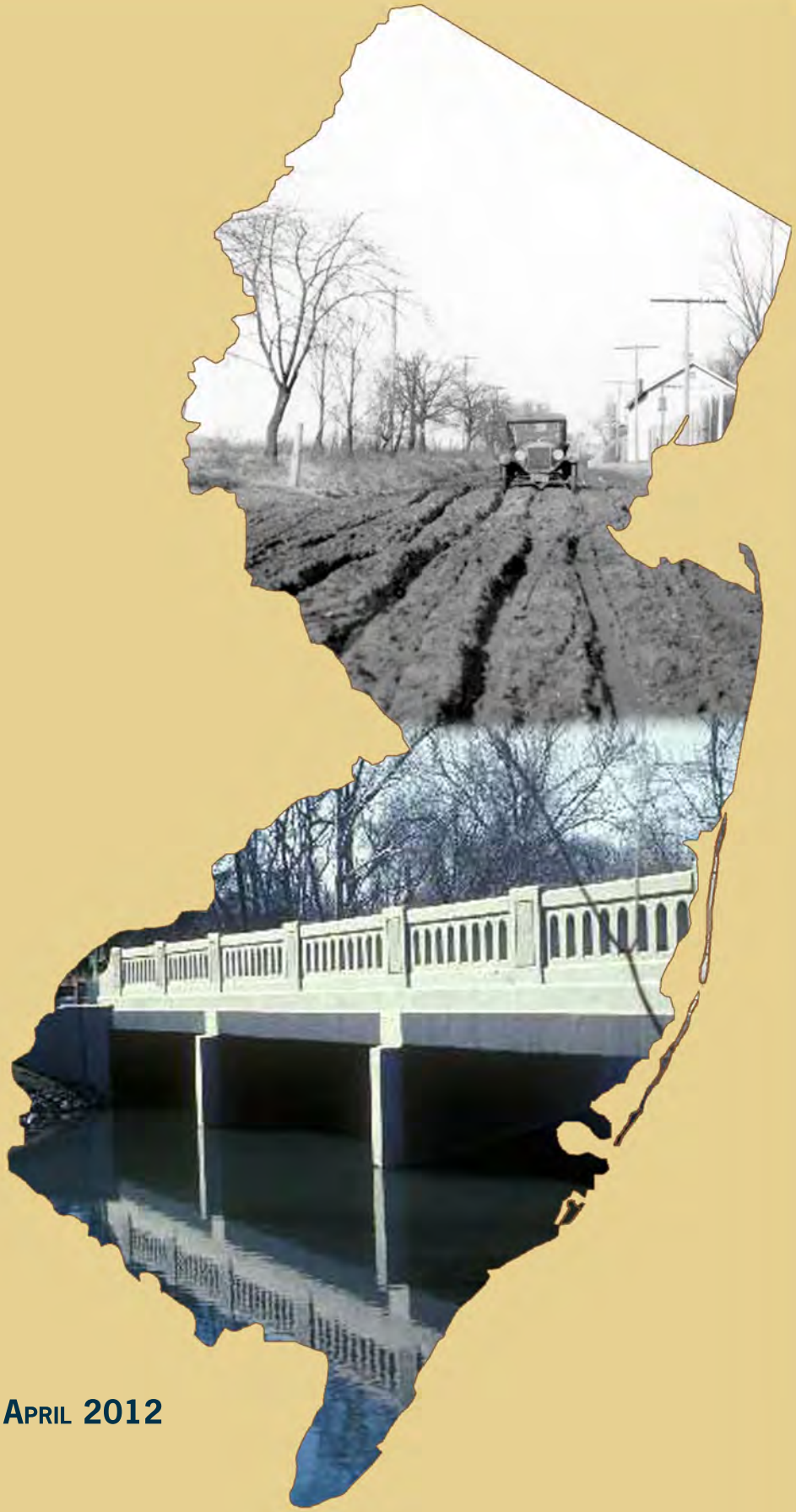
New Jersey Historic Roadway Design Guidelines



Prepared for
New Jersey Department of Transportation
and
Federal Highway Administration
New Jersey Historic Preservation Office

Prepared by
KSK Architects
Planners Historians, Inc.
with
McCormick Taylor, Inc.

April 2012

TABLE of CONTENTS

I. INTRODUCTION

A. HISTORY, PURPOSE AND PREMISE OF THESE GUIDELINES

Responding to an increased national interest in the history and significance of our transportation resources, New Jersey has prepared the *New Jersey Historic Roadway Study* and these associated *New Jersey Historic Roadway Design Guidelines.* This interagency initiative includes the New Jersey Department of Transportation (NJDOT), the New Jersey Historic Preservation Office (NJHPO), and the Federal Highway Administration (FHWA). While the audience for these design guidelines is primarily NJDOT, FHWA, and design consultants, the document will be useful to county and municipal officials to understand the project considerations related to historic roadways and to consider design approaches that can achieve project goals while protecting New Jersey's historic roadways.

In recent years, transportation agencies have been designing roadway facilities that respond to the special needs of the infrastructure and to the communities in which they are located. Indeed, design guidelines have been prepared to encourage an approach that is sensitive to historic roads and their surroundings, such as *Flexibility in Highway Design* and the forthcoming *Developing Design Management Guidelines for Historic Road Corridors* (NCHRP 25-29A). Locally, the NJDOT has published *A Special Look*, which showcases context sensitive solutions used for specific projects, and prepared a Toolkit for internal use that catalogues a broad range of design solutions. The *New Jersey Historic Roadway Design Guidelines* were written to bring the principles of these tools together to guide design choices when initiating work on the state's historic roads.

The fundamental premise of the *New Jersey Historic Roadway Design Guidelines* is that the road itself, inclusive of the travel surface, shoulders, traffic control devices or other related features, is a cultural resource. Just as old buildings or wilderness areas may have certain features or characteristics that make them unique and worth saving, so do historic roads. Historically significant (or "historic") roadways include all important aspects of the road structure, as well as related roadway and roadside elements. Roadway elements are generally those items within the toe or top of slope that lend to the functioning of the road and were part of the road's historical design (e.g. culverts, milestones, retaining walls); roadside elements are those items generally outside the right-of-way that relate to the significance and historical setting of a roadway (e.g. taverns, filling stations, landscaping).

These guidelines offer recommendations to avoid or minimize adverse effects to significant historic roadways. The general approach is based on the U.S. Secretary of the Interior's *Standards for the Treatment of Historic Properties*, which defines approaches to treatment for historic properties (preservation, rehabilitation, restoration, and reconstruction) and acknowledges that other factors, such as historical significance, physical condition, integrity, code requirements, and proposed use, will be considered when making treatment decisions. In summary, the preference is to preserve existing historic material and features. Where this is not possible or materials have been compromised, features can be rehabilitated, restored, or replicated based on documentary or physical evidence. New features should be compatible, but identifiable. The unique issues of historic roads are considerable, and the principles of context sensitive solutions are also employed in these guidelines where appropriate.

Interpretation and implementation of the guidelines will require NJDOT approval, and maintenance and cost factors will contribute to the selection of design strategies. However, upon balancing these other project considerations, the design team of cultural resources professionals, landscape architects, engineers, and other stakeholders will work together to reach a mutually agreeable design decision that is appropriate for the historic road while meeting the needs of the project.

It is the historical significance and physical integrity of roadway and roadside features that convey the importance of a roadway. Not all old roads are historically significant, and not all historic roads can remain unchanged: some roads may have already had their historic features compromised by previous "improvements," whereas others may now pose a serious threat to public safety for a variety of reasons. However, the goal of these design guidelines is to ensure that the integrity of historic roadways is

not compromised needlessly by proposed improvements so that important historic roadway characteristics may continue to be enjoyed by New Jersey residents and visitors.

B. HOW TO USE THESE GUIDELINES

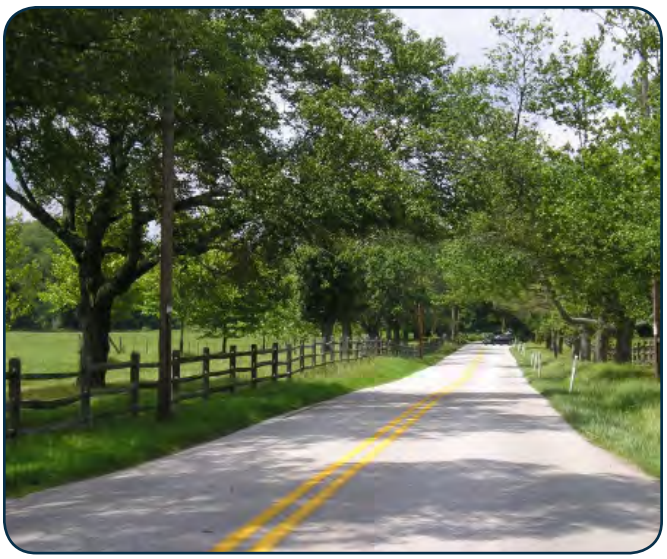
The *New Jersey Historic Roadway Design Guidelines* will improve understanding of the design choices to be considered when changes to a roadway are proposed, and provide recommendations for design options that can minimize the potential impacts of improvements to historic roads. These guidelines cannot resolve all design issues related to historic roadways, and it must be acknowledged that all change will have some consequences, regardless of how it is managed. Creative engineering skills and an understanding of the principles of historic preservation will help designers apply sound engineering principles within a context of the often competing goals of safety and preservation, where preservation and rehabilitation of the historic resource is the starting point for design. Change is inevitable as materials age, technology improves, and public needs evolve. Managing those changes thoughtfully will yield a considered, balanced result, where sometimes doing less will achieve more.

Information and principles in this document are intended to identify appropriate treatment for roadways meeting the Criteria for Eligibility for the National Register of Historic Places (NR). Projects involving roads that do not meet the eligibility criteria may also present an opportunity to incorporate similar aesthetic design elements, thereby enhancing public awareness and appreciation of the history of the roadway. Incorporating the principles of these guidelines will ensure that all improvements to the roadway remain as sympathetic as possible to the historic era with which it is associated, and is consistent with the broader principles of context sensitive solutions that are used to soften sometimes intrusive utilitarian roadway improvements.

This document is divided into five chapters, including a summary of New Jersey's historic roadway eras, design guidelines for roadways and bridges, case studies, and reference materials. The first two chapters provide introductory material and background information, while Chapter 3 walks the user through different design strategies for roadway and bridge elements to examine ways in which road improvement and historic roadway preservation might be achieved. The six appendices provide a glossary, web resources, useful contacts, a summary of federal roadway classifications and New Jersey project classifications, a list of statewide roads of historic significance, and examples of approved design elements (Appendices A-F).

The following paragraphs further explain the purpose and process of each segment of the design guidelines for historic roadways.

- *Project Considerations*: Determine the scope of the proposed project, including problem(s) to be solved, potential alternatives, and project constraints. The section presents ideas to consider as transportation problems and potential solutions are analyzed.
- *Determine the status of the roadway to be improved*: Consult Appendix E of these design guidelines to verify whether the roadway has been determined to be of statewide historical significance. The *New Jersey Historic Roadway Study* may also be consulted to gather additional information. NJDOT and NJHPO staff should also be consulted to resolve whether the roadway has been determined to be significant since the completion of the *New Jersey Historic Roadway Study* (KSK Architects Planners Historians, Inc., 2011), or whether the roadway may have local significance. Further, the historic era of the roadway's development should be established to anticipate the potential historical characteristics



Historic split-rail fence, Chester County, PA. (Courtesy of KSK Architects Planners Historians, Inc.)

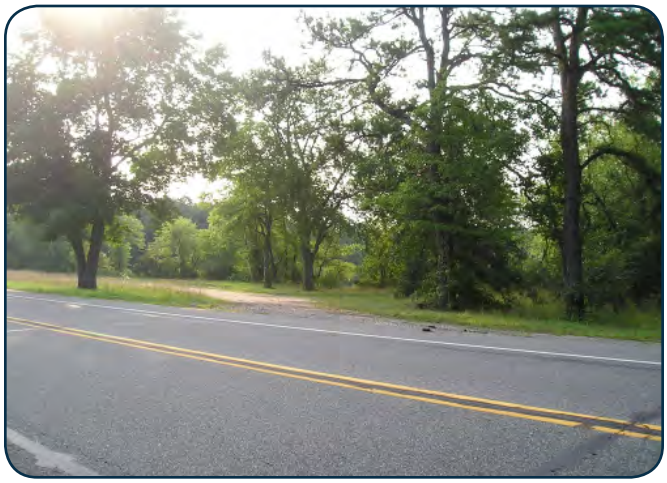
of the roadway and the kinds of historic features that may exist in the project area and be affected by the proposed project.

- *Identify Historic Roadway Elements*: Roadway elements are those historic features associated with the construction and functioning of the road. Roadway elements might include bicycle and pedestrian facilities, traffic control devices, bridges, tollgates, embankments, milestones, guide rails, paving, or parking.
- *Identify Historic Roadside Elements*: Roadside elements are those features, often located outside the right-of-way, that relate to the use of the corridor by travelers. Roadside elements might include motels, fencing, millponds, farmstands, hitching posts, taverns, or billboards. A field visit, preferably with NJDOT cultural resources staff or their qualified cultural resource management consultant, should be undertaken during project planning to identify these roadway and roadside elements in the proposed project vicinity.
- *Identify Appropriate Preservation Design Strategies*: Based upon the historic character of the roadway, extant historic roadway and roadside elements, and the nature of the proposed project and its potential impacts to the historic features and character of the corridor(s), identify preservation design strategies that would avoid or minimize impacts to the historic features and character of the roadway(s) while achieving project goals. This takes into account that different levels of preservation will be feasible depending on the project, and for projects that have limited opportunities for preservation, there are strategies for designing within the context of the historic surroundings.

These guidelines should be consulted early and often during project development and design. Guidance presented herein will have the greatest impact when incorporated into the development of problem statements or other project identification analyses developed in preparation for proposing roadway improvements or new construction. Additionally, initial consultation with NJDOT cultural resources staff and the staff of the NJHPO should occur at this early stage for general guidance.

C. SECTION 106 CONSULTATION

Because most projects sponsored by the NJDOT have some sort of federal involvement (i.e. FHWA funding, Army Corps permit, etc.), NJDOT and FHWA must consult with NJHPO per Section 106 of the National Historic Preservation Act (as amended). The State Historic Preservation Officer resides in the NJHPO in New Jersey. Under the regulations implementing this legislation (36 CFR 800), federal agencies must consider the impact of their project on historic resources, which include buildings, sites, districts, objects, and structures eligible for or listed in the NR.[1] Significant historic roadways are often treated as historic districts.



Rustic pull off area on the Rockefeller Memorial Highway (Route 70). (Courtesy of NJDOT.)

The Section 106 consultation process includes

- identification of an area in which the project may impact historic resources ("area of potential effect" or APE);
- the identification of potential historic resources in the APE and evaluation of their eligibility for the NR;
- assessment of the project's impacts on NR listed or eligible resources; and,
- if the project will impact those characteristics that qualify a resource for the NR, consideration of ways to avoid, minimize or mitigate adverse effects.

[1]Certain New Jersey laws and permits call for similar project review and consultation, such as New Jersey Executive Order 215, state Freshwater Wetland permits, Coastal Area Facility Review Act (CAFRA) permits, and Highlands Preservation Area approvals.

Throughout this process, the public must be invited to provide information and consult regarding project impacts to cultural resources in a manner appropriate to the project.

This process provides a mechanism to consult with interested parties and review agencies to determine the best design solutions to satisfy the needs of the project while protecting the important characteristics of our irreplaceable historic resources. Related but separate legislation known as "Section 4(f)" serves a similar purpose, and requires an analysis of design alternatives to determine the most prudent and feasible alternative that will result in the least harm to historic and other types of resources.[2]

These design guidelines and related documents are intended to give roadway project designers a framework for thinking about projects and selecting design solutions that are appropriate to historic roadways and their surroundings. This will result in projects that use appropriate design tools that have proven efficacy in the field, while fulfilling the principles of historic preservation and thus achieve a more efficient Section 106 consultation process.

For example, a portion of the Rockefeller Memorial Highway (Route 70) is a NR eligible historic district. Its main character-defining features are its native vegetation, broad vegetated clear zones with undulating edges, limited access, and lack of development visible from the road, among others. Any proposed improvements should preserve and/or be compatible with these characteristic features that make this corridor significant. New projects that adhere to these design features will have the most favorable outcomes in the Section 106 consultation process.

D. IDENTIFYING HISTORIC ROADWAYS

Historic roadways are generally those considered eligible for or listed in the NR. To be eligible for the NR, a resource must be historically significant, and must also retain historical integrity – i.e., be able to convey the period and nature of its historical importance. This section briefly describes the process undertaken to identify historic roadways in New Jersey.

1. Historical Significance

Prior to drafting these guidelines, the tri-agency initiative (NJDOT, NJHPO, and FHWA) undertook an extensive study to identify historic roads of statewide significance in New Jersey. Consideration was given to both NR criteria (See "Eligibility" in Appendix A: Glossary) for historical significance and criteria more specific to the state of New Jersey, including whether

- the roadway contributed to the broad patterns in New Jersey's history and made a significant contribution to overall growth and development of the state;
- the roadway had regional or inter-regional importance and linked major population or political centers or destination points within or outside the state;
- the roadway was directly and clearly associated with a recognized historic place or person; and/or
- the roadway represents a significant type or period of roadway building technology, or represents master craftsmanship.

The study concluded with the identification of a number of historically significant roads. These fell into four relatively distinct "Eras:"

- The Early Roads Era (ca. 1621 to ca. 1815),
- The Internal Improvements Era (ca. 1790 to ca. 1889),
- The Good Roads Era (ca. 1870 to ca. 1917), and
- The Highway Era (ca. 1891 to ca. 1947).

A brief discussion of these eras is included in Chapter 2 of these guidelines. The full results of research undertaken, including specific criteria for evaluating roadway significance and a list and location map of historically significant roads in New Jersey, are included in the document entitled *New Jersey Historic Roadway Study*. Consideration of locally significant roadways was outside the scope of the study; however, the agencies acknowledge that roadways of local importance may also be eligible for the NR. This should be considered during project planning and the identification of potential historic resources during the Section 106 consultation process.

[2]Section 4(f) of the U.S. Department of Transportation Act of 1966, as amended [49 U.S.C. 303(c)], seeks to limit the use of certain types of resources in transportation-related projects, such as NR listed and eligible properties, publicly owned parklands, and wildlife refuges. The purpose of a 4(f) analysis is to evaluate all potential alternatives to the "use" of 4(f) resources as defined in 23 CFR 774.17 so that the prudent and feasible alternative that avoids or imposes the least harm to 4(f) resources is selected as the "Preferred Alternative."

Given the scope of the task, the earlier study was unable to fully evaluate the NR eligibility of each historic road identified. The incomplete status of this evaluation is clear in the *New Jersey Historic Roadway Study*, and should be considered during project planning and development. Roadways identified as significant in the Study may require additional effort to fully evaluate their historical significance and integrity to verify their NR eligibility.

