nominations for eligible structures identified in the Final EIS, the Record of Decision (ROD), and Programmatic Agreement (PA) commitments.

The negotiation of flexible permits to the overall Project for impacts to waters, water quality, cultural, and historic resources are integrated with the Contractor commitments to the EDA. The EDA provides a flexible framework which is replicated for each geographic segment of the Project. This allows for significant time savings through simultaneous "multi-path" completion of traditionally asynchronous processes (e.g., different geographic segments of the Project have unique environmental issues causing the need for more expansive permits).

The EDA was also developed with stringent schedule deadlines. Significant monetary penalties would be levied on the Design-Build Contractor for non-compliance to the schedule milestones. These financial penalties drive the entire Project schedule and help to ensure compliance. Adaptation of internal TxDOT policies or procedures to allow effective use of the EDA and other permits were critical to facilitating an expedited permitting process.

Participants in Design-Build Environmental Process

- Texas Department of Transportation (TxDOT)
- Federal Highway Administration
- Texas Commission on Environmental Quality (TCEQ)
- U.S. Army Corps of Engineers
- U.S. Coast Guard
- U.S. Fish & Wildlife Service
- State Historic Preservation Office
- Lower Colorado River Authority
- Federal Emergency Management Agency

Special permit conditions and commitments were imposed by the several regulatory agencies on the Design-Build Contractor to comply with:

Historic Preservation Commitments:

- Standard documentation of properties, including photographs and record review; and,
- Design and implementation of a screening measure (vegetative landscaped buffer from the highway).

USACE Permit:

- Continuous accounting of Jurisdictional Waters and associated Riparian Habitat impacts with annual reporting requirements;
- Submittal of Pre-Construction Notifications (PCNs) for segments of the Project. This requirement serves as the mechanism for delivery of detailed design drawings and design information to USACE that was not available at the time the permit was issued; and,
- Submittal of a PCN for all anticipated additional impacts which exceed one-tenth acre or 50 linear feet.

TCEQ 401 Water Quality Certification:

- Concurrent submittal of USACE PCNs to TCEQ to meet 401 Certification requirements; and,

- Commitment to meet the 80 percent Total Suspended Solids reduction [Edwards Aquifer Authority Rule for Water Pollution Abatement Plans in the Recharge Zone] performance requirement for the perennial streams.

TxDOT, the Design-Build Contractor, and the several regulatory agencies have taken extensive measures to protect the environment along the SH 130 corridor and incorporated them into the EDA. The development of new wetlands, the completion of archeological surveys conducted in the right-of-way, a tree-donation program for local schools, and the installation of bat roosts under certain bridges are just a few examples of the measures implemented throughout the SH 130 development process that provide environmental balance for the Project.

The EDA also set a goal of "zero violations" and provided requirements for on-site environmental compliance monitors and an extensive environmental training program. To achieve "zero violations," environmental impacts to resources such as wetlands, water quality, wildlife habitat, archeological, and historical resources are aggressively monitored. This ensures that both the design and construction of SH 130 meet all applicable environmental regulations. Early pro-active coordination with external agencies is also a necessary component for monitoring environmental resources.

The Contractor voluntarily implemented the Environmental Management System (EMS) ISO14001 computer tracking software as a means to ensure compliance. While this system is not typically used for highway projects, TCEQ considers EMS an incentive program for the Contractor to remain within compliance. The result of this effort is an EMS certification and TCEQ assistance in the form of regulatory training and inspection notification.

> *"Zero violation tolerance emphasized SH 130's commitment to environmental protection and setting the standard at zero."*
>
> *- Jon Geiselbrecht, TxDOT*

Pursuant to the EDA, Environmental Compliance Inspectors (ECIs) have been provided by the Contractor to monitor all activities to ensure the protection of sensitive resources and compliance with applicable environmental permits. Daily monitoring logs are compiled into weekly reports that are reviewed by a multi-tiered environmental management team. Environmental staff from both TxDOT and the Contractor conducts spot checks of construction activity throughout the corridor to verify that the Contractor's construction personnel are complying with the applicable environmental permits. This system is guided by the underlying principle of continual improvement.

