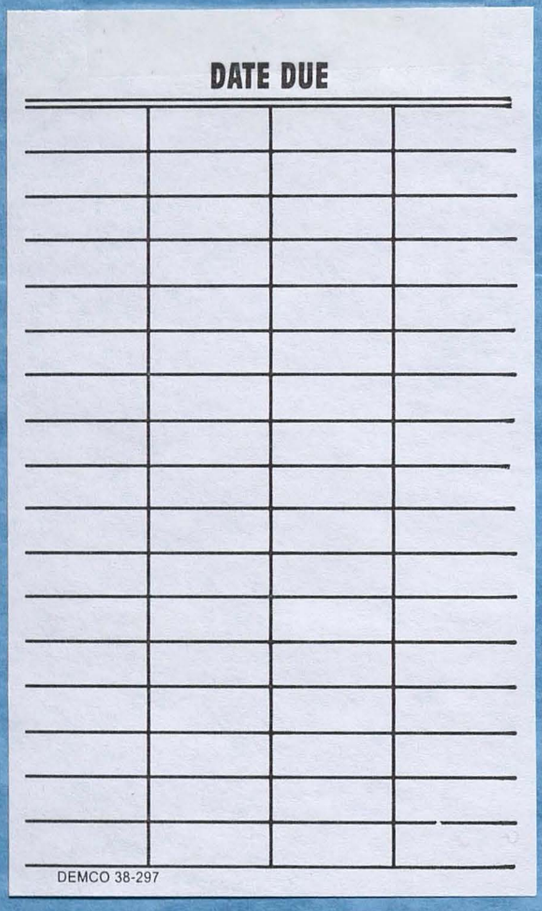
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Research Report
KTC-02-27/FHWA-01-1F

DOCUMENTATION OF CONTEXT-SENSITIVE DESIGN CASE STUDIES

by

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U.S. Department of Transportation

September 2002

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1.0 INTRODUCTION

1.1 BACKGROUND

A major challenge for many current transportation projects is to plan, design and build to create a solution which will not only address the planning and engineering requirements, but also satisfy the human and natural environmental issues related to a specific project. Occasional projects of this type have been designed and built for many years, typically when there have been few alternatives otherwise. A key component to these types of projects has been a greater level of community interest and public involvement. Initial efforts to introduce the concept of increased sensitivity to community interests and the natural environment was labeled "Thinking Beyond the Pavement." This concept was the outgrowth of a conference held in Maryland in 1998, through the joint efforts of the Maryland DOT, FHWA, and AASHTO. As part of the conference, the concept was defined, the principles of Context-Sensitive Design (CSD) were outlined, and five pilot states were identified to begin developing training courses. Those states were Connecticut, Kentucky, Maryland, Minnesota, and Utah. Various forms of information sharing and training programs have also begun in each of the pilot states. Realizing more input was needed in order to expand the concept beyond the project development stage, several state highway agencies began to seek input from construction, operations and maintenance experts, as well as resource agencies and the public. This general concept of seeking innovative solutions to achieve flexibility in highway design has begun to be implemented and aggressively expanded.

Context-Sensitive Design is the development of a project to simultaneously advance the objectives of safety, mobility, enhancement of the natural environment, and preservation of community values. As early as the 1969 with passage of the National Environmental Policy Act, Congress made a commitment to preserving and protecting the environment and cultural values affected by transportation facilities. With the Intermodal Surface Transportation Efficiency Act of 1991, highway design partnerships were encouraged to involve those affected by transportation projects. As part of the National Highway System Act of 1995, language was provided that encouraged state highway agencies to consider the "constructed and natural environment of an area" as well as the "environmental, scenic, aesthetic, historic, community, and preservation impacts of the activity". Many had recognized the flexibility that existed in the current design guidelines contained in the AASHTO "Green Book"; however, there has been and continues to be resistance to increased use of flexible design values as necessary to accommodate special project requirements. A publication by the Federal Highway Administration in 1997 titled "Flexibility in Highway Design" was an effort to provide a guide about designing highways that incorporated community values, while creating a safe, efficient, and effective means for movement of people and goods. The guide was intended as a document that was compatible with the "Green Book" while achieving the proper balance between safety and the community/environment. Context Sensitive Design is the most significant effort undertaken to increase public involvement in the project development process. The use of multi-disciplinary

teams at the appropriate stages of project development is also critical to the promotion of CSD applications. An increased level of awareness of the concepts of CSD has been achieved in the highway community through workshops and conferences.

Context-Sensitive Design should also be considered a collaborative, interdisciplinary approach that involves all project stakeholders to develop a transportation facility compatible with the physical setting to preserve scenic, aesthetic, historic and environmental resources, while maintaining safety and mobility. The objectives of CSD are to achieve the following:

1) Satisfy purpose and need with the consensus of stakeholders
2) Create a project that is safe for the user and the community
3) Insure the project is in harmony with the community
4) Achieve a level of excellence in the public's mind
5) Provide for efficient and effective use of resources
6) Result in minimal disruption to the community
7) Develop projects with lasting value to the community
8) Balance safety and environmental issues

1.2 PROJECT OBJECTIVES

The objective of this project was to document 15 case studies to illustrate applications of Context-Sensitive Design, with emphasis on community-based solutions. Attention was given to documentation of tools and techniques to support CSD principles and practices. It is intended that the results from this documentation of CSD case studies will provide a series of applications of flexible design concepts serving as practical examples for roadway designers and others involved in the project development process. The case study examples and supporting materials are expected to foster a more flexible approach to the project development process and illustrate the wide range of workable solutions that have been implemented.

A template was developed to outline the primary elements of Context-Sensitive Design in a form that would be suitable for communicating the theme of flexibility applications and community-based involvement in highway projects. With the varying approaches used to accomplish projects employing CSD, not all of the elements were included for each of the case studies. Following is a list of specific elements considered for documentation.

1) Project Location
2) Project Description
3) Purpose and Need Statement
4) Context-Sensitive Factors
5) History of Project
6) Highway and Resource Agencies Involvement
7) Community Involvement
8) Natural and Human Environmental Issues
9) Schedule of Activities
10) Project Outcome and Lessons Learned

CONTEXT-SENSITIVE DESIGN CASE STUDY NO. 1
Paris Pike - Kentucky

LOCATION:

Paris Pike (US 27/US 68 between Lexington and Paris - Kentucky)

PROJECT DESCRIPTION:

Paris Pike is a US urban/rural primary route between the northern limits of Lexington and the southern limits of Paris. The project involved reconstruction of an existing two-lane road into a four-lane over a distance of approximately 13.5 miles. The route served commuters as well as through travelers on a segment officially designated as a scenic route. There were four construction sections included in the project as shown below:

Section 1	Length: 0.75 miles
(Paris)	Letting: 12-13-97
	Work Start: 4-17-97
	Work Complete: 8-3-00
	Contractor: Hinkle Contracting
	Amount: $4,541, 555
Section 2	Length: 3.2 miles
(Houston Creek)	Letting: 12-18-98
	Work Start: 2-18-99
	Work Complete: 5-14-01
	Contractor: Hinkle Contracting
	Amount: $13,988,659
Section 3	Length: 4.1 miles
(Hutchinson)	Letting: 3-31-00
	Work Start: 5-22-00
	Work Complete: Spring 2002
	Contractor: Hinkle Contracting
	Amount: $17,495,523
Section 4	Length: 5.6 miles
(Fayette County)	Letting: 8-24-01
	Work Start: 10-1-01
	Work Complete: Fall 2003
	Contractor: Central Rock
	Amount: $33,899,753

PURPOSE AND NEED STATEMENT

The purpose of this project is to improve a 13-mile section of US 27/68 between Lexington and Paris, Kentucky. The need for this improvement is based on Paris Pike's importance in the regional transportation system, i.e. its system linkage, its lack of sufficient capacity to adequately serve not only projected travel but also existing traffic demands, inadequate existing roadway geometrics and design features, safety considerations, and social

demands.

CONTEXT-SENSITIVE FACTORS

A wide range of sensitive issues were addressed as part of the construction, impacting both the natural and human environments. Context-sensitive design and construction issues which were implemented as part of the Paris Pike project included the following:

- Silt loam topsoil, which was critical to the central Kentucky horse farm industry, was stripped, stockpiled and returned to the original thickness after grade and drain work was completed.
- Roadway alignment was selected to avoid and minimize impacts to historical properties and structures. Dry-stone walls were prominent along the corridor and approximately three miles of walls were dismantled and reconstructed or newly constructed. Historic signature entrances to horse farms were avoided where practical and where impacted, new entrances were built to match the original entrances as part of the contract cost.
- Timber guardrail was used for aesthetics, with steel backing for structural integrity.
- Stone facade matching indigenous stone outcrops was applied to concrete bridge structures.
- Extensive landscaping with local plant species was included. Roadway alignment and median widths were selected to minimize impact to matriarchal trees. Extensive tree protection was maintained to prevent root zone damage to mature trees. Utility easement modifications were coordinated to lessen impact on trees. An endangered species, Running Buffalo Clover, was transplanted to a fence-protected easement purchased specifically for this purpose.
- Grass shoulders along the roadway were selected and designed/constructed as functional and aesthetic features of the roadway.
- Water channel changes were combined to minimize and control erosion.
- Archeological site investigations were performed at Monterey and McConnel Station.

HISTORY OF PROJECT

Paris Pike has been designated as a historic scenic corridor marking an early Kentucky trail that connected Maysville, Kentucky on the Ohio River to Lexington, Kentucky. Native Americans first used this route to follow herds of grazing buffalo. Later, the route was used by early settlers of central Kentucky. Paris Pike was one of the first roads built west of the Allegheny Mountains.

In recent years Paris Pike became recognized for its safety and capacity problems. Although the overall accident rate was not greater than the average for all two-lane roads, the fatal accident rate was significantly higher. Factors which contributed to the high fatal accident rate were relatively narrow lane widths, lack of adequate shoulders, inadequate clear zones, steep ditches and side slopes, insufficient passing sight distances, fixed objects along the roadside, and various scenic distractions.

HIGHWAY AGENCY INVOLVEMENT

The Kentucky Transportation Cabinet had significant involvement beginning with the preliminary planning studies that were initiated in 1966 to identify safety and traffic operations improvements. Their involvement continued throughout the project and was critical to the evolution of events and eventual progress that occurred on the project.

RESOURCE AGENCIES INVOLVEMENT

Several resource agencies were involved in the project from the beginning stages. Included were the following agencies:

Federal Highway Administration
State Historic Preservation Officer
Bluegrass Trust for Historic Preservation
Land and Nature Trust of the Bluegrass
Kentucky Department of Natural Resources

COMMUNITY INVOLVEMENT

There was direct community involvement in the early stages of the project, specifically landowners adjacent to the existing alignment of US 27/US 68. Through the coalition of affected landowners and other indirectly affected citizens, a civil lawsuit was filed in the Federal District Court resulting in issuance of an injunction, which halted progress on the project prior to the completion of right-of-way acquisition. This court injunction was in place for 14 years from 1977 to 1991. Significant events in the acceptance of the project by the public were the "hayride tours" which permitted landowners and other interested parties to see firsthand the proposed corridor and understand the project plans. As part of the resolution to end the injunction, the Paris-Lexington Road Project Advisory Task Force was formed to direct the project. The Advisory Task Force was composed of representatives from the following agencies or special interest groups:

- Kentucky Transportation Cabinet
- Federal Highway Administration
- State Historic Preservation Officer
- Lexington-Fayette Urban County Government
- Land and Nature Trust of the Bluegrass
- The Bluegrass Trust for Historic Preservation
- Lexington Directions
- Bourbon County Magistrate
- Citizen representative
- Landscape Architect
- Civil Engineer

The role of the Advisory Task Force was to guide the project development and management through the stages of design and construction with minimal impacts to the historic and scenic resources unique to the Paris Pike corridor.

NATURAL ENVIRONMENT ISSUES

There were several issues related to the natural environment that warranted special attention. Following is a summary of the most prominent issues addressed.

- Running Buffalo Clover was identified within the project corridor and was successfully replanted in a protected area on a farm along the corridor.
- Unavoidable impacts to a wetland on the Hutchinson Segment is being

mitigated on a 5.5 acre site where a prior converted wetland at Peaks Mill in an adjacent county is being restored.

- Savannah Remnants and other trees along the corridor have been avoided, incorporated into the median, and protected by guardrail to the maximum extent possible throughout the project.
- The original topsoil, Marnie silt loam, was stripped, stockpiled and returned to the original thickness and ground contours to insure preservation of this irreplaceable natural resource unique to the central Kentucky horse farms.

HUMAN ENVIRONMENT ISSUES

Historic District

The Paris Pike Historic District was evaluated professionally to document and insure minimal impacts to the buildings and structures. Those adversely affected buildings and structures were documented to the Historic American Building Survey and the Historic American Engineering Record. Existing and as-built landscapes were documented, in addition to before and after video driving tour recordings.

Approximately three miles of dry-laid stone fences have been either rebuilt or built new to retain the character of the existing road. Fence styles were customized to each individual property owner's original fence. The Transportation Cabinet also sponsored certification training through the Dry-Stone Conservancy to bring stone masons from Scotland to Kentucky as the trainers.

A landscape architecture firm was contracted with to participate on the design team. The project was designed to blend with the landscape, preserve mature trees, avoid impacts to the historic district and minimize impacts to the existing stone fences. Manufactured stone veneer was used on concrete retaining walls, bridge abutments, and bridge rails. Steel-backed timber-faced guardrail was used in the rural sections of the project in Bourbon County, and rusticated steel guardrail was used in Fayette County. In addition, extensive landscaping was used to retain the parkway-type aesthetics of the roadway corridor.

The Wright House, a historic structure on the Paris end of the project, was purchased with plans to renovate and donate to Lexington-Fayette County as a multi-use facility by the public.

Archaeology

Archaeological investigations along the Paris Pike identified several prehistoric and historic sites. Included were the following:

- The community of Monterey where European Americans lived side by side with both free and enslaved African Americans
- The structure at McConnel's Station, an early 1800's house where early settlers of Lexington lived and entertained.
- The residence at Clovelly Farm which was occupied from about 1850 - 1900 and contained a range of artifacts from that time period.

Public Education

Exhibits and kiosk-type displays will be developed at each end of the project after construction is completed. One exhibit will focus on the thoroughbred horse industry with

specific attention to the horse farms in Fayette County. At the previously mentioned Wright House, exhibits will be devoted to the history and archaeology of the pike between Lexington and Paris. A driving tour brochure will also be developed which identifies and explains interesting features along the route.

Public Involvement

Extensive public involvement was utilized to seek input and guide the project during the various stages of project development. The Advisory Task Force played a significant role in the interaction and involvement of the public.

SCHEDULE OF ACTIVITIES

Following is a time-line of significant events in the Paris Pike project development process:

- 1966 - Kentucky Transportation Cabinet (KYTC) initiated a planning study to identify safety and traffic operations improvements
- 1973 - KYTC submitted and Federal Highway Administration (FHWA) approved Environmental Impact Statement (EIS)
- 1975 - KYTC held first public hearing
- 1975 - KYTC commissioned a special historic study
- 1976 - KYTC commissioned a design study
- 1977 - KYTC reinitiated right-of-way acquisition
- 1978 - Civil suit filed on behalf of citizens' group in Federal District Court
- 1978 - Injunction issued by Federal District Court
- 1980 - Project cancelled by KYTC
- 1986 - Public hearing held by KYTC in Paris
- 1987 - Traffic Safety Memorandum approved
- 1988 - Supplemental EIS submitted by KYTC
- 1991 - FHWA executed Section 106 of Memorandum of Agreement and approved the FSEIS and 4(f) Statement
- 1993 - Court injunction was lifted
- 1995 - Participants selected for constructibility review process
- 1996 - First design segment on the Paris end of project was completed
- 2001 - Final three design segments were combined into one construction contract

PROJECT OUTCOME AND LESSONS LEARNED

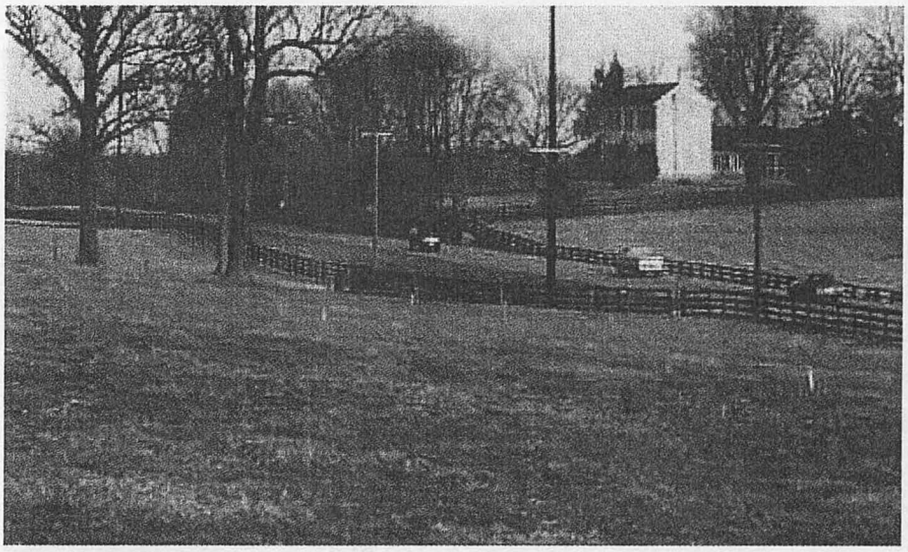
Key attributes of the Paris Pike project were summarized to provide insight into the performance results and how these results differ from other highway projects where the concepts of context-sensitive design were not implemented. Following is a listing of the most prominent attributes of the project and an assessment of the success achieved.

- A major emphasis of the project was environmental sensitivity to the construction processes used on the project. It appears that significant success

has resulted from the attention given to site and corridor- specific characteristics.

- The Paris Pike project has received statewide and national attention for the management and cooperative processes used to achieve the partnerships necessary to insure success.
- A quality-based prequalification process was used to secure contractors with credentials most suited to the project.
- Contractor involvement in constructibility reviews was a critical component resulting in appropriate attention being given to the design sensitivities delineated in the project documents.
- An outcome of the cooperative partnerships developed was fewer change orders as compared to typical projects.
- The Advisory Task Force was a positive factor in creating a trusting relationship between the public representatives and the project team of Transportation Cabinet representatives and contractors.
- In general, the Paris Pike project was a successful effort involving a wide range of stakeholders in the development and direction of designing and constructing a highway through an esthetic and historic section of central Kentucky.

The cut/fill was minimized to match original ground contours

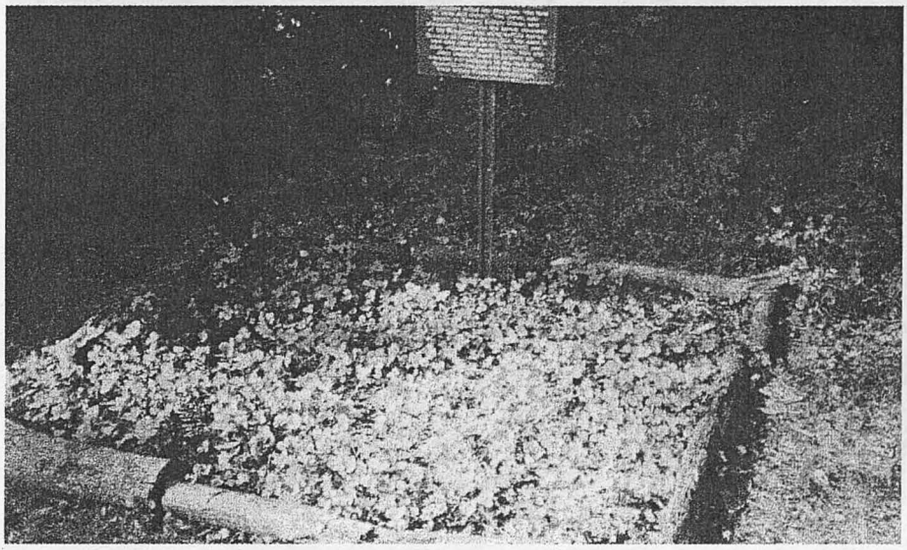


The roadway was aligned to miss historical properties and structures

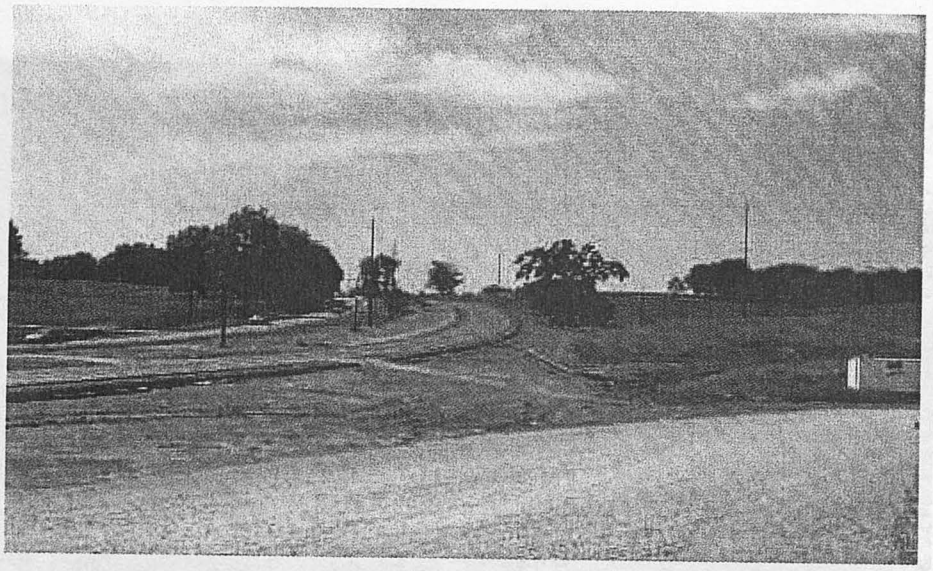
A house on the Historic Registry was refurbished as an interpretive center

The roadway was aligned to miss historic mortar-less stone walls

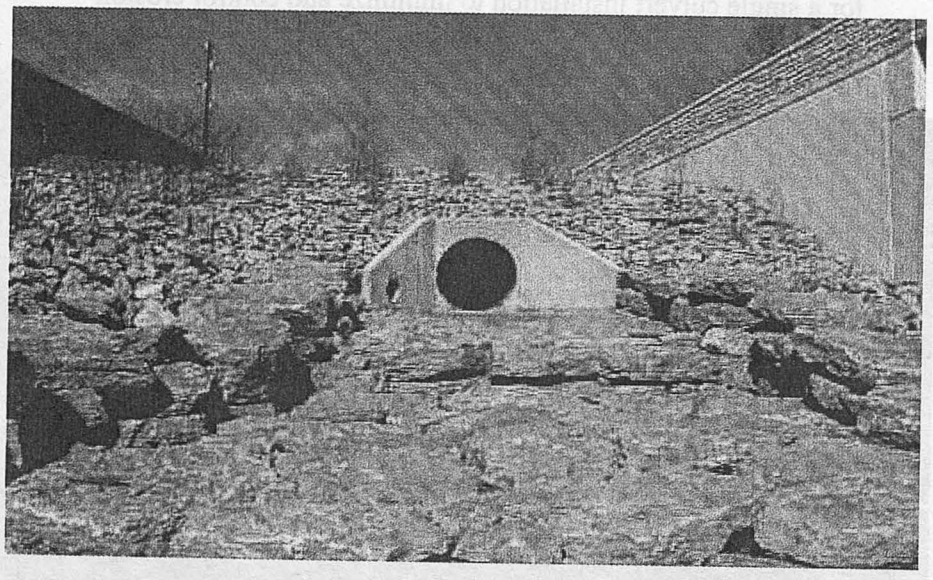
A water channel change combining multiple water channels performed to allow for a single culvert installation to minimize and control erosion



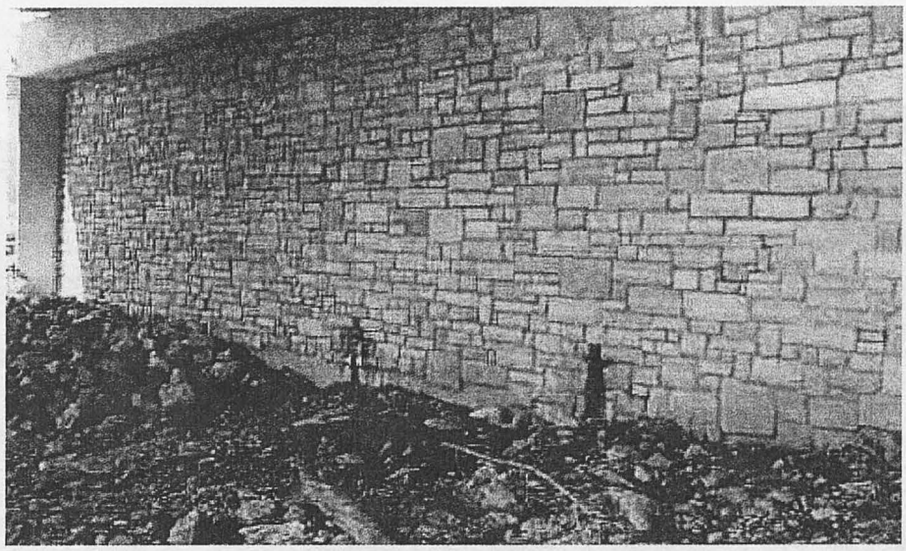
An endangered species, *running buffalo clover*, was transplanted to a fenced easement track of land, purchased by the DOH solely for this reason



The roadway alignment was adjusted to selectively keep, or replace, specific tree species



Scupper slab erosion control technique was used at the Paris bridge

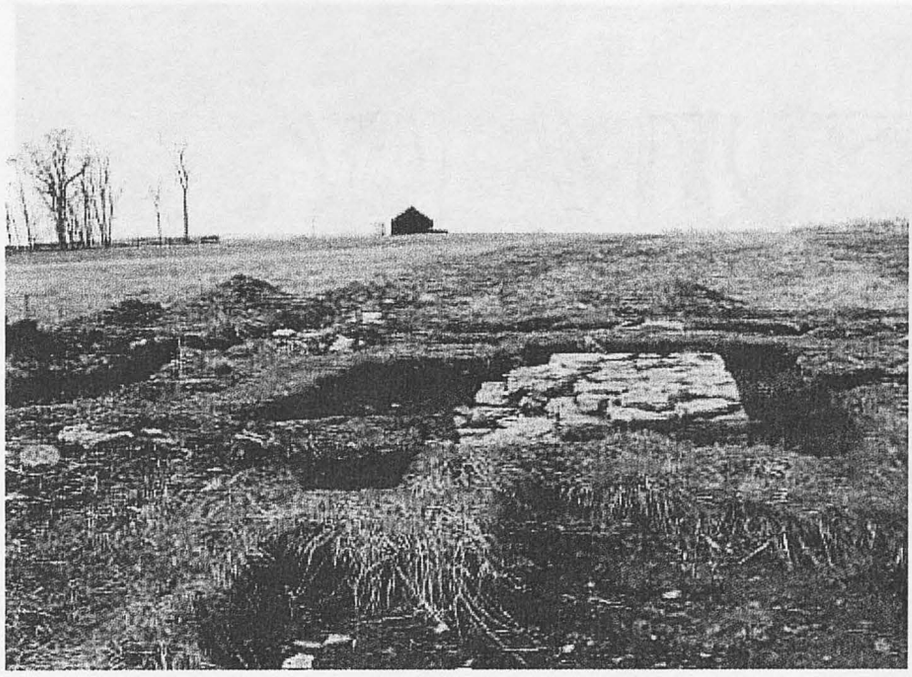


A stone facade to match the local indigenous stone outcrops was applied to the bridge structures near Paris

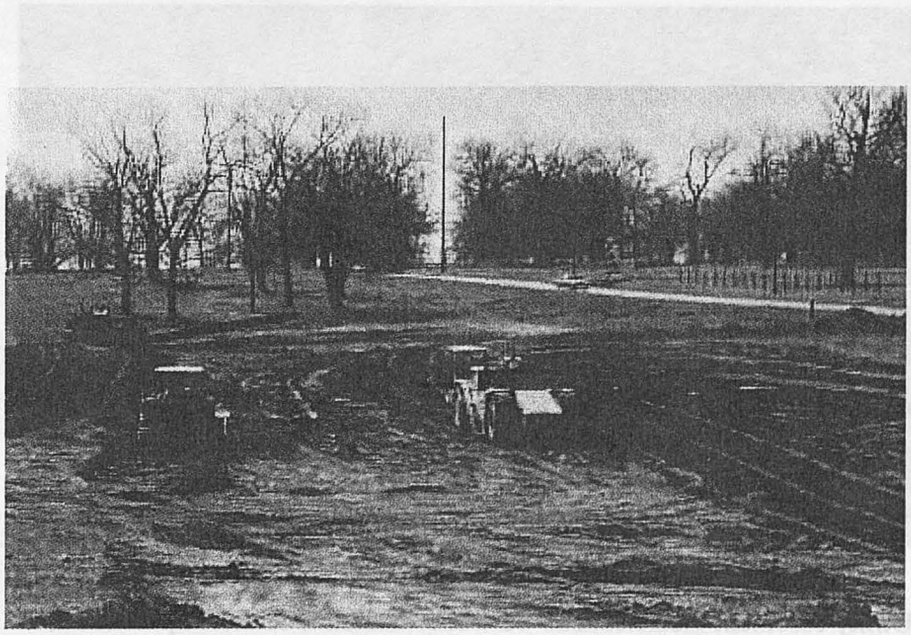
Extensive tree protection zones were established and maintained to prevent root affected zone damage of the existing mature trees

If not, stonewalls were dismantled and rebuilt

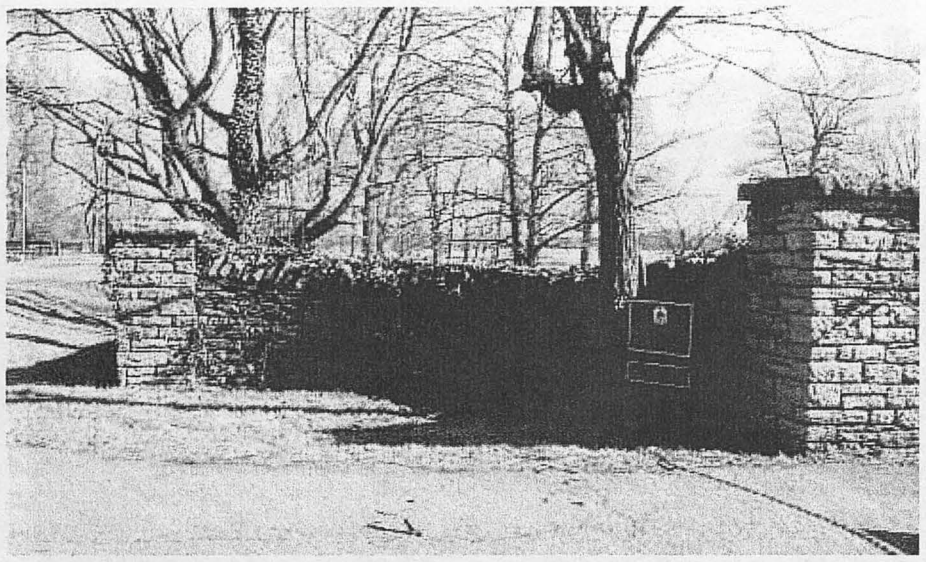
Steel-backed timber guardrail was used to provide driver safety while giving strong consideration to aesthetics



Archeological site investigations were performed at *Monterey,*
the first free-black community in Kentucky

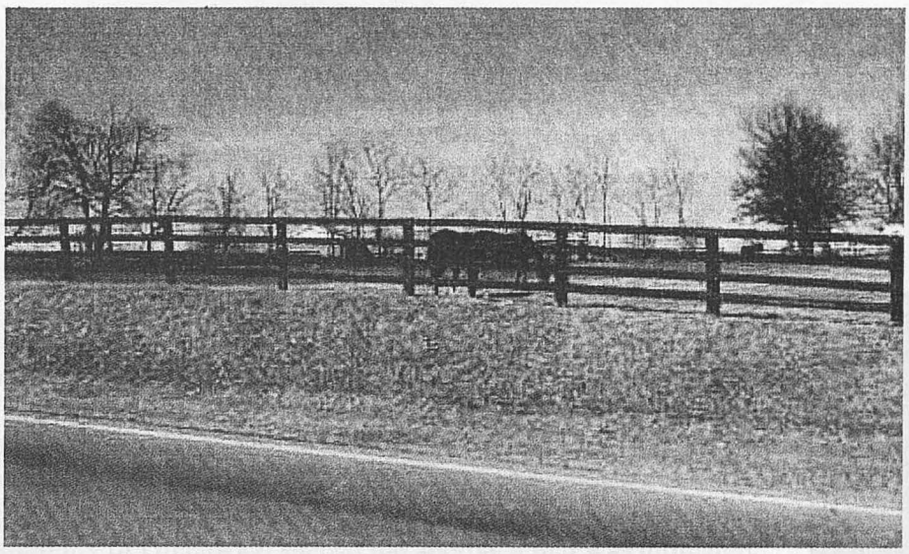


The original topsoil, *Marnie* silt loam, was stripped, stockpiled and returned
to the original 1 to 1½ foot thickness



Historic signature entrances to the horse farms were avoided by roadway alignment or rebuilt to original form

Utility easement modifications were coordinated to lessen impact on trees and overall aesthetics of the countryside



The Paris to Lexington Road Project – Adapting to the Environment

CONTEXT-SENSITIVE DESIGN CASE STUDY NO. 2

LOCATION:

Merritt Parkway – Greenwich, Connecticut

PROJECT DESCRIPTION AND HISTORY:

Much has been written and reported about the safety improvements and landscape restoration of the Merritt Parkway which started in the 1990s in Greenwich, Connecticut.[1] The project will be undertaken in seven sections and this case study focuses on the first phase, the gateway, for which design started in 1992 and construction was completed in 1997. It is fitting to include this project in a community-based study because the unique community of Greenwich shaped the approach that was ultimately taken to improve this roadway. The community's influence started long before any formal design process was undertaken, and was instrumental in motivating the context sensitive design approach (although not called such at the time).

The history of the Merritt Parkway is long and very significant to the conduct of this restoration project. In 1923, the plan to build a route parallel to the very busy U.S. Route 1 along the north shore of Long Island Sound, in Connecticut outside of New York City, was first conceived (See Figure 1). The 38 mile Merritt Parkway (US Route 15) which runs from the New York State line to just west of New Haven, Connecticut was completely opened in 1940. It was one of the first parkways in the country and the first limited access highway in Connecticut. The divided four-lane facility is approximately 5 miles north of the Sound paralleling the coast. The original conception was for a somewhat open formal garden way that offered vistas of the adjacent and mostly rural farmland. The roadway was designed to include extensive landscaping which was reduced in the 1970s to save costs.

The most notable aesthetic features of the parkway are the bridges representing Art Moderne, Art Deco, Classical, Gothic and Renaissance architecture. These bridges are undoubtedly the most treasured aspect of the facility for the community and travelers alike (See Figure 2). Each bridge, both over and under the parkway, is unique and very few had been replaced or altered significantly for maintenance or

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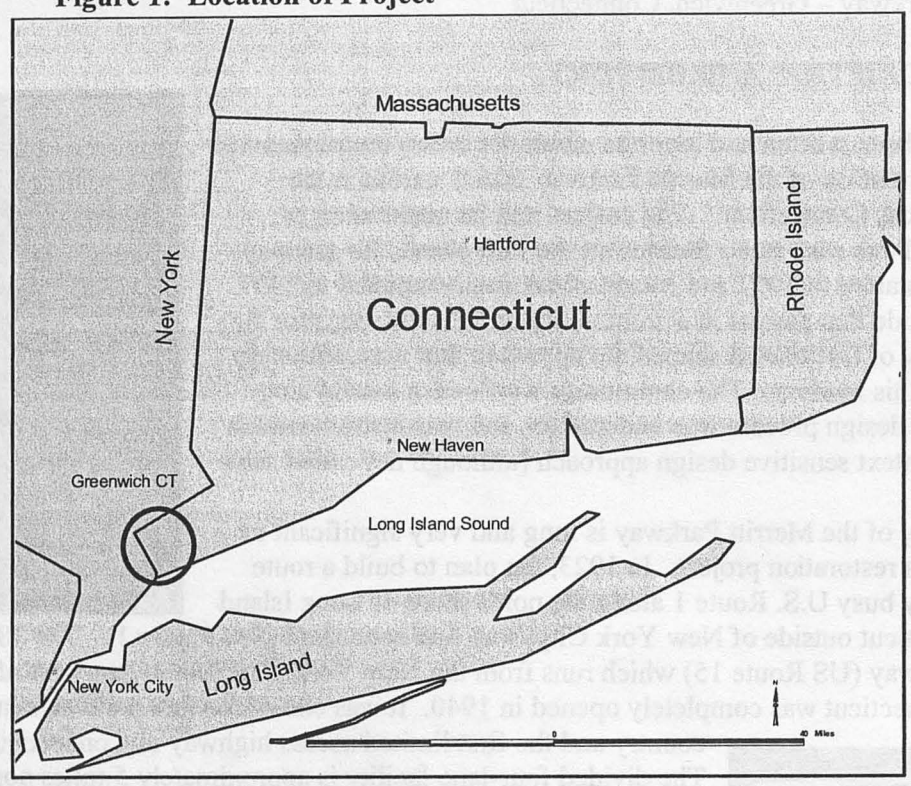
[1] The Merritt Parkway Working Group (1994) *Merritt Parkway Guidelines for General Maintenance and Transportation Improvement.*

Milone and McBroom, Johnson Johnson and Roy Inc., Johnson Landscape Design and Fitzgerald & Halliday Inc. (1994) *A Landscape Master Plan for the Merritt Parkway.*

Merritt Parkway Gateway – Greenwich (November 2000) Thinking Beyond the Pavement: Context Sensitive Design in Connecticut, Project History and Design Information Booklet.

repair. A less unique, but certainly charming, architectural element to the parkway is the frequent service areas which consist of miniature stone "old fashioned" gas stations (Figure 3).

Figure 1: Location of Project



Over time, the rural farmland surrounding the parkway was transformed into more developed suburban land use. The parkway itself remained buffered from the development owing to the very wide highway right of way. The wide right of way was originally intended to contain a second parallel roadway. Certainly in the 1980s, as traffic congestion on the parallel Interstate 95 became very significant, there were those that may have looked to expansion of the Merritt Parkway as a corridor traffic management solution. The existence of the large right of way made this possibility seem very real to many community members who wished to preserve the parkway.

Over the years, the gardens were transformed to rather dense and overgrown forests, that while different from originally conceived, still provide a peaceful park-like setting (See Figure 4). However, despite the park-like setting, some members of the public indicated during this case study, that they still feel somewhat unsafe on the narrow road that lacks shoulders. Vehicles tend to drive freeway level speeds on this road which lacks interstate level geometric standards. When the redesign process for the parkway began in 1992, the ADT was nearly 40,000 vehicles (no trucks or buses are allowed on the parkway) and the 85% percentile speed was approaching 70 mph.[2]

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[2] The Merritt Parkway Working Group (1994) *Merritt Parkway Guidelines for General Maintenance and Transportation Improvement.*

Figure 2: A Selection of Bridges on the Merritt Parkway

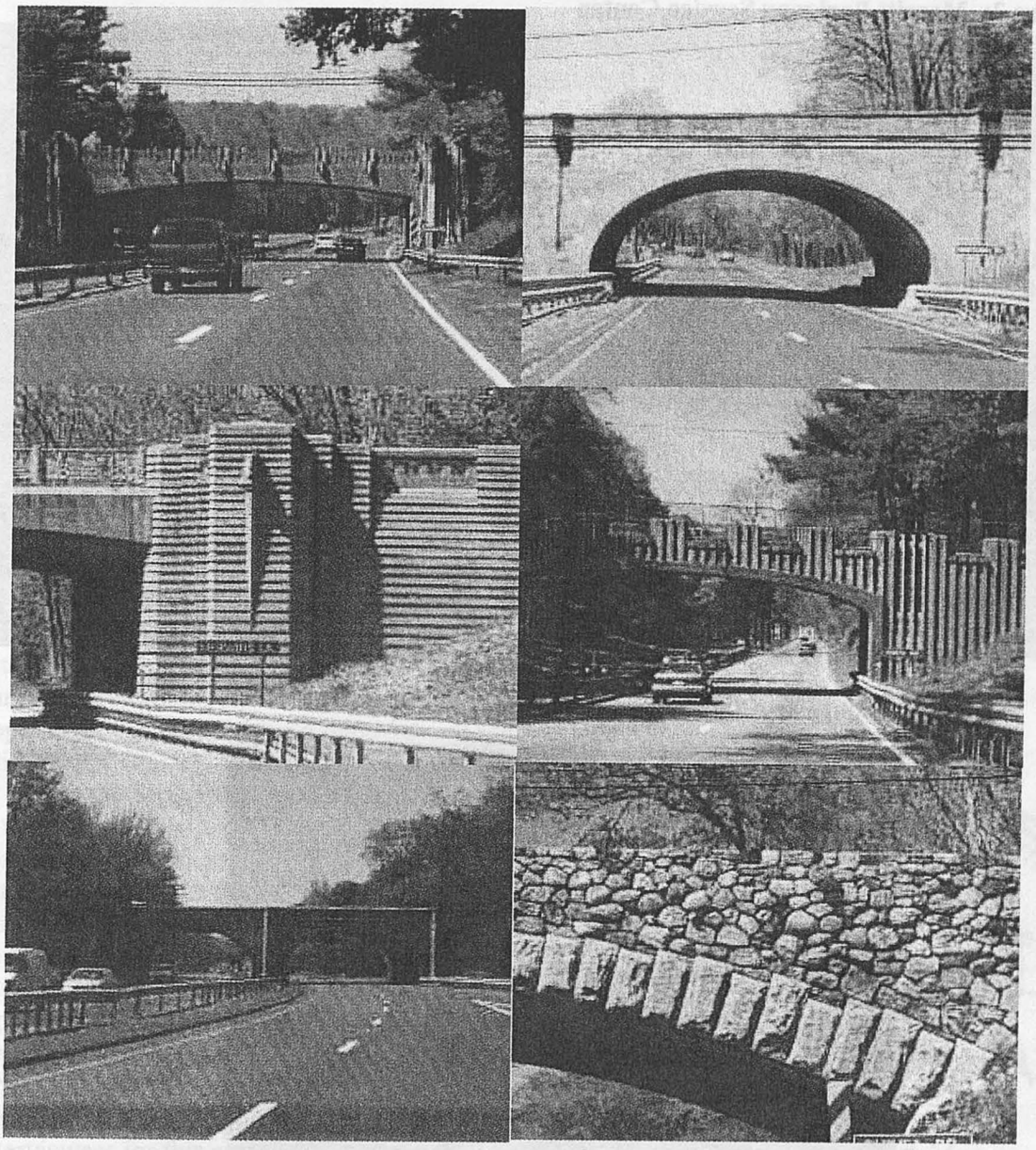


Figure 3: Merritt Parkway Service Center

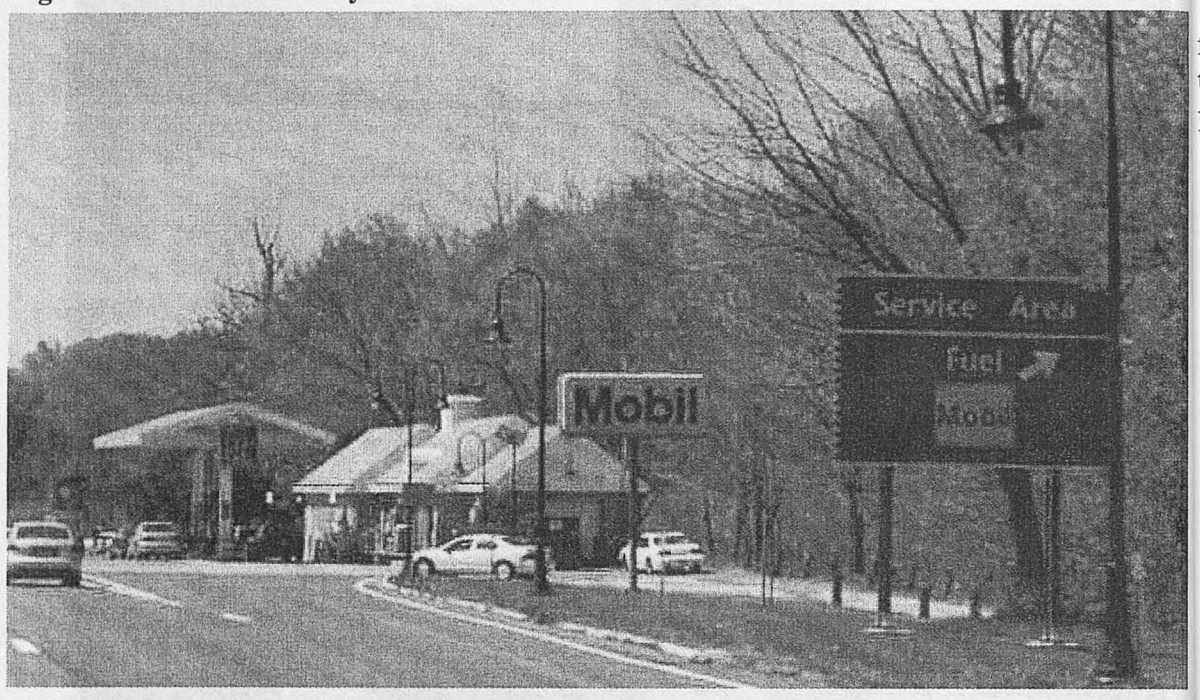
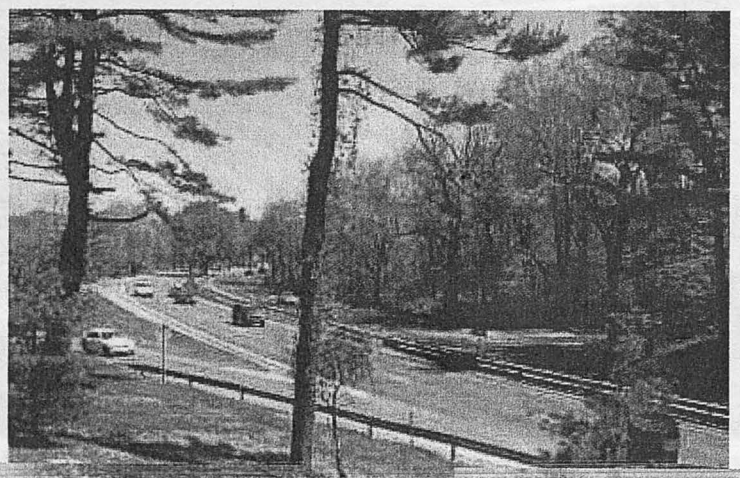
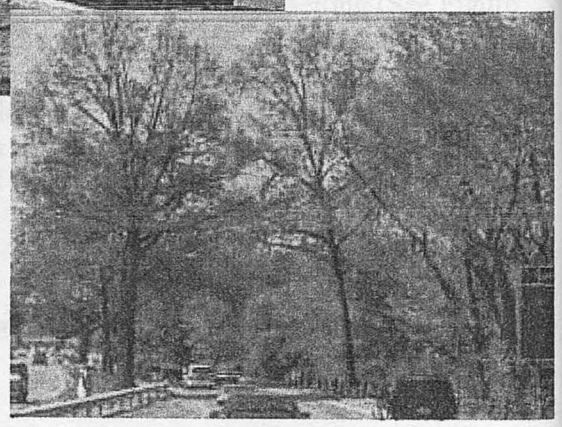


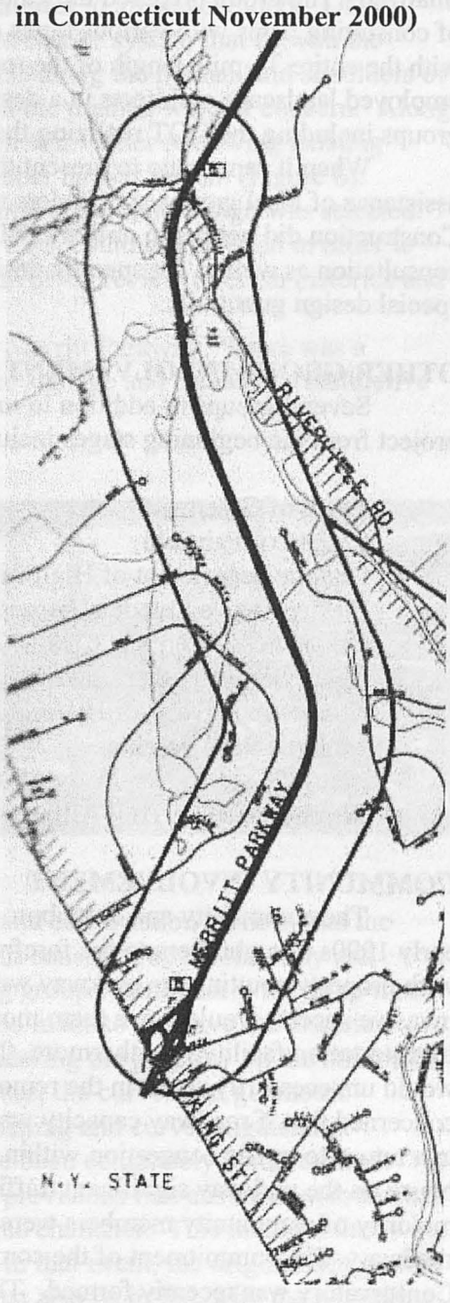
Figure 4: Character and Setting





This case study focuses on the initial context sensitive design process which preceded the first improvements to the highway and revitalization of the setting. This first section runs from the New York State Line in the Town of Greenwich in the southwest corner of Connecticut. The project runs for 2.5 miles. The general location is shown in Figure 1, while the first phase section, known as the Gateway, is shown in Figure 5. The second phase of work is about to start in 2002 and the third phase is in design. These subsequent phases are proceeding based on the documented guidelines and landscape plan that was developed during the multi-year multi-group effort preceding the gateway project.

Figure 5: Gateway Section of Merritt Parkway (Source: CSD in Connecticut November 2000)



THE COMMUNITY OF GREENWICH

The community of Greenwich, which might reasonably be termed a suburb of New York City, is somewhat unusual in that the median household income in Greenwich is $99,100 a year. This is almost double the state median of $53,900 (US Census, Profile of Selected Economic Characteristics). Furthermore, the cohesive community has a history of activism and community-based service especially in "green" issues. The powerful, active and well-informed community was identified during interviews for this case study as part of the impetus for handling this road improvement project "differently".

In the early 1980s modern interchanges were built at three locations along the parkway and this precipitated community movement for preserving the parkway and its character. In 1991, the Parkway was listed in the National Historic Register and shortly after it was named both a national and state Scenic By-way. These designations were community driven and further motivated the need for a balanced and well thought out design. Due to the nature of the community, the DOT would not have considered tackling this project without a design process that included all stakeholders. Interviewees for this case study indicated that the DOT was aware of the level of community interest and therefore never considered moving without community input.

DOT ACTION

By 1992, traffic volumes and speeds along the Merritt Parkway had continued to increase and the safety concerns required attention. In response the Commissioner of the Connecticut Department of Transportation established the Merritt Parkway Working

Group. This internal group was faced with balancing the safe transport of heavy traffic volumes, with not only the compromised geometric standards of the road, but also while ensuring the character and beauty of the roadway was maintained (or even enhanced to its original level). The commitment of the highest DOT management to the context sensitive design process (although not called such at the time) was essential to starting this process and ultimately responsible for its success. In the fall of 1993 the working group presented its findings to the public and in mid 1994 the "Merritt Parkway Guidelines for General Maintenance and Transportation Improvements" and the "Landscape Master Plan for the Merritt Parkway" were finalized. The group prepared the guidelines while the landscape plan was contracted to a group of consulting firms with various types of expertise. The landscape master plan was completed with the entire 38-mile length of the route in mind. This effort was the first time the DOT had employed landscape architects in a design process. The experience was a positive one with groups including the DOT realizing that different people hold important different knowledge.

When it came time to present the guidelines to the public, the DOT wisely sought the assistance of local groups and leaders to help set up meetings and to contact local stakeholders. Construction did not begin until the fall of 1996 as the interim years were used for public consultation as well as for specific design and research including the testing of features such as special design guardrails.

OTHER GROUP INVOLVEMENT

Several groups in addition to individual community members were involved in the project from the beginning stages including the following:

Town of Greenwich
County of Fairfield
District Department of Highway Offices
Elected state and federal representatives
Greenwich Green and Clean
Connecticut Chapter of American Society of Landscape Architects
Connecticut Trust for Historic Preservation
National Park Service
Metro Pool
Merritt Parkway Trail Alliance

COMMUNITY INVOLVEMENT

The community and neighbors of the Merritt Parkway had varying concerns that in the early 1990s brought them to the forefront of the discussion on the future of the parkway. People with property abutting the parkway were concerned that plans to clear the forest of vines and invasive species would leave them more exposed to noise and the visual impacts of the transportation facility. Furthermore, they were concerned that the access needed for construction would unnecessarily result in the removal of some of the forest. Community members were also concerned that if roadway capacity was increased, traffic volumes would also increase, resulting in a return to traffic congestion within a few years. The community did not necessarily wish to house on the parkway significant traffic that was passing through from other towns. The vast majority of community members were concerned to preserve the scenic beauty and history of the roadway. The commitment of the community is evident still today as the Merritt Parkway Conservatory was recently formed. This group was created in recognition that with DOT

budgets shrinking local money needed to be raised for landscaping. These community concerns stretch beyond simply the parkway as another local group, Greenwich Green and Clean, has undertaken an interchange beautification project on I-95. They have claimed great success not only for the landscaping but also for the project's impact on litter reduction.

