



Project Summary Report O-2113-S

Project O-2113: Develop Cost-Effective Plans to Add Aesthetically Pleasing Features to Transportation Projects

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## A New Approach to Aesthetics Design Decision Making for Texas Highways

The aesthetic character of the roadway, both in its structures and its roadsides, is an increasingly important part of roadway design within the Texas Department of Transportation (TxDOT). TxDOT addresses the issue and nature of aesthetics related to highways in the *Landscape and Aesthetics Design Manual* now provided online at its public website (<http://manuals.dot.state.tx.us/dynaweb/>). This manual discusses the types of aesthetic approaches that have been or may be appropriate for highway design and provides some general guidance on when and where they may be applied.

The suitability of a particular aesthetic design treatment or element is determined by the details of its specific application and specification. The purpose of Project O-2113 was to provide TxDOT designers and TxDOT-contracted consultants with guidance in the development and construction



Figure 1. Limited Right-of-Way Can Constrain Aesthetic Alternatives.

of aesthetically pleasing features within transportation projects. The goal of the project was to provide guidance on the development of aesthetic elements on state projects, specifically to:

- develop a listing of best practices for aesthetic treatment of highway and transportation elements of construction;
- determine, through surveys, which aesthetic treatments are preferred by the traveling public;

- develop guidelines for use of specific aesthetic treatments;
- detail issues that affect the construction of the aesthetic elements; and
- develop solutions for identified construction issues.

### What We Did...

Research activities included:

- a review of the literature related to aesthetic design in the highway;



- a telephone survey of other state departments of transportation (DOTs) to determine the type and extent of aesthetic treatments being used;
- a telephone survey of TxDOT districts to determine the types of aesthetic treatments being used and the nature of any construction or maintenance issues associated with their use; and
- a driver survey conducted in Dallas, Texas, to identify driver-preferred aesthetic elements.

Researchers used information gathered from these efforts to develop a list of aesthetic treatments and elements that designers may consider for use in projects on Texas roadways. Detailed technical information and design guidelines for each treatment or element were developed.

Aesthetic guidelines for determining the suitability of proposed treatments or elements were also prepared. The intent of these guidelines is to provide designers with a methodology to aid them in the decision-making process when considering aesthetic alternatives, either in a design setting or in public participation venues.

### **What We Found...**

The literature contains excellent discussions about the importance of aesthetic features in highway design, but these are expressed in the context of designing a new alignment typically over a long distance. Although the information

is certainly valuable to designers, the majority of projects today are road widening projects and retrofits, where the alignment and often super-elevation is already established. Many of these projects are occurring where very limited right-of-way is left, further constraining the alternatives available (Figure 1). These limitations result in an increased focus on the visual characteristics of texture, color, and form of structures and roadside elements rather than on alignments to take advantage of scenic views.

Industry literature related to aesthetics is heavily weighted toward case studies and, although informative as to the range of creativity possible, rarely offers detailed information regarding the use of the treatments described. A number of DOTs include consideration of aesthetics in their roadway designs, but we found that in many cases these occur on a very localized basis. Indications are that innovation does occur, but the dissemination of the results — either good or not so good — is not wide and sometimes not even across DOT district lines. There is little information that individual designers may turn to when considering a specific aesthetic treatment or element in a project.

Researchers conducted a driver survey in Dallas, Texas. This survey revealed that most drivers rate highway aesthetic character based on the visual quality of the properties adjacent to the highway. Natural areas with limited development and forest vegetation tended to rate high as a preference. However, very dense

strip-commercial developments might rate high in preference if the driver was facing a view of the Dallas skyline from the site. Depressed freeway lanes, the walls of which have received extensive architectural treatments, were the exception to this, rating high in terms of preference (Figure 2). However, no respondent made reference to a specific treatment or element, only to an area.

Innovation is occurring that makes use of established technologies in concrete, coatings, asphalt, lighting, etc., for different applications within the roadway. Figure 3 shows a good example of form-liner finishes used to create highly detailed murals on retaining walls.

Literature from the fields of environmental psychology and human factors research offered insight into the fundamentals of designing for driver visual perception within highway corridors. Of particular interest are the concepts of visual complexity,



Figure 2. Areas with Freeway Walls That Contained Extensive Architectural Treatments Rated High in Terms of Driver Preference.





