PENNSYLVANIA'S CORRIDOR O: A MODEL FOR INTERACTIVE DESIGN

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Abstract: Under the current Environmental Impact Statement (EIS) project development process, the Pennsylvania Department of Transportation (PENNDOT) typically develops engineering alternatives which are presented to the State and Federal resource agencies, local governmental organizations, and the public (these three groups are known as the project stakeholders). Afterward, PENNDOT solicits comments and makes revisions to the alternatives. Although effective, this process often creates feelings of confusion and mistrust between the stakeholders and the Project Team, which can lead to costly project delays as seen in many other large projects.

Problem Approach: Interactive Design

The TEA-21 Restoration Act (1998) called for the use of environmental streamlining techniques for the Corridor O Project, a new 25 mile highway in Centre and Clearfield Counties, PA. With Corridor O, PENNDOT sought a process that would enable the stakeholders to develop the alternatives during an open forum. The primary difference is that the new Corridor O Project Development Process is oriented toward stakeholder involvement throughout the decision-making process rather than at the end. Instead of PENNDOT generating alignments, a bi-directional approach is used in which the stakeholders initially develop alignments, PENNDOT then reviews and revises them, and the stakeholders reassess and narrow the options until a preferred alternative is selected. By allowing the stakeholders to generate alignments and examine impacts while making decisions, a feeling of trust is generated. It also enables the stakeholders to see first hand why certain decisions are made, and what the basis for those decisions is throughout the process.

Introduction

The S.R. 0322, Section B02 Project, commonly known as the Corridor O Project, involves investigations into the location of a limited-access highway along existing U.S. Route 322 between Interstate 99 in Port Matilda, Centre County, and Interstate 80 in Clearfield County, Pennsylvania. The Corridor O Project Area spans approximately 59,300 acres of land within twelve municipalities, with a maximum width of about 5 miles, and a length of about 25 miles.

This project was authorized in the 1998 Transportation Equity Act for the 21st Century (TEA-21) to complete a portion of the Appalachian Development Highway System (ADHS) and to provide a connection between I-99 and I-80 along U.S. Route 322. The ADHS was developed by the Appalachian Regional Commission to help upgrade substandard, unsafe and inadequate roadways that have plagued mountainous areas in the eastern United States since the 1950s. The ADHS is designed to provide the entire Appalachian region with a modern system of four-lane highways complemented by access roads that link the system to industrial and commercial sites. The language in Section 1309 of the TEA-21 includes initiatives related to environmental streamlining that have provided PENNDOT an opportunity to develop a new, refined approach to transportation project study, evaluation and documentation.

Environmental Streamlining

Environmental Streamlining is defined by the Mid-Atlantic Transportation and Environment (MATE) Task Force as "a cooperative and coordinated process that assures timely, cost effective, and environmentally sound transportation planning and project development based upon concurrent, multi-agency review" (MATE, 2000).

The Pennsylvania Department of Transportation (PENNDOT) has been following many of the guiding principles of environmental streamlining since 1992 with the Integrated National Environmental Policy Act/Section 404 process. PENNDOT has been working with Pennsylvania state and federal resource agencies in cooperative agreements that have set the framework for concurrent agency reviews and active participation by the agencies throughout a given project.

Over the last several years, particularly since the TEA-21 legislation, people have been discussing environmental streamlining and its implications on transportation projects. Too often, the initial reaction is of concern that environmental analyses will become obsolete. However, we have come to learn that environmental streamlining is about coordination and review, not an attempt to shortchange the fulfillment of environmental laws and regulations.

The project team and PENNDOT examined the work of the Mid-Atlantic Transportation and Environment Task Force (spearheaded by the USEPA), the Federal Highway Administration, and PENNDOT for examples that illustrate environmental streamlining goals and principles. It was clear that most of the goals were achievable if PENNDOT were to implement them on a new highway project. Based on these factors, Corridor O was selected as the model project to implement these streamlining principles.

