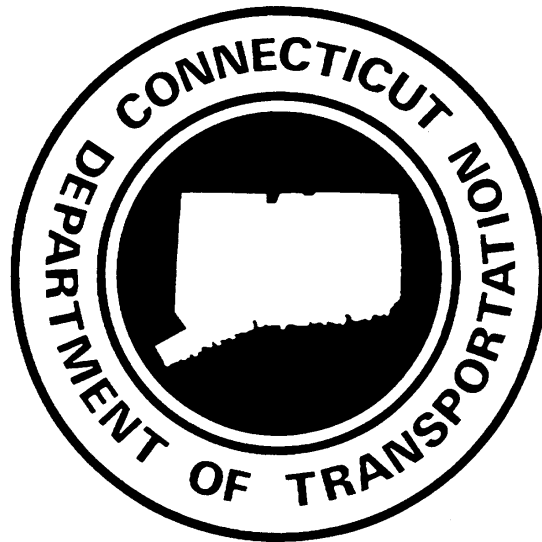


CONSTRUCTIBILITY REVIEW PROGRAM



~ Update ~ June 2009 ~

**CONNECTICUT DEPARTMENT OF TRANSPORTATION
BUREAU OF ENGINEERING AND HIGHWAY OPERATIONS
Office of Quality Assurance**

TABLE OF CONTENTS

Title Page	1
Table of Contents	2
Introduction	3
Program Overview	4
Constructibility Champion	4
Constructibility Process	4
Performance Measures and Benchmarking	5
Specification Review	6
Handling of Pre-bid Questions	6
Preconstruction Estimation of Cost and Time	6
Post-Construction Review	6
Team Composition	7
Team Responsibilities	7
Appendix A (Project Review Checklist) [see <i>Project Review Checklist</i>]	
Appendix B (Classifications)	9

Introduction

The Connecticut Department of Transportation (Department) has established a Constructibility Unit within the Office of Quality Assurance, as part of the **Quality Control / Quality Assurance** efforts to ensure that quality plans and specifications are developed. The objective of this unit is to implement a formal Constructibility Review Program to **supplement** the current plan review processes to facilitate relevant communication and input among pertinent parties. The program will also implement applicable recommendations of the Construction Cost Overrun Committee, a joint FHWA/ConnDOT process review committee established in 2004.

The procedures developed for this program are based on the Best Practices Guide for Constructibility Review developed by the American Association of State Highway and Transportation Officials (AASHTO) Subcommittee on Construction, modified as appropriate to fit the Department. The AASHTO Subcommittee on Construction has defined “Constructibility Review” as a process that utilizes construction personnel with extensive construction knowledge **early in the design stages** of projects to ensure that the projects are buildable, while also being cost-effective, biddable and maintainable.

Teamwork between all the units involved in the preparation of bid packages and the commitment of the management in supporting this program will be critical to the success of this program, which has the potential to minimize the delays, claims and cost overruns of the projects. The following pages detail the key elements of the program and establish a roadmap for the implementation of the program.

Program Overview

The goal of the Program is to make constructibility considerations a part of normal design development. To this end, it is important to formalize the process with written procedures. It is also important to formulate the procedures so that they fit seamlessly with our current plan review processes. Consideration also has to be given to deploy resources efficiently without impacting the schedule of the projects.

Constructibility Champion

It was noted by the AASHTO Subcommittee on Construction that success of such programs will be helped by the designation of an individual near the top of the organizational pyramid as the Champion of the program. The Chief Engineer/Bureau Chief will be designated as the Constructibility Champion, the Engineering and Construction Administrators and Quality Assurance Division Chief will serve as the deputies to ensure the smooth functioning of this program.

Constructibility Process

The projects will be divided into the following categories.

Level A projects are highly complex projects with an estimated value greater than 20 million dollars.

Level B projects are moderately complex projects with an estimated value between 5 and 20 million dollars.

Level C projects are of average complexity with an estimated value less than 5 million dollars.

The following processes will be adopted.

Case I:

Typically this process will be utilized on Level C projects. The current processes will be followed with the addition of the following:

- The Constructibility Unit will be responsible for review of the plans and specifications at the preliminary design, semi-final design and the 95% design phases.
- Check Lists that were developed from the “Design / Constructibility Review Guidelines – DOT – March 1998” (see Appendix A) are recommended as a useful tool for the various Department reviewing units. Check lists by nature are dynamic and other units are encouraged to suggest changes or revisions that will benefit the process.

- A formal site review will be conducted by the Constructibility unit for certain projects for a plans-on-hand review.
- The Constructibility Unit will follow up with Design to ensure that all constructibility related review comments are properly addressed.
- Representatives from Federal, State or Local levels should be invited, by the Lead Design Unit, to the plan review meetings as appropriate.
- Utility and Railroad representatives should be invited to the plan review meetings as appropriate.
- A representative of the Constructibility unit will attend design coordination meetings, as time permits.
- The Constructibility Unit will arrange post-construction review, on a case by case basis.

Case II:

Typically this process will be utilized on Level A and Level B projects. In addition to Case I procedures, the following additional processes will be employed:

- On-call consultants will do a constructibility review for selected **Level A** and **Level B** projects. The review will include but not be limited to site logistics and restraints, environmental impacts, technical constructibility, construction staging, maintenance and protection of traffic, site access to different construction stages, lay down areas, subsurface soil data, material acquisition, assessing project durations, contract milestones, utility schedules and clearances, impact of utilities on project schedules, developing CPM schedules, etc.,
- Constructibility/Value Engineering workshops for selected **Level A** and **Level B** projects at the Preliminary Design phase.
- For select **Level A** projects, construction industry personnel will be utilized in the constructibility review. Guidelines will be developed to identify the circumstances under which the construction industry personnel will be involved, and the actual mechanism of accomplishing that.

