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Final Case Study for the National Scenic Byways Study

Creative Landscape Design Solutions in
Scenic Byways

Scenic **BYWAYS**



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Final Case Study
for the
National Scenic Byways Study

**CREATIVE LANDSCAPE DESIGN SOLUTIONS
in SCENIC BYWAYS**

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The Federal Highway Administration

Submitted by
The American Society of Landscape Architects

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EXECUTIVE SUMMARY

This study identifies examples of landscape design which accommodate development while enhancing scenic highway environments. It describes design and planning considerations which can help incorporate creative landscape design solutions in scenic highways. The analytic approach identifies a range of notable and award-winning examples of landscape design solutions for scenic highways, analyzes how positive and negative scenic values associated with those highway environments were handled in the design process, and describes the key factors which led to creative landscape design solutions in case study examples.

Critical landscape design elements found in a range of notable scenic highway design solutions include: The notion of a "landscape unit" associated with a given road segment as experienced by different travelers moving in different directions; scenic components such as distinct landforms, patterns of vegetation, vistas, water bodies, cultural and manmade elements, and the prominence of each of these components as seen in the view from the road; the "unity" or harmony of these components with one another in the scenic landscape; the "intactness" -- integrity or extent to which development is handled or allowed to encroach into the scenic environment; and the uniqueness, or relative scarcity, of a given scenic resource along a road segment or within a landscape unit.

Effective landscape design approaches for scenic highways are those which enhance positive scenic values and mitigate negative scenic values. These values are typically determined by survey methods which incorporate highway users, local residents, and visual resource planners. Some of the positive scenic values examined in this study include: vegetation (forest patterns and edges, agricultural patterns, spatial definition by trees, etc.), landscape features (panoramas, rock outcrops, skylines, etc.), roadway characteristics (conformance to topography, surface, design speed, etc.), water bodies (lakes, rivers, wetlands, etc.), and cultural and man-made structures (buildings, walls, bridges, etc.). Some of the negative scenic values examined in this study include: landscape scars (erosion, clear-cuts, etc.), clutter development (uncontrolled strip development, conflicting land uses, etc.), and encroachment in the scenic landscape (inappropriate signage, dilapidated buildings, landfills, etc.).

Landscape design factors considered in the scenic highway planning process include: landscape analysis in the scenic resource inventory, recognition of landscape interest by the motorist/user, landscape design considerations in determining roadway geometry, creative design treatment of roadside and corridor development, and design of roadway structures consistent with surrounding scenic landscapes.

Case examples reviewed include: Arkansas S.H. 7 (Harrison to Hot Springs), U.S. 285 (Morrison CO to Taos NM), the Colorado Peak-to-Peak Highway (Estes Park to Central City), Colorado Mining Frontier Roads, Oklahoma/Kansas Prairie Route (Pawhuska to Manhattan KS), Texas Hill Country (U.S. 281/290), and Vail Pass (I-70, CO).

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1. INTRODUCTION

The concept and implementation of scenic byways takes on many dimensions in this country. Some view it simply as an act of designation -- hang out a few signs and it's done. Others see scenic byways as a much more involved process of location, design, and management, with almost incidental designation, and perhaps forgetful maintenance.

We all enjoy those magnificent and unique American parkways constructed solely to give us visual and traveling enjoyment. We all relish the immaculate landscapes and village scenes of New England. Most of us are awestruck by the spaciousness of the western landscape. Travel posters of the long cultured and inhabited landscapes of Europe entice us all to travel those scenic byways.

But what of the industrial landscapes of Western Pennsylvania, the expansive deserts of Nevada, or the swampy bayous and marshes of the Southeast? These landscapes are also deserving of presentation to the traveling public in an enjoyable and safe way.

The public's perceptions of scenic roads, beauty, and visual quality are analogous to that famous saying by a Supreme Court justice regarding pornography: "I can't describe it, but I know it when I see it!" And yet there are identifiable standards and

guidelines to measure the success of a scenic byway. There are certainly numerous promoters of the art of scenic roadways, ranging from many state highway organizations, to Chambers of Commerce, the American Automobile Association, and practically anyone who takes pleasure in the journey, not just arriving at the destination.

Regardless of conscious perceptions of the traveler, "scenic" objectively does apply to the landscape viewed from the road, rather than just the roadway itself. This study identifies landscape design elements that affect the scenic attributes of a road environment in both a macro and a micro sense. At the larger, macro scale this study examines key landscape planning aspects of the scenic corridor. At the smaller, micro scale, those detailed landscape elements which contribute to or detract from the scenic experience are examined.

2. THE SCENIC CORRIDOR

This study identifies examples of landscape design which accommodate new and existing development while enhancing scenic highway environments and describes design and planning processes which led up to those successes. And yet, roadway design in the architectural, engineering, and landscape sense of the word may only play a somewhat secondary role in the success of a scenic byway. The landscape context for that design is very important.

At the same time, design of the road itself in the narrow

sense has a great deal of impact on the success of roads constructed solely for scenic traveling, such as the Blue Ridge Parkway or the Mount Vernon Memorial Highway. But design influence is less obvious on those thousands of miles of roads in this country which were designed as simply utilitarian routes, but are acclaimed, nonetheless, for their scenic attributes. Therefore, it is believed that corridor characteristics, or macro-design elements, are significantly more important than micro-design elements for this latter class of existing routes. Micro-design aspects, however, are critical when roadway improvements are being considered, and can lead to a "complete road," one exemplifying the attributes of utility, safety, economy, and scenic beauty.

In this study, elements which contribute to the character of the scenic byway are outlined. Then, design elements contributing to the successful scenic experience of the byway are described. Finally, several examples of roads acclaimed for their design considerations as scenic corridors are discussed along with the impacts, positive and negative, on those scenic values. Within this study's scope limitations, these thoughts are developed on as wide a geographical basis as possible.

Attempts are made to illustrate those situations where economic development has been accommodated within a scenic road corridor and how the adversities of such development have been mitigated through landscape design and planning. This is an extremely important concept, for too often the

scenic road concept is thought to be limited to natural-appearing landscapes, rather than the variety of cultural ones. And yet, as noted above, many of the visual delights from the road are the pleasant townscapes, well-tended farms, and even the sculptural drama of an industrial landscape.