PENNDOT's Approach

PENNDOT's Transportation Project Development Process for Environmental Impact Statements (EIS) involves a series of Ten Steps along with a number of consensus points (Figure 1). The procedure was developed to pertain more to the involvement of state and federal resource agencies rather than the public. However good this process worked in the past for PENNDOT, it has been clear over the last several years that the coordination and project development process could be and should be improved. Feelings of distrust and a general lack of cooperation often stood in the way of sound transportation planning. In addition, PENNDOT realized that a key component was missing from the planning table – the local perspective.

The lack of public participation and understanding coupled with the growing sense of mistrust among state and federal resource agencies, PENNDOT sought to develop a new process that incorporated environmental streamlining techniques and actively involved project stakeholders. In response, PENNDOT and the Project Team developed a new project development process to expand public and agency input while streamlining the documentation and consensus points. This process incorporates a funnel analogy to illustrate the process of narrowing the range of alternatives (Figure 2).

A New Project Development Process

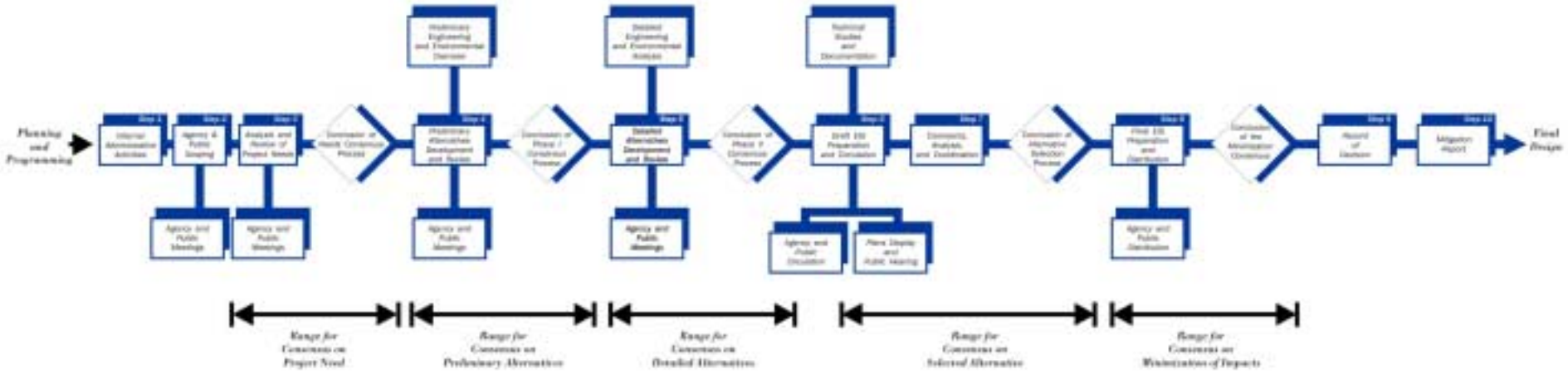
Based on the initiatives related to environmental streamlining contained in Section 1309 of the TEA-21, PENNDOT sought to create a new process that would enable the stakeholders to actively participate in the generation and refinement of alternatives for Corridor O during an open forum. This new process would allow the stakeholders to be actively involved throughout the decision-making process. To accomplish this, the Corridor O Project is using a new Four-Stage Project Development Process (Figure 2) that includes several interactive design workshops.

