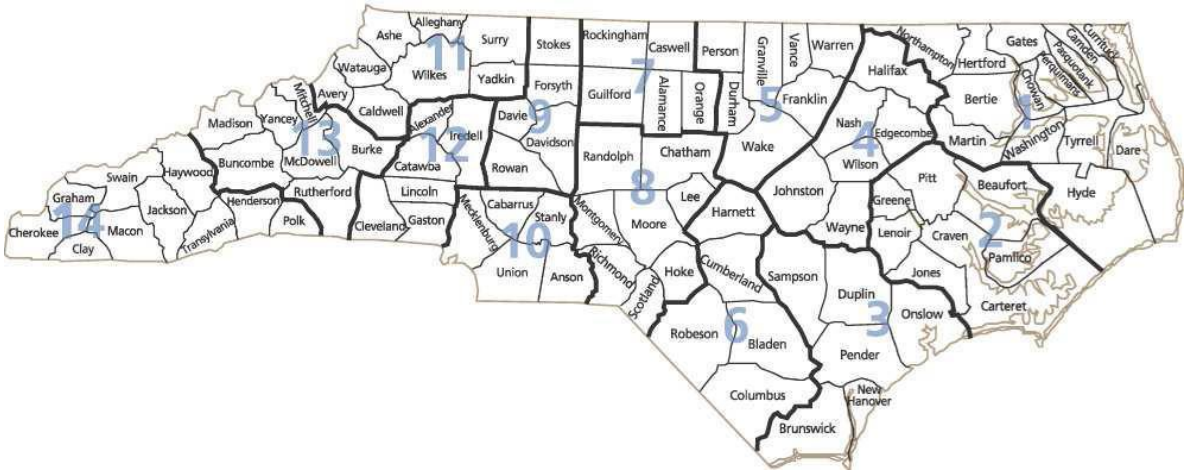
North Carolina Department of Transportation
Value Management Unit

NCDOT
Value Management Program
Policy and Guidelines

Version 4.0
November 26, 2013



Forward

I have worked in the Value Management Unit since December 2010 and accepted the position of State Value Management Engineer in October 2013. As the State Value Management Engineer, it has been my personal goal to ensure that the administration of the NCDOT's valuable programs is performed in such a manner as to fully utilize the knowledge and abilities of the talented pool of planners, designers, engineers, and construction personnel throughout the Department. I am grateful for the opportunity to work as a public servant and strive to make the Value Management Program an effective tool for the Department in doing its part for the great state of North Carolina.

As the population of North Carolina continues to grow, so do the demands of the State Department of Transportation. It is imperative, especially in this current fiscal environment, that the Department embrace the importance of value management principles. The ability to maximize the effectiveness of tax payer dollars is paramount to the Department's success in providing efficient, safe, and reliable transportation to the citizens of North Carolina. If there are any questions or comments regarding any facet of the NCDOT Value Management Program, please don't hesitate to contact me.

Thanks for all you do for the Citizens of North Carolina.

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Acronyms and Definitions

AASHTO – American Association of State Highway and Transportation Officials

AGC – Associated General Contractors of America

CPI – Continuous Process Improvement

CR – Constructability Review

CRP – Constructability Review Program

CVS – Certified Value Specialist

Department – North Carolina Department of Transportation

DB – Design-Build is an alternative project delivery method that combines both the project design and the construction under one contract

FFY – Federal Fiscal Year runs from October 1st through September 30th of each year

FHWA – Federal Highway Administration

NCDOT – North Carolina Department of Transportation

PCAP – Post Construction Assessment Program

PDA – Performance Dashboard and Appraisal

PDEA – Project Development and Environmental Analysis

PE – Professional Engineer

PEP – Product Evaluation Program

RA – Risk Assessment

RAP – Risk Assessment Program

RCP – Resource Conservation Program

RSA – Road Safety Assessment

SAVE – Society of American Value Engineers which is the U.S.-based international professional society promoting the worldwide use of Value Engineering that governs the certification of Certified Value Specialists.

STaRS – Scheduling, Tracking, and Reporting System

TIP – State Transportation Improvement Program

Tri-Project Managers – For a TIP project, the Tri-Project Managers consist of the Roadway Design Project Engineer, the PDEA Project Group Leader, and the Division Construction Engineer

VE – Value Engineering is the systematic application of recognized techniques by a multi-disciplined team to identify the function of a product or service, establish a worth for that function, generate alternatives through the use of creative thinking, and provide the needed functions to accomplish the original purpose of the project and at the lowest life-cycle cost without sacrificing safety, necessary quality, and environmental attributes of the project. (Title 23 of The Code of Federal Regulations Part 627)

VECP – Value Engineering Change Proposal is a proposal by a Contractor, as outlined by Section 104-12 of the North Carolina Department of Transportation *Standard Specifications for Roads and Structures*, which encourages the Contractor to propose changes in the contract requirements which will accomplish the project's functional requirements at less cost or improve value or service at no increase or a minor increase in cost. The net savings of each proposal is usually shared with the Contractor at a stated reasonable rate.

VEP – Value Engineering Program

VEST – Value Engineering Study Team

VMP – Value Management Program that is operated and maintained within the Value Management Unit of the Technical Services Division of the NCDOT

VMP Database – A database of information that contains pertinent information and lessons learned from all facets of the Value Management Program.

VMU – Value Management Unit within the Technical Services Division of the NCDOT

Introduction

To further establish the Value Management Program (VMP) as a management asset providing the Department procedures to pursue cost efficiencies, mitigate project risks, standardize product approvals, provide resource conservation opportunities, and incorporate construction method considerations into the planning and design of a project, the North Carolina Department of Transportation has developed the Value Management Policy and Value Management Program Guidelines.

The North Carolina Department of Transportation Value Management Program is composed of multiple interrelated department wide programs working together to serve the Department as a vital resource and information clearinghouse. Because of the broad range of responsibilities within the Value Management Program, the VMP guidelines were written to provide overall guidance for the procedures and processes for each of the individual programs. Periodic reviews of these guidelines are performed to ensure that the programs are meeting their intended end goals.

The NCDOT Value Management Program Guidelines (Version 1.0) were initially approved on September 29, 2010. Subsequent additions and revisions to the program resulted in the NCDOT Value Management Policy being approved by Department authorities in November of 2011 (see a copy of this policy in Appendix B at the back of these VMP Guidelines) and the VMP Guidelines 2.0 were published on February 10, 2012. This document serves as the annually updated current operating guidelines for the Value Management Program and incorporates modifications and revisions from this past calendar year. It is referenced as the Value Management Program Guidelines 4.0.

Disclaimer

In an effort to ensure the effectiveness of the processes, procedures, reports, and outcomes of the NCDOT Value Management Program, the Department reserves the right to make changes and modifications to the guidelines presented within this document on an as needed basis if, in doing so, it is in the best interest of the NCDOT and ultimately the tax payers of North Carolina.

1.0 Value Management Program (VMP)

1.1 Purpose

The purpose of the NCDOT VMP is to ensure the prudent statewide use of resources and revenues. To achieve this purpose, the VMP currently encompasses seven statewide programs that contribute to the Department's overall management objectives of streamlining operations, improving quality and outcomes, reducing costs without compromising function, and increasing the use of environmentally sound and energy efficient practices and materials.

These guidelines will detail the functions and processes of the seven principal value management program areas which are:

- The Value Engineering Program (VEP)
- The Value Engineering Change Proposal Program (VECP)
- The Risk Assessment Program (RAP)
- The Product Evaluation Program (PEP)
- The Resource Conservation Program (RCP)
- The Constructability Review Program (CRP)
- The Post Construction Assessment Program (PCAP)

The figure below is a graphical representation of where each of the individual programs fits in the overall timeline of an infrastructure project as it progresses from the planning phase through maintenance. In addition to the seven principal value management programs, the figure also depicts the ongoing component of "research, reporting trends, proposed policy changes, and overall consulting" that is also a key aspect of the overarching NCDOT VMP.

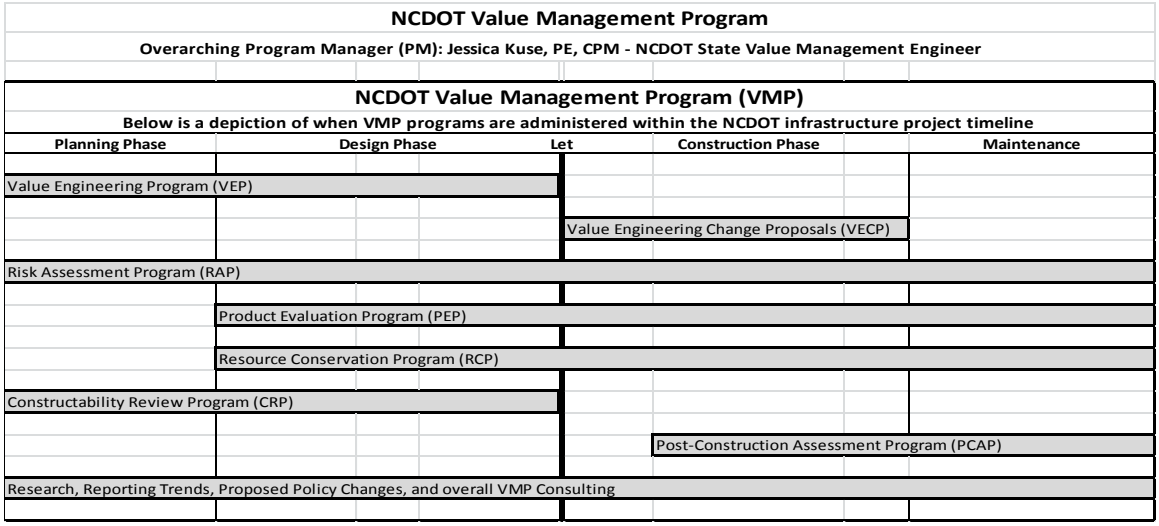


Figure: Depiction of the various VMP Programs in relation to infrastructure project timeline.

1.2 Goals

The overall goal of the statewide Value Management Program is to provide synergy between several value-add management programs and provide a means of communicating trends and lessons learned to the multiple units throughout the Department to enhance the quality of project delivery.

1.3 Definitions

See the Acronyms and Definitions Section of the VMP Guidelines.

1.4 Roles and Responsibilities

Department Leadership

Department leadership shall actively support the VMP by ensuring adequate funding for establishing the overall program and setting clear expectations and performance measures. Department leadership will be called upon by the State Value Management Engineer to serve as a VMP Advisory Panel to aid in bringing consensus and a final disposition on an as needed basis.

Value Management Unit

The Value Management Unit of the Technical Services Division shall be responsible for managing the VMP which includes establishing guidelines, procedures, training, administering VE studies, and monitoring and reporting overall VMP results and trends. The State Value Management Engineer and other Value Management Engineers will be staffed in the VMU.

State Value Management Engineer

The State Value Management Engineer is ultimately responsible for the overall management and direction of the VMP. Responsibilities include but are not limited to:

- Establishing and maintaining the VMP Guidelines and procedures to ensure the success of the VMP
- Developing annual work plans and establishing program goals
- Supervising the VMP Staff
- Serving as a liaison with Department Leadership and the various Business Units to identify and help resolve VMP challenges
- Determining multimodal transportation projects that would benefit from VMP services
- Providing analysis and synthesis of trends ascertained from the VMP Database
- Using performance measures to track the effectiveness of the VMP

- Effectively advertising the results of the VMP and recognizing individuals that make significant contributions to the VMP

1.5 VMP Processes

The following is an excerpt from the AASHTO Guidelines for Value Engineering (March 2010):

> *"For optimum results, value engineering should be applied as early as possible in the project development or design process so that accepted VE recommendations can be implemented without delaying the progress of the project. By proper timing and planning, the value engineering manager can usually ensure specific VE studies can be accomplished without conflicting with the project schedule. In fact, the earlier value engineering is applied, the greater the potential for savings. Care must be taken to ensure that the project is ready and the appropriate information is available to perform the study."*

Based on these AASHTO guidelines, all the applicable programs within the VMP are run such that the timing of the studies, evaluations, and reports are at an appropriate time in the project schedule to provide the best opportunity for incorporating the recommendations. The processes for each program are detailed in the individual sections within these VMP guidelines.

1.6 Outputs and Reports

The VMP produces a wide range of outputs and reports for the purposes of communicating value-add information both internally and externally to the Department. A graphical depiction of anticipated 2014 calendar year for the Value Management Program with examples of the type of outputs and reports associated with the overarching Program is included on the following page.

1.7 Program Evaluation

The processes and procedures of the Value Management Program that generate the outputs and reports are evaluated on an ongoing basis throughout the year. A primary goal of the Value Management Program is to consistently evaluate all facets of the program to ensure that it is serving the Department and, ultimately the Citizens of North Carolina, in the most efficient and effective manner possible.

General Overview of Monthly VMP Outputs and Reports

January • 1-2 VE Studies • 1 CR • VEP Status Update • Business Unit Report • VM Quarterly Publication	**February** • 1-2 VE Studies • 1 CR • PCAP annual work-plan • PEP annual meeting with TWGs	**March** • 1-2 VE Studies • 1 CR • RCP Task Force Meeting
April • 1-2 VE Studies • 1 CR • VEP Status Update • Business Unit Report • VEP Training (Tentative) • VM Quarterly Publication	**May** • 1-2 VE Studies • 1 CR	**June** • 1-2 VE Studies • 1 CR • RCP Task Force Meeting
July • 1-2 VE Studies • 1 CR • VEP Status Update • Business Unit Report • VM Quarterly Publication	**August** • 1-2 VE Studies • 1 CR	**September** • 1-2 VE Studies • 1 CR • RCP Task Force Meeting
October • 1-2 VE Studies • 1 CR • Annual RCP Report • VEP Status Update • Business Unit Quarterly Report • VEP Training • VM Quarterly Publication	**November** • 1-2 VE Studies • 1 CR • FHWA Annual VE Report • Annual Revision of the VMP Guidelines	**December** • 1-2 VE Studies • 1 CR • RCP Quarterly Task Force Meeting • PEP Product Annual Re-certifications • VMP Year End Report

Figure: Anticipated Schedule as of November 26, 2013 and is subject to change.