It is not surprising that the attributes of the corridor have more to do with the scenic quality of the road than the road itself. The road is but a means to an end, and if it carries one through an attractive setting, it is a work of art in itself, and a "bonus." But just what are those corridor attributes which contribute to scenic quality?

2.1. Landscape Units

Even the shortest of scenic corridors is difficult to analyze in its totality. Most analysts, therefore, have divided the scenic corridor into subordinate units for purposes of study. Most accept the lateral boundary of the scenic road as the viewed area, or "viewshed," of varying width. But there is also a fair amount of diversity in how to divide the roadway up longitudinally.

Some planners assume a very arbitrary approach, that is, dividing up the road into fixed segments based on miles or tens-of-miles. Another technique simply adopts political boundaries -- townships, counties, etc. A third method takes a more natural approach by identifying units of the landscape based on common physiographic or land use characteristics in a "scenic corridor."

All of these methodologies can be acceptable and useful, depending on the situation at hand. But what is important is that they all focus on the same elements of the landscape, while using varying systems of value judgment. Here again, as many scenic road studies point out, there is a wide range of value and judgment associated with scenic road evaluation.

These value judgments may range from the very simple (such as yes and no responses, or positive and negative values) to more complex qualitative ones. In a classic scenic design study for the Washington State DOT, planners developed a value judgment system using scenic criteria such as:

* Vividness or the memorability of a scene -- The distinctiveness, diversity, and contrast of visual impressions, derived from qualitative assessments of landform, waterform, vegetation, and built forms.

* Intactness or wholeness -- A measure of the degree of natural condition of the landscape, the degree of landscape modification by man, and the degree of visual disruption by encroachment.

* Unity or harmony of its parts -- A measure of scenic compositional harmony, derived from the congruence of built forms with nature and the overall unity of the elements of the view.

All of these measures attempt to judge and quantify scenic values to deal with the two major categories of landscape elements affecting the corridor: Those of natural elements and built elements. What is important in all these evaluations is the relationship between these two.

2.2. Natural Elements

All natural landscapes are inherently attractive, some more than others, some spectacular, others subtle.

Landforms invariably provide a measure of scenic beauty. Rolling and mountainous terrain is universally viewed as more attractive than flat. Rolling terrain gives opportunities for panoramic and distant views. Diversity is assured. Landform features, such as rocky outcrops, cliffs, and erosion formations add to this diversity and provide landscape accent.

Yet many flat landscapes can also be superbly scenic. Consider the Everglades of south Florida and the Marshes of Glen of coastal Georgia: Diversity seems to be the key here, since these landscapes are far from monotonous. Open water areas, hummocks of differing vegetation, and ecosystem richness make these landform-poor landscapes exceedingly attractive.

Water itself is a very important component of the visual landscape as well as a sustaining factor in all landscapes. Visible bodies of water such as streams, lakes, and wetlands add immeasurably to the diversity and scenic value of a roadside environment. Even man-made water features, such as reservoirs

and irrigation channels, can be considered scenic attributes. Certain water features, such as waterfalls, river views, and beaver ponds also deserve special treatment on the scenic byway.

Vegetation plays an important design role in the view from the road. Patterns of vegetation, diversity of species, roadside shade trees all add materially to the scenic view. Seasonal floral displays and fall or winter color can also be considered positive attributes of a scenic byway. Often trees are the major ingredient, but other vegetation can be as important. For instance, wildflowers are increasingly becoming an important consideration in the roadside view.

In some regions of the country, evergreen shrubs, such as rhododendron and laurel, are the focus of festivals, tours, and caravans. Even landscapes dominated by grasses, such as marshlands and prairie environments, have their advocates.

2.3. Man-made Features

The single-most important visual factor in a scenic byway seems to be the character of development in the foreground and mid-ground view. An uncluttered landscape -- one without the jarring cacophony of billboards, junkyards, and trashed properties -- appeals to practically all eyes. It is the simple landscape, especially in a rural setting, which seems most attractive. Admittedly, it is difficult to quantify "nonclutter" and "simplicity," but these subjective factors seem to be most important in the scenic experience.

Man-made vegetation patterns such as orchards, croplands, hay meadows, and gardens convey a sense of orderliness and neatness to the landscape. The beautiful scenic roadscapes of rural France and Italy are often embellished by continuous rows of trees, providing definition to the roadway and framing views for the traveler.

Strip development is anathema to the scenic road. Especially in rural settings, views of strip developments can be avoided by consciously encouraging a meandering scenic edge. In this case, the edge of development should have a varying set-back from the highway. Scenically, the most debilitating strip developments are those urban-edge, garish, commercial zones where each establishment seeks to outdo its competitor.

Obviously, in an urban setting, strip development can be the very essence of the city. Here then, the scenic byway may assist attempts to maintain an attractive street scene, fronted by well-maintained, even loved, architecture.

While certain forms of strip development are objectionable, all development is certainly not. Cultural development along a byway adds materially to the interest of the route and to scenic values. Picturesque farmsteads, historic buildings, and notable architecture are positive elements. Within an appropriate landscape context, industrial works such as refineries, steel mills, and paper plants can also be attractive and captivating elements of the roadside.

Man-made elements can thus have both positive and negative

influences on the scenic byway. Other positive examples include well-kept fences and walls, parks and managed open spaces, and monuments and historic districts.

Buildings and other roadside structures greatly influence visual quality. Inappropriate and dilapidated buildings, oversized and inharmonious signs, junkyards and cluttered yards, disorderly storage facilities and tanks, all create negative scenic value. Facilities and services associated with the automobile can especially affect the qualities of the roadside. Open auto sales lots with all their appurtenant glitter, gas stations, and auto repair facilities are particularly difficult to handle in the scenic byway design context.