Figure 1

Transportation Project

Development Process Flow Diagram

Environmental Impact Statements



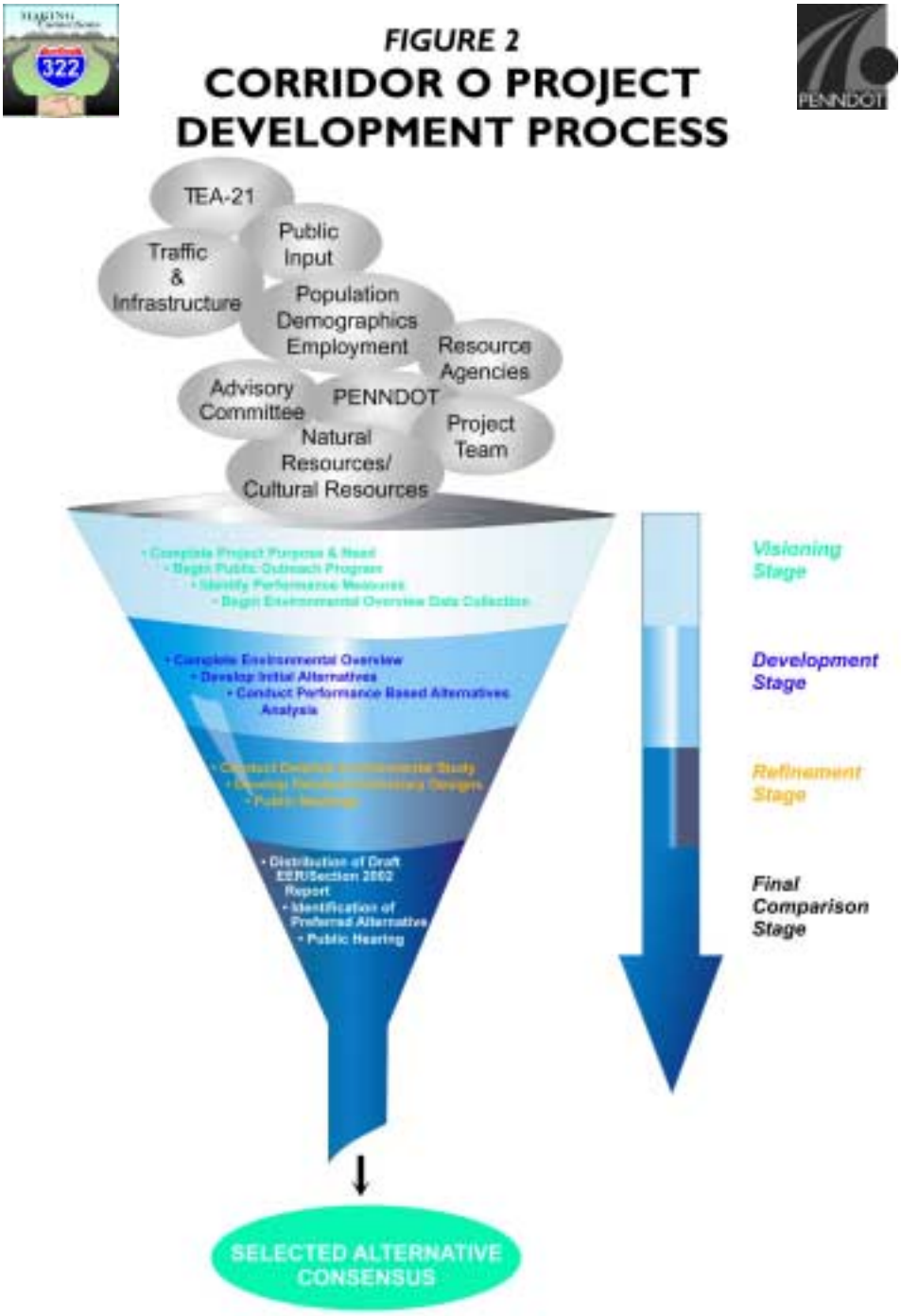


FIGURE 2
CORRIDOR O PROJECT DEVELOPMENT PROCESS
322
PENNDOT
TEA-21
Public Input
Traffic & Infrastructure
Population Demographics Employment
Resource Agencies
Advisory Committee
PENNDOT
Project Team
Natural Resources/ Cultural Resources
• Complete Project Purpose & Need
• Begin Public Outreach Program
• Identify Performance Measures
• Begin Environmental Overview Data Collection
• Complete Environmental Overview
• Develop Initial Alternatives
• Conduct Performance Based Alternatives Analysis
• Distribution of Draft EIS/Section 2002 Report
• Identification of Preferred Alternative
• Public Hearing
Visioning Stage
Development Stage
Refinement Stage
Final Comparison Stage
SELECTED ALTERNATIVE CONSENSUS

Visioning Stage

The first stage of the project development process is the Visioning Stage, which was designed to help the communities gain a better understanding of the changes a new highway may bring to the area. This stage of the project coincides with the traditional purpose and need evaluation as well as the affected environment section of an Environmental Impact Statement.