2.0 Value Engineering Program (VEP)

2.1 Purpose

The purpose of the Value Engineering Program (VEP) is to exceed the expectations set forth by the Code of Federal Regulations (CFR) Title 23, Chapter 1, Part 627. This code requires states to utilize a "systematic application of recognized techniques by a multi-disciplined team to identify the function of a product or service, establish a worth for that function, generate alternatives through the use of creative thinking, and provide the needed functions to accomplish the original purpose of the project, reliably, and at the lowest life-cycle cost without sacrificing safety, necessary quality, and environmental attributes of the project."

In addition, the VEP is dedicated to upholding the NCDOT policy to design, construct and maintain the State Highway System in the most cost-effective and efficient manner possible.

The VEP has established these guidelines and processes as a way of ensuring a systematic program for statewide administration of value engineering techniques and value cost management which meets the FHWA requirements and the policies of the Department. In addition, these guidelines provide authority for administration of the program, assign responsibilities for participation, and outline Federal Highway Administration and internal reporting procedures.

2.2 Goals

The overall goal of the VEP is to provide the means for the NCDOT to utilize value engineering techniques at each major decision point within the project procurement. This may result in scope definition improvements, project designs improvements, project cost savings, accelerated incorporation of new materials and construction techniques into projects, improved constructability, internal and external coordination improvements, reduced environmental impacts, accelerated project schedules, reduced project risk, reduced public inconvenience, improved customer satisfaction and improved transportation infrastructure operations.

Ultimately, the VEP strives to provide the means for the Department to efficiently implement lessons learned throughout the VE process into project design and construction throughout the state.

In addition to these program goals, each year the VEP establishes goals for the VE Studies. These goals are measurable and established based on the anticipated number of projects which meet the minimum FHWA criteria for requiring a VE study, but is not limited to just projects with federal funding.

For FFY 2013, below is a chart showing the goals and the actual results for the year.

Federal Fiscal Year Criteria	Goal	Results
# VE Studies Performed	25	25
# Recommendations submitted	80	270
# Recommendations approved	50	93
Estimated Cost Savings	$ 20 Mil	$6.3 Mil

As of 11/26/2013, there are 58 recommendations under review.

For FFY 2014, below are the goals:

Federal Fiscal Year Criteria	Goal
# VE Studies Performed	25
# Recommendations submitted	80
# Recommendations approved	50
Estimated Cost Savings	$ 20 Mil

2.3 Definitions

See the Acronyms and Definitions Section of the VMP Guidelines.

2.4 Roles and Responsibilities

State Value Management Engineer

The State Value Management Engineer is responsible for the overall management and direction of the VEP. Responsibilities include but are not limited to:

- Developing the annual VE Studies List and VE Studies Work Plan
- Serving as a liaison with Department Leadership and the various Business Units to identify and help resolve VE challenges
- Assigning identified TIP projects to VMP Engineers
- Coordinating with Business Units to determine a VE Coordinator for each Unit
- Coordinating with the VEP Engineer to schedule VE studies
- Promoting and encouraging the use of VEPs and facilitating expeditious reviews of proposals received from Contractors
- Ensuring that VE recommendations are evaluated in a fair and equitable manner and monitoring the implementation of accepted recommendations
- Providing analysis and synthesis of VE trends ascertained from the VMP Database
- Using performance measures to track the effectiveness of the VEP

- Effectively advertising the results of the VEP and recognizing individuals that make significant contributions to the VEP

VEP Engineer

The VEP Engineer is responsible for the day-to-day management of the VEP. Responsibilities include program monitoring, preparing the VE Annual Report as required by FHWA, maintaining VEP procedures and guidelines, maintaining the VEP Database, acting as a liaison between Construction and Preconstruction to disseminate information, facilitating VE Studies as necessary, providing VE training and coaching to NCDOT personnel, and leading continuous improvement efforts related to the VEP. The VEP Engineer will coordinate with the Value Engineer to prepare the VE Study Report. Ultimately, the VEP Engineer will be responsible for action items as assigned by the State Value Management Engineer to ensure the success of the VMP.

Value Management Engineer

The Value Management Engineer is responsible for administering the VE Study for TIP projects on the VE Studies List that have been assigned to them by the State Value Management Engineer. The Value Management Engineer may also serve as the VE Study Facilitator. Responsibilities include administering VE studies at various stages of the project, gathering project information for VE studies, coordinating the space and materials needed to administer VE studies, coordinating between the other value-related programs, performing data entry for the VMP Database by entering the pertinent project information from the VE Studies, working to ensure fully developed recommendations, and identifying additional subject matter experts and/or team members for a VE Study based on the project type and scope. The VEP will ensure that the VE Study is properly documented and coordinate with the VMP Engineer to prepare the VE Study Report. Ultimately, the Value Management Engineer will be responsible for action items as assigned by the State Value Management Engineer to ensure the success of the VMP.

VE Study Facilitator

The VE Study Facilitator will be assigned to each VE Study by the VEP Engineer or the State Value Management Engineer. The VE Study Facilitator will usually be the VEP Engineer or the Value Management Engineer assigned to the project. However, a consultant or other NCDOT employee may be used for this role. The VE Study Facilitator will guide the VE Study team through the VE Process to develop viable recommendations for the assigned project and to ensure the goals of the VE Study are met.

Business Units

The Business Units from various areas within the Department are responsible for coordinating with the State Value Management Engineer and the VEP Engineering in identifying projects that either require or would benefit from VE studies, providing technical information as requested for VE Studies, and designating a Business Unit VE Coordinator. Also as requested by the State Value Management Engineer, Business Units will provide competent, experienced personnel as described in the VE Study Team Selection section to serve as VE Study Team Members. In addition, Business Units should identify personnel who would benefit from VE training in order to fully and effectively participate in VE studies

VE Coordinator

Each Business Unit may elect to appoint a VE Coordinator. The State Value Management Engineer and VEP Engineer will work with the VE Coordinator to assign staff to VE Studies, assist the Value Engineer in gathering project information for studies, and assist in evaluating and fully developing the recommendations from VE Studies that directly relate to that Business Unit.

VE Study Team Member

The VE Study Team Member will be assigned from the Business Units through the collaboration of the State Value Management Engineer, the VEP Engineer, and the Business Unit VE Coordinator. VE Study Team Members should have the appropriate expertise to address the major functional areas and critical high cost issues of the Study The VE Study Member will be responsible for allocating sufficient time and rearranging priorities in order to fully participate in the VE Study.

State Estimating Engineer

The State Estimating Engineer will assist the State Value Management Engineer, and other Value Management Engineers as appropriate to calculate the cost savings associated with the recommendations resulting from VE Studies.

VE Consultants

VE Consultants may provide any of the following services on certain NCDOT VE Studies as directed by the State Value Management Engineer:

1) <u>Provide the team leader/ facilitator only</u>: The Consultant will provide a team leader while the NCDOT provides the study team members. The preferred team leader will hold the PE/CVS certification. The team leader will lead the study team, compile the information for the report, prepare the

report, and prepare/conduct a presentation for management if necessary. Team leader may be a CVS, in lieu of a PE/CVS, only if they have sufficient expertise in transportation related topics and a background in conducting VE studies for highways and bridges. The NCDOT has the right to reject, accept, or request the team leader on a project by project basis.

2) Provide a partial team: The Consultant will provide a mix of study team members to complement/supplement the team members provided by the NCDOT. This may or may not include providing the team leader. Team staff provided by the Consultant will be forwarded to the NCDOT for review and approval prior to conducting the VE study. The NCDOT will specify certain disciplines to be provided and minimum experience requirements.

3) Provide the entire team: The Consultant will assemble a multi-disciplined VE project team of 5-7 persons, led by a VE Facilitator. Teams should be structured so there is appropriate expertise to evaluate the major problem areas anticipated within the project. NCDOT may add one or two Departmental personnel to participate with the VE team. NCDOT may provide additional assistance and expertise but will not replace consultant VE team members. Team staff provided by the Consultant will be forwarded to the NCDOT for review and approval prior to conducting the VE study.

   Recommended qualifications of VE Consultant team members are as follow:

   VE Team Leader/Facilitator: This member must be a qualified VE practitioner, experienced in performing and leading VE studies (have participated in several VE studies as a team member and as a team leader), and have sufficient VE training, education, and experience to be recognized by SAVE International as meeting the requirements for certification.

   Design, construction, maintenance and traffic engineering expert members: These team members should have at least ten years of experience in design, construction, maintenance or operations. The VE team must also include member(s) experienced in estimating construction costs and cost-benefit analysis. All members should have completed a 40-hour Value Engineering training seminar or have prior Value Engineering experience. The composition of the expertise should reflect the complexity of the project design to be studied. At least two members of the team should be experienced in the high-cost areas of the project or have expertise in the disciple requested by NCDOT Value Management.

Safety and Mobility expert member: The VE Team should include expertise to review and provide recommendations in accordance with this policy.

Constructability expert member: This member should be an experienced construction professional who is able to add the Contractor's perspective to the VE Study. As stated above, if a current employee of a construction company is selected by the VE Consultant and participates as a member of the VE study team, the construction company will not be eligible to bid on the project nor partake in any of the construction activities as a sub-contractor.

Special Note: Value Engineering Consultants will have at least one (1) person on staff that is a licensed Professional Engineer (PE) as well as a Certified Value Specialist (CVS) by the Society of American Value Engineers (SAVE). The PE/CVS should have extensive experience in the design and/or construction of highways and bridges and maintenance of traffic and project scheduling. The Consultant should demonstrate their experience conducting VE studies for transportation facilities, particularly highways and bridges. The Value Engineering team should be able to provide all the services listed in the scope of work.

4) Provide training: The Consultant may be requested to provide basic value engineering workshops, team leader training, or management briefings. Training will be in accordance with these guidelines. Training courses provided by the Consultant may include but not be limited to the following:

- SAVE Certified Module I Value Engineering Workshop
- Development and Training of a 3 day VE Workshop for VE Study team members
- Development and Training of a 1 day VE for Transportation Executives

The fee for VE Training will be negotiated on a workshop-by-workshop basis.

5) Provide other services: The Consultant may provide other services to complement the VE services. These may include:

- Information gathering for team studies
- Providing facilities for team study activities
- Preparation of VE study report
- Formal presentation of VE findings
- Development of implementation plans

6) Additional requirements: The VE team should have CADD capability to develop, analyze, and propose modifications within the VE time schedule.

For all VE Studies, 'Read-Only' CADD files in Micro-Station format will be made available to the VE team.

2.5 VEP Processes

The VEP Process was established to give guidance and to ensure the goals of the program are met. This process can be applied to projects multiple times throughout the planning and design process and preferably prior to major decision making milestones. While the program focuses on projects that meet FHWA requirements for a study, this process can be applied to any project as a way to seek a better more cost efficient method.

VEP Personnel diligently strives to develop and update a process that creates an atmosphere of excellence in an effort to provide a more effective delivery, and streamlines the details to allow more projects to be evaluated by a VE Study Team. The remaining portion of this section details the concerted efforts and steps used to develop a successful Value Engineering Program.

Project Selection:

VEP continuously coordinates with the Unit Heads, Assistant Unit Heads, and Project Engineers in Roadway Design, Project Development and Environmental Analysis, and Design-Build to select projects, coordinate the studies and review the recommendations. The project selection is based not only on FHWA requirements but also based on management recommendations, projects with budgetary constraints, projects with significant changes to scope, and project recommendations from VE Study Teams. This communication plays a critical role in selecting the projects for a VE Study and allows VEP to keep a check of any projects which were not initially selected for a VE Study.

To initiate these discussions for the upcoming FFY, the VEP develops an annual VE Study list each August. The list is compiled based on the requirements found in the CFR 23 part 627 for Value Engineering.

> Code of Federal Regulations, Title 23, Chapter 1, Part 627 requires that all projects on the Federal-aid system with an estimated total cost of $50 million or more shall have a value engineering analysis performed during the development of the project. Bridge projects with an estimated total cost of $40 million or more shall have a value engineering analysis performed. The total estimated cost shall include all costs associated with the project, including but not limited to design, right-of-way, construction, and administrative costs.

Other projects may be added to the initial list if the project has been recommended by management within the last year but no VE Study has been

conducted. It is a goal of the VEP to conduct VE Studies prior to the Right-of-Way Date when at all possible.

The VEP Engineer also uses the 5 Year Work Plan Let List provided to the Department monthly to develop a list of additional projects to consider for Value Engineering Studies. This list is more extensive than the Federal requirements. While all projects meeting the federal regulations regarding VE studies will be studied, the Department recognizes the potential benefit from conducting VE studies on projects that do not meet these regulations. Therefore, a list of all projects (both federally-assisted and state-funded) with estimated project costs of $10,000,000 or more is developed in order for these projects to be considered and potentially added to the list of VE Study candidates.

Information included on the initial list typically includes: the TIP Number, the Let Date, the Division, the Project Engineer, the current cost estimate and the project description.

The State VMP Engineer and the VEP Engineer meet with designated Roadway Design, PDEA, and DB staff to review the initial project list and discuss any other potential projects that should be included on the list. Additional input is also requested during a meeting with the upper management of the Planning and Design Branches.

Projects with issues that add complexity to the project design will be added to the list of potential VE studies. These complexities may include, but are not limited to: critical constraints, complex technical issues, expensive solutions, challenging or unusual circumstances, complicated functional requirements or projects experiencing scope creep.

The types of projects that usually provide the highest potential for value improvement are:

- Projects with alternate solutions that vary the scope and cost
- New alignment or by-pass sections
- Widening of existing highways for capacity improvements
- Major or unique structures
- Interchanges on multi-lane facilities
- Projects with extensive or expensive environmental or geotechnical requirements
- Difficult materials requirements or inferior material sources
- Major reconstruction of existing highways
- Projects with significant traffic disruption or requiring major traffic control
- Projects with multiple stages
- “Shelf projects” that have been reprogrammed

A project that is below the $10,000,000 threshold but that would benefit from a VE study may be submitted by the various NCDOT Business Units as a candidate project for a VE study. Recommendations are also requested from the VE Study Teams at the conclusion of each VE Study. This allows Department staff to participate in the selection of a project based on their experience with the VE Process and their current project workload.