CONTEXT-SENSITIVE FACTORS

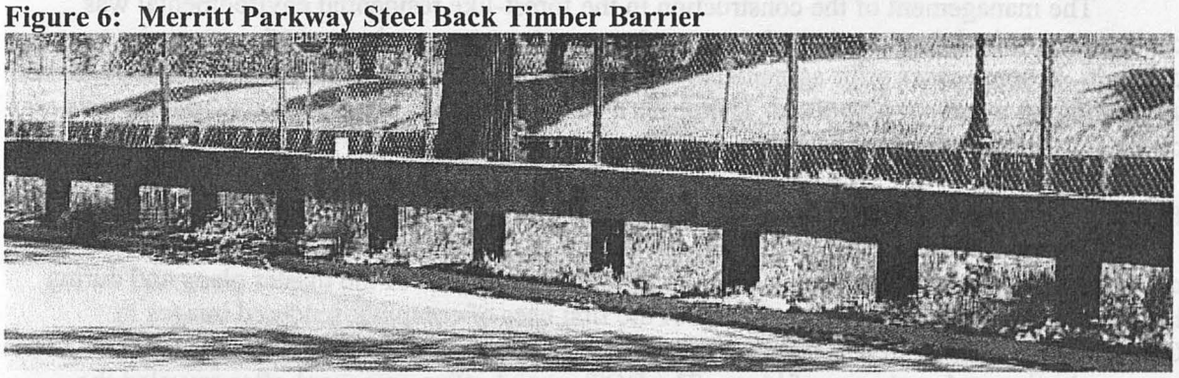
Scenery and Aesthetics

Concerns related to scenery and aesthetics were of interest to all stakeholders. Of particular interest in this case was the development of a rigid barrier system that fit with the scenery of the parkway but also provided protection to drivers along the median and shoulders of the road. The very small median and the presence of trees in the median were of concern. Along the shoulder and clear zone, both rocks and trees were of concern. After reviewing existing systems, the DOT designed and tested its own steel-back timber barrier system (Figure 6). Several iterations were needed with crash testing before a final acceptable design was selected.

Careful consideration was given to which rocks and trees could be removed in order to balance safety improvements with scenic objectives. This involved review of crash histories and also careful engineering evaluation.

Guidelines for signage were also established for the Merritt Parkway. There was a concern to provide safe functional signs but also to minimize signage and establish a distinctive style that fit with the scenery.

Figure 6: Merritt Parkway Steel Back Timber Barrier



Historic

This project is somewhat unique in highway design and construction work in that the historic assets were not along the property to be obtained, but consisted of the roadway and bridges themselves. This created challenges for the working groups, particularly for those that sought to improve safety. Ultimately, compromises had to be made to preserve the historic character. A contrasting case study might be made by considering the parkway on the other side of the Connecticut - New York border to the west. In this case, the curves and geometric standards were addressed in the traditional way through widening and curve lengthening. However, the atmosphere and character of the roadway have been completely compromised.

The guidelines for the Merritt Parkway also include provisions that ensure restoration of the bridges will proceed in a manner that protects their unique character. This includes the eventuality where a complete bridge might need replacing. In that event, the original design will be replicated. Any new bridge over the Merritt Parkway must also be in line with the prevailing

character and not of the plain concrete style of the newer interchange bridges.

Environmental Concerns

The environmental concerns along the Merritt Parkway might be considered minor compared to projects involving wetlands or water, however the proper course of action was not necessarily easy to define. Forest management, invasive species removal in particular, was undertaken as opposed to continuing to let the area overgrow naturally.

Multimodalism

Some members of the community have requested pedestrian access, perhaps along a shared-use trail, within the large park-like forest along-side the parkway. This issue has not been resolved due to safety concerns and a failure to reach consensus on how access could be provided.

Safety

In addition to the guardrails and removal of rocks and trees already discussed, several other efforts to improve safety were undertaken. Due to the lack of shoulders, grass pull off areas are to be maintained and provided where possible. Park curbing was to be utilized in order to provide adequate drainage especially during heavy rain events. Consensus was reached to provide standard pavement markings and roadside delineators.

Other Community Needs

The management of the construction in the forest-like residential environmental was challenging. Obtaining access to the areas where work such as rock removal was required was difficult. In some cases prior agreements had to be broken in order to practically accomplish the work with the machinery involved. There was a constant need to inform and explain the nature of the construction tasks to the public but especially the neighbors.

Public Education and Involvement

The community-led nature of this project resulted in excellent attendance at public meetings and information sessions both during the development of the master plans and during later planning. The project involved one of the first uses of computer rendered images in Connecticut and this tool was deemed very useful and important for facilitating the communication and exchange of ideas. The DOT central office personnel often traveled the distance to Greenwich to hold meetings but also to have one-on-one meetings with neighbors. However, it should be noted that the well-informed and active community made the effort to obtain public input on this project easier than might be the case in other areas or for other projects.

PROJECT OUTCOME AND ACCOMPLISHMENTS

The final project can be considered a successful compromise. The parkway remains a beautiful roadway with spectacular bridges. However, traffic congestion in the overall southwest corridor of Connecticut is still significant. Although guard rails and other improvements should show success in improving crash or fatality rates on the Merritt Parkway, speeds remain high and the facility lacks what might be considered less than the highest levels of safe engineering design. The wood guardrail has been hailed as a great success. Groups are working together to improve

plantings and landscaping further.

The lessons learned on this project include the need to involve maintenance personnel in early design discussions. Maintenance has been challenging in some areas requiring more manual labor than is ideal. The need for better communication during the construction phase was also identified. Another missing piece was the provision of turn arounds for emergency vehicles. Finally, although the preparation of formal written documents is an excellent tool, especially given the number of years it will take to construct improvements along the entire length of this parkway, some problems with consistency between the "master plan" and the "guidelines" were encountered. One single document may have served the groups better.

Overall this project can be considered an excellent example of how a road represents so much more to a community than simply a transportation conduit. The future of this roadway was community driven and while the DOT provided the leadership and expertise to accomplish the improvements, their use of other professionals, such as landscape architects and historians, improved the final result.

CONTEXT SENSITIVE DESIGN CASE STUDY NO. 3
Danville-Riverside Bridge and Bridge Approach, Montour and Northumberland Counties, Pennsylvania

LOCATION

State Route 54 across the Susquehanna River spanning between Riverside and Danville in Montour and Northumberland Counties, Pennsylvania.

PROJECT DESCRIPTION

The project involved replacement of an existing two-lane Parker Through Truss bridge built in 1904 spanning the Susquehanna River, with a new 1440 foot long bridge with weathered steel haunched girders. The approach to the old bridge from Danville was on Mill Street, the center of the town's downtown commercial area. The final alignment for the new bridge on this side of the river directs traffic under two blocks of the West Market Street Historic District one block west of Mill Street, creating a 320 foot long cut and cover structure before transitioning onto the four-lane Continental Boulevard which links to other major traffic routes.

PURPOSE AND NEED STATEMENT

The Evaluation of Project Need report was finalized in February 1991. This report was formally presented to the public at a public meeting in Danville in March 1991. The purpose and need statement was not developed based on consensus with all stakeholders, since the Citizens Advisory Committee first met in September, 1991.

The report summarized the need for the bridge replacement as follows:

- A number of structural components are deficient.
- The structural configuration of the bridge is not a redundant design that would prevent a possible catastrophic collapse in the event of a failure in a structural member.
- The bridge trusses are susceptible to damage caused by motor vehicles.
- The bridge has a sub-standard roadway width.
- The bridge will eventually have to be weight restricted because of its contributing deterioration. Long-term maintenance of the existing bridge is not cost effective because of escalating maintenance costs.
- Rehabilitation of the bridge would not be prudent because of the adverse socioeconomic impacts caused by even a short-term bridge closing. Rehabilitation would not correct the narrow bridge width nor would it assure that the bridge will continue to be non-weight restricted in the future.
- The bridge serves as a vital link between the northern Northumberland County area and Danville, providing access for police, fire, and medical services, and for secondary school students.

- The economic viability of the region is partially based on the ability of businesses to receive raw materials and ship finished goods on a highway system, which is safe and efficient. A weight-restricted river crossing at this location would preclude manufacturers in the Danville-riverside area from using route 54 to access Interstate 80 or 81.

In addition to the replacement of the steel truss bridge, other project needs and objectives were identified including:

- The relief of traffic congestion within Danville's Mill Street Business District.
- The relief of traffic congestion in other areas of Danville and Riverside Boroughs.
- The reduction of vehicular accidents within the Route 54 corridor.
- The reduction of traffic noise and vehicle exhaust emissions, particularly within the Danville Historic District.
- The long-term preservation of historic resources within Danville and Riverside.
- The transport of agricultural products and services.
- The improvement of pedestrian access and safety within the study area.
- The preservation of public parklands within Danville borough.

CONTEXT SENSITIVE FACTORS

A wide range of context sensitive issues were addressed as part of this project including the impact of the bridge approach through Danville on business in the downtown commercial area, the impact of construction on historic properties directly adjacent to the cut and cover section and on the natural environment of the river. Aesthetics and creating a project that would enhance the identity of both Riverside and Danville were also important considerations. Context sensitive design and construction issues which were implemented as part of this project include the following:

Bridge Design: The new, 1440-foot, seven-span, continuous composite steel girder bridge was built on new location immediately downstream of the old bridge, and includes distinctive architectural features designed to provide a clean, uncluttered appearance, while complementing the area's historic setting. These features include:

- Historic quarried stone appearance of the piers and abutments
- Arched weathering steel girders
- Traditional style parapets
- Decorative pedestrian railings
- Historic-style "dual acorn" street lamps
- Pedestrian alcoves at each pier - good fishing locations.

The communities of Danville and Riverside wanted a cut-stone arch bridge but PENNDOT determined that this was not a reasonable and prudent option because of high costs. The chosen solution utilized conventional, unpainted, grade 50 weathering steel designed with haunched girders. There are no joints over the entire 1440-foot long bridge except at the abutments. This eliminated the associated costs for new deck joints at the piers and their long-term maintenance costs. The steel also tied into the regional iron-making heritage, satisfying one of the community design guidelines requirements. Additional benefits were gained in the longer spans and high slenderness ratios that the

steel girders provide, which eliminated three piers and significantly increase the hydraulic opening.

Cut and Cover Design: The "underpass" section, SR 6054, Section A14, is located on Factory Street in Danville, immediately north of the new river bridge. The underpass provides a straight, new alignment that extends from Riverside, across the new bridge, directly through (and under) the Danville historic district, to Continental Boulevard (a four lane, limited access facility). By essentially isolating the roadway from its historic surroundings, the underpass allows traffic to flow safely and less obtrusively through Danville while preserving the area's historic character. Finally, by giving trucks and other through traffic the opportunity to bypass Danville's Mill Street business district, the underpass has reduced congestion on this main street.

A major focus of the design effort was to create a "livable, visually-appealing, and historically-correct," integration of roadway, structure, and historic neighborhood. Like the new bridge, the underpass includes amenities and distinctive architectural features that blend the new construction with its surroundings. These include:

- Historic quarried stone finishes on the retaining walls
- Historic-style "dual acorn" street lamps matching those on the bridge
- Brick pylons to match the area's brick buildings
- Ornamental fencing
- Brick pavers for the streets crossing over the underpass
- Slate finish sidewalks
- Landscaping including trees and shrubs
- Raised planter and pedestrian promenades.

Protection of Historic Structures: A significant challenge in the design and construction of the underpass was protecting the delicate historic buildings immediately adjacent and within 5 feet of the structure's deep excavation. Detailed designs of three approved alternate systems – slurry wall, secant pile wall, and soil-mixed wall – were developed. All three methods are complicated, rely on sophisticated technologies, involve careful construction sequencing, and require qualified specialty contractors. The project's construction documents specified the allowable support methods, minimum design, installation, and monitoring requirements. The required sequence of construction was thoroughly documented and integrated into the underpass design to assure the proper interface between the temporary bracing system and permanent structure.

The contract included the following mandatory construction requirements:

- Minimum disturbance/vibration
- Near-zero horizontal ground movement.

The contract documents provided details and specifications to control noise and vibration, and to minimize risk. Grouting specifications were designed to provide additional foundation stabilization to the four adjacent historic homes. In addition, instrumentation systems were designed to closely monitor vibrations and any horizontal or vertical soil movements. This early detection would provide time to develop remedial or

precautionary measures if shifting occurred. The specifications also required preloading the strut/bracing system.

As a result of careful attention to all aspects of the design and construction, the underpass was successfully completed with no detectable soil movements and no damage claims to historic properties. Nearly 8,000 mechanical reinforcement splices were used to construct the underpass in four phases.

The contractor chose to build the soil-mixed wall alternative. Soil-mix walls consist of hardened soil-grout mixture, with steel I-beams inserted vertically at 5-foot intervals. The soil-mix walls used to build the underpass were 3 feet thick and up to 45 feet deep. The walls are installed from the existing ground surface prior to beginning excavation. After the soil-grout mixture gained sufficient strength to resist soil pressures, the ground adjacent to the wall was excavated. Lateral bracing was installed between the soil mix walls as the excavation progressed to prevent excess wall deflection. Finally, after the excavation operations were completed, the storm drainage lines were installed and the underpass structure was built using conventional reinforced concrete.

Soil mixed walls are normally used when very rigid excavation support is needed and when the proximity of existing structures necessitates minimal ground disturbance as excavation support is installed. Clearances as tight as 5' between existing residences and the 30' deep excavation needed to construct the underpass dictated specialized excavation support measures. Although PENNDOT selected contractors by low bid, they also had to be prequalified. PENNDOT felt fortunate to get a competent prime contractor that did the actual construction of the underpass and a subcontractor very familiar with the soil mixing process.

Enhancement of Boroughs: The Boroughs of Danville and Riverside saw the bridge project as a revitalization opportunity for their communities. The boroughs obtained approval to use ISTEA enhancement funds and carried the architectural treatments from the bridge and underpass to Mill Street and Continental Boulevard in Danville and along the intersection approaches in Riverside including ornamental lighting, brick paving, an outdoor sound system on Mill Street, and new trees.

HISTORY OF PROJECT

In 1982, structural deficiencies were found during a routine bridge inspection of the steel truss carrying State Route 54 across the Susquehanna River. Critical structural members rated as substandard. Additionally, the 7-span steel truss bridge was determined to be functionally obsolete due to narrow lanes, a lack of shoulders, poor sight distances and low vertical clearance. Environmental studies were started in 1983 when the department retained the services of a consultant to develop alternatives and to conduct an Environmental Assessment. Numerous public meetings were conducted to solicit input from local citizens, community leaders and elected officials.

Alternatives were developed that ranged from replacement on existing alignment at Mill Street in Danville (the central business district), crossing on new location at Factory

Street in Danville in the West Market Street Historic District and local neighborhood), and for what some members of the communities wanted - bypassing the boroughs altogether with a new crossing upstream. Very early in the project the West Market Street historic District was established with the Factory Street Alternative the only one determined to impact a 4(f) resource. Eventually, the historic district was expanded to include more of the borough making both the Mill Street and Factory Street Alternatives 4(f) alternatives. The determination of eligibility for both districts preceded their listing in the register by a number of years – over five years for the Danville Historic District alone.

Amid escalating controversy over the identification of a preferred alternative, a public hearing was held in November 1988. The transcript of the hearing reveals deep division among the community members between the Mill Street and Factory Street alternatives with some residents believing that the existing bridge should be rehabilitated. The core concerns were perceptions that each proponent group had about their community and what was important to preserve.

The Federal Highway Administration elevated the project to Environmental Impact Statement (EIS) status in 1989 because of public controversy and concerns for the Danville Historic District. The project team started over with development of project purpose and need and set out a new course. The department organized a Citizens Advisory Committee (CAC) in September 1991 to meet routinely and discuss the various aspects of the project. The CAC requested the formation of a Community Design Task Force to address community design issues, prepare guidelines for implementation, and develop design concepts, resulting in publication of "Community Design Guidelines for Replacement of the Danville-Riverside Bridge" in July 1993. PENNDOT retained a consultant for preliminary and final design that same year

The draft EIS was circulated for comment in October 1992, and a second public hearing was held in November. The results were similar to the first public hearing in many regards, the community was still divided on the choice of alternatives. There was growing concern for the historic district (a Danville Historic District was listed in 1994 incorporating the West Market Street Historic District in a larger district) and the escalation of this issue to the Pennsylvania Historical and Museum Commission (PHMC) and the Advisory Council on Historic Preservation (ACHP) through a letter writing campaign by the project opposition.

A lawsuit filed against the Federal Highway Administration (FHWA) in January 1998 by the Concerned Citizens Alliance, Inc. on behalf of citizens of the Market Street Historic District sought to enjoin the project from proceeding. The National Trust for Historic Preservation filed an Amicus Brief to support the case. In July 1998 the United States District Court ruled in favor of the FHWA and in a subsequent appeal filed by the plaintiffs in the U.S. Court of Appeals in Philadelphia, the Circuit Court in May 1999 supported the District court's ruling.

To help resolve remaining concerns about which alignment entering Danville was best, PENNDOT hired a nationally recognized consulting team knowledgeable in historic preservation and commercial revitalization issues to evaluate the two alternatives under

consideration, the Mill Street and Factory Street alignments and their relative impacts on historic resources and the business community. Their mid-1995 report concluded that "The Factory Street bridge location is…the more acceptable solution to a vexing situation." The team identified, however, a series of measures that were needed to mitigate the impacts of this alternative that were included in the Memorandum of Agreement signed the next year and are discussed under the Resource Agencies Involvement section.

A new Danville-Riverside Community Design Group (CDG) of 33 members was formed in April 1996 including some members from the CAC, to address issues in final design. A Memorandum of Agreement between FHWA, PHMC, the ACHP and the Boroughs of Danville and Riverside was signed in June 1996. The Final EIS was approved by FHWA in July 1996 and the Record of Decision was issued by FHWA in May 1997. Groundbreaking for the bridge came in July 1998 and a dedication ceremony for the new bridge occurred two years later in mid-2000. The Underpass was opened to traffic about two months later.

HIGHWAY AGENCY INVOLVEMENT

PENNDOT initiated this project in 1982. The agency's involvement continued throughout the project and was critical to the evolution of events and eventual progress that occurred on the project.

RESOURCE AGENCIES INVOLVEMENT

The Pennsylvania Historical and Museum Commission (PHMC) had the greatest involvement of the resource agencies. Following the listing of the Market Street Historic District on the National Register in 1984, PENNDOT asked their consultants to survey the entire Borough of Danville for National Register eligibility. This resulted in the designation of a Danville Historic District, which encompassed the West Market Street Historic District, as eligible in 1989. This district was formally listed on the National Register in 1995.

The selected alternative called for the relocation or demolition of two properties in the historic district, one of them a non-contributing element of the district. Alternatives for treatment for the other house that was found to contribute were included in the MOA. Another contributing property eventually was demolished once construction was underway. The Iles House located at the intersection of Factory Street and Mahoning Street, was not needed for construction of the Underpass, but structural deficiencies inherent in the building's design and construction posed a safety concern for its 83-year-old owner/occupant, Mrs. Ruth Iles, by the adjacent Underpass construction activities. It was purchased for stabilization during Underpass construction with restoration work to be completed later. Subsequent investigations of the property by the contractor and structural engineers determined it to be too severe of a safety risk for workers performing the stabilization and recommended demolition of the building. PHMC concurred with

the recommendation on the condition the MOA be amended to include the former Iles property in the boundaries of the Urban Design Plan.

Other concerns of PHMC echoed those of residents and the business community in Danville who were concerned about the impacts of taking traffic off of Mill Street, its possible negative impact on businesses and the potential negative impact of inappropriate new development along Front Street between the new bridge and the start of Mill Street. Mitigation measures to address these concerns were identified in the course of the expert consultant team's report completed in 1995 and were included in the MOA signed in 1996.

The MOA called for FHWA and PennDOT to prepare an Urban Design Plan to integrate the Danville-Riverside Bridge Replacement Project into the Danville-Riverside area while maintaining the character of the Danville Historic District. FHWA was to provide funding for PennDOT to prepare the plan including design guidelines, development strategies and potential zoning modifications to encourage the most appropriate development for the gateway into the borough. FHWA was also to provide funding to PennDOT to develop a traffic and parking plan to focus on the needs of pedestrians and downtown shoppers and to hire a planner to work in conjunction with Borough officials to maintain the economic vitality of the downtown area.

All the above activities stipulated in the MOA have been completed except for the proper disposal of the vacant land along Front Street. A marketing plan for developing the property that takes into consideration the compatibility with the Historic District is expected to be advertised in the next couple of months. There is interest in both the private and public sectors for the property

COMMUNITY INVOLVEMENT

The intense level of community concern engendered by this project necessitated a strong program of community involvement. PENNDOT benefited from the inputs from three community task groups, two in the preliminary design phase and one in the final design phase. The Citizens Advisory Committee included 17 members representing residents' and business interests. A sub-group called the Community Design Task Force (CDTF) was formed with a larger membership of 22, to focus on aesthetic design issues.

Given the high level of controversy within the community about this project, the CDTF provided a forum for a broad range of citizen interests to build their own consensus about a vision for the community and the contributions possible from the new bridge and access through Factory Street. Their foreword to their guidelines report states in part, that while federally mandated highway design "standards have helped improve highway safety and the efficiency of our transportation network, they have done little to address urban design and social issues in the neighborhoods and communities which highways affect."

The Community Design Task Force (CDTF) sought to educate themselves through assessing the character of the proposed project area and its environs, research on historic and contemporary bridge and tunnel types to better understand the economic and

environmental determinants of structure types and structural forms, and photographic studies of Susquehanna River bridges. The Guidelines publication identifies underlying principles of their work: Cost and Benefits, Value Added, Design Approach, Urban Character, Riverfront, and Linkages. Regarding the Design Approach, they asked that the project team, "Give equal consideration to transportation and community design objectives. Be flexible with the interpretation and application of federal design criteria. Permit reasonable accommodations in design consistent with the existing scale and urban situation of the project."

The CDTF's publication, "Community Design Guidelines for Replacement of the Danville-Riverside Bridge" provided valuable guidance to the engineering firms responsible for final design of the bridge and Factory Street connection, allowing them to move ahead quickly with design work with confidence that there would be community support for concepts that adhered to the guidelines.

A community Design Group (CDG) of 33 participants with membership overlapping the two previous groups was formed to assist the engineers with final design. They met 19 times over an 18-month period providing valuable input to expedite the design process.

NATURAL ENVIRONMENT ISSUES

A causeway, necessary for construction of the new bridge and removal of the existing bridge required review and approval by the state's Department of Environmental Protection (DEP). Additional restrictions included fluctuating river levels, permitting restrictions to half-width of the normal flow, and a flood control levee around Danville. Careful planning and execution resulted in a complex, but effective construction sequence.

The causeway was first constructed from the Danville side through a temporary breach and closure structure in the levee. A temporary stop-log structure, designed to meet DEP criteria, was constructed to maintain the highest level of flood protection. After the piers were completed on the Danville side, the causeway materials were excavated, loaded on trucks, and hauled to the opposite end of the causeway where they were deposited and recompacted. The causeway relocation operation was a continuous movement of causeway materials from one end to the other. In all, the causeway was relocated four times.

HUMAN ENVIRONMENT ISSUES

Issues of the human environment were paramount in this project, from concerns regarding preservation of National Register properties to concerns for the business environment of downtown Danville once its historic role as the primary artery through town was changed. Many of these issues were addressed in an expert consultant team's report. Recommendations developed through this report were incorporated in the Advisory Council's MOA and these commitments to support mitigation measures were helpful in allaying public concerns.

SCHEDULE OF ACTIVITIES

- 1982 - Bridge inspection conducted; structural deficiencies identified.
- 1983 - PENNDOT initiates engineering and environmental studies
- 1985 - West Market Street Historic District listed in National Register of Historic Places.
- 1988 - Environmental Assessment completed with 4 alternatives; public meeting held amidst growing controversy.
- 1989 - FHWA elevates the project to Environmental Impact Statement status and the project team starts over to consider alternatives.
- 1991 – PennDOT organizes a Citizens Advisory Committee (CAC).
- 1992 – CAC requests formation of a Community Design Task Force to prepare guidelines for implementation.
- 1992 – Draft EIS is circulated for comment; public hearing held to consider comments again reveals major controversy over alternatives.
- 1993 – CDTF completes and publishes design guidelines.
- 1993 – PennDOT retains consultant to prepare preliminary and final design plans.
- 1996 – Danville-Riverside Community Design Group (CDG) is formed to provide input to design.
- 1996 – MOA (Memorandum of Agreement) is signed among FHWA, PHMC, ACHP and boroughs allowing project to proceed; FHWA approves Final EIS.
- 1997 – FHWA issues Record of Decision.
- 1998 – Lawsuit is filed by Concerned Citizens Alliance, Inc. against FHWA to enjoin construction of the bridge, but the US District Court rules in favor of FHWA.
- 1998 – Groundbreaking for the bridge
- 1999 – In the appeal of the lawsuit, the US Court of Appeals in Philadelphia supports the District Court's ruling.
- 2000 – Dedication ceremony held

PROJECT OUTCOME AND LESSONS LEARNED

The completed project is viewed as a major asset with distinctive quality by the public. Despite significant dissention through an overly long project development process, the public's goals to preserve valued historic resources and for the new facilities to serve as a source of pride and identity for the boroughs have basically been met.

It was a drawback that a consensus was not reached among all stakeholders and the project team on the chosen alternative. While diverse community involvement techniques allowed the project to go forward with substantial input from the public once the EIS was mandated; some stakeholders, including property owners immediately affected by the project, did not feel that all viable alternatives were fully explored or that their concerns had been adequately heard and taken into account in selecting a final alternative.

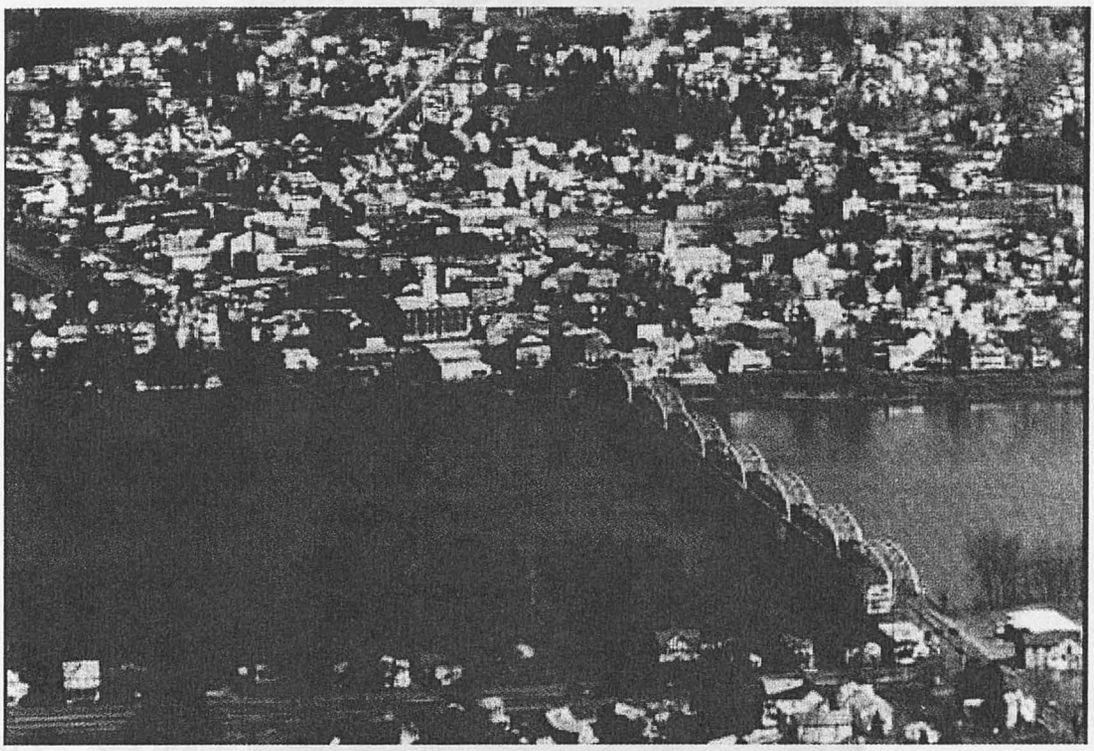
The aesthetic vision for the project elements was developed and clearly articulated by the 22-member Community Design Task Force. This group set out to address the opportunities for urban design to enhance the boroughs of Danville and Riverside in the bridge project. The group's published guidelines, "Community Design Guidelines for Replacement of the Danville-Riverside Bridge" gave direction to the team preparing final designs as they sought to balance the transportation needs and cost restraints together with the community design vision established in the guidelines.

Although the public was involved in the design of the project from 1991 forward through the CAC, the lack of trust created through traditional avenues for interaction with the public in project stages prior to that date was never fully eliminated. Immediate neighbors in the project area felt that PENNDOT continued to make decisions "behind closed doors" without full disclosure to the public.

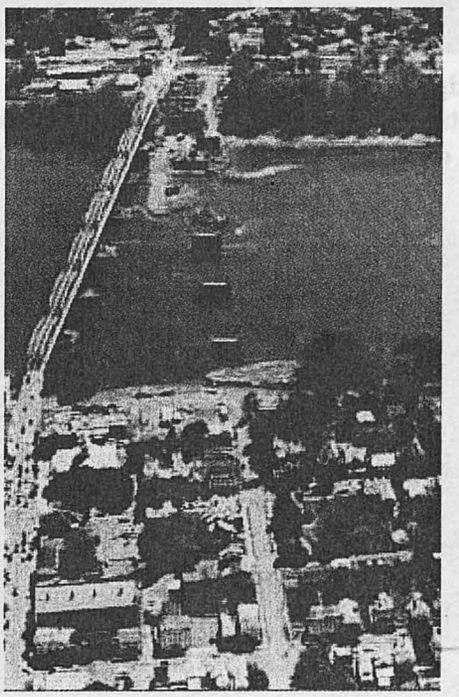
PENNDOT's decision to hire a recognized team of experts in historic preservation and commercial revitalization was helpful in providing an "outside" opinion on the choice of two alternatives and in identifying mitigation measures that would help reinforce the historic character of the community and support the downtown business core as it adjusted to a new pattern of traffic.

It might have saved years and considerable money if the project had been scoped as an EIS from the start. Initial interviews with various stakeholder groups should have given clues to the level of disagreement within the public on both the purpose and need of the project and possible alternative solutions. Had a more meaningful coordination and outreach effort to a full range of stakeholders taken place early and efforts to reach consensus on both the purpose and need of the project and alternatives, project time might have been considerably shorter and project interactions less contentious.

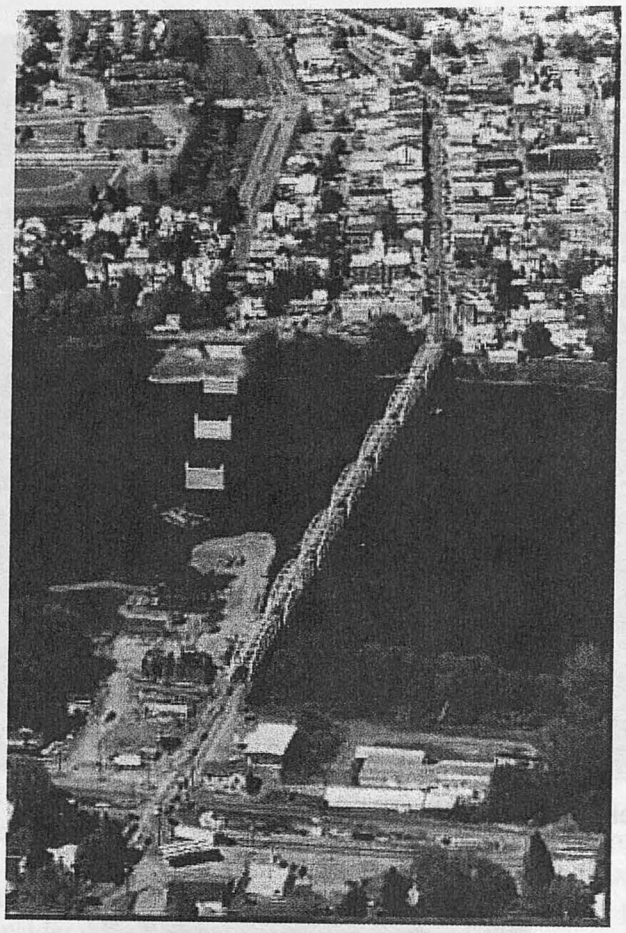
The lessons learned in this project process have helped shape PENNDOT's evolving pro-active effort to involve stakeholders earlier and more meaningfully in project planning, design and development. Several publications to assist staff and consultants have been published including an Environmental Impact Statement Handbook in 1993, a Public Involvement Handbook in 1995 and a Needs Study Handbook in 1996.



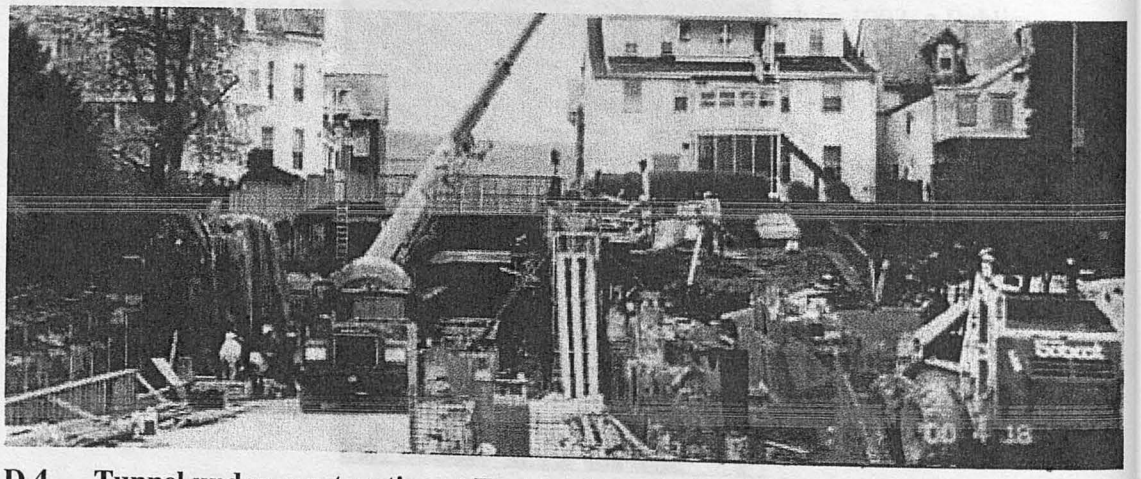
D.1 1904 Parker Through Truss Bridge from Riverside at lower right to Danville.



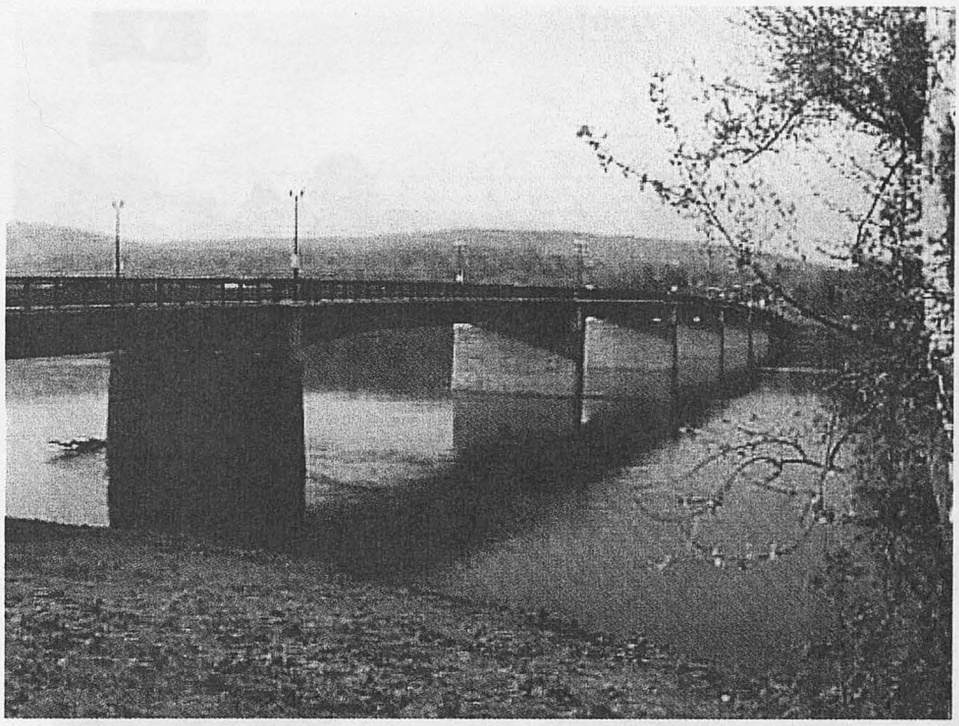
D.2 Aerial view of bridge under construction. Danville is at bottom of photo.



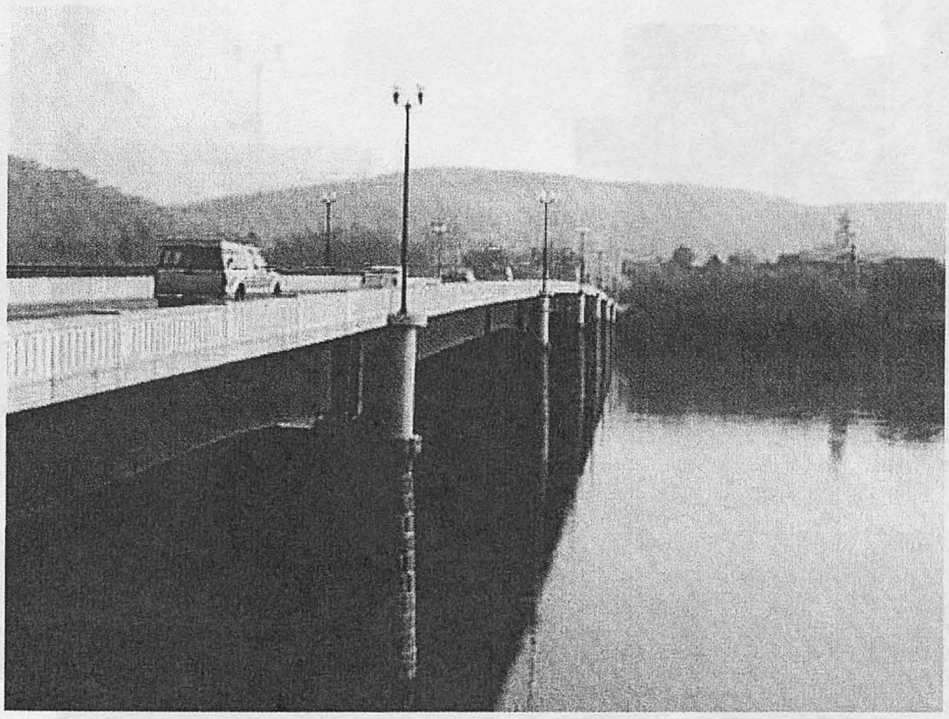
D.3 Aerial view of bridge under construction. Danville is at top of photo. Old bridge connects to Mill Street in Danville. New bridge will connect to Factory Street. Note relationship of Factory Street to Continental Boulevard.



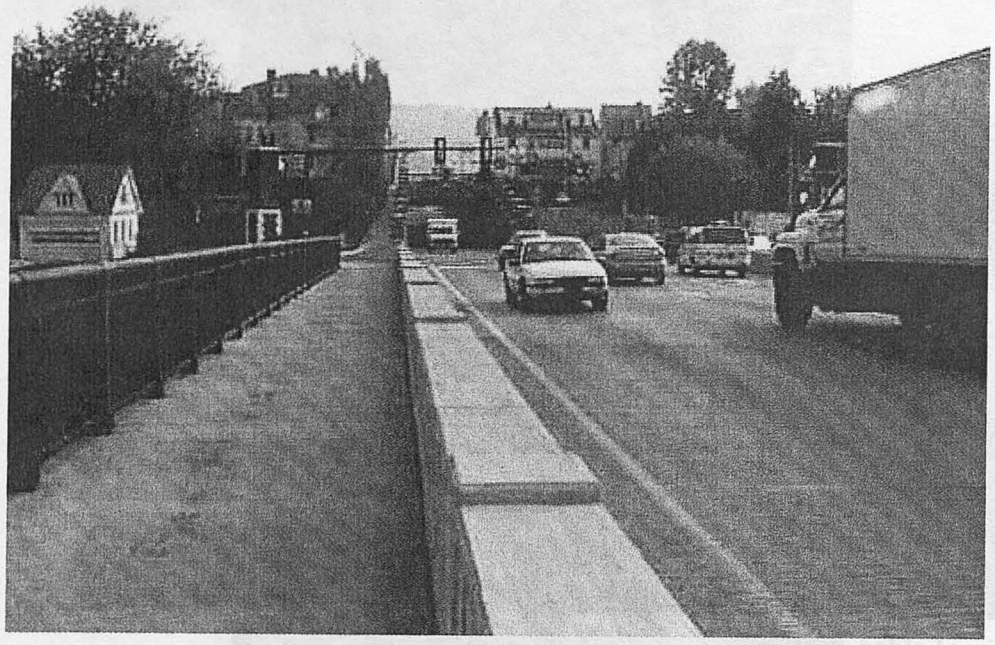
D.4 Tunnel under construction at Factory Street.



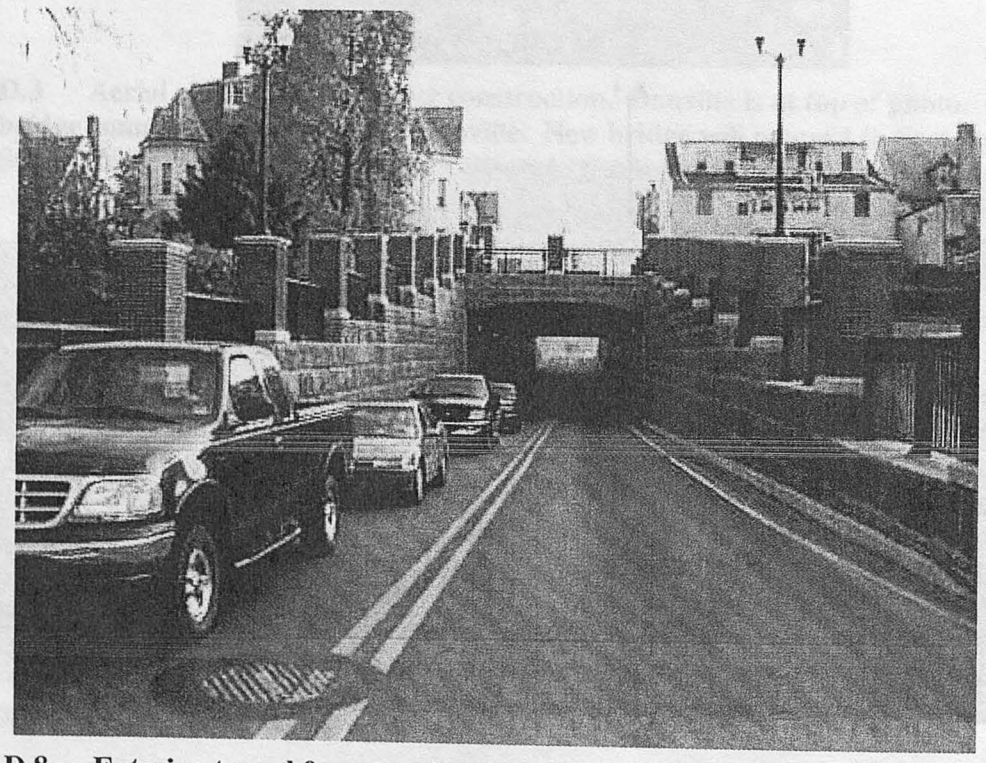
D.5 New bridge.



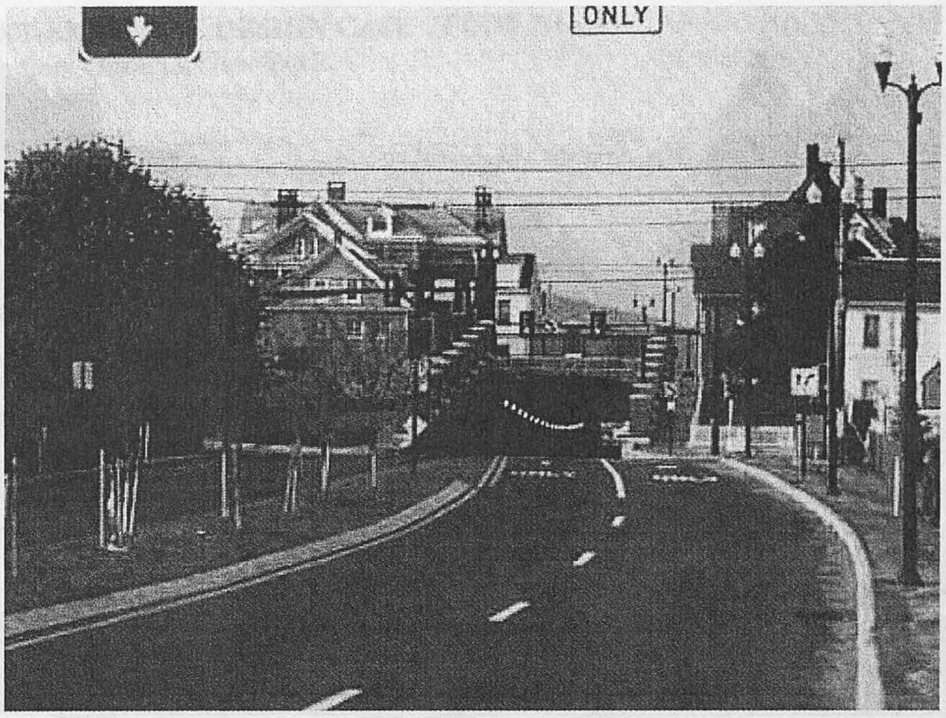
D.6 New bridge



D.7 Photo taken from new bridge toward tunnel under Factory Street.



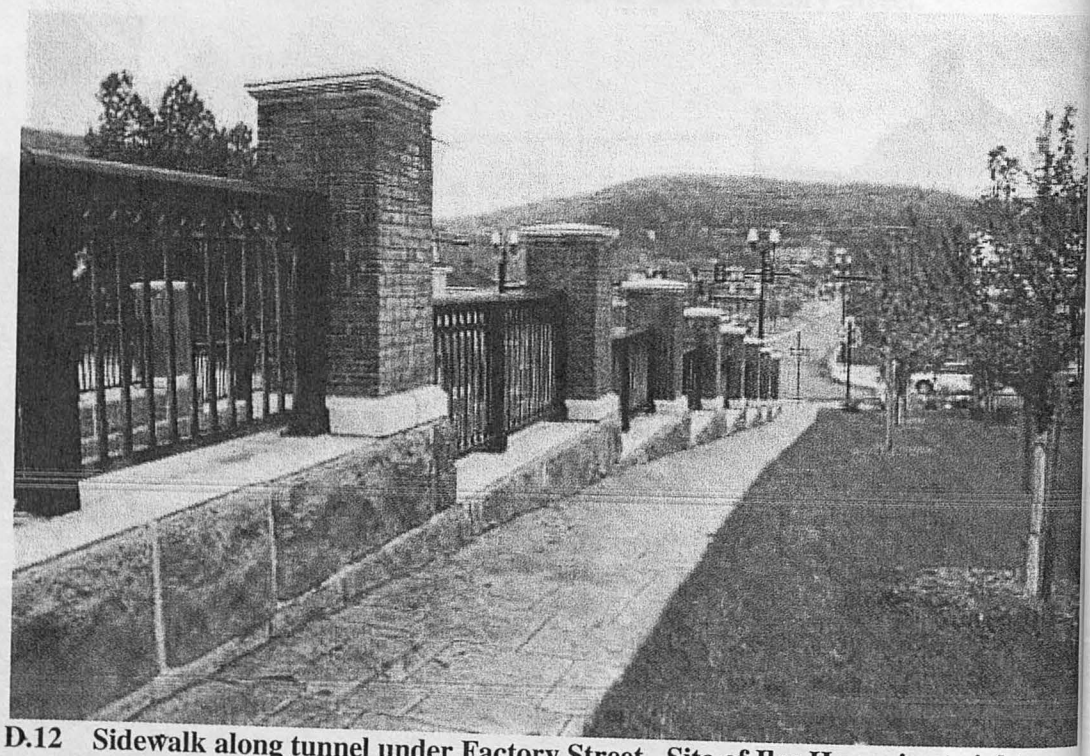
D.8 Entering tunnel from new bridge.



D.9 Tunnel under Factory Street from Continental Boulevard side.

D.10 Intersection of Factory Street and Market Street. Looking toward Continental Boulevard in distance.

D.11 Looking along Market Street. Tunnel is below concrete brick pavers.



D.12 Sidewalk along tunnel under Factory Street. Site of Iles House is at right as you descend the walkway.

CONTEXT-SENSITIVE DESIGN CASE STUDY NO. 4
Route 3 – Port Ontario, New York

LOCATION:

Route 3 over the Salmon River – Port Ontario, New York

PROJECT DESCRIPTION:

U.S. Route 3 runs north/south between the shore of the east end of Lake Ontario and I-81 in New York State (See Figures 1 and 2). Route 3 is a two lane rural highway which passes through many old downtowns and small villages (See Figure 3). The route is part of the Seaway Trail, a national scenic byway and is also part of a state bicycle route. This particular project consisted of reconstruction and improvements along a 1.1 km section[a] in the village of Port Ontario, Town of Richland, Oswego County. Port Ontario has a population of only several hundred but increases in the summer with seasonal residents. Neighboring Pulaski has a permanent population of only 2400.

Figure 1: Project Location in New York State

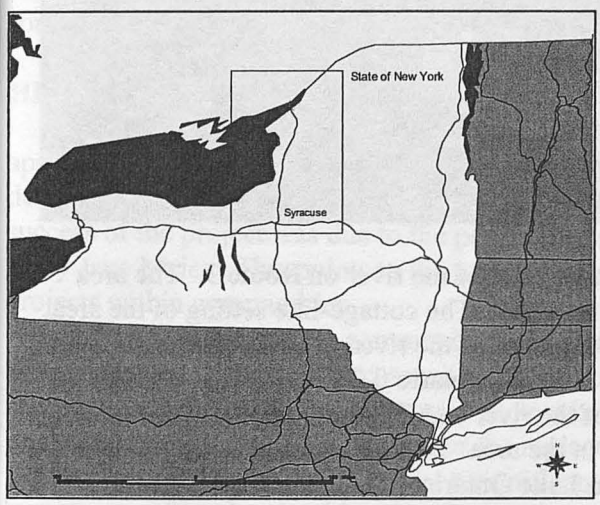
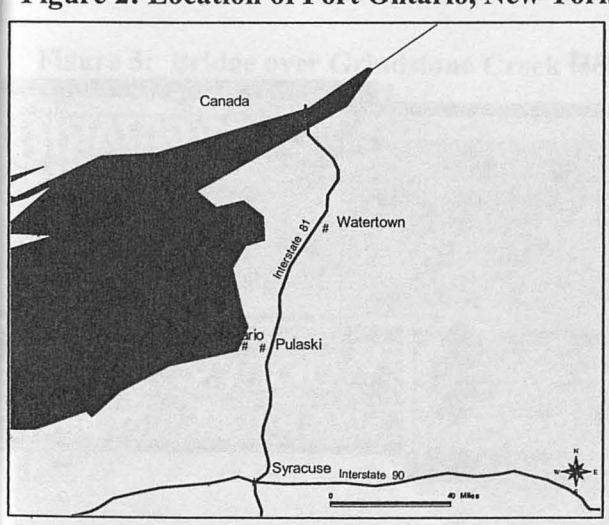


Figure 2: Location of Port Ontario, New York

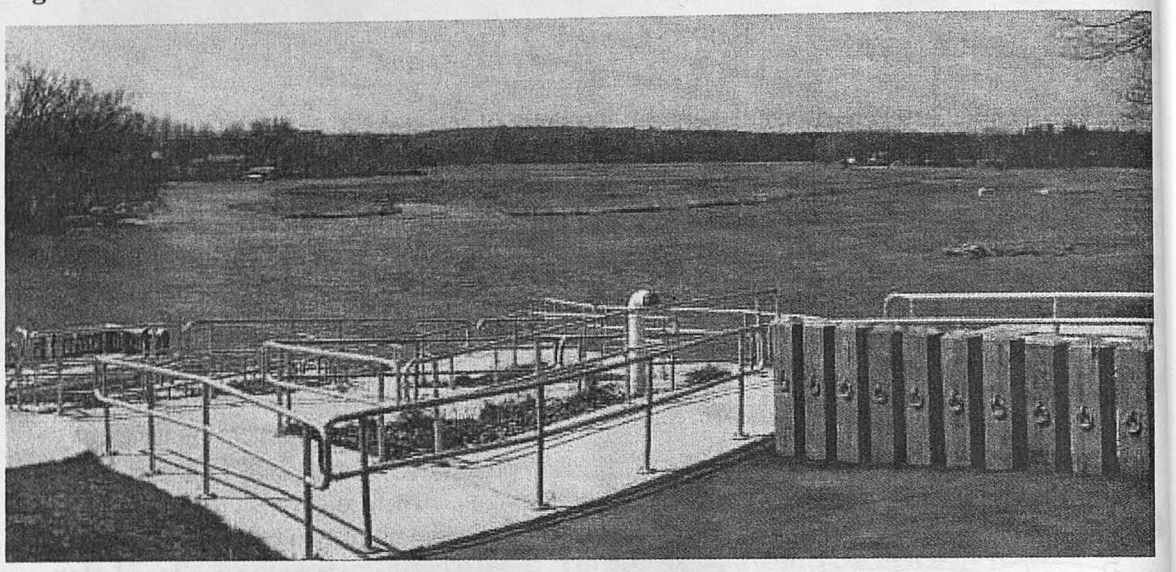


The project included the replacement of two bridges over the mouth of the Salmon River, intersection improvements, accommodation of bicycles/pedestrians and general improvements in geometric standards. The location where route 3 crosses the Salmon River in Port Ontario is

Figure 3: Route 3 South of Project

approximately 1 mile upstream of Lake Ontario and is approximately 1500 feet wide (see Figure 4, note the handicap accessible public fishing area built with this project is shown in the foreground). Therefore, this study section is comprised almost completely of river crossing.