Development Stage

The second stage of the project is known as the Development Stage. The primary purpose of this stage is to develop the preliminary alternatives, and to determine which of these alternatives merit detailed analysis based on their ability to meet the project needs and project performance measures. This stage coincides with the traditional preliminary alternatives or Phase I alternatives development process associated with an EIS.

Refinement Stage

The third stage of the project is called the Refinement Stage. The main purpose of this stage will be to refine the mainline alternatives based upon additional engineering and environmental studies and to identify potential interchange locations and designs. This stage is comparable to the traditional detailed or Phase II alternatives analysis, and will contain many of the elements of the Environmental Consequences and Mitigation Section of an EIS.

Final Comparison Stage

The last stage of the project is called the Final Comparison Stage. This stage will be used to study the preferred alternative in detail and to minimize any impacts that this alternative has to the social or natural environment.

This stage is comparable to the traditional discussion related to the identification of a preferred alternative in an EIS.

The information addressed in the above described environmental streamlining process will address Pennsylvania Act 120 requirements, the USACOE Public Interest Factors as contained in the Section 404 Regulations, the FHWA requirements for project documentation, and will address all of the factors identified in the CEQ regulations found in Part 1500. More specifically, although not in the same format, will address all of the considerations, and contain all of the information found at Part 1502 relating to EIS preparation. As such, this format will provide sufficient information at an appropriate level of detail to support decision-making processes at both the state and Federal levels.

With this process, the alternatives are developed based upon a number of different inputs, such as traffic needs, community goals, environmental concerns, demographics, resource agency ideas, and others. The focus of this process is active stakeholder involvement. PENNDOT achieved this active involvement through an extensive public outreach program and a dynamic, reciprocal process for development of alternatives.

Active Stakeholder Involvement

Project stakeholders are defined as Private Citizens, Municipal/Government Officials, Business Leaders, State/Federal Resource Agency Representatives, and Special Interest Groups. Active stakeholder involvement includes a dynamic exchange of information disseminated in more than just routine public meetings and project newsletters. The Project Team has come up with several innovative concepts designed to help empower the stakeholders, to hold their attention and enthusiasm for the project, and to present project information in a creative manner that evokes thought and concern, not mistrust and miscommunication.

Active stakeholder involvement also includes access to all available data, and the provision of this data based on a “real time” timeframe - basically delivered to stakeholders as soon as it is discovered in the field and in the analysis. The end product of Active Stakeholder Involvement is a sense of trust and respect for all parties involved, including the project team and PENNDOT. The provision of project details in a timely, concise and creative way facilitates informed dialogue during consensus building exercises and provides the opportunity for face-to-face contact.

Alternatives Development

Developing an alternatives analysis process that is accepted by all project stakeholders is a key component for any successful highway development project. This process must consider several elements, including: 1) the project needs; 2) public concerns; 3) natural, cultural, and socioeconomic resources; and 4) engineering constraints. As with all transportation projects, the alternatives must first be weighed against the project needs to ensure that these needs are met in order to provide for a safe and efficient highway system. However, further comparison must be performed to determine which alternatives best fit the needs and concerns of the public while minimizing impacts to the natural, cultural, and socioeconomic environment.