Utility lines (such as telephone or low volume power lines) often adversely affect scenic values. Where feasible, these should be placed underground. Of course, there will invariably be crossings of major transmission lines over the scenic byway, and these need to be treated carefully, crossing at or near right angles, with appropriate screening. Similarly, cleared corridors and substations need special landscape design and architectural treatment to minimize their negative scenic impacts. While few transmission towers are architecturally attractive, some are better than others, especially if sited appropriately.

Signs -- whether public or private -- deserve special attention. Signage should be minimal and outdoor advertising rigorously controlled. The size, height, number, and type of

on-premise signs should be limited to the size necessary for identification. Off-premise outdoor advertising should be prohibited along the scenic byway, and existing advertising signs eliminated. Well-designed information panels and stations should be provided at rest areas or commercial information sites.

Raw, degraded landscapes, either temporary, or semi-permanent, are negative influences which can seriously detract from the scenic view. Unlandscaped, eroding construction scars are among the most common, but also the most conducive to corrective action. Timbering operations can decimate the natural scenery, at least temporarily, but can be easily mitigated by a screen of trees and management of the operation with an eye toward the visual resource.

Mining operations and aggregate extraction can present awesome problems in landscape restoration, but modern technologies of planned extraction and post-mining reclamation are making notable achievements in restoring scenic values to these degraded landscapes. Some of the most prevalent activities of this sort associated with roads are borrow pits and spoil areas. Operations in these areas should be developed with an eye to the future, not solely the short-term functional requirements.

2.4. Management of the Visual Resource

As noted in the discussion above, many elements of the roadside environment can have either a positive or negative impact on visual quality. However, even positive scenic elements

can even be neutralized by mismanagement. Thus, management and maintenance of the scenic resources within the corridor greatly influence scenic quality. A dilapidated structure near the road can spoil the setting, while the same structure carefully maintained can have a positive scenic influence. Another otherwise handsome building, painted with an outrageous or inharmonious color, can be similarly distracting. For example, contrast a contour-farmed field with one eroding due to poor management. A well-managed woodlot contrasts sharply with an untended one, both visually and economically.

An important landscape management factor of the corridor affecting scenic quality is land use. Diversity of land use is commonplace, and yet some uses, such as strip mining and logging, while adding diversity, can have highly visible negative impacts on scenic quality. One important scenic design aspect of land use as it relates to scenic byway development is that roadside land use be allowed to sweep across the roadway, rather than allowing the roadway to form an enclosed tunnel through a landscape. Land use regulations which protect wetlands and streams edges, encourage husbandry of the landscape, support preservation of historic values, regulate building heights and setbacks, and control adverse development can contribute greatly to scenic byway values.

The scenic byway should respect and capture the essence of a region through its integration with these land uses. A scenic byway feels a part of the landscape, rather than a structure on

it, and "lays lightly on the land."

The immediate foreground of a scenic byway can be protected through wider than usual right-of-way acquisition, though this is often infeasible once development has occurred. Scenic easements are useful, but can pose management difficulties and may offer only marginal savings compared to fee title acquisition.

Transfer of development rights is a relatively recent concept which can be applied to scenic byways to encourage clustering, reduce strip development, and preserve openness. Local planning and zoning can also protect scenic corridors if applied early enough in the process, where the zoning concept is broadly accepted, and where public participation brings about consensus on the importance of aesthetic values.

Management of vegetation is extremely important to scenic protection. Simple approaches to managing vegetation like maintaining vistas, sculpturing the road's mowed edge, contouring of farm fields, and preserving choice tree stands and specimens all contribute to the beauty of the scenic byway.

3. DESIGN ATTRIBUTES AFFECTING SCENIC QUALITY

The location, design, and construction of roadways has a significant impact on their scenic quality, as well as their safety. For those roads marginally scenic, good design practices can make the difference in a road being rather ordinary and one that is high in scenic value and "enjoyability." The Natchez

Trace Parkway in Tennessee, Alabama, and Mississippi is a good example of this. Here, an historic route through relatively unspectacular countryside emerges as a scenic road, brought about through sensitive design of the roadway itself and its roadside development.

Among the most enjoyable of scenic roads are our national parkways, the Natchez Trace among them. Parkway are really linear parks threaded by a motor road, with limited access, no commercial traffic, smooth-flowing alignment, and a wide right-of-way. Their location, design, and construction principles can assist in defining the design attributes of a scenic byway, and in forming its standards and guidelines.

Scenic byways encompass existing roads as well as newly designed and constructed routes sometimes identified as parkways. Parkway, in contrast to most commercial highways, are designed with the motorist in mind. There is a major effort to fit the road to the landscape and minimize environmental disturbance. Parkway are designed as sculptural objects within the landscape to provide physical, visual, and intellectual access to the landscape.

Due to this multiplicity of purpose, parkways are designed by teams of landscape architects and highway engineers. Each brings its unique professional viewpoint and value system. The result is a "complete road," with four carefully interwoven attributes -- utility, safety, economy, and aesthetics. It is important to note that aesthetics do not stand alone as the

principle characteristic of parkways. Travel functionality is an essential component in a balanced scenic byway.

3.1. Environment as a Design Influence

Environmental constraints have substantial influence on the design of a parkway or scenic byway. These constraints include the physical elements of terrain, vegetation, drainage, and intangible open space values of neighborhood and scenery. Ignoring these environmental constraints can lead to costly mistakes as well as imperil the visual quality, scenic opportunities, and public support of the road.

Terrain also has a great impact on road design. A scenic byway should flow gently with the landform, capturing view points and providing a diverse landscape scene. Scenic byways should deal effectively with drainage, maintaining hydrologic systems, and preserve wetlands. Natural drainage patterns are maintained to avoid the damming effect of roadway embankments. Special design treatments are used to prevent soil erosion and stream sedimentation.

Preservation of existing native vegetation not only can save money, but can provide immediate amenity to the byway. Too often the right-of-way is cleared from edge to edge to simplify new construction. Often billboard companies attempt to keep it that way. Where replanting is attempted, sometimes with exotic plants which can be out of character and out of scale, the new plants are soon overwhelmed by more hardy native plants.