Figure 4: The Wide Mouth of the Salmon River at Port Ontario



The main part of the village is on the southern bank of the river on Route 3. The area consists of several businesses, many of which are seasonal. The cottage-like setting of the area contains both permanent and seasonal homes on both sides of the river. On the north side of the river, the major land use is a 1450 site trailer park on Lake Ontario 0.25 miles from the Salmon River. As illustrated in Figure 5, the importance of the river and fishing to the local community and economy is evident immediately upon arrival in the area. Indeed, the area is well-known for its fishing and is the largest cold water tributary on Lake Ontario. The draw for the area's recreational amenities and fishing is great throughout the year (including ice fishing) but is greatest in the summer. These activities are central to the area's economy.

Figure 5: "Fish" at the Community Heart

[a] The project runs from reference marker 3-3401-3232 to 3-3401-3239.

In the mid 1990s, the condition of the existing bridges over the Salmon River could not be ignored. Crash rates were three times the state average for similar roads. The highway condition, especially on the bridge crossing, was generally poor. The narrow crossing lacked shoulders and pedestrian access. Lack of good access to the river often resulted in parked cars along this section. Visitors and seasonal residents noted it was a difficult crossing with trailers particularly at the one location where a steel truss bridge was located. Pavement quality had deteriorated and the vertical curvature created sight distance problems and hidden areas from an intersection on the south shore.

Planning and design began in August 1995. The first major public involvement session was held in October 1996. Construction started in February 1999 and continued through three fishing/tourism seasons until October 2001. The contractor was Tuscarora Construction Company. Total project cost was $8.5 million. In 2002, this project was selected as New York State's Context Sensitive Solutions Exemplary Project. As such, it was featured on the New York DOT CSS website along with other projects from various regions and general information for contractors and the public about how CSS works in New York.

HIGHWAY AGENCY INVOLVEMENT

The New York Department of Transportation started using a context sensitive design approach to this project from the beginning. They shared leadership on the project planning and design with other agencies. Several people interviewed for this case study noted that part of the success of the project was due to the personal attention of the NYDOT design project manager Mary Jane Meier. This points to the importance of personal connection when undertaking projects within communities.

The members of the community, as well as the DOT personnel, interviewed for this case study indicated that the context sensitive design process was used in this project in part because hard lessons had been learned during a project in 1994 about 1 mile south of Port Ontario where route 3 crosses Grindstone Creek. For the replacement of this much smaller bridge (see Figure 5) route 3 was completely closed for a significant period of time and traffic was detoured. Many businesses suffered and neither the community nor the DOT wished to repeat this unintended negative impact for the community when undertaking replacement of the Salmon River bridges.

Figure 5: Bridge over Grindstone Creek (south of Port Ontario)

RESOURCE AGENCIES INVOLVEMENT

Several resource agencies were involved in the project from the beginning stages including the following:

U.S. Army Corps of Engineers
NYS Department of Environmental Conservation
U.S. Environmental Protection Agency
U.S. Fish and Wildlife Service
NYS Department of State
Oswego County Planning Department
Eastern Shore Salmon Rover Corridor Fisheries Committee
Cornell Cooperative Extension
Town of Richland
Oswego County (Promotion and Tourism, Highway Department

Of particular note in this project was the initial involvement of the Cooperative Extension Service. The DOT contacted them as a non-DOT agency to convene and lead a public involvement process including citizen roundtables. Together with local businesses, the Extension Service also actively publicized the upcoming bridge replacement project and advertised the time/location where citizens could become involved. The Cooperative Extension Service provided the DOT with a summary report of the public's concerns for the construction phase as well as project design. They also sought technical guidance and input on certain concerns from other Cooperative Extension groups in their nationwide network. The use of a community-based non-DOT agency as part of the public involvement process may be a factor that resulted in such good community satisfaction and involvement with this project.

COMMUNITY INVOLVEMENT

There was direct community involvement in the early stages of the project, but especially from business owners on both sides of the river in Port Ontario. Beyond private citizens and land owners the following community groups were represented:

Seaway Trail Inc.
Advocacy Resources Information Services Education (ARISE)
Toothpick (Bethel) Community Center
Brennan's Beach (1450 trailer sites – 1100 permanent year round)
Restaurants
Tackle Shops

Many meetings were held in one of the local restaurants and this community setting may have represented "common turf" which aided in discussions. The proximity of the meetings to landowners and residents eased the burden of attending.

CONTEXT-SENSITIVE FACTORS

A wide range of sensitive issues was addressed as part of the design of this project. It is particularly interesting to note that the prime issues of concern to the community were different from the prime issues for different resource agencies. Furthermore, the business owners had

unique issues from other residents. This points to the need to contact all stakeholders in order to address all concerns (many of which cannot be foreseen). The business owners in the community were concerned most with the construction phase of the project and ensuring continued ease of traffic flow particularly during the tourist season. They were concerned that timely access to their business driveways be maintained during construction. Both business and citizen community members wanted the old bridge to stay in place until the new bridge was ready. The community also raised a traffic safety issue regarding intersection sight distance that was not known to the DOT at the start of the project. This resulted in the scope of the project being extended to include the intersection south of the bridge and its eventual signalization. Landowners who were going to have land purchased were particularly concerned about how much land they would lose and their compensation. One such owner lost the gas pumps on his business property. Those interviewed suggested that although the whole process went relatively well, the process of compensation for acquired land could be further improved. The main environmental concerns were raised by the agencies involved, not the public and many of these concerns related to the fish habitat.

Scenery and Aesthetics

Concerns related to scenery and aesthetics were of interest to all stakeholders but not contentious. Discussions lead to solutions acceptable to all.

Historic

A cultural resource study was prepared for this project in 1997. No historic buildings or structures were found to be eligible for federal or state historic registers. A restored church, used as a community center, was not eligible for registry, however, the NYDOT purchased the whole land parcel and gave the church back to the community (only some of the land was needed for the expanded highway right of way). The church is to be moved to the opposite corner of the intersection just north of the river. Many in the community appreciated this gesture on the part of the DOT.

During construction, original roadbed consisting of submerged logs or corduroy road was unearthed. Archeologists investigated and removed some sections of roadbed while leaving others.

Environmental Concerns

The environmental concerns raised by many agencies related to fish habitat and wetland function. During construction, port-a-dams, wetland mitigation techniques and erosion control measures were used. The design option finally selected afforded wetland mitigation within the project limits.

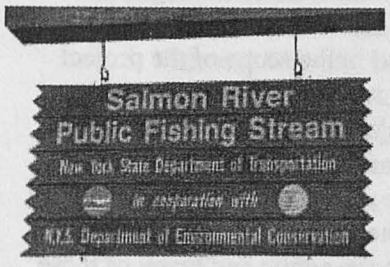
Multimodalism

Given the tourism, trailer parks, state parks and state bicycle route within this area, pedestrian and bicycle demand was known to exist. The final project has sidewalks and good quality shoulder bikeways. During the planning phase the possibility of accommodating snowmobiles was also considered and ultimately not undertaken by agreement of all stakeholders.

Other Community Needs

The provision of a parking area and an accessible fishing area was very important to the community (see Figures 4, 6 and 8). A stakeholder group, ARISE, ultimately provided the technical guidance needed to properly design such a unique facility.

Figure 6: Public Fishing Access

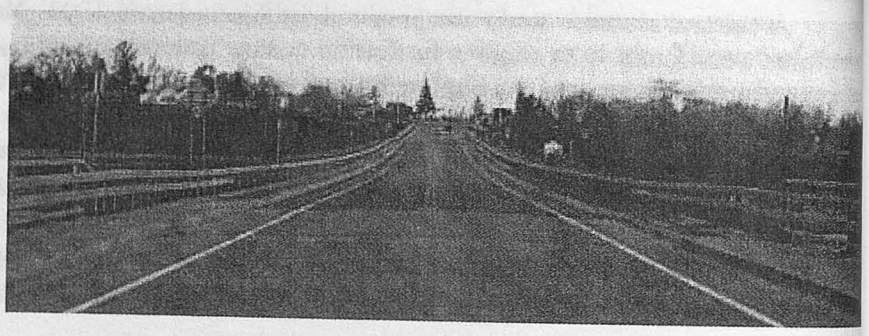


Public Education and Involvement

Extensive public involvement was desired and sought from the beginning on this project. In addition to the usual public meetings, news releases and distribution of design documents, the stakeholders interviewed identified unique communication strategies that contributed to the success of this project. First, small group sessions were held on site making it easier to involve locals. Second, DOT representatives provided personal and timely follow-up, often in person. Third, a phone contact line was established. Finally, specialists were brought to the community of Port Ontario to provide direct information to residents.

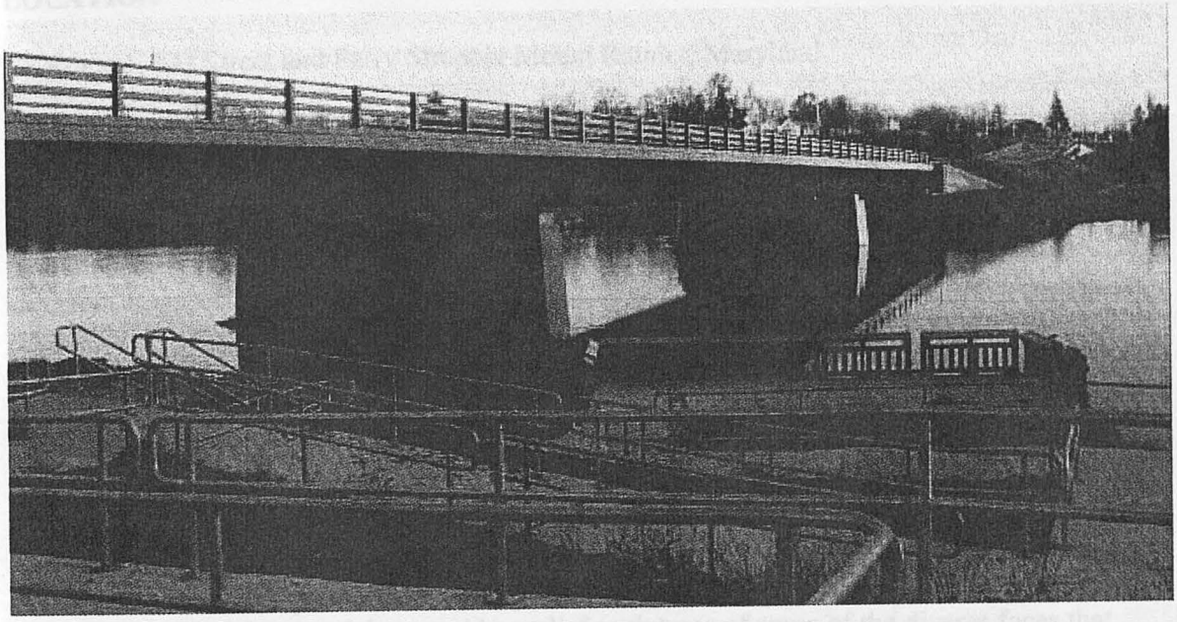
PROJECT OUTCOME AND ACCOMPLISHMENTS

Figure 7: Salmon River Bridge (looking South)



The final project is shown in Figures 7 and 8. Both the community and the project team are very satisfied with the project outcome. The product of this design process is very different from the draft options originally proposed. The NYDOT was willing to compromise and take new input from the beginning of the project design. In this case, a three instead of two-lane bridge was built (for the south bridge), a traffic signal was added to the project and sidewalks were provided on both sides of the bridge as well as into the community. An important turning point for the community was the elimination of the design alternative that would have replaced the bridges on the existing alignment using temporary structures and interfering with traffic and therefore the community economy. The physical facility itself is far superior to the old substandard river crossing and all community members interviewed were extremely pleased with the functioning transportation facility. This project has restored the confidence of the people of region in the DOT after the less successful bridge replacement in 1994 south of Port Ontario. This level of confidence was achieved by diligent attention to early and frequent communication. The circumstances of this project illustrate that it is not possible for design professionals to anticipate all of the needs and priorities for a community. For example, the focus on traffic management during construction and the provision of a handicap accessible fishing area are not large issues that would have necessarily been anticipated; but they were important community issues that made this project

Figure 8: Completed Salmon River Bridges



CONTEXT SENSITIVE DESIGN CASE STUDY NO. 5
Mount Rainier, MD Neighborhood Conservation Project

LOCATION

US Route 1, 34th Street and Perry Street in Mount Rainier, Maryland

PROJECT DESCRIPTION

US Route 1 (Rhode Island Ave.) split the commercial town center of Mount Rainier with a six-legged intersection and four lanes of traffic with an ADT of 21,000. This division created numerous transportation and urban design problems that hindered commercial revitalization in the heart of the community. The basic issues were pedestrian safety; environmental enhancement; the Washington Metro Area Transit Authority bus turn-around area (with 8 routes and 1,352 passengers daily); storm drainage inadequacy; the lack of a clean, safe, and welcoming mixed-use town center; and vehicular and bicycle safety.

This project replaced a six-legged intersection and four lanes of cars rushing through two blocks of liquor stores and abandoned buildings with a simple traffic roundabout, landscaped plazas, pedestrian lighting, easy pedestrian crossings, bus shelters built on early 20th century designs, new business, and with public art including two blue-glass sculptures that will be lighted at night at opposite ends of the roundabout and bas relief sculptures of some of the diverse faces that make up the community of Mount Rainier.

The project budget was $1.8 million with about $1.350 million provided by Maryland State Highway Administration (MSHA) and about $450,000 provided by the Maryland Transit Administration (MTA).

PURPOSE AND NEED STATEMENT

There was no official purpose and need statement. At MSHA the Neighborhood Conservation Program (NCP) falls under a categorical exclusion as defined by Section 106 so the agency does not prepare a purpose and need statement. MSHA developed the process in their Main Street Handbook ("When Main Street is a State Highway," available on MSHA's web site, www.marylandroads.com) to create a community-based planning project development process. The Goals and Elements of this process are somewhat like the project's purpose and need. As Mount Rainier was one of the first communities to participate in NCP, the community participation process used then helped to create the process that MSHA now follows, which includes a more systematic method of developing formal consensus on goals and needs.

The City of Mount Rainier passed a resolution of intent to form a partnership with the Maryland Department of Transportation (MDOT) and the Washington Metropolitan Area Transit Authority (WMATA) in the design and construction of a roundabout in October, 1997. The resolution included the following language:

- This resolution constitutes the City's agreement to join in a "good faith" partnership with MDOT and in an MDOT-funded effort to design and implement a roundabout, related traffic and pedestrian safety improvements, and other design features and streetscape improvements.
- This resolution likewise constitutes the City's agreement to join in a "good faith" partnership with WMATA and Prince George's County to change bus routes and facilities in a way that accommodates and complements the roundabout and City acquisition of the easternmost and westernmost Metrobus parking lanes.

CONTEXT SENSITIVE FACTORS

A wide range of sensitive issues were addressed in the design and development of this project including addressing scenic values, aesthetics, historic issues, environmental concerns, and multi-modal needs.

Scenic and aesthetic values were seen as of tremendous importance as the city struggled to renew itself and create a positive sense of identify and community pride. The Route 1 intersection was considered to be an "asphalt lake," contributing to the blighted appearance of the area.

Bringing artists onto the project team was a very important addition, bringing understanding and skills to better meet goals of the project. These goals for what public art could do for Mount Rainier were identified at a Public Art Community Workshop held in 1998 as:

- Humanize and beautify our urban environment.
- Create a "sense of place" or belonging.
- Strengthen the cultural and social life of the community.
- Identify, become a landmark, a civic symbol.
- Help develop of sense of pride in the community.
- Provide comfort and an amenity to the people.
- Stimulate interest in the community's history and heritage.

Environmental issues were also paramount. An important goal of the city was to reclaim green space in order to reduce the effects of broad expanses of asphalt contributing to "heat island" effects. Two bus lanes were eliminated and added to the plaza area in front of City Hall.

The reduced asphalt area from adding medians and green space also will reduce storm water run off and allow for natural filtration of rainwater and storm water before it enters the Chesapeake Bay watershed. By reducing the number of traffic lights at this intersection, air quality should improve, since emissions are lower for continuously moving vehicles than those with engines idling at traffic lights.

Furthermore, reduced lights also reduce the energy needs for operating the intersection, thereby reducing long term costs for electricity. City officials of Mount Rainier, as a member of the group titled, Cities for Climate Protection Campaign, were very conscious of environmental issues affecting climate change.

The city also had important goals for the lighting in the project. City officials wanted lighting to focus on pedestrian needs, wanted the quality of light to be adequate and not overly bright, and wanted white light not the yellow light of high-pressure sodium fixtures. The city suggested induction lighting that operates efficiently with a 20-year life, but the decision was to use metal halliod lights that are energy efficient but will require replacement bulbs about every three years.

Historic issues were important for this National Register Historic District. The artists' research of the trolley system yielded several benefits. They designed the bus shelters modeled after the designs of historic trolley stations. Echoes of the trolley tracks and turn around were included in the paving pattern designed for this project.

HISTORY OF PROJECT

The local community initiated this project by approaching the Maryland State Highway Administration (MSHA) to ask for assistance in redesigning the principal intersection of Mount Rainier. The City of Mount Rainier had begun to take steps at revitalization of the intersection area by opening a new City Hall, purchasing a building for a new police station, applying for various business development and streetscape grants, and hiring staff to strengthen property standards enforcement. But none of these local initiatives were enough to turn the community around without addressing the fundamental issue of the barrier formed by Rt. 1. Land use and roadway integration, pedestrian and bicycle access, and easy use of the bus terminal were severely constrained by the expansive road, the confusing intersection, and the high-speed traffic environment.

A 1990 revitalization study by the County Executive, Parris Glendening (now governor of Maryland) identified certain corridors of the county that had become weakened both physically and economically, as needing improvement. In that same year the city sponsored a RUDAT team to address options for reinvigorating the city center. The outcome of this charrette, a proposed underpass through the intersection with pedestrian area above, proved too expensive to consider, but the study also surfaced the idea for a traffic circle.

A few years later a newly elected mayor revisited the revitalization concepts and created a newly funded position for a full time economic development staff person. Working with the University of Maryland's Landscape Architecture Department, the City developed a proposal for an extensive redesign of the intersection centered on creation of a roundabout. In response to a request from the city, two people representing MSHA visited with city staff and council members in the spring of 1996. One was a consultant who brought with him films of European roundabouts. The other represented MSHA's relatively new Neighborhood Conservation Program that agreed to fund the roundabout project.

The critical importance of the bus lines to the roundabout's design and function meant this needed to be a strong partnership project. Mount Rainier is just north of the District of Columbia border and is the turn around point for several bus routes. Both the Maryland Transit Administration (MTA) and the Washington Metro Area Transit Authority were key decision makers to involve. MTA's partnership became a critical factor in the success of the project because their funding was able to pay for the bus shelters sculptures, benches and lighting.

HIGHWAY AGENCY INVOLVEMENT

This proposal was given to the newly created Neighborhood Conservation Program of the Maryland Department of Transportation, a part of the State Highway Administration and Maryland Transit Administration charged with improving existing roads and transit facilities to spur investment in older communities.

Neighborhood Conservation projects are provided only in Priority Funding Areas, targeted for growth as part of Maryland's Smart Growth Initiative. Communities receive funding priority if further designated by Maryland's Department of Housing and Community Development for revitalization focus.

The design work for the project was carried out primarily by MSHA but the collaborative nature of the project process was very beneficial. In the course of the design WMATA requested that the roundabout be designed in an oval shape to ease the passage of its buses. This oval design proved to be a better geometric design on several levels. WMATA was also helpful in planning the one traffic signal that allows their buses to turn out of the bus holding bays.

RESOURCE AGENCIES INVOLVEMENT

Maryland Department of Transportation (MDOT)
Maryland State Highway Administration (MSHA)
Maryland Transit Authority (MTA)
Department of Housing and Community Development (DHCD)
Washington Mass Transit Authority (WMATA)
Maryland National Capital Park and Planning Commission – Prince George's County (MNCPP-PGCo.)
Prince George's County Department of Public Works (PGDPW)

COMMUNITY INVOLVEMENT

MSHA asked the city to create a task force to work on the roundabout project.
The close and direct working partnership of MSHA with the community in Mount Rainier gave an unprecedented opportunity to identify transportation-related issues; establish project limits; assist in the collection of data; assist in the organization, publication, and management of field walks, workshops, open houses, and public meetings; review materials intended for distribution to the community; review and revise all proposed plans; and endorse the agreed upon final concepts for approval by the local elected officials. Literally every aspect of the project from color selection to lighting to lane width to cost was subject to analysis by the community and the designers together. Members of the City Council, business owners and diverse residential representatives were encouraged to keep their constituents up to date.

Many community involvement techniques were used, including design charrettes where the public was invited to brainstorm with the project team about specific aspects of the design.

Drawings were available in the City Hall. The city's newsletter included project updates frequently.

NATURAL ENVIRONMENT ISSUES

As discussed above, the roundabout has decreased starting and stopping by through traffic and has reduced emissions from this source. The overall project significantly reduced impervious surfaces and replaced them with landscaping. Finally, the project area has been selected as a pilot site for an urban bioretention facility to be constructed by MSHA.

HUMAN ENVIRONMENT ISSUES

Mount Rainier is a racially diverse area with its average income of about $30,000 a year considerably below the county's average income of $48,000. The population is 60-70% African American, 10% Hispanic, and the rest from a variety of other ethnic groups.

In addition to struggling with revitalization, Mount Rainier has had a continuing struggle with crime. It was designated a Hot Spot community in 1997 and eligible for special grant assistance to fight crime. Local officials blamed much of this problem on lack of pedestrians on the street, failing businesses, and abandoned buildings. Without an improvement of the physical environment, they saw little chance of creating a viable housing market or adding needed community facilities.

With the physical improvements brought by the roundabout project, pedestrians are welcome and more comfortable in the neighborhood, street activities have increased because of safer access to the transit facility, lighting has improved the feeling of security, public spaces are available as refuges from the business of the neighborhood, plans for specialty housing for artists are moving ahead, and a library expansion is planned.

SCHEDULE OF ACTIVITIES

- 1990: Designation of a Mount Rainier National Register Historic District included the town center and Route 1 at its heart.
- 1990: MSHA partnership for tree planting in the median.
- 1991: Creation of a State-authorized commercial district management authority.
- 1994: Creation of a County-authorized mixed-use town center zone and committee.
- 1994: $900,000 investment at the intersection for the construction of City Hall building. Adopting this central location had been a key campaign issue in the 1989 election for Mayor. Landscaped plaza created with the purchase of a bus lane from WMATA.
- 1996: City Engineer prepared roundabout drawing for MSHA review.
- 1997: University of Maryland Landscape Architecture Program students prepared streetscape design concept for traffic circle and other major improvements along Route 1.
- 1997: City completed $100,000 sidewalk construction project for curb extensions to promote pedestrian safety and beautify the street. City issued $700,000 in bonds to begin phase one of project to renovate an historic Route 1 building for a new police station.

- 1997: City became a State designated revitalization area.
- 1997: Mayor Fred Sissine and landscape architecture student presented the idea of the roundabout as a project for Neighborhood Conservation Program funds to MDOT staff.
- July 1997: The idea of a roundabout was first rejected by MSHA District Traffic staff but upon review was accepted as a reasonable traffic and pedestrian/safety improvement for the Neighborhood Conservation Program. MSHA Project Engineer was assigned to begin working with the community through the engineering phase. First MSHA/City meeting held.
- September 1997: MSHA's proposed roundabout design presented in public hearing. City passed resolution supporting the roundabout concept.
- February 1998: Key community charrette held to develop roadway geometry.
- May 1998: Key community charrette held to consider landscape and streetscape alternatives for the roundabout center, the City Hall and bus terminal area, and the Perry Street Memorial Park area.
- July 1998: Discussions began with Art Consultant to bring public artists into the design process.
- September 1998: City requested consideration of pedestrian scale lighting in the project as part of Transit-side improvements to be funded by MTA. City investigated the most appropriate pedestrian lighting standard, inviting Vermont lighting consultant to advise.
- September 1998: Selection Committee composed of City officials, Arts Community members, MSHA and MTA selected two artists based in part on their understanding that elements will need to relate to pedestrians and to vehicles traveling at greater speeds and further distances.
- October 1998: Public Art Presentation to the Community includes paving treatment, two sculptures, a series of bas-reliefs wrapped around pedestrian space, unique bench design.
- November 1998: Artists asked to design bus shelters.
- December 1998: Second community meeting to review sculpture designs. Community acceptance of public art elements.
- December 3, 1998: Project Design Final Review
- March 17, 1999: City sent letter to MDOT Secretary with final recommendations on lighting and landscape
- June 15th, 1999: Advertised project for Bids
- May 2002: Construction Complete
- August 2002: Public Art Installations to be completed

PROJECT OUTCOME AND LESSONS LEARNED

There is a great deal of pride in this project by those involved in it from the project team as well as the community and public agencies. The parties interviewed for this case study all considered this to be a major learning experience with frustrations in the process but with a very worthwhile result. MSHA has acknowledged that the experience here has contributed greatly to the evolution of their project efforts using Context Design Principles.

The Mount Rainier project was importantly an effort of urban design. MSHA found that its project team members were not skilled at urban design. In this case the artists' skills added greatly to the teams ability to address urban design issues. It is important in the future for

projects of this type that an urban designer be on the team. In many cases this skill may be provided by a landscape architect skilled in urban design.

The project would have benefited from the knowledge that MSHA now has in designing its project process for NCP projects. If overall project goals had been identified up front with all stakeholders and if a team with all the skills needed had been assembled early, the project would have proceeded more smoothly. The project would have benefited from the artists joining the team earlier, for example. As it was, there were an unusual number of major project changes from early stages of the project to final design as new ideas and the means to implement them emerged. The process used, however, sometimes followed a "messy" process, but yielded some exciting and creative solutions.

It was very beneficial to engage an art consultant to establish a process to select the artist team. Her ability to understand both the project teams' needs and the artists' perspectives was valuable. One artist chosen works around the corner from the project and does primarily abstract art. The other is located in Northern Virginia and is does primarily figurative art.

The decision making process for including public art in the project was a learning experience. The task force needed to have faith in the skills of the artists; the artists needed to listen to the aspirations of the community and be responsive to these varied interests. The first design brought by the artists was not well received. The artists went back to the drawing board, generating dozens of new ideas. When these were brought to the task force, the artists explained which design they preferred and why and the task force agreed with this judgment. The artists also found they needed the trust of the task force to allow them to make small changes to their plans in the field as construction proceeded where they felt this necessary.

There were a number of difficulties in the construction process. Utility boxes were placed in awkward locations, some due to design errors and some due to contractor error. For example, there is an unsightly utility box within the center area of the roundabout.

Both poor construction and time delays caused the artists problems. The planters designed by the landscape architect that will carry the artist's bas-relief panels were complex to build and had to be rebuilt. The artists lined up contractors to build their designs and repeatedly found the job was delayed and then lost the contractor and had to line up another.

Projects of this nature require a significant long-term local maintenance commitment. MSHA has recently established a local maintenance policy and manual for public works efforts. In their agreement for the MTA grant, there is a formal commitment from Mount Rainier to maintain the roundabout and median and associated areas. This responsibility is not shared outside curb areas.

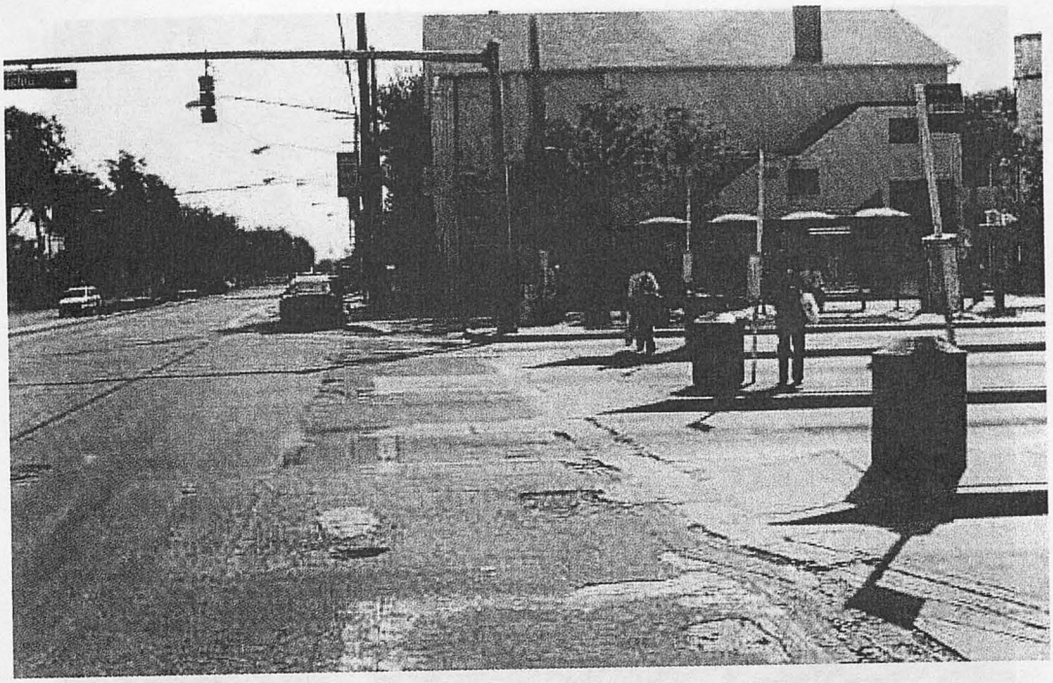
Text from an award submission for the Mount Rainier project: "The design process succeeds if it has credibility with highway engineers, planners, landscape architects, environmental staff, and the community. It must ring true with all. This means that those primarily concerned with engineering factors and functionality appreciate the benefits of a broader design context. It means that designers willingly and openly seek the flexibility necessary to achieve a balanced outcome that respects the imperatives of both technical functionality and context sensitivity. It also means that planners, landscape architects, environmental staff, and the community have a

heightened awareness of the legitimate concerns and constraints with which highway design engineers must deal."

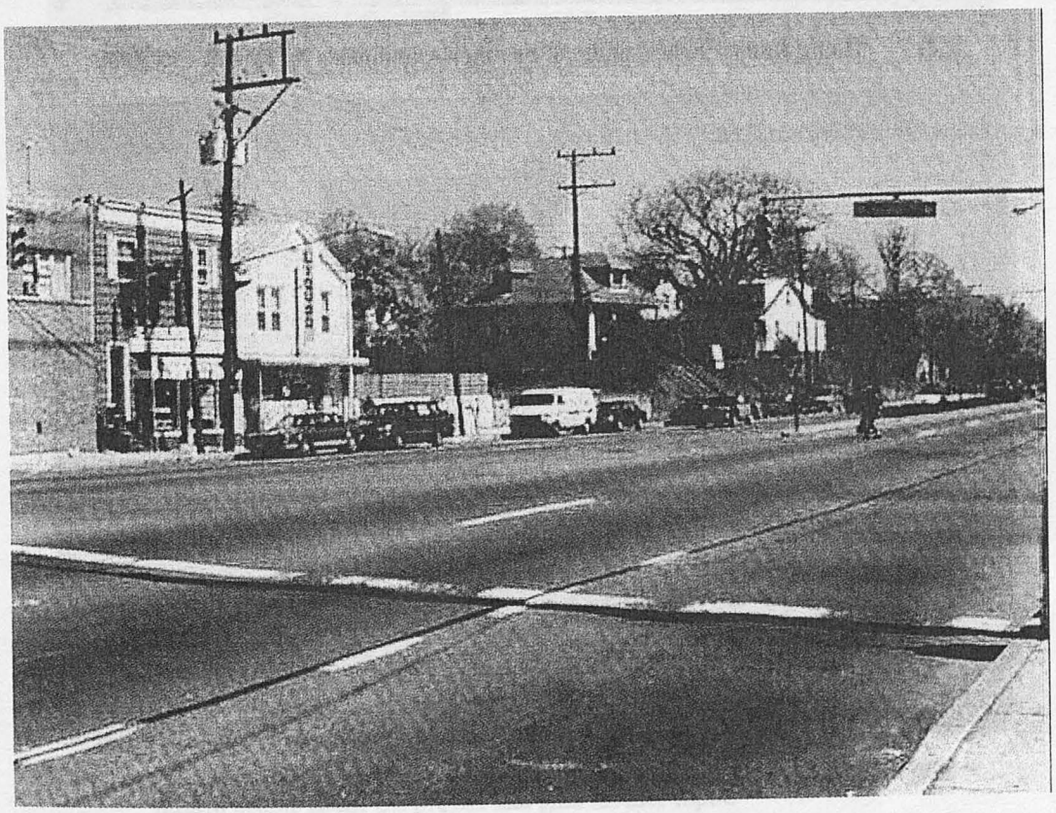
There have been many positive spin off effects of the investments in this project. With the transportation project leading the way to improved functioning of the entire town center area (both access to land uses and access to transit), long-term support for the continued viability of the revitalization is found in:

- Creation of a Town Center Zone and Urban Industrial Zone by Prince George's County;
- Creation by the City of a Design Review committee to evaluate site plans according to new design guidelines;
- Adoption by the City of new sign regulations to improve aesthetics in all commercial areas;
- Establishment by local business owners of a Commercial Development Management Association; and
- Several businesses have received loans from the Maryland Department of Housing and Community Development's Neighborhood Business Development Program.
- Mount Rainier has been named as one of five Gateway Arts Districts in Maryland.
- Recent results have included the expansion of the local food cooperative, and the addition of several new businesses including a dance studio, a bookstore, a café, and a Latino specialty market.

Mount Rainier's decades-long story of revitalization reflects the circumstances of many small communities across America. It is through strong local leadership and passionate commitment to a vibrant vision for the community that significant changes are coming about in Mount Rainier. The partnership forged between the community and MSHA and MTA's Neighborhood Conservation Program resulted in a critically important turning point for this community on the road to revitalization.



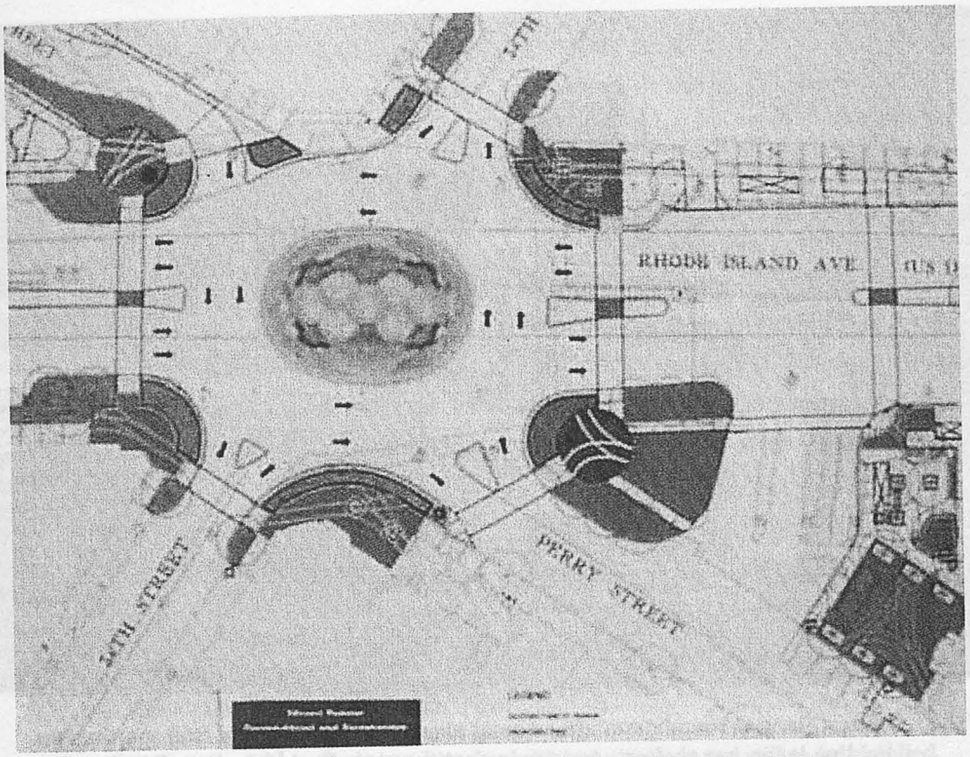
C.1 Mount Rainier before photo of bus shelter and bus holding lanes.



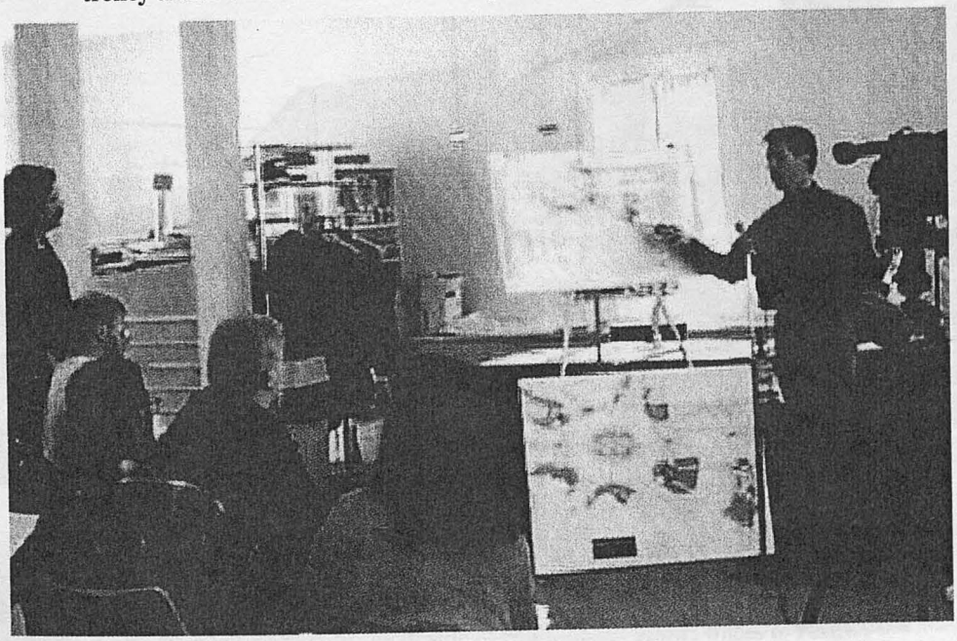
C.2 Mount Rainier before photo of pedestrian crossing experience at north side of intersection.

C.3 Mount Rainier before photo of bus shelter and plaza in front of City Hall.

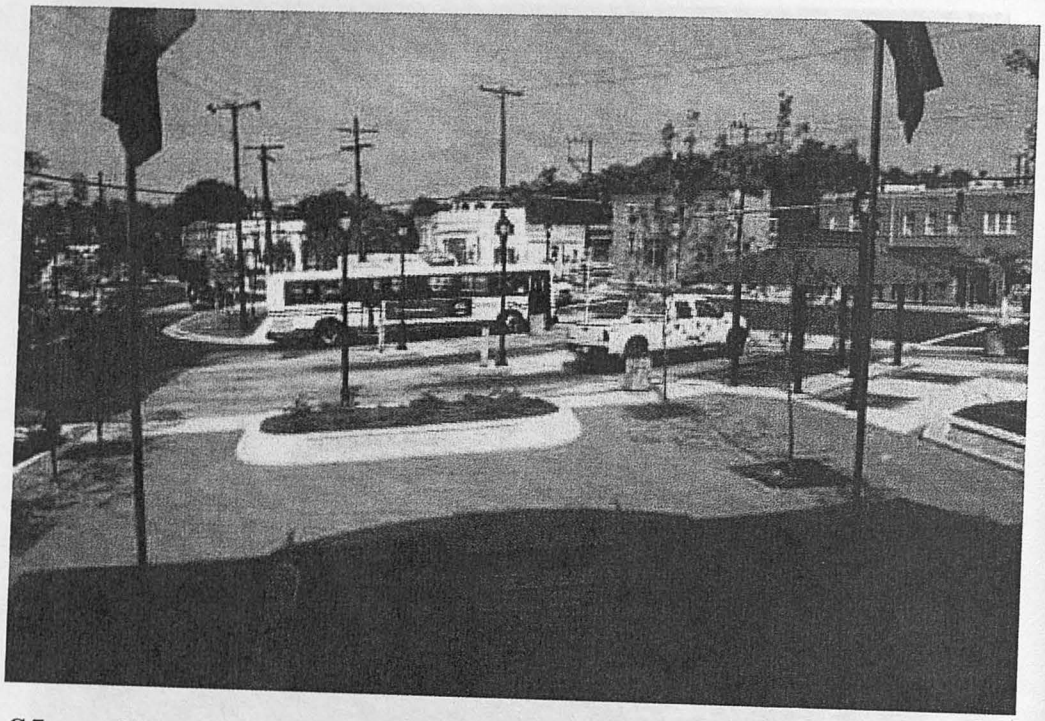
C.4 Sign for Neighborhood Conservation Program at north end of project.



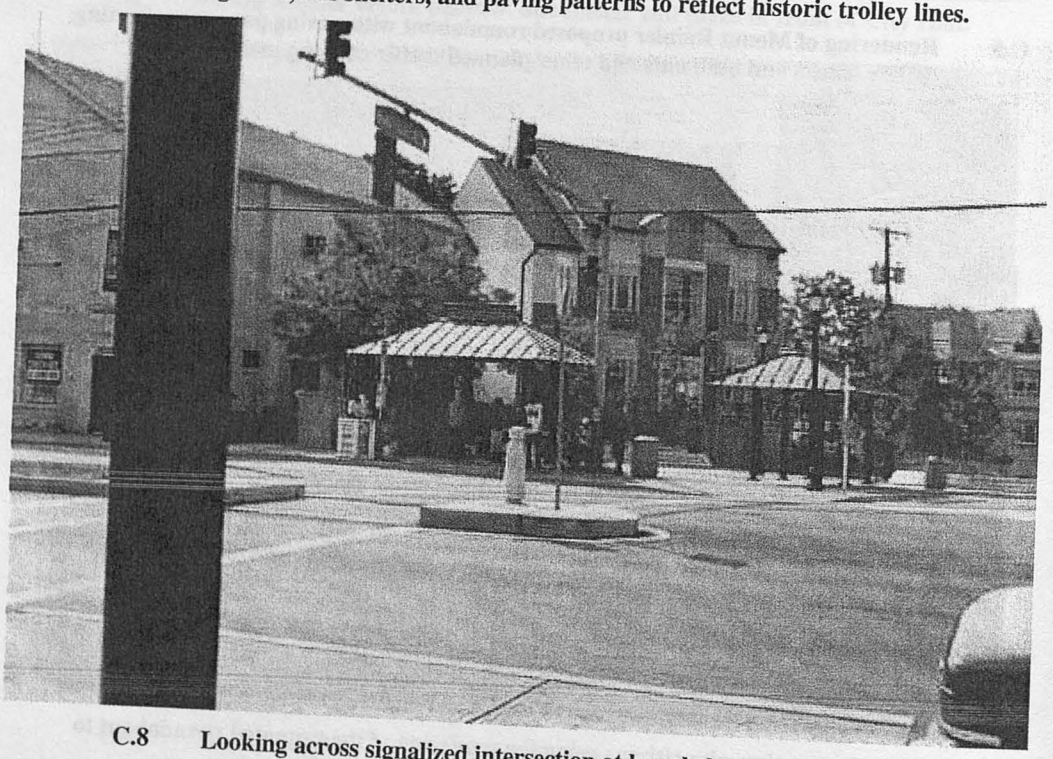
C.5 **Rendering of Mount Rainier proposed roundabout with paving patterns reflecting trolley tracks and bulb outs and other planned traffic calming measures.**



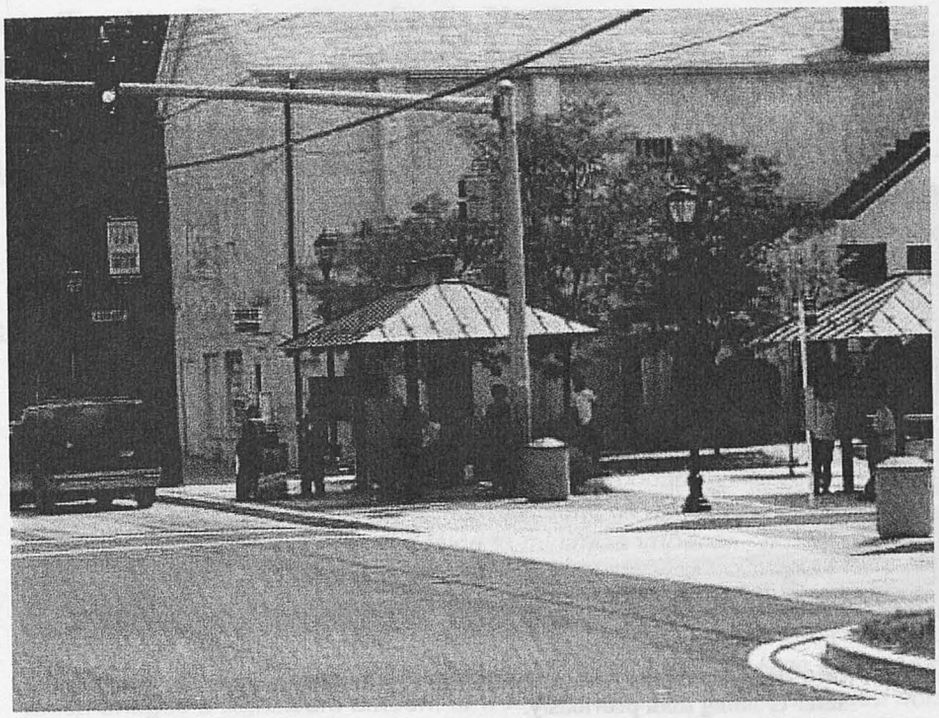
C.6 **Public meeting with citizens using the rendering of the proposed roundabout to inform people about the project and gain further input.**



C.7 **Mount Rainier roundabout after photo taken from steps of City Hall showing bus holding lanes, bus shelters, and paving patterns to reflect historic trolley lines.**

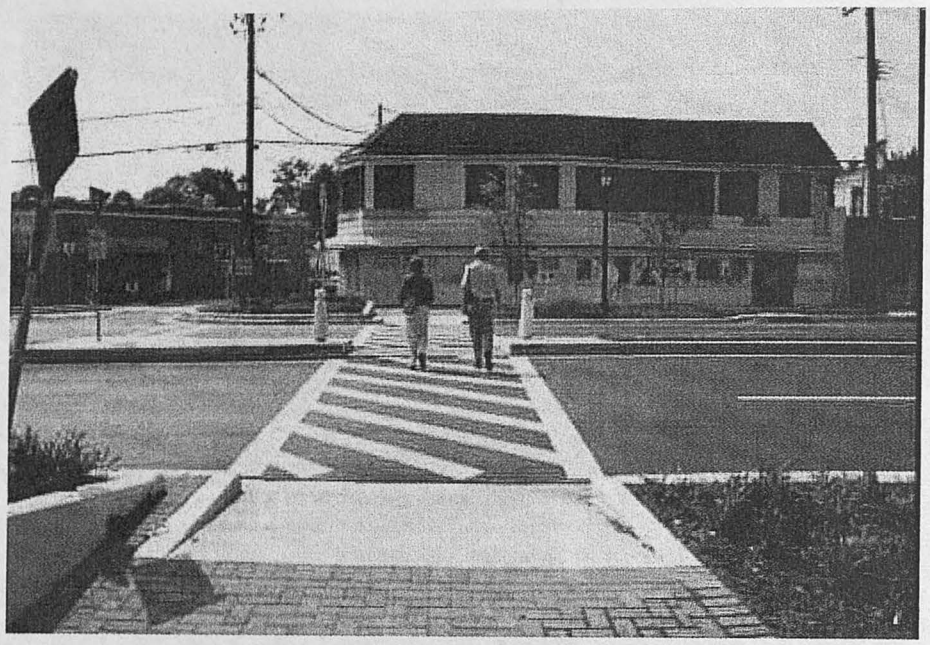


C.8 **Looking across signalized intersection at bus shelters and City Hall.**

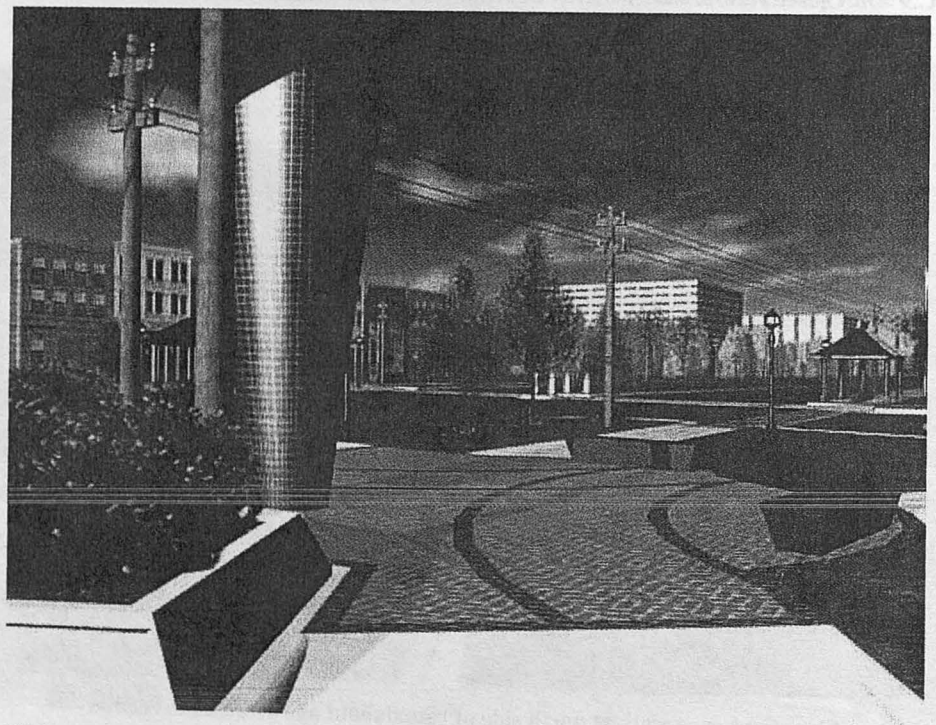


C.9 Closer view of bus shelters. Benches with art elements are still to be installed.

C.10 Signalized crosswalk at north side of roundabout allows buses to reenter traffic and pedestrians to cross street.



C.11 **Non-signalized crosswalk at south side of roundabout allows for easier and safer crossing than previously.**



C.12 **Computer visualization of the effect that 15 foot tall pylons will have to add character and a special sense of place to the roundabout.**

Context-Sensitive Design Case Study No. 6
Smith Creek Parkway – Wilmington, North Carolina

Location:

Smith Creek Parkway (also known as Martin Luther King Jr. Parkway) is on the north side of Wilmington, NC in New Hanover County.

Project Description:

The Smith Creek Parkway project of seven plus miles has been a priority since 1972 with the original environmental impact study of alternatives being completed in the 70's. The project was divided into four sections and the two eastern most sections (C and D) were designed, constructed and opened to traffic. However, the two western most sections (A and B) required further alternative investigation in final design to minimize impacts. The two highway sections open to traffic are six-lane with median. The alignment and designs for the remaining sections were altered significantly to minimize environmental impacts. The alignment for the remaining sections had to take into consideration a myriad of issues and has resulted in a controlled access 4-lane divided facility which bridges a significant amount of wetland. Specific issues included noise impact at a film studio, hazardous materials at a waste site, vibration of instruments at a manufacturing facility, an existing and possible future spur railway corridor, significant wetland area, tying into the Northeast Cape Fear River Bridge adjacent to the proposed expansion of the downtown historic area (4th Street), and finally a 75 year-old magnolia tree. Numerous meetings and discussions were necessary to satisfactorily resolve the issues with city officials, special interest groups, businesses, residents, and the numerous resource agencies involved. And a high level of coordination was required within the NCDOT among those responsible for project planning, design and construction.