The process of analyzing alternatives is often difficult to explain to the Community Advisory Committee (CAC), the resource agencies, and the public. Most stakeholders understand that alternatives must meet the project needs. The confusion and debate regarding the alternatives revolves around the acceptable degree of impact on the competing resources. The Project Performance Measures (Figure 3) are designed to identify the different stakeholders' concerns regarding sensitive resources in the project area, and provide a documented framework for assessing the degree of alternative impacts to these resources. This framework is agreed upon by the stakeholders at the beginning of the project, to avoid future confusion and debate as alternatives are developed.

For Corridor O, alternatives that meet the project needs are carried forward and compared to the Project Performance Measures, as depicted in Figure 4. The Performance Measures act as an additional set of standards (beyond the project needs) that are used to weigh each alternative. Those alternatives that best meet these Performance Measures are carried forward for additional study. Final analysis based on Project Performance Measures can then be used to identify the preferred alternative and to refine this alternative during final design.

The Corridor O Project Team has illustrated this process using a modification of the alternatives analysis process discussed in *Mastering NEPA: A Step-by-Step Approach* (Bass and Herson 1993). All of the alternatives are evaluated for their ability to meet the project needs. Only some of the alternatives will meet this test. Those that meet the project needs are then carried forward to be compared against the Project Performance Measures (the second test).

Figure 3 Project Performance Measures
S.R. 0322-B02
Corridor O

PENNDOT

The Performance Measures identified below are a combination of Performance Measures provided by the public and the Community Advisory Committee, the State and Federal resource agencies, and PENNDOT. Performance Measures have been grouped into several categories including Transportation; Community/Land Use; Environmental; and Engineering. Those Performance Measures generated by the CAC/public are indicated by a (C), Resource Agency Performance Measures are indicated with an (A), and PENNDOT with a (P).

TRANSPORTATION

1. Reduce and divert through traffic from local roadway network (C)
2. Substantial reduction of through truck traffic from Route 350, Route 220 and Route 504 (C)
3. Reduce travel time to State College and points east (C), (P)
4. Reduce traffic congestion and safety problems at Woodland (C)
5. Provide local connection with Corridor O near Woodland where the trucks are generated (C)
6. Substantial reduction of through truck traffic in Philipsburg (P)
7. Substantial reduction of through truck traffic on Route 322 (P)
8. Substantial reduction of through truck traffic on Route 350 (P)
9. Maximize safety to automobile and truck traffic (C), (P)
10. Accommodate regional and local travel desires (P)

ENGINEERING

1. Design a limited access highway using 70 mph design speed, 3% uphill grades, 3.5% downhill grades and other acceptable design criteria in PennDOT's Design Manual (P)
2. Maximize use of existing right-of-way (P)
3. Provide for high-speed interchanges at I-80 and I-99 and local access alternatives within the corridor (P)
4. Employ a 60 foot median width and a 1910 foot radius for horizontal curves (P)
5. Reexamine engineering criteria throughout project if critical or red flag environmental features are discovered (P)
6. Develop an incident management plan for post construction (C)
7. Consider costs to taxpayers (C)

ENVIRONMENTAL

1. Comply with all applicable laws and regulations (A) (P)
2. Avoid/minimize impacts to wetlands and other Waters of the US/Commonwealth with an emphasis on high quality wetlands such as those associated with exceptional value (EV)/high quality (HQ) streams, with diverse vegetative patterns, and/or containing threatened or endangered species (A) (P) (C)
3. Avoid/minimize impacts to aquatic habitats with an emphasis on EV and HQ surface water resources. (A) (P) (C)
4. Avoid/minimize impacts to surface and underground water resources used for drinking water supplies (A) (P) (C)
5. Avoid/minimize impacts to historic and archaeological resources (listed or eligible for inclusion on the National Register of Historic Places) (A) (P) (C)
6. Avoid/minimize impacts to productive agricultural lands and productive agricultural security area lands (A) (P) (C)
7. Avoid/minimize impacts to parklands, playgrounds, public recreation lands (state forest and state gamelands, with an emphasis on their hiking trails and providing access to/from these facilities) (A) (P) (C)
8. Avoid impacts to known threatened and endangered species and their habitats (A) (P) (C)
9. Avoid/minimize impacts to high quality wildlife areas, specifically to minimize fragmentation, preserve connectivity, vegetative diversity, and unusual habitats (A) (P) (C)
10. Encourage the use of previously disturbed areas and explore the opportunity to clean up hazardous sites, with an emphasis on downstream and/or downgradient impact (A) (P) (C)
11. Mitigate negative impacts of noise and lighting (C)
12. Reduce exposure of potential hazardous spills in general (C)
13. Replace polluted waters and wetlands lost to highway with clean up of polluted streams and wetlands (acid mine abatement) (C)
14. Design road to allow crossings for Rails to Trails (C)
15. Protect rural lands (C)