Study Schedule

Once the State VMP Engineer and the VEP Engineer finalize the list of projects, tentative dates for the VE Studies are selected. The date selected is based on the Let Date ensuring the projects with the nearest Let Date are scheduled first. Otherwise, VE Study dates are scheduled approximately every 2-3 weeks taking into consideration the Board of Transportation Meeting dates and holidays.

Quarterly status updates (October, January, April and July) are sent to the Department managers to inform them of the anticipated dates for Value Engineering Studies. The update will also be posted on the VMP website. This status update project list is a fluid document that changes quarterly to keep the Department informed on the current status of a project and also to ensure the date of the VE Study coincides with stage in the procurement process that would result in viable recommendations for the VE Study. This quarterly update has provided an invaluable avenue for improved communication, coordination, and accountability for Value Engineering Studies.

Study Timing

As part of the ongoing coordination with Department Management, the VEP Engineer verifies that the selected project to be evaluated during a scheduled VE Study is at a point in the procurement process that an evaluation would be beneficial. This is most critical with the projects being reviewed during the planning stages. In FFY 2011, projects from the planning stages were added to the candidates VEP considers for VE Studies. This addition has proven to be a beneficial format to formally capture value engineering ideas already being discussed by PDEA. It also allows the recommendations to be incorporated into the early stages of design. With the additional projects from the planning stage, the VEP has identified four primary windows of opportunity for a VE Study to be conducted.

- **VE Study Window 1 – Planning Stage 1**
  The first opportunity for a VE Study is between the Scoping Meeting and Concurrence Point 1(CP 1). The VE Study will focus on such items as purpose and need, project limits, scope, functionality, constraints, red flags, and potentially costly impacts.

- **VE Study Window 2 – Planning Stage 2**
  The second opportunity for a VE Study is between Concurrence Point 1 (CP 1) and Concurrence Point 2 (CP 2). The VE Study will focus on functional designs, constraints, preliminary impacts, scope, project limits, potentially costly impacts, some initial constructability issues, and access issues.

- **VE Study Window 3 – Main VE Study**
  The Main VE study is scheduled after Concurrence Point 4A (CP4A), which deals with avoidance and minimization efforts and before Concurrence Point 4B (CP4B), which is a review of 30% complete hydraulic design plans.

- **VE Study Window 4 – Constructability Reviews**
  The final opportunity for a VE Study is between CP 4C and Finalizing the Permit.

A project may be studied at any or all of the four stages. However, the main VE Study conducted between CP 4A and CP 4B is required for all TIP projects on the VE Study List. More detailed information regarding the windows for a VE Study is detailed elsewhere in these guidelines.

Study Duration

The duration of the VE Study is based on the complexity of the individual project as well as which VE Study Window the project is categorized. Projects early in the planning process (i.e. VE Study Windows 1 and 2) may be allotted one-half day to a day for the VE Study duration. Larger projects in the design stage (i.e. VE Study Window 3) may be allotted up to two days for discussion.

VE Study Team Selection

VE studies incorporate the use of a multi-disciplined team of experts to provide a broad perspective of ideas that address complex engineering issues. VE Study Team participants are selected based on an individual's expertise and the challenges of the specific project being studied. VEP coordinates with each business unit in selecting a candidate that would most effectively participate in the VE Study.

In addition to the internal NCDOT personnel who participate in VE studies, Private Engineering Firms were also contracted to conduct VE Studies or to participate as part of an internal VE Study Team.

A goal of the VMP is to foster innovation by providing a forum for team members to work together and evaluate project elements in an environment conducive to value engineering principles.

The Department may utilize various options to staff VE study teams. These options include the use of a VE Study Team assigned to one project, a VE Study Team assigned to study multiple projects, and the use of VE Consultants to perform part or all of one or multiple VE studies. VE Consultants must be prequalified in VE prior to a task order being added to a current limited services agreement to perform a VE study.

The VE Study Team approach uses neutral facilitators for process management and coordination and utilizes VE Team Members from multiple technical Business Units who are unfamiliar with the project for project review and the development of recommendations. The VE Study Team will generally be comprised of 5 to 7 team members and a majority of the team members should have previous VE training and experience. Team members will be representative of the discipline areas most affected by the project or issue and should have diverse backgrounds relevant to the specific study. Local agencies, other state agencies, and community groups may also be invited to participate as team members or subject matter experts on a case by case basis depending on project issues. VE Consultants may also be used to augment the VE Study Team. Assignment of persons directly involved in the development of the project should be avoided.

Team members should have the appropriate expertise to address the major functional areas and critical high cost issues of the study, and must be committed to the time required for the study. It is preferred that team members be engineers with a minimum of five years of experience. For best results the team members should have received VE training prior to participation on a VE study.

Due to the fact that VE study recommendations form the basis for important project management decisions, it is preferable for the selected team members to have achieved Advanced or Journey levels in their specific area of knowledge. As an exception, a VE Study Team member may be selected to participate in a VE Study at the Contributing level in a mentored capacity or if they are Professional Engineers.

Expertise levels are defined as:

- **Advanced** – Sufficient experience to review and critique work developed by advanced level professionals within the specified discipline for a project of similar complexity as the project being studied

- **Journey** – Sufficient experience to perform advanced quality work within a given discipline independently for a project of similar complexity as the project being studied

- **Contributing** – Experienced in providing support level work within a discipline for a project of similar complexity as the project being studied

Logistics

In addition to the coordination involved in selecting the projects and the VE Study Teams, there are many details necessary to ensure a successful VE Study. A check list has been developed to ensure the logistical details are completed. The electronic copy of this check list is found in the Value Management Group Master Directory electronic files. An overview of the items on the list include are:

- The VEP Engineer will reserve the facilities to be used for the VE Study
- The VEP Engineer will assemble all current project data and cost estimate. The Business Units are to work closely with the VE Specialist to provide the data from their Unit in a logical order, including any value decisions that were recorded for the project outside of any VE Studies
- Set up electronic file for project. (See S:/ Drive master directory for folders)
- Complete Pre-Study and During Study documents, forms, letters, presentations, etc.

Conducting the VE Study

Prior to conducting a VE Study, preparation is needed to ensure the study is effective. One enhancement the VEP provides to participants prior to the VE Study is a Value Engineering Packet. This packet of information gives a general overview of the project but more importantly provides participants with the Value Engineering Process. While no preparation is required, the VE Study Packet allows participants to be aware of the project being discussed without knowing all of the details related to the project.

The VE Study process shall be conducted in accordance with the following six phases of the internationally recognized VE Job Plan:

(1) Information: The team gathers information about the present design and cost, then determines the needs, requirements, and constraints of the owners, users, and/or stakeholders, as well as the design criteria.

(2) Function Analysis: The team defines the project functions using measurable objectives consisting of an active verb and a noun. The team analyzes these functions to determine which need improvement, elimination, or combination. Tools used during this phase include: Random Function Identification, Function Analysis System Technique (FAST), Function Listing, and Value Index

(3) Creative: The team uses a variety of creative techniques, such as brainstorming, to generate alternative ideas to perform the project functions

(4) Evaluation: The team refines and combines ideas, develops functional alternatives, and evaluates by comparison. Appropriate tools of comparison

include advantage and disadvantage comparison and a rating of a 1, 0 or -1. These designations are used after a discussion of each idea. A rating of 1 is the decision by the team to carry the opportunity forward to development. If more discussion on the idea is needed, a 0 rating is given. An idea which will not be carried forward for development will receive a -1 rating. By the end of the evaluation step in the VE process, all ideas will have a 1 or -1 rating. The opportunities given a 1 rating are now identified as recommendations.

(5) Development: Based on the evaluation phase, the team begins to develop in detail the recommendations carried forward. During this phase it is essential to establish costs and backup documentation needed to individually convey the alternative solutions.

(6) Presentation: The final phase of the VE study in which the VE team presents to management the findings of the study in a written report. The VE Study Team will use the Recommendation Form to record all of the final recommendations for the project as provided by the VEP Engineer.

The VEP Engineer will compile the recommendations as part of a VE Study report to send to the appropriate Business Units. The Business Unit VE Coordinator will make a final determination to accept, modify, or reject a recommendation and forward the recommendation to the VEP Engineer. A written justification, based on sound engineering principles, must be supplied with all recommendations that are accepted or rejected. This phase may also include a verbal presentation.

The VM Engineer will record the study recommendations and the final decisions in the VMP Database.

Design-Build Projects

Effective October 1, 2012, the Moving Ahead for Progress in the 21st Century (MAP-21) federal legislation acknowledges that the Design Build process incorporates the value engineering process and a separate VE Study is not mandated. However, Value Management will continue reviewing the Industry Draft RFPs for the Transportation Program Management Unit on an as needed basis.

The State Value Management Engineer and VEP Engineer coordinate with the Director of the Transportation Program Management Unit and the Design-Build Project Engineer to determine VE Study opportunities.

VE Studies for DB Projects are typically pursued once the initial draft of the RFP has been printed. The VE Study Team reviews any preliminary plans and other project data but focuses on reviewing the RFP. During the VE Study, the team seeks ways to clarify the document in order to reduce risks which could reduce

the overall cost of the contract. The Team asks questions of the RFP which a DB may bring forward during the DB procurement process and provides suggestions for ways to address the questions. In addition, NCDOT includes an Alternative Technical Concept (ATC) provision in each DB contract. This provision allows the DB team to request exceptions to the RFP in order to reduce the cost of the design while still providing the expected functions of the project. Because the DB process is inherently Value Engineering itself, NCDOT is continuously seeking ways to utilize the internal VE Process to ensure the RFP does not preclude the DB from pursuing various options.

Unique Opportunity:

The VEP is also receptive to aiding Business Units with special requests to facilitate the Value Engineering process for any challenge the Unit is facing. As an example, in a previous FFY, Division 3 provided VEP a unique opportunity to review 8 individual projects. The recommendations and suggestions developed within the VE study were used by the Division Engineer and other managers as an effective tool to efficiently manage Division financial resources.

During FFY 2011 and 2012, VEP conducted two VE Studies for the Rail Division. These VE Studies extended across multiple days and focused on the Piedmont Improvement Program projects and the Charlotte Rail Improvement Safety Program. Both of these programs are being funded by ARRA funding. Recommendations developed during the VE Studies have provided cost savings, improved project delivery, and expanded the VEP efforts into multiple modes of transportation.

2.6 Outputs and Reports

VE Study Reports

All VE studies will be conducted according to AASHTO and FHWA guidelines. A memorandum from FHWA dated May 25, 2010 with the subject line “Updated FHWA Value Engineering (VE) Policy” notes that the production of a formal written VE study report will include at a minimum the following:

- project information
- identification of the VE analysis team
- background and supporting documentation, such as information obtained from other analyses conducted on the project (e.g., environmental, safety, traffic operations, constructability)
- documentation of the stages of the VE Job Plan which would include documentation of the life-cycle costs that were analyzed
- summarization of the analysis conducted
- documentation of the proposed recommendations and approvals received at the time the report is finalized. (This shall also include related

information to support the State DOT's and FHWA's VE program monitoring and reporting.)
- the formal written report shall be retained for at least 3 years after the completion of the project (as specified in 49 CFR 18.42)

and for bridge projects, the VE Analyses must also:

- include bridge substructure and superstructure requirements based on construction material
- be evaluated based on:
    - an engineering and economic bases, taking into consideration acceptable designs for bridges
    - analysis of life-cycle costs and duration of project construction

This report is sent to DOT management for consideration. After reviewing the recommendations, the VEP is given the final disposition for each of the recommendations. When approved, recommendations are incorporated into the design. The VE Study report is provided to management within 10 days from the end of the VE Study. Management then returns the conceptual response and often the final disposition of the recommendations within four weeks of the report date. This process has streamlined the ability to submit recommendations, receive responses and track the projects for annual reporting. The quarterly status reports described elsewhere in this report are an effective tool to ensure the reports are on track.

The participating VE Study Team also receives a copy of the report as well as a copy of the management response. This demonstrates to the VE Study Team that the time and effort provided as part of the VE Study is part of a larger process that is making a difference in the decisions made within the design of a project.

VE Annual Report

The State Value Management Engineer and the VEP Engineer will be responsible for preparing the annual VE report and providing it to FHWA upon request at the end of each FFY. This report provides an overview and summary of the VEP during the previous FFY. Information regarding NC VEP Policy, coordination, guidelines, training, goals & measures, evaluations, reporting, and cost savings are some of the required elements of the report. VEP sets annual goals to exceed the expectations of FHWA.

Other Outputs

In addition, the VMP Engineer will be responsible for monitoring program compliance with NCDOT policies, procedures, and standards, as well as Federal

VE requirements. Specific areas to be monitored and reported at various time throughout the year will include but are not limited to the following:

- Department VE Studies List
- Annual VE Studies Work Plan
- Department VMP accomplishments
- Documentation of VE activities
- Economic analysis methods used in cost/benefit determinations for project decisions
- Compliance with the VMP Guidelines
- Revisions to the VMP Guidelines on an annual basis

Report Clearinghouse

The VMP Database is a collection of the data from all VE reports and aids the VEP staff in tracking and monitoring the status of each project. The VEP Engineer is responsible for coordinating, inputting and updating the project data. In addition, the VEP Engineer is also responsible for reporting, analyzing, documenting results and trends, making recommendations, and disseminating the results throughout the Department. Additional reports may be requested throughout the year. The database provides the VEP Engineer access to various types of VE Study information related to the VEP.