Purpose and Need Summary: (abstracted from the project's Final Supplemental Environmental Impact Statement of 1998)

The primary purpose of the project is to relieve traffic congestion on Market Street (US 17) in Wilmington. The project will reduce traffic on Market Street by approximately 25 percent and will reduce traffic congestion and travel time delays at several key intersections. The project will also delay the year Market Street reaches traffic operations breakdown and reduce the accident rate related to congestion along Market Street. A secondary purpose is to provide a continuous east-west link between US 74 and downtown Wilmington.

History of the Project:

The engineering and environmental issues related to the development of the Smith Creek Parkway corridor were extremely complex. Numerous alternatives have been studied since the 1970's. Every alternative considered which satisfied the project need had potential environmental impacts associated with its implementation. NCDOT began developing construction plans for individual

sections with the eastern-most sections being developed first. These two eastern sections have been built and are open to traffic. During the final design of the two western-most sections the NCDOT determined that the noise impacts on a film/TV studio, potential hazardous material impacts from abandoned landfills, and significant wetland incursion warranted evaluation of additional alternative alignments that could minimize these impacts.

In 1992 NCDOT initiated a feasibility study to evaluate alternative alignments to reduce the potential impacts. This produced a shift of the design alignment to the north. During the study of alternatives the NCDOT's Rail Division expressed interest in protecting the potential of future rail service on an abandoned downtown spur rail corridor. The preferred 'Northern Alternative' design alignment reduced unknown impacts and clean-up costs associated with landfills, reduced noise on the film/TV studio, reduced potential impacts to the Downtown Historic District (and its proposed expansion), and preserved the abandoned downtown spur for future rail service. It also included a reduction of typical section from a 6-lane divided roadway to a 4-lane divided roadway and expanded the bridge lengths and replaced a proposed box culvert with a bridge in the wetland areas that reduced impact. This alternative (for the two western-most sections) was approved for final design and subsequent construction in 2001-2002.

Context-Sensitive Factors:

- *Wetlands avoidance/mitigation – impact was reduced from 14.4 acres to 5.35 acres by reducing the roadway section design from six to four lanes and increasing the amount of bridging (the goal is to accomplish compensatory mitigation by restoring the tidal swamp forest adjacent to Smith Creek).*

- *Noise and vibration avoidance – while possible mitigation approaches were considered the final design alignment was adjusted to accommodate the existing location of Wilmington's 'premier film industry studios' and a nearby industry's measuring equipment that was sensitive to vibration.*

- *Hazardous waste and hazardous materials storage/distribution avoidance – the alignment was readjusted to minimize use of landfill areas with a high probability of hazardous materials that could adversely impact the wetland and create a significant additional cost for the NCDOT.*

- *Railway corridor accommodation – the existing active CSX corridor and the abandoned rail spur corridor being considered for possible future use has been accommodated with bridging structures and alignment.*

- *Historical area mitigation/enhancement – impact was mitigated for the future expansion of the historic district and enhancements include land for mini-parks and parking lots, lighting and landscaping coordinating with the North 4th Partnership, SHPO, and the Memorial Committee of the 1898 Centennial Foundation.*

- *Protect matriarchal magnolia tree (variously reported to be from 73 to 100 years old) – at this writing it is the expressed interest of the NCDOT that this tree be saved. However, a decision has not been made as to how that can best be accommodated (discussion of alternatives with the local community is ongoing).*

Highway Agency Involvement (Partnerships):

Development of the last segments of Smith Creek Parkway have involved a high degree of teamwork with the NCDOT and a close working relationship with numerous resource agencies, local government officials and agencies, and local special interest groups along with the area's businesses and citizens.

Resource Agencies Involved:

- *US Corps of Engineers*
- *US Coast Guard*
- *NC Division of Coastal Management*
- *NC Department of Environmental Health and Natural Resources*
- *NCDOT Rail Division*
- *Federal Aviation Administration*

Community Involvement:

- *Wilmington Mayor and City Council*
- *Metropolitan Planning Organization*
- *City of Wilmington Planning Department*
- *City of Wilmington Engineering Department*
- *North fourth Street Revitalization Group (now North 4th Partnership, Inc.)*
- *Residents and Business Owners in the Project Vicinity*

Significant Environmental Issues:

Natural Environment:

The most significant natural environmental factor was the protection of the wetlands and the potential of contamination from hazardous waste at landfills on or near the alignment.

No threatened and endangered plant or animal species have been found.

Human Environment:

There were two areas of significance in the human environment: 1) noise that could adversely impact film and TV studios and vibration that could impact sensitive measuring instruments at a manufacturing facility and 2) impacts to the developing historic downtown area immediately adjacent to the project's western terminus.

No residential relocations were required, but several businesses and two government facilities are to be relocated.

Public Education and Involvement:

Numerous forms of communication were used including workshops, small group meetings, hearings, and newsletters along with various forms of visualization including maps, photographs, renderings and computer animation. The following list is illustrative of some of the coordination and meetings that have taken place over the more recent years in the development of the project:

- *Citizens Informational Workshop (1994)*
- *Meetings with Planning Staff and North 4th Partnership Representatives (1996-2001)*
- *Status Newsletter and Public Meeting Schedule (1996)*
- *Public Hearing in Wilmington (1996)*
- *Meeting with SHPO and Wilmington Planning Staff (re: Historic District, 1996)*
- *Meetings with Housing Authority, North 4th Partnership, and community members (1997)*
- *Meetings with the Memorial Committee of the 1898 Centennial Foundation (1999-2001)*

Note: Meetings and coordination continues relating to historic area mitigation and enhancement as well as construction issues for Sections A & B into 2002 and beyond as necessary.

Design Issues and Special Features:

Design Speed:

60 mph for Sections C & D; 80 km/h (50 mph) for Sections A & B

Right-of-Way:

100 meters (328 feet)

Clear Zones:

ASSHTO Design Guide (30' rule or barrier protected)

Number of Lanes:

4-lane divided (Sections A & B) and 6-lane with median (Sections C & D)

Lane Width:

12 feet

Adjacent Land Use:

Predominate uses adjacent to the sections of the alignment are indicated below:

	Section			
	A	B	C	D
Residential	X		X	
Commercial	X	X		X
Industrial	X	X		
Open Space (wetland)		X	X	
Open Space (scrub)	X		X	X
Historic District		X		
Institutional (gov't)		X		

Special Features:

Special features include: significant wetlands bridging; some landfill clean-up required, but avoided the most hazardous areas; preserved future rail spur corridor; minimized noise and vibration to business/industry; and enhanced downtown historic area.

Project Development Schedule/Milestones:

Project development is in four sections (see attached diagram and photos):

Section A (Cape Fear Bridge to US 117 [Castle Hayne Rd.])
Section B (US 117 to 23rd Street)
Section C (23rd Street to NC 132 [College Road])
Section D (NC 132 to US 17/74 [Market Street])

Status:

Section A – 2.37 km (1.47 miles) let for construction 2/2001
Section B – 1.98 km (1.23 miles) let for construction 5/2002
Section C – 2.95 miles open to traffic 8/1996
Section D – 1.24 miles open to traffic 8/1994

Costs:

Construction:

Section A -- $61 million
Section B -- $41 million
Sections C & D -- $30 million (approximately)

Design costs were not available.

Project Outcome and Lessons Learned:

One WilmingtonStar.com news article quotes Wilmington city councilwoman and chairwoman of the local Transportation Advisory Committee Laura Padgett with saying: 'This project has come up with every possible holdup…everything that could go wrong with a highway project did go wrong.' The project's development spanned some three decades that saw new environmental concerns arise (wetlands protection, hazardous materials site mitigation, noise/vibration avoidance, and historic preservation). This resulted in the need to develop a new northern alignment and cross-section for the unfinished segments. In addition, new opportunities had to be accommodated including the future use of an abandoned railroad right-of-way and the proposed expansion of the downtown historic district. For the NCDOT the Smith Creek Parkway was a unique learning experience that required an extra measure of internal teamwork for planning, design and construction as well as significant outreach and cooperation with various stakeholder agencies, special interest groups, businesses and citizens. Beyond the councilwoman's comments, the fact that the Smith Creek Parkway's remaining sections are finally under construction, though significantly modified from the original design, has to be considered a success for modern day road building and the NCDOT.

Route Diagram and Photographs:

See attached.

Information Contact(s):

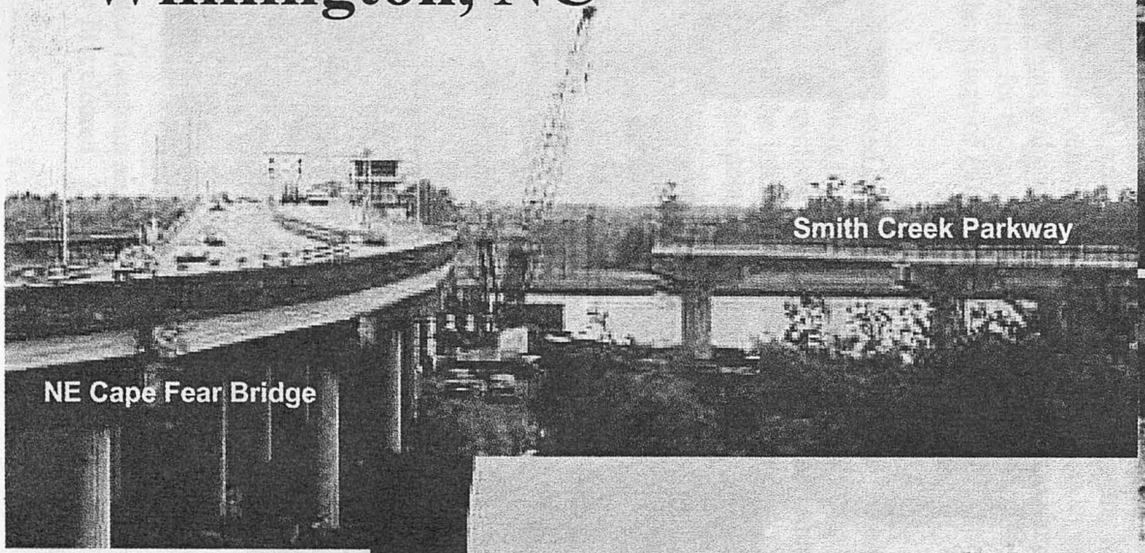
Nya K. Boayue, PE
Roadway Project Design Engineer
North Carolina Department of Transportation
919 250-4036
nkboayue@dot.state.nc.us

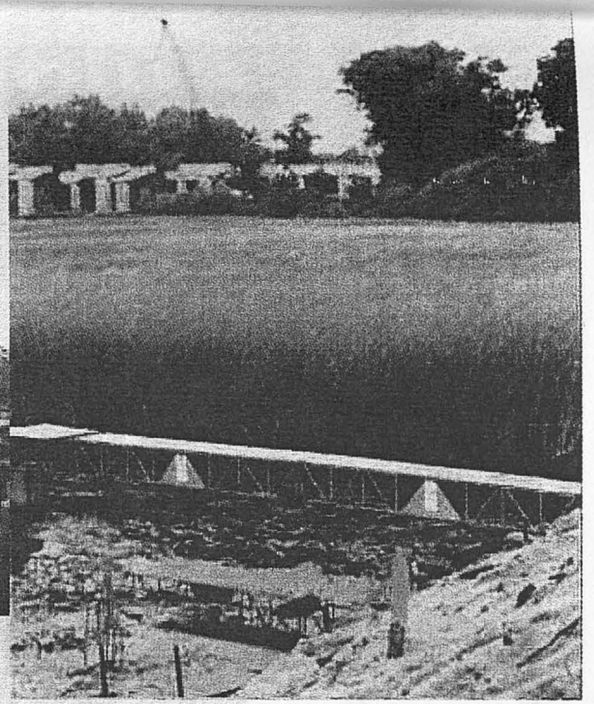
Newspaper Coverage:

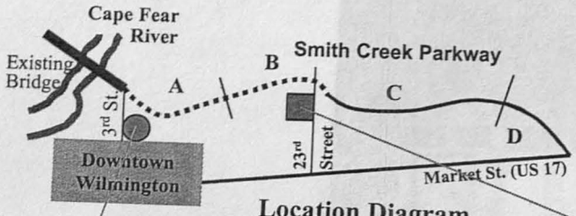
Numerous articles and letters to the editor in the Wilmington Morning Star (wilmingtonstar.com) including:

- *Designer says magnolia worth saving despite cost, Si Cantwell, December 13, 2001*
- *Parkway passes its final financial test, should finish in '05, Gareth McGrath, June 7, 2002*

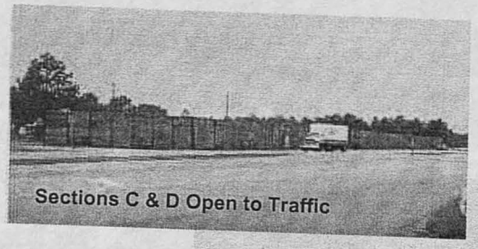
Smith Creek Parkway
Wilmington, NC

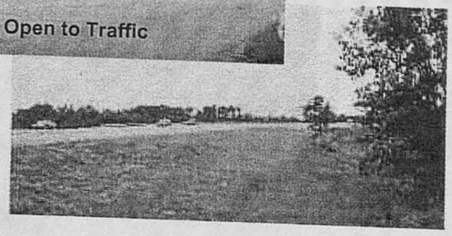




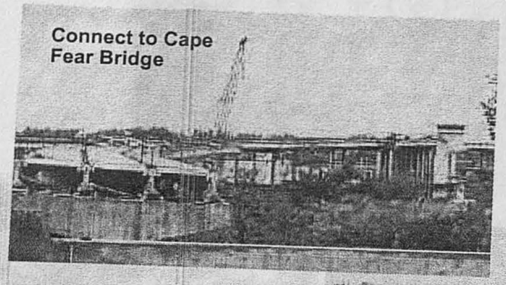


Location Diagram
(not to scale)

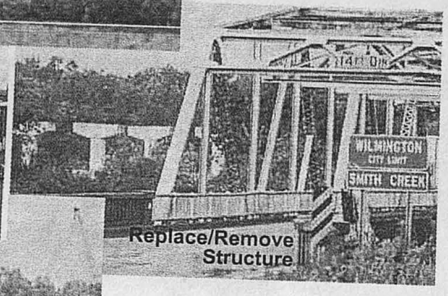


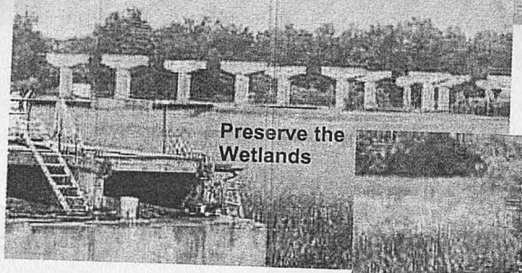


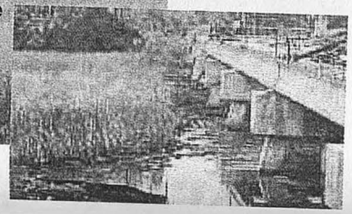
75 year old Magnolia Tree

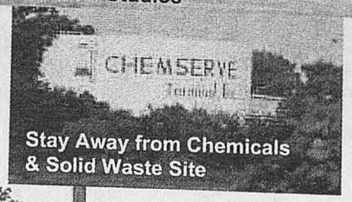


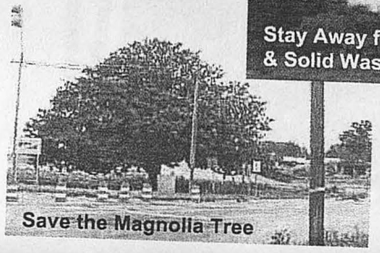
Film & TV Studio











CONTEXT SENSITIVE DESIGN CASE STUDY NO. 7
Route 50 – Loudoun-Fauquier Counties, Virginia

LOCATION:

Route 50 from US 17 near Paris to SR 600 in Lenah, Virginia. Approximate length is 24 miles.

PROJECT DESCRIPTION:

This project is a national demonstration project, funded under TEA-21 and VDOT's (Virginia Department of Transportation) Virginia Transportation Development Plan. The project is described as "Traffic Calming Measures for Route 50 in Loudoun and Fauquier Counties." The portion of US Route 50 affected by this project (called the Route 50 Corridor in this case study) is 24 miles long and located approximately 45 miles west of Washington, D.C. in the VDOT Northern Virginia District. Route 50 is a rural highway, serving as a through route as well as the main street for several small towns. The area economy is based on tourism and agriculture, so the road serves farm vehicles, bicyclists and tourists as well as local businesses, schools, churches, residents and commuters. Route 50 is functionally classified as a Minor Arterial. Current funding for the project totals $16.25 million. The corridor of Route 50 under study begins in the village of Paris and continues through Upperville, Middleburg, Aldie and ends at Lenah.

The problems expressed by residents and business owners in the area are those of excessive speeds of motor vehicle traffic, aggressive driving along the corridor, poor and unsafe conditions for pedestrians and cyclists, and harm to historic buildings and noise due to high speed traffic, especially trucks. The intent of the project is to employ traffic calming measures that will require drivers to comply with posted speed limits within the towns and along the intervening roadway segments. The purpose is to reduce speeding and aggressive driving, enhance safety, and promote local business, scenic beauty and the historic nature of the area.

This project was federally funded for the purpose of being a demonstration project and a model for the rest of the country. Part of the importance of the project is the public process by which it was and is to be developed. The study of the project and the process, before, during and after implementation is to be shared with interested communities throughout the country.

CONTEXT SENSITIVE FACTORS

There are several interrelated sensitive features along the 24-mile US 50 traffic-calming corridor. Immediately west of Paris at Route 17, the project's west terminus is Ashby's Gap. Ashby's Gap was a lookout post during the Civil War and is the current location of the Appalachian Trail (AT) crossing of US 50. The view to the east from the AT over the hamlet of Paris and Sky Meadows State Park is arguably one of Virginia's most scenic.

In this area of Loudoun and Fauquier Counties the pastoral setting has been maintained since the fields were first cleared. This land use is maintained in the respective county comprehensive

future land use plans and ensured through preservation easements and agreement between the property owners and the Virginia Outdoor Foundation (VOF).

As part of the Rural Policy Area of the Revised Countywide Transportation Plan (CTP) and General Plan, Route 50 can be seen as one of the many rural roads originally developed to serve the needs of a predominantly farm-based community. The General Plan states that, "Sensitivity to centuries-old stone walls, large trees, homes and outbuildings, scenic views and the Green infrastructure must be an essential element of road improvements if Loudoun County is to retain its rural character." The goal of any rural road improvements should be to incorporate rural character features as well as safety. The CTP states that, "Residential growth will not be encouraged in the Rural Policy Area by additional road capacity." The General Plan further identifies that, "There is strong citizen support for keeping Route 50…a two-lane road that is the subject of a 'traffic calming' initiative from Aldie in Loudoun County to Paris in Fauquier County."

The proposed land use for the majority of the project areas encompasses the Southern Tier area of the Rural Policy area, which is planned for a base residential density of 1 dwelling unit per 50 acres. Residential development can occur at a density of 1 dwelling unit per 20 acres if clustered. By lowering the zoned density, the County is attempting to assure that additional pressure is not placed on the road's capacity. The existing zoning is predominantly rural residential with a density of 1 dwelling unit per three acres.

The villages of Upperville and Aldie, and the Town of Middleburg each have historic districts that are on or eligible to be on the National Register of Historic Places. Within each historic district area there are numerous architectural structures individually eligible for inclusion to the Register. US 50 bisects each of these districts and has played a prominent role in the development of the communities.

Each of the communities is also included as part of cavalry battlefields leading to the Battle of Gettysburg. Views and interpretive signs of the Civil War battlefield areas have been incorporated into the concept plans. Citizens have established The John Singleton Mosby Heritage Area to tell the story of these battles and of the cultural, economic and political history illustrated in this area.

Part of the economic vitality of each of the respective communities is tourism. Maintaining the setting for scenic, historic and economic preservation were all raised by members of the communities and incorporated into their vision statement, "A scenic, unique, rural community in an historical, agricultural, quiet, and natural setting."

Traffic calming elements were selected to address significant safety problems but also to avoid adverse impacts on both historic and scenic resources. A finding of No Adverse Effect was made by the SHPO (state historic preservation officer). The project is under review for a Categorical Exclusion from NEPA requirements.

No historic structures will need to be relocated throughout the 24-mile route.

Minimal right-of-way (ROW) acquisition is required. If the alternative for a triad of roundabouts is selected for Gilbert's Corners, ROW will be needed to construct the roadway connecting the roundabouts on Route 50 east and south of Gilberts' Corners. Otherwise, ROW requirements are just slivers of land.

Shoulders along the project length will be stabilized turf shoulders. A VDOT maintenance staff person is working with personnel at the Virginia Transportation Research Council on a number of test areas this season to test the result of different plant material and gravel mixes.

Part of the scope of work is developing a maintenance program for the 24-mile route.

The project includes several noteworthy design elements:

- The use of a roundabout at a high accident intersection (US 50 and Watson Road) as opposed to a traffic signal. Located immediately to the south of and adjacent to the intersection is the National Register listed Mount Zion Church. Current studies show that there is a reduction in the number and severity of accidents at roundabouts. In this particular location, the roundabout is a less intrusive visual element in front of the National Register site than a traffic signal. In fact, the roundabout provides far greater landscaping opportunities that would enhance the National Register site.
- Rural Splitter Islands that announce an intersection location and provide space for one car either making a left turn from Route 50 or attempting to cross Route 50 from a side road.
- The overall integration of landscape materials throughout the concept development phase. Landscape is as much of a traffic calming tool and element as any of the roadway design features. The effectiveness of the roadway elements will increase with the addition of landscape elements.

Design exceptions for lane widths are being used in the project. However, the goal of the Design Team was to use a design guideline that was either provided by AASHTO or by another state that has incorporated similar measures. The travel lanes will be 10 ft. wide within the village areas, with an additional 1 ft. of the adjacent valley gutter drainage system available if needed.

HISTORY OF PROJECT

In 1994, VDOT was asked by the Loudoun County Board of Supervisors to reexamine earlier proposals for building bypasses around Aldie and Middleburg and expanding Route 50 in the area from a two-lane road to a four-lane divided highway. The town council of Middleburg established a committee to study the effects of such potential plans. As the interest and concern of citizens and business owners grew regarding the prospective effects of this proposed construction on local commerce, the environment, and the historical heritage of the area, the Route 50 Corridor Coalition, an organization of people who live and work in the area, was formed to seek an acceptable alternative for handling traffic.

The Route 50 Corridor Coalition raised several hundred thousand dollars in private funds over several years and hired a transportation engineer to lead the preparation of a traffic-calming plan for the Route 50 corridor. Numerous workshops were held to educate stakeholders and to gather

advice from the community. A Traffic Calming Plan for Virginia's Rural Route 50 Corridor was published by the Coalition in 1996. The Middleburg Town Council and the Loudoun and Fauquier Boards of Supervisors all unanimously approved the plan.

In the plan, Traffic Calming is defined as the combination of physical measures and a supportive environment that reduces the negative effects of motor vehicle use on individuals and society in general, by changing the design and role of streets to serve a broad range of transportation, social, and environmental goals and objectives, including:

- Increasing the quality of life,
- Improving conditions for people,
- Incorporating the preferences and requirements of the people using the area (residing, working, playing, etc) along the streets or at intersections,
- Creating safe and attractive streets,
- Helping reduce the negative effects of motorized vehicles on the environment, and
- Promoting pedestrian, cycle and transit use.

The objectives of Traffic Calming are to:

- Achieve slower, safer speeds for motor vehicles, require drivers to observe speed limits,
- Reduce collision frequency and severity,
- Improve the real and perceived safety for non-motorized users of the street,
- Reduce the need for police enforcement,
- Provide more greenery (trees, shrubs, etc.), and
- Increase access to land for all modes of transportation.

In 1998, Senator John Warner secured $13 million in federal Demonstration funds for the project. VDOT provided the required 20% match. A Task Force to oversee the project was formed under the authorization of the Virginia Commonwealth Secretary of Transportation. The 11-member task force is made up of elected officials from Loudoun and Fauquier Counties and the Town of Middleburg, representatives from the Route 50 Corridor Coalition, local businesses, residents, commuters, and historic preservation groups. The VDOT District Administrator is a non-voting member of the Task Force.

HIGHWAY AGENCY INVOLVEMENT

Under pressure to accommodate increased motor vehicle travel between expanding suburbs and the nation's capital, the Virginia Department of Transportation developed a preliminary design to widen Route 50 to four lanes, with bypasses around Aldie and Middleburg. Once the Congress had approved the "Traffic Calming Measures for Route 50 in Loudoun and Fauquier Counties" as a demonstration project, VDOT established a close working relationship with the community appointed Task Force to convert the community goals into design plans.

RESOURCE AGENCIES INVOLVEMENT

Because a NEPA document is required for the project, other interested state and federal agencies were contacted through VDOT's document Scoping Process. Additionally, agencies with jurisdiction and review authority were contacted, specifically the Virginia Department of Historic Resources and the Virginia Outdoor Foundation, for 106 Coordination and Preservation Easement information. The State Historic Preservation Officer issued a finding of No Adverse Effect for the project.

COMMUNITY INVOLVEMENT

Before a consultant team was hired for the project, a Task Force of interested citizens, local elected officials, a member of the Commonwealth Transportation Board and VDOT had been formed. The Task Force is scheduled to meet every month and is open to the public

Near the beginning of the schedule, project kick-off meetings were held at the each of the three communities. During the day informal meetings were held to introduce the consultants, the project concepts, and listen to those that choose to be heard. During the evenings, seminars discussing the goals of traffic calming were discussed followed by a question and answer period concerning the potential uses of traffic calming along the corridor. Through the three-day period a list of potential stakeholders was developed. Members of the design team were available to meet with interested parties throughout the concept development portion of the project.

A design charrette was held with members of the design team and VDOT. The issues noted during the initial stakeholder interviews were addressed as best as possible one by one. An overall concept for the corridor was developed and presented to the Task Force. Additional meetings were held with the stakeholders to refine the concepts. A public meeting was then held to present the overall and specific concepts. Meeting notes from this public presentation were again reviewed by the design team and refinements made.

SIGNIFICANT ENVIRONMENTAL ISSUES

Natural Environment

Among the design goals for the project team was to preserve and enhance views from the roadway that provide residents and travelers a connection to and an appreciation of the vast farmlands and preserved environmental lands along the Route 50 corridor. It was agreed that the rural rolling terrain would be maintained to preserve the natural topography of the land.

Human Environment

The typical section proposed in Middleburg will result in a potential reduction in the current curb-face to curb-face width from approximately 40-feet to a proposed width of 36 feet for the travel lanes and parking areas. The additional 4-foot area (2-feet north and south of US 50) will

be "added" back to the existing sidewalk. Two additional feet of sidewalk may allow room for two people to walk abreast and other streetscape amenities.

In Aldie, a sidewalk is being incorporated into the typical section to provide pedestrian access from the portion of the village to the Aldie Mill. This will better accommodate residential and tourist foot traffic.

In Upperville, the existing footpath is being restored. The proposed changes in Upperville include an extension of the existing footpath from its current terminus near the county store to the eastern end of the village near the entrance to the park.

Public Involvement

The community's input through out this project has been a determining factor, from selection of the consulting team, participation on the community Task Force that directs the project team's work, participation in small group meetings, and participation in larger public meetings.

There are four sub-committees of the Task Force, covering safety, community issues, design and engineering, and finance. These groups meet on an as-needed basis and report to the Task Force at their monthly meetings.

The Project Team has been extremely responsive to community input and concerns. They have endeavored to seek input in ways that encourage creative and collaborative thinking. For example, in public meetings when the project concept was being discussed, all sections of the road were printed out in 1"=100"scale. Preliminary concepts, many drawn from earlier small informal meetings with individuals as well as from the Project Teams collaborative brain-storming were presented in sketch form on tracing paper and participants were given markers and asked to draw themselves on the tracing paper to suggest additional ideas.

SCHEDULE OF ACTIVITIES

Following is a time-line of significant events in the Route 50 Corridor project development process:

1994 VDOT reactivates previous studies to expand Route 50 to 4 lanes from the existing 4-lane section westward to 4 miles east of Route 15. Money is programmed in the VDOT Six Year Improvement Program for FY '96-'97 to study bypasses of Aldie and Middleburg.

1995 Route 50 Corridor Coalition forms an all volunteer group of residents and business owners to examine alternatives to widening Route 50 and bypassing towns to reduce aggressive driving, improve safety along the road and balance needs of travelers with needs of residents and business owners in the area.

1996 Route 50 Corridor Coalition published, "A Traffic Calming Plan for Virginia's Rural Route 50 Corridor," a concept plan prepared by a well-known traffic engineer skilled in traffic calming techniques.

1998 $13 million in demonstration project funds was secured in the authorization of Tea-21.

1999 Project Task Force was created appointed by the Virginia Secretary of Transportation

2000 The Route 50 Traffic Calming project received a total of $16.25 million in funding.

2001 Consultant team was selected including a diverse range of disciplines. Public meetings were held in Aldie, Middleburg and Upperville. The design team met with many community groups including the Aldie Mill group, the Loudoun and Fauquier Counties sheriff's offices, the Middleburg Police Department, the emergency services teams, the Prelude to Gettysburg group, and Middleburg Town Council.

A design charrette was held with members of the Task Force and VDOT to refine the conceptual plan developed by the community into a 24-mile Corridor Concept Plan.

2002 A Categorical Exclusion was requested from NEPA reviews. A finding of No Adverse Effect was made by the Department of Historic Resources.

2004 Construction is expected to begin. Current funds will cover complete design, right-of-way acquisition, and an estimated one-third of total construction costs. The Task Force together with VDOT will prioritize construction projects.

PROJECT OUTCOME TO DATE AND LESSONS LEARNED

Although it appeared that Virginia law did not allow citizens to participate on the consultant selection team, a ruling from FHWA's Chief Counsel clarified that this was possible. The 6-member selection team was equally divided between VDOT staff and community representatives. The team's collaborative effort to conduct a fair and impartial review of consultants resulted in a unanimous choice. This activity was a turning point in the relationship between VDOT and the Route 50 Corridor Coalition, and allowed a relationship of trust to begin.

The Design Team is comprised of a very diverse group of educational backgrounds including individuals with expertise in traffic calming measures, hard-line traffic engineers and designers, landscape architects, planners, and an architectural historian. During the team meetings and the design charrettes, ideas and concerns were freely floated, hard questions were asked and discussed, and concepts were evaluated openly. As a result, the product or overall design concept is an exceptional reflection of the diversity of the project team. Additionally, the enthusiasm of team members who are thoroughly enjoying the opportunity to exercise their creative skills in a national demonstration project is clearly evident. They are having fun!

An important element of the context sensitive design approach with this project was the willingness of the engineers to get away from a "template" mentality where often a typical section is designed and then uniformly applied to large areas of the corridor. Instead the designers and engineers all agreed about the overall design goals and principles – most related to transforming a rural highway to a village street – and then adapted the agreed upon principles to the very unique conditions of each of the three towns. The result is that each town will continue to retain its own unique character.

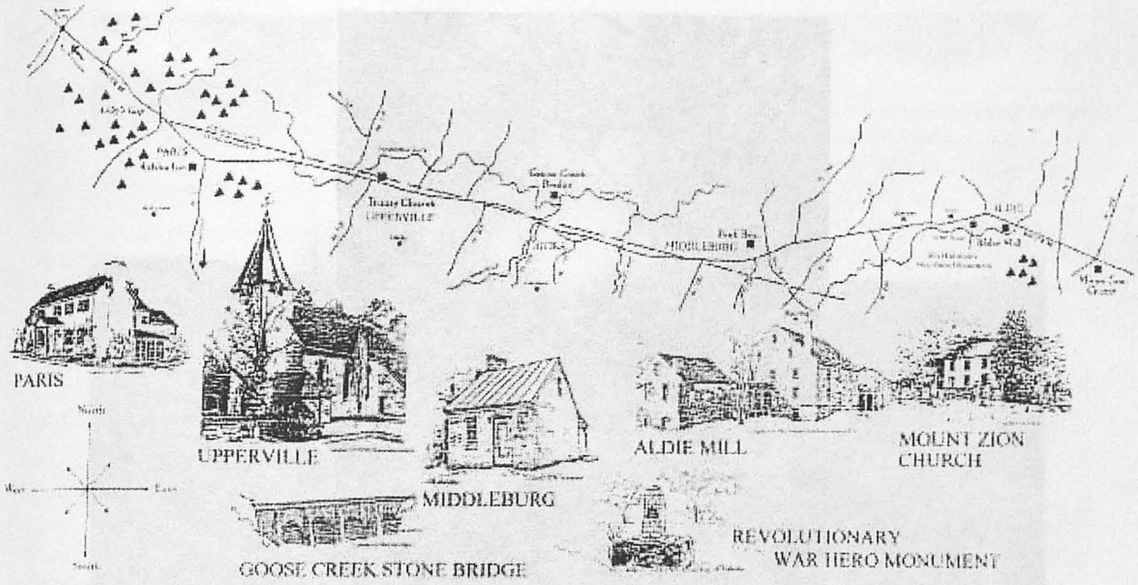
The design team has been particularly sensitive to the need to look at design elements in the context of the existing resources so they enhance these resources – not overwhelm or detract from them. For example, there has been debate on entrance features – size, scale, materials, etc. that are appropriate in this "quiet" environment. For a second example, the team is aware that the cumulative interest in promoting the corridor and its amenities through signage has the potential to induce sign pollution. Some stakeholders expressed a desire to combine the signs with the entrance features. This too has the potential to overwhelm the intent of the feature that the landscape architects were trying to accentuate. An example is the east entrance to Aldie that uses a slight vertical element (a pier) that frames the existing church. The teams' lesson is to rely heavily on the trained eye of the landscape architects and to stay on top of ALL of the comments provided and consider the potential cumulative effect - in essence "less is more."

One of the keys to the success of the project has been the availability of members of the design team and Task Force to address issues and concerns raised by interested citizens. This responsiveness has been through individual and small group meetings such that individual voices can be heard in an informal setting.

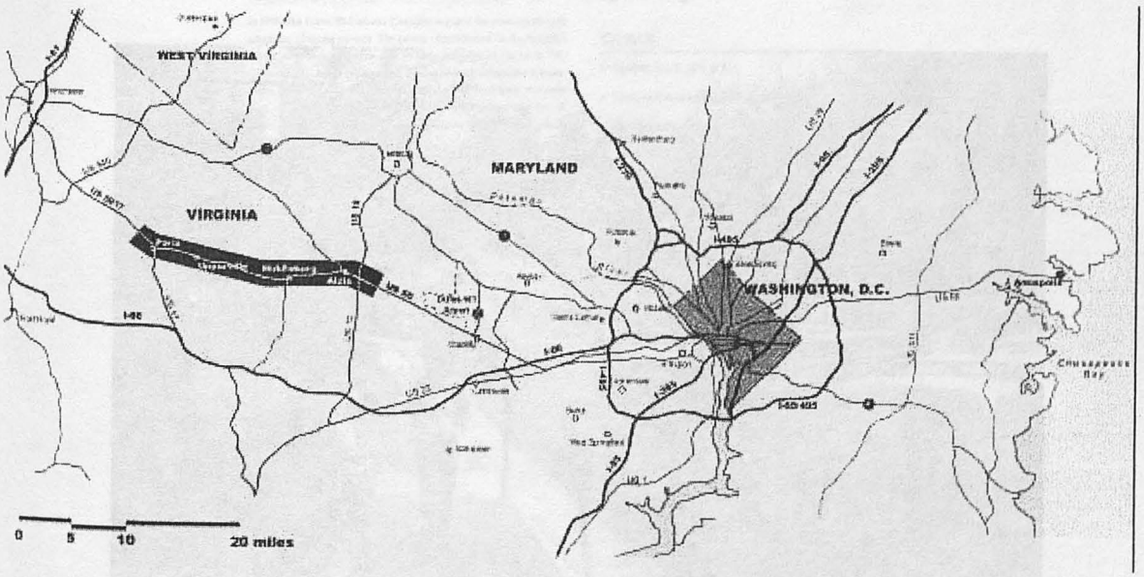
Having a design team that brings a full appreciation for the flexibility in the design guidelines has been very important along with the ability to research and bring for consideration successful design concepts from other states and countries.

One of the best examples in this project of the power of a small group meeting was with representatives of the Middleburg Fire Department. These individuals were concerned about the potential reduction of response time and the ability of their fire trucks to negotiate the proposed traffic calming measures. The fire department drove their largest truck through a mock raised intersection to discern if the traffic-calming feature would adversely affect the turning ability. The truck negotiated each approach without incident thereby settling the concerns of many of the firemen.

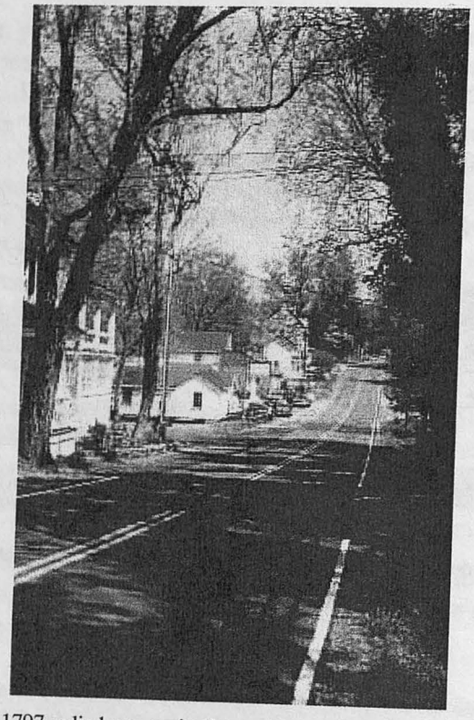
A significant accomplishment is that a concept for overall treatments in the corridor and for specific treatments in three communities and several rural intersections was developed and will be presented in a formal Public Hearing in a little over one-year's time.



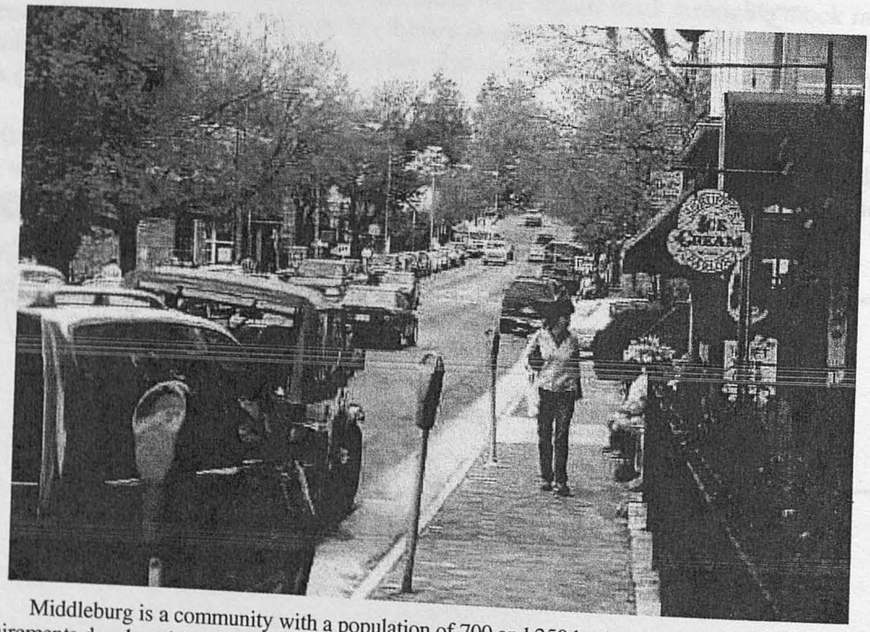
A.1 The corridor – Approximately 24 miles between Paris and Mount Zion Church.



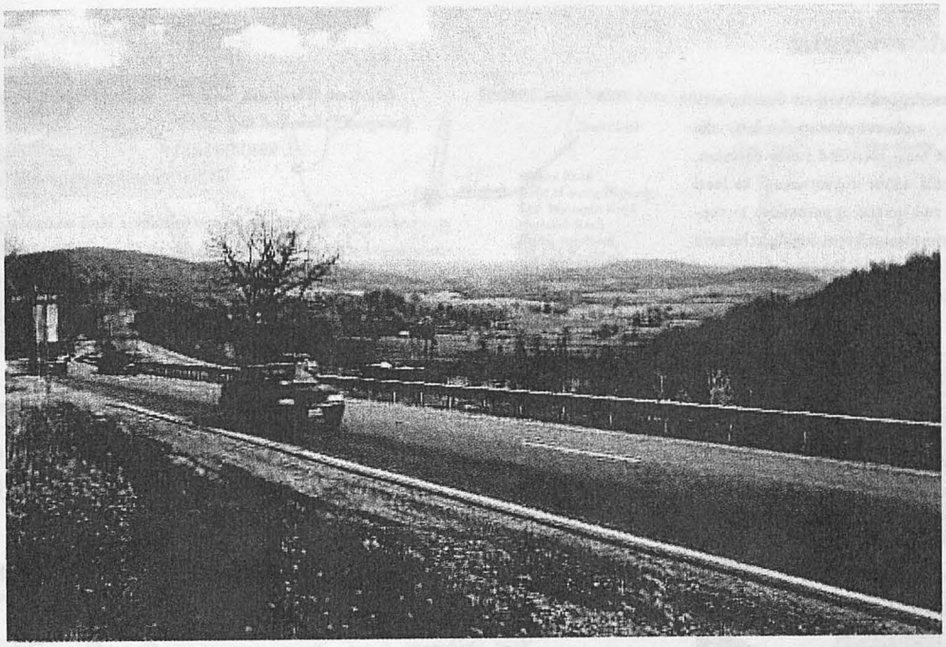
A.2 Route 50 Corridor – The Regional Context.



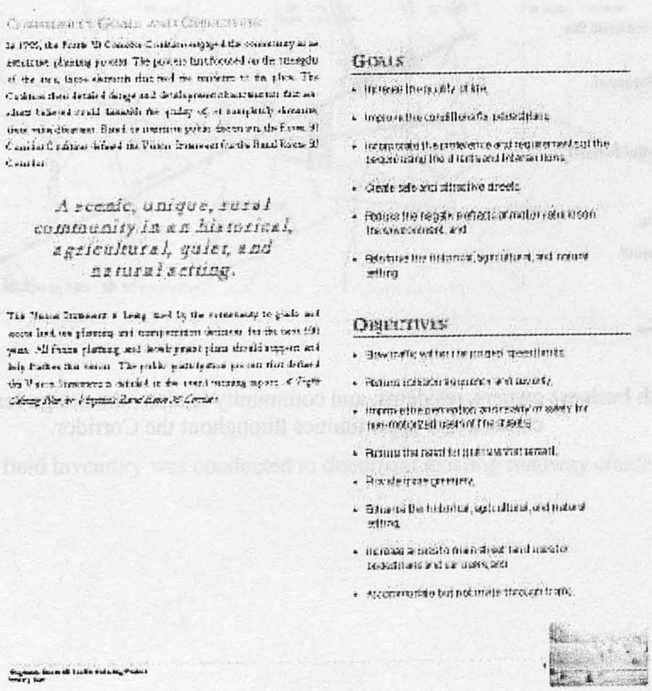
A.3 Upperville, founded in 1797, relied economically on the nearby Panther Skin Creek, used to turn millstones for grinding corn and wheat.



A.4 Middleburg is a community with a population of 700 and 250 business licenses. One of the design requirements developed based on public input was to, "Support multiple uses and users of the roadway."



A.5 Another design requirement was to "Preserve / Enhance Views." Views from the roadway provide residents and travelers a connection to and an appreciation of the vast farmlands and preserved environmental lands round along the Route 50 Corridor.



A scenic, unique, rural community in an historical, agricultural, quiet, and natural setting.

GOALS

- Improve the quality of life.
- Improve the conditions for pedestrians.
- Incorporate the pathways and requirements of the requirements of the Federal and State laws.
- Create safe and attractive streets.
- Reduce the negative impacts of motor vehicles on the environment, and
- Enhance the historical, agricultural, and natural setting.

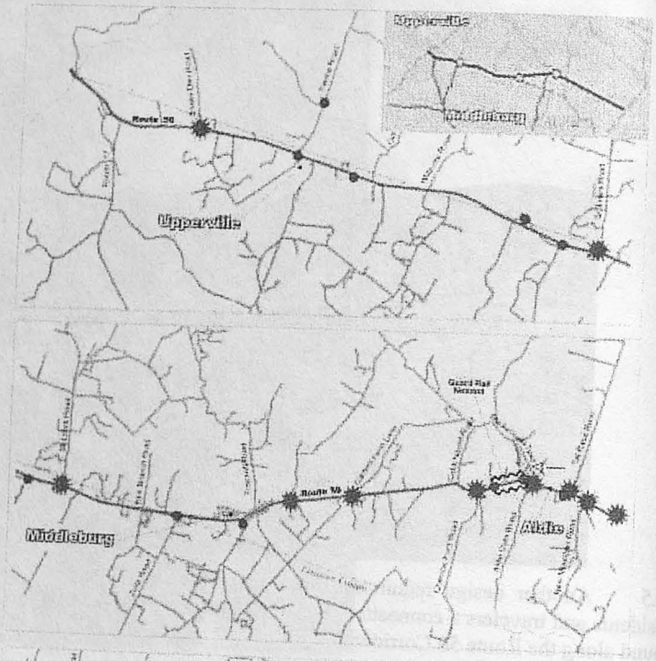
OBJECTIVES

- Slow traffic within the posted speed limits.
- Reduce collision frequency and severity.
- Improve the perception and reality of safety for non-motorized users of the streets.
- Reduce the need for future commercial growth.
- Provide green corridors.
- Enhance the historical, agricultural, and natural setting.
- Increase the ability to maintain rural character for residents and tourists, and
- Accommodate but not invite through traffic.

A.6 Community Goals and Objectives from "A Traffic Calming Plan for Virginia's Rural Route 50 Corridor," published 1996.

Community Input

By meeting with business owners, residents, and community leaders, the design team identified safety concerns, potential access improvements to local sites, and unique opportunities to support existing land uses, highlight historic sites, and reinforce the rural character of the area. The following maps identify these opportunities.



LEGEND

- Prelude to Gettysburg Battlefield Site
- High Crash Rate
- Pedestrian Crosswalk Requested
- Poor Sight Distance
- Difficult to Turn onto/off of Route 50
- Drainage Problem
- P Need Additional Parking
- Additional Lighting Needed

A.7 By meeting with business owners, residents, and community leaders, the design team identified areas of concern and opportunities throughout the Corridor.

Roadway Characteristics

Functional Classification: **Minor Arterial (Loudoun)**
Principal Arterial (Fauquier)

AADT (2001): **7,500-12,000**

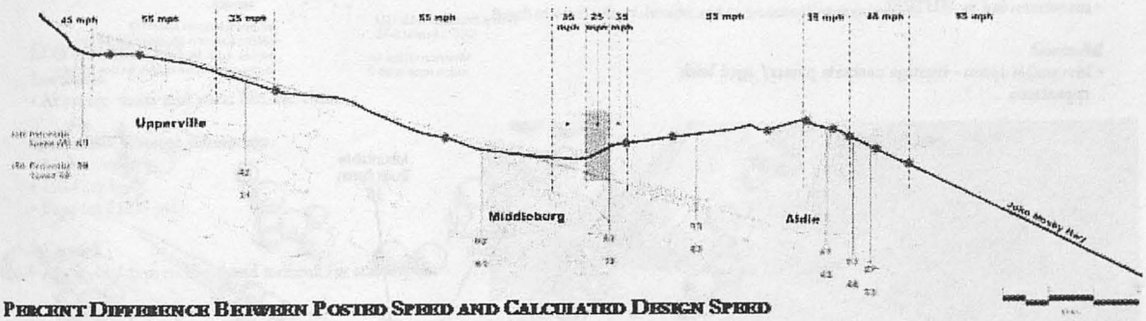
Percent Heavy Vehicles: **5.0%**

A comprehensive field inventory was conducted to document existing roadway conditions. Data was collected on the posted speed limits, existing operating speeds, and crashes. Also, a profile analysis was conducted to calculate the design speed for roadway segments based on the stopping sight distance of the vertical curves.

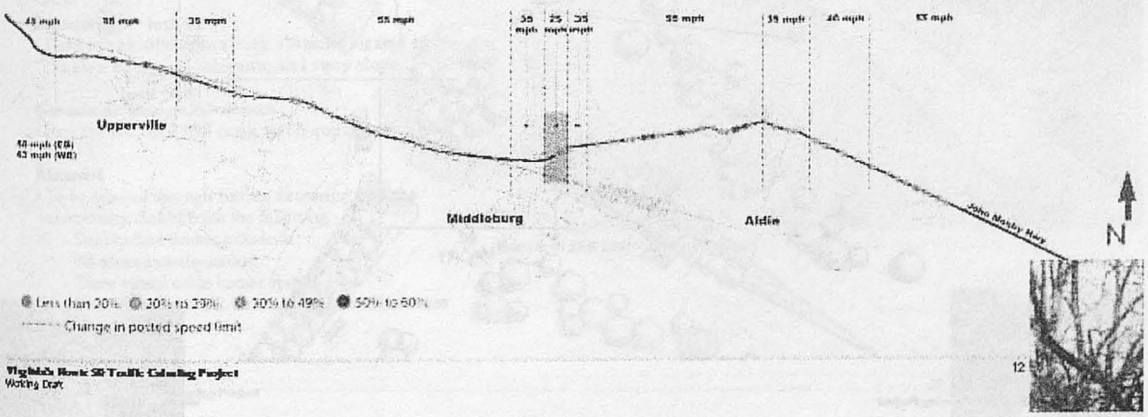
High Crash Sites (sites with more than 10 accidents in the past five years)

Street Name	*# of Crashes (Past 5 years)*	*Accidents per Million Entering Vehicle*
Watson Road	66	2.43
James Monroe Highway	56	1.11
New Mountain Road	40	
Dumfries Road	28	1.44
Saint Louis Road	23	1.40
Champe Ford Lane	19	
Aldie Dam Road	18	1.04
Snake Den Road	15	
Macville Road	14	
Tail Race Road	13	
Sam Fred Lane	12	
Greengarden Road	11	

85th Percentile Travel Speed and High Crash Sites



Percent Difference Between Posted Speed and Calculated Design Speed



A.8 A comprehensive field inventory was conducted to document existing roadway conditions.

Rural Traffic Calming Measures

Roundabouts

Location

- At intersections where a traffic control device is required to increase safety and/or accessibility.

Geometric Design Elements

- Design speed = 50 mph approaches
- 1 lane on approaches.
- single, 15 foot wide lane in roundabout.
- 90 foot diameter center island. (may vary)

Landscaping Elements

- Use to emphasize location of roundabout

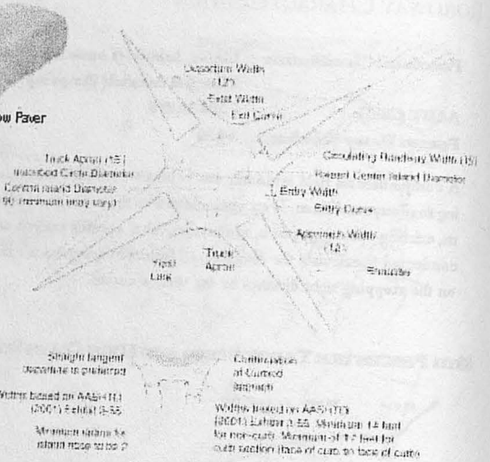
Signage

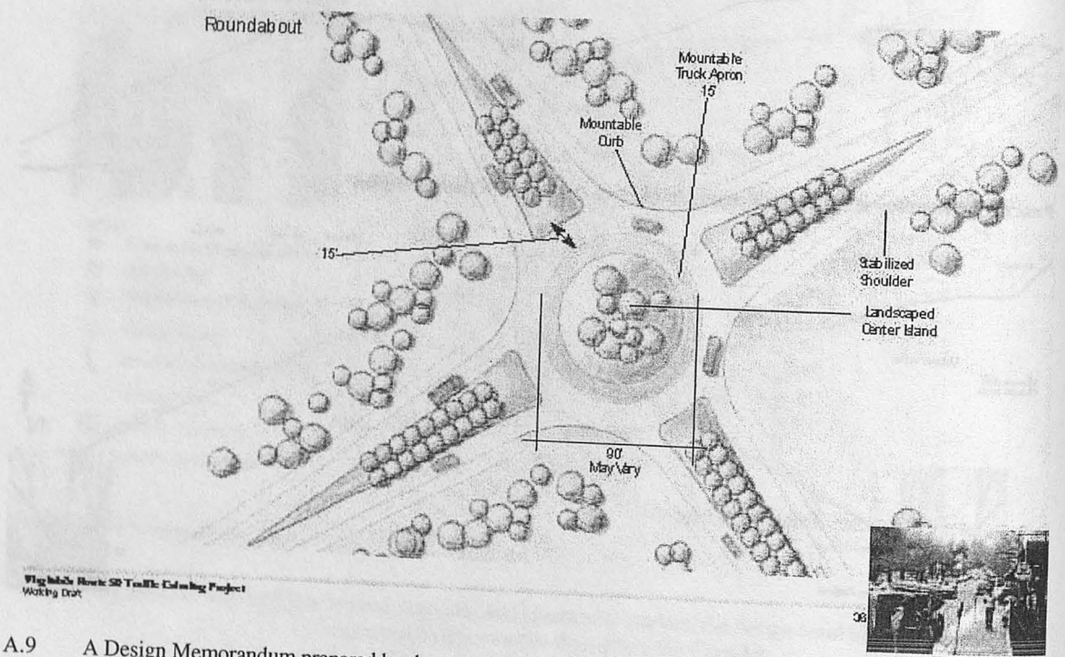
- Locate directional signs at roundabout
- Locate warning signs for splitter island on Route 50 as recommended in MUTCD.