COMMUNITY AND LAND USE

1. Minimize impact to residential and commercial areas (C) (P)
2. Consider local infrastructure in development of alignment (C) (P)
3. Ensure consistency with community goals and plans (C) (P)
4. Target utility R/W's and stripped areas (maximize use of abandoned surface mined areas over impact to homes) (C) (P)
5. Consider emergency service coverage areas after construction (C) (P)
6. Maximize use of existing right of way or infrastructure where possible (C) (P) (A)

Figure 3: Project Performance Measures

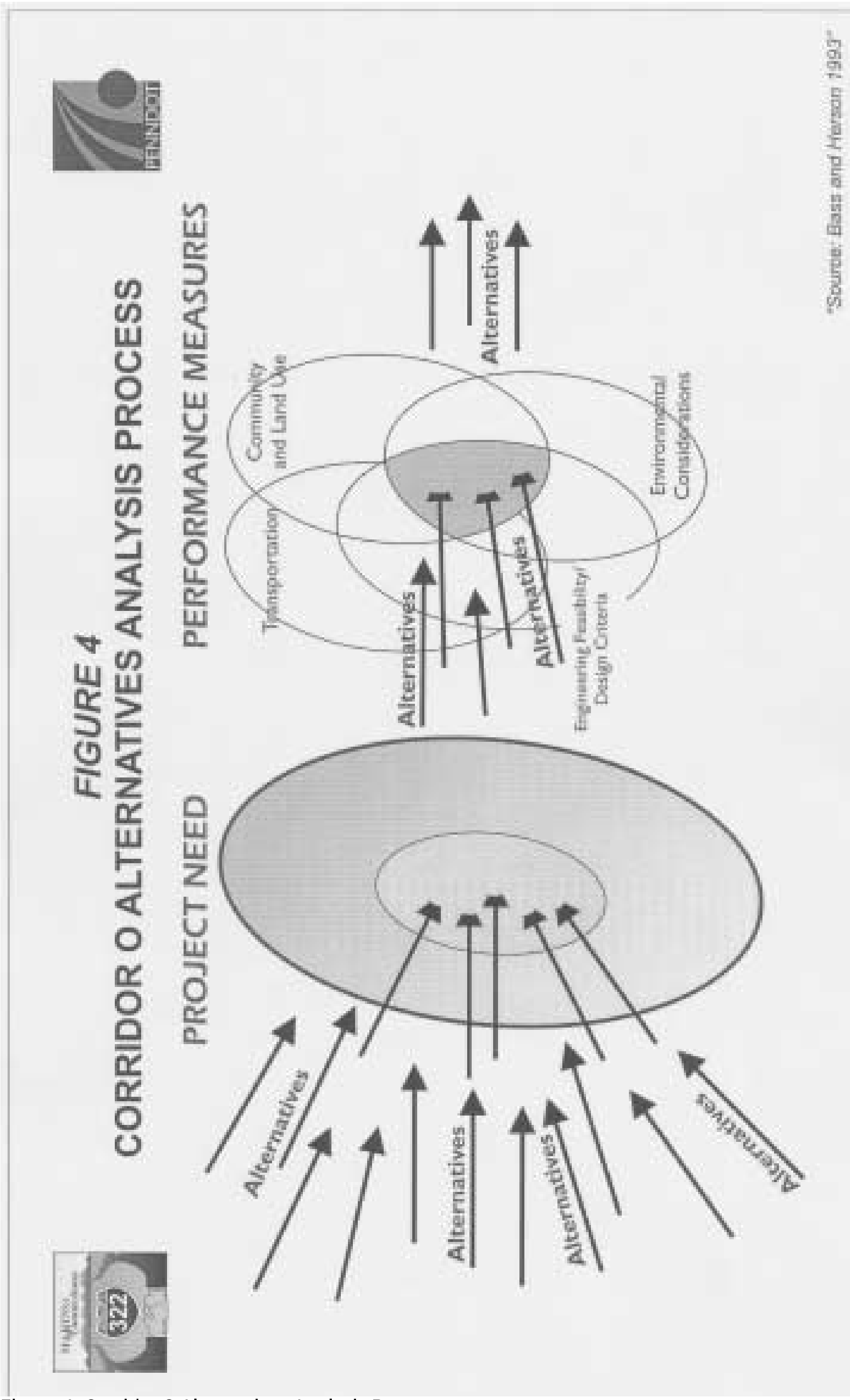


Figure 4: Corridor O Alternatives Analysis Process

Interactive Design

With Corridor O, PENNDOT sought a new process that would enable the stakeholders to develop the alternatives during an open forum. The primary difference between the old method and the new Corridor O Process is that the new method is oriented toward stakeholder involvement throughout the decision-making process rather than at the end. Instead of PENNDOT generating alignments, a bi-directional approach is used in which the stakeholders initially develop alignments, PENNDOT then reviews and revises them, and the stakeholders reassess and narrow the options, etc. until a preferred alternative is selected. By allowing the stakeholders to generate alignments and examine impacts while making decisions, a feeling of trust is generated. It also enables the stakeholders to see first hand why certain decisions are made, and what the basis for those decisions is throughout the process.

Interactive design workshops serve as the vehicle by which the stakeholders participate in the development and refinement of alternatives and the recommendation of a preferred alternative. The participants of the workshops include resource agency members and CAC members. The CAC members include local officials from the project area counties, boroughs, and townships, as well as members of active civic organizations within the region. By allowing the project stakeholders to actively participate in the generation and refinement of alternatives, a sense of "stakeholder ownership" is created.