2. Historic Resource Integrity

Few roads in New Jersey older than 50 years remain as they were built. Most have been altered with new surfaces, drainage systems, grade changes, and/or safety features since their original construction. Some have been widened, had bridges replaced, or their alignments altered. In addition, the surrounding buildings or landscape may have changed, and almost certainly, the type and intensity of road use has changed. Usually historic roads with the greatest integrity, particularly those from early eras of development, are roadways that have been bypassed or removed from the state system. Thus, the historic character of an old roadway can vary widely. The National Park Service will only list a historic resource in the NR if, in addition to having historical significance, it has retained its historic "integrity." An assessment of "integrity" usually requires the input of a cultural resources specialist, but in general terms there are seven aspects of integrity as listed in the National Park Service's *National Register Bulletin 15: How to Apply the National Register Criteria for Evaluation*.

- *Association*: whether the roadway has a direct link with a historic event, place or person. For New Jersey's historic roadways, while Association is important and strengthens integrity, retention of Association alone does not confer NR eligibility.
- *Location*: whether the roadway follows its historic alignment. This is an important design characteristic.
- *Design*: whether the grade, cross slope and other geometric features of the original roadway are still present. This aspect of integrity becomes less important as the age of the road increases.
- *Setting*: whether the original surrounding land use and landscape are still present. Adjacent historic elements should remain.
- *Materials*: whether the original road or structure materials are still present. It is assumed that road materials have changed over time. Original materials strengthen the overall historic integrity.
- *Workmanship*: whether the quality of craftsmanship is consistent. This is not important by itself, but it strengthens overall historic integrity.
- *Feeling*: whether a sense of history, in an aesthetic sense, is present. This is not important by itself, but it strengthens overall historic integrity.

Table 1 illustrates the relative thresholds of integrity that a historic roadway must possess to be considered a resource with integrity within its era of significance.

Table 1: Relative Integrity Thresholds for New Jersey's Historic Roadways.

Era	Association	Location	Design	Setting*	Materials	Workmanship	Feeling
Early Roads	High	High	Medium	Medium	Low	Low	Medium
Internal Improvements	High	High	Medium	Medium	Low	Low	Medium
Good Roads	High	High	High	Medium	Medium	Low	Low
Highway	High	High	High	Medium	Low	Low	Low

*In cases when the road is significant under Criterion A, the integrity threshold for setting changes from medium to high.

For example, a roadway from the Early Roads Era must have high integrity for association and location (i.e. intact historic corridor character and retains historic alignment, whether vertical, horizontal or both), and at least medium integrity of design, setting, and feeling; it may have low integrity of materials and workmanship (i.e. historic road materials and evidence of early workmanship may longer remain or be minimally present). For a road significant under NR Criterion A (for the Early Roads Era, those mandated by the colonial government or linking major population centers, among others), the integrity of setting must be high to be considered eligible for the NR. Only the segment(s) of a significant road meeting the integrity thresholds for its era will be NR eligible.

E. DESIGN EXCEPTIONS

A design exception documents the legal divergence to design a highway segment to a standard that does not meet a minimum established value for that project. The FHWA has defined 13 instances that would warrant a design exception, such as the use of a narrower shoulder or a curve with radius smaller than required for the design speed. To receive a design exception, the reason for the divergence must be documented, an analysis for the proposed design conducted, and it must be identified how safety considerations will be satisfied. While a design exception cannot, or should not, be sought as a matter of course, it is a useful tool to encourage design flexibility when evaluated and applied properly.

In addition to considering a design exception under the criteria of FHWA, the Roadway Design Manual used by the NJDOT should be consulted. The manual lists 15 "controlling design elements" including, but not limited to stopping distances at curves, structural capacity, minimum and maximum grades, lane and shoulder widths, and vertical clearance.

While these design guidelines describe a range of options appropriate for historic roads in New Jersey, they do not cover all possible choices, and not all those put forward can be used as standard procedure. Some design alternatives included in these guidelines are not yet approved for general highway use in New Jersey (noted in the text). Moreover, there are undoubtedly other design options, both in use and as yet not thought of, that could be well suited to resolve specific design issues.

To use any unofficial or "non-standard" design in roadway projects requires special documentation and authorization if a project involves federal funds or permitting. NJDOT can request such authorization as a design exception. For a project involving numbered U.S. highways, the FHWA must approve a design exception. For other state roads, the State can request an exemption from FHWA oversight and avoid such close scrutiny, although this is generally not the preferred approach.

Where a design exception is sought, specific criteria must be documented and justified. These include design speed; lane, shoulder and bridge width; structural capacity; horizontal and vertical alignment; grade; stopping sight distance; cross slope; superelevation (road banking around curves); vertical and horizontal clearances; intersection sight distance; auxiliary lane length and through-lane drop transition length. Consult with appropriate NJDOT staff if a design exception might be an appropriate project tool to preserve a historic road and satisfy project needs.

II. NEW JERSEY'S HISTORIC ROADWAY ERAS

The *New Jersey Historic Roadway Study* identified four historical eras of road development in New Jersey, spanning the earliest period of European settlement through the mid-twentieth century. This chapter summarizes the historical context of each era, and provides a brief description of historical design characteristics from each era that may remain in the field. These characteristics contribute to the integrity of historic roadways, and should be preserved in new roadway projects, where possible.

All roads constructed prior to 1947 can be attributed to one or more of the following eras:

- Early Roads Era (ca. 1621 to ca. 1815),
- Internal Improvements Era (ca. 1790 to ca. 1889),
- Good Roads Era (ca. 1870 to ca. 1917), and
- Highway Era (ca. 1891 to ca. 1947).

Each era highlights a unique approach to road building, but the four eras significantly overlap each other. Many roadways exhibit characteristics of multiple eras, and may require more detailed study to assess the integrity of the resource and evaluate appropriate treatments. Because roadways may reflect multiple eras of development, these design guidelines have focused on identifying and describing specific "design elements" or features of roadways and roadsides that are often found in one or more of the historic eras.

The design elements have been roughly grouped into five subject areas:

- The road itself, such as roadway geometry, grade, clearance, curbs and sidewalks;
- Major structures, such as bridges and retaining walls;
- Traffic management, such as pavement markings, signs, traffic control devices, and intersections;
- Roadside development, such as adjacent housing and picnic areas; and
- Landscaping.

The *New Jersey Historic Roadway Study* identified roads in New Jersey that are of statewide significance within the context of each era (Appendix E). When a roadway has been identified as having historical significance, this chapter should be consulted to determine which historical era is most relevant. More detailed information can be found in the *New Jersey Historic Roadway Study*. Consultation of the relevant chapter(s) in these guidelines will aid designers in considering design choices appropriate for each roadway era.

The *New Jersey Historic Roadway Design Guidelines* focus on treatments that would be appropriate for transportation projects involving historic roadways. The description of roadway design elements in these guidelines is by no means exhaustive. It is recommended that where there is doubt about the relevance of a particular design element associated with a historic roadway, assistance beyond these guidelines should be sought. See Appendices B and C for useful websites and contacts.

A. THE EARLY ROADS ERA (CA. 1621 TO CA. 1815)

During most of the Early Roads Era, nearly all long distance travel was by water. Those roads that did exist were little more than short dirt tracks and trails that connected farming areas or settlements to a landing on the nearest navigable river. Traffic generally consisted of people on foot or horseback. Roads did

Route of Old Mine Road, Walpack Township, Sussex County, date unknown. (Courtesy of NJDOT.)

not usually follow a straight line because private property rights generally took precedence over ease of travel. Using these roads for transporting people (for goods of any volume were rarely transported overland) was subject to the vagaries of the weather. Except during winter when the ground was frozen, local tracks were often too boggy to use. Roads were frequently impassable and poorly maintained.

Corduroy roads were usually the first serious improvements made to local overland routes (other than simply widening them to allow two horses to pass). This primitive road making technique involved cutting down trees into short lengths and laying them close together across longitudinal wood sleepers, similar to railroad tracks. With a thin layer of dirt on top, they provided a more stable surface for horses and carts, particularly where the land was very swampy.

There was a significant increase in the use of wheeled vehicles during the latter half of the eighteenth century despite British discouragement of inter-colonial trade. The first public stagecoach service in New Jersey was started in 1772. With the exception of several roads across the "waist" of New Jersey connecting young America's two largest cities, New York and Philadelphia, the primary means of travel was still by water. Even during the latter years of the Early Roads Era, after the American Revolution, there were few bridges over any rivers. Therefore, travel by boat was often a component of travel between New Jersey and other colonies.

The path of Old Cape Road among the trees of Belleplain State Forest, Cumberland County, 2002. (Courtesy of NJDOT.)

It took the War of 1812, when British coastal blockades forced heavy use of existing overland routes to move American troops and goods, for the public to understand how poor the regional road system really was.

Physical evidence of the Early Roads Era is limited, but the possibility should not be discounted. Below is a brief list of roadway and roadside design elements that may still exist. For a more complete description, see Tables 2 and 3 (page 16), and the *New Jersey Historic Roadway Study*.

- Roadway elements that might still be visible include drainage improvements and sections of road cut or fill.
- Major structural elements might include bridges, culverts, retaining walls, and dams that form part of the roadway.
- Traffic management elements might include milestones, water troughs, and hitching posts.
- Roadside development elements might include roadway related buildings (such as taverns, stagecoach stops, blacksmith shops, ferry landings), crossroad communities, houses, farms, mills and millponds, and commercial signs.
- Landscape elements might include old trees, ground cover, hedgerows, fences, and stone walls.

B. THE INTERNAL IMPROVEMENTS ERA (CA. 1790 TO CA. 1889)

The first serious road builders in America were private companies that recognized that the public might be willing to pay a toll to use better roads. At this time there was still little federal or state interest in road building. Most communities had their own "road supervisors" to look after local roads. Most states, including New Jersey, passed charters to enable private road development on a

larger scale. Few major roads were publicly financed during this period because local road taxes were applied to relatively short local road-building efforts.

One of the first privately financed roads in the United States was Lancaster Pike in Pennsylvania, built in 1792. This was the first road in the Western Hemisphere to use hard packed multi-layered gravel as a road surface (the original macadam, which did not use oil). New Jersey's first turnpike was chartered less than 10 years later; by the end of the 1820s, the state had 550 miles of improved toll roads.

In the 1830s, long distance freight traffic carried by the toll roads began to move to the new canal system. Two major canals in New Jersey, the privately financed Morris Canal and the Delaware and Raritan Canal, crossed the breadth of the state. During the next decade both the canals and the toll roads began to lose all their long distance traffic to the burgeoning railroads. Whereas toll road and canal operations were often seasonal due to weather conditions, railroads generally operated year round.

There was a brief revival in turnpike construction during the 1850s with the introduction of a Canadian form of road building using wooden planks. As the train network spread across New Jersey, however, toll roads gradually lost profitability, were abandoned, and then ultimately taken over by the state.

Physical evidence of historic roads in New Jersey from the Internal Improvements Era is also fairly limited, but the following is a brief list of roadway design elements that may still exist. For a more complete description, see Tables 2 and 3 (page 16), and the *New Jersey Historic Roadway Study*.

- Roadway design elements still visible might include road surfaces (gravel, macadam, oyster shell, slag iron and planks); single lane roads with high crowns; drainage improvements; and sections of road cut or fill.
- Major structural design elements might include bridges, culverts, retaining walls, and dams that form part of the roadway.
- Traffic management design elements might include tollgates, milestones, water troughs, hitching posts, and gas street lighting.

Morris Turnpike, Lopatcong Township, Warren County, after improvements, date unknown. (Courtesy of NJDOT.)

- Roadside development elements might include roadway related buildings (such as toll houses, taverns, stagecoach stops, blacksmith shops, ferry landings), houses, farms, mills and millponds, and commercial signs.
- Landscape design elements might include old trees, ground cover, hedgerows, fences, and stone walls.

Paterson and Hamburg Turnpike, abandoned section in Wawayanda State Park, Passaic County, circa 2003. (Courtesy of NJDOT.)

Route 45 bridge over Woodbury Creek, Woodbury, Gloucester County, 1954. (Courtesy of NJDOT.)

C. THE GOOD ROADS ERA (CA. 1870 TO CA. 1917)

Public interest in improved roads was stimulated in the last quarter of the nineteenth century largely due to the concerted efforts of, among others, farmers, progressives, and the League of American Wheelmen and other bicycle enthusiasts, some of whom were also important public figures. Early in this period, bicycling became a widely supported form of public recreation, and roads were initially improved to meet the new demand. The spin-off benefits of the improvements, however, such as better market access for farmers (and thus lower food prices), higher property values, and lower taxes, were immediately recognized by others.[3]

Until this time, development nodes outside major cities had been largely limited to the immediate vicinity of train stations along narrow rail corridors. The new road improvements introduced the practicality of large-lot, single-family, suburban development while also benefiting a declining farming industry.

During the first two decades of the twentieth century, use of the automobile joined and then overtook use of bicycles and carriages for travel. Weekend recreational trips to the shore and other attractions drove the demand to continue building and improving roads.

At the time, most rural roads consisted of one eight-foot travel lane made of gravel or stone with shoulders for passing. More heavily trafficked areas sometimes had sections of roadway twice this width to allow for continuous passing.

The introduction of motor vehicles on roads initially built for lightweight bicycles and carriages accentuated the limitations of packed gravel as a road surface. Thus began early experimentation with other road surface treatments including salt and water, calcium chloride, shells, diluted coal-tar products, and crude oil. The practice of excavating and replacing unstable road material to provide a more permanent roadway foundation also began at this time.

During this time the use of design standards for road construction was introduced, and the federal government became involved in funding small demonstration road building projects to show how to build better roads. Probably the most significant advancement, however, was the beginning of state and county funding for public road improvements, including bridges.

Physical evidence of Good Roads Era historic roads in New Jersey is more common than from earlier eras. The following is a brief list of some road design elements that may still exist. For a more complete description, see Tables 2 and 3 (page 16), and the *New Jersey Historic Roadway Study*.

- Roadway elements might include road surfaces (macadam, concrete, tar, block, brick, wood, crude oil, and others), shoulders, curbs, sidewalks, drainage improvements, and sections of road cut and fill.
- Major structural elements might include bridges, culverts, retaining walls, and dams that form part of the roadway.
- Traffic management elements might include tollgates, milestones, guide rails, pedestrian refuge islands, traffic control devices, and street lighting.
- Roadside development elements might include gates houses, old roadway oriented buildings (such as accommodation, restaurants, service and filling stations,

[3]Financing for road projects was traditionally raised by local and county taxes. Once the state took over road improvements, the broader statewide tax base could support roadway projects, resulting in a lower local tax burden for individual property owners.

and stores), houses, farms, water troughs, hitching posts, mills and millponds, and commercial signs.

- Landscape elements might include trees, ground cover, hedgerows, sculpted landforms, fences, and walls.

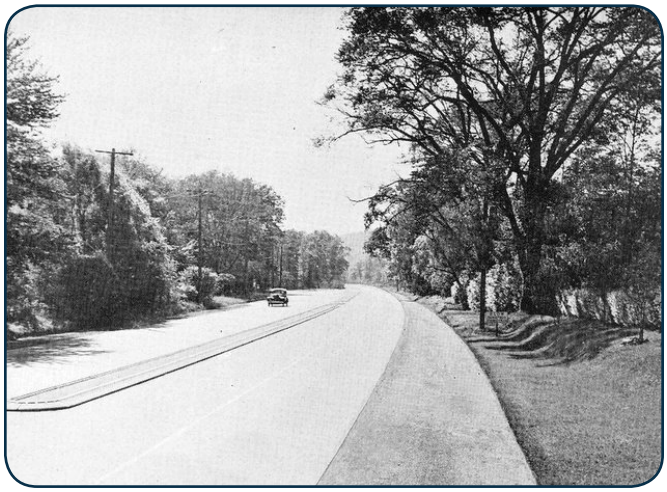
D. THE HIGHWAY ERA (CA. 1891 TO CA. 1947)

The most recent historic roads era in New Jersey, the Highway Era, began with the State's passage in 1891 of pioneering legislation known as the State Aid Highway Act. This act got the State directly involved in funding public roads for the first time. By 1912, the State had drawn up a plan for a 1,350-mile network of existing and new roads to form a state highway system and was beginning to establish statewide road design standards.

By the time the federal government had added its own funding to initiate a nationwide state highway system in 1917 (modeled on the original New Jersey legislation), New Jersey had already designated 15 routes across the state to form its highway network and had set up the New Jersey Highway Department to undertake its own highway improvements. Prior to this, nearly all road building had been undertaken by county and local governments and toll companies.

During the Highway Era, the size of roads changed significantly to handle ever-growing business and recreational traffic. Roads went from a standard width of only one lane (usually only eight or nine feet wide) at the turn of the century to as many as four lanes (with rights of way 100 feet or more) by the 1930s. Traffic control devices such as stop signs, traffic signals, traffic striping and markings, guide rails, traffic circles, bypasses and grade-separated intersections were all introduced and perfected during this time. Other improvements to existing roads included modifying sharp curves, widening traffic lanes, reducing steep grades and reducing the number of grade crossings.

There was also increased attention paid to roadway aesthetics, including the introduction of landscaped parkways, the use of contoured and landscaped road edges, and the preservation of (usually rural) scenic areas through which the road passed.



Route 29 between Mountainside and North Plainfield (Union and Somerset counties), designated "Blue Star Drive" by the state legislature after World War II in honor of the state's veterans, date unknown. (Courtesy of NJDOT.) Note the center median, wide shoulders, and scenic landscaping.

Palisades Parkway, view north toward New York state, 1961. (Courtesy of NJDOT.)

Note the gravel shoulders along Route 31, Hunterdon County, 1959. (Courtesy of NJDOT.)

The Highway Era is not noted for the development of new roads, although there were some, including the Pulaski Skyway, the Palisades Parkway and the Admiral Wilson Parkway. Roadwork during this period primarily involved the improvement and alteration of existing roadways to accommodate new functions. The following is a brief list of roadway design elements that may be evidence of a road built or modified during the Highway Era. For a more complete description, see Tables 2 and 3 (page 16), and the *New Jersey Historic Roadway Study*.

- Roadway elements might include road surfaces (macadam, concrete, asphalt), shoulders, divided highways, curbs, sidewalks, drainage improvements, and major road cut and fill.
- Major structural elements might include bridges, culverts and retaining walls.
- Traffic management elements might include guide rails, medians, traffic circles, bypasses, pedestrian refuge islands, channelized lanes, traffic control devices, and street lighting.
- Roadside development elements might include roadway oriented buildings (such as motels, motor camps, produce stands, restaurants, service and filling stations, auto showrooms, and other strip development), housing clusters, farms, mile markers, commercial signs/ billboards, parking areas, drive-in theaters, comfort stations, maintenance facilities, bus shelters, picnic areas, scenic overlooks, and viewsheds.
- Landscape elements might include trees, ground cover, hedgerows, sculpted land forms, embankments, fences, and walls.

III. DESIGN STRATEGIES FOR HISTORIC ROADWAYS

A. PROJECT CONSIDERATIONS

While safety and level of service are of paramount consideration to all roadway users, from a historic preservation perspective, retaining a historic resource's character-defining features along the roadway and roadside is essential. The decisions made about what to preserve affect not only the integrity of the historic roadway, but also a community's sense of place. To aid in identifying historic roadway and roadside features that should be considered for preservation, Tables 2 and 3 (page 16) list typical roadway and roadside features. The design strategies recommended to retain the historic fabric of significant roads and their context are described later in this chapter, organized by type of feature: Road; Shoulders; Noise Walls; Traffic Control Devices; Sidewalks/ Pedestrian Crossings; Lighting/Street Furniture; Landscaping; Signage; Structures/Bridges; and Roadside.