Plant materials can enhance the travelway, provide shading, screen objectionable views, and frame vistas. Artificiality should be avoided, especially the use of exotic plant materials. Preservation of the natural vegetative character of the corridor through which the road flows should be encouraged. Maintaining existing vegetation is preferable to extensive replanting, although a few specimen trees can provide immediate scale to a new or rehabilitated scenic byway. One example of design use of plant materials is in the state of Texas, which has pioneered the use of native seed mixtures to produce extraordinary wildflower displays.

In design schemes which have a strong presence of natural environment, special efforts should be made to protect cultural and natural features, including historical sites, structures of architectural significance, endangered plants and animals, wetlands, and stream edges. Special caution needs to be taken when dealing with certain sensitive ecosystems which offer extraordinary scenic values, such as tundra, coastal zones, and desert, all of which lack resilience and require extraordinary restorative measures.

Design of scenic byways should minimize disturbance of systems, both natural and human, while at the same time offering visual and physical access to roadside resources.

3.2. The Motorist as a Design Influence

The user and the volume of use are key factors in design of

scenic roads, as these factors largely determine the standard of the roadway itself. Different roads serve different purposes, providing a range of experiences, and all can provide pleasant driving experiences without being the same in character. A section of the Interstate Highway System (such as I-70 over Vail Pass in Colorado) can be designed and managed as a scenic viewing resource. A busy urban street can provide pleasurable travel if the design is well done and the streetscape is well maintained and reflects a sense of neighborhood pride. Winding rural roads are commonly scenic ways due to their lack of clutter and roadside development, both official and private. Unpaved roads - in forests or the countryside -- are another scale of scenic experience. The commonality between these roads is that they compliment the character of the landscape through which they pass.

Roads through pastoral landscapes, for instance, should reflect that landscape type in their qualities. Land uses should be allowed to sweep across the roadway. Road "furniture," such as signs, guard rails, and structures should take their design theme from adjacent human development. Such furniture for a rural setting might be quite different from that of an urban setting.

Roads serving cultural landscapes need to reflect the historic character of a site. Sensitivity in selecting materials, alignment, and scale should insure that the cultural landscape is not overwhelmed by out-of-character improvements.

Scenic byways through and near urban environments are most difficult to design and manage due to high volumes of traffic, commercial value of adjoining properties, and urban clutter. And yet, they present a great opportunity both in terms of community involvement, protection of community values, service to large numbers of people, and relatively large budgets.

However, there is the danger here that scenic byways, particularly parkways built as scenic approaches to cities, will succumb to the pressures of continuing "improvement." Few people recall today the exquisitely well-designed original Shirley Highway in Virginia, a magnificent south approach to our nation's capital, now an eight-lane-plus river of asphalt. In sharp contrast, managers of the George Washington Memorial Parkway, also in the Washington area, have resisted pressures for "improvements" and it continues to provide handsome approaches to the capital.

3.3. Geometry of the Scenic Byway

Whether evaluating the aesthetic character of existing potential byway corridors or designing for new construction or major reconstruction, modern highway geometrics theory can be useful. Modern highway geometrics have been greatly influenced by early parkway concepts originating in the New York City area early in this century, and perfected in such projects as the Mount Vernon Memorial Highway, the Skyline Drive, and the Blue Ridge and Natchez Trace Parkways. One of the greatest of these

innovations -- curvilinear alignment, developed by the late landscape architect Wilbur Simonson -- involves smooth-flowing, coordinated horizontal and vertical alignment. Such a roadway is characterized by long sweeping horizontal curves connected by short tangents which replicate the natural flow of ground contours. Similarly, the vertical alignment is smooth flowing and closely coordinated with horizontal curvature. Spiral curves, pioneered on the Mount Vernon Memorial Highway, are used for both safety and driving ease. Odd curvature and other idiosyncrasies of alignment are avoided.

The key factor in curvilinear design is careful coordination of horizontal and vertical alignments. Optimally, a horizontal curve is matched with a vertical curve. Horizontal and vertical curves on the same road should feel and appear uniform in the degree to which they change direction.

Another important element of roadway geometry contributing to the scenic quality of the road is cross-section design. The design intent here is again to wed the roadway to the landscape as closely as possible, using a "streamlined" cross-section where the sculptured landscape simulates natural forms. The streamlined cross-section features flattened slopes, rounded edges, and removal of unnatural landforms.

Ditches are shallow and swale-shaped to reflect more natural conditions and avoid the erosion proneness of V-shaped channels. Culverts are provided with shaped headwalls, or are cut off to conform to the same slope as the fill. Culvert ends are not

allowed to protrude. Slopes are varied. The streamlined cross-section facilitates maintenance, re-establishment of vegetation, and erosion control.

As with cross-section, all grading operations associated with the roadway endeavor to blend the road into the landscape. Slopes are varied and parabolic-shaped. Where cuts intersect with natural draws, the "corners" are laid back. Rock cuts may be sculptured and stepped.

Another basic element in geometric design is rhythm, in which a roadway has a high level of consistency in its geometry and curvature. This leads to a safer facility, one that is more predictable, and one that is pleasant to negotiate. Curvalinear alignment greatly facilitates achieving rhythm in the roadway.

Intersections, turnouts, and rest stops are spaced appropriately to promote safety and good sight distances. Access control and limitations on the number and frequency of intersections and accesses enhance safety as well as visual quality.

Multi-lane highways can be visually objectionable, but mandatory for traffic loads. Often these super-highways traverse scenic areas, and can be designed for beauty as well as utility, while preserving and presenting scenic values. Such highways should be divided with opposing lanes on individual horizontal and vertical alignment. Variable, wide medians result, adding considerably to the safety, beauty, character, and environmental "fit" of the roadway. The cross-section should be

consistent as well, with the vegetative edge between grassy shoulders and adjacent woods sculptured to avoid a monotonous edge. Pavement width should also be consistent.

Top-paved width can affect the visual quality of roads, as excessively wide pavements tend to be offensive to the eye. To mitigate this effect, many scenic roads and parkways feature unpaved, gravel-stabilized shoulders which reduce the apparent width of the travelway, retard speeds, and harmonize the roadway with the landscape. The popularity of recreation bicycling, while emerging as one of the biggest beneficiaries of scenic roads, implies that these unpaved shoulders be paved in cases where bicycle use is contemplated.