Material

- Mountable apron - heritage concrete pavers / aged brick appearance.

Heritage Hollow Paver





A.9 A Design Memorandum prepared by the consulting team documents numerous traffic calming measures.

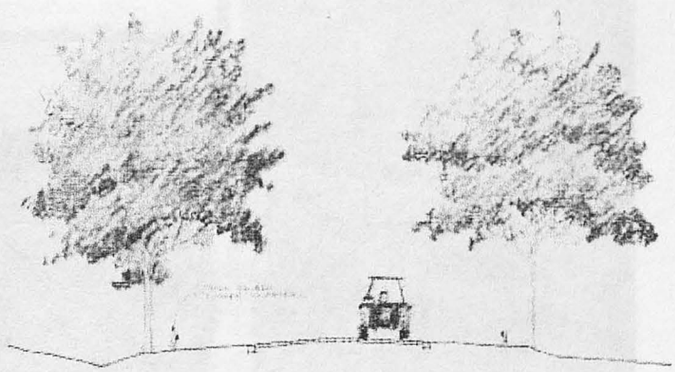
Stabilized Turf Shoulder

Replace gravel shoulders with stabilized turf shoulders. Stabilized turf shoulders reinforce the desired driving characteristics by visually narrowing the road and improve the aesthetics of the roadway.

Location
- Along edge of travel lane in Rural and Transition Areas

Geometric Design Elements
- 8 foot wide shoulders.
- 12 foot wide travel lanes.

Material
- Aggregate / topsoil blend.



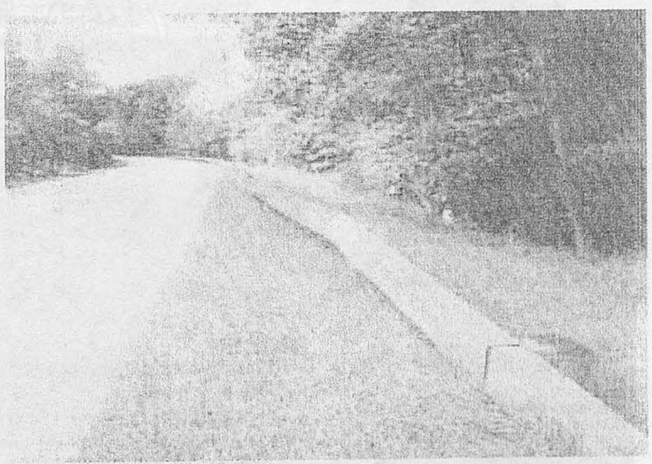
Sketch of stabilized turf shoulder and steel-backed timber guardrails.

Scenic Pull-offs

Location
- At scenic vistas and rural historic sites

Geometric Design Elements
- 14 foot wide.
- 150 foot long.
- Support 3,000 psi.

Material
- Aggregate / topsoil blend and terracell for stability.



Example of steel-backed timber guardrails

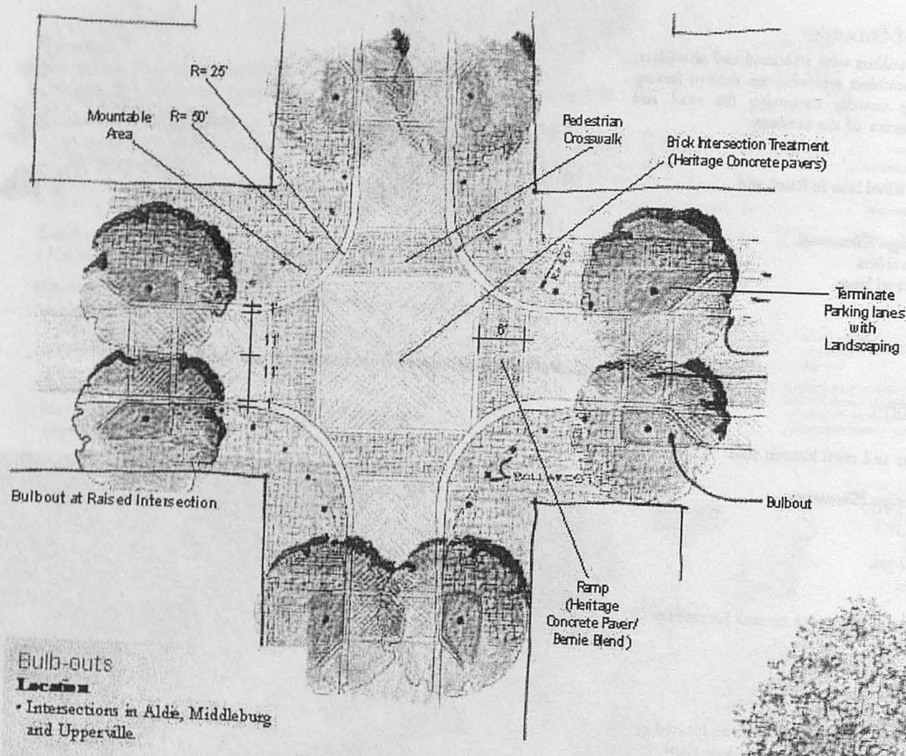
Guardrails

Location
- Used to shield motorist from obstacles located in the clear zone, embankments, and steep slope.

Geometric Design Elements
- Pass the NCHRP 350 crash test requirements.

Material
- To be selected through further discussion with the community. Select from the following:
  - Steel-backed timber guardrails
  - Weathered steel guardrails
  - Three strand cable barrier system
  - Stone masonry walls with reinforced concrete core

A.10 The Design Memorandum calls for replacing gravel shoulders with stabilized turf shoulders.



Bulb-outs

Location

- Intersections in Aldie, Middleburg and Upperville.

Signage

- Pedestrian crossing sign

Landscaping Elements

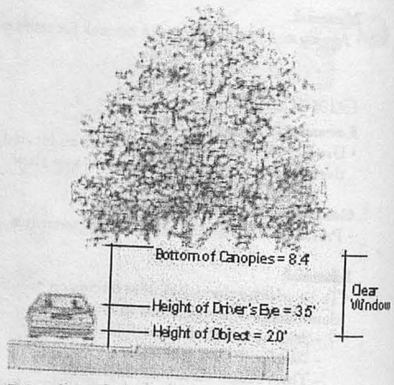
- Use to highlight location
- Will be compatible with the existing landscaping and proposed streetscaping.

Geometric Design Elements

- Design speed 25 mph
- 25' Curb Return Radius.

Material

- Raised Table: Heritage Concrete Pavers
- Crosswalks: Similar material (color and pattern) to sidewalk. 12" tinted concrete bands with smooth finish will edge the crosswalk pavers.
- Detectable concrete warning pavers at edge of vehicle driving lane. Use darker color than sidewalk.



Clear window for landscaping or other obstructions within the sight triangle at in-town intersections.

Reference: FDOT Roadway Design Manual

A.11 Bulb-outs are another traffic calming measure included in the Design Memorandum.

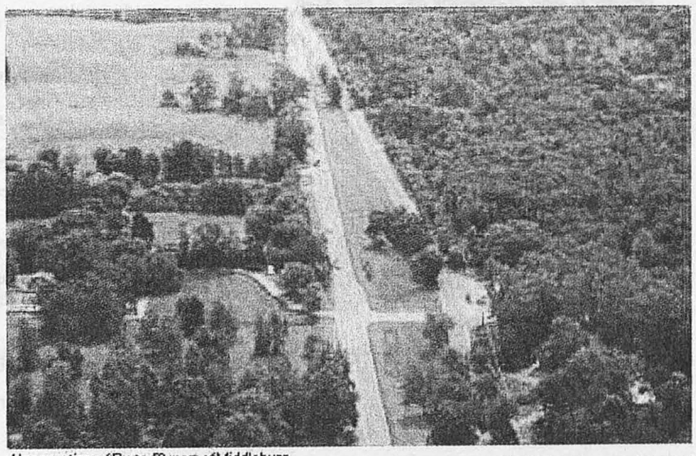
Specific Corridor Enhancements

There are two areas in the study that require comprehensive modifications to the roadway. These areas are defined as follows:

- Gilbert's Corner, and the associated traffic congestion.
- The 1.3 mile four-lane segment of Route 50 located west of Middleburg.

The Study Team outlined a detailed enhancement plan for each of these areas that address safety, access, and aesthetic concerns.

Gilbert's Corner (intersection of US 50 and US 15)



4-Lane section of Route 50 west of Middleburg

A.12 There are two areas in the Route 50 Corridor that require comprehensive modification to the roadway. These are Gilbert's Corner and a 1.3 mile four-lane segment of Route 50 located west of Middleburg.

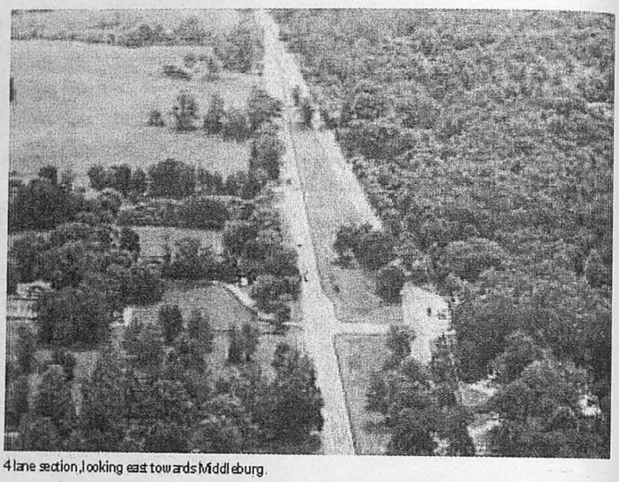
4 Lane Section

Rural Route 50 widens to four-lanes west of Middleburg. Stakeholders identified the 1.4 mile long four-lane section as a safety concern, where drivers increase speeds in an attempt to pass other drivers before re-entering the two-lane road section. The high speed section is located immediately adjacent to the Middleburg west transition area. The slope, straight alignments and wide cross-section entice drivers to speed up as they approach town, working in opposition to the intent of the transition area and the entrance way features.

The recommended design restores this section of Route 50 to a two-lane roadway. A portion of the existing westbound lanes are redesigned to serve as a local access road. The existing westbound lane are redesigned to provide eastbound and westbound travel. The meandering alignments is design to self-enforce the 50 mph travels speeds in this area.

Design Principles

- Self-enforce Posted Travel Speed
- Increase Safety of Vehicular Travel
- Provide Access to Historic Sites
- Preserve / Enhance Views
- Maintain the Rolling Terrain
- Improve Shoulder Treatment
- Use Natural / Traditional Landscaping Materials and Techniques
- Accommodate Agricultural / Equestrian Transport / Emergency Vehicles



4 lane section, looking east towards Middleburg.

Signage

- Signs associated with Prelude to Gettysburg/Mount Defiance Battlefield Site.

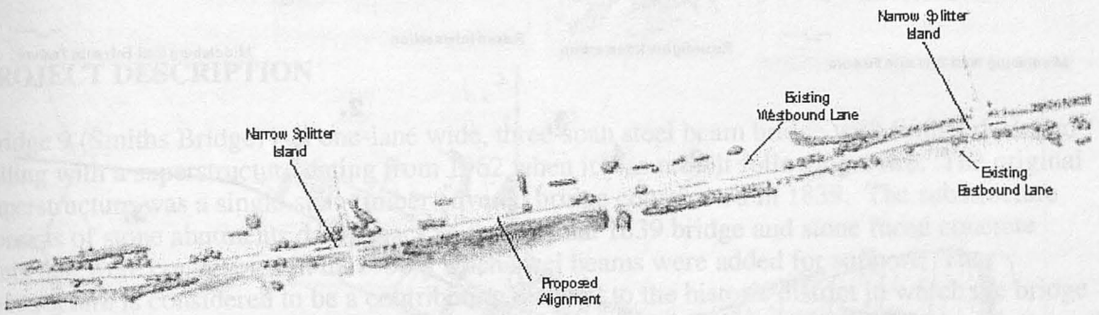
Landscaping Elements

- Will be compatible with the existing landscape.
- Will reflect historic landscaping features.

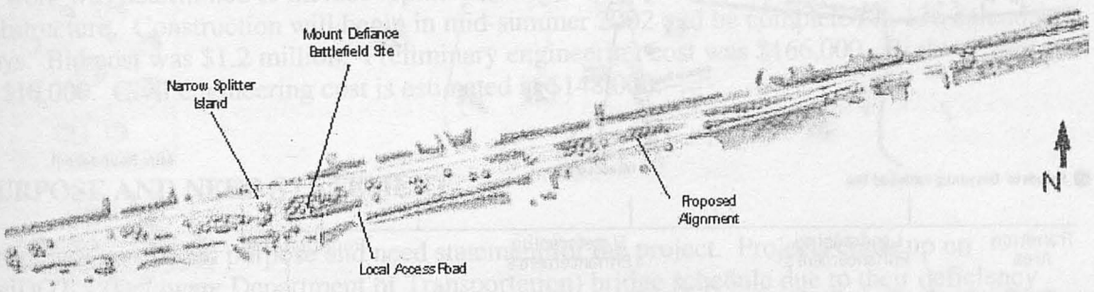
Geometric Design Elements

- 50 mph design speed on approaches.
- 2 lanes.
- 12 foot wide travel lanes.
- Maintain access to adjacent uses.

A.13 In the four-lane section west of Middleburg, stakeholders identified this section as a safety concern, where drivers increase speeds in an attempt to pass other drivers before reentering the two-lane road section. The recommended design restores this section of Route 50 to a two-lane roadway.

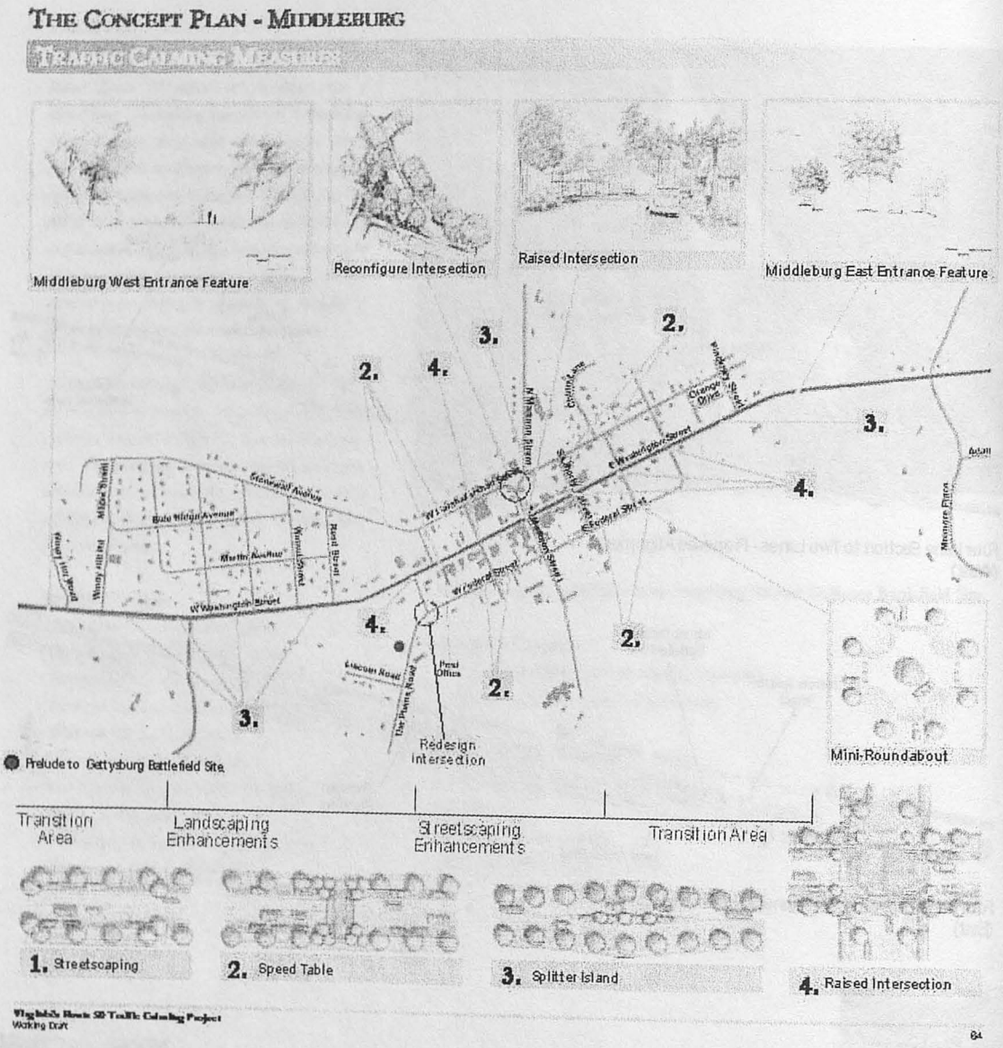


Four Lane Section to Two Lanes - Proposed Alignment
(West)



Four Lane Section to Two Lanes - Proposed Alignment
(East)

A.14 In the four-lane section west of Middleburg the Design Memorandum proposes that a portion of the existing eastbound lanes be redesigned to serve as a local access road. The existing westbound lanes are realigned to provide eastbound and westbound travel. The meandering alignment is designed to self-enforce the 50 mph travel speeds in this area.



A.15 The Design Memorandum includes concept plans for each of the three major communities along the Route 50 Corridor. This is the concept plan for Middleburg.

CONTEXT-SENSITIVE DESIGN CASE STUDY NO. 8
Bridge 9 on Smiths Bridge Road over Brandywine Creek, Delaware

LOCATION

Bridge #1-009 on Smiths Bridge Road (N221) over the Brandywine Creek north of Wilmington in New Castle County, DE.

PROJECT DESCRIPTION

Bridge 9 (Smiths Bridge) is a one-lane wide, three-span steel beam bridge with timber deck and railing with a superstructure dating from 1962 when it was rebuilt following a fire. The original superstructure was a single-span timber covered bridge constructed in 1839. The substructure consists of stone abutments dating back to the original 1839 bridge and stone faced concrete piers that were constructed in the1950's when steel beams were added for support. The substructure is considered to be a contributing element to the historic district in which the bridge lies. The latest condition evaluation reports that the bridge deck is in poor condition, with the superstructure and substructure in fair condition. Based on the condition of the bridge, the scope of work was determined to include replacement of the superstructure and rehabilitation of the substructure. Construction will begin in mid-summer 2002 and be completed in 136 calendar days. Bid cost was $1.2 million. Preliminary engineering cost was $166,000. Right of way cost is $10,000. Civil engineering cost is estimated at $148,000.

PURPOSE AND NEED STATEMENT

There was no official purpose and need statement for the project. Projects come up on DelDOT's (Delaware Department of Transportation) bridge schedule due to their deficiency rating and at that time the Department determines the project scope. The original project scope here was to replace the deck and rehabilitate the substructure. It was following the first Public Workshop at which DelDOT staff took input from the public that DelDOT decided to alter the initial scope of the project.

DelDOT staff attempted to have a "mission statement" for the working group that incorporated the concerns raised by the public in the first two Public Workshops. DelDOT drafted a mission statement with a focus on engineering and safety concerns, but the working group and the Department could not come to an agreement on the wording. Therefore it was dropped. The public's concerns and options obtained from the first two Public Workshops were used to guide the working group's efforts.

CONTEXT SENSITIVE FACTORS

The following context-sensitive factors were raised: Aesthetics, historic issues, environmental concerns, noise concerns, multi-modalism (pedestrian/cyclists), traffic calming (speed, traffic volumes, trucks), safety, vandalism, and flooding.

The landmark 1839 bridge was recorded by the Historic American Building Survey in a Works Project Administration project in 1936. As built drawings were available from 1956 when the bridge was rehabilitated adding stone-faced concrete piers when steel beams were added for support. Community residents remember the landmark bridge that stood until it was burned through arson in 1961. The documentary record of the historic bridge gave design engineers good information to develop a replacement for the superstructure of the bridge that is not a literal recreation of the historic structure, but is based on its design qualities.

The decision to build a one-lane covered bridge required a design exception to AASHTO design guidelines. While normally a road classified as a rural collector requires a 80 km./hour design speed, such a design speed would have required extensive re-alignment of the approaches and significant wetland fills (exceeding allowable limits and requiring mitigation). DelDOT engineers determined that a 20 mph speed limit would be appropriate. DelDOT's engineers determined their principal concern with the poor sight distances on the approaches to the bridge could be met by a limited realignment on the north side of the bridge to provide better sight distances.

The following are the geometric values called for by AASHTO's guidelines and those provided in this project:

DelDOT Design Criteria Form

Design Criteria			
Design Factor	**Required by Road Design Manual**	**Required by AASHTO Green Book For 20 MPH**	**Provided**
Design Speed	80 km/h (50 mph)	30 km/h (20 mph)	30 km/h (20 mph)
Width of Clear Zone	8 m (24 ft)	5 m (16 ft)	0.6 m (2 ft)
Width of Through Lanes	3.6 m (12 ft)	3.6 m (12 ft)	3.0 m (10 ft)
Width of Auxiliary Lanes	N/A	N/A	N/A
Width of Shoulder	2.4 m (8 ft)	2.4 m (8 ft)	0.6 m (2 ft)
Width of Median Shoulder	N/A	N/A	N/A
Width of Median	N/A	N/A	N/A
Stopping Sight Distance	122 m (400 ft)	30 m (100 ft)	30 m (100 ft)
Passing Sight Distance	N/A	N/A	N/A
Maximum Horizontal Curvature	6°45'	58°13'	58°13'

Minimum K (Crest)	34 m (110 ft)	3 m (10 ft)	3.4 m (11.2 ft)
Minimum K (Sag)	27 m (90 ft)	4 m (13 ft)	4.1 m (13.5 ft)
Maximum % of Grade	6 %	10 %	8 %
Maximum Front Slope (Unprotected Section)	4:1	4:1	4:1
Maximum Back Slope	4:1	4:1	N/A
Barrier Offset	0.6 m (2 ft)	0.6 m (2 ft)	0 m (0 ft)

Improved sight line distances will be achieved by realigning and raising the approach from the west side of the bridge and by lowering the bridge deck by one foot. The reduced section height of the superstructure will allow this while maintaining the current soffit elevation of the bridge.

HISTORY OF PROJECT

The project was initiated as a deck replacement/rehabilitation project. DelDOT staff had a request from a community organization, which they were working with on another project, to approach the public with a "blank sheet of paper". The concern was that on the typical bridge project, public input is sought late in the process after most of the decisions that would affect the community have been made. Because this project could be accomplished in many different ways and is a local landmark in which many people and organizations have an interest, DelDOT agreed.

HIGHWAY AGENCY INVOLVEMENT

Bridge 9 had a history of maintenance problems relating to its wooden plank surface and frequent need for repair to the timber bridge rail. When the bridge came up for deck replacement and rehabilitation work, DelDOT's North District decided the project was more than they could handle and turned to the Office of Preconstruction in Dover that provides designs for all districts in the state. DelDOT's engineers thought that the ADT of 3,600 vehicles per day warranted building a two-lane facility. The accident history for the bridge was not severe: 18 accidents over ten years (including one fatality and three injuries). Most accidents were caused by the poor sight distance at the approaches to the bridge.

RESOURCE AGENCIES INVOLVEMENT

An architectural resources survey conducted at DelDOT's request revealed the Smith's Mill-Granogue Historic District, a rural historic landscape encompassing seven inventoried resources, and recommended the district as eligible for the National Register of Historic Places. The National Park Service defines a rural historic landscape as a "geographical area that historically has been used by people, or shaped or modified by human activity, occupancy, or intervention, and that possesses a significant concentration, linkage, or continuity of areas of land use, vegetation, buildings and structures roads and waterways, and natural features." The elements of Smiths Bridge that survive from the 1839 bridge were judged to constitute a contributing element

to the historic district. Therefore, the Delaware Historic Preservation Office and the New Castle County Historic Review Board were involved in review of the project.

A U.S. Army Corps of Engineers Nationwide Permit was required for the abutment work in the waterway and any placement of riprap in scour holes. The area surrounding Bridge 9 was designated in the Brandywine Valley Scenic River and Highway Study, conducted by New Castle County in 1987, as a priority area for protection, and therefore consultation with the County's Department of Planning was recommended. Consultation with the Department of Natural Resources and Environmental Control was needed to address findings in a Natural Heritage Survey that one state rare fish species, known as the Comely Shiner, is found near the project area. However, because of the limited nature of the project, impacts were not anticipated.

The project received a Class II, Categorical Exclusion under NEPA requirements.

COMMUNITY INVOLVEMENT

Prior to the first Public Workshop, initial contact was made with the adjacent property owners by letter and follow up interview. At the request of a community group that was working with DelDOT on a nearby project, the Department agreed to hold a public meeting with a "blank sheet of paper". Notice of the public meeting was placed on a sign adjacent to the bridge. One hundred people attended this first meeting held in April 2000. Sixty-eight of the attendees returned a questionnaire that asked them to identify their concerns with the bridge's operation and their proposed solutions. The questionnaire also asked people to identify community groups to which they belonged. Many respondents were concerned that if a two-lane bridge was built, it would encourage more traffic through the area. Also there was strong opposition to installing a traffic signal to control traffic flow as being incompatible with the character of this rural setting.

A second workshop was held two months later. DelDOT staff organized the responses to the April questionnaire into four options, one lane open, one lane covered, one lane covered with bike/pedestrian lane, and two lanes open. At the second Public Workshop DelDOT distributed a questionnaire and asked the workshop attendees to rank the options. One hundred questionnaires were returned.

DelDOT then organized a 15-member Working Group to help them to refine the project concepts. A letter was sent to the various civic groups, organizations, property owners, and legislators asking if they would like to participate in the Working Group. The following were represented on the working group:

- Preservation Delaware (private historic preservation organization)
- Kennett Pike Association (local civic group)
- Centerville Civic Association (local civic group)
- Brandywine Conservancy (private environmental organization)
- Delaware Greenways (private organization for preservation and enhancement of natural, scenic, historic, cultural, and recreational resources)
- Delaware Nature Society (private organization for the preservation of natural resources)
- State Historic Preservation Office
- Adjacent Property Owners

-DelDOT Locations Studies Group (obtains state and federal permits for environmental and historic issues)
-Legislators

The responses from the second set of questionnaires gave nearly equal votes to the one lane covered option and to the one lane covered with bike-pedestrian lane option. Support for a two-lane option was negligible. The Working Group strongly supported the one lane covered option, possibly because the width of the one lane covered with bike-pedestrian lane option (which included an intermediate member separating the lanes) was 20 feet or essentially wide enough for two lanes at a point in the future. The Working Group agreed upon the one lane covered option with a 15-foot width, allowing enough width to accommodate bikes and pedestrians.

NATURAL ENVIRONMENT ISSUES

The principal environmental impact is a small reduction of wetlands due to the road realignment on the west side of the bridge. The amount of wetland fill was minimized and kept below the level, which would require mitigation, by the use of a concrete retaining wall along much of the realignment.

In addition to other environmental issues discussed in the Resource Agencies Involvement section, a New Castle County Floodplain Permit is required due to the abutment work. Hydrological calculations to prove that the improvements will not decrease the storage capacity of the floodplain and not increase the floodplain elevation were provided to the County in the floodplain permit application and the County issued a permit.

HUMAN ENVIRONMENT ISSUES

As noted in the section under Resource Agencies Involvement, Smiths Bridge is located in and its historic substructure contributes to the Smith's Mill-Granogue Historic District, a rural historic landscape. The special character of this area is widely recognized by those who live near and use this road. Respect for preserving the historic and scenic qualities of the area and developing a bridge design that would fit well with these qualities was a goal of all participants in this project.

SCHEDULE OF ACTIVITIES

February 3, 1998	Estimate supplied to North District Maintenance for replacement of timber deck.
August 18, 1998	Project added to Design project list.
October 2, 1998	Bridge rehabilitation project initiated with expectations to match existing geometry.
August 20, 1999	Submitted Survey Plans.
Sept.-Dec. 1999	Developed design alternatives in preparation for public workshop.
Dec. 1999-Feb. 2000	Met with adjacent property owners and environmental agencies.
April 10, 2000	Held public workshop "with a blank sheet of paper" at citizens' request, distributed questionnaire to determine public concerns.

Apr.-May 2000	Reviewed questionnaires, developed design options.
May 26, 2000	Presented design options to DelDOT's Program Development Committee and received favorable response.
June 26, 2000	Held public workshop, presented design options, requested public preferences.
July 2000	Tabulated design option survey.
July 24, 2000	Met with Director of Preconstruction, determined to proceed with one lane covered bridge with separate bike lane.
Aug.-Sept. 2000	Set up working group.
October 17, 2000	Held first working group meeting.
October 24-25, 2000	Toured covered bridges in Southeastern Pennsylvania.
November 6, 2000	Held second working group meeting.
November 21, 2000	Held third working group meeting; reached consensus on 15-foot one lane wide covered bridge that would accommodate vehicles along with pedestrians and bicyclists
December 6, 2000	Met with Brandywine Conservancy and an adjacent property owner concerning preservation easement.
December 18, 2000	Held fourth working group meeting; reached consensus on roadway re-alignment.
December 2000	Prepared Hydraulic Study of proposed construction.
Jan.-Mar. 2001	Developed Preliminary Plans.
March 15, 2001	Distributed Preliminary Plans to working group.
March 26, 2001	Held fifth working group meeting; reviewed Preliminary Plans.
June 18, 2001	Final public workshop.
January 15, 2001	Construction plans finalized
March 13, 2002	Bid opening.
July 2002	Estimated start of construction; 136 calendar day work period.

PROJECT OUTCOME TO DATE AND LESSONS LEARNED

DelDOT staff's request that the Department provide a facilitator for the Working Group meetings was denied since the Department would not usually use such services on a bridge project. Consequently, the project engineers found it very difficult to manage the Working Group meetings, because they needed to serve both as facilitators and also to represent their own positions regarding design guidelines and safety issues. Since some members of the Working Group had past experiences with DelDOT that led them to lack trust in interactions with the agency, a facilitator could have helped bring a sense of balance to all discussions to help build trust. As an example, the attempt to achieve consensus on a mission statement failed because the engineers brought to a Working Group meeting a mission statement focused on engineering ethics and safety and were then in a difficult position to evolve a consensus statement that could have reflected all parties' interests.

Following DelDOT's design procedures, the Design Exception is normally requested after preliminary plan submittal. This procedure left the design engineers in an uncomfortable position as they made commitments or created a perception that any of the public's proposed solutions agreed upon would be approved by the Department. The actual Design Exception request was not submitted until mid-January, 2002 when the project was going into advertising

for bids. The design engineers, however, did have informal concurrence from those who would be signing the exception much earlier.

DelDOT's current procedure for bridge projects does not include a concept development phase. This project was outside the norm for DelDOT's procedures. The design engineers were quite successful with the public involvement process due to their own creativity and ingenuity. However, including a concept development phase for future bridge projects would lend itself to supporting Context Sensitive Design principles.

A two-day trip to Pennsylvania and Maryland to observe traffic flow at existing covered bridges helped the design engineers to reach a comfort level regarding their safety concerns about the alignment.

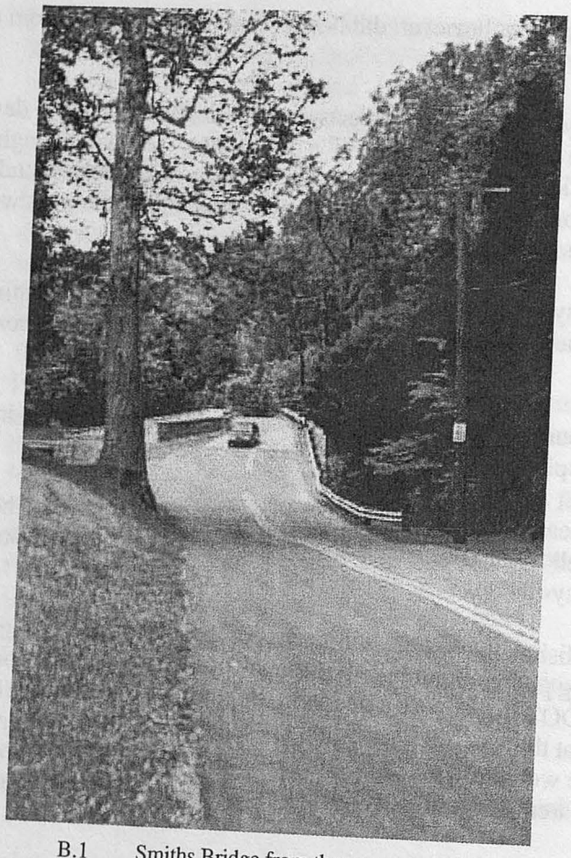
Information signs announcing the public meetings were quite successful at drawing a large interested group of people to participate.

Bringing the public in early on a project of this nature worked very well. They had a say in what the problem was as well as having a say it the proposed fix. This format allowed DelDOT to achieve community buy-in.

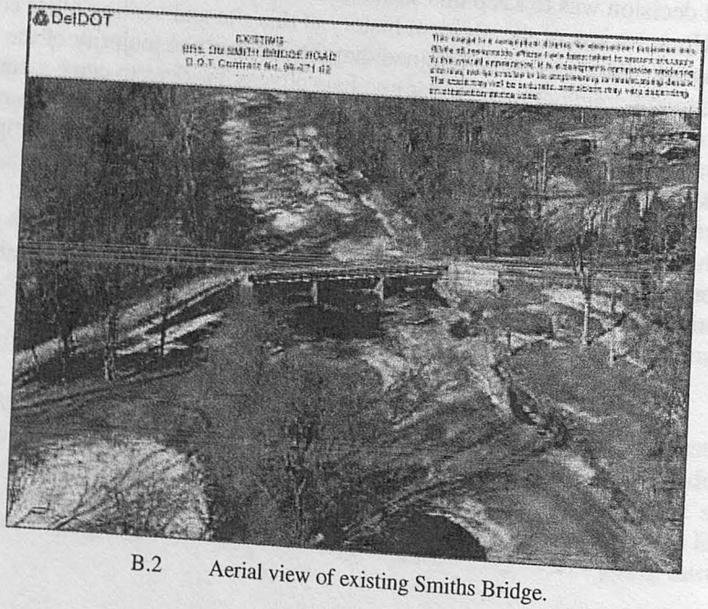
An important accomplishment was the willingness of the Department to approach this project differently by allowing public input into the "scope" of the project. This community input and support allowed Del DOT to propose a one-lane structure. It was the majority of the community's view that this narrow road with poor alignment could not support the added traffic that a two-lane bridge would invite. Also, there was a strong desire to maintain the rural and historic nature of the area along this road, which DelDOT believes the proposed covered bridge accomplishes.

The most difficult decision was to keep this structure a one-lane bridge. The bridge carries and AADT of 3600. Upon review of the accident history at this site and visiting other covered bridges in neighboring states, it was determined that the cause of the majority of the accidents at this site and the element which allowed other one lane covered bridges to carry a comparable AADT was sight distance. Therefore the most noteworthy design element was the realignment of the west approach, which will keep speeds low due to the curvature but allow improved sight distance to enhance safety and traffic flow.

DelDOT has gained respect and good will from the participants in the public involvement process for this project. DelDOT's engineers are proud of their design and pleased they had the opportunity to work on a project that will add lasting value to the community.

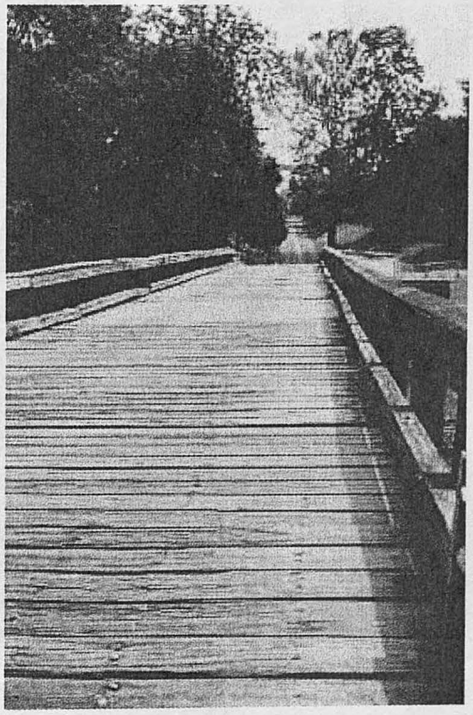


B.1 Smiths Bridge from the east approach.



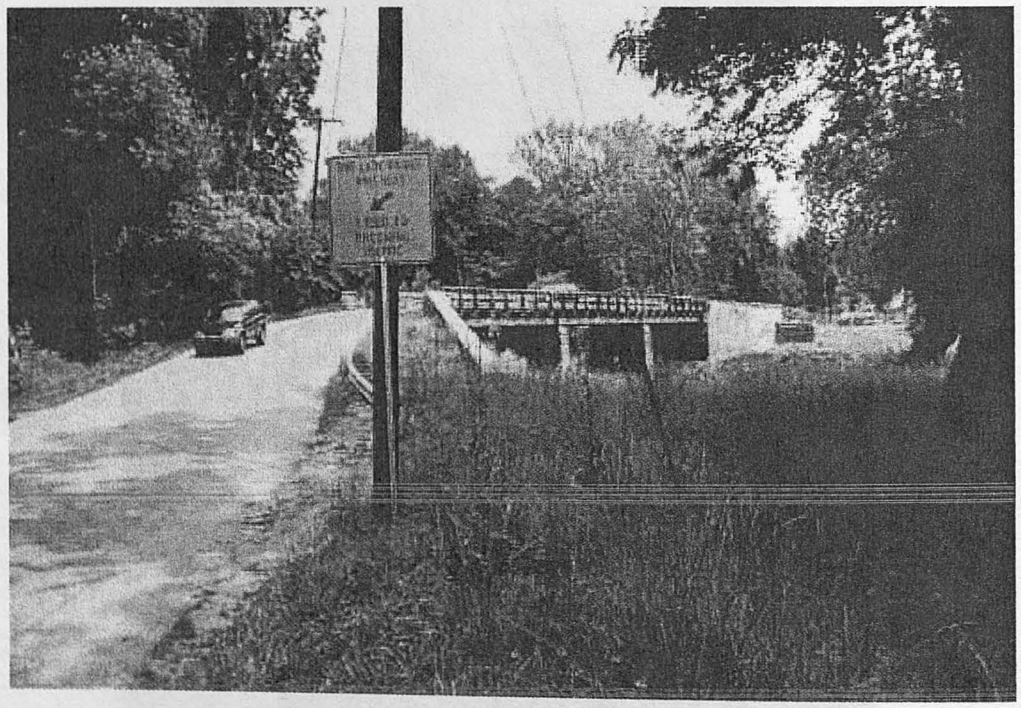
B.2 Aerial view of existing Smiths Bridge.

B.3 Side view of existing Smiths Bridge

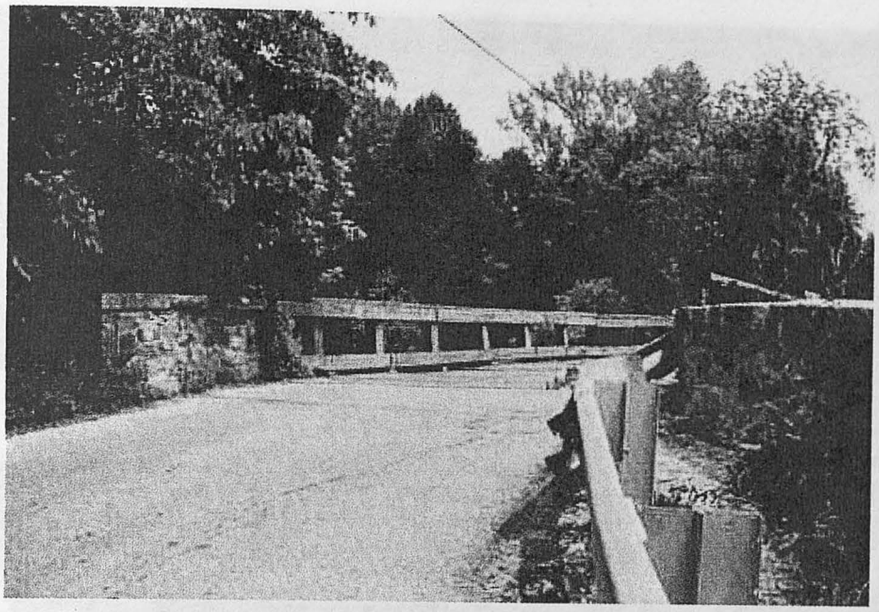


B.4 Deck of Smiths Bridge.

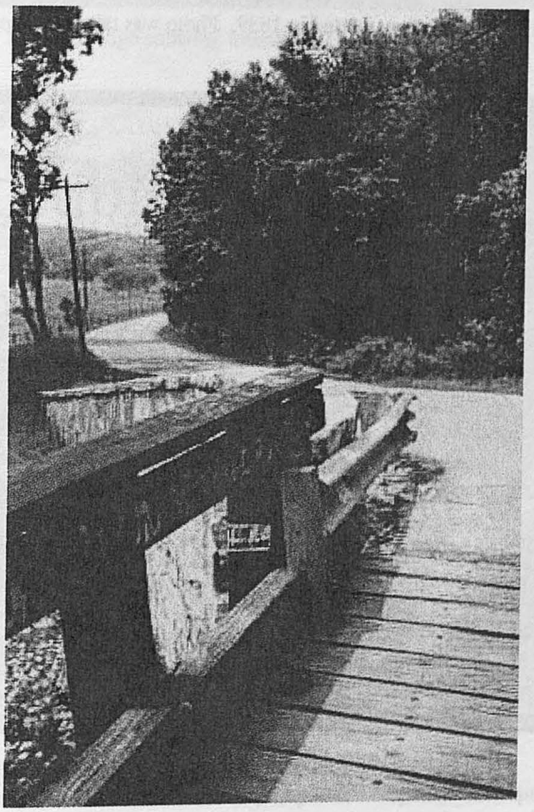
B.5 Smiths Bridge from east approach.



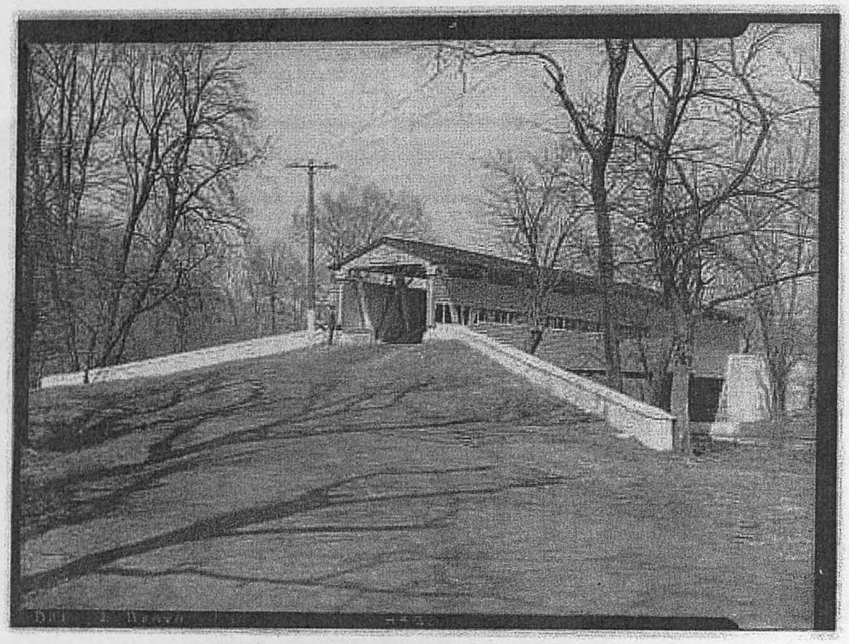
B.6 Smiths Bridge from west approach.



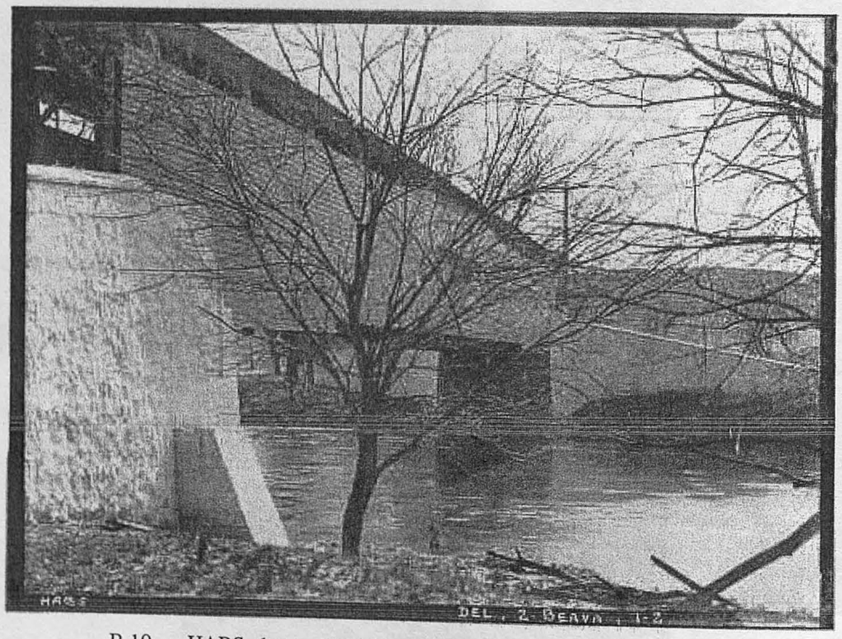
B.7 Smiths Bridge from West approach.



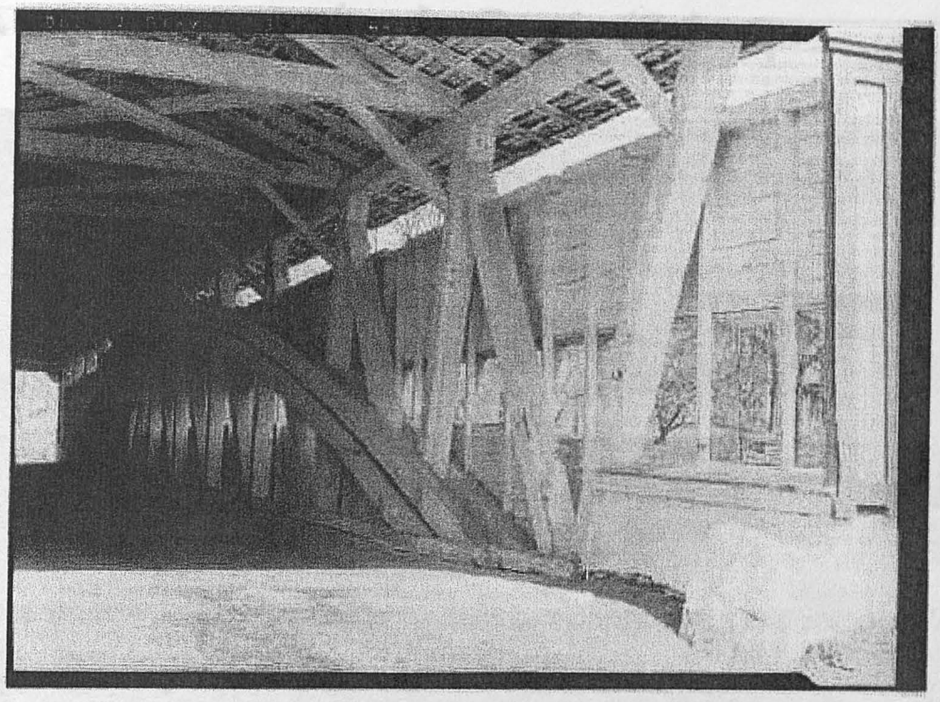
B.8 Close up of Smiths Bridge at west approach.



B.9 HABS Photo of Smiths Bridge constructed in 1839. Photo was taken from east approach in 1939.



B.10 HABS photo of Smiths Bridge with side view taken in 1939.

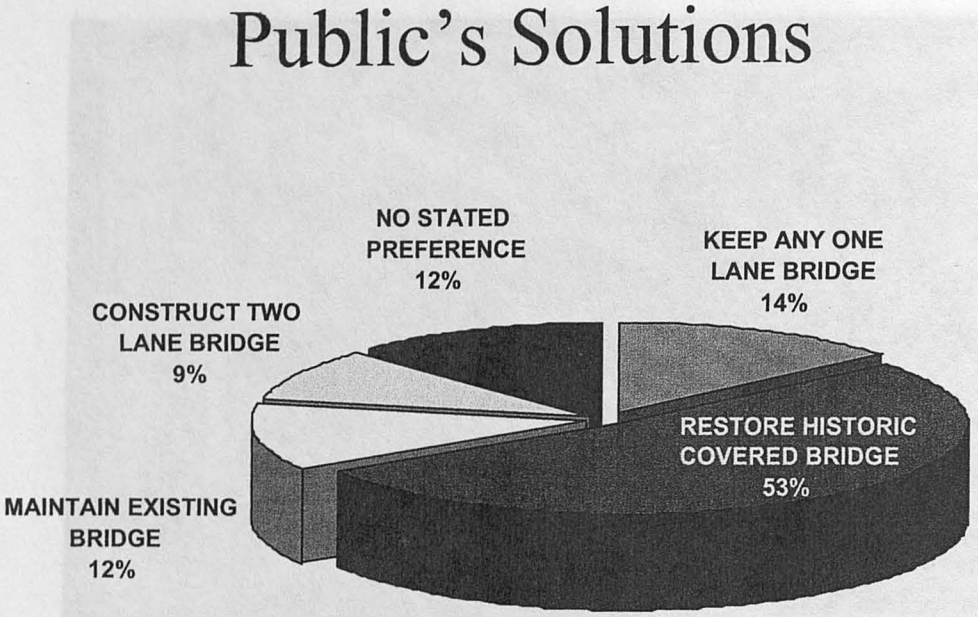


B.11 HABS photo of Smiths Bridge showing interior of 1839 covered bridge. Photo was taken in 1939.