VE Recognition Program

The VEP values the contributions of the VE Study participants and other VEP supporters. Department leadership strives to fairly and equitably recognize and reward individuals and teams for excellence in service to the overall mission of the Department. The VEP supports the Department's recognition efforts and has established a VEP Recognition Program. This Program acknowledges employee contributions and achievements that enhance organizational performance, support organizational goals and objectives, and improve project value and quality. These awards are given as Value Management determines merit and may not be given on an annual basis.

- **Individual Recognition Awards**

  Secretary's Value Engineering Champion Award

  This award is designed to honor those managers and supervisors who, as leaders, have significantly contributed to organizational goals and objectives by identifying and achieving cost savings and visibly supporting the objectives of Value Engineering within the Department.

  Nominations for this award are based on meritorious contributions of unusual value to the Department in meeting its strategic goals through

support of the VMP. Examples of such contributions include but are not limited to:

- accomplishment of assigned role in such an outstanding manner as to be clearly exceptional among all those who have performed similar duties
- development and improvement of methods and procedures which have accomplished extraordinary results for the Department
- exceptionally outstanding leadership which resulted in the highly successful accomplishment of the Department's VE goals
- leadership, accomplishments, or actions that make a significant contribution to building a continuously improving / learning organization
- demonstrated an outstanding ability to manage outcomes by creating an organizational environment that allows every employee to reach his or her full potential and fully contribute to the DOT's mission
- nurtured and supported the development of employees to ensure a future complement of value engineering leaders
- improved customer satisfaction with transportation systems and Departmental services

Outstanding Achievement Award

This award is designed to honor those team members who have successfully participated on VE studies. The recognition items are presented for team members who fully participate in the most studies. Typically one of these awards will be given, but final determination is based on the decision of the State Value Management Engineer and the VEP Engineer.

- **Team Recognition Awards**

Secretary's Most Outstanding VE Achievement Award

This award is presented to VE Study Teams to recognize meritorious contributions of high value to the Department, and whose exceptional performance results in the improvement, reinvention, or reengineering of practices, products, and/or operations.

Nominations for this award must specifically address all of the elements included in each of the following categories:

Teamwork – Describe how the members of the team/group worked together effectively either within the Department, across Business Units, or with external stakeholders to coordinate and carry out the study to achieve objectives. At least one example of an activity that displays cooperation, coordination, or group process skills is required.

Problem Solving – Describe how the members of the group or team effectively use problem solving methods, techniques, and tools (as appropriate) to achieve desired objectives and/or integrate objectives, procedures, etc., of participating Business Units.

Creative and Innovative Techniques – Describe any innovative techniques used by the team to develop recommendations for improvements. The work of the team should reflect an awareness of evolving methods, procedures, and technologies. Where appropriate, highlight techniques that promote cooperation and collaboration among the Business Units.

Results – Describe results accomplished by the team such as objectives met, solutions found, and process changed or improved.

In addition to the awards described above, Business Units are expected to support the VMP by acknowledging the contributions and achievements of employees. Supervisors and managers are expected to use various methods of recognition to encourage employee support of the VMP.

VE Training

The Value Management Group will conduct Value Engineering Workshops periodically for the development and training of NCDOT staff. Participants will be selected in coordination with the various Business Units to ensure the workshop includes a diverse group of disciples and experience levels.

Each VE Workshop will be a minimum of 3 days. During this time, participants will:

- Learn the fundamental concepts of value engineering
- Learn the steps of the value engineering process
- Apply the concepts to an assigned project
- Present their recommendations to other participants
- Learn how the different groups within Value Management can be used

2.7 Program Evaluation

The processes and procedures of the VEP are evaluated on an ongoing basis throughout the year. A primary goal of the VEP is to consistently evaluate all facets of the program to ensure that it is serving the Department and, ultimately the Citizens of North Carolina, in the most efficient and effective manner possible.

Revisions to the program will be reflected in the Value Management Program Guidelines that are updated on an annual basis. This re-evaluation process will

provide the Department an opportunity to modify this program as necessary to incorporate any changes that will enable the program to operate in a more effective manner.

3.0 Value Engineering Change Proposal (VECP) Program

3.1 Purpose

According to American Association of State Highway and Transportation Officials (AASHTO), Value Engineering (VE) principles can be applied during the construction of the project through VECPs. A VECP program encourages contractors to develop construction VEC proposals and allows the state to benefit from a contractor's design and construction ingenuity, experience, and ability to work with new techniques. Some elements of a successful, ongoing VECP program are:

- Processing of proposals must be kept simple and done so as not to delay the contractor's construction schedule.
- Cost savings are shared between the contractor and the implementing agency.
- Change proposals become the property of the state and the concept may be used on future projects.
- Change proposals should not compromise any essential design criteria or preliminary engineering commitments.
- Change proposals cannot be the basis for a contract claim. With good justification, the implementing agency has the option to reject contractor's proposals. .
- It is essential that all VE team recommendations and contractor proposals be fairly reviewed and expeditiously evaluated for implementation.

As part of every NCDOT construction contract, it is stated that the Contractor shall complete the contract in accordance with the NCDOT 2012 *Standard Specifications for Roads and Structures.* Section 104-12 of these specifications contains the Department's policy on VEPs. It is the NCDOT's policy to provide all Contractor's that are awarded projects in our State an incentive to pursue cost reduction proposals with the Department as it is in everyone's best interest that tax payer dollars are spent as efficiently as possible.

3.2 Goals

The goal of the VECP Program is to ensure the fair and expeditious review of all VECPs for either acceptance or rejection on NCDOT projects.

3.3 Definitions

See the Acronyms and Definitions Section of the VMP Guidelines.

3.4 Roles and Responsibilities

See Section 3.5 below for current roles and responsibilities as they apply to VECP evaluation process.

3.5 VECP Processes

1. A copy of the Final Value Engineering Change Proposal (VECP) shall be submitted by the Contractor to both the Resident Engineer's (RE) office and to Jessica Kuse, PE, CPM, State Value Management Engineer.
2. Value Management will facilitate the evaluation of the VECP by coordinating with RE, Construction Unit, and the appropriate NCDOT engineering disciplines (roadway, structures, geotech, hydro, traffic control, signals, etc.) to determine if the VECP is recommended for approval.
3. Based on the results of this evaluation, a memorandum from Value Management will be sent to the State Construction Engineer and the Resident Engineer (RE) with a recommendation either to approve or reject the VECP, a summary of the evaluation results, and the recommended total net savings of the VECP.
4. The Construction Unit makes the final recommendation to approve or reject the VECP and notifies the RE and Value Management.
5. The RE notifies the contractor of the decision.
6. If the VECP is accepted, the necessary changes will be accepted by Supplemental Agreement. Included as a part of the Supplemental Agreement will be requirements for price adjustments giving the Contractor 50 percent of the net savings to the project resulting from the VECP modifications.
7. The State Value Management Engineer will ensure that the pertinent information from the VECP is documented in the VMP Database and, in coordination with the Construction Unit, will pursue incorporating engineering practices from accepted VECPs into the appropriate NCDOT policies and standards.

The State Value Management Engineer, in coordination with Department Leadership, has set a goal of facilitating the VECP process and providing recommendations to the Construction Unit within 15 business days after receiving the final VEP from the Contractor.

3.6 Outputs and Reports

See Section 3.5 above for outputs and reports as they apply to VECP Program.

3.7 Program Evaluation

The processes and procedures of the VECP Program are evaluated on an ongoing basis throughout the year. A primary goal of the VECP Program is to consistently evaluate all facets of the program to ensure that it is serving the Department and, ultimately the Citizens of North Carolina, in the most efficient and effective manner possible.

Revisions to the program will be reflected in the Value Management Program Guidelines that are updated on an annual basis. This re-evaluation process will provide the Department an opportunity to modify this program as necessary to incorporate any changes that will enable the program to operate in a more effective manner.

4.0 Risk Assessment Program (RAP)

4.1 Purpose

Risk Assessments (RA) have been performed as part of NCDOT day-to-day business for years; however, the NCDOT Value Management group is striving to formalize internal procedures to incorporate the RA process, when applicable, into the existing VE program or to conduct a RA as a stand alone process. In a recent Rapid Renewal Risk Management Training Workshop prepared for the Strategic Highway Research Program, Golder Associates noted that:

> *"Risk Management is the formal, structured and imperative process of anticipating and planning for potential problems ("risks"), as well as opportunities ("negative risks"), before they occur, to better understand and control project outcomes (e.g., cost and schedule). It also needs to be adequately accurate and defensible, as well as flexible and efficient, and compatible with the State Highway Agency. The process is applicable to all kinds of projects (including programs or projects)."*

Risk Management provides an opportunity to identify and develop management strategies to minimize the risk and optimize the desirable performance.

4.2 Goals

The overall goal of the RAP is to perform risk assessments on various projects for the Department to determine if there are any potential recommendations that can be made to either eliminate or mitigate those risks that are identified.

4.3 Definitions

See the Acronyms and Definitions Section of the VMP Guidelines.

4.4 Roles and Responsibilities

See Section 4.5 below for current roles and responsibilities as they apply to RAP.

4.5 RAP Processes

Risk Assessments will include the following steps:

1. Assess potential project risks
2. Communicate with appropriate units within the department to determine whether a Risk Assessment is needed or would be beneficial
3. If warranted, perform Risk Assessment independently or in conjuction with a Value Engineering Study

4. Document Assessment in a report format as described in section 4.6

4.6 Outputs and Reports

The Risk Assessments as performed by Value Management will be documented in a report format and often will be included as part of a Value Engineering Study Report. Challenges identified as part of the Risk Assessment will often be utilized in Value Engineering Studies to determine if recommendations can be generated to either eliminate or mitigate the risk.

4.7 Program Evaluation

The processes and procedures of the RAP are evaluated on an ongoing basis throughout the year. A primary goal of the RAP is to consistently evaluate all facets of the program to ensure that it is serving the Department and, ultimately the Citizens of North Carolina, in the most efficient and effective manner possible.

Revisions to the program will be reflected in the Value Management Program Guidelines that are updated on an annual basis. This re-evaluation process will provide the Department an opportunity to modify this program as necessary to incorporate any changes that will enable the program to operate in a more effective manner.

5.0 Product Evaluation Program (PEP)

5.1 Purpose

The purpose of the Product Evaluation Program is to provide a comprehensive evaluation of products to make The North Carolina Department of Transportation's (NCDOT) network safer, move people and goods more efficiently, and make the infrastructure last longer. Another purpose of the program is to determine if evaluated products are viable for use in North Carolina's infrastructure by monitoring installations and providing documentation on their durability and performance.

Products evaluated are typically those that have not been previously evaluated by NCDOT and where a NCDOT standard specification does not exist, or products that have a NCDOT standard specification but require evaluation prior to approval.

Refer all product inquiries to the Product Evaluation Program Engineer:

- Product Evaluation Program Desk: (919) 508-1860
- Product Evaluation Program Email: productevaluation@ncdot.gov
- Product Evaluation Program Website: https://connect.ncdot.gov/resources/Products/Pages/default.aspx

5.2 Goals

The Department receives numerous requests for evaluation and approval of products for use on NCDOT infrastructure transportation projects. The primary goal of the PEP is to enable the NCDOT to provide objective, impartial, and consistent evaluation of products for use in the construction, maintenance, and operation of the State's transportation system. Only products that are fully developed, commercially available, and serve a useful function within NCDOT operations will be evaluated.

5.3 Definitions

Approved Product List (APL) – a list of products that have been evaluated and approved by NCDOT for potential use on NCDOT projects.

Oversight Committee – A group comprised of NCDOT leadership personnel to make final decisions on product appeals and resolve non-consensus TWG issues as necessary.

Product – A fully developed, commercially available item for use in the construction, maintenance, and/or operation of the State's transportation system.

Product Evaluation Program (PEP) Engineer – The one-person central contact managing the Product Evaluation Program.

Status Code – The standing assigned to a product as it moves through the decision process. The four status codes are as follows:

> **"Under Evaluation"**: Product is undergoing evaluation consisting of, but not limited to, technical evaluation, laboratory review, calculation verification, and/or field testing.
>
> **"Approved"**: Product has been evaluated and is approved for use.
>
> **"Approved for Provisional Use"** (APU): Product has been evaluated and is approved for use based on site specific and/or project specific conditions being met. (NOTE: Work Zone Traffic Control products are given APU status when they are to be used in the field prior to being given a full "Approved" status. The vendor must contact WZTC prior to using it on a NCDOT project.)
>
> **"Unapproved"**: Product has been evaluated and currently does not meet either the specifications or the needs of the Department. Additionally, a product status may be changed to "Unapproved" if any of the following conditions occur: (Note: this list is not all inclusive)
>
> - Unsatisfactory performance
> - Product failure resulting in serious injury or death
> - Unsafe product or installation
> - Warranty not honored
> - Insolvency
> - False information submitted on any application, statement, certification, reports or records
> - Debarred by Federal or State Agency
> - Failure to furnish a non-collusion affidavit upon request
> - Evidence of collusion among vendors
> - Failure to meet the requirements of an existing guarantee

Technical Work Group (TWG) – A group comprised of NCDOT technical experts (typically 2-5 members) who review submitted products and determine the status of the product. The TWG is composed of representatives from individual NCDOT units that have an established evaluation process and responsibility over specific product categories. The leader of this group is referred to as the TWG Chair.

Vendor – The entity (typically the product manufacturer or distributor) that submits an application for product evaluation.

For additional definitions, see the Acronyms and Definitions Section of the VMP Guidelines.

5.4 Roles and Responsibilities

Several entities comprise the Product Evaluation Program. They are the Vendor, Product Evaluation Program Engineer, Technical Work Groups, various NCDOT Units managing their respective Qualified Products List (QPL), and the Oversight Committee.

Vendor:

Role: Submit product for evaluation

Responsibilities:

- Submit a complete application and supporting documentation electronically using current PEP Application
- Respond in a prompt manner to PEP Engineer and/or TWG member requests for additional information
- As necessary, per the request of NCDOT, provide installation assistance of products for evaluation purposes.
- Submit recertification of approved product on an annual basis
- Initiate appeals process, if applicable

Product Evaluation Program Engineer:

Role: Manage and monitor the Product Evaluation Program. The Department has adopted a one-person central contact for all products to be evaluated through the Product Evaluation Program.