Figure 3. Form-Liner Finishes Can Be Used to Create Highly Detailed Murals on Retaining Walls.

coherency, legibility, and mystery. Figures 4 and 5 depict the concepts of complexity and coherency.

These concepts have generally been applied in a broad context of the human environment, typically in contrast between the built and natural landscapes. No direct application has been developed for highway aesthetics design. The human factors issues

have historically been topics of research and application in the areas of signs, signals, and lane delineation but not in terms of aesthetics planning. Each of these fields has direct relevance to the question of visual character of the roadway since the quality of visual information is directly related to driver performance.

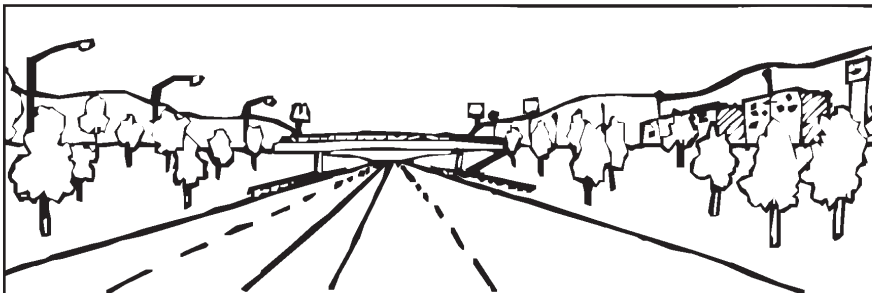


Figure 4. Drawing Showing Complexity in Aesthetic Features.

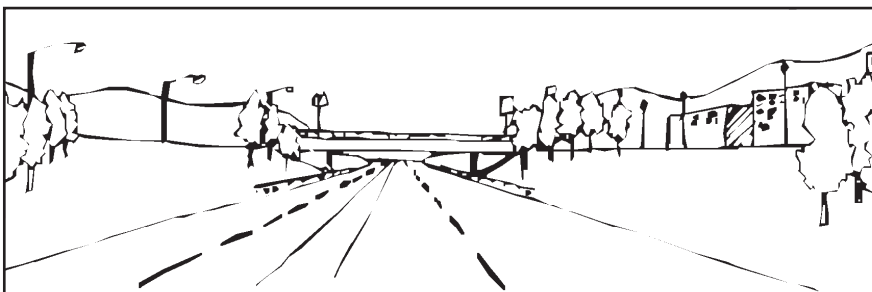


Figure 5. Drawing Showing Coherency in Aesthetic Features.

## The Researchers Recommend...

TxDOT should approach the application of aesthetics within the highway environment from the aspect of the visual quality of the highway and how it affects driver performance and safety. This criterion is used for the introduction of any other element into the right-of-way. Similar criteria have not been available for aesthetics because there is no framework or methodology rooted in objective analysis of what most people consider a subjective exercise. TxDOT should:

1. use visual quality guidelines that focus on driver performance and safety as the basis for aesthetic planning and decision making;
2. document and circulate growing knowledge of effective tools and techniques for aesthetic design;
3. use project public participation venues to educate communities about the connection between aesthetic quality and driver performance and then use this as a “first hurdle” component to decision making; and
4. develop initiatives to more effectively apply research from the fields of design, human factors, and environmental psychology to the highway environment.



## *For More Details...*

The research is documented in Report 2113-3, *Guidelines for Aesthetic Design in Highway Corridors: Tools and Treatments for Texas Highways*.

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## *TxDOT Implementation Status*

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The research developed guidelines on how to apply 25 aesthetic treatments and elements. Some of the aesthetic treatments and elements addressed in the guidelines include modular concrete, veneers, pedestrian barriers, lighting, public art, etc. The research will be used to enhance aesthetic design decision making on Texas highways.

For more information, contact Bill Knowles, P.E., RTI Research Engineer, at (512) 465-7403 or e-mail [wknowle@dot.state.tx.us](mailto:wknowle@dot.state.tx.us).

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There was no invention or discovery conceived or first actually reduced to practice in the course of or under this contract, including any art, method, process, machine, manufacture, design or composition of matter, or any new useful improvement thereof, or any variety of plant, which is or may be patentable under the patent laws of the United States of America or any foreign country.

Not intended for construction, bidding, or permit purposes. The researcher in charge of this project was James R. Schutt.