The need for roadway or bridge projects can arise for a number of reasons such as general wear, the accommodation of other transportation modes, or to support increased traffic volume. Projects that alter existing roadways or bridges have significant potential to impact historic resources, both within the historic roadway and along the roadside. As proposals for improvements are developed, larger issues of traffic management, land use, and understanding of local physical contexts and community aspirations should be part of the project planning dialogue. Among the factors to consider:

- How will the NJDOT work with the municipality on the proposed project?
  - Does the municipality have a department, commission, or consulting firm that addresses historic resource, landscape, or urban design issues?
  - Does the municipality in which the work is proposed have streetscape or historic district design guidelines that may be helpful in considering historic or context sensitive treatments to the roadway and roadside?
  - Are there land use planning tools or policies that would alleviate the need for new or reconstructed roads or bridges?
- Are there project alternatives that would avoid or minimize the need for the roadway or bridge project?
  - Consider the feasibility of synchronizing traffic signals, adding new signals or signs, or changing posted speeds in the surrounding area, which may maintain or improve the vehicular level of service and minimize or delay the need for a new or expanded road or bridge.
  - Consider whether directional or other route signage (e.g. identification of truck routes) would alleviate problems identified in the project problem statement.
  - Consider reducing the number or width of lanes proposed, which can preserve historic resources such as an existing bridge, or allow for new features such as wider shoulders, bicycle lanes, sidewalks and medians, turning lanes, or parking while maintaining the existing road width. For example, CalTrans in its 2005 publication, "Main Streets: Flexibility in Design and Operations," states that reducing the number or width of lanes is a traffic calming measure that may result in decreased speeds and fewer collisions.
  - Consider whether re-striping the existing road or bridge will provide the desired additional lane width needed.
  - Consider whether additional capacity could be added to nearby, non-historic roadways or bridges.
  - Consider whether upgrades or alterations to a nearby non-historic bridge, or construction of a new bridge on a new alignment, would satisfy capacity concerns. A new bridge could provide duplicate traffic capacity or allow for space for multiple modes of travel.
  - Consider whether it is appropriate to change the road's functional classification, for example from "collector" to "local," to match user needs in the area with the appropriate road capacities and technical requirements of the functional classification.
  - Evaluate whether a change in land use is the cause for the project. If land uses with additional trip generators are proposed near the roadway, a land

COMPLETE STREETS

Complete Streets is a relatively new movement in the transportation field that strives to safely integrate a multi-modal roadway network for users of all types, ages, and abilities, including pedestrians, cyclists, transit riders, and motorists. A complete street could take on many forms depending on the context of the community, such as rural, suburban, or urban, or commercial or residential settings. Elements that may be seen in a complete street include travel lanes with wide shoulders, median islands, curb bump outs, wheelchair ramps, frequent crosswalks, pedestrian signals, transit shelters, designated bus lanes, bicycle lanes, and sidewalks.

Numerous benefits are associated with implementing complete streets tools, such as improving safety, reducing congestion, encouraging walking and biking, lowering transportation costs when given more traveling options, and contributing to more livable communities through safer, more walkable networks. Complete streets may also become "green streets" when certain technologies are employed to reduce the stormwater run-off from impervious materials. For example, asphalt and concrete pervious pavers can be used, travel lanes can be narrowed to accommodate bike lanes or wider sidewalks, rain gardens can absorb some run-off, and materials that reduce pavement reflectivity can be used to reduce the urban heat island effect or improve nighttime illumination.

New Jersey adopted a Complete Streets policy in December 2009 to ensure that transportation planners and engineers consistently design, construct and maintain state or federally funded roadways to provide safe access for pedestrians, bicyclists and transit users of all ages and abilities. This policy supersedes the NJDOT's prior Bicycle and Pedestrian policy that had been in use since 1989. In 2010, Montclair was the first municipality in New Jersey to adopt its own Complete Streets policy, and the NJDOT is examining the feasibility of an incentive program for other municipalities to follow that example. When implementing work that falls under Complete Street policy guidelines, these *New Jersey Historic Roadway Design Guidelines* should also be consulted.

use analysis would determine whether the change should be permitted.

- General preservation principles for projects where historic roadway or roadside features are present:
  - Retain and preserve character-defining features of the historic resource consistent with its period of significance. For example, for a project along a significant road from the Internal Improvements Era, historic features such as toll gates, retaining walls, or milestones should be preserved.
  - If the historic resource's character-defining feature must be disturbed, document the elements in place in accordance with appropriate standards as agreed to by the NJHPO and NJDOT cultural resource professionals.
  - Restore, rehabilitate, or replicate deteriorated historical elements, based on historical documentation or remaining features. Do not execute historical interpretations if no evidence of that material or feature exists.
  - In instances where historic features must be removed, consider the reuse or retrofitting of character-defining features along the new roadway in another appropriate location, or if historical documentation supports it, along another section of the historic roadway.
  - If a new feature that does not have historical documentation or precedent is proposed along a historic roadway or bridge, the new feature should be designed to be compatible with the roadway and its setting, but distinctly non-historic. It may be appropriate to assess how the new feature may become more "transparent," such as through the use of material, scale, and color or, in some cases, it may be appropriate to consider what type of feature is used on similar roadways in the vicinity for design guidance.
  - New roadway or bridge elements should be compatible with, but distinct from, the historic

setting, including materials, features, proportion, and scale.

- General principles for projects where no historic roadway features are present but the historic setting remains:
  - Use materials, features, and proportions that are consistent with the setting.
  - Investigate paving materials, lighting, street furniture, landscaping, bridge span types, parapet designs, and other design features used on similar roads in the vicinity, assessing their compatibility with the setting and needs of the proposed project.

Roadway materials and devices should meet the appropriate FHWA design standards such as the Manual on Uniform Traffic Control Devices and the AASHTO road sign design guide. However, consultation with the NJDOT, project stakeholders, and FHWA may identify appropriate project alternatives.

B. IDENTIFY ROADWAY ELEMENTS

Roadway elements that contribute to a particular historic era should be preserved. Certainly no road will have all of the items that appear in Table 2, and some roads might have historic elements not identified here. However, if a roadway element will be impacted by the project, avoidance or minimization of harm to the feature is recommended. As a last resort, the design team should identify a means to mitigate the impacts where historic features will be lost.

C. IDENTIFY ROADSIDE ELEMENTS

Along with the roadway design elements, roadside elements need to be considered when evaluating the historic context of the roadway. In the case of bridges, "roadsides" are the properties adjacent to the bridge approaches, and the bridge's context would include those areas with a view to the bridge. Due to the alteration of many historic roadways and bridges, sometimes the roadside elements are the only remaining historic characteristics of a roadway. Furthermore, as roadways or bridges are widened,

CONTEXT SENSITIVE SOLUTIONS

Nationwide, roadway design in recent years has trended toward the incorporation of local scale and aesthetics, widely known as "context sensitive design" or "context sensitive solutions." New Jersey has strongly endorsed "context sensitive solutions" as a way to manage change to its road network, integrating good road design, historic preservation, and design standards based on a road's classification.

Context sensitive solutions should consistently be applied to all transportation-related projects that involve historic roadways. Applying these principles will help to retain the historical integrity of significant roadways and their settings, while enhancing safety, functionality, and aesthetics. The principles of context sensitive solutions suggest that proposed improvements to traffic congestion and road safety problems must consider wider community objectives, such as providing alternative forms of transportation, protecting significant historic and cultural resources, reducing air and water pollution, blending improvements with local aesthetics, and improving other quality of life issues. Long-term stewardship of the environment, including historic resources, has become integral to transportation planning.

Most importantly, a key ingredient in the success of context sensitive solutions is communication through community involvement. Input from the public about what are considered important aspects of the local historical and environmental setting are valuable to the ultimate quality and success of project designs and implementation. Ongoing discussion of alternative solutions, particularly at the very beginning of a road improvement project, is encouraged among all those who are likely to have an interest in them, including

- state and local government engineers and officials,
- historic preservation experts and community groups,
- adjacent property owners, and
- affected road users and the public at large.

These guidelines are complementary to the principles of context sensitive solutions and will be an asset to community-based recommendations for appropriate aesthetic elements of transportation projects. These guidelines are designed to stimulate and contribute to the discussion of the implementation of context sensitive solutions.

Table 2. Roadway Elements

Early Roads Era	Internal Improvements	Good Roads Era	Highway Era
adjacent drainage ditches	adjacent drainage ditches	adjacent drainage improvements	adjacent drainage improvements
boat landing/dock	bridges	bridges	bridges
bridges	culverts	culverts	bypasses
culverts	dams	curbing	channelized lanes
driveway/driveway cut	driveway/driveway cut	dams	culverts
milestones	embankments	driveways/driveway cuts	curbing (reflective)
retaining walls	milestones	fencing	divided highways/dualized highways
	raised road bed	grade separations	driveway/driveway cuts
	retaining walls	guide rails	embankments
	road signs	milestones	fencing
	road surface (dirt, gravel, plank)	pedestrian safety islands	grade separations
	toll gates	raised road bed	guide rails
		retaining walls	landscaping
		road surface (hard surfaced: macadam)	medians
		roadway signage (route designation and directional signage)	parking (urban)
		shade trees	pavement
		shoulders	pedestrian safety islands
		sidewalks	reduced (low) grades
		street lighting	retaining walls
		toll gates	shoulders
		traffic control devices	sidewalks
			signage
			street lighting
			traffic circles
			traffic control devices
			wide right-of-way

Table 3: Roadside Elements

Early Roads Era	Internal Improvements	Good Roads Era	Highway Era
blacksmith shop	blacksmith shop	advertising signs (billboards, etc.)	auto camps
cluster/crossroad communities	cluster/crossroad communities	blacksmith shops	auto showrooms
farm buildings	farm buildings	cluster communities	billboards
farm fields	farm fields	commercial buildings	bus shelters
farmhouses	farmhouses	drug stores	comfort stations
fencing	fencing	farm buildings	commercial strip development
ferry houses	ferry houses	farm fields	drive-in theaters
ferry landings	ferry landings	farmhouses	drug stores
field walls	field walls	fencing	gas stations/service garages
hitching posts	hitching posts	filling stations	general stores
hotels, inns, taverns	hotels, inns, taverns	general stores	hardware stores
mill ponds	mill ponds	hardware stores	maintenance facilities
mills	mills	hotels, motels	motels
neighborhoods (urban locations)	neighborhoods (urban locations)	landscaping	picnic areas
residences	residences	mill ponds	produce stands
stagecoach stops	stagecoach stops	mills	restaurants (hamburger/hotdog stands)
warehouse (at ferry/road connection)	toll houses	neighborhoods (urban or resort locations)	scenic overlooks
water troughs	water troughs	produce stands	signage
way stations	way stations	residences	weigh stations
wheelwright shop	wheelwright shop	restaurants	
		service garages	
		walls	
		wheelwright shops	

rehabilitated, or replaced, roadside elements may be susceptible to change. The list of roadside elements in Table 3 should serve as a guide for what contributes to the historic nature of the road or bridge. As with the list of roadway elements, no road or bridge will have all of these items and some roads or bridges might have historic elements not identified here.

D. DESIGN STRATEGIES

A variety of strategies may be employed to avoid or minimize the impacts often associated with alterations to roadways or bridges. The following design strategies are categorized by Road, Shoulders, Noise Walls, Traffic Control Devices, Sidewalks/ Pedestrian Crossings, Lighting/Street Furniture, Landscaping, Signage, Structures/Bridges, and Roadside elements.

The preservation of historic roadway characteristics and scale, as prescribed in the design strategies, is inherently responsive to adjacent viewsheds, assuming those viewsheds retain their historic or natural character. Projects requiring major changes to vertical or horizontal roadway or bridge alignment, or other significant deviations from the road's historic character, should consult with the project stakeholders and employ context sensitive solutions to minimize impacts to important viewsheds.

ROAD

- Preserve the character-defining features of the historic roadway that relate to its period of significance, such as paving, curbs, and retaining walls.
- Repair the historic surface before replacement. If replacement is necessary, replace the materials in-kind. If replacement is not feasible for safety considerations, work with the design team to determine what elements of the surface, such as color or texture, may be re-interpreted with a new material, or whether the historic surface may be retained in a shoulder or median area.
- Reconstruct the surface, based on historical documentation, for the full width of the historic road.
- Maintain historic cartway widths, shoulders, and alignments, particularly in instances where traffic calming measures are warranted. Consider whether thermal safety signage may be used in the roadway pavement to support this guideline.
- Repair the historic curbing. If replacement is necessary, replace the materials in-kind. If replacement is not feasible, work with the design team to determine what elements of the curbing, such as the color or material characteristics, may be re-interpreted with a new material. As an alternative, retain historic curbing materials for reuse at the new cartway edge and replicate the historic design.
- Retain the materials of historic retaining walls for relocation to the new roadway edge if impacts cannot be avoided.
- Design new sections of the historic roadway with compatible proportions and stylistic features, such as pavement, curbs, retaining walls, and alignment as the original roadway and its setting.
- If a new section of roadway is to be constructed away from the existing mainline, consider repurposing

Construction of a stabilized grass pulloff area, with a geoblock base, along the Foothills Parkway in Great Smoky Mountains State Park, Tennessee, during (left) and after construction (right). (Courtesy of the Federal Highway Administration.)

the original section for hikers and bikers and install interpretive signage to explain the alteration.

SHOULDERS

- Understand the road's era when designing the shoulder: roads from the Early Roads Era, Internal Improvements Era, and Good Roads Era typically did not have formalized shoulders. To preserve this characteristic, newly constructed shoulders could be stabilized turf that reflects the color and character of gravel. Concrete blocks and porous pavers allow grass to grow through them while providing a hard surface.
- Distinguish shoulders, where historically appropriate, from travel lanes by adding gray or brown pigment to the pavement or apply an appropriate colored coating to represent packed earth or other material.

NOISE WALLS

- Involve the community and historic preservation stakeholders to verify the desirability of noise walls. If views to important historic roadway characteristics are compromised by the installation of noise walls, consider requesting a design exception to eliminate the noise wall from the project. If noise walls must be incorporated, assess how they may best become "transparent," such as using clear panels, earth berms, or work with the design team to select a neutral texture or pattern. In some cases, it may be appropriate to design a custom formliner, which could be used as an opportunity for historic interpretation.

Pigmented asphalt road shoulder. (Courtesy of Red Earth Oxides.)

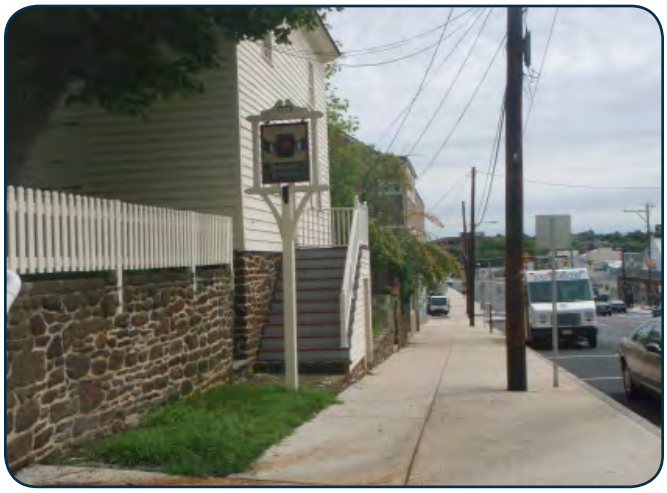
The formliner design for this retaining wall reflects the "red rocks" of Sedona, Arizona. Similar technology can be used to implement appropriate interpretation on noise walls. (Courtesy of KSK.)

Clear noise wall panels at the Agnew House, Route 18, New Brunswick, Middlesex County. (Courtesy of NJDOT.)

- Consider landscaped buffers in lieu of noise walls if there is sufficient right-of-way. Use planting materials that are consistent with historic landscape design, where present.

TRAFFIC CONTROL DEVICES

- Preserve, repair, restore, retrofit, or replicate, based on historic documentation related to the period of significance, historic guide rails, medians, and other traffic control features to meet current collision standards. Examples include reinforced historic masonry or timber guide rails, and replica signals with LED lights.
- Design new guide rails, medians, and other traffic control features with no historical precedent or documentation to be compatible with the historic roadway design and its setting, but distinctly non-historic. It may be appropriate to assess how the new feature may become more "transparent," such as through the use of material and color or, in some cases, it may be appropriate to consider what type of guide rail or median is used on similar historic roads throughout the project area for design guidance.



The new concrete curb was tinted to match the historic bluestone curb on a bridge over the Cohansey River in Bridgeton, Cumberland County. (Courtesy of NJDOT.)

A reinforced guide rail along Paris Pike, a historic and scenic roadway in Kentucky. (Courtesy of Pars International.)

SIDEWALKS/PEDESTRIAN CROSSINGS

- Preserve the character-defining features of the historic sidewalk and pedestrian crossings that relate to its period of significance, such as pavers or verges.
- Repair and maintain the historic surface. If replacement is necessary, replace the materials in-kind. If in-kind replacement is not feasible, work with the design team to determine what elements of the surface, such as color and texture, may be re-interpreted with a new material, or whether the historic surface may be retained in a verge.
- Reconstruct the surface, based on historical documentation, for the full width of the historic sidewalk or pedestrian crossing.
- Work with the design team to select an appropriate context sensitive solution, such as stamped concrete, brick pavers, exposed aggregate concrete, or painted patterns to soften modern utilitarian treatments where no historical precedent or documentation is available.
- Examine whether Americans with Disability Act requirements for sidewalks can be met through existing infrastructure before widening the sidewalk. For example, areas for wheelchair turnaround may be satisfied by the presence of multiple paved driveways.
- Avoid the use of bulbouts (also known as bump-outs) at pedestrian crossings. Determine whether longer traffic signal cycles, modification of an existing median, or other tools would provide a similar level of pedestrian safety without introducing historically inappropriate elements.

LIGHTING/STREET FURNITURE

- Preserve, repair, restore, retrofit, or replicate lighting and street furniture based on historic documentation related to the period of significance.

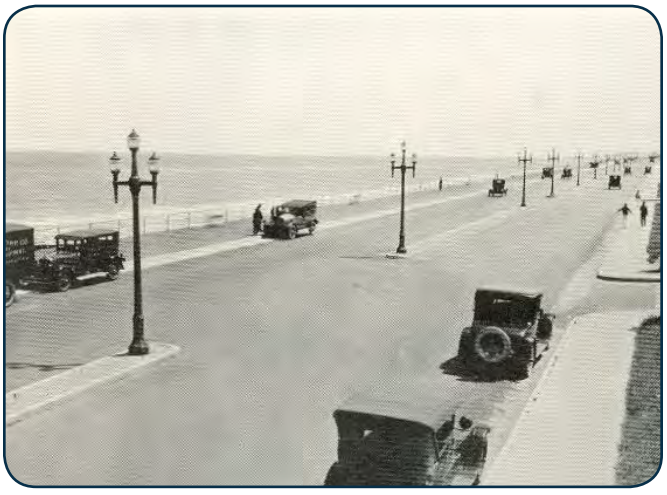
- Design new lighting fixtures and streetscape furniture with no historical documentation or precedent to be compatible with the historic roadway design and its setting, but distinctly non-historic. It may be appropriate to assess how the new feature may become more "transparent," such as through the use of material and color or, in some cases, it may be appropriate to consider what type of feature is used on similar historic roads in the vicinity for design guidance.
- Evaluate how the intensity and color of the light source (LED vs. high sodium pressure) may affect the historic roadway and its setting. If the historic fixture has an insufficient light level for contemporary needs, consider the addition of unobtrusive modern fixtures as a supplement. Work with the design team to avoid an excessive number of fixtures and poles to address lighting needs.