Another component of the EDA includes the Contractor's implementation of an Environmental Protection Training Program. The in-depth environmental protection training for the Contractor's personnel included all of the following topics:

- Background on environmental issues;

- Overview of specific environmental commitments at the Project level;
- Overall importance of environmental protection to the Project;
- Contractor's commitments and responsibilities;
- Worker responsibilities;
- Regulatory permit conditions;
- Wetlands identification;
- Overview of the provisions of the Endangered Species Act and Project mitigation commitments;
- Best Management Practices for environmental compliance, including but not limited to, erosion, sedimentation, and dust control measures to maintain water and air quality;
- Required mitigation measures;
- Compliance responsibility and Governmental Entity authority;
- Procedures and precautions in the event of spills or discovery of Hazardous Materials, unknown chemicals or contamination;
- Procedures and precautions in the event skeletal remains or other archeological or paleontological resources are discovered;
- Procedures and precautions in the event of karst void/cave discovery;
- Edwards Aquifer Rules and groundwater protection requirements;
- Clean Water Act regulations, Rivers and Harbors Act regulations, and surface water protection requirements;
- Overview of noise and residential impact reduction procedures;
- Air quality and dust control requirements;
- Penalties and/or fines for noncompliance with environmental requirements and laws. Failure to comply could result in termination of employment.

Key goals to achieve the environmental commitments of this Project include:

- Compliance with applicable local, Federal, and state environmental laws;
- Fulfillment of all environmental commitments set forth in the TxDOT-provided permit approvals and Contractor-obtained environmental permit approvals;
- Knowledge of the required actions, practices, and procedures regarding regulated resources;
- Provision of information to all workers regarding the Design-Build Contractor's management commitment to the Project's environmental quality; and,
- Implementation of TTA / TxDOT and Contractor measures to achieve zero tolerance commitments for violations.

Contract Design Drawings

As mentioned previously, most highway projects conducted by TxDOT would normally include development of 100 percent design drawings prior to construction contractor authorization. However, Texas' first Design-Build project used an alternative method where preliminary drawings (less than 15 percent design level) were developed to show the right-of-way. TxDOT developed a caveat in the contract stipulating that the SH 130 schematic drawings show minimal constructability, and all risks associated with the designs were the responsibility of the Design-Build Contractor. It also stipulated that the stringent environmental TxDOT requirements would be met. Numerous modifications were made to the SH 130 design schematics since the issuance of the ROD due to the limited design-specific details provided as part of the preliminary drawings.

The flexibility associated with both the preliminary and final designs maximized the cost savings through the competitive bidding process. However, this flexibility resulted in a higher number of design changes that caused the following:

- Multiple re-evaluations of Final EIS / ROD for the constructability of the preliminary design;
- Multiple USACE Permit Modifications (part of special conditions); and,
- Significant design changes affecting the right-of-way process and NEPA. These changes created parcel-specific impacts to additional properties in the corridor that were not identified in the Final EIS.

Lessons Learned

Valuable lessons can be drawn from this Project and can be used by other state highway agencies in their preparation of Design-Build contracts, including:

- Clear contractual ground rules for Project tasks that rely on external agency approvals/permits should be established (These tasks pose the greatest potential for negatively affecting the schedule and increasing agency fiscal risk / liability for delays incurred by non-contractors);

- Contract language should be very clear and concise to minimize ambiguous interpretation;

- "Traditional" linear policies, which can create bottlenecks in a rapid-paced multi-path process and cause delays in the Project schedule, should be avoided in order to maximize the benefits and effectiveness of the Design-Build process (e.g., TxDOT policy regarding acquisition of properties on traditional projects requires all environmental clearances prior to their acquisition, but a revision to that policy was needed to allow the right-of-way acquisition process to proceed for parcels that were already cleared by NEPA while conducting re-evaluations for new right-of-way;

