# Highway Wall Structure Aesthetic Design Guidance

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**PDH:** 2

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# Module 1: Introduction

## Learning Objectives

By the end of this section, you will be able to:

- **Identify** the primary constructability challenges associated with aesthetic wall treatments.
- **Define** the scope of "Aesthetic Treatment" within the context of highway infrastructure.
- **Evaluate** the functional and community-based benefits of integrating architectural features into wall design.

*Executive Summary:* Wall structures are prominent, high-cost highway components that significantly influence a corridor's visual character. Effective aesthetic design requires careful coordination with engineering and construction to avoid permanent, costly misalignments and to ensure the infrastructure integrates seamlessly with both the natural environment and local community values.

## Design Background

Wall structures are seen by millions of viewers and must be considered within comprehensive corridor and local community planning. Poor coordination between aesthetic design and structural engineering often leads to **constructability issues** that are difficult and expensive to remediate.

## Common Constructability Challenges

- **Misaligned patterns** across joints or panels.
- **Staggered top-of-wall profiles** that disrupt visual continuity.
- **Conflict with expansion joints** where joint placement interrupts the intended aesthetic texture.

The staggered appearance and misaligned pattern of this wall structure are the result of inadequate coordination of the aesthetic design, wall design, and construction methods.

## Structural and Aesthetic Definitions

To ensure clarity across project development teams, the following definitions apply:

- **Wall Structure**: Includes concrete cantilever walls and **Soil Reinforcement Systems** (such as Mechanically Stabilized Earth/MSE), whether independent or part of larger systems.
- **Aesthetic Treatment**: Also known as **architectural treatment**, this encompasses the overall form (columns, end treatments, caps, barriers) and the application of color, texture, pattern, or imagery to concrete surfaces.

## Purpose of Wall Structure Aesthetics

Because wall structures are massive in scale, they can dominate the surrounding context. The principle objective of aesthetics is to unify these physical elements and integrate them into the corridor.

# Primary Objectives

- **Scale Reduction**: Techniques like **slope terracing** reduce the apparent mass of the wall.
- **Environmental Mitigation**: Aesthetics help compensate for vegetation loss and reduce the "urbanizing" effect in rural areas.
- **Community Identity**: Treatments reflect local scenic, cultural, and historic values.

Aesthetic treatments on wall structures can reflect an image of the surrounding community and create visual interest for motorists.

## Functional and Safety Benefits

- **Driver Alertness**: Visual interest helps stimulate alertness.
- **Glare Reduction**: Surface textures minimize dangerous light reflection.
- **Vandalism Deterrence**: Rough textures and varied patterns discourage graffiti and improve worker safety by reducing the need for chemical or manual removal.

Wall structure aesthetic treatments should be coordinated with other highway elements in a well-considered corridor design. In Orange County, repeating the orange motif aesthetic treatment from the MSE wall (left) to the sound wall columns and adjacent slope paving is one technique used to help provide unity to the appearance of the highway corridor.

## Stakeholder and Process Management

The **Context Sensitive Solutions (CSS)** process balances transportation goals with stakeholder desires. Effective involvement can:

1. Reduce the risk of project delay.
2. Foster public trust.
3. Streamline approval processes for subsequent projects.

### How to Use this DIB

This bulletin establishes the current state of practice and must be used in conjunction with the **Highway Design Manual (HDM)**.

💡 **Design Tip**: Consult HDM Topic 109 (Scenic Values) and Topic 210 (Earth Retaining Systems) alongside DIB 88 to ensure full compliance with planning and design criteria.

*Checkpoint Quiz*

1. **According to DIB 88, why is remediation of design-related constructability issues particularly problematic?**
   a) It is mandated by the CSS process.
   b) It is often not cost-effective and may result in poorly considered permanent features.
   c) It requires approval from the local community for every change.
   d) It only applies to soil nail walls.

**Answer:** (b). Remediation is often not easily accomplished and can lead to permanent aesthetic flaws in the wall structure.

2. **Which surface characteristic is specifically noted for improving worker safety?**
   a) Smooth Class 1 finishes.
   b) Bright, high-visibility colors.
   c) Rough textures and varied patterns.
   d) Flat, untextured concrete.

**Answer:** (c). Rough textures discourage graffiti, which improves safety by reducing the frequency and necessity of graffiti removal.

3. **What is a principle objective of highway corridor aesthetics?**
   a) To ensure every wall is identical regardless of location.
   b) To prioritize cost-savings over all environmental mitigation.
   c) To make wall structures visually relate as a unified whole and integrate with the surrounding context.
   d) To maximize surface glare to increase driver alertness.

**Answer:** (c). Integration and unification of physical elements into the surrounding natural and cultural context is a primary goal.

# Module 2: Design Guidance

## Learning Objectives

By the end of this section, you will be able to:

- **Evaluate** the collaboration requirements between the Project Development Team (PDT) and community stakeholders for wall structure design.
- **Select** appropriate construction methodologies, such as gang form systems and elastomeric form liners, to facilitate aesthetic alignment and cost control.
- **Analyze** the technical requirements for different wall systems, including Concrete Cantilever, MSE, and Soil Nail walls, to achieve specific aesthetic and structural goals.

*Executive Summary:* Successful highway wall aesthetics require seamless integration between architectural and structural design. Design decisions—ranging from footing step increments and form liner selection to specialized shotcrete sculpting—must prioritize constructability, corridor unity, and community context to avoid costly field errors and ensure long-term visual quality.

## Collaboration and Coordination

Aesthetic design must be compatible with structural design to satisfy the design intent. The **Project Development Team (PDT)**—comprising DES Structures engineers, landscape architects, planners, and consultants—must collaborate from the planning phase through construction.

# Aesthetic Design Intent Statement

The PDT and community stakeholders should develop this statement early in project development.

- **Content**: Must account for environmental requirements, visual impact assessments, and community planning goals.
- **Function**: Provides guidance to ensure wall structures and corridor features are coordinated aesthetically and can be maintained effectively.
- **Continuity**: Ensures aesthetic consistency if project personnel or community partners change.

## Corridor Coordination

Wall structures must be aesthetically coordinated with:

- **Related Features**: Fencing, safety cable railing, concrete barriers, lighting, and landscaping.
- **Contextual Elements**: Signage, hydraulics, grading, erosion control, and adjacent buildings or bridges outside the right of way.

Purchase this course to see the remainder of the technical materials.