This replacement light fixture on Millstone Causeway in Millstone, Somerset County, was modeled after the original fixtures that remained on the bridge prior to the replacement of the superstructure. (Courtesy of NJDOT.)

LANDSCAPING

- Preserve, restore, or replicate historic landscaping features based on historical documentation related to the period of significance. Consider whether native or native adoptive plant species may be used to evoke the feeling of original invasive or otherwise inappropriate plantings. Historic landscape design features may include broad grassy clear zones, selected tree or plant species, viewshed screening, protection of riparian buffers, or rustic safety features like wood or post-and-chain guardrails. As-built drawings for later roadways often document landscape design intent.

Black powder coated mast lighting and utility cabinets (right of center, next to the telephone pole) with landscaping can minimize visual intrusions in historic areas. This is Route 47 in Dennisville, Cape May County. (Courtesy of NJDOT.)



Ocean Drive, Long Branch, Ocean County. (Courtesy of NJDOT.) Note the curbed median, sidewalk, and period light fixtures.

- Design new landscaping with no historical documentation or precedent to be compatible with the historic roadway design and its setting. Plant types (shrubs, trees, grasses, etc.), size and scale of mature plants, and maintenance requirements are a few parameters to consider. It may be appropriate to consider what type of landscaping is used on similar historic roads in the vicinity for design guidance.

SIGNAGE

- Preserve, repair, restore, or replicate historic signage based on historical documentation related to the period of significance.
- Relocate the signage, if it must be moved, to a comparable and functional location along the route or bridge.
- Design new signage with no historical documentation or precedent to be compatible with the historic roadway design and its setting, but distinctly non-historic. It may be appropriate to assess how the new feature may become more "transparent," such as through the use of material and color or, in some cases, it may be appropriate to consider what type of signage is used on similar historic roads in the vicinity for guidance on design of the new feature.
- Consider whether the creative use of traditional static signs, pavement markings, traffic signals, or other tools would eliminate or minimize the need for electronic signs along historic roadways or bridges.
- Minimize visual clutter through 1) the selection of the smallest available sign that maintains legibility for the roadway design speed; 2) painting the poles and backs of modern street signs a dark neutral color and installing signs at a uniform height; and 3) through consolidation of modern signage - but not at the expense of historic signs. Incorporating thermoplastic signage into the pavement may be an alternative for some types of signage.
- Explore opportunities to incorporate interpretive signage along the historic roadway or bridge, or at an appropriate roadside facility. Signage can be placed along or near the historic roadway, allowing drivers to pull off the road to read the signs. Maps, photographs, cross-sections, and text should be used to highlight the historic roadway's or bridge's characteristics, historic use, and construction methods.

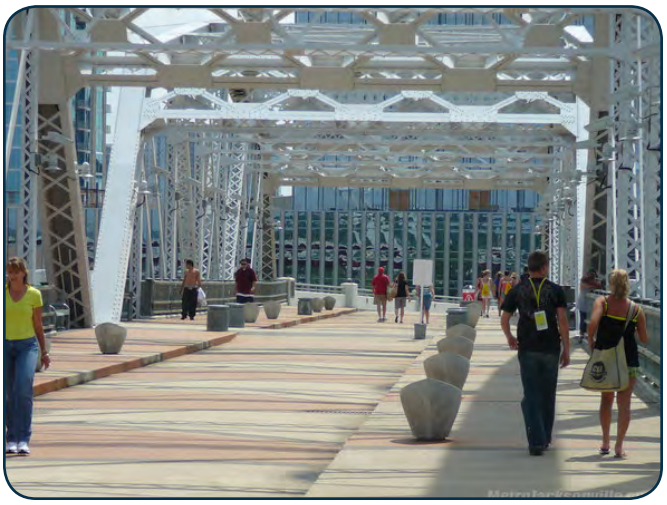
STRUCTURES / BRIDGES

- Preserve the character-defining features of the bridge that relate to its period of significance such as railings, abutments, parapets, pylons, lighting, medians, or signage, based on historical documentation.
- Repair the character-defining features. If replacement is necessary, replace the materials in-kind. If replacement is not feasible, work with the design team to determine what elements may be re-interpreted with a new material.

Although a new town, Celebration, Florida paints the back sides of its signs to blend these features with the landscape. (Courtesy of Strong Towns).

Use of thermoplastic pavement marking as an advance curve warning reduces the need for signs along the roadway. (Courtesy of the Federal Highway Administration.)

- Reconstruct or retrofit character-defining features based historical documentation, such as railings, that do not meet current safety standards.
- Do not rely on applied decoration that is not historically accurate for the structure or its setting. Allow the historic resource to dominate, not the new feature. For example, avoid using simulated material, such as a faux stone texture on a pier or the use of ornament that is not based on historical precedent or documentation.
- Design new features with no historical precedent or documentation to be compatible with the historic bridge design and its setting. It may be appropriate to assess how the new feature may become more "transparent," such as through the use of material, texture, and color or, in some cases, it may be appropriate to consider how that feature is used on a similar historic bridge in the vicinity for design guidance.
- Consider whether both sidewalks are needed when a bridge widening is proposed. If a single sidewalk could accommodate the anticipated users, the second sidewalk could be incorporated into the roadway to create additional lane capacity or shoulder, which would minimize the need for more drastic changes to the historic bridge.
- Evaluate whether an outdated bridge could be reused for bicyclists and pedestrians with a new bridge constructed for vehicles. Consider the installation of interpretive signage to explain the change.



The Shelby Street Bridge in Nashville, Tennessee was converted to a pedestrian bridge in 2003. (Courtesy of MetroJacksonville.com.)

- Document the existing bridge in accordance with appropriate standards as agreed to by NJHPO and NJDOT cultural resource professionals if demolition is required. Consider the installation of interpretive signage to explain the change. Signage can be placed near the historic bridge, allowing drivers to pull off the road to read the signs. Maps, photographs, cross-sections, and text should be used to highlight the historic bridge's characteristics, historic use, and construction methods. When appropriate, incorporate salvaged materials into the new design or use as interpretive features in areas such as parks.
- Consider using the historic bridge as a resource to guide the new design for replacement structures. Adhere to

This truss bridge crossing the Musconetcong River between Hunterdon and Warren counties collapsed in a storm (left). The design of the replacement truss bridge (right) was inspired by the lines of the original bridge. (Courtesy of the New Jersey Historic Preservation Office.)

The early 20th-century concrete bridge at Kirby's Mill in Medford Township, Burlington County was replaced with a similar concrete bridge with eight feet additional width. The scoring on the new concrete parapets mimicked that of the historic bridge. Adjacent historic buildings were not disturbed. (Courtesy of the New Jersey Historic Preservation Office.)

design principles of simplicity, good proportions, and human scale, with clear demonstration of how the structure works to create a bridge that will be compatible with its surroundings. Apply color to define, clarify, modify, or accentuate or subdue the visual effects of structural elements in areas that are context sensitive; lighter colors tend to emphasize the presence and size of elements whereas darker colors diminish the visual importance of the elements.

- Minimize visual clutter through 1) the selection of the smallest available sign that maintains legibility for the roadway design speed; 2) painting the backs of modern street signs and poles a dark neutral color and installing signs at a uniform height; and 3) through consolidation of modern signage - but not at the expense of historic signs. Incorporating thermoplastic signage into the pavement may be an alternative for some types of signage.

Stone from the historic bridge was used in this reconstruction, which was aligned on the original bridge footprint. (Courtesy of NJDOT.)

HISTORIC BRIDGES: REHABILITATE OR REPLACE?

Debates have long been waged between engineers and cultural resource professionals regarding whether historic bridges must be replaced or whether rehabilitation is a prudent course of action. AASHTO recently published guidelines to help make these assessments on a case by case basis. Prepared by Lichtenstein Consulting Engineers, Inc. with Parsons Brinckerhoff Quade & Douglas, Inc., the *Guidelines for Historic Bridge Rehabilitation and Replacement* (2008) guide the user through a four-step analysis process to reach a balanced decision about whether to keep historic bridges in service, whether for their originally intended use or for another use, such as a pedestrian bridge.

- Understanding What Makes a Bridge Historic: discusses what might be significant about a historic bridge, and identifying character-defining features.
- Applying Structural and Functional Considerations: this step considers geometry, load, condition, waterway adequacy, and other technical questions.
- Historical and Environmental Considerations: outlines the breadth of historic and environmental aspects of a project that could inform the decision-making process.
- Applying the Decision-Making Thresholds: provides guidance for balancing the historical, technical, cost, and environmental project considerations to come to a conclusion about whether a historic bridge can remain in service in an adequate capacity.

The guidelines are available on AASHTO's publications website: https://bookstore.transportation.org.

ROADSIDE

- Preserve historic roadside elements in place, both inside and outside of the right-of-way.
- Document the resource in its undisturbed setting according to appropriate standards as agreed to by NJHPO and NJDOT cultural resource professionals if preservation of roadside resources in place is not feasible.
- Replace disturbed landscaping based on historical documentation related to the period of significance with the same or similar plantings. Consider whether native or native adoptive plant species may be used to evoke the feeling of original invasive or otherwise inappropriate plantings.
- Design new landscaping with no historical documentation or precedent to be compatible with the historic roadway design and its setting. It may be appropriate to consider what type of landscaping is used on similar historic roads in the vicinity for design guidance.
- Shift roadside features from the historic roadway, if road widening is required, such as fencing or hedgerows, to a comparable position along the new roadway when relocation is feasible.
- Move selected roadside features, if they must be moved, to an area where their historic significance may be interpreted. When relocating historic roadside buildings, text regarding the building and its relationship to the historic roadway should be included in any interpretive signage. Mitigation strategies beyond documentation and interpretation may be warranted depending upon the significance of the feature.
- Design new roadside features, such as fencing or shelters with no historical documentation or precedent to be compatible with the historic roadway design and its setting, but distinctly non-historic. It may be appropriate to assess how the new feature may become more "transparent," such as through the use of material and color or, in some cases, it may be appropriate to consider what features are used on similar historic roads in the vicinity for design guidance.

IV. CASE STUDIES OF RELEVANT PROJECTS

The purpose of the case studies is to present actual projects that illustrate the principles and recommendations of these guidelines. Examples of historic bridge preservation and rehabilitation projects are numerous, as historic bridges have been a priority for transportation departments and historic preservation officials for well over a decade. However, because the preservation of historic roads and their related features is a relatively new approach in terms of design policy, and a challenging goal given the competing needs of road and bridge projects, documented examples of pure historic road preservation were difficult to find. Examples of context sensitive improvements of roads through historic districts are increasingly common, while considerations of the historic road itself are not as prevalent or well documented. The need to balance safety, cost, maintenance requirements, historic preservation, natural resources, and other environmental factors often results in projects that are less than ideal in terms of the preservation of historic roads and related features, which can be seen in the selected case studies. Identifying and preserving the key character-defining features amid a number of competing interests will always be a challenge.

The case studies in this chapter represent a range of project types and design strategies to preserve features of historic roadways and their historic contexts. Projects were selected based upon their treatment of historic roads (rather than strictly scenic roads); projects of different scales, road types, issues to consider, and improvements made; and their ability to reflect the recommendations of these guidelines.

SAFETY AND AESTHETIC IMPROVEMENTS: THE ARROYO SECO PARKWAY IMPROVEMENT PROJECT, LOS ANGELES COUNTY, CA

ROADWAY DESIGNATION:

California state highway; limited access freeway

BRIEF HISTORY OF THE ARROYO SECO PARKWAY

Dedicated on December 30, 1940, the 8.2-mile, six-lane, Arroyo Seco Parkway (State Route 110) connects Los Angeles to Pasadena. More than holding the title as the first freeway in the United States, the Parkway represents a transition between how early parkways and modern freeways were designed. Characteristic of the parkway style, the Arroyo Seco is scenic with its curves and lush landscaping in the medians and along the roadside. Like modern freeways, however, it was designed for limited access, minimized steep grades, and incorporated a wide right-of-way for shoulders, utilities, landscaping, and to accommodate future expansion.

Little has changed along the Arroyo Seco Parkway. The original bridges remain, as do four bridges that were added prior to the 1930s. However, an extension was constructed at the south end in 1953 to connect the Parkway to the rest of the Los Angeles freeway system via the Four Level Interchange. The landscaped medians have been replaced with steel guard rail, and for the period between 1954 and 2010 Caltrans renamed the Parkway as the Pasadena Freeway. In 2010, the original name returned with Caltrans' plans to revitalize the roadway's scenic qualities and improve its safety.

The Arroyo Seco Parkway was listed in the National Register of Historic Places in 2011. It also has been designated as a State Scenic Highway, a National Civil Engineering Landmark, and a National Scenic Byway.

THE PROJECT

To improve the safety of the Arroyo Seco Parkway while being sensitive to its scenic and historic features, Caltrans replaced the existing metal beam and temporary barriers with concrete median and side barriers that feature a stone pattern similar to that seen on the architecture of the surrounding communities. The side barriers have a fence to limit freeway access, and historically accurate reproduction lighting will be installed along the roadway.

Arroyo Seco Parkway entrance at Pasadena (HAER CA-265. National Park Service).

Arroyo Seco Parkway at Avenue 26. Note the stone guide rail with chainlink fence (HAER CA-265. National Park Service).

Arroyo Seco Parkway at Highway 101 interchange. The channelized Arroyo Seco is to the right of the highway (HAER CA-265. National Park Service).

BENEFITS

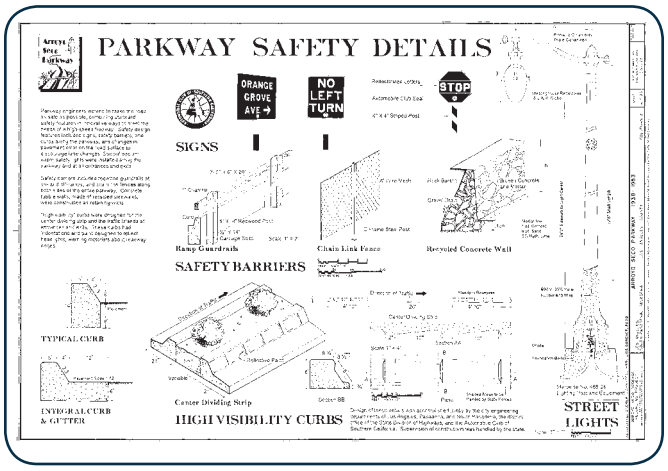
Improvements to the highway were needed to address the increased traffic volume caused by regional population and economic growth. Safety will be improved for motorists, maintenance costs will be reduced, and the appearance of the historic highway will be enhanced.

IMPLEMENTED FEATURES CONSISTENT WITH DESIGN GUIDELINES

1. Safety Improvements were accomplished within the existing right-of way.
2. The new concrete median and side barriers were intended to reflect the stonework architecture seen throughout the surrounding communities.
3. A three- to four-foot chainlink fence on top of the side barriers, based on historic documentation, limits access and preserves a view to the landscaping at the edge of the right-of-way.
4. Existing non-historic replacement lighting will be replaced with historic reproduction lighting based upon the original Parkway fixtures.

CRITIQUES OF THE PROJECT

Preservationists have criticized the final design execution as not being context sensitive enough, noting that the final details bear little resemblance to the design intent promoted during the public process. Additionally, critics were troubled when some of the highway's historic features were reduced to rubble during construction.



The Historic American Engineering Record documented many aspects of the original Parkway design. This sheet illustrates safety details from the road's construction. (HAER CA-265. National Park Service. Drawing by Andrew Johnston and Lisa Gardner, 1999-2000.)

Mock-up of proposed improvements, including stone side barriers and lighting inspired by historic fixtures. (Courtesy of Cal Trans.)

Arroyo Seco Parkway (left) through Elysian Park. (Courtesy of Cal Trans.)

RESURFACING AND CAPACITY MANAGEMENT: STATE ROUTE 91, HUDSON, OHIO

ROADWAY DESIGNATION:

Ohio state highway

BRIEF HISTORY OF STATE ROUTE 91

State Route 91, also known as Main Street, is a north–south state highway in northeastern Ohio, near Lake Erie. The corridor passes through several picturesque communities in the region, and includes the public squares of Hudson, Tallmadge, and Mayfield, some of the best examples of Connecticut Western Reserve town planning.

The City of Hudson, Ohio, unlike many surrounding communities, has retained two-lane roadways in much of its downtown. This has helped preserve assets that the community values, such as trees lining the streets, historic buildings, and open space. However, the limited road capacity along Main Street often leads to traffic congestion, significantly lengthening commute times through Hudson.

First & Main, a mixed-use development just west of North Main Street, opened in 2004. The 200,000-square-foot open-air complex created a significant increase in traffic on adjacent roads, including the two-lane Main Street through downtown Hudson. The town's "Main Street Stores Rear Façade Program" resulted in the rehabilitation of structures downtown, also lending to increased automobile, pedestrian, and other activity in the area.

THE PROJECT

The project entailed resurfacing the roadway, maintaining its current width through Hudson's historic downtown. Final plans for Main Street protected the width of the two-lane roadway and retained diagonal parking in front of the historic shops on the town green. Historic sandstone curbs were re-set during a recent milling and resurfacing project. Pedestrian priority crossing areas occur in multiple places along the busy corridor to maintain connectivity across the town's historic green.

On-street parking was maintained through downtown. (Courtesy of Tom King.)

New signs are appropriate to the character of historic downtown. (Courtesy of Tom King.)

IMPLEMENTED FEATURES CONSISTENT WITH DESIGN GUIDELINES

1. Maintenance improvements were achieved within the existing right-of-way without widening the historic roadway.
2. During the First & Main development construction period, synchronizing traffic signals, creation of pedestrian priority areas, and the introduction of a regularized grid system for ingress and egress from the project maintained a vehicular level of service that allowed the roadway to be maintained at its current width.
3. Character-defining features of the historic resource were preserved, such as the resetting of historic sandstone curbs. By maintaining the cartway width, roadside elements were not threatened.
4. New signage is appropriate to the character of the historic downtown in terms of scale, materials, and aesthetic.

Street trees and hanging plants create an inviting pedestrian environment. (Courtesy of www.pedbikeimages.org/Dan Burden.)

INTERSECTION IMPROVEMENTS: NJ ROUTE 47, DENNISVILLE, CAPE MAY COUNTY, NJ

ROADWAY DESIGNATION:

New Jersey state highway

BRIEF HISTORY OF NJ ROUTE 47

What is now Route 47 through Dennisville may have been part of the Burlington-Cape May Road, an early overland route through southern New Jersey. It was designated Route 15 between Rio Grande and Millville in 1917 as part of the creation of New Jersey's state highway system. In 1923, it was also designated one of two branches of Route 20 between Millville and Westville. Route 47 now runs approximately 75 miles from Wildwood, Cape May County northwest to U.S. Route 130 in Brooklawn, Camden County. The road has also long been known as Delsea Drive, recognizing its role as the overland route connecting the Delaware River to the sea. It is primarily a two-lane route through rural areas of Cape May and southern Cumberland counties. Summer travelers to the New Jersey shore often use Route 55, a four-lane divided highway, to access the area. Because Route 55 stops short of reaching shore communities, traffic moves onto Route 47 to complete the trip, resulting in major traffic jams near Dennisville during the summer vacation season.