- Once special permit conditions have been established (i.e., Individual 404 Permit and 401 Certification), there is a potential for working more closely with external agencies to create greater flexibility and mitigation streamlining (e.g., Whenever jurisdictional impacts are identified, individual design reviews could be combined so that multiple segments could be reviewed with each submittal);

- More detailed schematic drawings than the 15 percent level of design used for this Project, may be necessary in order to avoid NEPA re-evaluation, permit modification, and right-of-way impacts (e.g., During the course of this Project, TxDOT needed to acquire more rights-of-way than originally anticipated due to utility, drainage, and overall design modifications);

- Consideration should be given for performing a pre-RFP utility survey as a method for potentially streamlining the Project schedule by not waiting for the Contractor to conduct the survey (In addition, the completion of the survey prior to the RFP could allow the completion of the utility verification task as an early action item);

- Establishment of a "zero violation" goal set a high standard for both TxDOT and the Contractor to attain (It emphasized the Project's environmental protection priority to the permitting agencies as well as to the public);

- Implementation of an incentive program by TCEQ for the Contractor in the form of Project compliance assistance encouraged the Contractor to go above and beyond specified requirements (e.g., The Contractor implemented ISO14001 for certification, even though it was not required); and

- Provision of Environmental Compliance Inspectors by the Contractor to monitor all activities to ensure the protection of sensitive resources and compliance with applicable environmental permits.

References

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State Route 16: New Tacoma Narrows Suspension Bridge
Washington State Department of Transportation
Tacoma, Washington

Project Background

Congestion is a growing problem on State Route (SR) 16 in Washington State, which connects the urban Puget Sound area with the Kitsap and Olympic peninsulas. Eight miles west of Tacoma, the Tacoma Narrows Channel is the narrowest waterway in Puget Sound and the most likely location to bridge the waterway. Indeed, the Tacoma Narrows is the watery grave of the first suspension bridge built at that site, infamously known as "Galloping Gertie" because it opened to traffic in 1940 and collapsed in a windstorm a short four months later. In 1950, a second Tacoma Narrows Bridge opened to traffic atop Gertie's foundations, and that bridge continues to carry about 90,000 vehicles over the water today. As the bridge was built to accommodate 60,000 vehicles a day, existing rush hour traffic substantially exceeds both the roadway and bridge capacity. Planners estimate that by the year 2020, the total vehicles using the Tacoma Narrows Bridge will increase to 120,000 per day. Thus, the Washington State Department of Transportation (WSDOT) determined that a higher capacity bridge was needed to enhance the ability of people and freight to move safely within the corridor now and to plan for future traffic expansion.

Currently, WSDOT is building a new parallel suspension bridge south of the existing bridge, and renovating the existing bridge by seismically upgrading it and resurfacing the bridge deck. When the Project is complete in 2008, the new bridge will carry eastbound traffic only, with two 12-foot wide general-purpose lanes and one 12-foot wide HOV lane, each with 10-foot wide shoulders. The new bridge will also include a 10-foot wide barrier-separated path for bicycles and pedestrians. The new bridge's towers and caissons are being constructed to accommodate a future lower deck that could hold additional roadway capacity or light rail.

The existing bridge will be resurfaced and reconfigured to provide two westbound general-purpose lanes and one westbound HOV lane, and will also include seismic improvements to comply with current codes. Also incorporated into the Project is 2.4 miles of additional improvements to SR 16, including one split-diamond interchange to accommodate toll traffic into a toll plaza, an underpass, drainage improvements, and improvements to local streets leading to SR 16.

How Project Development Advanced Through Design-Build

Design-Build authority is provided to WSDOT in several different forms. In 2001, the Washington State Legislature passed legislation that gave Design-Build authority to WSDOT. This Design-Build legislation requires a minimum project size of $10 million. In addition, Design-Build authority is provided within Public-Private Initiatives Legislation, RCW 47.46, originally enacted in 1993. The Tacoma Narrows Bridge Design-Build Project is authorized under the Public-Private Initiatives Legislation, and was developed during a long and somewhat contentious timeframe.