Responsibilities:

- Communicate product evaluation process information to the vendor
- Receive product application from vendor
- Review application for completeness
- Follow up with vendor if application is incomplete
- Determine if product category should be evaluated for possible inclusion on the main APL (If not, transfer product application to other appropriate Unit)
- Determine appropriate TWG to evaluate product for possible inclusion on main APL
- As necessary, identify team members for ad-hoc TWGs
- Follow up with TWG on product evaluation progress

- Follow up with TWG on products being monitored in the field
- Notify vendor of product status
- Maintain current product status in APL database
- Oversee distribution of annual recertification notices, and update product status in APL database based on response of recertification notice
- Receive, review and process appeals from vendor
- Elevate non-consensus status decisions to Oversight Committee
- Generate and distribute PEP quarterly results

Technical Work Groups:

The Department has adopted a membership structure that consists of product category-specific Technical Work Groups. These groups are empowered to define product evaluation and determine the status of products.

Role: Evaluate and assess products within their area of technical expertise.

Responsibilities:

- Identify additional members for product evaluation, as needed
- Determine if NCDOT has a need for the product and if an existing NCDOT standard specification applies
- Communicate with vendors and schedule meeting(s), as necessary to complete product evaluation
- Develop an evaluation and monitoring process necessary to determine the product status
- Conduct preliminary investigation regarding other experiences with product (including but not limited to other states, municipalities, contractors, FHWA, NCHRP, etc.)
- Coordinate with vendor in selecting field test site, if necessary to complete evaluation
- Oversee installation and monitor product performance, if necessary to complete evaluation
- Communicate product status decision to PEP Engineer

Note: Individual TWG members may change as necessary, but the established Unit representation will remain.

Other Various NCDOT Units:

Currently, as part of NCDOT's overarching Product Evaluation Program, there are several NCDOT Units that manage their own respective approved or qualified products lists. These Units include, but are not limited to, Materials and Tests, Signals Management, Geotechnical, and Signing and Delineation. For more information and links to these lists, refer to the PEP website.

Oversight Committee:

Role: The Department has adopted the use of an Oversight Committee to make final decisions on product appeals and resolve non-consensus TWG issues as necessary.

Responsibilities:

- Make final decisions on product appeals
- Resolve non-consensus TWG issues
- Recommend program improvements

The current Oversight Committee membership structure is:

Name	Position	Unit
Victor Barbour	Director	Technical Services
Kevin Lacy	State Traffic Engineer	Mobility and Safety
Deborah Barbour	Director	Preconstruction
Edward Parker*	Assistant Division Administrator*	FHWA*

*Utilized on an as needed basis

5.5 PEP Processes

Products submitted to NCDOT for evaluation must meet the following criteria:

- The vendor must utilize the most recent PEP Application and submit electronically
- The vendor must identify the proposed use of the product
- The product must be directly related to the transportation system
- The product must be fully developed, marketable, and commercially available

Applications:

The vendor must complete the Product Evaluation Program Application form, including all required fields, and include any supporting documentation. If an application is incomplete, the vendor will be notified in writing by the PEP Engineer to provide missing information within 30 days of notification. If the submittal package is still incomplete after 30 days, the product will not be considered for any further review. The vendor must submit a new PEP Application submittal to be considered for future evaluation.

Samples:

Product samples should not be submitted with the application. NCDOT may request product samples later in the process. If requested, the vendor will have 30 days to submit a product sample. Should the vendor fail to submit the product sample within 30 days, the product will not be considered for further review. The vendor must submit a new PEP Application submittal to be considered for future evaluation.

The following is a general description of the PEP Process

1. Receipt and Distribution of Product Application

- Upon receipt of a product application, the PEP Engineer determines if the product should be evaluated for possible inclusion on the main APL. If not, it is transferred to the appropriate Unit to evaluate for possible inclusion on their own respective approved or qualified products lists and they notify the vendor of the decision
- If the product will be evaluated for possible inclusion on the main APL, the PEP Engineer will acknowledge receipt of the application to the vendor in writing and assign an identification number and status code designation of "Under Evaluation" in APL database
- The PEP Engineer will process the application and forward to the appropriate TWG for evaluation

2. Evaluation Process

- TWG determines if product meets NCDOT Specifications
- If product meets NCDOT Specifications, TWG performs evaluation to determine if the product is "Unapproved", "Approved", or "Approved for Provisional Use"
- If product does not meet NCDOT Specifications, TWG determines if the product is needed
- If TWG determines that the product is needed, TWG performs evaluation to determine if the product is "Unapproved", "Approved", or "Approved for Provisional Use"
- If TWG determines the product is not needed, the product is "Unapproved"
- If TWG requests additional information from the vendor, the vendor will have 30 days to comply with the request. If the vendor does not respond within 30 days, the product will not be considered for any further review and the vendor must submit a new PEP Application submittal to be considered for future evaluation. If the vendor requests additional time to submit the requested information, it will be at the discretion of the TWG to grant additional time
- If the TWG determines the product needs to be field tested as part of the evaluation process, the product status will remain "Under Evaluation" for

the duration of the field testing. Subsequent performance feedback will be evaluated to determine final product status. While the Department may locate field test sites on occasion, generally it is the vendor's responsibility to locate a suitable field test site and obtain the Department's approval of this site. PEP Engineer will communicate the specific requirements of field testing to the vendor on a per product/project basis. PEP Engineer will track products being field tested.

- TWG notifies PEP Engineer of decision on product status
- PEP Engineer updates product status in APL database
- Vendor is notified in writing of product status

3. Appeals Process

- If vendor does not agree with the determined product status, the vendor may elect to appeal the product status. The vendor must appeal in writing to the PEP Engineer within 30 days of product status notification and the appeal must include new or additional product information
- PEP Engineer determines if the appeal documentation is complete
- If appeal documentation is complete and contains pertinent additional information, the PEP Engineer will forward appeal package to TWG for re-evaluation. (If appeal documentation is not complete or does not contain pertinent additional information, the PEP Engineer notifies vendor that the original product status stands.)
- While maintaining the original product status, the TWG performs a re-evaluation to determine if the product status should be changed.
- TWG notifies PEP Engineer of decision on product status
- If product status has changed, PEP Engineer updates product status in APL database
- PEP Engineer notifies vendor in writing of the TWG's decision of the product status
- If vendor does not agree with the re-evaluated product status, the vendor may elect to appeal the product status for a second and final time. The vendor must appeal to the PEP Engineer electronically within 30 days of product status notification
- PEP Engineer submits all product evaluation documentation to Oversight Committee for final decision on product status
- Oversight Committee notifies PEP Engineer of final product status decision.
- PEP Engineer notifies vendor in writing of the Oversight Committee's final decision of the product status
- Oversight Committee decisions are final and no further appeals will be considered

During the evaluation process, the TWG may request a meeting with the vendor to further discuss the product. Should the vendor fail to responds to this meeting request within 30 days, the product will not be considered for further review. The

vendor must submit a new PEP Application submittal to be considered for future evaluation.

If the vendor requests to meet with the Department, the PEP Engineer will relay this to the TWG and it will be up to the discretion of the Department if a meeting is warranted.

Vendors may not “drop by” for unannounced, unscheduled visits with the PEP Engineer. A meeting must be scheduled and approved in advance.

5.6 Outputs and Reports

The PEP provides a central point of contact for Vendors to pursue possible incorporation of their products by the NCDOT. There are numerous communications, notifications, and reports that are generated through the PEP in regards to maintaining the Approved Products List and the product evaluation process. Reference Section 5.5 above for specifics regarding the outputs and reports as they apply to the PEP.

5.7 Program Evaluation

The processes and procedures of the PEP are evaluated on an ongoing basis throughout the year. A primary goal of the PEP is to consistently evaluate all facets of the program to ensure that it is serving the Department and, ultimately the Citizens of North Carolina, in the most efficient and effective manner possible.

Revisions to the program will be reflected in the Value Management Program Guidelines that are updated on an annual basis. This re-evaluation process will provide the Department an opportunity to modify this program as necessary to incorporate any changes that will enable the program to operate in a more effective manner.

The PEP conducts an annual “State of the PEP” meeting with all the Technical Work Groups to evaluate how the program is operating and to determine if there are any process changes that need to be incorporated.

5.8 Recertification

The Recertification Process will occur annually to ensure the Department’s main APL is kept up to date with current product and contact information. All vendors with products with an “Approved” or “Approved for Provisional Use” status must recertify their product on an annual basis by the 31st of January. If a recertification is not received by January 31st, the PEP Engineer will change the product status to VOID and it will no longer be listed on NCDOT’s main APL.

Recertification Notices with detailed requirements will be sent out in December of each year via e-mail. The notice will instruct the vendor to visit the PEP webpage and download the Recertification Form. The Form, similar to the Application, should be saved and e-mailed to the service account. Vendors may choose to include the latest product literature for the Department to keep on file.

The Recertification Process ensures the information is updated yearly. However, if at any time, contact information has changed, the vendor must inform the PEP Engineer. Additionally, if the composition of the product changes, notify the PEP Engineer in as soon as practicable, stating the specific changes and the reason for the changes. Based on the submitted information, the product may be re-evaluated.

5.9 File Retention

The Product Evaluation Program continues to evolve into a paperless process. In 2012, purging of the hard copy files began. Any “Unapproved” or “VOID” product with a product ID assigned prior to the year 2000, was completely purged. This ensures that any product resubmitted for possible inclusion on the APL will include the most up to date information. All other files were purged accordingly; keeping only one copy of pertinent information (i.e. the original application, latest testing data, product status notification, etc.) Upon completion, all remaining hard copy files will be sent out to be scanned in order to keep electronically. The hard copy files will then be recycled.

The PEP does not accept any hard copy applications or information. All information is stored electronically.

The State of North Carolina’s records retention policy, as well as the NCDOT Value Management Unit’s records retention policy will be observed.

5.10 Internal NCDOT Inventions

The PEP is currently coordinating with various Departmental staff to establish a review process to evaluate inventions developed by NCDOT staff for possible use. It is anticipated that the utilization of these various inventions will be for NCDOT use only and will not be published on any Approved Products List.

5.11 Program Disclaimer

Acceptance of a product for evaluation by the NCDOT is in no way a commitment to purchase, recommend, or specify the product reviewed, regardless of its performance. The vendor shall be responsible for all liabilities and injuries caused by any defect in the design, manufacturing, and/or labeling of their products. The vendor is responsible for keeping NCDOT informed of any changes in the product composition or company structure and contact

information. Any changes without proper notification may result in changing the product status to “Unapproved.”

6.0 Resource Conservation Program

6.1 Purpose

The purpose of the Resource Conservation Program is to promote and manage the use of recycled and solid waste products and materials throughout the Statewide system of transportation projects per the requirements of NC General Statute (G.S.) 136-28.8. See below for a copy of G.S. 136-28.8.

§ 136-28.8. Use of recycled materials in construction:

(a) It is the intent of the General Assembly that the Department of Transportation continue to expand its use of recycled materials in its construction and maintenance programs.

(b) The General Assembly declares it to be in the public interest to find alternative ways to use certain recycled materials that currently are part of the solid waste stream and that contribute to problems of declining space in landfills. The Department shall, consistent with economic feasibility and applicable engineering and environmental quality standards, use:

(1) Rubber from tires in road pavements, subbase materials, or other appropriate applications.

(2) Recycled materials for guard rail posts, right-of-way fence posts, and sign supports.

(3) Recycling technology, including, but not limited to, hot in-place recycling, in road and highway maintenance.

(c) As a part of its scheduled projects, the Department shall conduct additional research, which may include demonstration projects, on the use of recycled materials in construction and maintenance.

(d) The Department shall review and revise existing bid procedures and specifications to eliminate any procedures and specifications that explicitly discriminate against recycled materials in construction and maintenance, except where the procedures and specifications are necessary to protect the health, safety, and welfare of the people of this State.

(e) The Department shall review and revise its bid procedures and specifications on a continuing basis to encourage the use of recycled materials in construction and maintenance and shall, to the extent economically practicable, require the use of recycled materials.

(f) All agencies shall cooperate with the Department in carrying out the provisions of this section.

(g) On or before October 1 of each year, the Department shall report to the Division of Environmental Assistance and Outreach of the Department of Environment and Natural Resources as to the amounts and types of recycled materials that were specified or used in contracts that were entered into during the previous fiscal year. On or before December 1 of each year, the Division of Environmental Assistance and Outreach shall prepare a summary of this report and submit the summary to the Joint Legislative Commission on Governmental Operations and the Joint Legislative Transportation Oversight Committee. The summary of this report shall also be included in the report required by G.S. 130A-309.06(c).

(h) The Department, in consultation with the Department of Environment and Natural Resources, shall determine minimum content standards for recycled materials.

(i) This section is broadly applicable to all procurements by the Department if the quality of the product is consistent with the requirements of the bid specifications.

(j) The Department may adopt rules to implement this section. (1989, c. 784, s. 6; 1993, c. 256, s. 3; 1995 (Reg. Sess., 1996), c. 743, s. 9; 1997-443, s. 11A.119(a); 1999-237, s. 27.4; 2001-452, s. 3.6; 2010-31, s. 13.1(e).

6.2 Goals

The goal of the Resource Conservation Program is to meet the requirements of G.S. 136-28.8 through the research, investigation, scoping and identification of highway construction resource conservation opportunities.

6.3 Definitions

See the Acronyms and Definitions Section of the VMP Guidelines.

6.4 Roles and Responsibilities

The use of recycled products on NCDOT projects can be initiated by various Departmental staff including the State Value Management Engineer, Resource Conservation Program Engineer, Recycled Products Taskforce, State Roadway Design Engineer (Design-Bid-Build Projects), Transportation Program Management Director (Design-Build Projects), Contractors, and Division Engineers.

Resource Conservation Program Engineer:

Role: Manage and monitor the Resource Conservation Program and identify opportunities where recycled products can be used.