THE PROJECT

Two recent intersection improvement projects were completed along Route 47 in Dennisville, one within a historic district and the other near a NR listed house. The Dennisville Historic District is generally bounded by Petersburg Road, Main Street, Church Road, Hall Avenue, Fidler Road, Academy Road, and NJ Route 47. Representative architectural styles in the district are Late Gothic Revival, Greek Revival, and Queen Anne, dating to the nineteenth century. To increase capacity at the intersection, the projects captured the existing shoulder width to create space for dedicated left turn lanes, rather than building extra roadway beyond the existing shoulders.

NJDOT installed black powder-coated traffic signals and components (i.e. signal poles, mast arms, meter cabinets, mast

Left turn lanes were accomodated within the existing roadway by incorporating existing shoulder areas. (Courtesy of NJDOT).

The black mast arm and pole are relatively unobtrusive against a backdrop of trees. (Courtesy of NJDOT).

arm support assemblies, lighting arm assemblies, transformer bases, luminaries, etc.). The color (black), selected in consultation with the NJHPO, was intended to complement the eighteenth- and nineteenth-century significance of the adjacent historic house and Dennisville Historic District. The meter cabinets were placed in visually non-intrusive locations where possible, and were buffered with new landscaping.

BENEFITS

Given the increase in traffic volume and necessity for turning movements at these intersections, upgrading the roadway was critical. This project will improve safety for motorists, reduce maintenance costs, and improve the appearance of the historic road.

IMPLEMENTED FEATURES CONSISTENT WITH DESIGN GUIDELINES

1. The use of a narrower shoulder to accommodate the new turn lane without adding cartway width, preserving the historic roadside features (mature trees, picket fence, etc.) and avoiding the need for related nearby bridge improvements.
2. Black powder coated mast arms and poles are visually less noticeable, minimize the need for additional overhead wires, consolidate signals and street signage, and blend into the surrounding landscape.
3. When mature, landscaping around utility features (meter boxes) will mask their appearance allowing them to blend into the landscape.

Roadway improvements occurred within the existing roadway and did not encroach upon the historic house and fence to the left. (Courtesy of NJDOT).

Mast arms carry traffic signals and street signs, minimizing the need for additional fixtures along the roadway. (Courtesy of NJDOT).

SAFETY AND TRAFFIC CONTROL: NJ ROUTE 57, BEATTYSTOWN, MANSFIELD TOWNSHIP, WARREN COUNTY, NJ

ROADWAY DESIGNATION:

New Jersey state highway

BRIEF HISTORY OF NJ ROUTE 57

New Jersey Route 57 in Warren County is a long-standing passage through mountain ridges and valleys in the lower portion of the New Jersey Highlands. A portion of the route, from Phillipsburg to the Morris County line, was part of the Washington Turnpike, established in 1806. The importance of the road was later solidified by its designation as Route 12 with the establishment of the State Highway System in 1917. Approximately 19 miles of Route 57 has been designated the Warren Heritage Scenic Byway.

THE PROJECT

New road shoulders and traffic calming measures were needed in the Beattystown Historic District, which is listed in the National Register of Historic Places. Textured painting of road shoulders was used to provide a safe, functional shoulder for motorists and cyclists, and maintain the perception of the two-lane historic cartway. A product called TyreGrip was applied to the paved shoulders to emphasize the blacktop cartway and provide a safe shoulder surface; it is anticipated that this color distinction will help keep motorists on the blacktop by more clearly defining the edge of the roadway. Though a variety of colors are possible, tan was selected to mimic the look of a dirt shoulder, creating the perception of a relatively narrow street resulting in a traffic calming effect.

BENEFITS

This project added traffic calming measures on this two-lane roadway, and incorporated safe shoulders for bicyclists.

IMPLEMENTED FEATURES CONSISTENT WITH DESIGN GUIDELINES

1. Textured, tinted paint on shoulders to provide a functional shoulder and maintain the look of a two-lane road with dirt shoulders.

Landscaping and gateway signage may slow traffic. (Courtesy of NJDOT).

TyreGrip applied to the paved shoulder creates a safe surface for cyclists and drivers, and maintains the two-lane rural character of the road. (Courtesy of NJDOT).

BRIDGE WIDENING: PRATT TRUSS BRIDGE AT CALIFON, NJ

ROADWAY DESIGNATION:

New Jersey county road

BRIEF HISTORY OF THE TRUSS BRIDGE AT CALIFON, NJ

The Califon Bridge, also known as the Main Street Bridge, is a steel Pratt through truss bridge that carries County Route 512 over the South Branch of the Raritan River in Califon, Hunterdon County, New Jersey. The 100-foot long bridge was built in 1887 by I. P. Bartley and Company. This permanent structure across the river connected the surrounding agricultural community to the town, as well as its railroad station. The bridge is a contributing element of the Califon Historic District. The Califon Bridge remained in its original configuration until it was renovated and widened in 1985 with rolled I-section steel stringers added under the trusses. Technically, it is now a beam bridge rather than a true truss bridge. Nonetheless, the truss superstructure was left in place, and it contains some steel fabric with the "Carnegie" stamp.

Despite the alteration, the New Jersey Historic Bridge Survey deemed the Califon Bridge historically significant as one of the fewer than five remaining bridges built by the prominent Mount Olive, New Jersey-based Bartley Company.

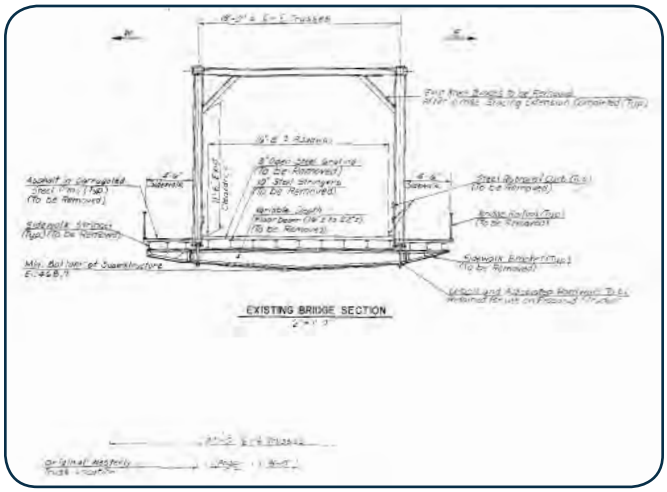
THE PROJECT

The Pratt through truss Califon Bridge was widened seven feet to the west, from 17 to 24 feet. The original bottom lateral bracing and deck elements were removed and a new steel stringer deck was built to carry the bridge loads. The top struts of the bridge were cut to separate the trusses and allow for the attachment of the trusses to the new fascia stringers, preserving original visible truss elements and cantilevered sidewalks. New sections were added to the top struts to bridge the seven feet to the new western truss location.[4]

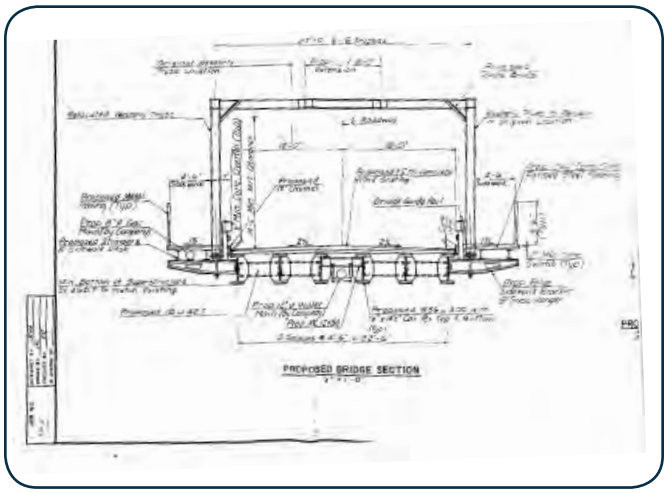
BENEFITS

In some cases, bridge widening adversely affects historic bridges by destroying the original proportion of the structure. In this case, widening was a superior alternative to outright demolition due to the bridge's contribution to the surrounding historic context.

The Pratt through truss structure of the Califon Bridge is evident in this pre-rehabilitation photo. (Courtesy of NJHPO).



Section through the bridge showing the original structural elements. (Courtesy of NJHPO).



Section through the proposed bridge improvements, showing insertion of stringers and widening of the bridge. (Courtesy of NJHPO).

[4] Lichtenstein Consulting Engineers, Inc. in association with Parsons Brinckerhoff Quade & Douglas, Inc., *Guidelines for Historic Bridge Rehabilitation and Replacement* (AASHTO: Washington, DC, 2008), A-22.

IMPLEMENTED FEATURES CONSISTENT WITH DESIGN GUIDELINES

1. Retained and rehabilitated many original elements for continued use, including the abutments, piers, truss elements, and cantilevered sidewalks and railings.
2. Widened roadway retained the essential proportion, scale, and materials of the historic bridge, maintaining its relationship to the surrounding historic district.
3. Bridge guide rails are in a similar position to historic "rub rails" along the cartway, and are gray, compatible with the bridge color.
4. New deck structure allows for installation of utilities across the bridge, beneath the deck and out of sight.

HAER documentation. Califon bridge before rehabilitation. (Courtesy of NJHPO).

The rehabilitated and widened Califon Bridge, c. 1986. (Courtesy of NJHPO).

IN-KIND REPLACEMENT OF BRIDGE SUPERSTRUCTURE: COUNTY ROAD 514 (AMWELL ROAD) BRIDGE OVER THE MILLSTONE RIVER (ALSO KNOWN AS MILLSTONE CAUSEWAY), SOMERSET COUNTY, NJ

ROADWAY DESIGNATION:

New Jersey county road

BRIEF HISTORY OF THE MILLSTONE CAUSEWAY

The Millstone Causeway is a concrete, circa 1930s bridge that crosses the Millstone River in Somerset County, NJ. The bridge is located along the Millstone Valley Scenic Byway Corridor. County Road 514 is the main east-west route between Hillsborough and New Brunswick. Given the few major river crossings in the area and extensive development in the region since its construction, the bridge was heavily used and an increase in capacity was needed. Also, deterioration of the bridge's parapet and deck necessitated an extensive level of rehabilitation.

THE PROJECT

The Causeway is located within the Millstone Valley Scenic Byway corridor. The Corridor Management Plan strongly advocates for roadway and roadside improvements that are consistent with context sensitive design principles, including "changes to roadway cross-sections, intersections or roadside environments." The project included the removal and reconstruction of the superstructure and in-kind replacement to a near replica of the original design, including all components above the substructure (i.e., punched opening parapet, pedestrian sidewalk along one side of the cartway, new deck, guide rail and historic style lighting). The notable exception was the widening of the roadway to allow for increased lane and shoulder width.

BENEFITS

Given the pressure for increased capacity and a need for rehabilitation, upgrading the bridge was critical. By adding cartway width, the project improved safety for motorists while allowing for a superstructure design consistent with the historic bridge. The project was a context sensitive compromise, allowing for safety improvements while respecting the need for a historically sensitive replacement of bridge elements. The end result is a near replica of what was removed and the historic visual quality of the roadway remains intact.

Millstone Causeway before superstructure replacement . Note the single sidewalk, perforated balustrade and historic light fixtures at the far end of the bridge. (Courtesy of NJHPO).

The reinforced concrete balustrade was severely deteriorated. (Courtesy of NJHPO).

Millstone Causeway after rehabilitaion. Guide rails are brown to blend with surrounding trees, and light fixtures are modeled after those on the bridge prior to renovation. (Courtesy of NJHPO).

IMPLEMENTED FEATURES CONSISTENT WITH DESIGN GUIDELINES

1. Retained and rehabilitated original abutments and piers for continued use.
2. Replicated light fixtures and new parapet design based on existing historic bridge features.
3. Widened roadway and single sidewalk retained the essential proportion, scale, and materials of the historic bridge, avoiding creation of unnecessary additional capacity.
4. Painted approach guide rails (brown) blend with the surrounding wooded environment.

Millstone Causeway after rehabilitation. The perforated parapet with scored piers reflects the design of the historic bridge. (Courtesy of NJHPO).

V. BIBLIOGRAPHY

A. G. Lichtenstein & Associates, Inc. "New Jersey Historic Bridge Survey." New Jersey Department of Transportation and Federal Highway Administration, 1994.

Caltrans. *Main Streets: Flexibility in Design & Operations*. January 2005.

Context Sensitive Solutions.org. http://contextsensitivesolutions.org.

Ewing, Reid and Michael King. *Flexible Design of New Jersey's Main Streets*. Voorhees, NJ: Rutgers University Voorhees Transportation Policy Institute, n.d.

Federal Highway Administration. "Flexibility in Highway Design." http://www.fhwa.dot.gov/environment/flex/index.htm.

KSK Architects Planners Historians, Inc. *New Jersey Historic Roadway Study*. Trenton, NJ: New Jersey Department of Transportation, 2011.

Lichtenstein Consulting Engineers, Inc. with Parsons Brinckerhoff Quade & Douglas, Inc. *Guidelines for Historic Bridge Rehabilitation and Replacement*. National Cooperative Highway Research Program, Transportation Research Board, NCHRP Project 25-25/Task 19. American Association of State Highway and Transportation Officials, 2008.

Marriott, Paul Daniel. *The Preservation Office Guide to Historic Roads: Clarifying Preservation Goals for State Historic Preservation Offices, Establishing Preservation Expectations for State Transportation Departments*. New York, NY: The James Marston Fitch Charitable Foundation, 2010.

National Complete Streets Coalition. http://www.completestreets.org.

National Park Service. National Register Bulletin 15: *How to Apply the National Register Criteria for Evaluation*. Washington, D.C.: U.S. Department of the Interior, 1991.

New Jersey Department of Transportation Division of Capital Program Support, Bureau of Landscape Architecture and Environmental Solutions. "Toolkit for Historic Roadways" (Draft). March 2009. Available at the New Jersey Department of Transportation, Trenton, NJ.

Pennsylvania Historical and Museum Commission and Pennsylvania Department of Transportation. *Historic Highway Bridges in Pennsylvania*. Harrisburg, PA: Pennsylvania Historical and Museum Commission and the Pennsylvania Department of Transportation, 1986.

Rutgers University. "New Jersey Walks and Bikes: Encouraging alternative transportation in New Jersey." http://policy.rutgers.edu/VTC/bikeped/Walks_and_Bikes/Vol3_Issue2/streets1.html.

Subcommittee on Bridge Aesthetics of the Transportation Research Board. "Bridge Aesthetics Sourcebook: Practical Ideas for Short and Medium Span Bridges" (Draft). May 2008.

Trns•port Support Group. "State of New Jersey Department of Transportation: Construction Cost Estimating Guide." Revised March 2007.

United States Department of Agriculture, Forest Service, San Dimas Technology and Development Center. *Scenic Byways: A Design Guide for Roadside Improvements*. Washington, D.C.: Federal Highway Administration, July 2002.

APPENDIX A. GLOSSARY

AASHTO: American Association of State Highway and Transportation Officials.

Abutment: substructure supporting the end of a span, retaining or supporting the approach embankment.

Adverse Effect: found when an undertaking may alter, directly or indirectly, any of the characteristics of a historic property that qualify the property for inclusion in the National Register of Historic Places in a manner that would diminish the integrity of the property's location, design, setting, materials, workmanship, feeling, or association [36 CFR 800.5(a)(1)].

Alignment: the horizontal and vertical path of a route at a particular location.

Area of Potential Effects (APE): the geographic area or areas within which an undertaking may directly or indirectly cause changes in the character or use of historic properties, if such properties exist. The area of potential effects is influenced by the scale and nature of the undertaking and may be different for different kinds of effects caused by the undertaking [36 CFR 800.16(d)].

Arterial Road: a high capacity road that carries traffic between collector roads and highways, or between communities.

Balustrade: an entire concrete or stone railing system including a top rail, balusters (vertical members), and sometimes a lower rail.

Banking: construction technique whereby the outside edge of a road curve is higher than the inside edge of a curve creating a tilted or "banked" roadway.

Barrier: a structure built to bar passage, or separate directions of a roadway.

Building: a structure created to shelter any form of human activity, such as a house, barn, church, hotel, or similar structure; it may also refer to a historically related complex such as a courthouse and jail or a house and barn [36CFR60.3 (a)].

Channelize: the use of pavement markings, curbs, landscaping, or other features to delineate traffic flow.

Character-Defining Features: distinctive qualities or characteristics of a historic resource that contribute significantly to its physical character.

Clear Zone: an unobstructed, relatively flat area beyond the shoulder that allows a driver to stop safely or regain control of a vehicle that leaves the traveled way.

Collector Road: a low to moderate capacity road that moves traffic from local streets to arterial roads, or provides access to residential properties.

Compatible: consistent or in keeping with the character (material, dimension, texture, etc.) of a historic resource.

Complete Streets: roadways designed and operated to enable safe, attractive, and comfortable access and travel for all users, including pedestrians, bicyclists, motorists and public transport users.

Context Sensitive Design: improvements to roadways, traffic congestion, and road safety problems that are flexible and sensitive to community values; proposed improvements must consider wider community objectives, such as providing alternative forms of transportation, protecting significant historic and cultural resources, reducing air and water pollution and improving other quality of life issues.

Curb: the surface of a sidewalk adjacent to a street, traditionally finished at a right angle 4–6 inches above the street surface.

Cut and Fill: a construction technique wherein the soil in a section of the work area is removed ("cut") and the material ("fill") used elsewhere in roadway construction, such as for embankments or other roadway design features.

Design Exception: a decision made to alter a best–practice-based design, used if the impacts of that design are deemed too great.

Design Speed: the maximum safe speed that can be maintained over a specified section of highway when conditions are so favorable that the design features of the highway govern. The assumed design speed should be a logical one with respect to the topography, the adjacent land use, and the functional classification of highway (AASHTO). Note: the design speed may be different than the posted speed.

District: See "Historic District."

Dualize: the separation of opposing directions of traffic, often using design features such as landscaped medians, concrete barriers, or curbs.

Effect: the alteration to the characteristics of a historic property that qualify it for inclusion in, or eligibility for, the National Register of Historic Places [36 CFR 800.16(i)].

Eligibility: refers to having significance and maintaining integrity, thereby meeting the National Register of Historic Places Criteria for Evaluation (36 CFR 60.4):

- Criterion A – properties that are associated with events or trends that have made a significant contribution to the broad patterns of our history; or
- Criterion B – properties that are associated with the lives of persons significant in our past; or
- Criterion C – properties that embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction; or
- Criterion D – properties that have yielded, or may be likely to yield, information important in prehistory or history.

FHWA: Federal Highway Administration.

Guide Rail: a rail installed along the side of a roadway, intended to steer vehicles back onto the road. Also referred to as "guard rail" or "guardrail," though "guide rail" is the official term in New Jersey.

Gutter: the depression that runs along a street, usually adjacent to the curb, diverting water away from the street and into a storm drain.

HAER: See "Historic American Engineering Record."

Highway: a major road connecting two destinations, generally carrying heavy traffic and a route number designated by a state or federal agency.

Historic American Engineering Record: a program of the National Park Service to document significant historic engineering works with photography, written narratives, and measured drawings.

Historic Context: those patterns or trends in history by which a specific occurrence, property, or site is understood and its meaning (and ultimately significance) within history or prehistory is made clear. Historic contexts are found at a variety of geographical levels or scales. The geographic scale selected may relate to a pattern of historical development, a political division, or a cultural area.