In May 1994, during a request for public-private proposals, United Infrastructure Company (UIC), a joint venture of Bechtel and Kiewit, and a predecessor of United Infrastructure Washington (UIW), submitted a proposal to finance, develop, design-build construct, operate and maintain a second Tacoma Narrows Bridge. This Project was selected to proceed. The NEPA-mandated EIS for the Project was developed through a draft stage so that a public vote gauging support for the Project could be held. In the fall of 1998, a public vote to build the bridge as a toll facility passed, and the parties involved moved forward to finalize Project agreements and the EIS.

In May 1999, an agreement to finance, develop, and operate the Tacoma Narrows Bridge Project was executed between WSDOT and UIW. In early 2000, a Record of Decision was issued and Project development work moved forward at a rapid pace. Development work included developing preliminary design to a 10 to 15 percent stage, purchasing right-of-way necessary to build the Project, securing required environmental permits, and negotiating various Project agreements.

Project Chronology

ROD: March 2000

WSDOT executed Design-Build agreement with TNC: July, 2002

Construction Began: Sept. 2002
Scheduled New Opening: Early 2007

Budget: $849 million

The Design-Build Construction agreement was negotiated and finalized in late 2000. This agreement maintained the joint venture of Bechtel and Kiewit through construction of the Project. Several setbacks occurred during the development phase of the Project. The Project legislation and the public-private venture were challenged numerous times by Project opponents. In November 2000, the Washington State Supreme Court ruled that the legislation and Project agreements were enforceable; however, WSDOT lacked statutory authority to impose tolls on the existing Tacoma Narrows Bridge. The scope of the Project required a round-trip toll between the new and existing bridges and legislation at that time did not specifically address tolling the existing bridge. All work was put on hold while the parties involved pursued legislative remedies.

During the 2001 legislative session, it became apparent that the Washington State Legislature intended to change the funding of the Project from private to public, using state bonds reimbursed by tolls. In 2002, legislation was passed that allowed the Project to move forward, although significant changes revised the partnership and nature of remaining work on the Project. The State appropriated $849 million of funding for the Project, and changed the financing from mostly private to public. Solicitation of new Design-Build and operating proposals were not required as a result of the new funding avenue; however, previous agreements had to be

renegotiated with Tacoma Narrows Constructors (TNC - Bechtel/Kiewit joint venture previously selected for bridge design and construction), and TransCore, L.P. (the previously selected toll supplier and operator). In addition, during the spring and summer of 2002, the state renegotiated UIW's agreement to eliminate future financing and management responsibilities. In September 2002, WSDOT signed Notices to Proceed with both TNC and TransCore, and final design and construction of the Project began.

It is anticipated that the new Tacoma Narrows Bridge Design-Build Project will require a total of about 5.5 years to complete and compliance with a total of 853 special permit conditions. The new bridge is expected to open to traffic in early 2007, with upgrades to the existing bridge scheduled to be complete in early 2008.