Responsibilities:

- Provide liaison to the Recycled Products Taskforce.
- Review new projects to determine where recycled products may be used.
- Research and evaluate new and innovative ways to incorporate recycled products into NCDOT transportation projects.
- Serve as a resource to other operating units throughout NCDOT, other agencies, and the general public in advocating and promoting the use of recycled products.

Recycled Products Taskforce:

Role: To serve as a central point of contact for various agencies, municipalities, or industries to propose, evaluate and assess the use of new and innovative recycled products.

Note: Individual Taskforce members may change as necessary, but the established unit representation will remain as summarized above.

State Roadway Design Engineer:

Role: For traditional Design/Bid/Build projects lead in initiating, approving, and incorporating the use of recycled products and manage their use.

Responsibilities:

- Make final decisions on recycled products used
- Incorporate recycled product special provisions into bid documents
- Incorporate recycled product use into Project Commitments (‘Green Sheet’)
- Incorporate recycled product use as a % of total contract cost

Transportation Program Management Director:

Role: For Design-Build projects lead in initiating, approving, and incorporating the use of recycled products and manage their use.

Responsibilities:

- Make final decisions on recycled products used
- Incorporate recycled product use as a % of total contract cost
- Incorporate recycled products into Request for Proposals (RFP's)
- Incorporate recycled products into the contract as Alternate Bid(s)

Contractors (Post-Let):

Role: For Design-Bid-Build projects, after the contract has been awarded, the Contractor can choose to initiate the use of recycled products in accordance with Section 104-13 (January 2012) of the Standard Specifications for Roads and Structures.

Responsibilities:

- Submit statement to request modification of contract be made as a recycled products proposal
- Provide a description of differences between the existing contract requirements and the proposed modification and the comparative advantages and disadvantages of each
- Provide a complete drawing of the details covering the proposed modifications and supporting computations in the submittal
- Provide an itemized list of the contract requirements that would be modified along with a recommendation of how to make each modification.
- Provide a detailed estimate of the cost of performing the work under the proposed modification
- Provide a statement of the time by which approval of the proposal shall be issued by the NCDOT to maintain the completion date of the contract

If a new product is not on the Qualified Recycling Products List, the necessary changes will be effected by Supplemental Agreement.

Note: See paragraphs (A), (B), and (C) of the specification (Section 104-13) for further details and requirements.

The Department reserves the right to reject at its discretion any recycled products proposal and will not be liable to the Contractor for failure to accept or act upon any recycled products proposal submitted nor for any delays to the work

attributable to any third party claims, or fines that may be levied as a result of the Contractor's decision to use targeted recycled products.

Division Engineers:

Role: Division Engineers shall have the right to initiate, propose, and approve/deny the use of recycled products for any projects within their respective Division so long as the approval/denial is not unreasonably granted or withheld. In addition, the use of recycled products and/or materials that are incorporated as part of the respective Division's maintenance operations shall be used at the Division Engineer's discretion.

6.5 RCP Processes

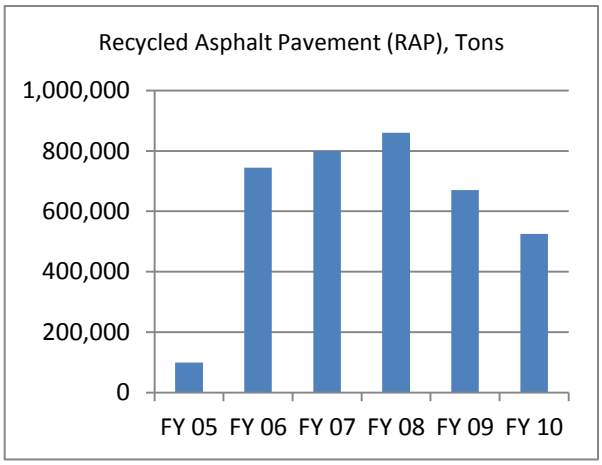
See Section 6.4 above for current practices as they apply to RCP process.

6.6 Outputs and Reports

Over the past twenty years, the NCDOT has utilized a variety of recycled products and solid waste materials including scrap tires, coal ash, recycled plastics, recycled glass, recycled asphalt, and recycled concrete on construction and maintenance projects in all 14 Highway Divisions across the state. The NCDOT Resource Conservation Program in the Value Management Unit has an extensive amount of data regarding efforts of the Department to reduce impacts to North Carolina landfills.

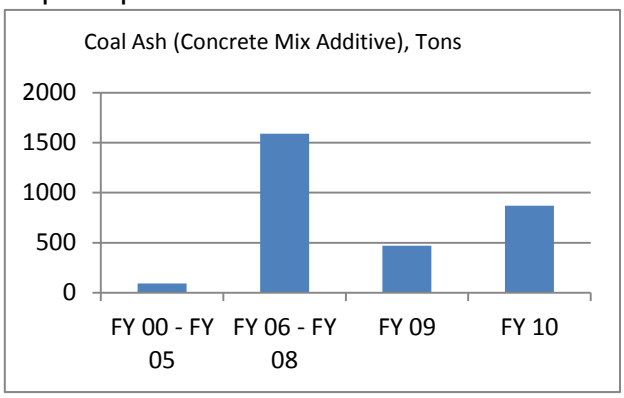
The RCP coordinates with all 14 Divisions, NCDENR, and other NCDOT Units to prepare the annual Reduce, Reuse, and Recycle Report that details the numerous efforts made by the Department in response to G.S. 136-28.8.

Below is an overview of three types of recycled products which the Department has used on a regular basis over the past five years. These recycled products are asphalt pavement, coal ash as a concrete mix additive, and plastic guardrail off-set blocks.

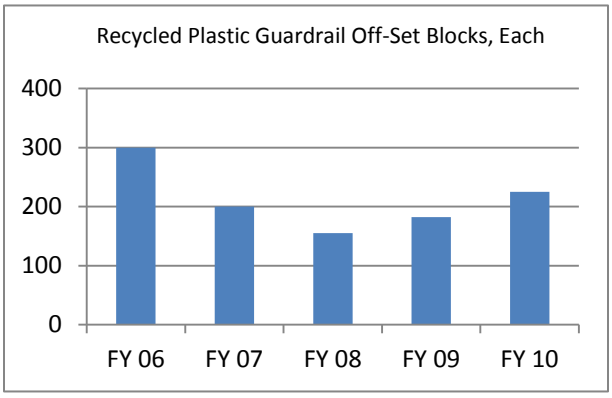


Reclaimed Asphalt Pavement (RAP): Reprocessed pavement materials containing asphalt and aggregates. These materials are generated when asphalt pavements are removed for reconstruction, resurfacing, or to obtain access to buried utilities. The most frequent application is the re-use of the reclaimed asphalt pavement to produce recycled hot-mix asphalt (HMA). NCDOT's

specifications allow that RAP may constitute up to 50% of the total material used in recycled asphalt mixtures although in most instances it ranges between 6% and 15% (with the balance of the mix being made up of 'virgin' or non-recycled materials). Most of the RAP used by NCDOT is for repair work and shoulder construction although there is good potential to use it on resurfacing contracts in the future. The rolling average use since 1989 has been over 225,000 tons per year and since 2005, it has been considerably higher. This trend is expected to continue given the potential for 'virgin' asphalt prices to continue to rise.



Coal Ash (Concrete Mix Additive): For many years it has been an industry-wide practice to use coal ash in concrete mixes as a substitute for Portland cement and to increase the plasticity and workability of the wet concrete. Because Portland cement is a commodity that is becoming scarcer and more costly, the use of coal ash in its place has been steadily increasing and since at least 1994, NCDOT has been specifying coal ash in concrete mixes. Although its use remained fairly consistent between 1994 and 2005, it peaked in 2006 through 2008. It is believed that between 2006 and 2008, the cost of concrete came down to a level comparable to asphalt and so many projects constructed in this time frame used concrete instead of asphalt. Although the use of concrete tailed-off considerably after 2008, its use has been steadily increasing over the past 2 years.



Recycled Plastic Guardrail Off-Set Blocks: Since at least 1997 (when tracking began), the NCDOT has utilized recycled plastic guardrail off-set blocks in place of wood blocks. This practice has been used on a consistent basis and between 2008 and 2010 its use has increased. This trend is expected to continue to the point that the use of recycled plastic guardrail off-set blocks may likely become standard practice and the use of wood blocks will become more limited. Using recycled plastic guardrail off-set blocks preserves a natural resource in wood and allows the use of certain post-consumer plastic waste materials that would otherwise be sent to landfills. In addition to the off-set blocks, NCDOT has also used recycled plastic fence posts and recycled plastic delineator posts on a number of projects and this use is expected to continue as well.

6.7 Program Evaluation

The processes and procedures of the RCP are evaluated on an ongoing basis throughout the year. A primary goal of the RCP is to consistently evaluate all facets of the program to ensure that it is serving the Department and, ultimately the Citizens of North Carolina, in the most efficient and effective manner possible.

Revisions to the program will be reflected in the Value Management Program Guidelines that are updated on an annual basis. This re-evaluation process will provide the Department an opportunity to modify this program as necessary to incorporate any changes that will enable the program to operate in a more effective manner.

7.0 Constructability Review Program (CRP)

7.1 Purpose

The primary purpose of the Constructability Review Program is to gather an experienced team of engineers and contractors in order to examine a project for potential constructability issues. The discussion and recommendations developed during the constructability review are primarily focused on improving the design and ensuring that the project is both biddable and buildable. The program provides design engineers and construction contractors the opportunity to view a project design from a different perspective and, through a site visit, gain better knowledge of the existing conditions and unique project challenges. Design engineers involved with constructability reviews will also have the opportunity to learn about common constructability issues and be able to revise the design of future projects accordingly. It should be noted that any project can be scheduled for a Constructability Review and, if it is deemed beneficial, reviews can be combined with Value Engineering Studies in order to obtain additional recommendations.

7.2 Goals

The primary goal of the Constructability Review Program is to reduce project risk by identifying and solving unique constructability issues before projects are let for construction. By examining these issues during a constructability review, benefits could include project design improvements, project cost savings, accelerated incorporation of new materials and construction techniques, improved constructability, reduced environmental impacts, reduced project schedules, reduced project risk, and improved transportation infrastructure operations. The CRP also aims to record the various recommendations developed during Constructability Reviews and track common trends. Using this analysis, the CRP and the VEP will relay any common recommendations or discussions to the design engineers to incorporate into future designs.

7.3 Definitions

See the Acronyms and Definitions Section of the VMP Guidelines.

7.4 Roles and Responsibilities

State Value Management Engineer

The State Value Management Engineer is responsible for the overall management of the CRP. The responsibilities for this position include selecting projects to be reviewed, combining Constructability Reviews with Value Engineering Studies if additional benefits can be obtained, coordinating with the Carolina's Chapter of the Associated General Contractors to have contractor

representation at CRs, facilitating reviews, and using performance measures to track the effectiveness of the CRP.

CRP Engineer

The CRP Engineer is responsible for managing the CRP on a day-to-day basis as well as over the long-term. This position is the main contact for anyone with questions regarding the CRP. The responsibilities for this position include program monitoring, maintaining the CRP procedures and guidelines, identifying and scheduling projects for review, assembling effective Constructability Review teams, coordinating with various Business Units to gather project information and identify constructability challenges, gathering and distributing CR materials, facilitating Constructability Reviews, publishing the CR reports, coordinating with the Business Units to review recommendations, and recording the recommendations in order to track common trends.

CRP Support Engineer

The CRP Support Engineer is responsible for assisting the CRP Engineer with day-to-day tasks and facilitation of the Constructability Reviews. The responsibilities of the CRP Support Engineer include gathering project background information, coordinating the meeting logistics, recording the recommendations, and assisting with the CR report. This position will also be responsible for any action items assign by either the State Value Management Engineer or the CRP Engineer.

Constructability Review Team (CR Team)

The Constructability Review Team is selected from NCDOT engineers and construction contractors that will analyze the materials provided by the CRP Engineers, discuss the project, and develop possible solutions to the issues identified during the Constructability Review. Members of the CR Team should have the appropriate level of expertise to address the constructability issues associated with any given project. At the conclusion of the constructability review, the CR Team will review all of the potential ideas and determine which will be presented to senior management as official recommendations.

Business Units

The Business Units will be responsible for analyzing the official recommendations developed during the Constructability Reviews and determining whether to implement them into the final design. Once a decision has been made to accept, modify, or reject a recommendation, they will follow up with the CRP Engineer by sending the completed Constructability Review Recommendation Form so the decision can be recorded.

Engineers from the various business units may also bring projects that may benefit from CRs to the attention of the CRP Engineer or State Value Management Engineer. When identifying projects, a description of the work, preliminary constructability issues, and a timeframe for possible review dates should be described. This will ensure that the CRP Engineer assembles an effective CR Team and the project is reviewed at such a time that any recommendations developed in the review can feasibly be incorporated in the final design.

Association of General Contractors (AGC)

The AGC will be responsible for selecting construction contractors to attend constructability reviews. The AGC will select contractors based on their experience with the type of work associated with the project being reviewed and the overall experience of the contractors. Depending on the stage and the scope of the project, one to four contracting firms may be asked to attend.

7.5 CRP Processes

The Department has been utilizing constructability type reviews for several years and various units have assisted with facilitating these reviews. Most recently, both the Traffic Management Unit and the Transportation Program Management Unit have performed constructability reviews for the Department. Value Management will continue to coordinate with both of these units as it carries this program forward.

Project Selection

The CRP Engineer continuously coordinates with Project Engineers in Roadway Design, Project Development and Environmental Analysis, Work Zone Traffic Control, and the Divisions to identify projects that would benefit from a constructability review. Projects are primarily chosen that have special and unique characteristics that might cause concerns for the construction contractors once the project has been let. These characteristics include, but are not limited to:

- Traffic Control Phasing
- Staging Areas
- Site Access
- Construction Phasing
- Contracting Options
- Time Constraints
- Environmental Constraints
- Materials
- Utility Conflicts
- Construction Methods
- Project Cost
- Project Location

The CRP Engineer also uses the 5 Year Work Plan Let List provided on a monthly basis to the Department to identify additional projects that may benefit from Constructability Reviews. Projects above $10,000,000 are noted and discussed with Roadway Design, PDEA, and Work Zone Traffic Control personnel to determine if a constructability review is warranted. In addition,

projects that may benefit from constructability reviews may be brought to the attention of the CRP Engineer.