Historic District: a geographically definable area, urban or rural, possessing a significant concentration, linkage, or continuity of sites, buildings, structures, or objects united by past events or aesthetically by plan or physical development; it may also comprise

individual elements separated geographically but linked by association or history [36CFR60.3 (d)].

Historic Property: as defined in the National Historic Preservation Act, a historic property is any prehistoric or historic district, site, building, structure, or object included in, or eligible for inclusion on the National Register; such term includes artifacts, records, and remains which are related to such district, site, building, structure, or object [16 U.S.C. Section 470(w)(5)].

Historical Significance: the importance of a property to the history, architecture, archaeology, engineering, or culture of a community, state, or the nation.

Horizontal Alignment: the position of the road, or how "straight" the roadway section is.

Integrity: the ability of the property to convey its significance through surviving character-defining features. The following are aspects of integrity as applied to historic roads.

Integrity of location: a roadway remains in its original location for its period of significance. This aspect of integrity relates directly to the roadway's position or placement. Properties that have been moved (realigned) are generally not considered eligible for listing in the National Register, unless the roadway was realigned during its period of significance.

Integrity of design: the retention of those characteristics that were purposely included in the planning and construction of the roadway.

Integrity of materials: the physical elements that were combined or deposited during a particular period of time and in a particular pattern or configuration to form the roadway.

Integrity of workmanship: the physical evidence of the labor, skill, and craft expressed within the roadway or its component parts.

Integrity of setting: the physical environment of the roadway. The setting(s) of the roadway or a segment of the roadway should reflect the same general character, with minimal intrusions, present during the roadway's period of significance.

Integrity of feeling: closely related to integrity of setting and refers to the expression of an aesthetic or historic sense of a particular period of time. Integrity of feeling usually results from the presence of physical features that convey the property's historic character. Retention of feeling alone is not sufficient to support eligibility of a property for the National Register.

Integrity of association: the direct link between an important historic event or person and the historic property. A roadway should contain the physical features and associated elements that convey the property's historic character. These features should date from the roadway's period of significance. Retention of association alone is not sufficient to support eligibility of a property for the National Register.

Jersey Barrier: a protective concrete barrier used as a highway divider and a means of preventing access to a prohibited area.

Landscape Features: the land and water forms, vegetation, and structures that comprise an overall characteristic landscape; may be of various scales.

Landscaping: an activity that modifies the features of the land, including living elements, natural elements, human made elements, and abstract elements.

Lane: a division of a road, street, or highway wide enough for a single line of motor vehicles.

Level of Service: a measure used by traffic engineers to determine the effectiveness of elements of transportation infrastructure.

Liability: legal responsibility for something, especially costs or damages.

Lighting: a mechanical means for providing artificial illumination.

Limited Access: a roadway with few means of entrance and exit; often a one-way route with one or more restrictions placed on access.

Local Historic Context: a local historic context represents an aspect of the history of a town, city, county, cultural area, or region, or any portions thereof. A property can be significant to more than one community or local area without having achieved state significance.

Local Road: a street that is primarily used to gain access to the property or properties that border it.

Median: a strip of land down the center of a road that separates lanes of traffic traveling in opposite directions.

MUTCD: Manual on Uniform Traffic Control Devices.

National Historic Context: properties are evaluated in a national context when they represent an aspect of the history of the United States and its territories as a whole. These national historic contexts may have associated properties that are locally or statewide significant representations, as well as those of national significance. A property with national significance helps us understand the history of the nation by illustrating the nationwide impact of events or persons associated with the property, its architectural type or style, or information potential. It must be of exceptional value in representing or illustrating an important theme in the history of the nation.

National Register Criteria for Evaluation: see "Eligibility."

NHPA: National Historic Preservation Act.

NJDOT: New Jersey Department of Transportation.

NJHPO: New Jersey Historic Preservation Office.

No Adverse Effect: found when the undertaking's effects do not meet the criteria of 36 CFR 800.5 (a)(1) [see **adverse effect**], or the undertaking is modified or conditions are imposed, such as the subsequent review of plans for rehabilitation by the SHPO, to ensure consistency with the Secretary of the Interior's Standards for the Treatment of Historic Properties and applicable guidelines, to avoid adverse effects [36 CFR 800.5 (3)(b)].

No Effect: found when there are no historic properties present, or there are historic properties present but the undertaking (project) will have no effect on them [36 CFR 800.4 (d)(1)].

Object: a material thing of functional, aesthetic, cultural, historical or scientific value that may be, by nature or design, movable yet related to a specific setting or environment [36 CFR 60.3 (j)].

Parapet: a low wall along the outside edge of a bridge deck (floor) running longitudinally along the bridge to protect vehicles and pedestrians.

Pavement: the hard, smooth surface of a thoroughfare that will bear travel.

Pier: stone, concrete, brick, steel, or wood structure to support the ends of the spans of a multi-span superstructure at an intermediate location between its abutments.

Posted Speed: the maximum speed legally permitted on a given stretch of road.

Preservation: the act or process of applying measures necessary to sustain the existing form, integrity, and materials of an historic property. Work, including preliminary measures to protect and stabilize the property, generally focuses upon the ongoing maintenance and repair of historic materials and features rather than extensive replacement and new construction. New exterior additions are not within the scope of this treatment; however, the limited and sensitive upgrading of mechanical, electrical, and plumbing systems and other code-required work to make properties functional is appropriate within a preservation project (The Secretary of the Interior's *Standards for the Treatment of Historic Properties*, 1995).

Programmatic Agreement: governs the implementation of Section 106 responsibilities for all individual undertakings or a program carried out in accordance with the agreement until it expires or is terminated [36 CFR Section 800.14(b)].

Pylon: a large monumental structure usually marking the entrance to a bridge or forming part of a gateway.

Realignment: activities that result in a new location for an existing road or portions of an existing road, including treatment of the old roadway.

Reconstruction: the act or process of depicting, by means of new construction, the form, features, and detailing of a non-surviving site, landscape, building, structure, or object for the purpose of replicating its appearance at a specific period of time and in its historic location (The Secretary of the Interior's *Standards for the Treatment of Historic Properties*, 1995).

Region: an area exhibiting similar history, economy, or physiographic character, which could extend over state/contemporary county boundaries.

Right-of-Way (ROW): land acquired for or devoted to transportation purposes.

Road: a bearing surface for vehicular or pedestrian transportation activity within a roadway.

Roadside Development: development in the area outside the traveled way, that fulfills operational, environmental, visual, and auxiliary functions, and can include contour grading, fencing, irrigation, noise barriers, retaining walls, roadside safety features, rest areas, parks, viewpoints, and historical markers, signs, traffic barriers, vegetation, and buildings, among others.

Roadside Features: buildings and structures generally associated with the use of the roadway, though not nesessarily the function of the road, generally constructed or located outside of the right-of-way (e.g. inns/taverns, motels, gas/repair stations, drive-in theaters, diners, auto camps, auto showrooms, recreational facilities, hot-dog/hamburger/produce stands, billboards, strip malls, among others).

Roadway: a strip of land physically altered to accommodate road construction and use, i.e. the right-of-way through which a road passes and all that it contains.

Roadway Elements: buildings or structures constructed as a functional element of the roadway usually within the right-of-way (e.g. roadway, bridges, culverts, guide rails, viaducts, drainage control, designed landscaping, sidewalks, retaining walls, fencing, toll houses, toll gates, milestones, lighting, roadway signs, picnic areas, weigh stations, scenic overlooks, bus shelters, among others).

Rod: a unit of linear measurement, 5 ½ yards or 16 ½ feet.

Section 106: Section 106 of the National Historic Preservation Act of 1966 (as amended) as implemented by 36 CFR 800; provides that federal agencies are to take into account the effects of federal or federally assisted undertakings on historic properties that are listed in or eligible for inclusion in the National Register of Historic Places.

SHPO: State Historic Preservation Office(r). The office or official appointed or designated pursuant to Section 101(b)(1) of the NHPA to administer the State historic preservation program, or a representative designated to act for the State Historic Preservation Officer [36 CFR 800.16(v)]. In New Jersey, the SHPO is the Commissioner of the Department of Environmental Protection.

Shoulder: a reserved area at the edge of a roadway, acting as a buffer between the main thoroughfare and the end of the paved surface; often reserved for safety reasons and for emergency vehicles.

Sidewalks: a paved walkway at the side of a street, reserved for pedestrians.

Sight Distance: the length of roadway visible to a driver.

Sign: a displayed structure bearing lettering or symbols, used to identify or advertise a place of business, a road route, or other information.

Significance: the importance of a property to the history, architecture, archaeology, engineering, or culture of a community, region, state, or the nation. Significance is achieved through one or more of the following: 1) association with events, activities, or patterns; 2) association with important persons; 3) distinctive physical characteristics of design, construction, or form; or 4) potential to yield important information. Furthermore, significance is defined by the area of history in which the property made important contributions and by the period of time when these contributions were made.

Site: the location of a significant event, a prehistoric or historic occupation or activity, or a building or structure, whether standing, ruined, or vanished, where the location itself maintains historical or archeological value regardless of the value of any existing structure [36 CFR 60.3(l)].

State Historic Context: properties are evaluated in a state context when they represent an aspect of the history of the state as a whole. A property that overlaps several state boundaries can possibly be significant to the state or local history of each of the states. Such a property is not necessarily of national significance, nor is it necessarily significant to all the states in which it is located.

Streetscape: the visual elements of a street that define its appearance, identity, and functionality, including adjacent buildings and land uses, street furniture, trees and landscaping, sidewalks, and pavement treatments, among others.

Structure: a functional construction made for purposes other than creating shelter; a work made up of interdependent and interrelated parts in a definite pattern of organization. Constructed by man, it is often an engineering project large in scale [36 CFR 60.3(p)].

Traffic Calming: a system of management strategies intended to slow or reduce motor-vehicle traffic, often intended to improve safety conditions.

Transportation: means of conveyance or travel from one place to another; conveyance of passengers, goods, or materials.

Transportation Corridor: a route along which people or goods move by roadways, waterways (canals or natural bodies of water) or rail between population centers, industrial, commercial, or cultural centers.

Vertical Alignment: a roadway's change in elevation, or the "flatness" of the roadway.

Viewshed: the environment visible from one vantage point; can be natural or man-made.

Volume: the product of the average traffic intensity and the period of study (in hours).

APPENDIX B. WEB RESOURCES

American Association of State Highway and Transportation Officials	http://transportation.org
American Society of Civil Engineers	http://www.asce.org
America's Byway Resource Center	http://www.bywaysresourcecenter.org
Context Sensitive Solutions.org	http://www.contextsensitivesolutions.org
Federal Highway Administration, Historic Preservation Program	http://environment.fhwa.dot.gov/histpres/index.asp
Historic Roads	http://www.historicroads.org
Manual on Uniform Traffic Control Devices	http://mutcd.fhwa.dot.gov
National Complete Streets Coalition	http://www.completestreets.org
New Jersey Department of Transportation	http://www.state.nj.us/transportation
New Jersey Historic Preservation Office	http://www.state.nj.us/dep/hpo
Transportation Research Board	http://www.trb.org/Main/Home.aspx

APPENDIX C. USEFUL CONTACTS

Federal Highway Administration (New Jersey Division)
840 Bear Tavern Road, Suite 310
West Trenton, NJ 08628
T: (609) 538-4200
F: (609) 538-4919

New Jersey Department of Environmental Protection
New Jersey Historic Preservation Office
Mail Code 501-04B
State of New Jersey
Department of Environmental Protection
Historic Preservation
PO Box 420
Trenton, NJ 08625-0420
T: (609) 984-0176
F: (609) 984-0578
E: njhpo@dep.state.nj.us
W: http://www.nj.gov/dep/hpo

New Jersey Department of Transportation – Cultural Resources staff
1035 Parkway Avenue
P.O. Box 600
Trenton, NJ 08625-0600
T: (609) 530-5670

APPENDIX D. FEDERAL ROAD CLASSIFICATIONS AND NEW JERSEY PROJECT CLASSIFICATIONS

All New Jersey state roads are classified by the FHWA into one of three general **"Functional Classification"** categories:

- **Arterial roads** (including both principal and minor arterials) are roads that form an interconnected network of continuous routes primarily intended to move vehicles at high speeds over long distances. These roads usually have access restrictions.
- **Collector roads** are roads designed for shorter trips, less traffic and slower speeds than arterials. These connect to the arterial system. They balance long distance travel needs with the need for access to adjacent property.
- **Local roads** are all other roads that are not either arterial or collector roads. Such roads are primarily intended to provide access to adjacent property and are not intended for long distance travel.

Most of the roads identified as historically significant at the state level are classified currently as arterial roads, which have varying design speeds. A road's classification and setting determines to a large degree the safe speed of vehicles that use it. Because many arterials in New Jersey have a design speed of 50 miles per hour or more, its historic roads are often straighter and more controlled than other roads to ensure their safe use.

Thus, while New Jersey's functional classification of roads does not relate directly to historic integrity, to comply with state and federal highway design standards (for example, to meet road design speed, road capacity, road user safety or access control standards) many road improvements commonly present challenges to the preservation of a road's historic integrity.

There is a great deal of flexibility built into present highway design standards (see U.S. Department of Transportation publication "Flexibility in Highway Design" and the latest version of AASHTO's "Green Book"). However, where serious conflict between design requirements and historic preservation remains, the functional classification of the road may itself need to be reevaluated upon consultation with the NJDOT.

In addition to the federal functional roadway classifications, New Jersey uses the following **project classifications** when defining new projects:

1. New Construction – new construction or major reconstruction of divided or undivided highways.
2. Reconstruction, Widening, and Dualization – the removal and replacement, rebuilding or upgrading of an existing facility, including intersections.
3. Widening and Resurfacing – widening and resurfacing of existing highway facilities when the total added width is equivalent to less than one lane width in each direction and grades are not changed.
4. Resurfacing – overlaying existing highways, and surfacing or overlaying existing shoulders with asphaltic material.
5. Bridge Repair – repair of bridges, includes repairs to decks, curbs, rails, beams, and structures.
6. Intersection Improvements – minor construction or reconstruction of street or highway intersections.
7. Electrical, Safety, and Traffic Control – placement, replacement and betterment of guide rail, signs, striping, traffic signals, highway lighting, sign lighting, electrical signs, movable bridge electrical systems and other safety and traffic control devices along streets and highways when let on a contract basis.
8. Miscellaneous – construction activities let on a specialty contract basis, not assignable to other work classes, such as demolition of buildings, removal of asbestos, and railroad pavement painting.
9. Unique – construction activities of a distinctive nature, which is let on a specialty contract basis, such as wetland replacement and restoration.
10. Intelligent Transportation Systems – construction of ITS devices and communication networks.

11. Landscape – design and installation of landscape architectural elements to enhance transportation facilities or to mitigate environmental and negative effects caused by transportation facility improvements.
12. Demolition – the demolition and removal of buildings and appurtenances within the acquired right-of-way in advance of the main construction contract.
13. Drainage – cleaning, inspecting, capacity restoration, and in-kind repairs to highway drainage facilities.

APPENDIX E. HISTORIC ROADWAYS OF STATEWIDE SIGNIFICANCE

Early Roads Era

- Old Dutch Road/Upper Road
- Lower Road
- Burlington-Salem Road
- Burlington-Perth Amboy Road/Lawrie's Road
- Cape May-Burlington Road/Old Cape Road
- Old York Road
- Philadelphia-Egg Harbor Road
- Burlington-Shrewsbury Road

Internal Improvements Era

- New Jersey turnpikes established by New York investors
  - Morris Turnpike
  - Union Turnpike
  - Washington Turnpike
  - New Jersey Turnpike (original)
  - Paterson & Hamburg Turnpike
- New Jersey turnpikes facilitating communications between New York and Philadelphia
  - Trenton & New Brunswick Straight Line Turnpike
  - Bordentown & South Amboy Turnpike
- New Jersey turnpike with State government investment
  - Newark Turnpike

Good Roads Era

- First roads associated with state aid spending
  - Old Bridge to Matawan Road (4 mile section)
  - Plainfield to Metuchen Road (1.7 mile section)
  - New Brunswick to Metuchen Road (complete route, 4.85 miles)
- Nichol Avenue
- Road from Camden to Atlantic City (White Horse Pike)
- Ocean Highway
- Delaware River Drive

Highway Era

- Lincoln Highway
- 1917 NJ State Highway System
- Admiral Wilson Boulevard
- Pulaski Skyway
- John Davison Rockefeller Memorial Highway
- Palisades Interstate Parkway

APPENDIX F. EXAMPLES OF APPROVED DESIGN ELEMENTS

This appendix lists a variety of design elements that have generally been approved for use by the New Jersey Department of Transportation and Federal Highway Administration, unless otherwise indicated. This list is not intended to be exhaustive, and new products and ideas are coming to the industry on a regular basis. Most of these design elements would be considered "context sensitive solutions," because they do not necessarily preserve historic road features; however, they can contribute to the preservation of the historic road setting and the character of the roadway and surrounding community. The appropriateness of design elements for a specific project must be determined on a case-by–case basis, depending on the historic nature of the roadway, its period/era of significance (Early Roads, Internal Improvements, Good Roads, or Highway Era), and the issues to be resolved by the project. Be mindful of these considerations when reviewing the list. The design elements below are organized alphabetically under the following headings:

- Barriers – Median
- Barriers – Roadside (includes guide rails)
- Barriers – Non-Approved
- Bridge Parapets and Railings
- Curbing
- Fencing
- Landscaping
- Lighting and Signals
- Paving: Roadway, Crosswalks, and Sidewalks
- Signage
- Wall Treatments

	Description	Appropriate Uses	Sample Locations	Source
BARRIERS - MEDIAN				
Jersey Barrier Curb	Used on many highways throughout New Jersey; the default barrier	High speed roadways; to separate opposing traffic when no median is provided	Route 1; Route 130, etc.	Toolkit for Historic Roadways; FHWA/ NJDOT Approved Roadside Barrier Spreadsheet

Jersey Barrier Curb

BARRIERS - MEDIAN (CONTINUED)

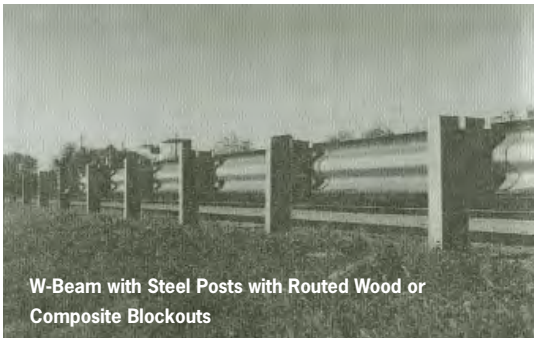
	Description	Appropriate Uses	Sample Locations	Source
Barrier Curb with Aesthetic Treatment	Brick or masonry pattern is stenciled on upper portion of the Jersey Barrier Curb to provide an aesthetic treatment; a formliner may also be used to create the pattern	Urban areas where there is a need or desire for an aesthetic treatment to what is normally a very plain feature	Route 30, Absecon, NJ; Route 30, Camden, NJ; Route 29, John Fitch Way, Trenton, NJ	Toolkit for Historic Roadways