Changes in pavement color and texture from lane to lane can reduce apparent width and objections to expansive pavement areas. Careful selection of the final paving material or final layer of gravel offers an excellent opportunity to harmonize the road to the landscape. Red aggregates in the red slick-rock country of Utah and green limestone around Charlottesville, Virginia are excellent examples of color-sensitive material selections for pavements. The use of a seal-and-chip topping will not only waterproof the surface, but will take the onus off expansive areas of asphalt. The aesthetics of pavement design necessitates selection of materials, colors, and textures which harmonize with the setting.

3.4. Roadside Development

Roadside development, that is, those appurtenances directly related to the road but not a part of the roadway itself, can have dramatic impacts on its scenic quality. Signs, guard rails, walls, fences, entrance features, and parking areas contribute significantly to the roadway's success. The character and scale of these accessories should be consistent with the purpose of the road and the roadway's environmental context.

Signs can particularly affect a scenic byway; not only private signs, but public ones as well. Unfortunately, using the rationale of consistency and safety, roadside signs have become so standard that they have become boring. Official signs have become so prolific that they contribute to an already serious clutter problem -- officially sanctioned litter, it might be said. In recent years, the advent of the international symbols has materially improved highway sign aesthetics.

However, highway departments show little imagination in design and mounting of signs, or to integrating them into their regional design context. At the same time, the private sector has shown more innovation in design of official signage than most public agencies. Examples are available, particularly in new community developments, that both meet the requirements of the Manual of Uniform Traffic Control Devices as well as contribute to the visual quality of the roadside and reflect regional design themes in their signage.

Guard rails and retaining walls are other important

components of a scenic road's architecture, and should be designed compatibly with the entire facility. Like signs, expediency and proliferation seem the criteria for these elements of the roadscape. Galvanized steel "W-beams" girdle our highways. "Jersey barriers" are almost as ubiquitous as center stripes.

The National Park Service has prevailed over conventional wisdom in some instances and has installed crash-proof timber guard rails. They are now testing other alternatives for high alpine areas and a log design reminiscent of historic guard rails.

Early parkways featured many miles of beautiful stone retaining walls. Some of these are not crash-worthy and others have deteriorated. New designs, including a relatively smooth-faced stone guide wall with a reinforced concrete core and a cast-in-place concrete wall simulating stone, have passed both safety and visual tests. Sculptured and form-imparted designs now grace many urban highway structures, materially contributing to their design quality. Other countries, Kuwait for example, have experimented with official graffiti. Highway structures can be places for sponsored works of art. Colorado has successfully painted structures to harmonize with their setting, while mitigating the effect of otherwise monotonously grey concrete.

For newly constructed and existing byways alike, first impressions are lasting impressions, and the entry

point to a scenic roads should be given special design consideration. The traveler is well aware on entering a national park that he is entering a special place; so it should be for all scenic places. This usually demands a uniquely designed entrance or identification sign. Such signs should be simple, yet expressive of the place and its spirit, and in character with its architecture and landscape. Scenic "entrances" should be exceptionally well-designed, and harmonious with the landscape. Maintenance of such "entrances" should be carefully monitored to avoid a proliferation of competing signs which are invariably out of harmony with one another and their setting. The entrance should convey the feeling that the visitor is entering a special place, should change the visitor's attitudes toward the landscape, and instill a sense of arrival into a different and better environment.

Since scenic byways can be more than simply a pleasant way to get from one point to another, the opportunities for interpretive developments should be exploited. Indeed, scenic byways, like parkways, can become travel objectives in themselves. The scenic byway can provide visual and intellectual access to features of historic and natural interest.

Rest areas should be frequent and attractively sited. Often these can be combined with a scenic overlook or some point of interpretive interest. These facilities should be separated from the main flow of traffic for visual as well as safety reasons. The architecture and signage of rest areas need to be consistent

with regional themes. Adequate spaces should be provided for oversized vehicles on those byways which are suited to tour buses, trailers, and motor homes, as well as for smaller ones like motorcycles. Unattractive expanses of paving can be reduced through changes in paving materials and incorporation of plantings.

In spite of how sensitively roads are designed and constructed, damage to the landscape and scenic values will occur. To minimize such damage, construction activities should be limited to the roadway prism and already disturbed areas. Special efforts should be given to restoration of disturbed landscapes, such as borrow pits and spoil areas.

3.5. Design of Roadway Structures

Structures such as bridges, tunnels, and walls have a major impact on the visual quality of the roadway. Scenic road structures should be graceful and simple without embellishment. Structures can be harmonized with their environment through use of materials, forms, colors, and textures. For example, structures on the Colonial Parkway in Virginia utilize brick, a material which dominates that region. Stone is common in many mountain roadway locations.

Grading around major structures should receive special design attention. Each should be carefully contour-graded to harmonize the structure with the surrounding landscape. Tunnels located in places which seem like natural portals reduce the

perception of environmental damage. Retaining walls can reduce the impacts of roadways by minimizing the width of the roadway prism. Walls should be harmonized with the landscape through selection of materials, textures, and colors. Reinforced earth walls and textured concrete walls can offer acceptable aesthetic solutions for the scenic byway.

3.6. Parkways as Models of Scenic Design

Parkways and park roads of the National Park System designed by landscape architects and highway engineers have been emulated around the world, especially in the design of modern expressways, because of their beauty, safety, and environmental sensitivity. Many roads in the nation's National Forest System and state parks share these same outstanding design characteristics. All can serve as models for development of a system of scenic byways.

4. CASE STUDIES

There are numerous examples of scenic roads around the country which exhibit many of these design elements affecting their visual quality. Few of these are perfect, by any measure, but through designation, land use controls, design improvements, and continuous management of the visual resource, their character can be preserved and enhanced for the traveling public. Moreover, these scenic areas can accommodate economic development while preserving scenic values through careful design and siting

of facilities and compatible land uses.