Study Timing

Currently there are three windows in which the Value Management Program schedules constructability reviews. These windows are described below.

Window 1: Planning

The first window is held while the project is in the planning phase, preferably before public hearing maps are displayed to the public. Constructability Reviews in this window tend to look at projects with the end goal in mind, and the CR Team will solve any problems or issues that may arise if the ideal project was to be constructed. Results from reviews in this window tend to ensure that final designs will incorporate the ideal Traffic Management Plans and Construction Methods, instead of traffic management plans and construction methods being tailored to an ideal design that may or may not be constructible. It is the hope of Value Management that this proactive approach will eliminate constructability issues from arising during the design of the project and give NCDOT design engineers a view of steps that can be taken to minimize constructability issues that can arise from their designs.

Window 2: Preliminary Plans

The second window is when the project is between the 25% Right of Way plans and the 65% Right of Way plans. Projects in this window have a well-defined design and major changes to the project usually cannot be incorporated without delaying the let date. However, because the design is well defined, the CR Team is easily able to identify unique constraints surrounding the project. Any recommendations developed during the review to mitigate the issues will have time to be incorporated into the final design. Constructability Reviews in this window differ from the Constructability Reviews in window 1 in that projects reviewed at this stage typically have the Traffic Management Plans and the Construction Methods tailored to the design instead of having the design tailored to the ideal construction method or Traffic Management Plan.

Window 3: Final Plans

The third window is when the project is between the 75% plans and 100% plans. Projects studied in this window have a set design as well as nearly completed construction sequences and traffic management plans. As a result, only minimal changes can realistically be incorporated.

CR Team Selection

Constructability Reviews utilize a multi-disciplined team of Department Engineers and Private Construction Contractors to provide input on the unique issues associated with each project. Team participants are generally selected based on their individual experience and their level of familiarity with the project, with those being most familiar with the project being included in the CR Team. Design engineers as well and unit heads and assistant unit heads may be included in a CR based on the importance of the project and the window in which it is scheduled. Depending on the project, a CR team could benefit from including an engineer from the following disciples:

- Construction
- Maintenance
- Divisions
- Traffic Control
- Environmental Agencies
- Roadway Design
- Structures
- Hydraulics
- Geotechnical
- Utilities
- PDEA / Planning
- Multi-Modal Transportation
- Area Roadway Engineers
- Area Bridge Engineers
- Roadside Environmental

Construction Contractors are invited through the AGC and are selected based on their background with the type of work included in the scope of the project. For the majority of the projects two private construction firms are invited to take part in the Constructability Review. For larger, more complex projects, up to four private construction firms may be invited.

Pre-Review

For each review, the CRP Engineer coordinates with the Roadway Design Project Engineer to gather pertinent project information and materials that will be used in the review. These materials will be distributed to the individual team members along with a Constructability Review Packet. This packet will include background project information, previously identified constructability issues, and time and place where the constructability Review will be held. In addition, the CRP Engineer or CRP Support Engineer will take care of the necessary logistics for the study such as, reservations of the room and equipment, arranging for transportation to the job site, etc.

A pre-review meeting with Department personnel may be held in order to ensure that all Department personnel are on the same page as far as the goals of the projects before meeting with the full CR Team. These meetings are typically held for projects being reviewed during window 1 and are meant to unify the Department's stance on a project and ensure that all data (i.e. Location and Surveys data points, Geotechnical soil borings, etc.) are obtained to minimize the number of assumptions made in the review.

Constructability Issues

The focus of each Constructability Review will vary greatly depending on the unique issues associated with each project, but there are three issues that should be discussed in all reviews. First, all reviews should ensure that the project, as detailed in the plans and specifications, can be constructed using standard construction methods, materials and techniques. Second, the CR Team needs to check that the plans and specifications provided to the contractor provide clear and concise information that can be utilized to prepare a competitive and cost-effective bid. Finally, the CR Team needs to agree that the work, when constructed in accordance with the plans and specifications, will result in a project that can be maintained in a cost-effective manner by the Department over the life of the project.

Depending on the window of the review, different aspects of the project may be discussed. Examples of types of Constructability Review Issues for discussion are detailed below:

Window 1 / 2: Planning / Preliminary Plans

Clearing / Grubbing / Earthwork

- Is there adequate access to the construction site?
- Have excess material and waste sites been addressed?
- Is clearing and grubbing confined to the area within the construction limits?
- Are there any plants and/or special sites that need to be protected during clearing and grubbing? If so, are these locations properly noted and included within the plans?

Plans / Design

- Has access for maintenance personnel (trash, landscape, electrical, structures, snow plow turnarounds, etc.) been adequately addressed in the design and provided for during construction?
- Is there sufficient room for access requirements?
- Have cross-sections for grade changes at phase tie-ins been checked?
- Will any right of entry agreements or construction easements be required?
- Are adequate transition areas shown beyond the project limits to provide for maintenance of traffic during construction?
- Are there any existing conditions that may interfere with construction?
- What is the perceived sequence of construction?

Removal / Demolition

- Does locality have noise limits that will restrict night work?
- Are there hazardous wastes on the project?
- Is pedestrian access accounted for?
- Is there adequate construction access for demolition?

Structures

- Is there sufficient clearance within the work zone for construction operations?
- If span is movable, can stage construction work?
- If staged construction, is sequence reasonable and are detours required? If so, determine minimum lane widths allowable?

Utilities

- Are existing utilities and facilities accurately shown on plans?
- Review the in-plan utility work to ensure that it is compatible with the phasing of the roadway.
- Are water or sewer lines being placed in deep cuts or fills that will require grading prior to installation? Will shoring/cofferdams be required?
- Check overhead utilities, guy wires for potential conflicts with operations and access of large equipment.

Drainage

- Has offsite drainage been considered (beyond construction limits)?
- Are there any existing or proposed drainage issues that need to be addressed?
- Has guardrail post placement and installation over drainage structures, retaining structures or other features been considered?
- Is the location of storm sewer trunk lines compatible with grading sequences and maintenance of traffic plans?

Traffic Management

- Is there sufficient clearance within the work zone for construction operations?
- Will school buses, mail carriers, fire trucks, emergency vehicles, permit vehicles or other local traffic require special maintenance of traffic provisions?
- Use existing pavement instead of temporary pavement if feasible.

- What effect will traffic barriers and other devices have on sight distance, driveways, intersections, and turning radiuses?
- Can work be safely accessed, especially median work?
- Has consideration been given to shopping centers, churches, schools, military installations, seasonal traffic constraints, sports arenas, special local events, etc.?

Signalization

- Will temporary signals be required?
- Will proposed signals conflict with existing utilities?

Environmental / Roadside

- Check to see if existing trees and shrubs that are not to be disturbed have been labeled.

Maintenance

- Are there any maintenance problems or procedures anticipated as a result of the proposed construction?
- Is the project compatible with anticipated future projects?

Window 3: Final Plans

Clearing / Grubbing / Earthwork

- Are underground tanks, existing foundations and slabs located within the construction limits being removed?
- Are there adequate easements for construction?
- Are right of entry agreements required and who will obtain them?
- How are tie-ins to be made and are they appropriate for existing conditions and phases (intersection conflicts, lane drop lengths, etc.)?
- Is suitable material available within the project limits for use as borrow materials? If so, where and what quantity. Are these locations properly noted and included within the plans?
- Can recycled materials be utilized?
- Sites for temporary fill and top soil storage.
- Underground obstructions clearly marked and who pays to have them removed from the site.
- Stabilization limits clearly shown. Is temporary stabilization required?
- Pay items for anticipated problem areas (e.g. geotextile fabric, stone, drainage pipe).

- Does contractor have adequate access to job site for equipment, materials, and labor?

Plans / Design

- Is sequence phased to provide minimum number stages, reasonable work areas and access?
- Is the construction phasing compatible with the maintenance of traffic phasing and/or utility relocation phasing?
- Is there sufficient clearance within the work zone for construction operations?
- Is staged construction adequately shown on the plans?
- Are there any safety issues between phasing and are they adequately addressed?
- Do site conditions conform to those represented in plan?
- Are top of slope & cuts shown. Any conflicts with Right of Way limits?

Removal / Demolition

- Adequate provisions if signs or road markers to be removed and/or relocated.
- Appropriate milling details (e.g. limits are identified; special treatment at bridge ends; bridge overpass; consideration for existing/proposed loop detector cables)?
- Is there adequate construction access for demolition?

Structures

- Are pile design loads and type shown? Do they require load testing and is space available? Are other substructure elements constructible (drilled shafts, spread footers, etc.)?
- Have borings been taken in the appropriate locations and are they sufficient in number and depth?
- Is water depth in channel sufficient depth to utilize barges or has a preliminary design been done for any temporary work bridges?
- Have utilities through bridges been incorporated into bridge plans if necessary?
- Are straps or other devices on retaining walls in the way of excavation and or the foundation?
- Are traffic control plans for the bridge coordinated with roadwork phasing?
- Is MOT plan coordinated with structures phasing?
- Will contractor have adequate room to place screed without impacting traffic?

- Is there room to offload and set girders or other structural components? Will transportation of beams/girders be restricted?
- Does Corp. of Engineers, DENR/DWQ, Coast Guard, or Fish & Game permits require work not shown on plans?
- Is foundation report available? Is it readable? Does it show ground water tables? Does it indicate possible layers/elevations or driving/ drilling difficulties?
- Do proposed piles conflict with existing piles?
- Can falsework be constructed meeting the minimum vertical clearance?

Utilities

- Are there any conflicts between drainage and utility work?
- Are underground obstructions clearly marked?
- Are there any conflicts with on-going or anticipated contracts or projects?
- Are the signal pole locations in conflict with utilities and drainage structures?
- Are proposed utility relocations clear of proposed traffic control devices?
- Has guardrail post placement and installation over or near existing utilities been adequately addressed?
- Have staging plans been accounted for in plan utility work?
- Overhead utilities, guy wires for potential conflict with operations and access of large equipment.

Drainage

- Are there any drainage problems between phases?
- Has construction site drainage been adequately addressed?
- Can water get to inlets or drainage structures during phase transitions and during each phase of construction?
- Have manholes, inlets, valve boxes, etc, requiring adjustment been noted?
- Will proposed or existing drainage structures function during different phases of construction?
- Have clearances above and below pipes and structures been verified?
- Is the sequence of construction compatible with the sequence that storm drains will have to be installed in order to maintain drainage in each stage?
- Is there a conflict between drainage and other utilities & structures (i.e. piling, footings, etc.)?
- Are erosion and sediment requirements adequate?

Traffic Management

- Will night construction be required and has temporary lighting been considered?
- Are drop-offs adequately addressed and protected?
- Will detours run through the winter? If so, has plowing of snow or maintenance of detour been considered?
- Are the traffic control plans clear and complete?
- Have detour routes been approved by the appropriate jurisdiction?
- Is there adequate room for temporary slopes, ditches, and shoulders between existing and proposed roadways in each stage of construction and are they shown clearly in the MOT plans?
- At MOT phase transitions/ tie-ins are any longitudinal joints in the final wheel paths? Can they be moved outside of the wheel paths?
- Do temporary pavement marking quantities reflect the life of the project?
- Are special arrangements for emergency vehicle access needed (tow trucks pre-positioned, signal light overrides, etc.)?
- Is there sufficient clearance within the work zone for the operation (such as crane swing room)?
- Are exits and entrances to the work zone adequate and safe? (I.e. sign distance and signing)
- Note covering traffic signal modifications for phased construction.
- Staging construction limits shown and are the limits adequate for traffic configurations?
- Are there horizontal or vertical differences that prevent shifting of traffic from phase to phase?

Signalization

- Do anticipated sign footings conflict with underground structures and/or obstructions?
- Do the location of signal heads, poles, loops, power supply, etc. match project phasing and/or maintenance of traffic?
- Do pole locations conflict with utilities and drainage structures?
- Are the appropriate types of temporary pavement markings in accordance with time of year they are being placed?

Environmental / Roadside

- Have existing trees that are required to remain in place been identified?

- Have the impacts of construction windows required by environmental resource agencies been addressed?
- Do sediment and erosion control devices match different phases of construction?
- Have erosion and pollution control items/measures been included in the plans?

Maintenance

- Are there any maintenance problems or procedures anticipated as a result of the proposed construction?
- Is the project compatible with anticipated future projects?

Review Duration

The duration of Constructability Reviews greatly depend on the individual nature of the project. Projects with many constraints and large issues may be scheduled for as long as one day. Smaller projects or projects with fewer constructability issues are generally scheduled for half a day of discussion.

The review can last longer if a visit to the project site is determined to be beneficial to the CR Team. In cases where a site visit is requested, the CR team will be transported to the project and will discuss constructability issues until they are satisfied. Site visits are generally held after the discussion has concluded and is primarily meant to clarify any unresolved items resulting from the discussion. If the CR team feels that a site visit would be more beneficial before the discussions take place, then the CRP Engineer will make the necessary arrangements.

Post-Review

Value Management will generate a Constructability Review Report which summarizes the results of the Constructability Review and identifies the recommendations developed during the review.

The CRP Engineer will compile the list of recommendations into individual Constructability Review Recommendation Forms and send them to the appropriate business unit for review. The engineer reviewing the recommendation(s) will respond to the CRP Engineer by returning the completed form with a final determination to accept, modify, or reject the recommendation. The CRP Engineer will then record the decision.

7.6 Outputs and Reports

After the completion of the constructability review, a summary of the proceedings and the recommendations are compiled into a Constructability Review Report.