Barrier Curb with Aesthetic Treatment

Stone Wall with Stone Cap

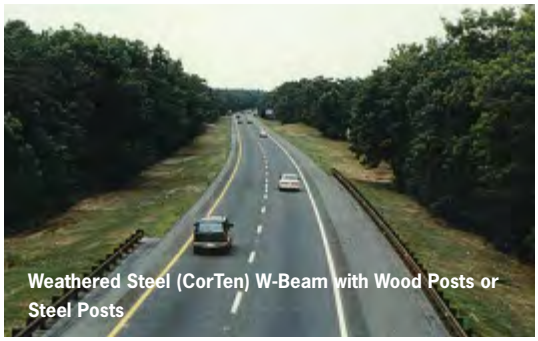
Stone Wall with Stone Cap	Stone wall with stone cap	Divided roadways; these may provide a more transparent alternative to the Jersey Barrier	Route 31 Dualization; Route 18 Section 2F, New Brunswick, NJ	Toolkit for Historic Roadways
Cable Barrier	Low or high tension steel wire ropes strung between weak posts	Typical guide rail found along high speed areas, bridges, along ditches and waterways	I-78, Hunterdon County, NJ	FHWA/NJDOT Approved Roadside Barrier Spreadsheet

Cable Barrier



W-Beam with Steel Posts with Routed Wood or Composite Blockouts

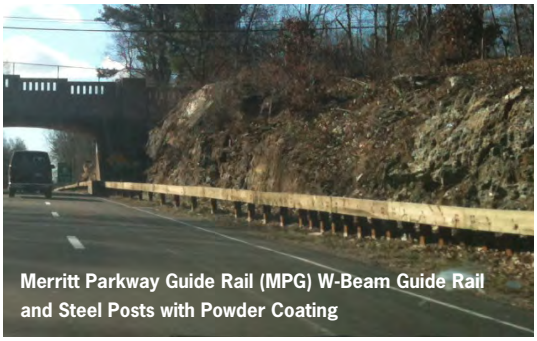
BARRIERS - ROADSIDE	Description	Appropriate Uses	Sample Locations	Source
W-Beam with Steel Posts with Routed Wood or Composite Blockouts	Consists of a galvanized steel rail with routed wood blockouts and steel posts	Typical guide rail found along high speed areas, bridges, along ditches and waterways	NJ, PA, OH, and many other states	Toolkit for Historic Roadways; FHWA/ NJDOT Approved Roadside Barrier Spreadsheet
W-Beam with Wood Posts	Consists of a galvanized steel rail with routed wood blockouts and wood posts	Typical guide rail found along high speed areas, bridges, along ditches and waterways	CA, OR, WA, IN, TX, and many other states	FHWA / NJDOT Approved Roadside Barrier Spreadsheet
Weathered Steel (CorTen) W-Beam with Wood Posts or Steel Posts	Standard w-beam guide rail made from weathering steel (ASTM A588)	Typical guide rail found along high speed areas, bridges, along ditches and waterways	Taconic State Parkway, NY; North Maple Avenue, Bernards Township, Somerset County, NJ; Garden State Parkway, NJ; Palisades Interstate Parkway, NJ and NY	FHWA / NJDOT Approved Roadside Barrier Spreadsheet
Iron Wood Guide Rail System (Proprietary Product)	Consists of a round timber rail with a thick steel channel embedded into and bolted to the timber rail; the post consists of a steel post with soil plate set into the soil; the above ground portion of the post is covered by a routed timber post	Typical guide rail found along high speed areas, bridges, along ditches and waterways	Watkins Glen Raceway, Watkins Glen, NY; Rocky Point, NY, Rockland County, NY and Jefferson County, NY	FHWA / NJDOT Approved Roadside Barrier Spreadsheet



Weathered Steel (CorTen) W-Beam with Wood Posts or Steel Posts

BARRIERS - ROADSIDE (CONTINUED)

	Description	Appropriate Uses	Sample Locations	Source
Merritt Parkway Guide Rail (MPG) W- Beam Guide Rail and Steel Posts with Powder Coating	Consists of a timber rail backed by a steel strap and splice plates; wood blockouts are structural shaped steel posts	Typical guide rail found along high speed areas, bridges, along ditches and waterways	Somerville Road, Bernards Township, Somerset County, NJ; Meritt Parkway, CT; Spring Valley Boulevard, Bernards Township, Somerset County, NJ	FHWA / NJDOT Approved Roadside Barrier Spreadsheet



Merritt Parkway Guide Rail (MPG) W-Beam Guide Rail and Steel Posts with Powder Coating

W-Beam Guide Rail and Wood Posts with Powder Coating

W-Beam Guide Rail and Steel Posts with Powder Coating	Same system as galvanized W-Beam with Steel Posts except a colored coating is applied in lieu of galvanizing	Typical guide rail found along high speed areas, bridges, along ditches and waterways	Route US 40, 12E MP 76.2, I-270, MD; Race Street, Vincentown, NJ; Chesterfield-Sykesville, Chesterfield, NJ; Route 179, Mt. Airy, NJ; Route 70, Bisphams Mills, NJ	Toolkit for Historic Roadways; FHWA/ NJDOT Approved Roadside Barrier Spreadsheet
W-Beam Guide Rail and Wood Posts with Powder Coating	Same system as galvanized W-Beam with Steel Posts except a colored coating is applied in lieu of galvanizing and posts are wood	Typical guide rail found along high speed areas, bridges, along ditches and waterways	Route 29, Hopewell Township, NJ	Toolkit for Historic Roadways; FHWA/ NJDOT Approved Roadside Barrier Spreadsheet

Thrie Beam with Wood or Steel Posts

Modified Thrie Beam

BARRIERS - ROADSIDE (CONTINUED)

	Description	Appropriate Uses	Sample Locations	Source
Thrie Beam with Wood or Steel Posts	This system consists of a Thrie Beam with a routed wood blockout; the posts are either wood or structural shape steel	Typical guide rail found along high speed areas, bridges, along ditches and waterways	WI, MD, OR, ID, and SD	FHWA / NJDOT Approved Roadside Barrier Spreadsheet
Stone Cast (Proprietary Product)	This system consists of reinforced concrete core and capped with stone and mortar to give it the appearance of a vertical-faced stone masonry wall	Typical guide rail found along high speed areas, bridges, along ditches and waterways	Letter of acceptance dated November 8, 2000	FHWA / NJDOT Approved Roadside Barrier Spreadsheet
Modified Thrie Beam	Consists of a Thrie Beam with a modified structural shape blockout	Typical guide rail found along high speed areas, bridges, along ditches and waterways	CO, OK, and IA	FHWA / NJDOT Approved Roadside Barrier Spreadsheet
Steel-backed Timber Guide Rail with Timber Posts	Consists of a wood rail backed with a steel plate and supported by timber posts; wood blockouts are used	Typical guide rail found along high speed areas, bridges, along ditches and waterways	North Maple Avenue, Bernards Township, Somerset County, NJ	FHWA / NJDOT Approved Roadside Barrier Spreadsheet

Steel-backed Timber Guide Rail with Timber Posts

Weak Post W-Beam with Steel Posts

Weak Post W-Beam with Steel Posts	Consists of W-Beam with structural shaped posts; soil plate is attached to each post	Not approved by NJDOT	CT, NY, PA, VA, and NC	FHWA / NJDOT Approved Roadside Barrier Spreadsheet

BARRIERS - ROADSIDE (CONTINUED)

	Description	Appropriate Uses	Sample Locations	Source
Weak-Post Steel Cable (3-Strand)	Consists of a flanged channel post with three wire ropes	Not approved by NJDOT	Route 84, CT; Route 684, NY	FHWA / NJDOT Approved Roadside Barrier Spreadsheet

Weak-Post Steel Cable (3-Strand)

Brifen Wire Rope Safety Fence

Brifen Wire Rope Safety Fence	Consists of four tensioned galvanized steel wire ropes supported by galvanized steel posts; the two upper ropes are located in a slot in the top of the posts, and the lower ropes are interwoven along the fence between each pair of posts	Not approved by NJDOT	Test location in Oklahoma City, OK	FHWA / NJDOT Approved Roadside Barrier Spreadsheet
Bollard	Cast iron, aluminum, concrete, granite, or wood; lighting option available with most designs and can be painted with a variety of colors; cast iron and aluminum bollards are concrete filled, and all bollards can be mounted on a concrete footing for stabilization	Define a roadway or pedestrian path, create boundaries between vehicular and pedestrian traffic, or can be used wherever subtle barriers are needed to separate uses	Route 29, Deck Park, Trenton, NJ; Route 18 2F, New Brunswick, NJ	NJDOT Staff

Bollard

BARRIERS – NON-APPROVED

	Description	Appropriate Uses	Sample Locations	Source

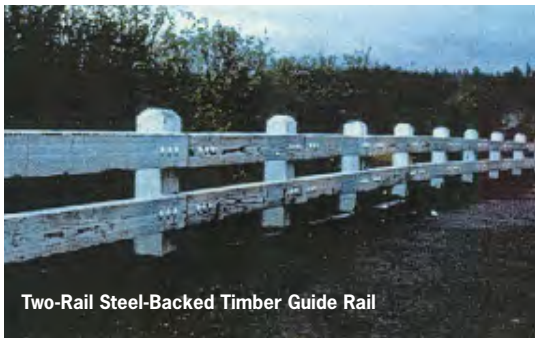
In 1993, the FHWA adopted performance evaluation guidelines for roadside barriers as set forth in NCHRP Report 350. Additional crash testing of the following roadside barriers must be conducted under the Report 350 guidelines; however, they have been in use in certain locations.

Stone Masonry Guidewall	Consists of a concrete footing, a tapered concrete core and stone cladding		Skyline Drive, VA; Route 117, NY; Foothills Parkway in eastern TN; Palisades Interstate Parkway, NY and NJ	FHWA / NJDOT Non-Approved Roadside Barriers Spreadsheet


Stone Masonry Guidewall


Pre-Cast Simulated Stone Guidewall

Pre-Cast Simulated Stone Guidewall	Precast simulated stone segments are in the form of an invert T placed on a concrete base on a compacted aggregate; an artificial stone cap is placed on top of the stem		Baltimore-Washington Parkway, MD	FHWA / NJDOT Non-Approved Roadside Barriers Spreadsheet


Two-Rail Steel-Backed Timber Guide Rail

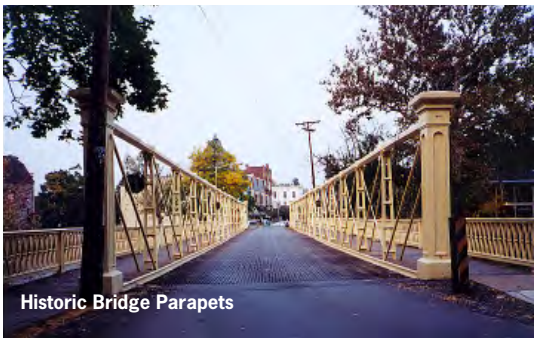
Steel-Backed Log Rail	Consists of a log rail with a steel splice plate and steel rail backing placed on log posts		Unknown whether system has been installed in the field	FHWA / NJDOT Non-Approved Roadside Barriers Spreadsheet
Two-Rail Steel-Backed Timber Guide Rail	Consists of two strips of wood rail backed with a steel plate and supported by timber posts		Columbia River Highway, OR	FHWA / NJDOT Non-Approved Roadside Barriers Spreadsheet

BRIDGE PARAPETS AND RAILINGS

	Description	Appropriate Uses	Sample Locations	Source
Concrete Parapet	Concrete parapets can be designed to include texture and repetition like historic parapet patterns; the finished mold can be stained and painted; treatments are intended to be pleasing for passing motorists and pedestrians	Bridge accent and historic replication and context sensitive treatments	Route 9 23J; Maple Avenue, Haddonfield, NJ; Roff Avenue over Route 46, Palisades Park, NJ	Toolkit for Historic Roadways; NJHPO staff
Modified Texas Open Concrete Parapet	Concrete parapet with open balustrade designed for vehicular traffic	Historic bridge parapet replication or context sensitive designs	Burnt Hill Road over Rock Brook, Skillman, NJ	NJHPO staff
Historic Bridge Parapets	Existing historic bridge parapets can sometimes be retained and rehabilitated, or retrofit if needed to meet safety standards	Historic bridges	Main Street Bridge, Clinton, NJ	NJHPO staff
Powder Coated Metal Bridge Railing	These railings can be historic railing replications or a historically compatible design element	Bridge accent, context sensitive design	Maple Avenue, Haddonfield, NJ	Toolkit for Historic Roadways


Concrete Parapet


Modified Texas Open Concrete Parapet


Historic Bridge Parapets

BRIDGE PARAPETS AND RAILINGS (CONTINUED)

	Description	Appropriate Uses	Sample Locations	Source
2-Bar Tubular Bridge Railing	2-bar tubular railing, similar to a stacked version of the Olmstead-designed Ball and Cap railing described below	Bridge accent	Route 47 over East Creek, Dennis Township, NJ	Toolkit for Historic Roadways


Powder Coated Metal Railing Bridge


2-Bar Tublular Bridge Railing

4-Bar Tubular Open Bridge Railing System	Consists of 4 tubular steel rail bars attached to steel tubular posts; more details are found in NJDOT Bridge Design Manual standard drawings 2.2-1 & 2.2-2	Provides better driver visibility due to its "see-through" nature; steel railing and posts can be color enhanced; for traffic and pedestrian use, where appropriate	Constructed on the new span of the Route 9 over Raritan River Bridge (Edison Bridge) to match the railing on the existing bridge; a sky blue fusion bonded finish coat was applied	Toolkit for Historic Roadways; FHWA / NJDOT Approved Bridge Railings Spreadsheet
Ball and Cap Railing	Ball and cap rail fence system/NJDOT specified. This design is by the Olmstead Brothers	Bridge accent on historically significant bridges, where appropriate	Washington Crossing, PA	Toolkit for Historic Roadways


4-Bar Tubular Open Bridge Railing System


Ball and Cap Railing

BRIDGE PARAPETS AND RAILINGS (CONTINUED)

	Description	Appropriate Uses	Sample Locations	Source
Historic Bridge Railings	Existing historic railings can sometimes be salvaged, refurbished and reused; this is preferred when the bridge is historically significant	Under the Secretary of the Interior's *Standards for Rehabilitation,* original historic fabric must be salvaged if at all possible; suitable for historic bridges	North Main Street, Vincentown, NJ	Toolkit for Historic Roadways

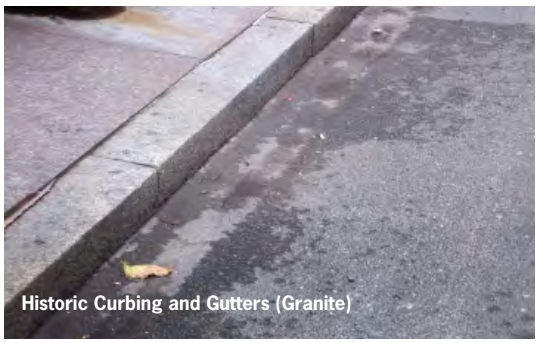
Historic Bridge Railings

Ornamental Steel Railing

Ornamental Steel Railing	Available in various styles and finishes	State scenic byways, historic roads and downtown area bridges where aesthetics are desired; provides a measure of safety for pedestrians	Madison Ave Bridge, Madison, NJ; Route 66/ Stonykill Road Bridge, Chatham, NY; Route 29, Deck Park, Trenton, NJ	Toolkit for Historic Roadways
815 mm High Parapet with Sidewalk	Concrete parapet can be surmounted with a one rail ornamental railing, or if required in urban areas, either a straight or curved vinyl-coated chain link fence			FHWA / NJDOT Approved Bridge Railings Spreadsheet
865 mm Tall Two Tube Curb Mounted Bridge Railing	Rail elements are made of structural steel tubing; posts and plates are made of structural steel	Can be used on local roads where heavy trucks are not present	Washington Avenue Bridge, Warren County, NJ; a decorative lattice was installed on the outside face of the railing Nassau Street, Princeton, NJ	FHWA / NJDOT Approved Bridge Railings Spreadsheet

CURBING

	Description	Appropriate Uses	Sample Locations	Source
Historic Curbing and Gutters	Historic curb and gutter materials can be retained and reused; if unit blocks, they can be re-set if out of alignment. Materials may include granite, slate, sandstone, bluestone, or others. If materials are compromised, they can be replaced in-kind	Where original or historic materials are present in historic districts or along historic roads		NJDOT/NJHPO staff
Standard Curbing	Concrete vertical curb; heights vary depending on need or existing conditions	Streetscape accent for local roads with pedestrian traffic	Statewide where curbing is required	Toolkit for Historic Roadways
Granite Curb and Brick or Granite Gutter	Granite curb with brick or granite gutter		Route 29 Deck Park, Trenton, NJ	Toolkit for Historic Roadways
Tinted Concrete Curb	Concrete curb tinted to match historic stone curb	Where concrete texture, form, and color can match existing or former historic stone curb	Route 49, Bridgeton, NJ	Toolkit for Historic Roadways



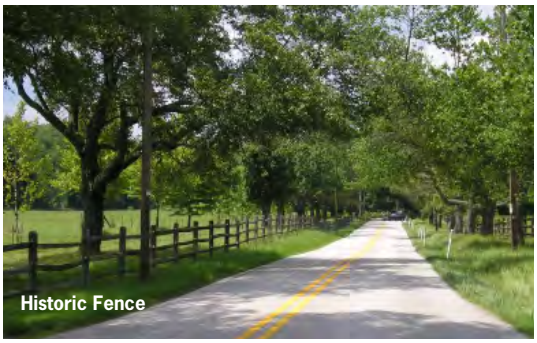
Historic Curbing and Gutters (Granite)

Tinted Concrete Curb

Standard Curbing

FENCING

	Description	Appropriate Uses	Sample Locations	Source
Historic Fence	Historic fences may be adjacent to the roadway, in materials such as wood, steel, or iron, of varying heights and design; these should be retained and rehabilitated where present	Along historic roadways; in historic districts; near historic properties	Route 52, Chester County, PA	

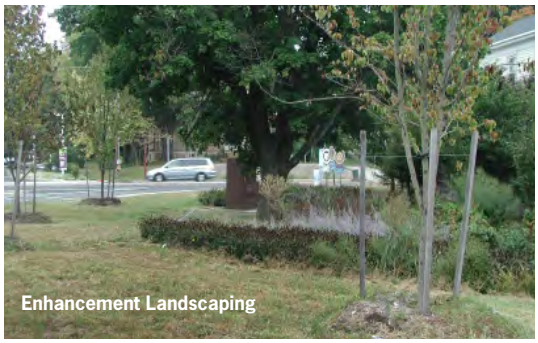


Historic Fence

Ornamental Fencing

Ornamental Fencing	Steel or aluminum fencing provides a strong, secure fence with an appealing open design that does not detract from landscaping; concrete bridge parapets may also be topped by this historically compatible and aesthetic fencing if safety standards are met and it is appropriate to the bridge or context	State scenic byways and historic roads, historic districts, park and ride facilities and downtown area bridges where ornamental aesthetics are desired	Route 29 Deck Park, Trenton, NJ; Route 47, Malaga, NJ	Toolkit for Historic Roadways

LANDSCAPING	Description	Appropriate Uses	Sample Locations	Source
Enhancement Landscaping	Often done to accentuate features in a community or to serve as a visual enhancement to a public space; seasonal color is used to accent areas of special importance and can add color and beauty along a roadway	High visibility "gateway" or business district areas, along village streets and park entrances	Route 46 at Piaget Avenue, Clifton, NJ; Route 208 at Fair Lawn Avenue, Fair Lawn, NJ; Route 29 Deck Park, Trenton, NJ; Good Neighbor areas; Route 12 Main Street Circle	Toolkit for Historic Roadways