Preserving scenic values while encouraging economic development would seem to be an unachievable dichotomy. In fact, they can and must be mutually supportive. These pleasant byways must be preserved and enhanced, not only for their inherent value, but for their tourism potential -- one of this country's major growing industries. Notably, just last year for the first time, more foreign tourism dollars were spent in America than Americans spent abroad.

The following case descriptions are based primarily on site visits anecdotal information and are supplemented with information collected through interviews with state and local government officials and design practitioners.

4.1. Arkansas State Highway 7 (Harrison to Hot Springs)

This highway has long been acclaimed as Arkansas' most scenic route. Traversing the highest mountains of the Ozarks region, the highway links two units of the National Park System, Buffalo National River on the north and Hot Springs National Park on the south. The road also traverses the Ozarks and Ouachita National Forests. Due to proximity to these public lands and major destinations, the highway is heavily traveled and has inherently high visual quality; however, abutting private lands tend to be abused and cluttered. A apparent lack of local zoning controls has led to substandard, spotty commercial development, including economically infeasible and abandoned projects.

Some of these problems could be ameliorated through design and application of the design principles above. But this is a good example of where simple designation, without commensurate land use controls and property owner stewardship, has not worked. This is not to minimize the value of Route 7 as a scenic resource, but to say that extensive efforts, mainly at the regional and county levels, are needed to recover the road's full potential as a scenic byway.

Once these controls are in place, the Arkansas State Highway Department could initiate improvements in the design features of the route. One principle control would be clustering of commercial developments to reduce the tendency toward strip development. This could have a beneficial effect on numerous small towns along the way which would benefit from increased commercial activity associated with tourism. Wider rights-of-way are needed, particularly through private lands.

4.2. Colorado/New Mexico US 285 (Morrison CO to Taos NM)

This major connection between the Denver area and northern New Mexico is often sought as an alternative to the more heavily travelled Interstate 25. Starting in an historic town in the Denver metropolitan area, the route climbs through the attractive foothills of the Rockies with frequent long range views of the snow-covered peaks. The route drops suddenly into Colorado's South Park, a high meadow of vast ranches surrounded by mountains with a fascinating mining history. The scenic way descends into

the valley of the upper Arkansas River, a breath-taking setting of lush, irrigated meadows and juniper-pinon foothills with a backdrop of massive snow-covered peaks.

Climbing out of the Arkansas valley, the route then descends into the San Luis Valley drained by the Rio Grande, following S.H. 17 to Alamosa. Another high, dry, but irrigated valley, this area of vast ranches and farms also boasts the world's highest sand dunes. After rejoining U.S. 285 at Alamosa, the route enters New Mexico at the south end of the valley and a somewhat dryer environment. While U.S. 285 continues on to Santa Fe through unattractive urban development, the traveler can take a scenic way on a minor state highway (route 96) through the gorge of the Rio Grande, entering Taos actually from the south.

The scenery throughout this route is outstanding and diverse, mainly due to the majestic Rockies and the abundance of long range views. The ranches and numerous easily accessible side attractions, including ghost towns and recreation opportunities, are impressive. Active mining is adjacent to the roadway, as are a number of historic towns and one of the country's few operating narrow-gauge railroads. Diversity of vegetation and surprisingly frequent encounters with stream environments add materially to the joy of driving this route.

This route is not officially designated. Commercial development is light and unimposing. Some second home development is occurring, but fortunately most is set back, often hidden behind a screen of trees. Some of these developments

represent a very desirable approach to economic growth, albeit unplanned. The more desirable building sites are among the trees and on the slopes where views are available, rather than along the flood-prone streams and on windy, open grazing lands.

Some of the distracting elements of the landscape include a very inconsistent design standard for the roadway itself, especially that section between Morrison and South Park. That section is becoming suburbanized, is heavily used, and yet retains much of its scenic character. Application of sound design principles, coupled with roadside controls, would do much to preserve this scenic byway segment.

South Park is dramatic, although all would not agree, especially if caught there in a winter blizzard! Few design improvements are required. Control measures for outdoor advertising applied now would preclude future problems. The broad-scale acquisition of water rights by distant municipalities will have unpredictable effects on economic development, but probably will discourage ranching and encourage second home development. This would be an unfortunate degradation of the vast open grasslands, and should be avoided through zoning and transfer of development rights.

The Arkansas River is heavily used for recreation and in this vicinity U.S.285 is encumbered with occasional garish commercial development. The San Luis Valley can be boring to some, mainly due to the flat terrain and to the "gunshot" alignment of major roads (SH 17 reportedly has one of the longest

tangent sections in the country). This section of the scenic road could be improved by provision of more sheltered rest areas, shoulder improvements, and sign controls.

Between Alamosa and Taos where the scenery becomes somewhat more subtle, there are a surprising number of attractions. Here can be found a narrow-gauge railroad, the gorge of the Rio Grande, abundant wildlife, and interesting old towns. Except for the winding, unpaved section of road through the gorge (and this report does not advocate major improvements), the geometry of the road is pleasant and flows with the landscape.

4.3. Colorado Peak-to-Peak Highway (Estes Park to Central City)

This is a route-of-choice for the unhurried traveler, as it connects two activity centers but is not used as a metropolitan connector. Long acclaimed for its scenic attributes, the route suffers from a lack of consistency in roadway character. Connecting Estes Park and Rocky Mountain National Park on the north with the historic towns of Black Hawk and Central City (Colorado's territorial capital) on the south, the Peak-to-Peak Highway attracts increasing numbers of tourists.

Although the road traverses the Roosevelt National Forest, much of the roadside lands are privately owned and few constraints on development have been imposed. Setbacks and vegetation screening works well in places, especially for some of the commercial resorts along the way, and should be encouraged throughout.

The highway department is improving this road, and better consistency of alignment may well result, improving the safety characteristics as well as the route's driveability. Some of these new improvements have, however, been a bit heavy-handed and lacking in environmental sensitivity. Achieving improved consistency and quality of roadside development -- signs, fences, guardrails, walls, etc. -- would also contribute to enhancing the route's scenic value.