All workshops are conducted using a basic format. Each workshop begins with a general introduction, which involves a description of the purpose and goals of the workshop, the work done to date, the resources to be presented for consideration, and the upcoming events that will ensue from the workshop. The participants then separate into teams to perform detailed alignment analyses (Photograph 1). The teams are organized to balance the interests of the resource agencies and to balance the geographic representation of the CAC. To do this, agency members with jurisdiction over similar resources were placed on each of the teams and CAC members from each of the three project area sections were placed on each team.

Once each team has fully assessed the alignments/tasks required, the teams reconvene for discussion. At the completion of discussion, suggested alignments or revisions to alignments/alternatives are agreed upon by consensus and the workshop is complete (Photograph 2).

The decisions made at the workshops are then presented to the public during a series of public meetings to solicit public comments. These comments are incorporated into the workshop designs, resulting in the finished alignment product for further study. By using this method, alignments/alternatives that best represent the needs and concerns of the citizens and resource agencies are generated. Using the interactive design workshops and public meetings, the Corridor O Project will be able to meet the accelerated schedule using new, innovative environmental streamlining concepts.

Highlights from the workshops include:

- State and Federal resource agencies and the Community Advisory Committee participation.
- Teams that balance geographic location and interests within the study area.
- Engineering templates used to draw alignment concepts on environmental features mapping
- Each team is given their own staff of consultant experts.
- CADD operators digitize the alignments as they are developed and projected on a screen for ease of viewing.
- GIS station available for instant check on impacts.
- Public provided opportunity to comment on workshop alignments.
- PENNDOT incorporates modifications as suggested by public into designs.