Enhancement Landscaping

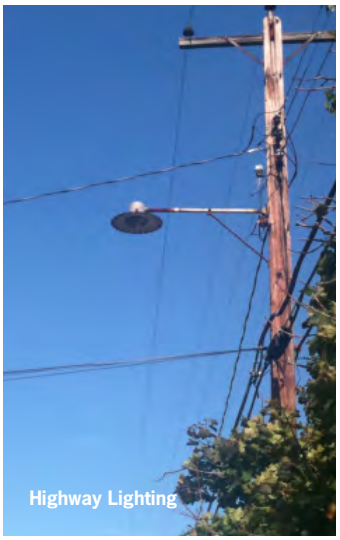
Functional Landscaping

Functional Landscaping	Landscaping can be designed to be functional and provide a context sensitive solution for issues like masking certain design features or providing natural barriers; plantings should be native or native-adaptive; examples might include creeping vines on a noise wall, tall grasses in a highway median, dense shrubbery, or thorny plants in appropriate locations	Carefully selected and placed plantings can offer an aesthetic barrier for light glare, can be used to soften the appearance of a concrete wall, screen utilities, or provide a barrier to access or light glare	Route 55 median, Cumberland County, NJ (grasses); Route 202, Readington, NJ	Toolkit for Historic Roadways

LIGHTING AND SIGNALS

	Description	Appropriate Uses	Sample Locations	Source
Historic Lighting	Historic light poles and fixtures can sometimes be retained, rehabilitated, and retrofitted for reuse	Along historic roadways and in historic districts	Wyoming, NY	
Pedestrian Lighting	Aluminum, cast iron, and steel products available from various manufacturers. Units with a decorative style can be used to provide either non-functional accent lighting or used as pedestrian/bike path lighting; multiple styles are available	Multi-purpose walkways and sidewalk lighting, depending upon the fixture used and the design criteria; design of period lighting for historical locations should be determined by documentation of historic light fixtures at or near the location, or appropriate to the period of the historic road or surrounding context	Liberty State Park, Jersey City, NJ; Route 130 and Horizon Boulevard, Mercer County, NJ; Route 18 2F, New Brunswick, NJ; Route 29, Deck Park, Trenton, NJ; Route 124, Madison, NJ; Route 28, Westfield, NJ; Route 71, Bradley Beach, NJ; Route 40, Woodstown, NJ; Route 87, Atlantic City, NJ	Toolkit for Historic Roadways; Alternative Treatments for Signals and Lighting Spreadsheet

Pedestrian Lighting


Highway Lighting

LIGHTING AND SIGNALS (CONTINUED)

	Description	Appropriate Uses	Sample Locations	Source
Highway Lighting	Steel lighting mast arm that is used at signalized intersections, often mounted to a wood pole; Standard length of arm is 20'; requires taller pole to achieve proper mounting height of lighting fixture; mast arm can be painted a high-gloss black or powder-coated for aesthetics	Potentially along Good Roads or Highway Era historic roads; along a historic highway, near historic resources, or in historic communities where a coordinated scheme is desired or sought; the light pole may be painted	Route 130 and Independence Boulevard, North Brunswick Township, NJ	NJ DOT Staff
Bridge-Mounted Highway Lighting	Bridge-mounted aluminum lighting assembly using vibration reducing mast arm; fixture is 150 watt high pressure sodium vertical mounted unit; entire assembly has a factory-ordered, powder-coated, high-gloss white finish; aluminum finish is standard	Potentially along Highway Era historic or replacement bridges; vibration reducing arm is ideal for bridges prone to high winds or heavy vehicular traffic; poles with standard mast arms and appropriate lighting fixture can be ordered with a colorized powder-coated finish pending approval by NJDOT to enhance the beauty and uniqueness of a structure	Route 37 Westbound, Tunney Bridge, Dover Township, Ocean County, NJ (white poles); Route 78, Watchung, NJ (brown poles)	Toolkit for Historic Roadways; Alternative Treatments for Signals and Lighting Spreadsheet

Bridge-Mounted Highway Lighting

LIGHTING AND SIGNALS (CONTINUED)

	Description	Appropriate Uses	Sample Locations	Source
Ornamental Highway Lighting	Aluminum, cast iron, and steel products are available from various manufacturers		Route 35 Coopers Bridge over Navasink River; Route 46 bridge over Passaic River; Proposed: Route 206 15J, Somerville, NJ (standard breakaway pole with ornamental arm & fixture)	Alternative Treatments for Signals and Lighting Spreadsheet
Aluminum Signal Assembly	Aluminum pole & arm; aluminum finish is standard, but colors can be special ordered		Brown - Route 57, Hacketstown, NJ; black - Route 88, Lakewood, NJ	Alternative Treatments for Signals and Lighting Spreadsheet
Steel Signal Assembly	Galvanized steel pole and arm (required if signal arm is longer than 25 feet)	Central business districts, some historic district intersections	Route 206 and Dukes Parkway East, Hillsborough Township, NJ	Toolkit for Historic Roadways; Alternative Treatments for Signals and Lighting Spreadsheet

Steel Signal Assembly

Electrical Cabinets

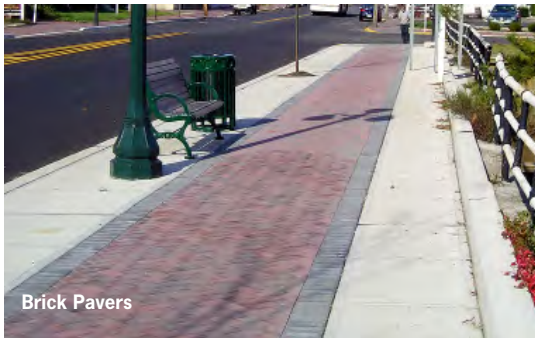
Colored Electrical Cabinets	Aluminum electrical cabinet; aluminum finish is standard, but specific colors can be ordered	In areas where cabinets may be intrusive to the context of the surrounding area	Route 124, Morristown, NJ (beige): Route 40, Hamilton, NJ (green); Route 124, Madison, NJ (green); Route 47, Dennisville, NJ (black)	Alternative Treatments for Signals and Lighting Spreadsheet

PAVING: ROADWAY, CROSSWALKS AND SIDEWALKS

	Description	Appropriate Uses	Sample Locations	Source
Pavement - General	Alternative surface treatments; acts to calm traffic and vary the overall look and feel of a site; can be stamped or scored, or it can be wet or dry laid pavers; an unlimited number of patterns is available; there are also a number of different colors; paver types and poured surfaces can be used in combination	Traffic calming, streetscape accent, city center definition	Route 29, Deck Park, Trenton, NJ; Avon by the Sea, NJ; Market Street, Trenton, NJ	Toolkit for Historic Roadways
Concrete Block Pavers	Can be dry or wet laid; can be different color and sizes to create visual patterns, or alter roadway texture for traffic calming	Sidewalks, pedestrian paths, accent areas, streetscape elements	Trenton Thunder Baseball Stadium, Trenton, NJ; Route 1 over Conrail; Route 18 2F, New Brunswick, NJ; Route 71, Avon by the Sea, NJ	Toolkit for Historic Roadways
Brick Pavers	Can be dry or wet laid; wet laid is more permanent; the Hastings installation method uses a concrete base and a graded bituminous setting base that supports the paving blocks	Sidewalks, pedestrian areas	Market Street, Trenton, NJ; Route 29, Deck Park, Trenton, NJ; Route 71, Freehold Park, NJ	Toolkit for Historic Roadways


Pavement - General


Conctrete Block Pavers


Brick Pavers

PAVING: ROADWAY, CROSSWALKS AND SIDEWALKS (CONTINUED)

	Description	Appropriate Uses	Sample Locations	Source
Granite Pavers	Granite pavers placed in a running bond pattern; may be wet or dry laid; crosswalks may have concrete borders	Streetscapes, pedestrian paths, crosswalks	Route 57, Beattystown, NJ (beige)	Toolkit for Historic Roadways


Granite Pavers

Chip Seal or "Chip and Seal"

Chip Seal or "Chip and Seal"	Modified epoxy resin product that is applied to existing paving materials to create a sealed, paved surface; can be ordered in different colors. TyreGrip, Safe-T-Grip, and Traffic Grip are proprietary products.	Can be used to differentiate vehicle lanes from shoulders, preserving the historic look of the road while providing a safe shoulder travel surface or bike lane	Route 29, Deck Park, Trenton, NJ; Route 28, Westfield, NJ	NJDOT staff

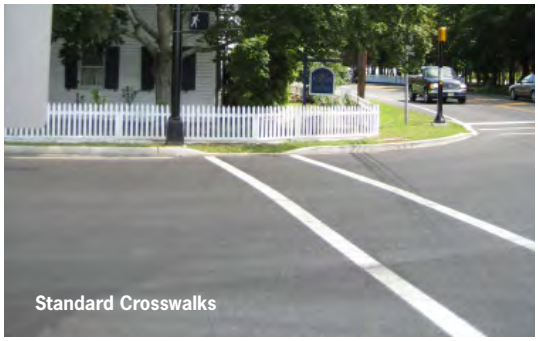

Thermoplastic Pavement Markings


Grass Shoulder/Pulloff Areas

PAVING: ROADWAY, CROSSWALKS AND SIDEWALKS (CONTINUED)

	Description	Appropriate Uses	Sample Locations	Source
Thermoplastic Pavement Markings	A hot thermoplastic paint mix resulting in durable roadway markings, such as lane markings and pavement-based signs	Delineate traffic lanes, turn lanes, bike lanes, and incorporate signage into paving surface, such as "slow" or similar signs	Route 57, Beattystown, NJ	Toolkit for Historic Roadways
Grass Shoulder/ Pulloff Areas	A structural grass shoulder or pulloff area, constructed over geoblock	In rural areas or areas where preservation of the cartway is important, but a safe pulloff area is needed	Foothills Parkway, Great Smoky Mountains National Park, TN	FHWA website
Grass Shoulder/ Sidewalk with Geogrid	Interlocking geogrids allow grass to grow, yet have the strength to act as a permeable shoulder or sidewalk	Roadways that historically had no paved shoulder or sidewalk, but need these functions	Race Street, Vincentown, NJ	Toolkit for Historic Roadways

Grass Shoulder/Sidewalk with Geogrid



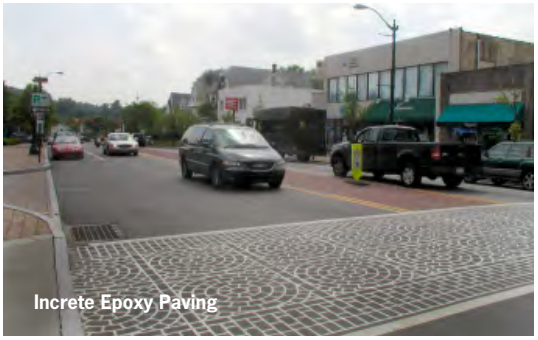
Standard Crosswalks

Standard Crosswalks	Defines the pedestrian right of way; the standard is delineated by the use of striping; striping is done by the use of a long-life thermoplastic paint	To define the pedestrian right of way	Most crosswalks installed by NJDOT	NJDOT Staff

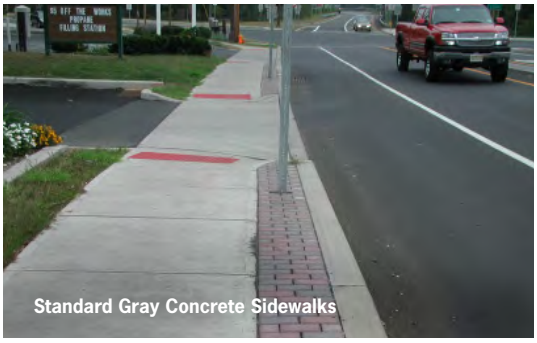
PAVING: ROADWAY, CROSSWALKS AND SIDEWALKS (CONTINUED)

	Description	Appropriate Uses	Sample Locations	Source
Brick Crosswalks/ Sidewalks	Defines the pedestrian right of way; brick is the main part with a concrete header bordering the brick	To define the pedestrian right of way; traffic calming	Route 29 Deck Park, Trenton, NJ	Toolkit for Historic Roadways


Brick Crosswalks/Sidewalks


Increte Epoxy Paving

Increte Epoxy Paving	Bituminous asphalt is installed; the bituminous surface is then stamped and colored; patterns, colors, and textures should be appropriate to the historic roadway or surrounding context	Accent areas, bike lanes, crosswalks, entrances, medians, parking lots, plazas, sidewalks, traffic calming, and driveways	Bernardsville streetscape project; Route 202, north of Bernardsville, NJ; Route 28, Westfield Circle, NJ; Darrah Lane, Lawrence Township, Trenton, NJ	Toolkit for Historic Roadways
Standard Gray Concrete Sidewalks	Standard gray concrete in accordance with Section 607.06 of the standard specifications	Streetscapes, pedestrian paths; most common type of sidewalk	Majority of sidewalks installed by NJDOT	NJDOT Staff


Standard Gray Concrete Sidewalks


Scored Gray Concrete Sidewalks

PAVING: ROADWAY, CROSSWALKS AND SIDEWALKS (CONTINUED)

	Description	Appropriate Uses	Sample Locations	Source
Scored Gray Concrete Sidewalks	Standard gray sidewalk is installed and then scored to simulate a specified architectural pattern	Streetscapes, pedestrian paths	Route 19 - 2M, Paterson, NJ; Route 18 - 2F, New Brunswick, NJ	NJDOT Staff
Stamped and Tinted Concrete Sidewalks	Same material as regular concrete sidewalk, except color tint is added either integrally during the batching process or colored tinting is applied as a dust-on color. The concrete surface is then stamped with textured mats to simulate a stone or block pattern	Streetscapes, pedestrian paths, or as a design element	Bernardsville Streetscape Project; Route 29, Deck Park, Trenton, NJ; Main Street sidewalks, Hackettstown, NJ	Toolkit for Historic Roadways

Stamped and Tinted Concrete Sidewalks

Exposed Aggregate Concrete Sidewalks and Curbs

Exposed Aggregate Concrete Sidewalks and Curbs	Use of exposed aggregate concrete to mimic a historic type of sidewalk treatment	In certain historic districts, or where appropriate along historic roadways	Route 49, Cohansey River Bridge, Bridgeton, NJ	Toolkit for Historic Roadways

SIGNAGE

	Description	Appropriate Uses	Sample Locations	Source
Colored Mast Arm-Mounted Street Name Sign	Powder-coated (black) traffic signal pole and mast-arm; street signs and signals hang from the mast, minimizing roadside signage; street name sign matches municipal standard	Central business districts; designated centers	Rt. 206 and Dukes Parkway East, Hillsborough Township, NJ; Broad and Market Streets, Trenton, NJ	Toolkit for Historic Roadways

Colored Mast Arm-Mounted Street Name Sign

Standard NJ Historical Marker Sign

Standard NJ Historical Marker Sign	Blue and white sign with state seal, conveying historical information; can be designed and printed in-house in NJDOT's Sign Shop	Along the roadway or pedestrian/bicycle path	Hightstown Bypass, Hightstown, NJ; Routes 47 & 83, Dennisville, NJ; Route 9 Bennett's Crossing, Cape May, NJ	Toolkit for Historic Roadways
Thermoplastic Pavement Markings	A hot thermoplastic paint mix resulting in durable roadway markings, such as lane markings and pavement-based signs	Incorporate signage into paving surface, such as "slow," curve warnings, bike lanes, or similar signs	Route 173, Clinton, NJ; Route 71, Avon, NJ; Alexander Road Bridge, West Windsor, NJ	Toolkit for Historic Roadways

Thermoplastic Pavement Markings

SIGNAGE (CONTINUED)	Description	Appropriate Uses	Sample Locations	Source
Cast Aluminum Interpretive Signs	Cast aluminum signs with raised lettering and graphics. Can be made in a standard or custom shape; several manufacturers, including Sewah Studios	Specialty signs, often used for interpretation or to mark the current or former location of a historic site	Route 206 over Blacks Creek, NJ	NJHPO staff
Historic Signs	Historic and original directional or information signs	When historic signs are in good condition and can remain in place or in a nearby suitable location; replicas are acceptable	Atsion Lake, Hammonton, NJ (replica); Route 206 over Blacks Creek, NJ; Malaga Lake, Salem County, NJ	Toolkit for Historic Roadways

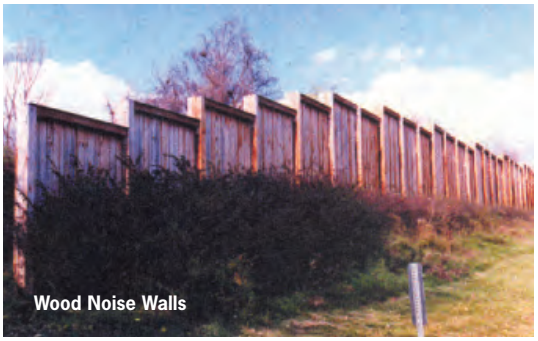
Cast Aluminum Interpretive Signs

Historic Signs

WALL TREATMENTS

	Description	Appropriate Uses	Sample Locations	Source
Wall Treatments – Formliners and Stamps	A formliner finish or stamped pattern found on the outside of the wall; can be a texture and/or a color; color can be added integrally or painted; standard and custom designs and colors available	To be used on retaining walls, noise walls, or median barriers; aesthetic treatments can be used to enhance the cultural, natural, or historic character of the area	Route 18 2A, Piscataway, NJ (random cut stone); Route 29, Deck Park, Trenton, NJ; Route 31, Readington, NJ; Chinatown, Philadelphia, PA (faux brick wall)	Toolkit for Historic Roadways

Wall Treatments - Formliners and Stamps



Wood Noise Walls

Wood Noise Walls	Specially designed structures, commonly post and panel type construction; built when noise impact studies are conducted and certain conditions and noise levels are found	High-volume traffic areas such as multi-lane highways and interstate roads warrant noise walls to provide relief for residents from traffic noise; also serve as safety barriers to enhance appearance and to screen highways from homes	Route 195, Hamilton, NJ; Route 95, Ewing, NJ; Route 55, Deptford, NJ	NJDOT Staff

Concrete Noise walls

WALL TREATMENTS (CONTINUED)

	Description	Appropriate Uses	Sample Locations	Source
Concrete Noise Walls	Specially designed structures, commonly post and panel construction built to reduce highway noise levels created by highway traffic; built when noise impact studies are conducted and certain conditions are met	High-volume traffic areas such as highways, and to provide relief for local residents from traffic noise; serve as safety barriers to enhance appearance and to screen highways from residents	Route 18 2A, Piscataway, NJ; Route 280, Essex County, NJ; Route 287, Bridgewater, NJ; Route 295, Camden County, NJ	NJDOT Staff
Transparent Noise Walls	Specially designed structures, commonly post and panel type construction; built when noise impact studies are conducted and certain conditions and noise levels are found	To be used where noise is an issue and views to/ from a historic resource are blocked	Route 18, 2F, New Brunswick, NJ	Toolkit for Historic Roadways
Landscape Screening	Use of trees, shrubs, climbing vines, or other plant materials to screen walls from view	Where noise walls are needed but would be visually intrusive, and landscaping or vegetation is appropriate	Route 202, Readington, NJ	Toolkit for Historic Roadways


Transparent Noise Walls


Landscape Stcreening

INDEX