4.4. Colorado Mining Frontier Roads

The central part of this interesting route is an unpaved road following the grade of a long-abandoned narrow-gauge railroad which once served the many gold and silver mines in this boom area of the late 1800s. Its flat, twisting alignment, with frequent opportunities for stopping, is fascinating.

The north section of the road winds into the mountains from Colorado Springs along the south flank of Pikes Peak, while the south end crosses sharply contrasting arid flatlands to Florence on the banks of the Arkansas River. An alternate route to the steeply winding section out of Colorado Springs would be the paved highway leading from U.S. 24 south to Victor. This alternate route offers two major attractions along a rather attractive way: Florissant Fossil Beds National Monument and the historic town of Cripple Creek. However, this route contrasts sharply in character with the main route. It is comparatively commercialized and it differs considerably in character.

The present route is one of a few local, low key roads providing a rare scenic road experience -- some would call it more of a rustic road. This unusual character should be preserved through very circumspect improvements in surface condition (but not traditional paving), roadside controls, interpretive signing, and additional picnic and rest stops.

4.5. Oklahoma/Kansas Prairie Route

Locally called the Prairie Parkway, this route is not truly a parkway, but rather a partially designated series of connected local, state, and U.S. highways traversing the Flint Hills of eastern Kansas and the Osage Hills of northern Oklahoma. Site of the nation's largest remaining vestige of the once vast tallgrass prairie, the area is rarely appreciated by the casual tourist. One reason for this is the north-south axis of the region, at right angles to the normal east-west flow of tourists anxious to get across the seemingly boring flatlands.

But the area has much to offer in the way of rolling topography, plentiful wildlife (especially birds), important cultural sites, and a largely unfettered landscape. This is truly cowboy country where cattle is king, and the agricultural cycle is not dissimilar from the days of the Texas longhorn drives to the Kansas railheads over the Chisholm Trail. The area's north end is also crossed by the Sante Fe Trail, one of the principle trails leading to the American frontier of the last century. The aura of this place is remarkable and can be

captured from a well-designed and controlled scenic way.

At the south end of the corridor are located several huge ranches, some of which have been purchased by The Nature Conservancy, and the site of a proposed Tallgrass Prairie National Preserve. The Conservancy also manages other extensive grasslands properties in the north, and Kansas State University's Konza Prairie adds to the inventory of protected grasslands near to the scenic way.

Since this route follows some rather devious directions and often changes route number, designation and directional signing is very important. As improvements are made in the roadway itself, wider rights-of-way should be secured and more parkway-like geometrics should be introduced. This needs to be carefully handled to avoid losing the rural character of present alignments.

Running counter to the prevailing east-west traffic, crossing many major highways, there is a real need to develop safe, uncluttered intersections with these major highways. These intersections also offer the opportunity to develop appropriate entrance features to the scenic way. The route has a dearth of interpretive facilities which could enhance the enjoyment of the route and an understanding of the prairie ecosystem.

The states of Kansas and Oklahoma also have an image problem to overcome if the tourism and economic development potential of this route are to be realized. The commonly held impressions of both places in terms of scenic value is negative. This route

needs to be developed, its scenic character enhanced, and then promoted as the best place now to savor the romance of the American prairie.

Enhancing the visual quality of the route would be fairly inexpensive, but somewhat non-traditional for a highway department. Gas and oil works need to be screened and cleaned up. Rest areas and interpretive devices need to be developed on some very secondary roads. Continuing attrition of grasslands to power lines, reservoirs, and communications facilities needs to be thwarted. Many of these actions are the responsibility of local governments and local communities which stand to gain the most from additional tourism activity.

4.6. Texas - Davis Mountain Loop

West Texas is rarely acclaimed for its scenery, but the Davis Mountains are an exception. With several historic sites including Fort Davis National Historic Site and the famous MacDonald Observatory, unexpected vegetative diversity and rolling topography, the Davis Mountains contrasts sharply with the generally uninteresting countryside. Through this island of beauty loops a road serving the several large ranches and attractions of the area. Texas routes 118 and 166 are well maintained and respect the terrain, giving a window to some very unusual landscapes for this part of the country.

The greatest detriment to this route is the growing trend toward subdivision for second homes creeping east from El Paso.

The visual absorption capability of the landscape is not very high due to the paucity of large vegetation. Of course, it is this very paucity which provides the wonderful views of the hillsides, wooded streams, and the seemingly endless Chihuahua Desert beyond.

Here as elsewhere in Texas, the highway department has reserved wide right-of-ways and has managed the roadside intensively. The results are a generally attractive roadside, including a profusion of native vegetation, including magnificent displays of wildflowers. In spite of the somewhat torturous nature of the topography, geometry of the route is pleasant and ground-hugging. Frequent turnouts for picnicking and resting add to the enjoyability of the scenic byway and the Davis Mountains.

While this route in itself is limited in length, there is the possibility of making it the center point of a larger system. The north anchor of this system could be Carlsbad Caverns and Guadalupe Mountains National Parks, connected to the Davis Mountains via U.S. 180, S.H. 545, and U.S. 90. Its south anchor would be Big Bend National Park via S.H. 17, U.S. 67, and County Road 170. This south extension goes through the historic Presidio and along the Rio Grande before entering Big Bend from the west. These routes, too, are well-developed and have minimal adverse influences. They could be enhanced with minimum effort. While the section along the Rio Grande between Presidio and Big Bend tends to be quite inconsistent, this section is periodically being improved. With the recent acquisition by the state of

Texas of the huge Big Bend Ranch adjoining the park on the west, this route will increase in popularity and importance for access to major state and national parks.

All of these national parks are also growing in popularity, suggesting a high priority to establishing workable protection measures for the roadside and special design treatments for the routes as they are improved.

4.7. Texas Hill Country U.S. 271/289

The Texas hill country is growing in popularity as a tourism destination. And Mrs. Lyndon B. Johnson's impact on the road systems in this area have been considerable, setting a high standard for other areas of the country. Wide, clean, and uncluttered right-of-ways provide room for attractive scenic enhancements including widespread use of wildflowers and other native plant materials. Even though the plant pallet here is a bit limited, roadside are rich, green, and natural appearing.