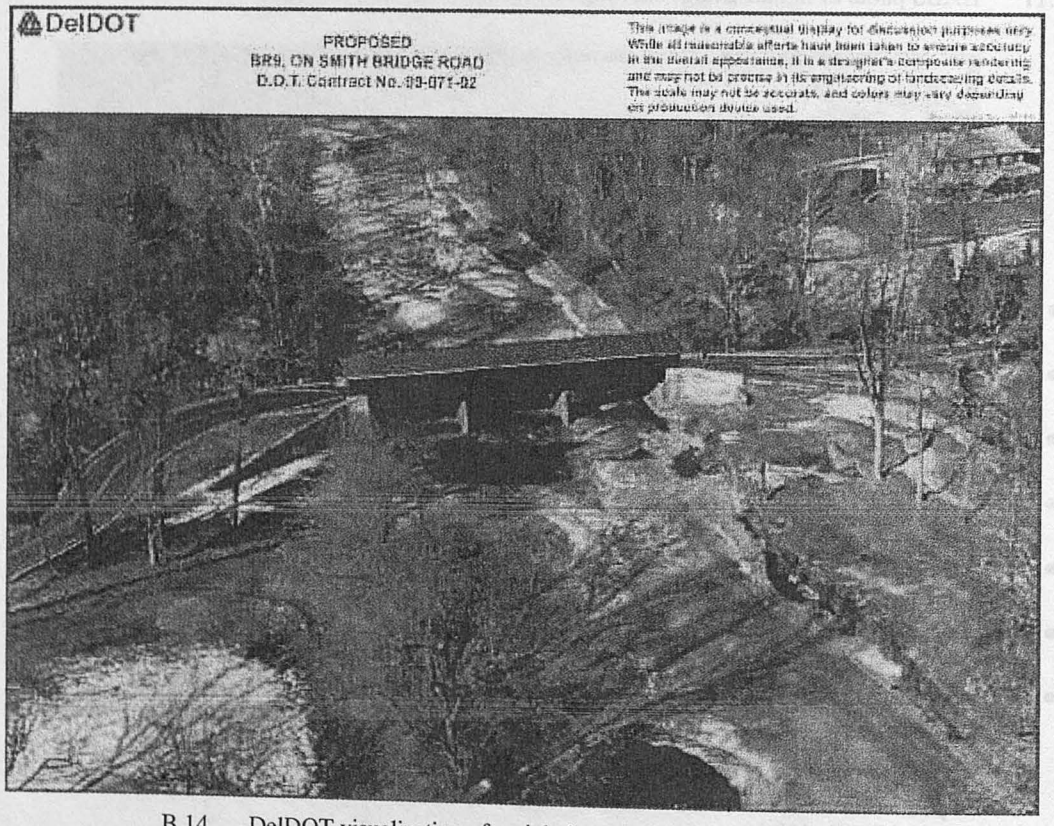
Public's Concerns

- Traffic Calming (34%)
- Maintain Historic Character (49%)
- Protect Environment (11%)
- Safety (31%)
- Pedestrians and Bikes (14%)
- Noise (2%)
- Flooding (3%)

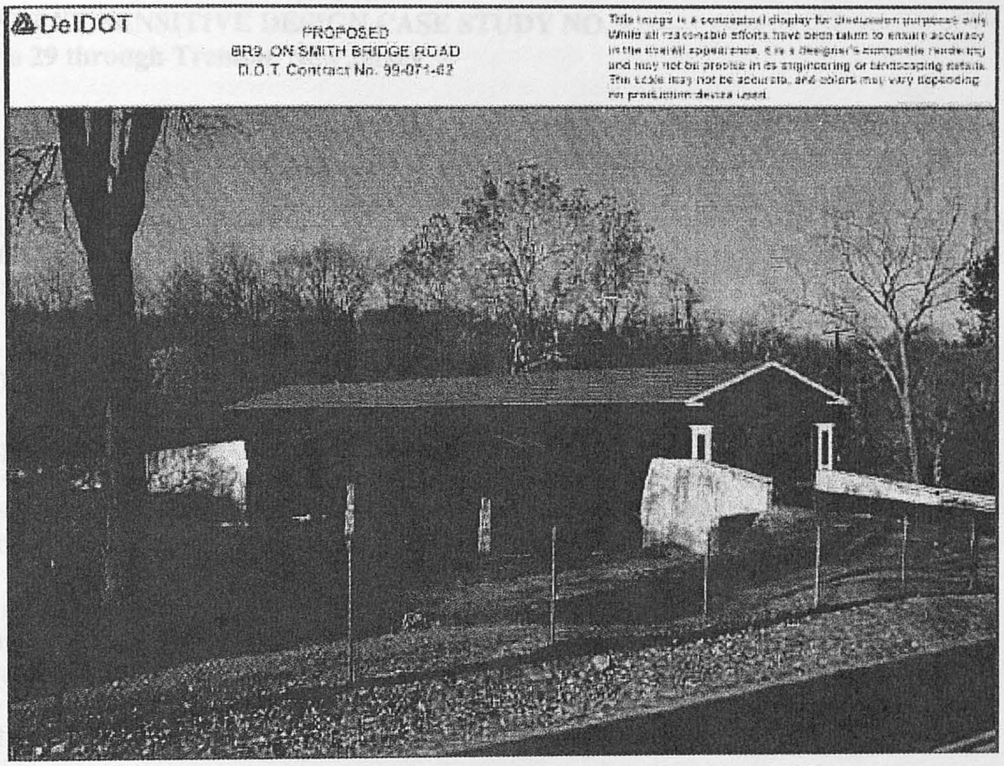
B.12 Power point slide used at second Public Workshop to provide responses from public to questionnaire passed out at first Public Workshop.



B.13 Power point slide used at second Public Workshop to provide responses from public to questionnaire passed out at first Public Workshop.



B.14 DelDOT visualization of aerial view of proposed bridge design.



B.15 DelDOT visualization of side view of proposed bridge design.

CONTEXT SENSITIVE DESIGN CASE STUDY NO. 9
Route 29 through Trenton, New Jersey

LOCATION

New Jersey State Highway Route 29 through the City of Trenton in Mercer County, from the Route 29/Route 129 interchange in the south to the Amtrak Bridge in the north; covering 2.5 miles in length.

PROJECT DESCRIPTION

The project is known as the Route 29 Highway Tunnel and encompasses 2.5 miles of roadway, including a 1/2-mile section of tunnel. The tunnel was constructed as a cut and cover post-tensioned tunnel. The southbound lanes are open to the Delaware River on the west and the northbound lanes are within a fully enclosed tunnel.

The roadway consists of two 12-foot roadway lanes, a 12-foot right shoulder and 3-foot left shoulder. The roadways are separated by concrete barrier curb along the south roadway approach to the tunnel. North of the tunnel the roadways are separated by concrete barrier curb to Waterfront Park, where a grassed and planted median strip separates the north- and southbound traffic.

The overall highway tunnel complex includes an off-site Tunnel Control Building, Intelligent Transportation Systems, a pre-stressed concrete bridge and six retaining wall structures. The facility creates a depressed section of highway and takes major traffic volume off city streets. The tunnel itself serves as the platform upon which a city park, South Riverwalk Park, will be constructed. Additional waterfront recreational facilities are being developed and coordinated with the efforts of the NJDOT.

The project cost for the tunnel was $105 million; the park on top of the tunnel costs an additional $10M. Other ancillary projects will total approximately $40 million with the county and city contributing approximately half of this cost.

PURPOSE AND NEED STATEMENT

The project's Purpose and Need Statement was developed for the Environmental Impact Statement (EIS) approved in 1981 for the entire Trenton Complex of roads. When the Route 29 project was taken up in 1995-96 the project team did an Environmental Reevaluation and did not revisit the Purpose and Need Statement from the previous document.

CONTEXT SENSITIVE FACTORS

There were many context sensitive factors in this project stemming from the project location that impacted residences in two historic districts and the National Register Riverview Cemetery and extended to the environmentally sensitive Delaware River. Given that residents knew that the approved EIS allowed revisiting of rebuilding Route 29, it was clear from the beginning that community involvement and responsiveness to community interests and concerns would be essential to get the project built.

The community wanted truck traffic off of Lamberton Road but did not want a large transportation facility to "wall off" the residences from the river. All interested parties seemed to want a scaled down transportation facility that would minimize impacts on the human and natural environment.

While the EIS had been approved in 1981 assuming that Route 29 would be rebuilt to interstate standards (70 mph design speed), the project team adopted design elements that reflected the community's desire for scaling down the roadway design including a 45 mph design speed. Curves around the Riverview Cemetery and at the railroad bridge were designed to slow traffic. Traffic signals were retained at the request of residents. With the adoption of this design speed, no design exceptions were required. Where the EIS had proposed impacting 2-1/2 acres of the river, the final design to accommodate the tunnel construction required a 0.67-acre section of river to be filled.

NJDOT's commitment to fund the design and construction of the South Riverwalk Park was initially controversial within the department, but was an important mitigation effort to gain community acceptance of the tunnel design.

HISTORY OF PROJECT

The Trenton Complex is a system of highways that was first proposed in the late 1950's and commenced construction in the 1980's. The system includes connections between several interstate and state routes to facilitate the movement of people and goods in and around the State Capitol. The entire road complex was designed to function together to provide connections within and around the City, while relieving congestion on local roads.

Route 29 was originally proposed as a 6-lane freeway to be cantilevered over the eastern banks of the Delaware River. The design followed rigid highway design principles and was not sensitive to the City's relationship to the riverfront or the historic and environmental resources in the area. The city of Trenton strongly objected to the design desiring a scaled down boulevard-style facility with increased access points to the waterfront for citizens. Ultimately the NJDOT agreed to leave the proposed Route 29 un-constructed until all of the other elements of the Trenton Complex had been completed. At that time they would work with major stakeholders to make a decision whether it was necessary to rebuild Route 29. The entire complex, minus Route 29, was completed in December 1995.

By the fall of 1995 truck traffic had increased significantly on Lamberton Road causing noise, vibrations and air quality concerns. Public officials and residents asked for a meeting with

NJDOT officials to investigate alternatives to relieve these concerns. Early the next year NJDOT began planning and project scope development for Route 29 responding to the community's sense of urgency in finding a solution to traffic problems.

A truck ban seemed the most direct way to reduce the citizens' concerns, but NJDOT officials ruled that their agency did not have authority to institute a truck ban. Project planning proceeded in a collaborative manner with substantial community involvement until a non-profit transportation/environmental group learned of the project and filed several lawsuits against it. Although the suits were dismissed. the dynamic of opposition made the public involvement process more contentious and less productive in the later phases of the project. Instead of a collaborative "give and take" tone, community involvement moved more toward tinkering with the design to respond to one or another interest in the area. Exacerbating this fact was the choice to make this a Design Build project which negatively affected the context sensitive design elements of this project as described in other sections of the case study..

Construction brought with it detours, dust, noise and more heavy traffic in the form of construction vehicles. There were troublesome problems with construction resulting in flooding in some residential basements and cracks in walls due to pile driving. Residents were concerned about whether the positive improvements to the waterfront would materialize. NJDOT decided public outreach efforts needed to continue and be more far-reaching and in August 2001 created a Community Partnering Team (CPT) to bring together all the stakeholders in the project area. The CPT was charged with continuing input on the South Riverwalk Park and guiding waterfront development projects along the Route 29 waterfront in Trenton and surrounding areas. The CPT was to reach out to all interested members of the residential, business and government communities including regulatory agencies. The team was to work toward consensus building on as many issues as were brought to the table by its members.

HIGHWAY AGENCY INVOLVEMENT

NJDOT was involved throughout this project from preparing the EIS approved in 1981 to rescoping the project once it was initiated in 1995. Working with a consulting engineering firm to develop the project scope and then preliminary design, NJDOT received FHWA approval to proceed with the project in a Design Build mode. Preliminary plans and specifications were developed prior to the bidding of the contract. Final design, engineering and construction plans followed the awarding of the project. Although initiated in response to residents who wanted the project completed quickly, all project stakeholders consulted agreed the Design Build approach was a poor choice for this project that involved very sensitive human and environmental resources and interests. NJDOT was not prepared to provide adequate oversight to ensure the project would be built based on the agreed upon design.

In June 2000 NJDOT hired a construction management firm to oversee the remainder of the construction work. In August of 2001 a Community Partnering Team was established by NJDOT to bring together all stakeholders to continue assistance on design of South Riverwalk Park and on a series of interconnected waterfront projects

RESOURCE AGENCIES INVOLVEMENT

An Environmental Impact Statement for the Trenton Complex was completed and approved in January 1981. In the EIS NJDOT agreed to build the Route 29 piece last and to reevaluate the needs at a later time. When the project was taken up at the end of 1995, NJDOT staff initiated monthly meetings in early 1996 with Resource Agency personnel to coordinate needed environmental reviews.

These agencies included the Department of Environmental Protection (DEP), which includes the State Historic Preservation Office, the Corps of Engineers, National Marine Fisheries, and the Fish & Wildlife Service. A waterfront development permit was needed from DEP. A permit was needed from the Corps of Engineers. The other agencies were commentators on the two required permits.

From the beginning it was clear there were challenging and valid interests to be balanced in choosing the final design for the project. If the road were moved inland to avoid environmental impacts to the river, it would impact numerous resources in the historic districts. If it was moved toward the river to avoid historic district impacts, there were greater environmental impacts along the river.

After the project was awarded to the design-build contractor, it was discovered that tidelands licenses for several riparian parcels had not been obtained. The Tideland license application process was complicated by the concurrent value engineering re-design proposed by the Design-Build contractor, which actually reduced environmental impacts to the Delaware River. The re-design required modifications to the environmental permits for the project, re-opening the door for opponents of the project to protest the Tidelands license process and the permit modifications.

The final modified environmental permits were approved a year after the Design Build contract was awarded.

COMMUNITY INVOLVEMENT

The project was started following a meeting of residents and city, county and state officials that occurred on the street corner of Lalor and Lamberton in November 1995. The residents of that area of South Trenton were very upset because of the large number of heavy trucks traveling along Lamberton Street in front of their homes.

From the start of project scope development in early 1996, an extensive community involvement effort was mounted. Since Mercer County was at the same time doing a redevelopment study of lands around the ballpark in the project area, NJDOT established monthly project meetings with Mercer County officials, other public officials, resident's groups, business owners and other interested stakeholders to examine project issues. Numerous informal meetings with small groups were held as well as larger Public Information meetings.

A project newsletter was started with bilingual text and 500 copies printed. In response to a request from FHWA, NJDOT staff developed a Community Relations Plan in November 1996 summarizing efforts made to date and the future schedule for community involvement. That fall as well NJDOT's project manager gave interested citizens the opportunity to go to the consulting engineers' office to give direct suggestions for project elements as the engineers worked on a CADD program to show how these suggestions would impact the project design.

From 1996 through the next year community involvement efforts were generally well received and there was substantial support for the project. Although the project managers thought they had been inclusive in bringing in stakeholders, early in 1998 the Tri-State Transportation Campaign came out in opposition to the project and filed a lawsuit. The entering of lawsuits had the effect of making community involvement efforts more difficult and more contentious. It was much harder to maintain a collaborative community involvement effort. With charges of presenting false facts being made by opponents, NJDOT staff were put on the defensive.

In August of 2001 NJDOT decided to strengthen its community outreach program and created a Route 29 Waterfront Community Partnering team (CPT). The CPT was charged with guiding waterfront development projects along the Route 29 waterfront in Trenton and surrounding areas. The CPT was to reach out to all interested members of the residential, business and government communities. The team was to work toward consensus on as many issues as were brought to the table by its members.

The first meeting of the CPT outlined its goals:
* To afford communication with and between the stakeholders in order to share understanding of the projects in the community and region;
* To identify the interests and concerns of local residents, organizations, county and municipal agencies, and businesses in the project area;
* To provide a forum for active participation in the development of transportation-related projects such as parks, walkways, and bikeways; and seek to minimize any detrimental impacts on the community; and
* To provide input and recommendations to a steering committee in a consensus-building manner to reach agreement on the various issues.

Also at that first meeting, the team spelled out 32 issues they wanted to address. These issues were categorized and divided into five subject areas. A subcommittee was created to address each of the issues in that subject area. The five subcommittees were: Project Coordination/Natural Resource Protection; Bike path Corridor/Pedestrian Access Issues; Safety/Security/Maintenance; Parking; and Landscape Design. Over the course of the CPT's progress, a sixth subcommittee dedicated to local issues was formed.

The CPT successfully brought together local residents, business leaders, and government representatives from city, county, state and regional agencies. Although their individual agendas were diverse, the overall goal of improving the Trenton waterfront and its associated neighborhoods was shared by all. The coordination amongst all the levels of government and their constituents has led to a much more open dialogue and helped advance the goal of a rejuvenated Trenton waterfront.

NATURAL ENVIRONMENT ISSUES

The original opposition of the city of Trenton to rebuilding Route 29 stemmed in part from a concern that mature Sycamore trees along the 2-lane Lamberton Road not be destroyed. While project specifications called for most *of* these trees to be preserved, during construction most were removed and will be replaced, due to their poor health and underground utility conflicts.

The push for rebuilding Route 29 along the waterfront came from neighbors' distress at increasing truck traffic along Lamberton Road. A NJDOT study of the trucks showed that there were approximately 1600 heavy trucks on the road in a 12-hour period and that 1200 of these were garbage trucks headed from various origin points in New York to a landfill in Pennsylvania. At the time, NJDOT did not believe they had the authority to ban trucks from Route 29 and did not see alternatives that would redirect this truck traffic to another viable route.

The industrial history of the area brought with it additional environmental problems. The industrial activities, which had occurred throughout the City's history along the waterfront, had left various contaminants in the soils. These had to be identified and then properly removed or contained on-site.

HUMAN ENVIRONMENT ISSUES

Extensive archaeological digs were performed in advance and during construction.

The history of Trenton, including its industrial prominence, will be preserved and celebrated in various park elements throughout the waterfront. The South Riverwalk Park will include a historic interpretive area which illustrates the history of Trenton through five (5) one hundred year time periods. Each segment will be marked by an arched structure indicative of the architecture of that time period and will present information about the local history of that era. Park visitors will be able to get a sense of "a passage through time" in the City's history as they travel along the interpretive timeline.

Access to the river, both for active and passive activities, has been one of the most important community concerns. The extensive linear park facilities do much to bring the riverfront back to the City's citizenry. Both passive and active recreation will be provided at the South Riverwalk Park. The County's boat docks and pedestrian access adjacent to the baseball stadium also provide water-based recreation and upland park facilities. The extension of the North Riverwalk to the Old Wharf provides opportunities for connectivity and fishing. Historically a fishing wharf, this area is the site of some of the best fishing along Trenton's riverfront.

SCHEDULE OF ACTIVITIES

Fall 1995: Trenton Complex construction completed except for Route 29; public officials and area citizens asked NJDOT to deal with negative effects of increasing truck traffic along Lamberton Road.
January 1996: Scoping of project began.
July 1996: Public information Center presented alternatives examined.
March 1997 Environmental Reevaluation approved.
August 1996: Preliminary design began.
September 1996: Landscape Design Workshop was held with stakeholders to discuss design of park.
October 1996: NJDOT request for FHWA approval to fast track the project as a SEP-14 experimental project (Design-Build) was approved.
October 1996: Steering Committee to help design park was established; met very 2 weeks.
Spring 1997: Advertised Design Build contract.
September 1997: Awarded contract to Design Build joint venture.
September 1997: Archaeology and minor construction begins.
Fall 1998: Secured Tidelands Resource Council permit and major construction began.
Winter 1998: Governor bans trucks other than local ones from Route 29.
January 1999-December 1999: Public meetings to discuss construction staging.
June 2000: NJDOT hired construction management firm.
August 2001: Community Partnering Team created to continue assistance on design of park and on a series of interconnected waterfront projects. Members represent business, city and county government representatives, elected officials, residents, resource agencies and various private and non-profit sector groups with a stake in the outcome of the waterfront.
March 2002: Tunnel opens to traffic.

PROJECT OUTCOME AND LESSONS LEARNED

This project will be instrumental in transforming Trenton's waterfront in many positive ways. As a result of the tunnel construction, creation of the South Riverwalk Park and other planned projects, the city will accomplish significant reclamation of the waterfront as a resource for the community. The project is leveraging many additional benefits for the community and there is evidence that it will draw new investment into adjacent areas.

The Community Partnering Team concept now in place provides great value in bringing together all stakeholders, providing a forum for holistic understanding of the interconnectedness of various waterfront projects and taking the best advantage of coordinating investments by multiple partners.

In retrospect, the choice to use Design Build for this project was not satisfactory. Although there was documentation of project commitments of all types made in the scoping and feasibility assessment phases to guide the contractors as they bid the project and proceeded with work, once selected, the contractor changed some Context Sensitive Design elements of

the project through value engineering. Other elements were built with little sensitivity for the site and multiple layers of planning that had preceded construction.

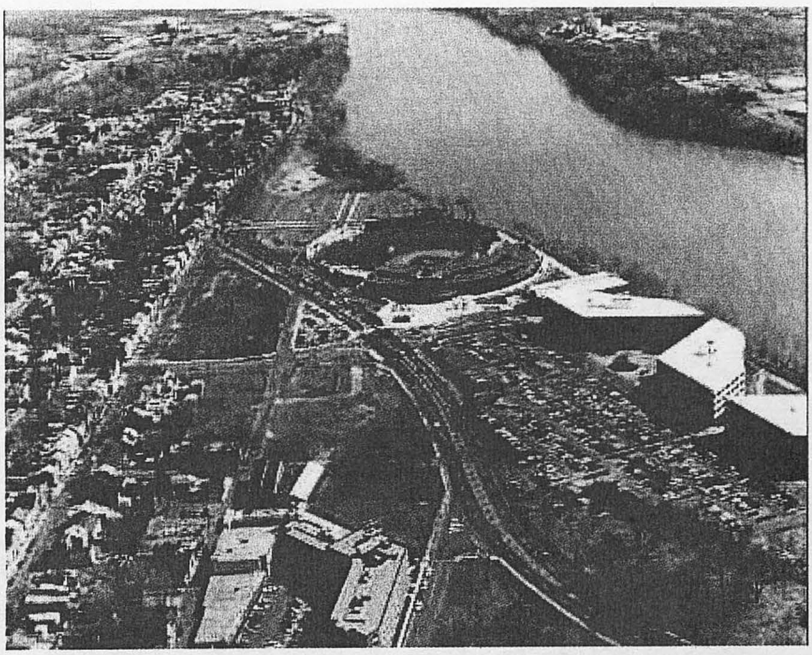
For example, several utility boxes are in prominent places that will need to be moved or camouflaged through landscaping. A number of project elements did not get built as promised and others will need to be reworked adding to the cost of the project. For another example, parts of Lamberton Road were repaved with new curbs and gutters and will have to be narrowed and repaved again. For a third example, the value engineering effort undertaken by the Design Build contractor resulted in the northbound lanes being fully enclosed in a tunnel rather than open to the river. This design decision reduced construction costs but also reduced aesthetic quality and raised operating costs due to much higher needs for ventilation and lighting. Due to the experiences of this job and of others, NJDOT is not currently using the Design Build approach for any other projects.

The prior approval of the EIS for the project as part of the Trenton Complex in 1981 required only an Environmental Reevaluation when the project was revived in 1995. Had a more holistic look at the broader project area and needs been undertaken in the mid-1990's, a different alternative for the tunnel design might have been chosen. If policy makers had examined more intensively the desirability and possibility of a truck ban on Route 29 when the project alternative was being chosen, the outcome might have been different.

As it is, there was dismay voiced by the Mayor of Trenton and members of the public when the Governor announced a truck ban on Route 29 shortly after the final permit approval for the highway tunnel. The city's support for the project had hinged on this being the only means to remove trucks from Lamberton Road, because the NJDOT assured the city that it did not have the authority to ban trucks on Route 29. Reversing this position through the Governor's action left many questioning the good faith of the department.

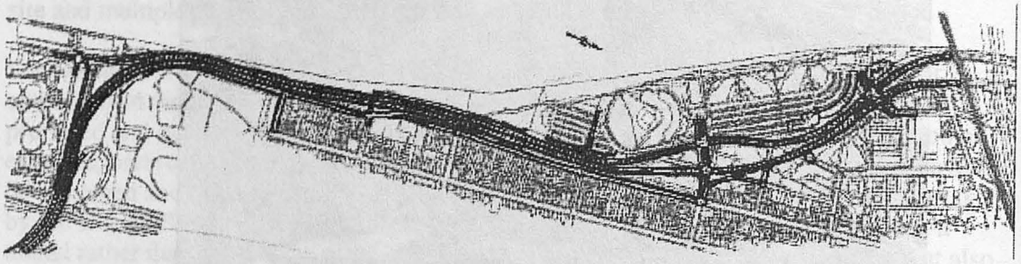
Some residents on Lamberton Road misunderstood what visibility of the river they would have once the tunnel was built and were unhappy with the outcome. Better, more accurate computer visualizations of the views from their specific houses could have helped establish reasonable expectations regarding views.

Lessons learned included the need to be as graphic as possible with the design team and stakeholders as designs proceed, but to be careful to keep visual aids at a realistic level of detail for each stage of the project, so people are not misled. The design team for the South Riverwalk Park found it valuable to have an artist on their team to prepare artistic renderings for use with the design team and the public.

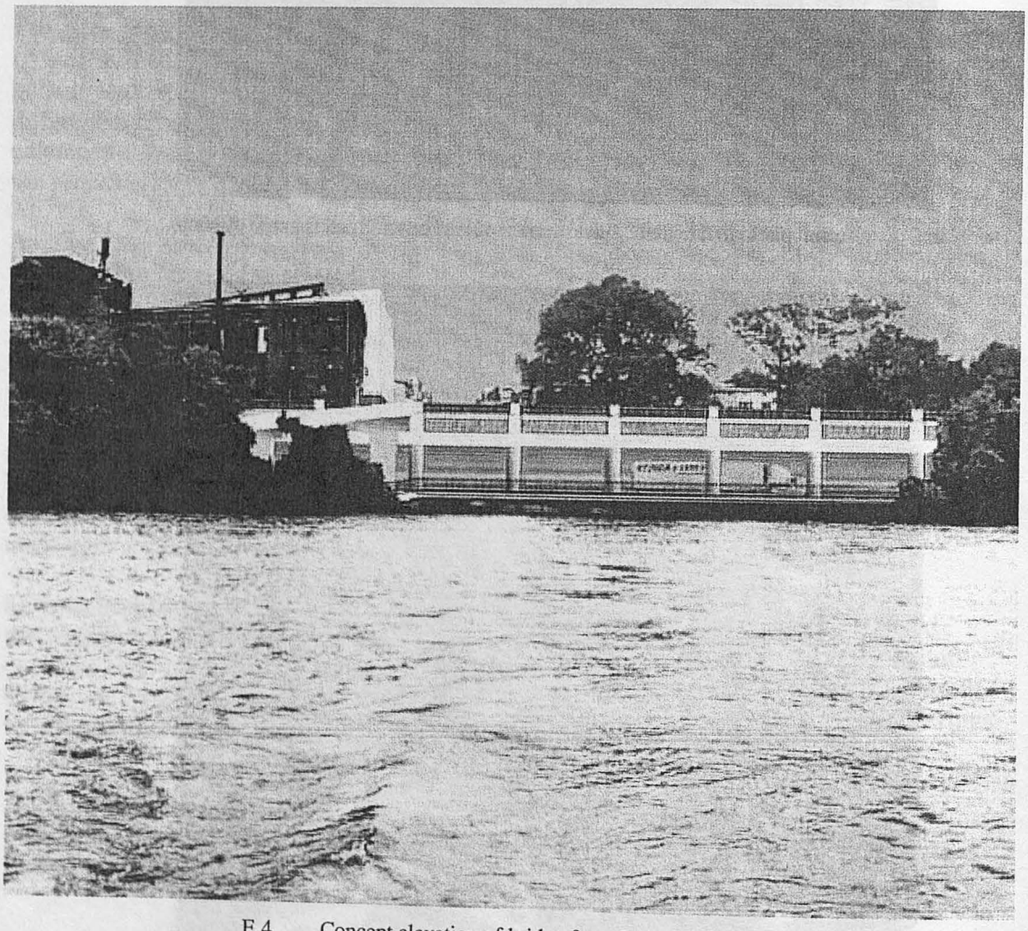


E.1 Aerial photo in Trenton. 2-lane section of Lamberton Road is at top of photo.

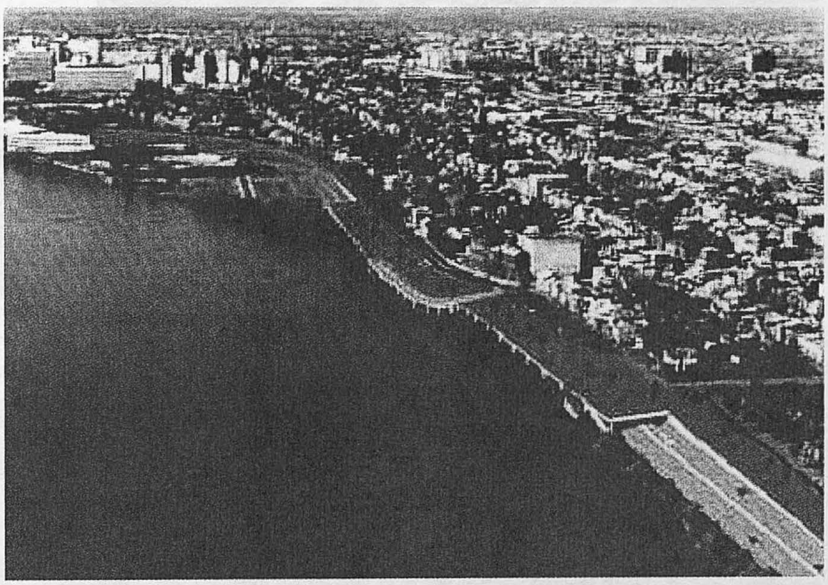
E.2 Aerial photo in Trenton. 2-lane section of Lamberton Road is in middle of photo.



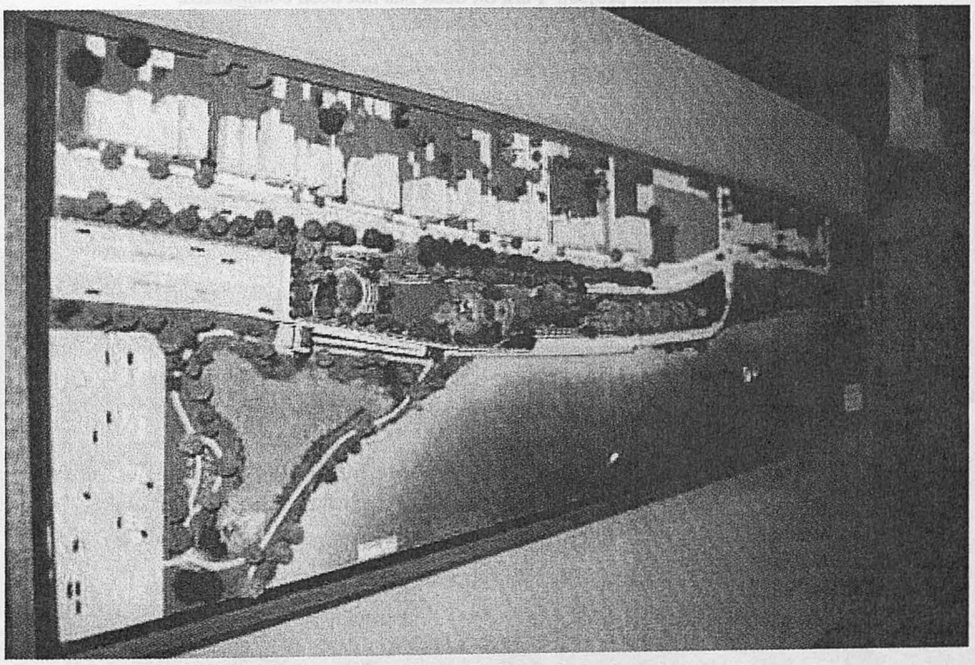
E.3 Drawing showing proposed route changes.



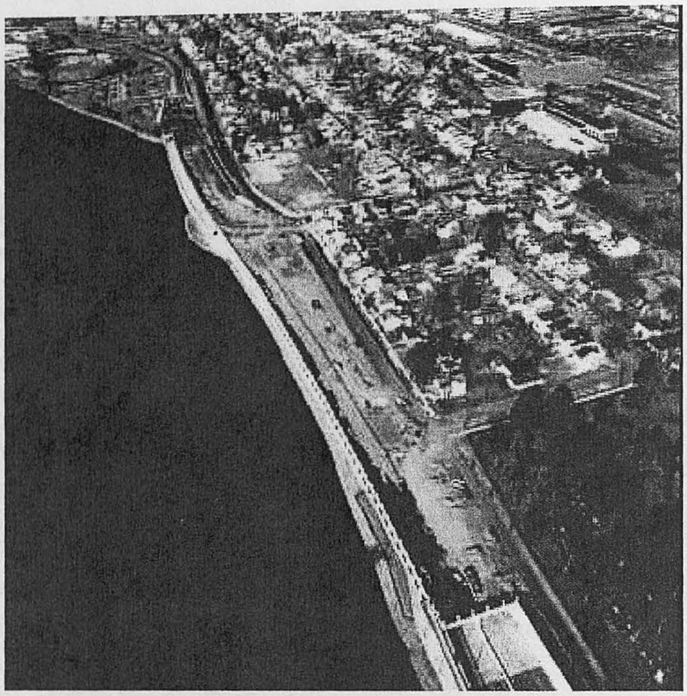
E.4 Concept elevation of bridge from Delaware River.



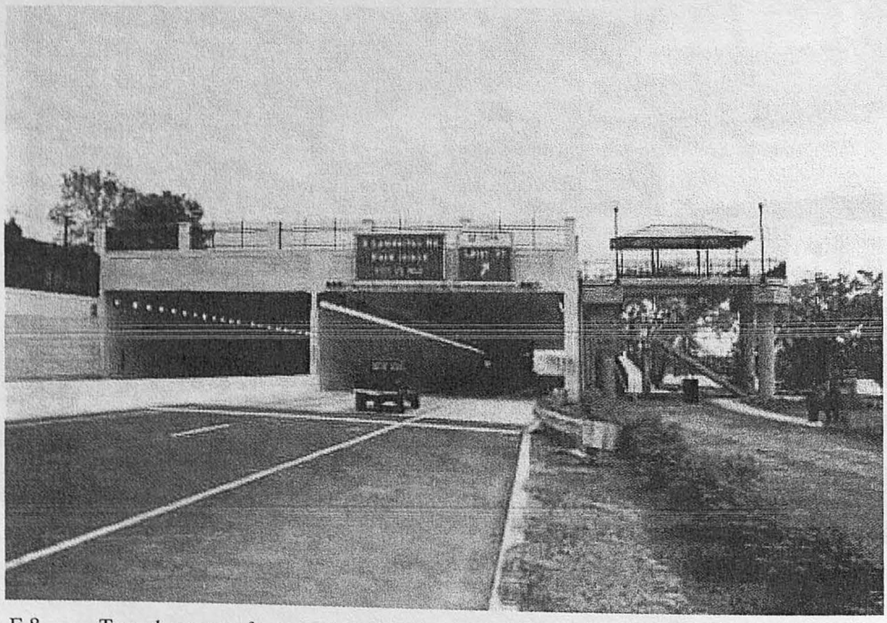
E.5 Computer visualization showing affect of tunnel design.



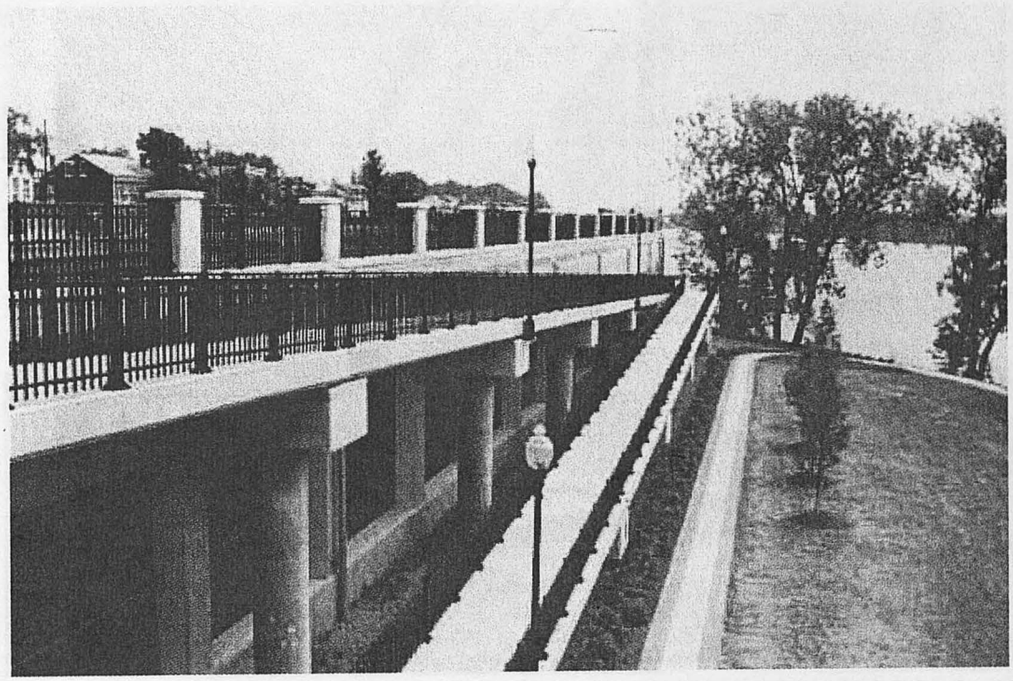
E.6 Model showing concepts for West Riverwalk Park.



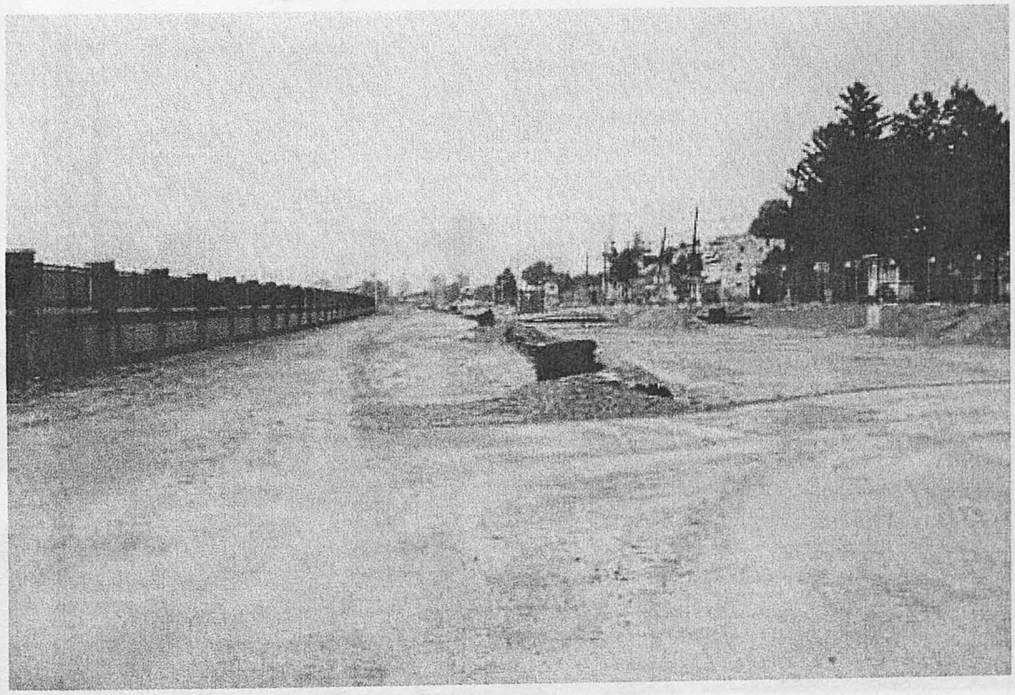
E.7 Completed tunnel project. Park on deck has not been constructed.



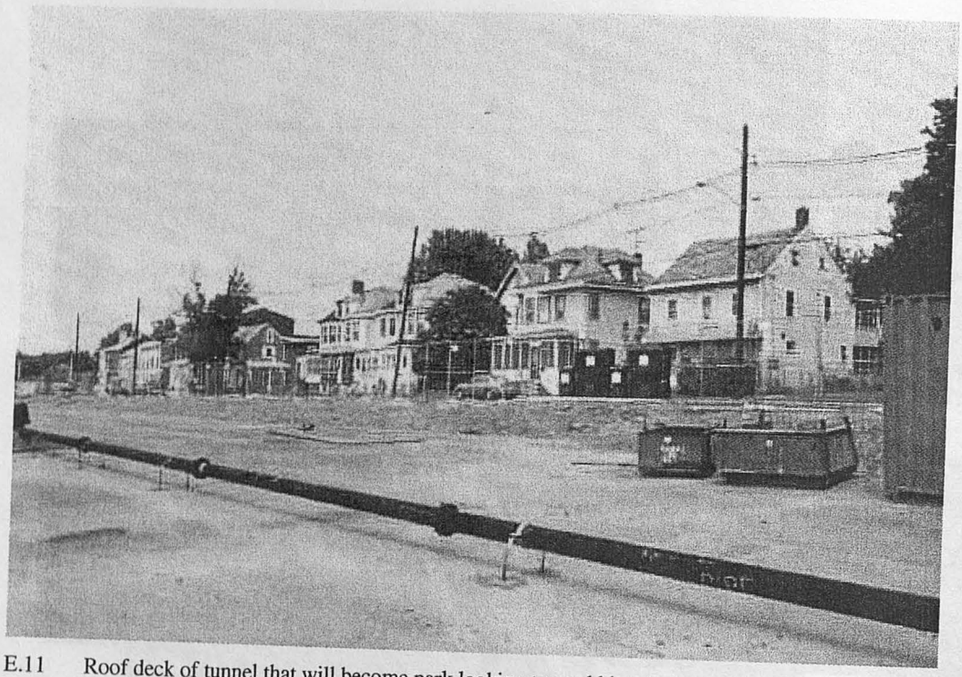
E.8 Tunnel entrance from north.



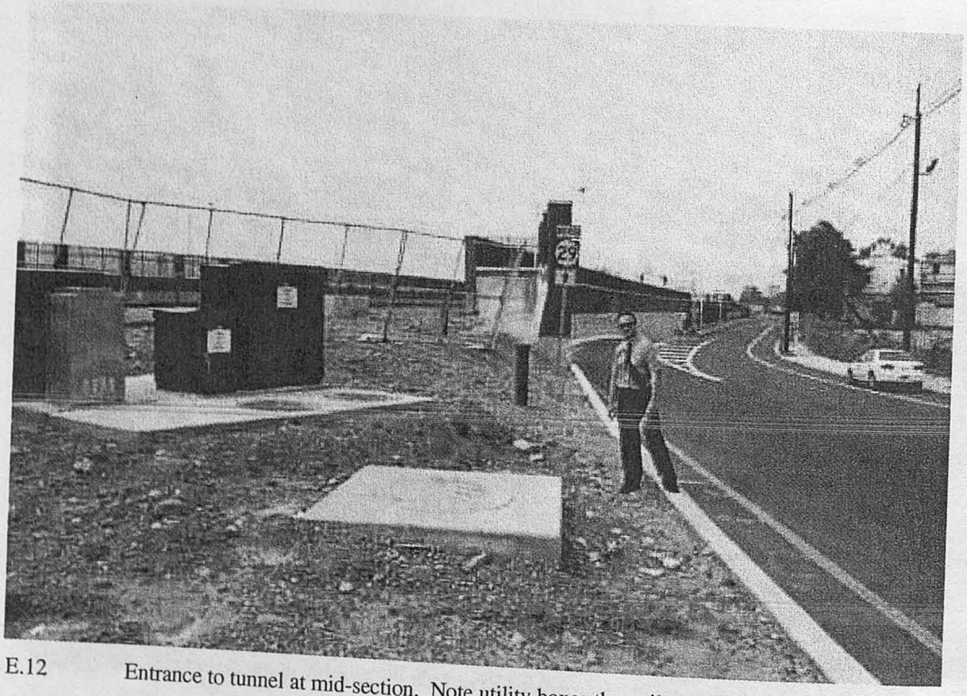
E.9 North end of tunnel.



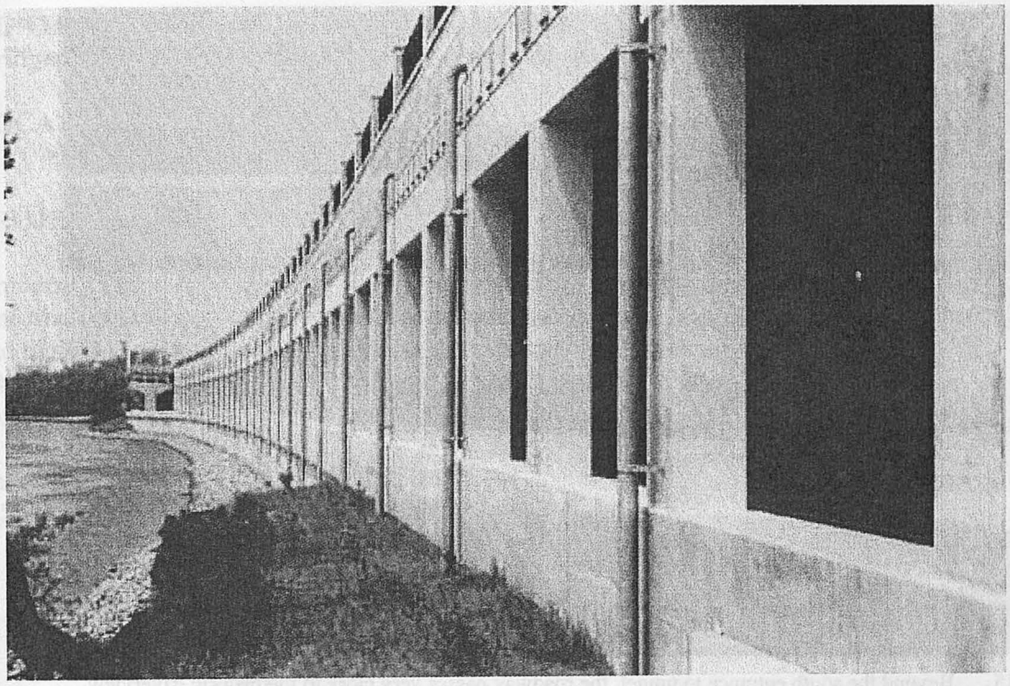
E.10 Roof deck of tunnel that will become West Riverwalk Park. Fill will be added to brick line on wall on left side of photo.



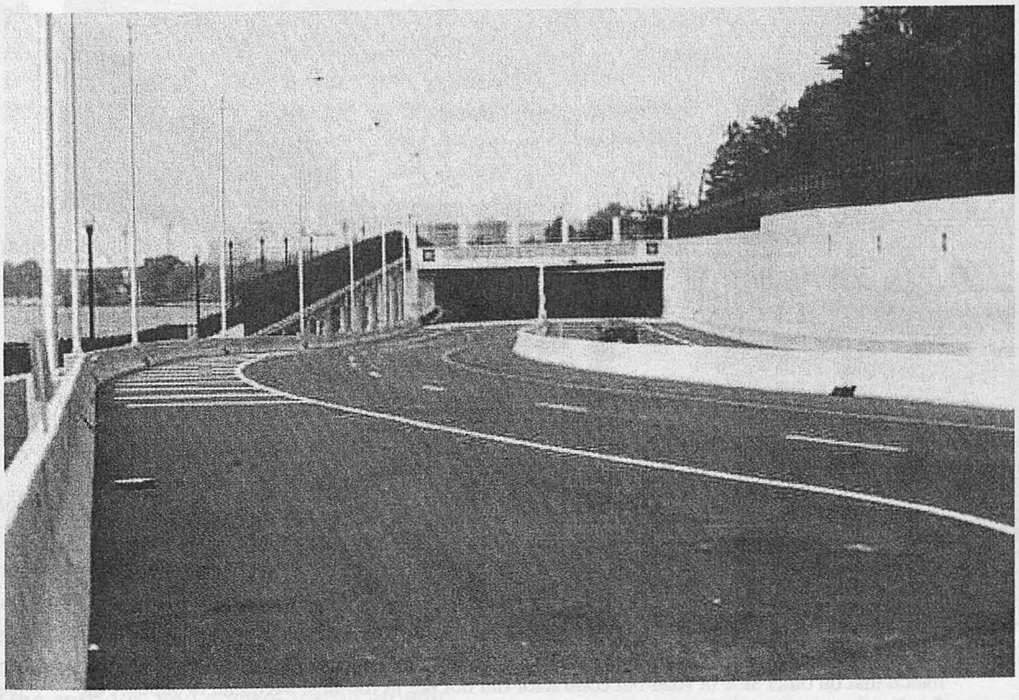
E.11 Roof deck of tunnel that will become park looking toward historic homes along Lamberton Road.



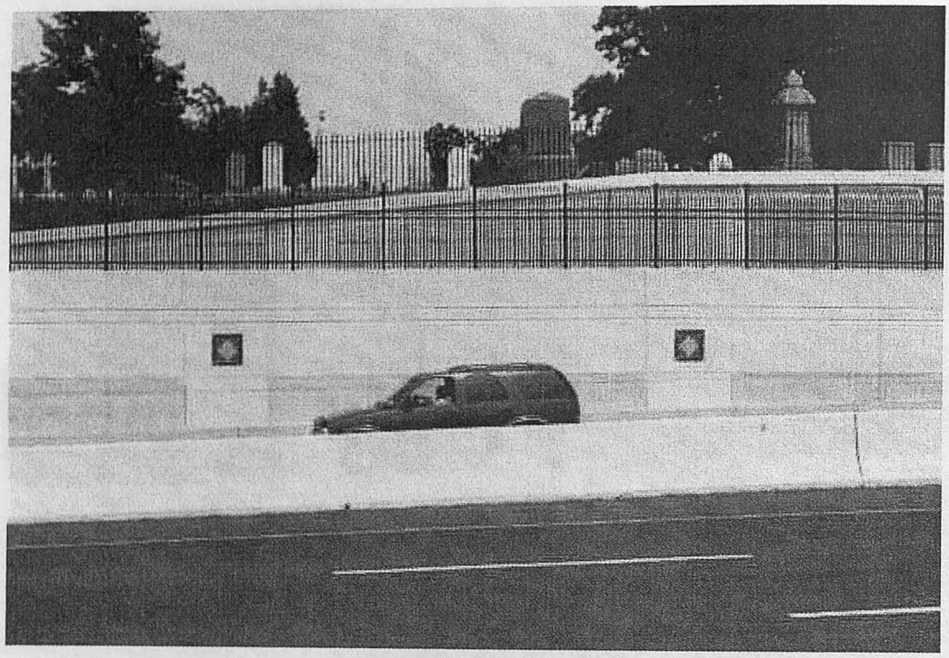
E.12 Entrance to tunnel at mid-section. Note utility boxes that wil need to be moved or hidden.



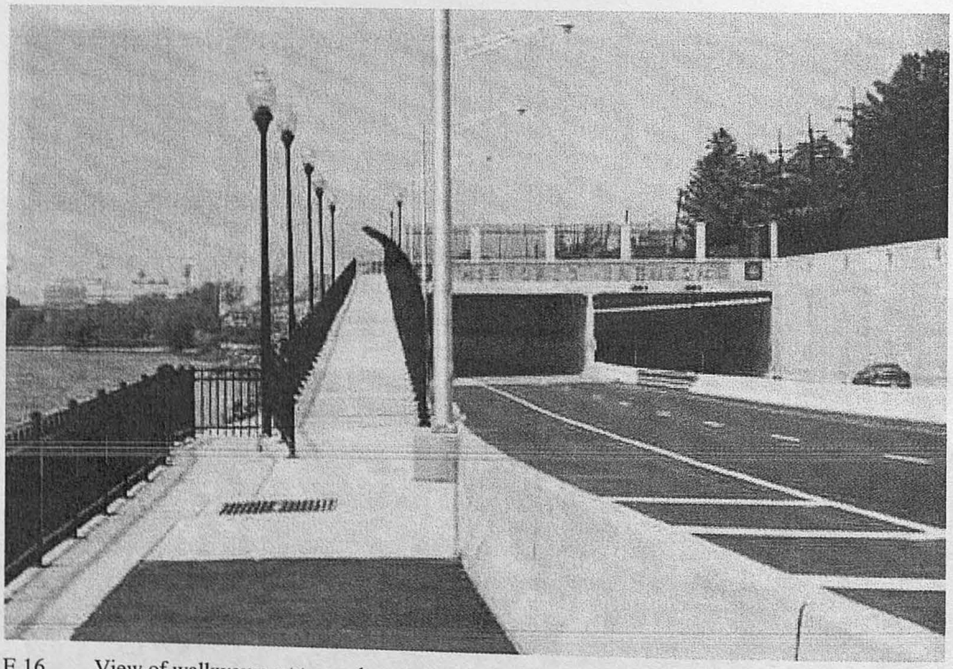
E.13 View of Route 29 tunnel from shoreline.



E.14 Entrance to tunnel from south.



E.15 Beyond the south entrance to tunnel, the roadway passes very close to the historic Riverview Cemetery.



E.16 View of walkway next to south tunnel entrance. Safety fencing at right of walkway was to match that on other side of road but contractor did not put in footings adequate to support the fencing that was specified.

CONTEXT-SENSITIVE DESIGN CASE STUDY NO. 10
Bridgeport Way - Washington

LOCATION:

Bridgeport Way (University Place, Washington)

PROJECT DESCRIPTION:

Bridgeport Way is a major urban arterial and it could be considered as a "Main Street" of University Place. The project involved reconstruction of an existing five-lane road into a four-lane divided roadway over a distance of approximately 1.5 miles. The route serves local traffic and regional commuters, it is the highest transit volume corridor for Pierce County, and it is often used as a bypass of the I-5 freeway (when congestion is heavy). There were three construction phases included in the project as shown below:

Phase 1A (35th to 40th Streets)	Length: 0.50 miles Letting: May 1998 Work Start: June 1998 Work Complete: February 1999 Contractor: R.W. Scott Construction, Inc. Amount: $2,215,103 (engineering, right-of-way, construction, and inspection)
Phase 1B (27th to 35th Streets)	Length: 0.50 miles Letting: May 1999 Work Start: June 1999 Work Complete: February 2000 Contractor: R.W. Scott Construction, Inc. Amount: $2,672,955 (engineering, right-of-way, construction, and inspection)
Phase 2 (40th to Cirque Dr.)	Length: 0.5 miles Letting: August 2001 Work Start: September 2001 Work Complete: June 2002 Contractor: DLB Earthwork Amount: $3,348,458 (engineering, right-of-way, construction, and inspection)

PURPOSE AND NEED

The purpose of this project was to address the safety concerns due to the high number of crashes over the past years. At the same time it was viewed essential to the vision statement of the City Council that aimed in improving the quality of life in the community by creating a town center. The goal of the project is to develop Bridgeport Way as a corridor that will improve traffic safety, increase the mobility and cohesiveness of the community, enhance the appearance of the corridor, and control traffic growth.