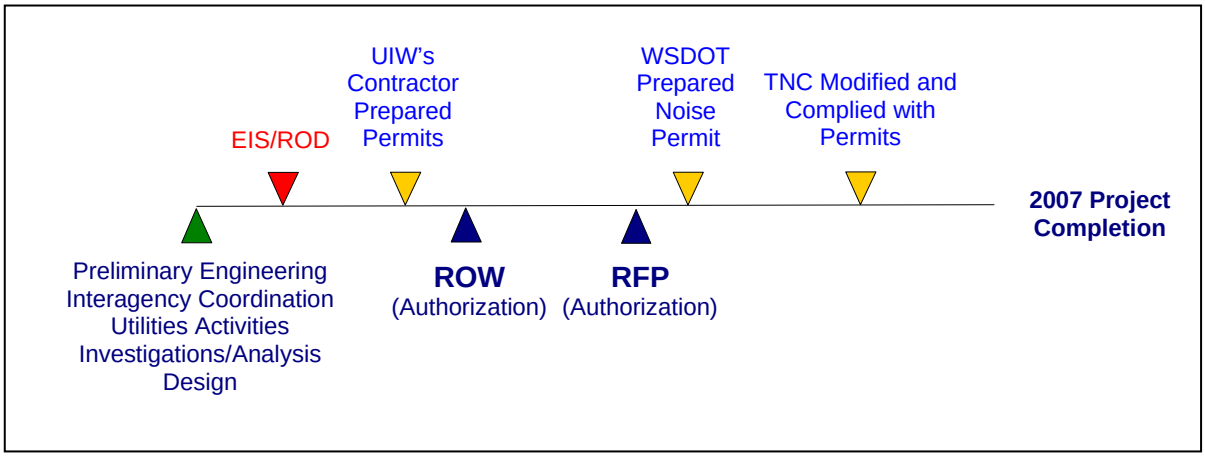
Relationship of Environmental Compliance Requirements and the Design-Build Process

The Project's major environmental issues, each discussed in the Project's Final EIS and addressed by the Design-Build Contractor, include:

- Minimization of wetland impacts;
- Compliance with the Endangered Species Act especially in light of the magnitude and scale of the Project related to the marine environment and the recent listing of Chinook Salmon and Bull Trout;
- Compliance with the National Historic Preservation Act since the earlier bridge that collapsed several decades ago (Galloping Gertie) lies at the bottom of the Narrows in the vicinity of the proposed new bridge and is protected from disturbance;
- Geotechnical considerations related to the massive effort required to construct the bridge foundations at great depth and in strong tidal currents;
- Minimization of residential and commercial displacements; and,
- Minimization of impacts to local parks protected under Section 4(f) of the Department of Transportation Act of 1966.

The figure on the next page exhibits the temporal relationship of the environmental compliance requirements of the Project, particularly environmental permits, to the overall Design-Build process, with work flow proceeding from left to right. This figure identifies WSDOT's insertion point for environmental permits into the logical sequence of steps for this Design-Build Project.

Temporal Relationship Environmental and Design-Build Processes



Permits for the Project were issued to UIW. When legislation changed the Project funding from private to public in 2002, all permits were changed to be in WSDOT's name. WSDOT was the responsible party or "owner" of the Project permits. However, overall impacts and timeline responsibilities associated with Project permitting rested with TNC, since mitigation and scheduling requirements were directly related to Project design.

The Design-Build Agreement between WSDOT and TNC required that risks of all obtained permits be transferred to TNC for any violations or citations incurred while work was in progress. This agreement required TNC to be responsible for modification and compliance with all permits and environmental regulations.

> *"For the ease of Design-Build, State and Federal agencies need to be funded adequately by the construction project in order to ensure that environmental aspects of design development can occur throughout the construction period."*
>
> *- Chris Nichols, TNC Environmental Design Manager*

Some of the more important environmental mitigation addressed by this Project include:

- Relocating Living War Memorial Park (4(f) property);
- Providing new and improved stormwater collection facilities;
- Developing and monitoring a new deep-water environment for bottom fish; and
- Continued consultation with the Puyallup, Muckleshoot, Squaxin Island, Nisqually, Skokomish, and Suquamish Indian Tribes, as necessary, concerning cultural resource issues from the EIS and the development of an Unanticipated Discovery Plan.

The environmental permits summarized below were required for the Project. The tables on the following pages list the responsible party for each project-specific permit, including type, issuer, and purpose.