This report will be completed no later than ten (10) business days after the conclusion of the constructability review and, at a minimum, include an executive summary, a list of the Constructability Review Team Members, background information on the project, reasons for the projects selection, identified constructability issues, and developed recommendations. Once completed, this report will be filed and distributed to the entire Constructability Review Team.

In addition, the recommendations will be recorded on CR Recommendation forms and be sent to the appropriate business units to review. These units will review the recommendations and respond to the CRP Engineer within 60 business days of receiving the recommendation. In the final disposition, the engineer may accept, modify or reject the recommendation. Once a decision has been reached regarding the implementation of the recommendations, the decisions will be documented. Over time, trends will be observed and these will be communicated out to the Department. All recommendations are included in the annual Value Management report that is sent to FHWA.

7.7 Program Evaluation

The processes and procedures of the CRP are evaluated on an ongoing basis throughout the year. CRP staff strive to consistently evaluate all facets of the program to ensure that it is serving the Department and, ultimately the Citizens of North Carolina, in the most efficient and effective manner possible. Each Constructability Review performed will be evaluated by the participants immediately following its conclusion, and the comments generated will be used to improve the Program to provide more value to the Department. Revisions to the program will be reflected in the Value Management Program Guidelines that are updated on an annual basis. This re-evaluation process will provide the Department an opportunity to modify this program as necessary to incorporate any changes that will enable the program to operate in a more effective manner.

8.0 Post Construction Assessment Program (PCAP)

8.1 Purpose

The purpose of the Post Construction Assessment Program (PCAP) is to be a liaison between the Design Engineers and the Construction Unit in an effort to incorporate lessons learned during construction into future designs. These lessons learned include vital information related to construction techniques, materials, standard details and designs, etc. It allows for NCDOT to adjust future cost estimates and, update standards, and change policies to continuously strive to be an effective organization that works well.

8.2 Goals

The goal of the PCAP is to provide the means to capture lessons learned post construction so that they can be taken back to the designers for future incorporation. Additionally, when trends are identified, changes could be incorporated into the Department's standards and policies.

8.3 Definitions

CQI – Construction Quality Index

Failing CQI Report Form – Any individual element with a rating of "6" or less must undergo an in depth investigation and the Failing Construction Quality Index Report Form must be filled out and submitted to the Construction Unit.

Overrun Report – Report generated by the Construction Unit detailing quantities that were overrun on projects.

For more definitions, see "Acronyms and Definitions" at the front of this document.

8.4 Roles and Responsibilities

See Section 8.5 below for current roles and responsibilities as they apply to the PCAP.

8.5 PCAP Processes

The PCAP Manager is coordinating with the Construction Unit to identify the best way to capture the lessons learned and bridge this information to designers. A formalized process is under development. Ideas being generated to develop this process include onsite project visits which include design staff, the use of existing construction reports (CQI, overrun report), electronic feedback forms, etc. These

sources will allow the PCAP Manager to identify trends which need to be incorporated into designs.

8.6 Outputs and Reports

VMP engineer reviews the overrun report generated by the Construction Unit and identifies trends in quantity over/underruns.

Each month, a report is generated from SAP and posted to NCDOT Workplace listing all the post let projects with an award of more than $10M. Based on assessment of this report, the PCAP Engineer will periodically choose projects from this list to perform a Post Construction Assessment.

When a Post Construction Assessment is performed, the PCAP Engineer will compose a report summarizing the lessons learned to distribute out to the appropriate Department personnel.

In the VMP year-end report, the VMP Engineer will include a report of how many Post Construction Assessments were done, what the outcomes were, and how many of the suggestions or comments resulted in policy changes. The VMP Engineer will also provide a report summarizing the number of feedback forms submitted by contractors and Resident Engineers.

8.7 Program Evaluation

The processes and procedures of the PCAP are evaluated on an ongoing basis throughout the year. A primary goal of the PCAP is to consistently evaluate all facets of the program to ensure that it is serving the Department and, ultimately the Citizens of North Carolina, in the most efficient and effective manner possible.

Revisions to the program will be reflected in the Value Management Program Guidelines that are updated on an annual basis. This re-evaluation process will provide the Department an opportunity to modify this program as necessary to incorporate any changes that will enable the program to operate in a more effective manner.

Appendix A – FHWA CFR 23 Part 627 – Value Engineering

§ 627.1 Purpose and applicability.

(a) This regulation will establish a program to improve project quality, reduce project costs, foster innovation, eliminate unnecessary and costly design elements, and ensure efficient investments by requiring the application of value engineering (VE) to all Federal-aid highway projects on the National Highway System (NHS) with an estimated cost of $25 million or more.

(b) In accordance with the Federal-State relationship established under the Federal-aid highway program, State transportation departments (STDs) shall assure that a VE analysis has been performed on all applicable projects and that all resulting, approved recommendations are incorporated into the plans, specifications and estimate.

§ 627.3 Definitions.

Project. A portion of a highway that a State proposes to construct, reconstruct, or improve as described in the preliminary design report or applicable environmental document. A project may consist of several contracts or phases over several years.

Value engineering. The systematic application of recognized techniques by a multi-disciplined team to identify the function of a product or service, establish a worth for that function, generate alternatives through the use of creative thinking, and provide the needed functions to accomplish the original purpose of the project, reliably, and at the lowest life-cycle cost without sacrificing safety, necessary quality, and environmental attributes of the project.

§ 627.5 General principles and procedures.

(a) State VE programs. State transportation departments must establish programs to assure that VE studies are performed on all Federal-aid highway projects on the NHS with an estimated cost of $25 million or more. Program procedures should provide for the identification of candidate projects for VE studies early in the development of the State's multi-year Statewide Transportation Improvement Program.

(1) Project selection. The program may, at the State's discretion, establish specific criteria and guidelines for selecting other highway projects for VE studies.

(2) Studies. Value engineering studies shall follow the widely recognized systematic problem-solving analysis process that is used throughout private industry and governmental agencies. Studies must be performed using multi-

disciplined teams of individuals not personally involved in the design of the project. Study teams should consist of a team leader and individuals from different specialty areas, such as design, construction, environment, planning, maintenance, right-of-way, and other areas depending upon the type of project being reviewed. Individuals from the public and other agencies may also be included on the team when their inclusion is found to be in the public interest.

(i) Each team leader should be trained and knowledgeable in VE techniques and be able to serve as the coordinator and facilitator of the team.

(ii) Studies should be employed as early as possible in the project development or design process so that accepted VE recommendations can be implemented without delaying the progress of the project.

(iii) Studies should conclude with a formal report outlining the study team's recommendations for improving the project and reducing its overall cost.

(3) Recommendations. The program should include procedures to approve or reject recommendations and ensure the prompt review of VE recommendations by staff offices whose specialty areas are implicated in proposed changes and by offices responsible for implementing accepted recommendations. Reviews by these offices should be performed promptly to minimize delays to the project.

(4) Incentives. The program may include a VE or cost reduction incentive clause in an STD's standard specifications or project special provisions that allows construction Contractors to submit change proposals and share the resulting cost savings with the STD.

(5) Monitoring. The program should include procedures for monitoring the implementation of VE study team recommendations and VE change proposal recommendations submitted by construction Contractors.

(b) State VE coordinators. Individuals knowledgeable in VE shall be assigned responsibilities to coordinate and monitor the STD's program and be actively involved in all phases of the program.

(c) Use of consultants. Consultants or firms with experience in VE may be retained by STDs to conduct the studies of Federal-aid highway projects or elements of Federal-aid highway projects required under §627.1(a) of this part. Consultants or firms should not be retained to conduct studies of their own designs unless they maintain separate and distinct organizational separation of their VE and design sections.

(d) Funding eligibility. The cost of performing VE studies is project related and is, therefore, eligible for reimbursement with Federal-aid highway funds at the appropriate pro-rata share for the project studied.

(e) In the case of a Federal-aid design-build project meeting the project criteria in 23 CFR 627.1(a), the STDs shall fulfill the value engineering analysis requirement by performing a value engineering analysis prior to the release of the Request for Proposals document.

Appendix B – NCDOT VMP Policy

North Carolina Department of Transportation
Value Management Unit

Value Management Program Policy

November 15, 2011

Policy Statement

It is the policy of the North Carolina Department of Transportation to administer the Value Management Program (VMP) on a statewide basis to ensure the prudent use of funds and resources on transportation infrastructure projects. The VMP provides the Department a centralized management group that focuses on establishing Departmental procedures to pursue cost efficiencies, mitigate project risks, standardize product approvals, utilize resource conservation opportunities, and incorporate the consideration of construction methodologies throughout the planning, design, construction, and maintenance stages of transportation infrastructure projects.

The North Carolina Department of Transportation Value Management Program is composed of multiple interrelated department-wide programs working together to serve the Department as a vital resource and information clearinghouse. Because of the broad range of responsibilities within the Value Management Program, the guidelines providing procedures and processes for each individual program have been established in a document titled "NCDOT Value Management Program Guidelines." An annual review of these guidelines ensures the programs are functioning effectively and efficiently and the updated guidelines are published at the end of each calendar year.

Goals & Objectives

The primary goal of the VMP is to serve the Department by providing valuable information to the appropriate planning, design, construction, and maintenance staff at the opportune time to ensure the effective use of statewide resources.

The major objectives of the VMP are:

- To provide the means for the NCDOT to utilize value engineering techniques at each major decision point within the project development process.

- To seek design improvements, project cost savings, accelerated incorporation of new materials and construction techniques into projects, improved constructability, reduced environmental impacts, accelerated project schedules, reduced project risk, and improved transportation infrastructure operations.
- To provide the means for the Department to efficiently implement lessons learned throughout the VE process into project planning, design, construction, and maintenance throughout the state.
- To provide the Department an effective resource to evaluate products for possible approval for use on statewide projects within NCDOT right of way.
- To train the Department on Value Management.

Department Approval

Given the growing population of North Carolina and the changing needs of its citizens, it is imperative that the Department embrace the importance of value management principles. The ability to maximize the effectiveness of tax payer dollars is paramount to the Department's success in providing efficient, safe, and reliable transportation to the citizens of North Carolina and the communities it serves.

The North Carolina Department of Transportation Value Management Program Policy is approved by:

Terry R. Gibson, PE – State Highway Administrator

J. Victor Barbour, PE – Administrator of the Technical Services Division

Julie Hunkins, PE – Quality Enhancement Unit Head

Jeffrey M. Garland, PE – State Value Management Engineer

Appendix C – Value Management Retention Guidelines

North Carolina Department of Transportation
Value Engineering Study Records
Archiving and Retention Policy

Draft 2 (6/25/12)

1. **Purpose**

   Provide a comprehensive procedure for the correct archiving and retention of Value Engineering (VE) Study records to promote efficient retrieval and utilization of past and present VE Study documentation.

2. **Background**

   Per Federal Highway Administration (FHWA) mandate, NCDOT is required to conduct a VE analysis prior to the completion of the final design on each applicable project that utilizes Federal-aid highway funding, and all approved recommendations shall be included in the project's plans, specifications, and estimates. The need to conduct a VE analyses is required on all projects that utilize Federal-aid highway funding with an estimated total cost of $25 million or more that are located on the National Highway System (NHS), and all bridge projects with an estimated cost of $20 million or more that are located on or off of the NHS that utilize Federal-aid highway funding (as specified in 23 U.S.C. 106(e)).

   The State Value Management Engineer and the Value Engineering Program Engineer will be responsible for preparing the annual VE report and providing it to FHWA upon request at the end of each Federal Fiscal Year (FFY).

3. **Organizational Significance**

   a. FHWA - Value Engineering documentation must be retained, as it provides reference and validation to the annual report required by FHWA. This report gives an overview and summary of the VEP during the previous FFY. Information regarding NC VEP Policy, coordination, guidelines, training, goals & measures, evaluations, reporting, and cost savings are some of the required elements of the report.

   b. NCDOT - Following a structured archiving and retention policy maximizes efficiency of Department funds. The files retained serve as an extensive database of project scenarios and corresponding cost saving techniques to be evaluated in future VE studies when deemed appropriate.

c. VEP – Evaluation of previous VE Study materials, presentation techniques, and team dynamics allows VEP to establish a continuous improvement process for future VE Studies.

4. Hard Copy Files (if electronic versions are not available)

Essential documentation must be converted to electronic form prior to disposal of the hard copy. Documentation not essential to VE outcomes will not need to be converted. Essential documentation is described as follows:

Documentation generated in the VEP including but not limited to Study Reports, Workbooks, Value Engineering Team selection correspondence, recommendations, and VE Study Materials regarding projects that utilize Federal-aid highway funding, shall be retained by the Value Engineer.

Documentation provided by other NCDOT Unit representatives, VE Study Team members, or other contributors, that is influential to value engineering recommendations and determinations, shall be retained by the Value Engineer. Influential documentation shall be clearly identified by the archiver, as a reference to the Study Report will be provided. This documentation includes but is not limited to maps, designs, correspondence, and all information the Value Engineer deems important.

a. Storage – Folders shall clearly display the associated study date(s) and TIP number, as files will be sorted in chronological (FFY?) and alphanumerical order.

b. Disposal – As specified in 49 CFR 18.42 of the Federal Register, the formal written report shall be retained for at least 3 years after final completion of the project. All contributing material shall be retained for this time as well. All material not retained shall be recycled or returned to the originator of documentation when appropriate.

5. Electronic Files

Electronic documentation generated in the VEP including but not limited to Reports, Workbooks, Value Engineering Team selection correspondence, recommendations and VE Study materials associated with projects that utilize Federal-aid highway funding shall be retained by the Value Engineer.

Electronic documentation provided by other NCDOT Unit representatives, VE Study Team members, or other contributors, influential to value

engineering recommendations and determinations, shall be retained by the Value Engineer. Influential documentation shall be clearly identified as such, as a reference to the Study Report will be provided. This information includes but is not limited to recommendations, maps, designs, correspondence, and all information the Value Engineer deems important.

a. Storage – All electronic files will be stored in the appropriate folder and directory

b. Disposal – All electronic files will be retained permanently.