CONTEXT-SENSITIVE FACTORS

A number of issues dealing with aesthetics, public involvement, and promotion of multi-modalism were central to this process. Context-sensitive design issues implemented as part of the Bridgeport Way project included the following:

- An extensive public involvement process was initiated to solicit input on how the street should be redesigned. The process utilized design charrettes, public meetings, open houses, meetings with neighborhood groups, and one-to-one meetings.
- A design charrette was completed with citizen participation to develop potential design alternatives for Bridgeport Way. There were two sessions, one for adults and a second for high school students.
- The use of flared intersections to accommodate U-turns for long vehicles at signalized intersections due to the use of the divided median to improve access management and reduce traffic crashes.
- Landscaped median with specially designed streetlights.Planter strips along the entire corridor with streetlights matching the median lights. Bike lanes along the entire corridor.
- Mid-block pedestrian crossings with in- pavement flashing lights at two mid-block crosswalks along Phase 1A. Because of reduced driver compliance over time and five vehicle-pedestrian collisions, the in-pavement lights are being replaced in Summer 2002 with pedestrian traffic signals. The signals will be interconnected with other signals along the corridor to optimize traffic progression and minimize vehicle-pedestrian conflicts.
- Undergrounding utility wires to enhance aesthetic appearance of the roadway.
- Use of a single corridor for all modes of transportation, i.e. passenger cars, public transportation, bicyclists, and pedestrians.

HISTORY OF PROJECT

University Place is a recently incorporated city (8/31/95) but it has been inhabited continuously for the past 130 years. Bridgeport Way has been the main street running though the City and it is used both by local residents and commuters residing in neighboring communities. The City Council adopted a vision statement that indicated that the goal was to make University Place a "safe, attractive city that provides a supportive environment for all citizens to work, play, get an education, and raise families." To achieve this objective, land use, transportation, and economic development goals were established to promote walking, biking, use of aesthetic treatments for roadways and development, and infill development. Central to this goal was the creation of a town center and a main street. Both of these concepts were considered essential in improving the quality of life in the community.

In recent years, Bridgeport Way experienced a safety problem. There have been 301 crashes over a 4.5-year period (1996-1998) with an average of approximately 67 crashes per year. A third of these crashes were injuries. Factors that contributed to this large number of crashes were the lack of sidewalks, large number of access points, and uncontrolled access.

HIGHWAY AGENCY INVOLVEMENT

The Washington State Transportation Improvement Board (TIB) was the funding agency for this project and had a significant involvement beginning with the initial application, which had as its objective to improve safety. Their involvement continued throughout the project and

was critical to the evolution of events. In Phase 2, additional transportation, planning, and funding agencies were involved including the Washington DOT, FHWA, Puget Sound Regional Council, and Washington State Public Works Board.

RESOURCE AGENCIES INVOLVEMENT

The Chamber of Commerce was a stakeholder involved in the entire process. Tacoma Power, the local electric utility company, was also involved and participated in the project by funding 50 percent of the cost of undergrounding power lines.

COMMUNITY INVOLVEMENT

There was a direct and continuous community involvement from the beginning of the project. There have been several approaches taken to solicit input from the community, including:

- A design charrette (8-9 November, 1996) was held with 100 adult participants where focus group, brain storming, design sessions were completed. Solutions provided included a 4-lane roadway with signals and median and a 2-lane road with median and roundabouts.
- A design charrette (12 November, 1996) at Curtis Junior High School was also held where the students came up with similar designs but they added several youth oriented facilities (skate parks, sports center, and bike trails).
- A charrette public forum was held on November 12 in a joint meeting of the City Council and Planning Commission to discuss the designs and get public input.
- A presentation to the TIB was the next step (January 1997) due to significant negative public campaign in the press and by a citizen's group (Citizens Against Repetitious Roundabouts-CARR). The TIB was favorable of the project and requested additional public input.
- Four neighborhood meetings were held over a two-week period where the two alternatives were presented and comments were solicited. Frequently asked questions and their answers were provided after the first two meetings. A special town hall meeting was held following these meetings (2/26/97) to consolidate the public input.
- A public hearing was held on March 4, 1997 to present the 4-lane alternative, since the roundabout option was deemed very controversial. It should be noted though that the Council approved the installation of a roundabout as a demonstration project in another location.

SIGNIFICANT ISSUES

City Council's Involvement

The City Council's vision statement was central to the design of Bridgeport Way. The development of a town center and a main street that would promote a walkable community was the main objective of the council. Most of the council members were behind the idea of redeveloping Bridgeport Way in such a manner that would enhance the quality of life of the community.

The continuous solicitation of ideas and comments from the public was considered essential in the development of a design that would be accepted by the community. The City Council was committed to involve the public and the business community throughout the process and they spent several nights and meetings discussing the various alternatives. To proceed with

the design and to dispel any reservations regarding the roundabout issues, the Council supported a demonstration project in an alternative location (Grandview) and installed a roundabout. This demonstration test project was so successful that several roundabouts were installed along the same street with the demonstration project.

Public Education

A pamphlet describing proper driving at roundabouts has been developed by the City Council and a video has been developed as well. Additional education efforts regarding nomenclature and terminology were developed during the public involvement phase.

Public Involvement

Extensive public involvement was utilized to seek input and guide the project from the conception of the project development. To notify the public regarding the meetings, newspaper notices were printed, fliers to all property owners in University Place were delivered, and posters were placed in City Hall, supermarkets, banks, library, fast food locations, and other places. Overhang signs were placed along Bridgeport Way as additional means of increasing public awareness. A representative of the City government visited each property owner along Bridgeport Way.

A new technique pioneered by City Manager Bob Jean during a recent public hearing on a road diet and roundabout project was that of "round tables." During this hearing, instead of the usual public meeting format where each individual has an opportunity to voice his/her concerns about a project, round tables for 8-10 persons were set up. The participants sat at the tables and were asked to discuss the issues at hand, i.e. the possible alternatives, and identify a spokesperson that would summarize the table's comments. This way, each table heard the pros and cons for each choice from the peers instead of the Council and they were able to make a more informed decision by understanding the concerns of other citizens.

Value Management and Value Engineering Analysis

A Value Management analysis was performed to assist the City Council with the analysis of the Bridgeport alternatives. This approach was a scoring method that allowed each member to grade each alternative based on eight attributes: pedestrians, bicycles, vehicles, economic impact, safety, beautification, emergency, response, and project cost. The 4-lane alternative with a landscaped median was the alternative with the highest score.

A Value Engineering study was also required by TIB as part of the funding requirements by state law. The objective was to reach a design solution at a lowered cost or improved value. The basic premise for this study was that Bridgeport Way should be "a corridor that will improve traffic safety, increase the mobility and cohesiveness of the community, enhance the appearance of the corridor, and control traffic growth."[1] This study evaluated additional cross sections based on the same criteria used in the Value Management analysis and arrived at a solution that used narrower lanes but added bicycle lanes. This solution also recommended the use of a landscaped median and left turn lanes and U-turns at the signalized intersections.

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[1] Stephen Sugg (2001) *Bridgeport Way Project, University Place, Washington.*

Economic Development

Initial concerns of the business community were voiced regarding the loss of revenue from the proposed access management due to the presence of the median. A recently completed before and after study indicates that there has been an increase in business revenues due to the project. Significant activity in redevelopment due to the Bridgeport Way project has also been observed with new businesses recently relocating to the area and others are applying for redevelopment and relocation.

SCHEDULE OF ACTIVITIES

Following is a time-line of significant events in the Bridgeport Way project development process:

•	1996 - February	Grant application to TIB for safety improvements
	May	Application approved
	October	Seminar by Dan Burden
	November	3-day Design Charrette
•	1997 - January	Presentation to TIB
	February	5 public meetings
	March	Council selects "best" alternative
	May	Value Engineering study
	June	Design Phases 1A and 1B
•	1998 – May	Finish Phase 1A design
	June	Award construction bid
	July	Start construction for Phase 1A
•	1999 – February	Finish construction of Phase 1A
	March	Complete design and right of way acquisition for Phase 1B
	May	Award construction bid
	June	Start construction for Phase 1B
•	2000 – February	Finish construction for Phase 1B
	July	Design for Phase 2
•	2001 – May	Award construction bid
	February	Start construction for Phase 2
•	2002 – June	Finish construction for Phase 2

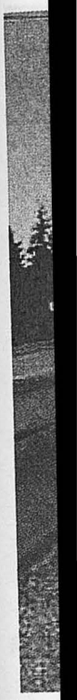
PROJECT OUTCOME AND LESSONS LEARNED

Key attributes of the Bridgeport Way project were summarized to provide insight into the performance results and how these results differ from other highway projects where the concepts of context-sensitive design were not implemented. Following is a listing of the most prominent attributes of the project and an assessment of the success achieved.

- A major emphasis of the project was public involvement and solicitation of comments from all stakeholders throughout the entire process
- The strong commitment by the City Council to develop a town center and sense of community played an important role in completing this project.
- The flexibility and open mindedness of the Council to develop a demonstration project for roundabouts indicated to the public and the stakeholders that their opinion is valued and is

seriously considered. This level of trust between the government and the public has helped the more efficient completion and acceptance of other transportation related projects.

- The application of the Value Management and Value Engineering analysis facilitated the development of appropriate solutions for the context of the roadway.
- The involvement of the area business owners from the outset of the project has been beneficial.
- The "road diet" concept (where a roadway with more lanes is converted to one with fewer lanes) has worked very well by reducing crashes up to 60% for some areas and speeds by about 6%.
- New techniques used for public involvement such as the "round table" format.
- Incorporation of innovative designs for pedestrian crossings.
- A systematic approach to educate public about design options and the purpose of the road using visual aids. A post-construction education was also undertaken to ensure proper driving.



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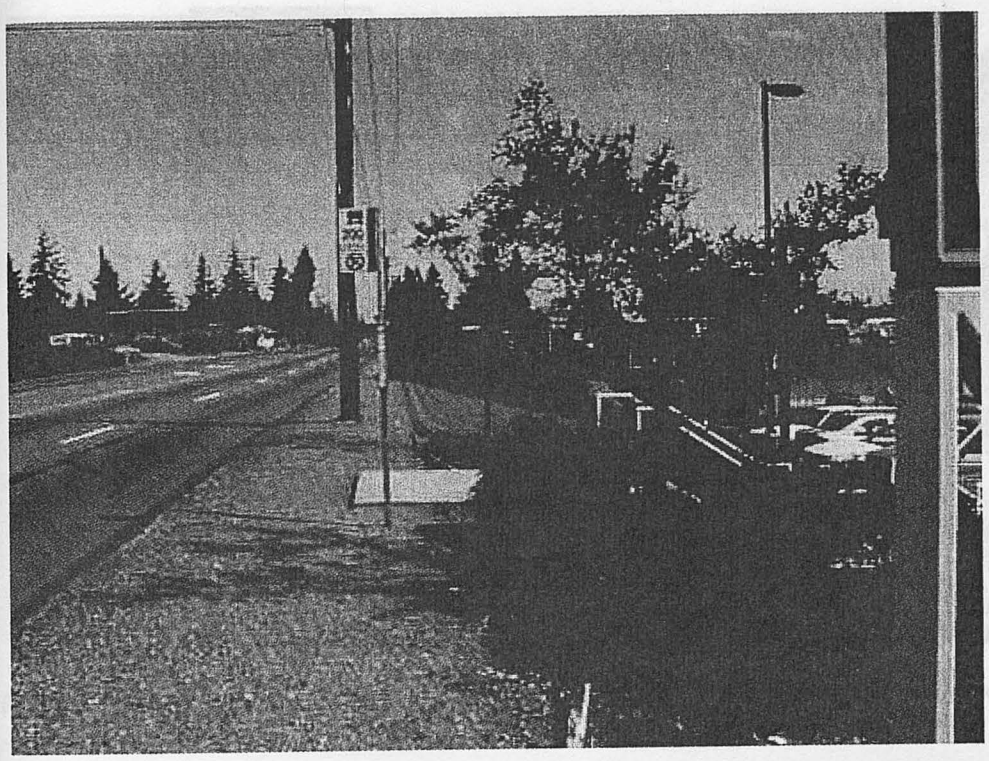


Figure 1. Bridgeport Way before

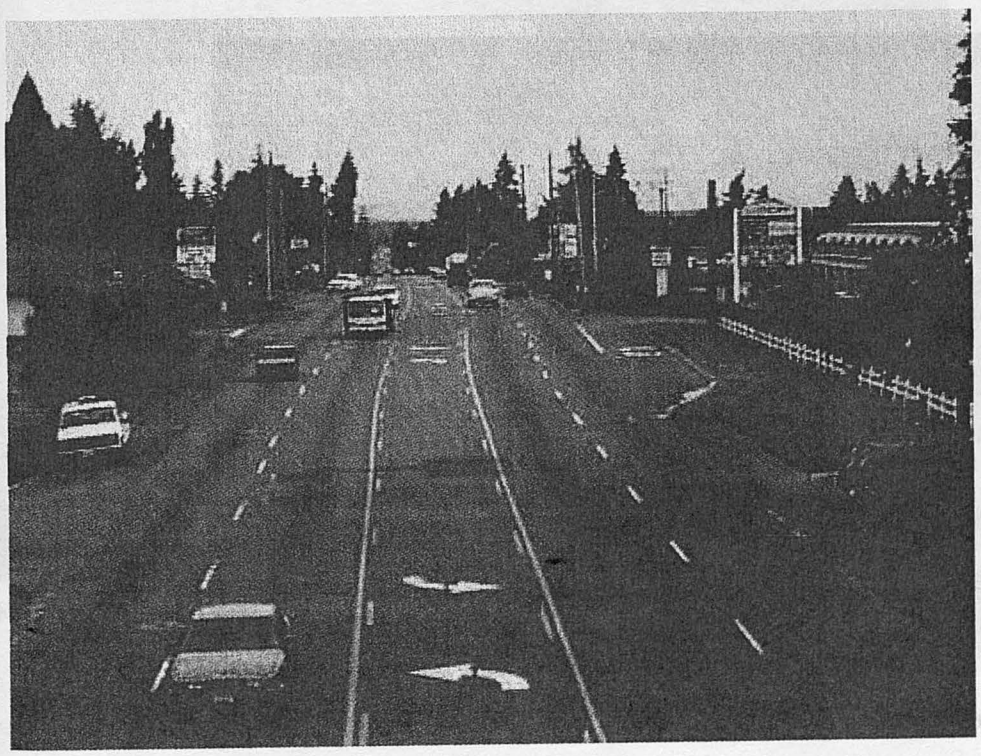


Figure 2. Bridgeport Way before

Figure 3. Bridgeport Way after, north view

Figure 4. Bridgeport Way after, south view

Figure 5. Bridgeport Way U-turns

Figure 6. Bridgeport Way bus stop

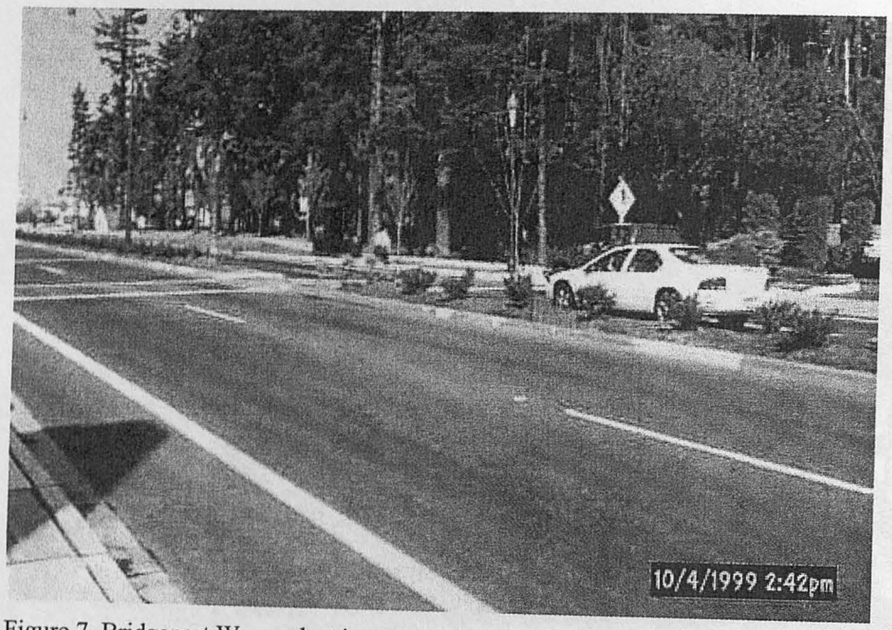


Figure 7. Bridgeport Way pedestrian crossing

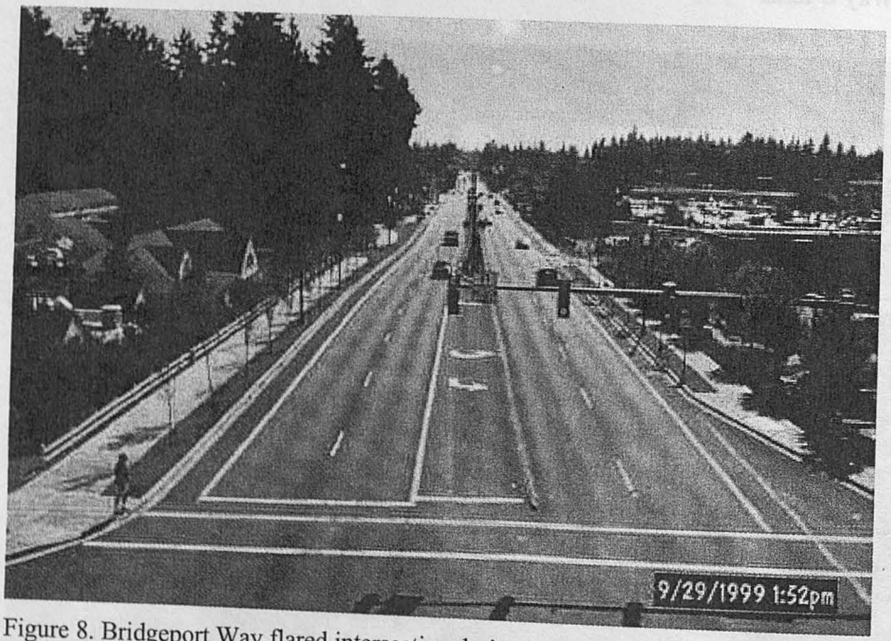


Figure 8. Bridgeport Way flared intersection design

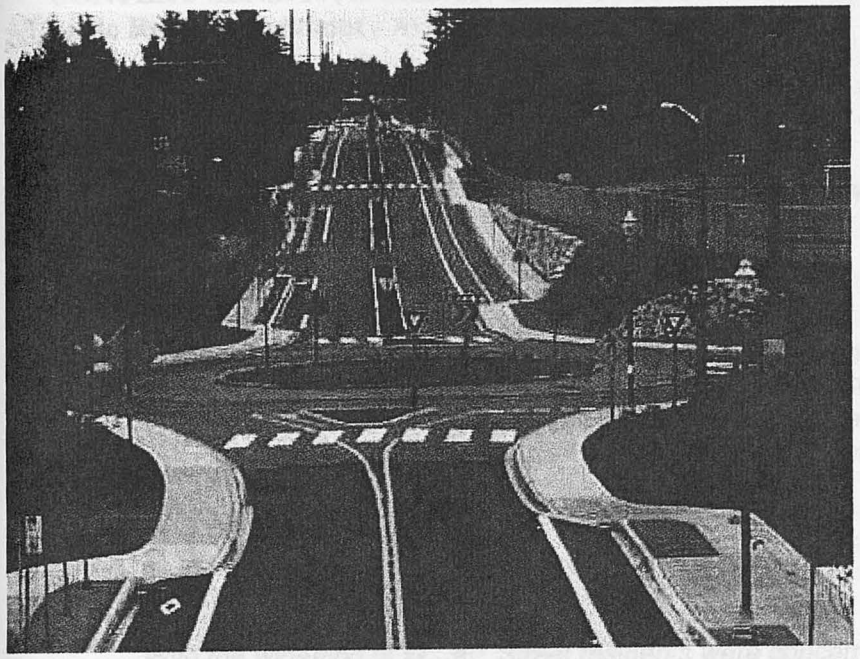


Figure 9. Demonstration roundabout

CONTEXT-SENSITIVE DESIGN CASE STUDY NO. 11
Little Rock Roundabout - Arkansas

Location:

Roundabout is on West 36th Street at Romine Rd. on the western edge of Little Rock, AR near I-430.

Project Description:

The project is a 4-leg roundabout with one travel lane at the intersection of 36th Street (minor arterial) and Romine Rd. (collector) / West Street (unclassified). Its design was completed in July, of 2000 and it opened to traffic in 2001. It was the fifth roundabout in Little Rock, but the city's first on an arterial.

Purpose and Need Summary:

History of the Project:

With the widening of W. 36th Street residents were concerned about higher traffic speeds. Some residents wanted speed humps installed. At the time a signalized intersection at W. 36th and Romine was not justified on traffic counts. The roundabout was proposed by city traffic engineers, but was neither initially endorsed by neighborhood community nor considered by the project design engineers of Little Rock Public Works. There were two public meetings held, the first to discuss the nature of the improvements and right-of-way requirements for West 36th Street and the second focused on the intersection at W. 36th Street and Romine. An extensive presentation on roundabouts, with graphic support including a video, was given at the second public meeting. In a memorandum to the City Manager the City's Traffic Engineering Manager stated the pros and cons of the options and the results of the poll of the second meeting's participants. He recommended the roundabout as a solution to the concerns of the citizens about speeding on the improved W. 36th Street (speed humps were deemed inappropriate for an arterial). It was also seen as a method to avoid a future signalized intersection at W. 36th and Romine and its inherent safety issues.

Context-Sensitive Factors:

There is a grade school and church (with day care) nearby on Romine and the need for traffic calming was indicated on W. 36th Street (an arterial without horizontal curves) in this residential area. Traffic calming features include two pairs of 'sidians' or chokers installed on the W. 36th Street south leg of the roundabout. The central raised island of the roundabout is planted and the mountable concrete circle and lane islands are simulated red brick. In this application the roundabout itself is considered a traffic-calming device. The manager of the adjacent apartment complex considers the roundabout to be a visual enhancement especially if it avoids a signalized intersection in the future.

Responsible Public Agency:

City of Little Rock
Department of Public Works
Traffic Engineering and Civil Engineering

Public Education and Involvement:

Two public meetings were held on the W. 36th Street improvement project. The second public meeting that included 25 residents focused on the roundabout option. Traffic engineers from the public works department prepared posters showing existing roundabouts, a color informational pamphlet on roundabouts and incorporated a video, prepared by the Maryland DOT, on the functioning of a modern roundabout in their presentation of the option. The roundabout option had been mentioned in the first public meeting that dealt primarily with right-of-way issues. Prior to the second meeting several residents had signed a petition questioning the viability of a roundabout at the intersection. The second meeting was advertised as a briefing and discussion after which the attendees would be polled for their opinion.

At the meeting a few ' very vocal participants' spoke against the roundabout option. However, a few participants indicated their understanding of the safety and traffic calming benefits of a roundabout and a willingness to have one in their neighborhood. Questions from the participants included:

- *Is this already a 'done deal'*
- *How would pedestrians cross*
- *Who would maintain it*
- *What signs would be necessary*
- *How would the driving public be educated*

The presentation by the traffic engineer representing the Public Works Department focused on the previously voiced public concerns for safety (vis-à-vis speeding) with the impending improvements to W. 36th Street (two travel lanes and a center turn lane). Comparisons (pros and cons) of various traffic calming or speed reduction solutions for the improved W. 36th Street were presented that included: enforcement; speed humps; stop signs; signalization; and roundabouts.

The roundabout option polling by show-of-hand at the end of the public meeting yielded: 0-for; 10-against; 11-undecided; 4-abstentions. In the recommendation memorandum to the city manager from the traffic engineering manager the polling dynamic was discussed and characterized in the following statement "...since the voting was done by a show-of-hands, many residents didn't want to go either way in order not to offend their more vocal neighbors."

Roundabout Design Issues, Special Features, Commentary:

Design Type:

Basic 4-leg with single lane entries

Design Speed/Posted Speed: *36th Street 30 mph*

Inscribed Circle Diameter: *100 ft.*

Circle Treatment:

4" mountable concrete truck apron 13 ft wide (red tinted concrete with brick pattern) and 6" curbed center island planting area with 32 ft. diameter

Number of Lanes (in circle): *One*

Width of Circle Travel Lane: *20 ft.*

Leg Road Classifications/Widths:

- *Minor arterial with 4,000 ADT (36th Street) 36' wide curb to curb*
- *Collector with 1,270 ADT (Romine) 36' wide curb to curb*
- *Non-classified (West Road) 34' wide curb to curb*

Entry Leg Angle: *All at 90 degree (with appropriate flares)*

Adjacent Land Use:

NE quadrant: wooded area and community facility (elementary school)
SE quadrant: multi-family residential (apartments) and institutional (church with day care)
SW quadrant: single-family residential
NW quadrant: single family residential

Commentary:

The roundabout was proposed by city traffic engineers to serve as a traffic-calming device and to eliminate the need for a future signalized intersection. A successful education effort allowed the project to go to design and construction. Two public involvement sessions were held. The first dealt primarily with right-of-way issues while the second focused on educating the public about the roundabout option. Roundabout posters were displayed and a video on roundabouts was shown. Initially the residents simply wanted 'speed bumps' installed on the minor arterial.

Little Rock has some recent experience with roundabouts being installed in new residential developments. A few citizens at the meeting indicated a positive experience with roundabouts when traveling elsewhere and the manager of the adjacent apartment complex suggested that the roundabout would be a 'visual improvement' over the possibility of a future 'ugly' signalized intersection. A few residents vocally opposed the roundabout and a significant number (but less than a simple majority) voted against the roundabout option when polled at the end of the public meeting.

The city manager, after reviewing the options and their safety and enforcement implications, with the recommendation of the traffic engineering division, decided to move forward with a roundabout design. The city's traffic center has received favorable telephone comments and positive newspaper coverage since W. 36th Street was improved and the roundabout at W. 36th and Romine was opened to traffic. It is believed by city staff that without the aggressive education effort at the second public that a majority would have been against proceeding with the roundabout option.

Project Development Schedule/Milestones:

Design Completed: *mid-2000*

Construction Completed: *early 2001*

Costs:

Design: *Unavailable separately, roundabout was part of larger improvement project.*

Construction: *Approximately $70,000*

Project Outcome and Lessons Learned:

All accounts seem to indicate a successful project. It is the 5th roundabout in Little Rock, but the first on an arterial. Opposition was limited through an informational neighborhood meeting that included a two-way dialogue about safety and esthetics. Residents understood that accidents would not be eliminated, but would be less severe than a traditional intersection and saw that a roundabout with center planting would be more attractive than, in their terms, an ugly signalized intersection. The traffic department has recorded favorable call-ins regarding how well the installed roundabout works and looks.

According to city staff the lessons learned include the need for education and discussion of options with the public. This includes the use of pictures and videos for education and familiarization. The second public meeting demonstrated the advantage of two-way dialogue regarding the pros and cons of options to increase the understanding and knowledge of the public.

After construction it was recognized that further delineation and lighting was needed for improved nighttime operation. Additional streetlights and reflective markers have been installed.

Photographs and Route Diagram:

See attached.

Information Contact(s):

Nat Banihatti, PE, Traffic Engineer
Dept. of Public Works, Traffic Engineering
621 S. Broadway
Little Rock, AR 72201-4119
501 371-4452

Design Consultant:

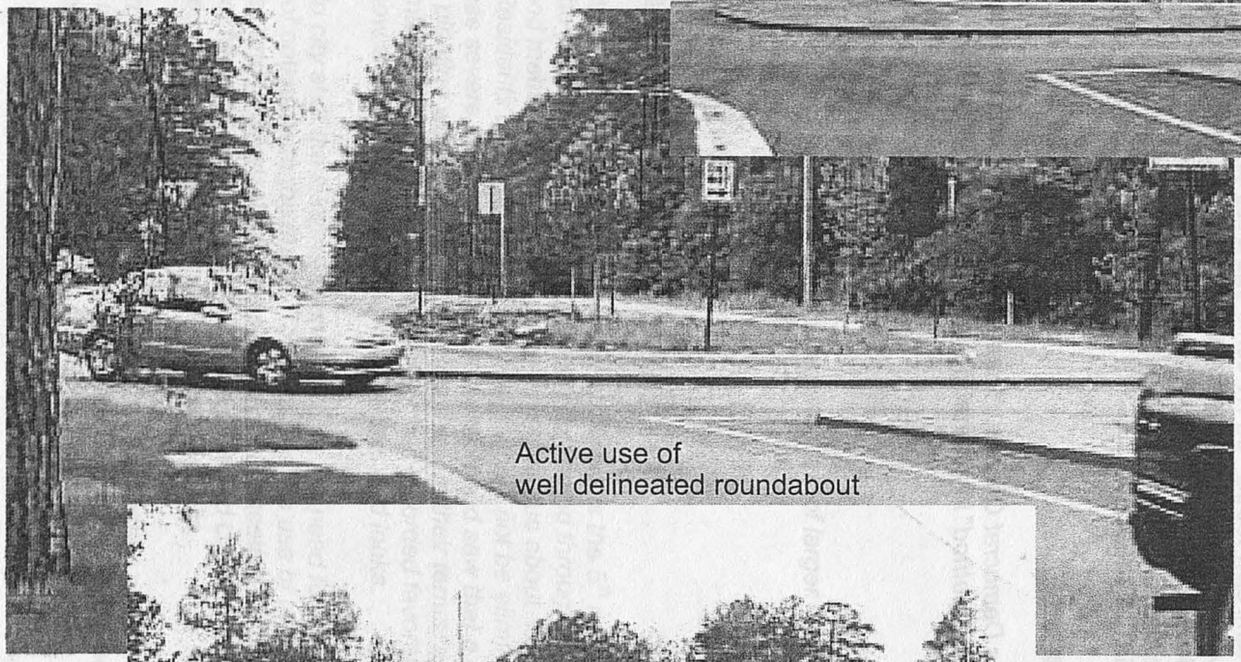
McClelland Consulting Engineers, Inc.
900 W. Markham St.
Little Rock, AR 72201
501 371-9932

Newspaper Coverage:

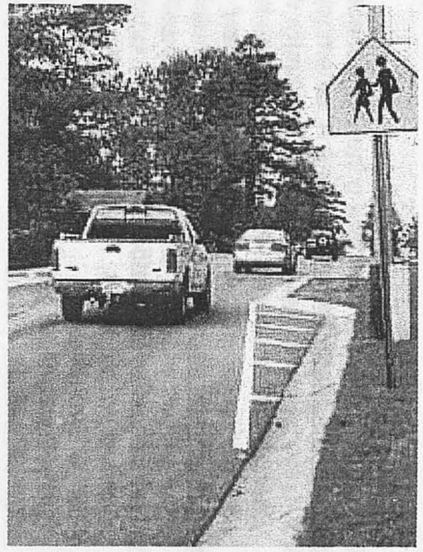
Arkansas Democrat Gazette, "Paper Trails: Construction slows traffic in roundabout method" by Carrie Rangers, 11/29/2001, page E1.

Roundabout in Little Rock Arkansas

Photographs taken on a morning when school buses were in service



Active use of well delineated roundabout

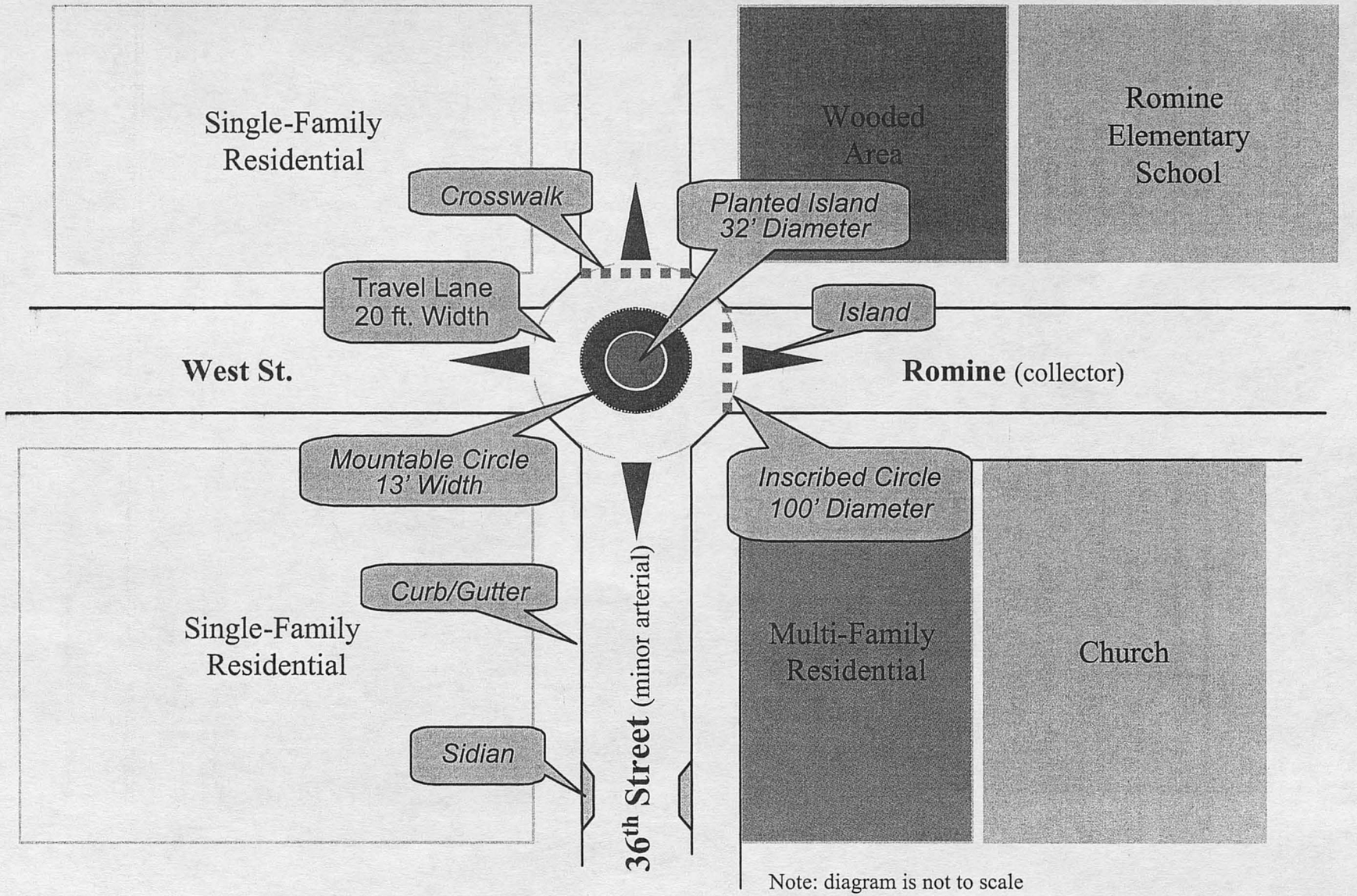


Sidian (or choker) on 36th Street approach to the roundabout

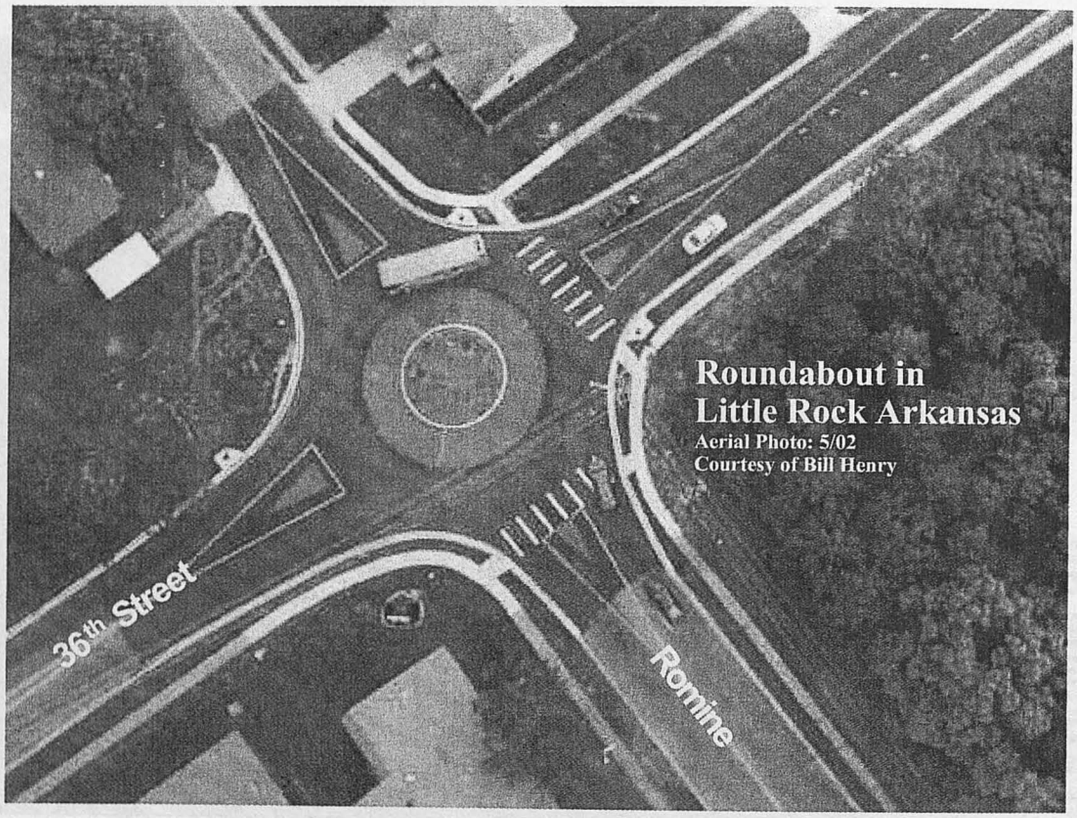
Little Rock Roundabout Diagram

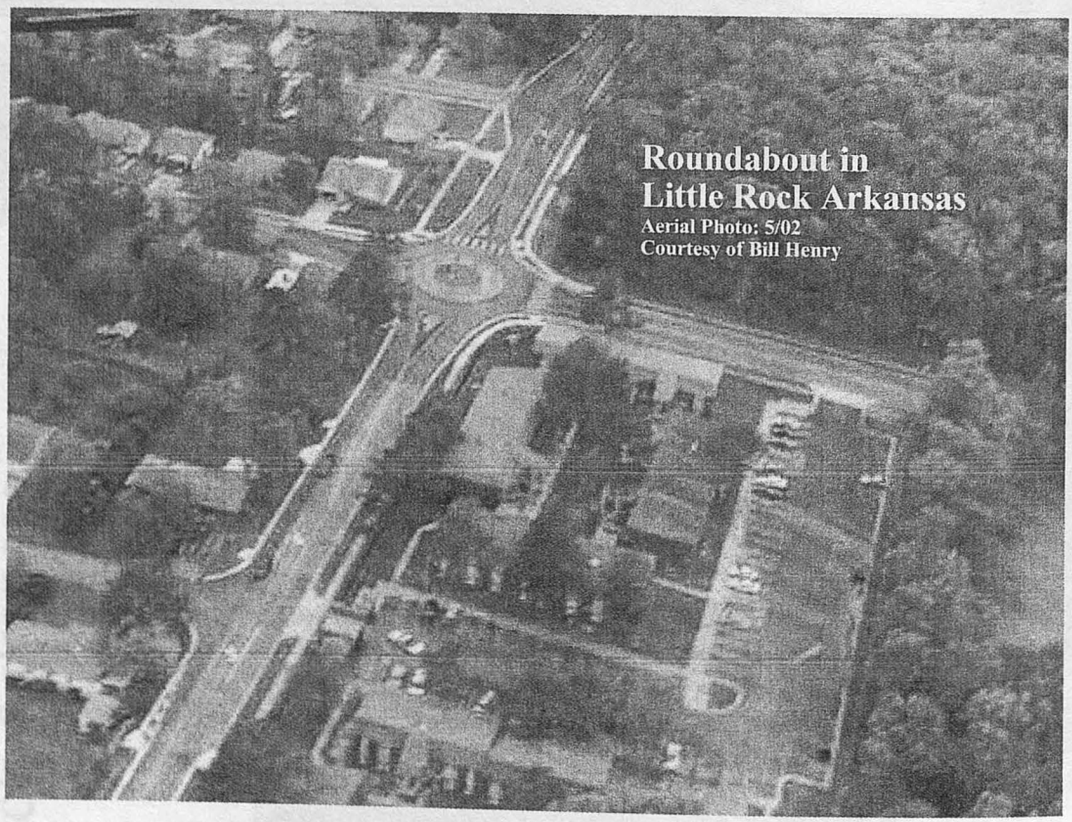
Little Rock Roundabout Diagram

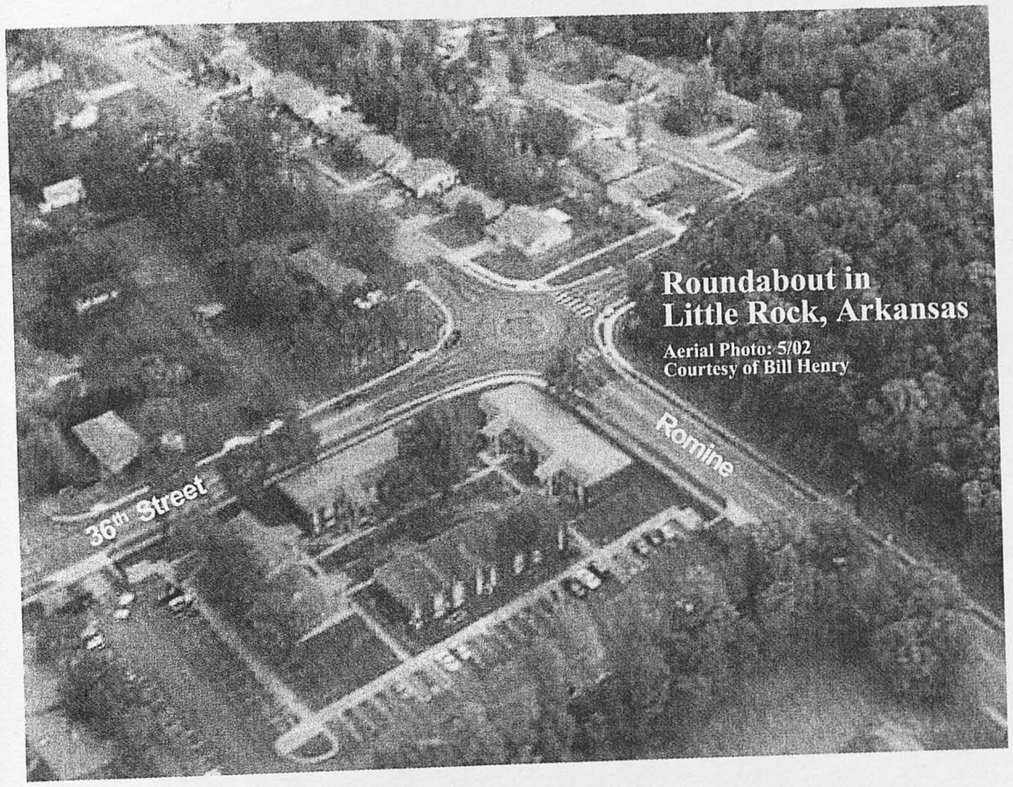
West 36th Street and Romine Rd.



Note: diagram is not to scale


Roundabout in
Little Rock Arkansas
Aerial Photo: 5/02
Courtesy of Bill Henry
36th Street
Romine


Roundabout in
Little Rock Arkansas
Aerial Photo: 5/02
Courtesy of Bill Henry



Roundabout in Little Rock, Arkansas

Aerial Photo: 5/02
Courtesy of Bill Henry

CONTEXT-SENSITIVE DESIGN CASE STUDY NO. 12
Highway 61 - Minnesota

Location:

Minnesota's North Shore Scenic Highway 61 along Lake Superior's Good Harbor Bay

Project Description:

Minnesota's Trunk Highway 61, North Shore Scenic Drive, runs northeasterly along the rock and heavily forested edge of Lake Superior, for than 150 miles, from the regional trade center of Duluth to Canada. TH 61 is both a scenic highway as well as a vital interregional and international trade corridor for northeastern Minnesota.

Context-Sensitive Objectives:

- Improve roadway safety and traffic flow
- Enhance the scenic and visual qualities of the corridor
- Preserve historic and traditional views and vistas from the highway.
- Preserve and enhance public access to the lakeshore.
- Avoid adverse impacts to residential and commercial property owners.
- Avoid adverse impacts to the environment and state parkland.
- Reduce erosion along the lakeshore and Cutface Creek.

History:

Visitors who travel along the North Shore Scenic Drive are able to experience the magnificent landscapes, the cascading rivers, the rugged shorelines, and the breathtaking vistas along with the other natural and cultural resources and history that abound along this Lake Superior region. The characteristics that draw visitors to this region are so unique that TH 61 was recently designated as an "All-American Road" in the National Scenic Byways Program.

Aside from being a tourist and recreational driving destination, within an environmentally challenging area, the North Shore Scenic Drive provides adequate safety, mobility and access for local residents, businesses, recreation areas and commercial trucking while accommodating bicyclists, pedestrians and rail crossings. Balancing transportation, community, environmental and stakeholder needs along this corridor was a tremendous challenge.

The Minnesota Department of Transportation's (MN/DOT's) reconstruction and realignment of TH 61, along Lake Superior's Good Harbor Bay, illustrates a context-sensitive design approach that balanced transportation, community and environmental needs without requiring exceptions to geometric design guidelines. This project also illustrates context-sensitive design that did not arise out of contentious public involvement and controversy but rather out of proactive project management and involvement of stakeholders.

Partnership Development and Involvement:
Highway Agency, Resource Agencies, and Community

MN/DOT's District One staff made the following commitments early in the project development process:

- To work closely with local communities and stakeholders to establish a highway corridor vision… a safe and aesthetic highway that enhances the local communities through which it passes.
- To make context-appropriate design decisions along the corridor.
- To apply design flexibility to preserve historic, natural and scenic corridor qualities.

Transportation, Community, Environmental and Stakeholder Objectives included:

- Improve roadway safety and traffic flow
- Meet current and future transportation demands
- Improve pavement quality
- Improve an existing limited-use safety rest area facility
- Minimize right-of-way, construction impacts and costs
- Remain consistent with north shore corridor visioning and management goals
- Enhance the scenic and visual qualities of the corridor
- Preserve historic and traditional views and vistas from the highway
- Preserve and enhance public access to the lakeshore
- Avoid adverse impacts to residential and commercial property owners
- Avoid adverse impacts to the environment and state parkland
- Reduce erosion along the lakeshore and Cutface Creek
- Consistent with MN/DOT's context-sensitive commitments and proactive stakeholder involvement, consensus was reached in:
    1. Determining project purpose and needs to balance transportation, community and environmental objectives.
    2. Selecting a lower design speed appropriate for the project characteristics and providing the flexibility to shift roadway alignment and balance project objectives without exceptions to geometric design standards.

Environmental Issues:
Natural Environment

- Enhance scenic and visual qualities of the corridor
- Preserve and enhance public access to the lakeshore
- Reduce erosion along the lakeshore and Cutface Creek
- Avoid adverse impacts to the environment and state parkland

Human Environment:

- Preserve historic and traditional views and vistas from the highway
- Avoid adverse impacts to residential and commercial property owners

Schedule of Activities:

The project was approximately 2.0 miles long in the 150-mile corridor of Highway 61, which runs from Duluth to the Canadian border. Initial planning for the project began in the late 1980's, with more activity in the early 1990's. Initial construction began in late 1990's and was completed in 2001.

Project Outcome and Lessons Learned:

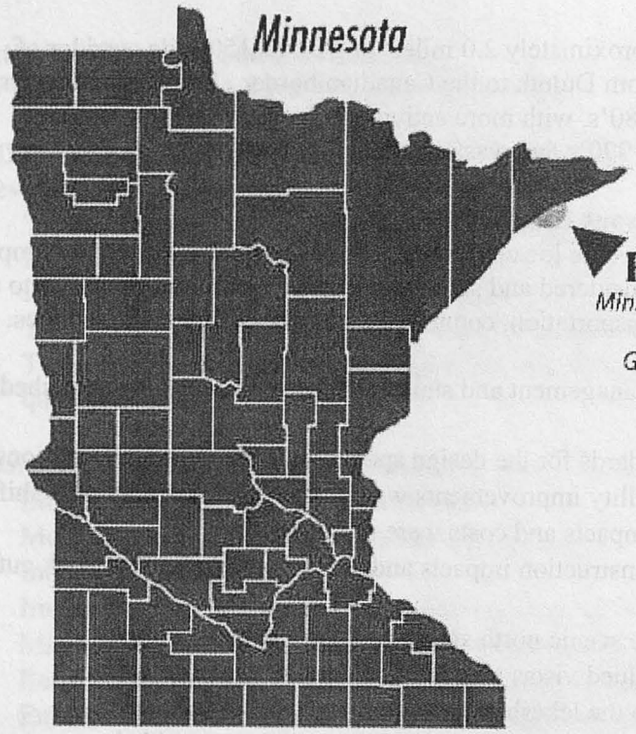
The decision to select the lower 55 mph design speed as opposed to 70 mph design speed previously considered and studied, afforded maximum flexibility to achieve the best balance among transportation, community and environmental objectives.