UIW Permit / Approval Responsibilities

Permit Issued	Issued By	Purpose
Section 404 Permit, Clean Water Act (CWA)	U.S. Army Corps of Engineers (USACE)	Authorized wetland impacts under an individual permit with mitigation.
Section 402 Permit	USACE	Required for dewatering of construction areas, if necessary.
Sections 9 and 10, Impacts to Navigable Waters, Rivers and Harbors Act	USACE and U.S. Coast Guard	Responsible for the construction of any structure in the channel or along banks of navigable waters of the U.S. that changes course, conditions, location or capacity
Section 401, Water Quality Certification, CWA	Washington State Department of Ecology (WSDOE)	Assures water quality is maintained at pre-construction standards.
Section 106 of National Historic Preservation Act/ WSDOT Tribal Consultation Policy	State Historic Preservation Officer (SHPO)	Responsible for any listing and/or data recovery required for tribal and archaeological findings
Section 7 of the Endangered Species Act	United States Fish and Wildlife Service (USFWS)	Consultation if new species are listed or if changes in the project design impact listed species that are not addressed in the approvals.
National Flood Insurance Program	Federal Emergency Management Agency (FEMA)	Conditional Letter of Map Revision for impacts to 100-year floodways and/or floodplains of designated waterways.
Hydrologic Project Approval	WA State Dept of Fish & Wildlife	Ensures protection during construction of moratorium due to migrating salmon.
Shoreline Permits	Pierce County/City of Tacoma/WSDOE	Ensures mean high water to 200 feet upland zone will not be disturbed during the rainy season.
National Pollutant Discharge Elimination System (NPDES)	WSDOE	Places limits on the quantity and concentration of pollutants allowed to be discharged.
Coastal Zone Management Act	WSDOE	Determination stating that the Project is consistent with Washington's Coastal Zone Management Program
Determination of Air Navigation	Federal Aviation Administration	Ensures height limitation on structures to avoid problems with aviation patterns

WSDOT Permit / Approval Responsibilities

Permit Issued	Issued By	Purpose
Noise Variance	Tacoma-Pierce County Board of Health	Allows noise from nighttime (10 pm to 7 am) construction activities to exceed maximum allowable noise levels.

Design-Build Contractor Permit / Approval Responsibilities

Permit Issued	Issued By	Purpose
Permit modification and compliance only	NA	NA

To ensure that compliance was achieved throughout the project design and construction, the following measures were implemented:

- TNC was required by contract to submit an Environmental Compliance Plan. TNC initiated the formation of an Environmental Task Force that included representatives from WSDOT, TNC and resource agency staff. This Task Force meets regularly to discuss environmental compliance issues.

- WSDOT placed internal environmental monitors on-site to ensure compliance with permit requirements. WSDOT trained field staff to identify failures in meeting environmental commitments and/or construction procedures.

Participants in the Design-Build Environmental Process

- WSDOT
- Federal Highway Administration
- United Infrastructure Washington, Inc (UIW)
- Tacoma Narrows Constructors (TNC)
- Local Tribes
- U.S. Army Corps of Engineers
- U.S. Coast Guard
- U.S. Fish & Wildlife Service
- Tacoma-Pierce County Board of Health
- Washington State Department of Ecology
- WA State Office of Archeology & Historic Preservation

Contract Design Drawings

WSDOT pursued a Design-Build strategy that involved not fully designing the Project before awarding it to a Design-Build Contractor. This Project was originally designed by UIW as a 10-15 percent level of design, incorporating NEPA environmental commitments and enough detail about the Project design to obtain necessary permits.

In general, permitting agencies were concerned with issuing permits without seeing the level of design detail they were accustomed to seeing in traditional Design-Bid-Build projects. Resource agency staff felt that the effects of projects should be known and understood before issuing permits. Under Design-Build contracting, these effects are not always known at the beginning of a Project. Resource agency staff were concerned that the Design-Build Contractor would modify the designs after the permits were issued without considering the "spirit" of the permit. The agencies feared that the Design-Build Contractors would repeatedly revisit permits, pushing agencies to allow designs that were different from those identified in initial permits. In the case

of the Tacoma Narrows Bridge Project, while most permits had been obtained early by UIW, a number of meetings were held between the parties involved to address permitting concerns. In fact, environmental mitigation permit measures were designed to offset "worst case" construction scenarios. In several cases, TNC ended up using construction methods that were less intrusive to the environment than the original permits allowed. However, no provision was made to allow lesser mitigation if the impacts were avoided or minimized. A decision was made to maintain the original mitigation plan.