Performance Measures and Benchmarking

An essential component of the QA/QC process is benchmarking to measure the effectiveness of the program. This serves as a tool to identify the current and potential future problem areas enabling the Department to focus on utilizing resources effectively and efficiently. Performance can be ascertained in part by utilizing the Office of Construction's various databases. These databases contain financial information critical to measuring performance. The impact of Design errors, cost overruns, and unique project problems can be enumerated, quantified, and corrected; avoiding and reducing the same or similar problems in future endeavors.

Specification Review

The Constructibility Unit will help review the correction of defective specifications as part of the quality control efforts. A communication chart will be developed to formalize the process by which Claims and Litigation unit and the Districts will notify the Constructibility Unit of the defective specifications and the unit will provide assistance to the other units of the Department to correct the specifications.

Handling of Pre-bid Questions

The Constructibility Unit will assist the Office of Contracts in addressing pre-bid questions received by the Department.

Preconstruction Estimation of Cost and Time

The Constructibility Unit will work closely with the Contract Development Unit of the Department to verify that the cost and time estimates are appropriate. A formal process will be developed to accomplish this objective.

Post-Construction Review

The Office of Construction has a Post-construction Review process in place. This practice will be updated and modified and performed on all projects. Post-construction reviews are a valuable resource for improving the quality of plans, specifications and construction on current and future projects

The Districts will be responsible for completing the Post-construction Review forms and submitting them to the Constructibility Unit in a timely manner. A significant component of the Post-construction Review process is the feedback mechanism. The review should be conducted near the end of a project so that the personnel directly involved in the projects are readily available and their memories are fresh. The Constructability Unit will meet with the relevant parties on selected projects to analyze the Post-construction review. A meeting agenda will be developed by the Constructibility Unit based on the reports provided by the District and information derived from the Office of Construction databases.

The Constructability Unit will prepare the review report. The report will be distributed through the Offices of Engineering and Construction Administrator to the appropriate Engineering and Construction personnel. This will ensure the dissemination of the “lessons learned” to all personnel involved in the design, administration, and execution of projects.

Team Composition:

The Constructibility unit will consist of five (5) members as follows: the unit will be headed by a Transportation Supervising Engineer. Four (4) additional members, two (2) at the level of Transportation Engineer III and Two (2) at the level of Transportation Engineer II will make up the rest of the team. The resources will be adjusted up or down depending on the need. The on-call consultants will be utilized to supplement the review processes.

Team Responsibilities:

- Provide an additional level of constructibility review as resources allow.
- Attend Design Coordination meetings as time permits.
- Arrange a site review meeting for the selected projects.
- Arrange Constructibility/Value Engineering workshop as necessary.
- Implement applicable recommendations of the Construction Cost Overrun Committee.
- Negotiate with Consultants for on-call service. Review and process the consultant billing.
- Establish guidelines for the on-call assignment.
- Establish guidelines for the utilization of a Contractor in the constructibility review process.
- Follow up with Design on review comments. Establish a procedure to resolve differences of opinions (escalation up the chain of command).
- Build and maintain a database in order to establish benchmarks.
- Provide assistance to Office of Contracts to ensure that the pre-bid questions are appropriately addressed.
- Review specifications with other units to incorporate corrections.
- Conduct post-construction review for the selected projects.
- Prepare post-construction review reports and ensure their wide distribution.

Appendix A

[see *Project Review Checklist*]

Appendix B

Standard Explanations - Classification of Line Item Changes

- 1-U Unforeseen Condition – Additional work necessitated by encountering reasonably unforeseeable conditions which differ materially from those indicated in the contract or unusual conditions differing from those normally encountered. Items applying to this explanation are defined by Article 1.04.04-Differing Site Conditions of the Standard Specifications. Examples: underground storage tank, contaminated materials, concealed decay, unanticipated rock or groundwater.
- 2-S Change in Scope – Changes from the original intent or purpose of the project, extension of projects limits (i.e., additional signalized intersection, limits more than 100' beyond original, etc.), elimination of contract work, and work not normally associated with the type of work originally bid.
- 3-C Contract Revision – Changes in the original design initiated by design or construction which falls within the original scope of the project and does not alter the basic character of the project. This also includes revised specifications. Examples: revisions to pavement markings, revisions to base materials, revisions to stage construction, revisions to signalized intersection.
- 4-Q Quantity Adjustments – Minor increases or decreases in original quantities not attributable to any of the above explanations. (Increase or decrease less than 10% of the original estimate and the value of the quantity change is less than \$5,000.)
- 5-O Other Adjustments – Revisions to the contract or plans to correct foreseeable changes which reasonably could have been expected. (Ex. Work shown on the plans for which no pay item was provided - no rock in trench item where rock outcrops are plainly visible, revisions to comply with environmental permit requirements or R-O-W agreements, incorrect original computations, and elevation bust resulting in extra work to correct.)
- This explanation also includes contract adjustments. (Ex. Liquidated Damages, incentives/disincentives, sanctions, material escalation clauses, etc.)
- 6-T Time Extension – Adjustment in the allowable contract time for any portion of the work.