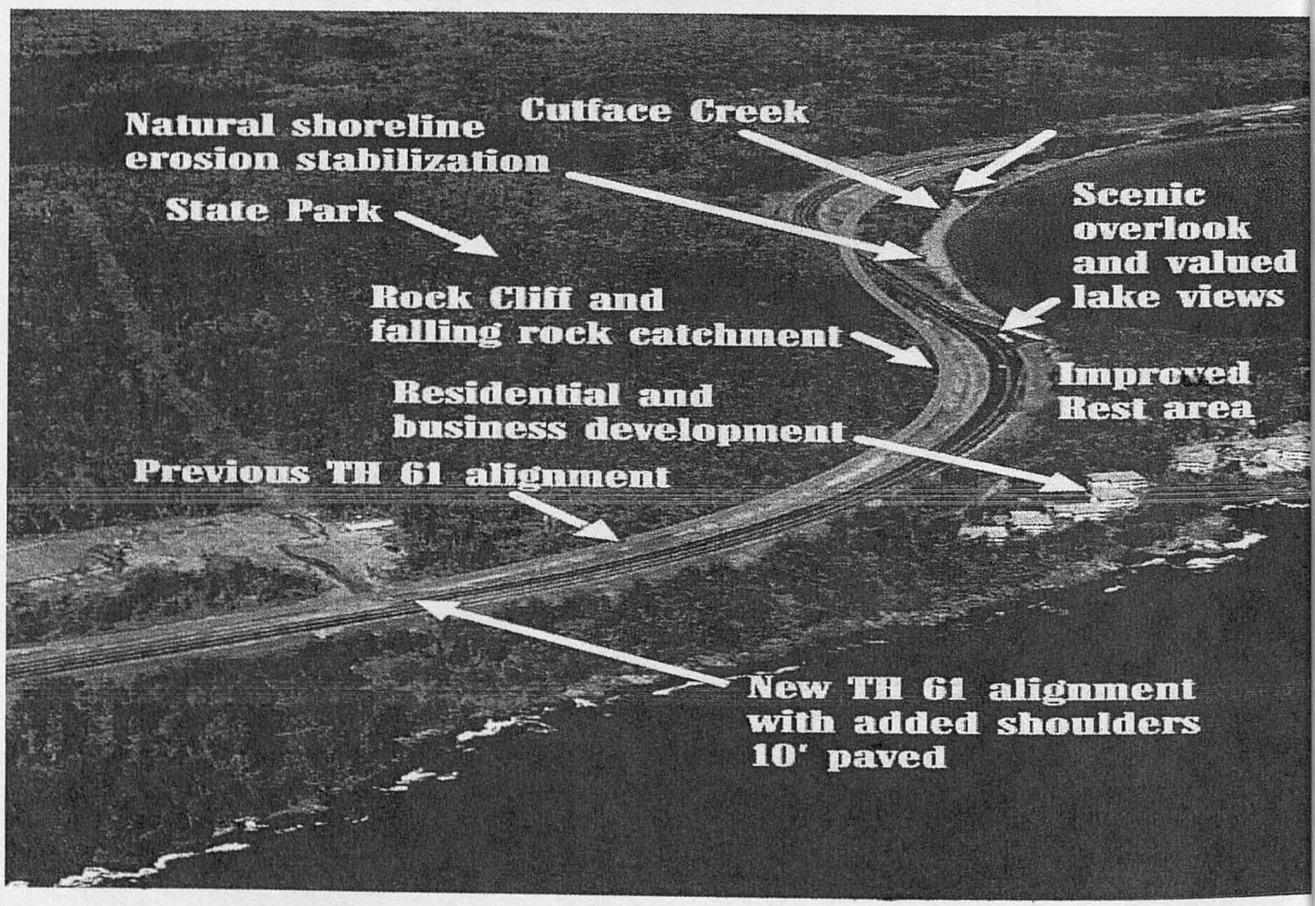
Proactive project management and stakeholder involvement accomplished the following project benefits:

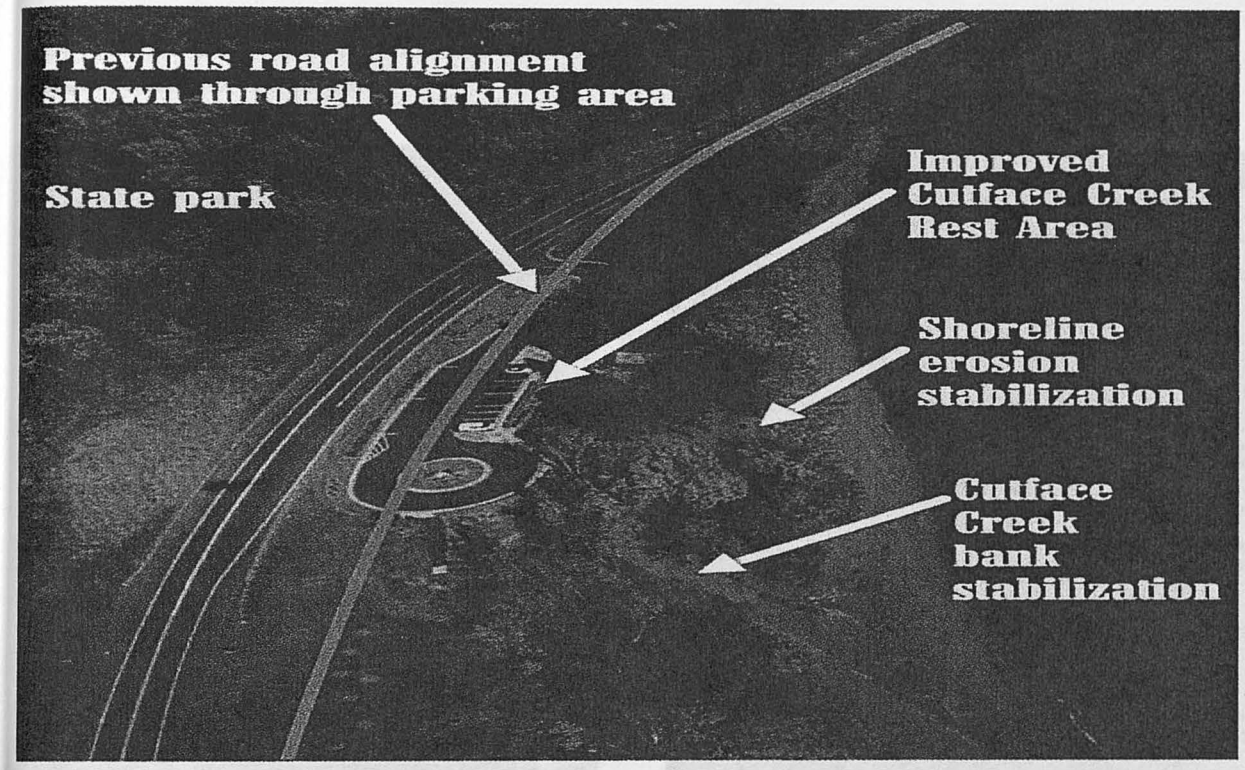
- Geometric standards for the design speed were met without exceptions
- Safety and mobility improvements were added with the alignment shifts
- Right-of-way impacts and costs were minimized
- Unnecessary construction impacts and costs were minimized (rock cuts, disposal, etc.)
- The goals of the scenic north shore corridor vision were met
- Original and valued vistas of Lake Superior were preserved
- Public access to the lakeshore was preserved and enhanced
- Improvements to the limited-use safety rest area were added
- Eroding areas were stabilized along the alignment shift
- State park impacts and rock cuts were minimized by the alignment
- The alignment fit the landforms and context, both physically and visually

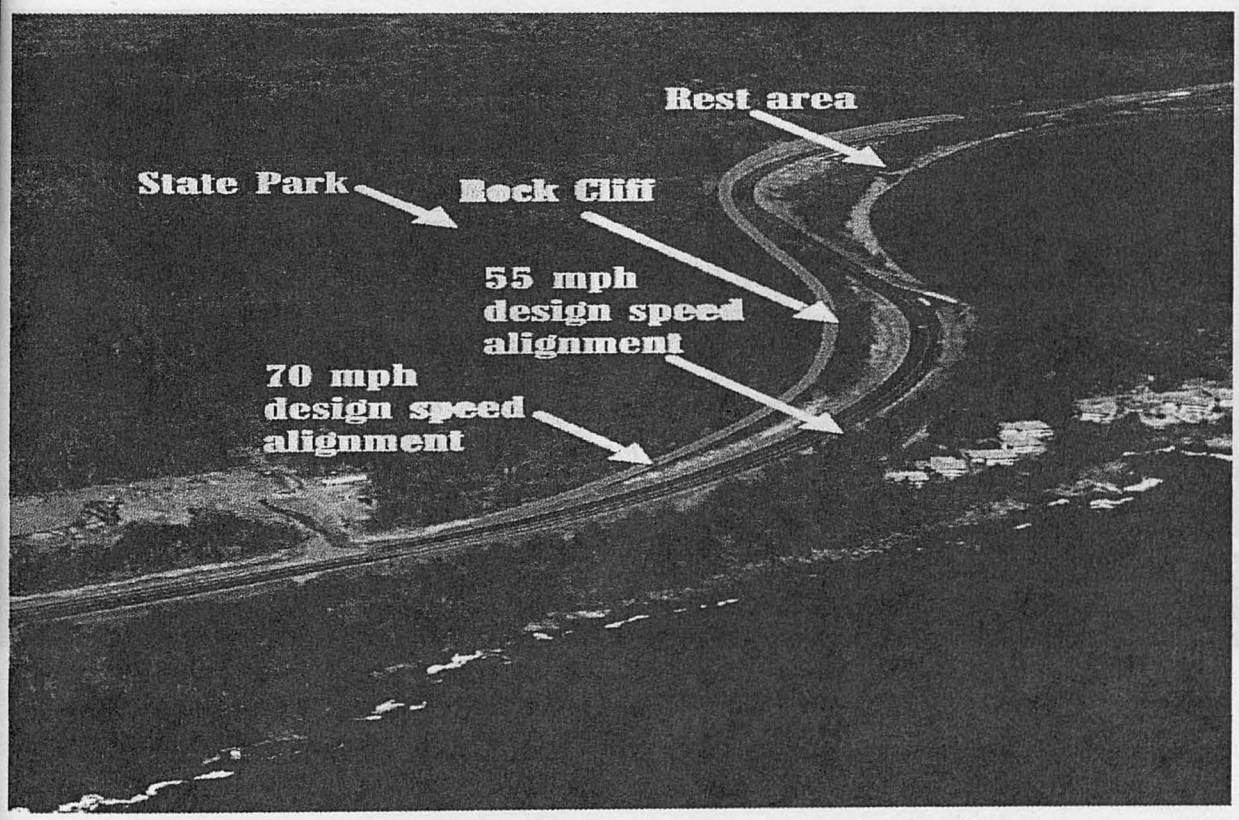
Four key measures of design excellence were met on the project:

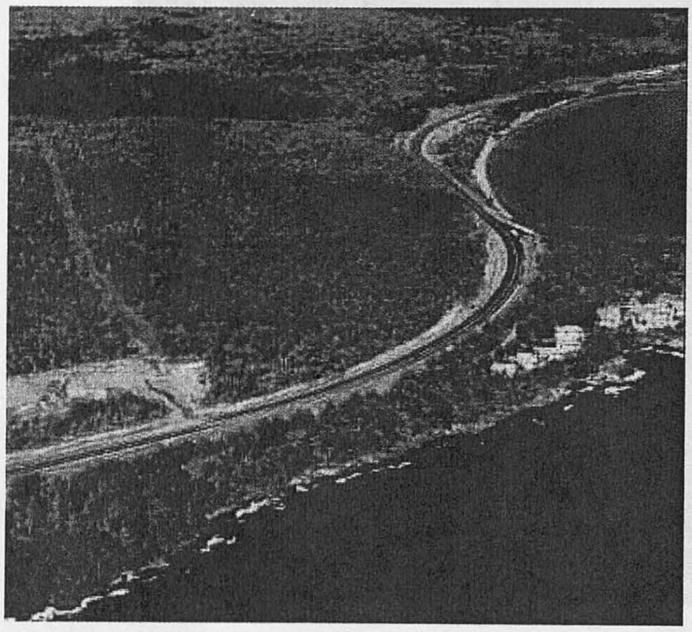
- Community acceptance
- Environmental compatibility
- Engineering and functional credibility
- Financial feasibility

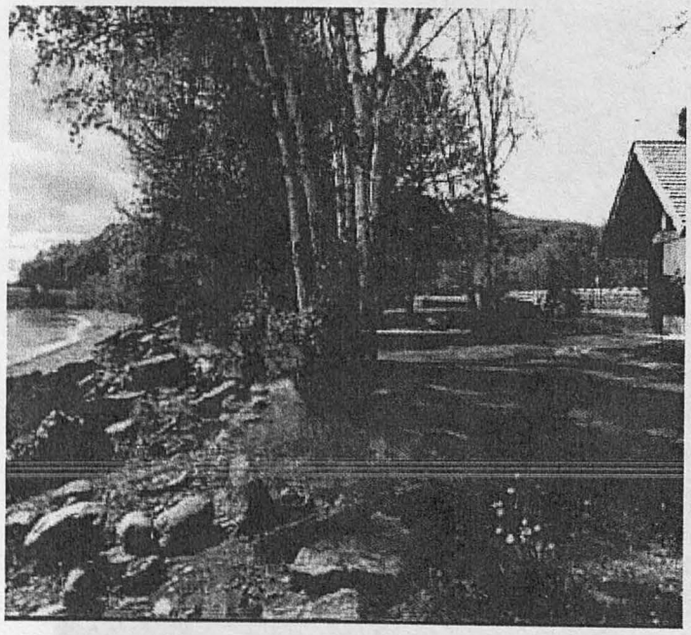

Minnesota
Project Area
Minnesota Highway 61
alignment at
Good Harbor Bay/
Cutface creek

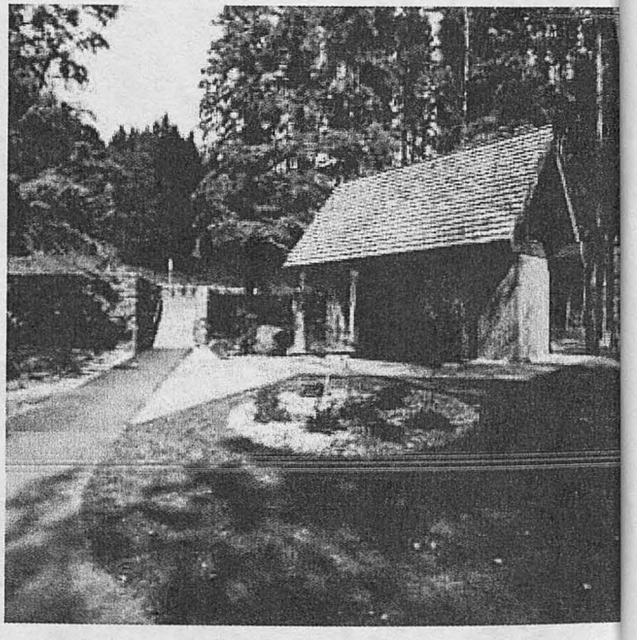

Natural shoreline
erosion stabilization
Cutface Creek
State Park
Scenic
overlook
and valued
lake views
Rock Cliff and
falling rock catchment
Improved
Rest area
Residential and
business development
Previous TH 61 alignment
New TH 61 alignment
with added shoulders
10' paved


Previous road alignment
shown through parking area
State park
Improved
Cutface Creek
Rest Area
Shoreline
erosion
stabilization
Cutface
Creek
bank
stabilization


Rest area
State Park
Rock Cliff
55 mph
design speed
alignment
70 mph
design speed
alignment







CONTEXT-SENSITIVE DESIGN CASE STUDY NO. 13
State Route 68 - Arizona

LOCATION:

State Route 68 between Bullhead City and Golden Valley in western Arizona

PROJECT DESCRIPTION:

The project involved reconstruction and widening of a 13.5-mile of an existing two-lane road into a four-lane roadway. The construction phasing and sequencing has been planned with primary consideration of the traveling public and businesses. The west end of the project near Bullhead City was completed first to increase travel capacity and improve business access in the area. An element of the plan was to maintain and utilize passing lanes in other segments so that one lane in each direction would be available at all times. Existing pullouts and passing lanes were maintained during the construction. Upon completion of the project, two lanes of travel were provided in each direction, with the lanes of travel separated throughout the length of the project. In the developed area within the Bullhead City limits, the lanes were separated by either a raised median or a two-way left-turn lane. Other areas were designed with an open depressed median. Where access was to be maintained in the raised median area, left-turn pockets were constructed. There were five construction sections included in the project as shown below:

SEGMENT/MILEPOSTS		DURATION	TIMEFRAME
A	1.23 - 3.5	7 months	Sept. 2000 - Spring 2001
C	6.8 - 8.3 (new alignment)	13 months	Fall 2000 - Fall 2001
D	8.3 - 12.2	16 months	Fall 2000 - Spring 2002
B	3.5 - 6.8	7 months	Spring 2001 - Fall 2001
E	12.2 - 14.9	7 months	Spring 2001 - Fall 2001

CONTEXT-SENSITIVE FACTORS

Several unique features were built into the SR 68 design-build project. Included were the following:

- Traffic was maintained on all passing and travel lanes during construction of the new roadway
- Lane rental was used to minimize the duration of lane closures by rewarding the contractor for keeping travel lanes open and charging them a fee for lane closures longer than five minutes
- Incentive/disincentive program was used to encourage the contractor to keep the travel time between Bullhead City and Golden Valley similar to the time prior to construction
- An extensive community outreach program was implemented to keep motorists informed about the SR 68 project
- A non-traditional retaining wall was installed near an historical property in order to maintain the historical aspects of the property

HISTORY OF PROJECT

SR 68 is a critical highway for the northwestern Arizona region. It provides a vital link for employment, tourism and commercial trucking. The Arizona DOT included several innovative features into the design-build contract to benefit the traveling public during construction. The project was the first design-build job in a rural area in Arizona. Design-build allows a design team and a contractor to work together, at the same time, to complete a project in a much shorter period of time than when working under a traditional design-bid-build schedule.

SIGNIFICANT ENVIRONMENTAL ISSUES

Several agencies worked closely together to mitigate disturbances during the project. Among the agencies involved were the Arizona DOT, the Federal Highway Administration, the Bureau of Land Management, Arizona Game and Fish, the State Land Department, and the Lake Mead National Recreation Area. Mitigation measures included salvaging and replanting native vegetation, preservation of visual quality, and preservation of wildlife and cultural resources. New construction was blended with the form, line, color and texture of the surrounding landscape. Disturbed surfaces were seeded or planted with shrubs, trees, and cacti native to the area. Other features aimed to preserve or enhance the environment and overall setting of the roadway area included construction of two wildlife crossings in the area of Union Pass, installation of wildlife fencing, and staining or painting to help new materials blend into the surrounding. Specific environmental and landscape measures were taken to accomplish the following:

Protect and enhance wildlife
Preserve visual quality
Accelerate vegetative rehabilitation

PROJECT PARTNERSHIPS AND PARTICIPANTS

Kiewit Construction Company
Parson Transportation Group
Arizona Department of Transportation
Federal Highway Administration
Bureau of Land Management
Kaneen Advertising and Public Relations
Michael Baker Jr., Inc.
Golder
CH2M HILL

For a project of the magnitude of State Route 68, a large number of cooperating people, private companies, and governmental agencies were required to cooperate in order for the project to be successful. The Arizona Department of Transportation was responsible for planning, design, construction, environmental oversight, and final quality. Financial management and standards quality were the responsibility of the Federal Highway Administration and the Arizona DOT. The Bureau of Land Management and the Arizona Land Department played a

vital role because of their ownership of the land adjacent to the project. The Arizona DOT was also supported by their general consultant CH2M HILL and their subconsultants. The design-build team of Kiewit Western Company and Parsons Transportation Group, along with several subconsultants, were responsible for the design and construction of the improved State Route 68.

PROJECT OUTCOME AND LESSONS LEARNED

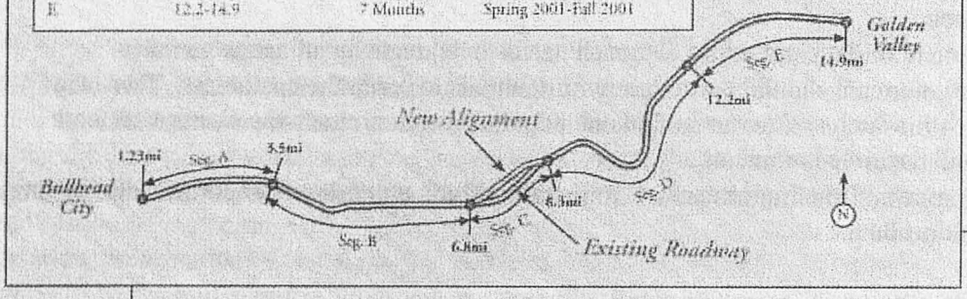
- Utilization of "Partnering" assisted in making design build work in an environmentally sensitive area.
- A commitment to the Community Outreach needs to be made by all teams member
- Community outreach should use a variety of methods to reach the customers. Two-way communication such as Internet and phone help the customer reach the owner with both positive and negative comments.
- Educating crews of the importance of, mitigation efforts and desired outcomes helps ensure a quality end product.

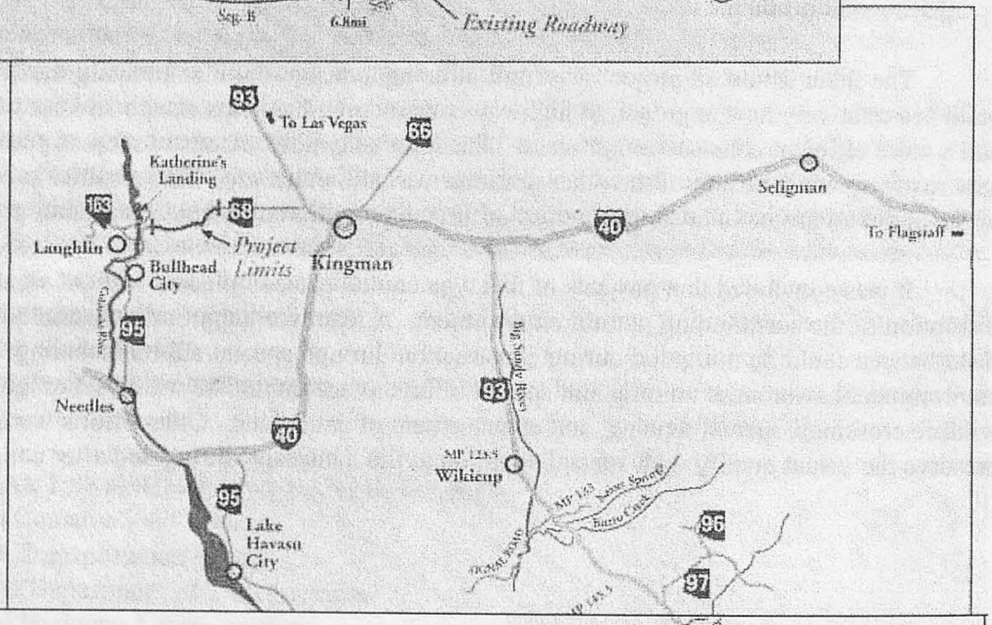
The State Route 68 project was built utilizing a design-build contracting method. Design-build is a relatively new approach to highway construction that helps ensure an improved quality and a more efficient construction process. The approach allowed construction of portions of the new roadway while design of the other portions was still underway. This resulted in completion of the highway project in a shorter period of time than with traditional construction projects.

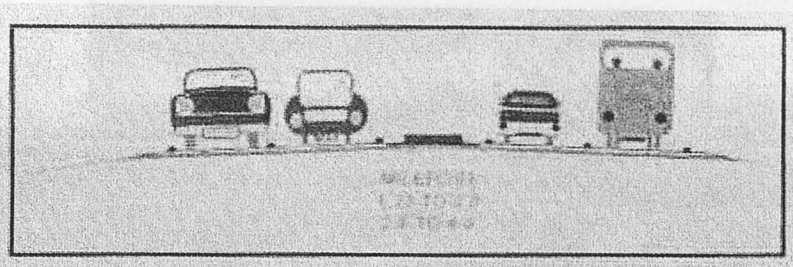
It was concluded that projects of this type could be accomplished without significant disruption of the surrounding natural environment. A teamwork approach ensured that disturbances could be mitigated during construction through special efforts including environmental awareness training and special efforts to accommodate wildlife through use of wildlife crossings, special fencing, and enhancement of bat habitat. Other efforts were made to preserve the visual quality with special attention to the landscape during and after construction.

Construction Phases and Sequencing

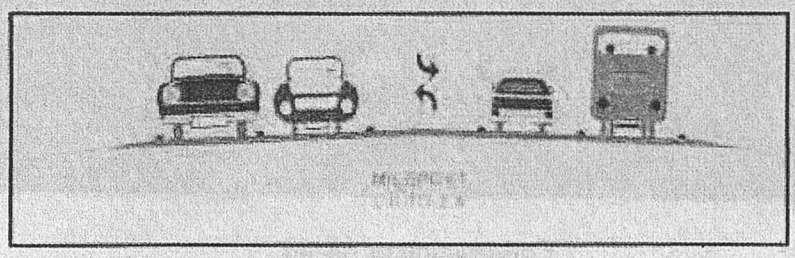
SEGMENT	MILEPOSTS	DURATION	TIMEFRAME
A	1.23-3.5	7 Months	September 2000-Spring 2001
C	6.8-8.3 (new alignment)	13 Months	Fall 2000-Fall 2001
D	8.3-12.2	16 Months	Fall 2000-Spring 2002
B	3.5-6.8	7 Months	Spring 2001-Fall 2001
E	12.2-14.9	7 Months	Spring 2001-Fall 2001



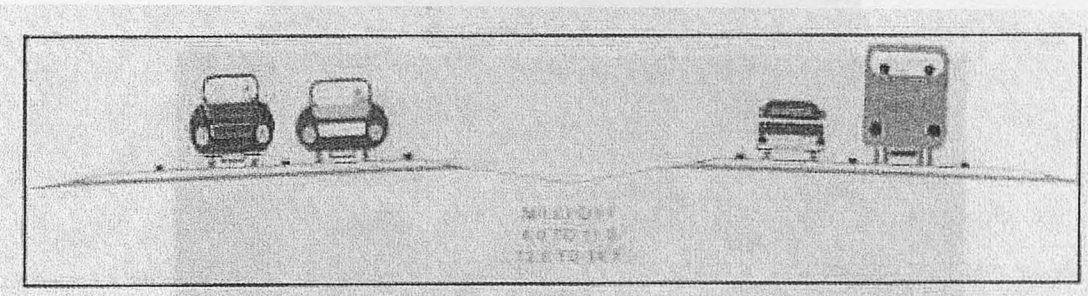




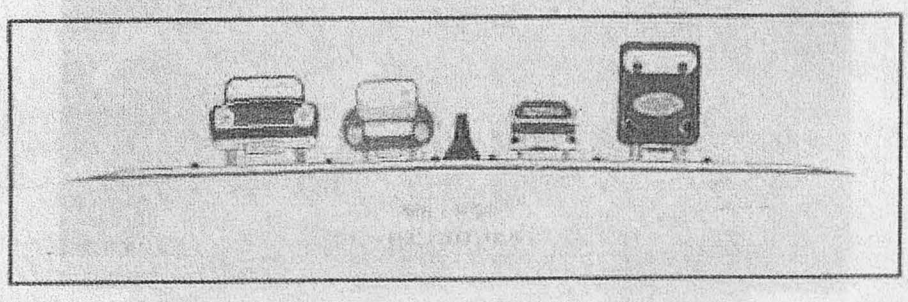
RAISED MEDIAN SECTION



TWO-WAY LEFT TURN LANE

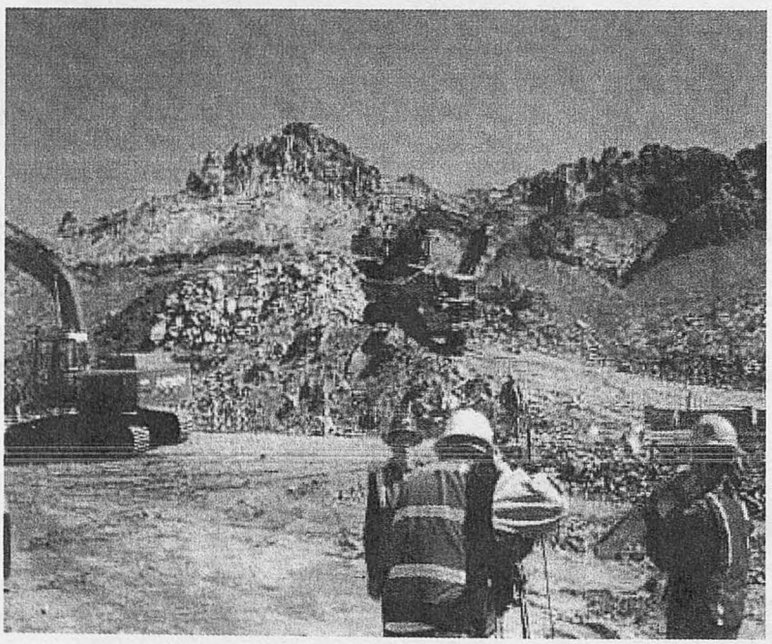


OPEN MEDIAN

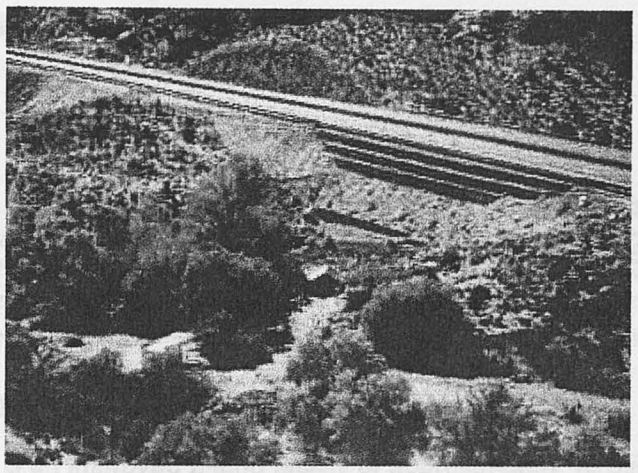


MEDIAN CONCRETE BARRIER

Construction of SR 68

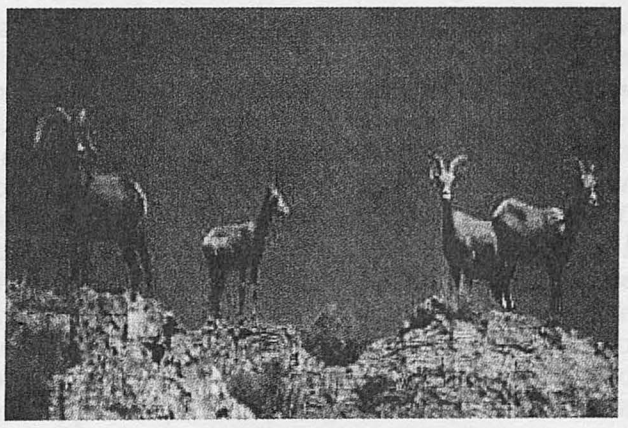


Filming Public Service Announcement



Hilfiker Wall Constructed on SR 68

Relocating Cactus Along SR 68



Wildlife Along SR 68

Context-Sensitive Design Case Study No. 14
Arkansas Route 215 - Ozark National Forest

Location:

Route 215 (approximately 15 miles in length) beginning at the junction with Route 23 (near Cass) to Oark in the Ozark National Forest (also designated as U.S. Forest Highway 65). The route is north of I-40, with Arkansas Route 23 as the western terminus, in NW Arkansas' Franklin and Johnson Counties (generally 45 miles East-NE of Fort Smith and 35 miles South-SE of Fayetteville).

Project Description:

Route 215 is an improved 2-lane facility of approximately 15 miles in length following along the Mulberry River (providing a scenic overlook) with its steep slopes and providing access to the Redding and Wolfpen Campgrounds in the White Rock Wildlife Management Area of the Ozark National Forest.

Purpose and Need Summary: *(abstracted from the project's 1994 Environmental Assessment)*

The previously existing route was not adequate for the current or anticipated future traffic. The travel lane was too narrow, the surface rough (gravel), and an unnecessary amount of dust and siltation were being produced, all of which detracted from the personal experience and water quality of the streams and river in the area. The road provides access to the Mulberry River Valley for local residents, recreationists, and other forest users. The road provides access to campgrounds, hiking trails, and scenic views of the Mulberry River. The Mulberry River is very popular among canoeists and it is highly regarded as a smallmouth bass river. Hunters also heavily use the National Forest during hunting season. The reconstructed roadway is meant to reduce dust and siltation thereby enhancing the personal experience and improving the water quality of the area.

History of the Project:

The intended project's environmental assessment was completed in 1994 based on a route to be constructed on existing alignment. The improvement was specified to be two 10' paved travel lanes with 2' shoulders where possible, or curb and gutter where necessary. The route was split into five project segments (beginning near Cass and extending eastward). The first two segments were the design responsibility of the Arkansas Highway and Transportation Department and they were open to traffic in 1997 and 1998, respectively. The last three segments are the design responsibility of the Eastern Federal Lands Highway Division (FHWA). The third segment is near completion and the fourth is under construction. It is anticipated that the final segment will be let in 2003. Once all five segments are complete the entire roadway is to be incorporated into the state's highway system. The upgrading of the corridor is part of the Forest Service's master plan to provide a scenic drive across the Ozark National Forest.

Context-Sensitive Factors:

Several principles were established for erosion and sediment control during and after construction. The visual environment of the forest, the viewscape from the Mulberry River, and the vistas overlooking the river were deemed extremely important to maintain and enhance. Improvement measures include: revegetation of cut and fill slopes; location of borrow and waste areas so as to not be visible from the river; and use of native stone to the largest extent possible for retaining walls, gabion walls, riprap and ditch lining. Because of the potential instability of the mountain, cuts were kept to a minimum. An additional requirement was to leave in place stone retaining walls at culverts and even a rock box culvert with large stone slabs (it has been covered over by the new roadway and its sides have been extended with pipe). The roadway alignment closely tracks the existing land contours to minimize both cuts and fills.

Highway Agency (Partnerships):

Arkansas State Highway and Transportation Department
Federal Highway Administration (specifically the Eastern Federal Lands Highway Division)

Resource Agencies Involved:

U.S. Forest Service
National Park Service
U.S. Army Corps of Engineers
Arkansas Natural Heritage Commission
Arkansas Dept. of Environmental Quality
Arkansas Natural and Scenic River Commission

Significant Environmental Issues:

Natural Environment:

The major issues include the fact that the road is in a national forest and follows a river. Concerns were for preserving and enhancing scenic quality as well as water quality. Design principles included following the terrain and creating as little disturbance as possible with the alignment and using natural materials to the largest extent possible. The roadway provides improved access to forest uses and an improved view from the roadway, while also protecting the viewshed of the Mulberry River below.

Design Issues and Special Features:

Design Speed:

A 20 mph design speed was used to minimize changes to the existing alignment and 40 mph used elsewhere, when possible.

Right-of-Way:

There were no recorded existing right-of way limits. The roadway project was mandated to be on the existing alignment with minimal changes to the existing landscape.

Clear Zones:

Various combinations of components were used including barrier walls, curb and gutter, and guardrail

Number of Lanes:

2-lanes with discontinuous 2' paved shoulders

Lane Width:

10' paved travel lanes

Special Features:

Design speed chosen to allow use of much of the existing gravel road alignment. Retaining structures were used adjacent to cuts and fills in lieu of slope flattening. Native stone was used extensively for veneer on crash worthy walls, riprap/gabion retaining walls and ditch lining. Controlling erosion and sediment during and after construction has been a major concern. The design maintains the visual quality of the viewscape from the Mulberry River and provides for scenic overlooks of the forest and river for the roadway traveler.

Adjacent land use:

Primarily forest (hunting and hiking), river (fishing and canoeing), and campgrounds.. The Mulberry River falls under the protection of the federal Wild and Scenic Rivers Act and is listed in the Arkansas Natural and Scenic Rivers Registry.

Project Development Schedule and Costs:

Design: (*Design costs are not available.*)

Construction:

Segment 1	*$3,822,144*	*completed 7/97*
Segment 2	*$3,167,260*	*completed 10/98*
Segment 3	*$1,803,888*	*under construction (near complete)*
Segment 4	*$4,497,577*	*under construction (let 9/01)*
Segment 5	*$3,750,000*	*to be let 2003*

Project Outcome and Lessons Learned:

The Arkansas State Highway and Transportation Department is knowledgeable of context-sensitive design practices. However, this project extended the parameters of past initiatives/experience especially for the design of a secondary road. The 'client' certainly 'did not want a flat straight road'. The preliminary design for the first segment underwent significant revision as the designers began to appreciate the full extent of the client's requirements. In order to preserve and protect the natural environment and create a built roadway environment that was to be esthetically pleasing design speed, roadway geometric features and natural materials were brought together. Some of the built features that look simple are made possible by using geotechnical design methods and special materials that cannot be seen. The photographs that accompany this case study show the results of this extraordinary roadway development effort.

Route Diagram and Photographs: *(see attached)*

Information Contact(s):

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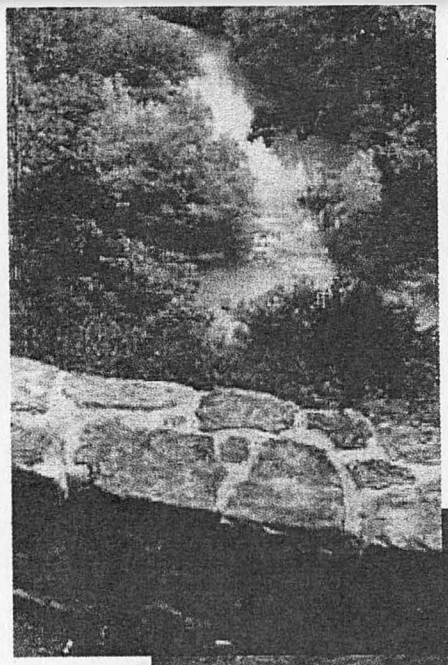
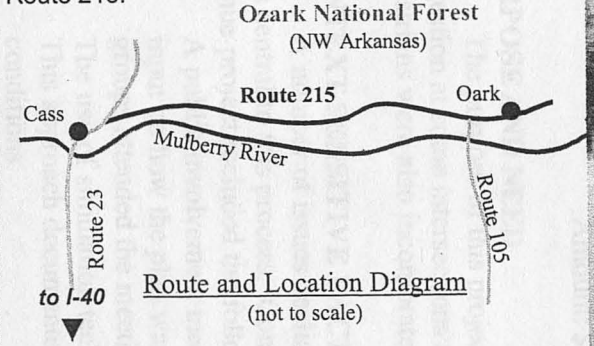
Eastern Federal Lands Highway Division (FHWA)
703 404-6315

Ozark National Forest (NW Arkansas)

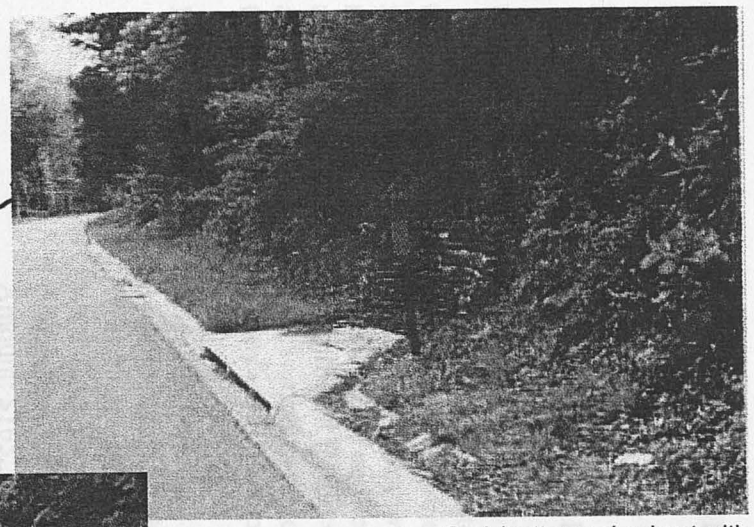
Scenic view of the Mulberry River from overlook on Route 215.



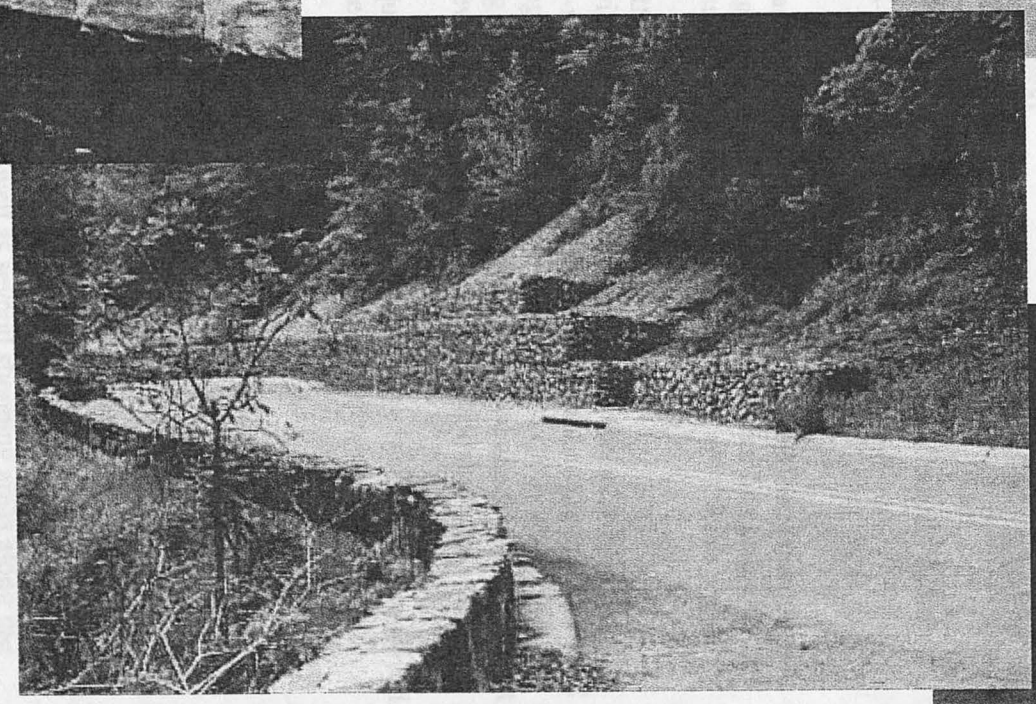
Scenic view of the Mulberry River from overlook on Route 215.



Route and Location Diagram
(not to scale)

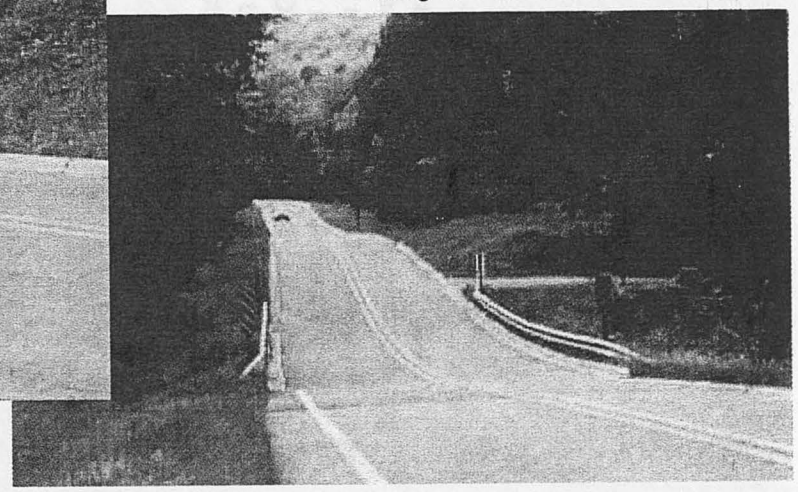


Curb/gutter and culvert with adjacent stone retaining wall.



Masonry stone wall on Mulberry Creek side of roadway and curb/gutter with natural stone gabion embankment on opposite side.

Discontinuous curb and gutter and guard rail section on Route 215.



CONTEXT-SENSITIVE DESIGN CASE STUDY NO. 15
Euclid Avenue - Lexington

LOCATION:

Euclid Avenue (Lexington, Kentucky)

PROJECT DESCRIPTION:

Euclid Avenue is a minor urban arterial and is considered the north boundary of the University of Kentucky campus. The project involved resurfacing and re-stripping of an existing four-lane road into a three-lane roadway with bike lanes over a distance of approximately 0.80 miles. The route serves local traffic and regional commuters, it has a mixed land use of retail and housing, it carries a significant traffic volume (20,000 ADT), it carries significant pedestrian and bicycle volumes, and it is used as the connector between the University and residential areas to the south. There was one construction phase for the project as shown below:

Phase 1
Length: 0.80 miles
Letting: April 28, 2000
Work Start: July 7, 2000
Work Complete: August 10, 2000
Contractor: L-M Asphalt Partners Ltd. And D/B/A Central Asphalt
Amount: $165,335

PURPOSE AND NEED

The purpose of this project was improvement of "mobility" needs of the area due to congestion at some intersections along the corridor. Efforts to improve mobility and safety of pedestrians were also incorporated later as a result of public involvement.

CONTEXT-SENSITIVE FACTORS

A number of issues dealing with public involvement and promotion of multi-modalism were central to this process. Context-sensitive design issues implemented as part of the Euclid Avenue project included the following:

- A public involvement meeting was set up to present the proposed alternative and solicit input on how the plan was viewed by the public. Neighborhood and special interests groups attended the meeting.
- The use of simulation techniques to evaluate possible alternative designs was employed. This approach documented the relative gains from each alternative over the existing conditions.
- Bike lanes along the entire corridor.
- Use of a single corridor for all modes of transportation, i.e. passenger cars, public transportation, bicyclists, and pedestrians. ?

HISTORY OF PROJECT

Euclid Avenue is a minor arterial that serves as a connector between the University of Kentucky and several residential areas to the east and south. The roadway is used both by local residents and commuters residing in various residential developments bordering the University. There is a heavy pedestrian and bicyclist traffic as well as several shopping areas along the

corridor. The road is a state-maintained roadway and funds were allocated for resurfacing. The Kentucky Transportation Cabinet initially envisioned as a solution to the congestion issues the conversion of the roadway to a five-lane road without acquiring any additional right of way. The plan was presented at a public meeting and it faced significant opposition by the neighborhood representatives and special interest groups. Pedestrian and bicyclist needs were not considered and safety concerns were raised due to the narrow width of the lanes proposed. An alternative plan of a three-lane roadway with bike lanes was proposed and the Department of Civil Engineering at the University of Kentucky was asked to perform an evaluation study of the alternatives. The results were presented at a City Council meeting and it was decided to adopt the alternative plan and provide bike lanes along the entire corridor.

HIGHWAY AGENCY INVOLVEMENT

The Kentucky Transportation Cabinet was the funding agency for this project and had a significant involvement beginning with the initiation of the project. Their involvement continued throughout the project and was critical to the evolution of events. Their support to the plan proposed by the public was central to successfully completing the project.

RESOURCE AGENCIES INVOLVEMENT

The Lexington-Fayette Urban County Government (LFUCG) was a stakeholder involved in the decision process. The City Council pioneered the idea of the bike lanes and strongly supported the conversion of the roadway after the presentation explaining the relative gains from each alternative.

COMMUNITY INVOLVEMENT

There was direct community involvement from the beginning of the project. There have been several approaches taken to solicit input from the community, including:

- A public involvement meeting was held with 30 participants where alternative ideas were presented. Solutions provided included a three-lane roadway with landscaped median, pedestrian crossings, and wide sidewalks and a three-lane roadway with bike lanes and landscaped median.
- The presentation to the LUFCG was well attended by the public and comments were collected regarding the importance of the redesign of Euclid Avenue as a more pedestrian- and bicycle-friendly roadway

SIGNIFICANT ISSUES

Urban County Government's Involvement

The Urban County Government's support of the concept was essential in the successful completion of the project. The improvement of the area and development of bike lanes was strongly supported by the neighborhood representatives. Most of the council members endorsed the idea of creating a safe pedestrian and bicyclist environment that would enhance the quality of life of the area surrounding the corridor. The solicitation of ideas and comments from the public was considered essential in the development of a design that would be accepted by the community.

Public Education

An educational campaign was undertaken to promote proper use of bike lanes and increase their use. Newspaper articles were prepared and a pamphlet was developed.

Public Involvement

The public involvement meeting was essential in developing alternative ideas. During the meeting plans were solicited and discussed that changed the focus of he project to addressing mobility needs for all users of the corridor and not only for the automobile drivers. The meeting also demonstrated the flexibility of the Highway Department to accept alternative designs and consider other approaches to improve the corridor.

PROJECT OUTCOME AND LESSONS LEARNED

Key attributes of the Euclid Avenue project were summarized to provide insight into the performance results and how these results differ from other highway projects where the concepts of context-sensitive design were not implemented. Following is a listing of the most prominent attributes of the project and an assessment of the success achieved.

- The flexibility and open mindedness of the Kentucky Transportation Cabinet to consider alternative designs and implement concepts suggested by the public indicated to the public that their opinion is valued and is seriously considered. This level of trust between the highway agency and the public has contributed to more efficient completion and acceptance of other transportation related designs.
- A major emphasis of the project was public involvement and solicitation of comments from various groups of interest.
- The strong commitment by the Urban County Government to develop a bicycle and pedestrian corridor played an important role in completing this project.
- The "road diet" concept (where a roadway with more lanes is converted to one with fewer lanes) has worked very well by reducing speeds without increasing congestion.

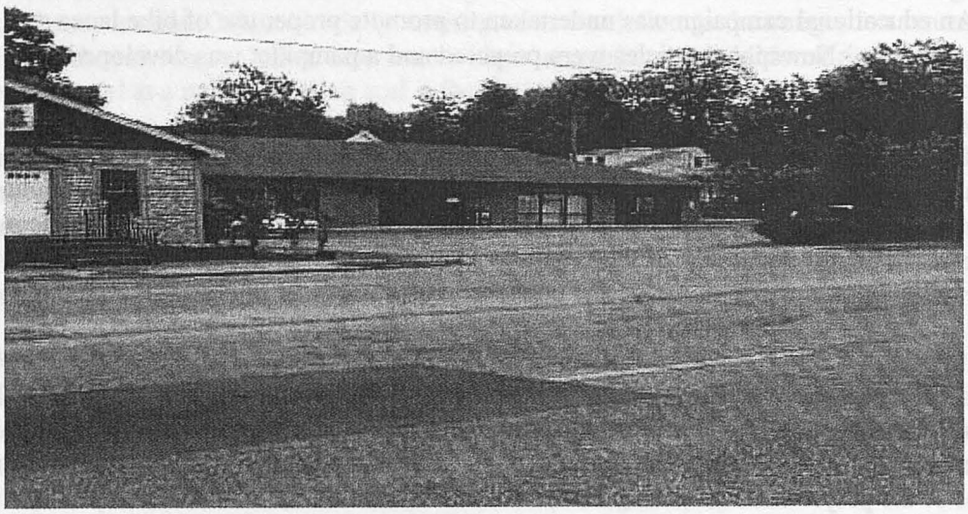


Figure 1. Existing conditions (4-lane with narrow median)

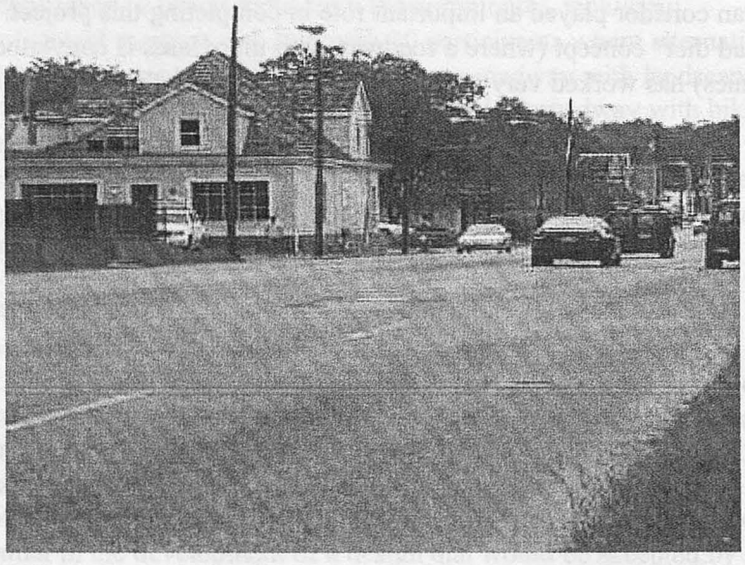


Figure 2. Existing conditions

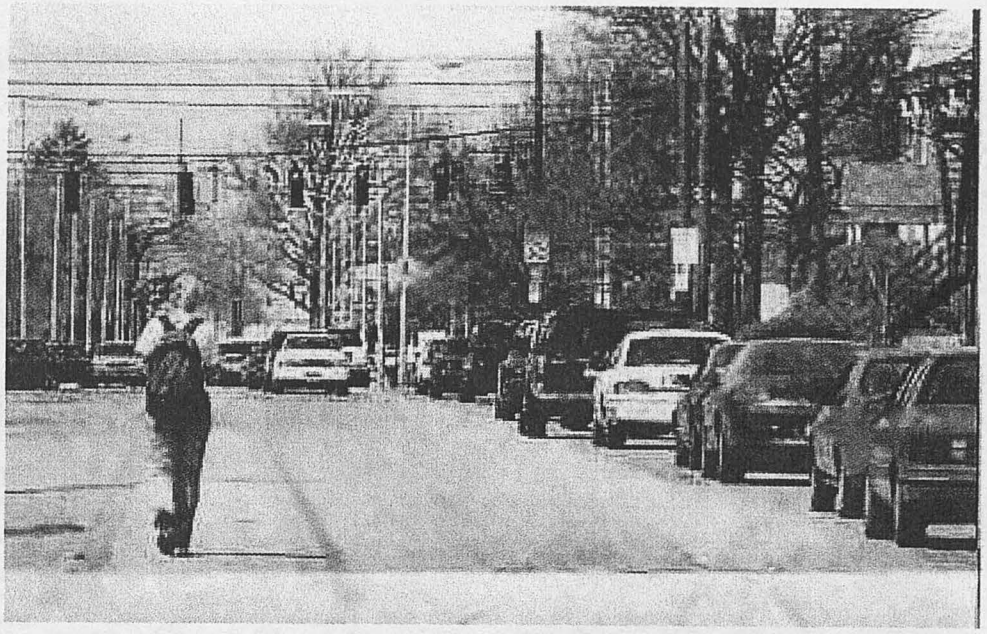


Figure 3. Existing conditions (unsafe pedestrian crossings)

Figure 4. Current conditions (east-bound view)

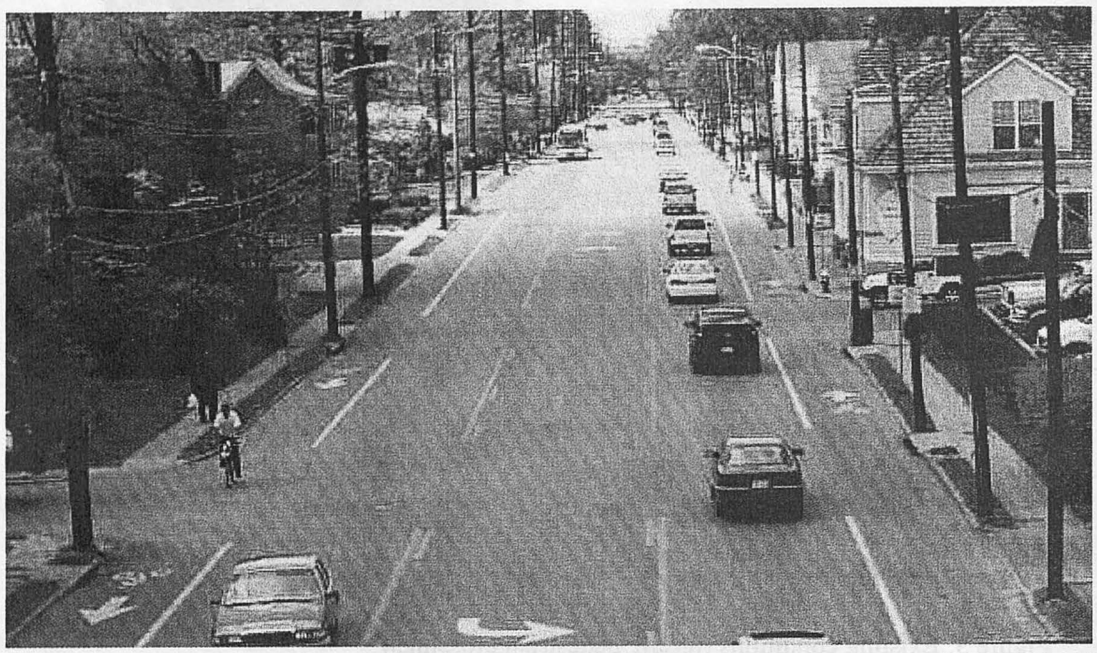


Figure 5. Current conditions (west-bound view)

Figure 6. Current conditions