Public Outreach

The involvement of the public is a crucial and intrinsic part of PENNDOT's Interactive Design Process. The public's role in this process is analgous to a three-legged stool, in which PENNDOT, the resource agencies and the public/CAC represent each of the three equally supporting legs. If any one of the legs is removed, the entire structure is compromised.

An extensive public outreach campaign has been developed for the Corridor O project to keep the public informed about the project and its progression. An effective public outreach campaign must establish a set of goals early in the project, and focus on keeping these goals until the project's completion. The goals of the Public Outreach campaign for Corridor O include:

- The promotion of public ownership of decisions and policies
- The creation of designs which were reflective of local goals and values
- The need to minimize rumors, distrust, and controversy between the public and cooperating agencies
- The development of a spirit of cooperation
- The enhancement of PENNDOT credibility

The most effective public outreach tool is the public meeting. These are held after each interactive design workshop. The public meetings are designed to allow the public to view mapping, attend presentations and speak to PENNDOT and other Project Team specialists about the status of the project, and their comments regarding the project and its impacts to resources. Due to the size of the project area, these meetings are held in three separate locations within the project area in order to attract as many local residents as possible. The first round of public meetings was held during the Visioning Stage of the project. The second, third and fourth rounds of public meetings took place during the Development Stage, and the fifth round of public meetings took place during the Refinement Stage.

The public meetings are held in an open house format, with poster presentations at several stations set up sequentially around a single room (Photograph 3). An example of a typical setup at a Corridor O public meeting might consist of the following stations: Project Development Process; Environmental Features; Cultural Resources; PENNDOT Right-of-way Procedures; the Intent-to-enter Process; the Alignment Drawing Workshop; and an Information Station.

There are also formal presentations held in conjunction with the open house poster presentations. Large maps scaled at one inch = 800 feet depict the alignments developed by the CAC and resource agency members (Photograph 4). At the Information Station, participants are asked to fill out questionnaires concerning the public meetings. Small maps are also typically available for the public to highlight their favorite or least favorite alignment, or draw in their own alignment. Computers are also made available at the Information Station so participants can get up-close views of alignments and the resources located in the vicinity of each alignment (Photograph 5). A Kid's Corner Station is set up at each public meeting to keep children occupied with play activities while their parents can discuss project issues with project team members and PENNDOT in an undistracted setting (Photograph 6).

Conclusion

To date, this approach has saved at least one year, if not two, from the life of the project. PENNDOT anticipates continued timesavings that will result in long term savings in terms of construction costs. An added benefit to this approach is the reduction in controversy, both from the public as well as the state and federal resource agencies. The state and federal resource agencies have indicated their desire to use this approach on all future projects.

Implications for the Future

With this new interactive design approach, PENNDOT has raised the bar for its future projects. All of these measures are designed to allow for a more efficient design of alternatives and review process, thereby allowing the process to meet an accelerated deadline while producing the best possible solution to the problems at hand. Early and often stakeholder involvement, as well as the use of context sensitive design will produce a better product for which all stakeholders can be proud. As such, Corridor O is considered to be a pioneering project, developing more positive working relationships with the public and resource agencies, and taking new steps to improve the overall NEPA compliance process. Many aspects of this project will be useful as a template for other similar projects, and can serve to guide future projects toward creating additional successful environmental streamlining techniques.

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Photograph 1. Workshop participants utilized templates to draw alignments on large scale maps of the project study area.

Photograph 2. Sandra Martin presented the White Team's findings during the consensus building portion of the workshop.

Photograph 3. Local area residents came out in full force to examine the Corridor O preliminary alternatives and other new information displayed during the February 2001 public meetings.

Photograph 4. Local residents review the alignments generated by the CAC and Resource Agency representatives during the Interactive design workshops.

Photograph 5. Computers provided the public with up-close aerial photography-based mapping of the initial alternatives and the natural, cultural, and socioeconomic resources of the project area.

Photograph 6. The kid's corner station occupies children while parents are free to discuss project issues.