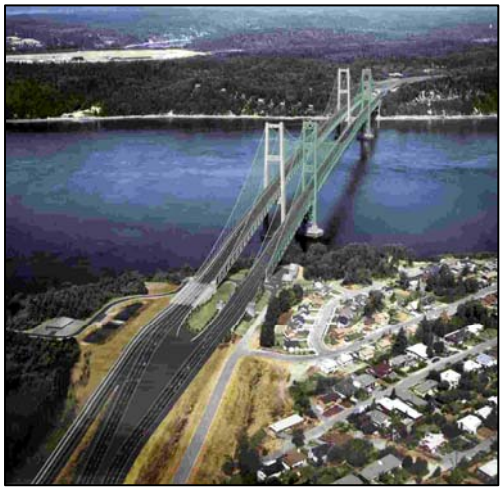


Photo courtesy of Tacoma Narrows Constructors

While full mitigation was designed and provided in this Project, TNC felt that in future projects, addressing mitigation for unrealized impacts would not make sense. In this Project, the ability to modify mitigation measures or provide mitigation commensurate with impacts reflective of the Project's final design and selected work methods would have saved time and cost.

Lessons Learned

Based on knowledge gained as part of this Project, new strategies have been developed by WSDOT for use on future projects. These include the following:

- Prior to formal permitting, WSDOT will hold meetings with permitting agencies to identify the natural resources at issue and, with agency help, determine the level of detail necessary to obtain each permit. The design constraints WSDOT commits to during permitting will be "locked in" or mandated in the Design-Build contract.

- If WSDOT pursues permits for a worst-case scenario design, it will commit to mitigate for that design. In order to avoid mitigating for worst-case scenario impacts, WSDOT will work with resource agencies to set up the following:

  - Mitigation bank agreements establishing credit that can be drawn upon for impacts incurred;

  - Permit terms and conditions that require mitigation dependent on level of impact;

  - Where appropriate, permit requirements, including mitigation, will be performance-based and included in the contract;

  - Any unapproved deviation of the contract would be considered to be a breach of the contract, making the Design-Build Contractor potentially liable to WSDOT for damages; and**,**

  - Where appropriate for the Project, WSDOT will pursue advanced mitigation; i.e., providing mitigation ahead of corresponding impacts. Where this strategy is

implemented, WSDOT will have control over the mitigation, and the Design-Build Contractor will need not take part in the process.

- Permit requirements will better define objective criteria and parameters in the contract to ensure that the "spirit" of the permit is maintained as well as the roles and responsibilities of WSDOT and the Design-Build Contractor. WSDOT, the Design-Build Contractor, and staff from regulatory agencies will meet on a routine basis to keep resource agencies informed of the development of the design and selected work methods. If design changes inconsistent with a particular permit are proposed, WSDOT will take responsibility to work with the Design-Build Contractor and resource agencies on permit modifications or on obtaining new permits.

- To support this effort, WSDOT will consider contributing to the cost of dedicated resource agency staff to develop and maintain a working knowledge of the Project. This will help resource agencies increase their level of comfort with Design-Build contracting methods, and will help them make decisions that are timely, informed and in the best interest of all involved.

- Education should be provided not only for design builders, but also for permitting agency staff. Greater knowledge and familiarity of the Design-Build process would decrease the apprehension or concern regarding potential modifications to plans as projects move forward, and what those changes would mean for permit compliance and resource impacts.

- Using consultants and agency staff knowledgeable of local permitting processes and contacts would help streamline coordination of permits and mitigations.

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