Roadside rest areas and historic markers abound, inviting a leisurely, informative cruise through the Hill Country. Between Johnson City and Fredericksburg is one of America's most popular sites associated with an American president, the Lyndon B. Johnson National Historic Site. This National Park Service site, partially in Johnson City and partially at the LBJ Ranch, has been the catalyst for considerable scenic road development in the region. A number of state parks and reservoir recreation areas are adjacent to the route.

Small towns along the way are charming and add materially to the variety. Fredericksburg is a notable example, with its abundance of handsome old stone buildings tracing back to the German-immigrant origin of the town. Unfortunately, contemporary developments on the approaches to these towns often are chaotic, unplanned, and cluttering, contrasting sharply with the charm of the historic core of the towns.

4.8. I-70, Vail Pass in Colorado

This route probably best epitomizes all the elements of the well-designed scenic route. What the route lacks in historic charm of older roads and townscapes, the road makes up in meticulous location, design, and maintenance. The irony of it is that this is one of the Interstate Highways, routes which are seldom known for their beauty and relationship to the landscape.

Of course, the route traverses some of the most spectacular scenery in America. This factor, coupled with the fact that the corridor traversed is quite ecologically sensitive, led the Colorado Highway Department, in conjunction with (some would say under pressure from) the Federal Highway Administration and the U.S. Forest Service, to develop an unusually sensitively designed highway here.

Extraordinary measures were taken to preserve existing features and vegetation, followed by equally heroic efforts to restore and stabilize the construction zone. The two pairs of lanes are on separate alignment, taking excellent advantage of

the topography. The variable width median is also the location for an important bike trail. The route is a year-round attraction, providing access in winter to areas popular for cross-country skiing and snowmobiling.

Structures, many of them of precast segmental construction, are very well-designed, and colored to harmonize with the natural setting. Parking areas and rest stops, while not abundant, are adequate and located at key features where stopping is both safe and enjoyable.

Special care was given to grading, stream environments, and rock cuts to blend the roadway into the landscape, to insure harmony with the alpine setting, and to protect natural values. Erosion control measures were applied rigorously to protect the numerous trout streams and the Eagle River from sedimentation. Hydro-seeding followed right on the heels of construction. Permanent plantings favored sizable native species used sparingly and in natural clusters.

By popular demand, this is the highway that had to be done right. As a result it serves as an example of what can be done and as a prototype for Interstate Highway developments. It demonstrates that these massive developments can be scenic while at the same time serving traffic in a safe, efficient way.

5. SELECTED BIBLIOGRAPHY

American Association of State Highway Officials, A Guide for Highway Landscape and Environmental Design, Washington, D.C., 1970.

Appleyard, Donald, with Kevin Lynch and John R. Myer, THE VIEW FROM THE ROAD, Task Force on Highways and the Environment, Cambridge, Massachusetts, MIT Press, 1964.

Blum, Randolph F., A Guide to Visual Quality in Noise Barrier Design, Implementation Package 77-12, U.S. Department of Transportation, Federal Highway Administration, Washington, D.C., December, 1976.

Blum, Randolph F., Junkyards, The Highway, and Visual Quality, Report No. DOT-FH-11-9327, U.S. Department of Transportation, Washington, D.C., April, 1979.

Bright, John W., "The Blue Ridge Parkway: A Catalyst for Environmental Design Innovation," in Proceedings of the Blue Ridge Parkway Golden Anniversary Conference, Appalachian Consortium Press, Boone, N.C., 1986.

Colorado Department of Highways, I-70 In A Mountain Environment: Vail Pass, Colorado, Report No. FHWA-TS-78-208, U.S. Department of Transportation, Federal Highway Administration, Washington, D.C., 1978.

Cron, Frederick W., et al, Practical Highway Aesthetics, American Society of Civil Engineers, Highway Division, New York, 1977.

Crowe, Sylvia, The Landscape of Roads, London, The Architectural Press, 1960.

Federal Highway Administration, Visual Impact Assessment for Highway Projects, The American Society of Landscape Architects, prepared for the Federal Highway Administration, Contract DOT-FH-11-9694, Washington, D.C., 1980.

Hornbeck, Peter, and Garland Okerlund Jr., Visual Values for the Highway User: An Engineer's Workbook, U.S. Department of Transportation, Federal Highway Administration, Washington, D.C., 1973.

Jones & Jones, Esthetics and Visual Resource Management for Highways, U.S. Department of Transportation, Federal Highway Administration, Washington, D.C., 1979.

Jones & Jones, Scenic & Recreational Highway Study, prepared for the Legislative Transportation Committee of Washington State, Seattle, March, 1975.

Litton, R. Burton, Jr., Forest Landscape Description and Inventories: A Basis for Planning and Design, Research Paper PSW-49, USDA Forest Service, Pacific Southwest Forest & Range Experiment Station, Berkeley, California, 1968.

National Park Service, U.S. Department of the Interior, Park Road Standards, developed by the NPS Park Road Standards Task Force, Washington, D.C., 1984.

Snow, W.B. ed., The Highway and the Landscape, New Brunswick, N.J., Rutgers University Press, 1959.

Stone, Edward H., Visual Resource Management, Landscape Architecture Technical Information Series Vol. 1 No. 2, American Society of Landscape Architects, Washington, D.C., June, 1978.

U.S. Department of the Interior, National Park Service, Aesthetic Awareness of Design in Improvements to U.S. 22 and Heritage Route Selection Criteria: America's Industrial Heritage Project, NPS D-24, Denver Service Center, January, 1989.

Wenchel, Andrew, Colorado I-70 Scenic Lands: Preserving/Enhancing the Visibility from Interstate 70 of National Resource Lands in Colorado, a cooperative pilot study by the Federal Highway Administration, Bureau of Land Management, and Colorado Highway Department, Denver, Colorado, 1975.

Yaro, Robert D. et al, Dealing With Change in the Connecticut River Valley: A Design Manual for Conservation and Development, published by the Lincoln Institute for Land Policy and the Environmental Law Foundation, Cambridge, MA, June, 1989.

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