

I-70 Mountain Corridor Design Criteria

Overview:

The following overarching principles apply to the entire I-70 Mountain Corridor. These principles are supported by the Aesthetic Guidance, which is divided into Design Segments and which presents specific objectives and strategies. The principles are provided to the future managers and designers of transportation facilities within the corridor to guide the desired outcomes of individual projects.

A. Corridor Design Character

Elegantly engineered transportation facilities will reflect function, simplicity, and integrated design throughout the corridor. The landscape under, adjacent to, and beyond the structures supporting transportation facilities shall be rugged, organic, and made of natural materials. Designers will not attempt to make facilities falsely appear natural with the application of materials. The linkage of land and transportation features will be visualized as a single design effort, rendering a cohesive quality to the entire corridor. The geometry of the road should maintain a continuous flow and fit existing land forms.

B. Integrated and Complete Design

All facilities included in a project -- whether primary or auxiliary to the function of the corridor -- will be identified, programmed, and conceptually designed prior to completion of 30% design. This will include consideration of the entire construction disturbance zone. A comprehensive design is necessary in order to plan for all construction disturbances and create an integrated, sustainable corridor that accounts for each project. Aesthetic objectives and functionality are optimized when all elements are included in the design at inception. Integrated design includes considerations such as drainage and hydrology, water quality, wildlife crossings, rock cuts, life cycle costs, and long-term maintenance.

C. Partnerships to Create the Corridor

Corridor design will include consideration of a buffer and transition area between transportation facilities and community-oriented land uses. The landscape planting, earthwork, structural solutions, and location of the transportation facilities need to be fully examined in order to avoid potential visual and scenic impacts, buffer highway noise, and preserve community character and patterns. Road and trail connections and multi-modal travel corridor opportunities should be considered. Reinforcement of alternative methods of travel such as pedestrian and biking paths should be incorporated and coordinated with community and recreational planning efforts.

D. Using the Programmatic Environmental Impact Statement (PEIS)

The I-70 Mountain Corridor PEIS contains critical background and reference information foundational to design. The PEIS should be reviewed throughout the entire design process for insight into the detailed assessments of various corridor aspects. This will ensure alignment and consistency with the analyses and recommendations determined by the PEIS.

E. Corridor-Wide Projects

Projects that will be implemented across the entire corridor have the potential to create elegant consistency. These projects should be approached with an additional level of care and scrutiny, and should address the ideas set forth in the Aesthetic Guidance for all four corridor Design Segments. The goal should be a project that yields an overall aesthetic benefit to the corridor.

Engineering the I-70 Mountain Corridor:

Design Criteria

Seven required Engineering Design Criteria have been developed to address the unique characteristics of the I-70 Mountain Corridor. These criteria are intended to influence the alignment of the transportation facilities and are an essential component of engineering design.

The Engineering Design Criteria have been developed and adopted by the Colorado Department of Transportation (CDOT) because they represent an approach that enhances safety, mobility, and sustainability while reducing maintenance through design and engineering.

Design Criteria Categories

The following Design Criteria categories direct the development of both I-70 and the Advanced Guideway Systems (AGS)*:

- Design Speed
- Alignment
- Slope Cut and Fill
- Disturbance
- Rock Cut
- Bridge Structures
- Sound Attenuation



*As the AGS for the I-70 Mountain Corridor is further defined, developed, and refined, the criteria may be updated to match the chosen technology.

Application of Design Criteria

All of the Design Criteria must be met in Life Cycle Phase 2: Project Planning. Alternatives may be refined in Life Cycle Phase 3: Project Design, when the designer is able to determine which criteria may require an exception and why. The one exception for this requirement is in Areas of Special Attention, where a design exception may be considered in Phase 2 due to the complexity of the issues involved.

Federal, state, and local agencies will neither officially review nor grant design exceptions until Life Cycle Phase 3: Project Design.

Project Leadership Team Role

The Project Leadership Team (PLT) must be apprised of the Design Criteria being used on its I-70 Mountain Corridor project.

Justification for any criteria that would not be met as determined during design must be presented, discussed, and agreed upon by the PLT. Consideration will be given to the I-70 Mountain Corridor Core Values; safety; operation; compatibility with the overall network; character of traffic; cost implications; and impacts to scenic, historic, and environmental features. Other variables to consider include the amount of change to the criteria, its effect on other criteria, and any additional impacts that one change may make.

Design Exception Process

Due to challenges presented within the I-70 Mountain Corridor, a situation may arise in which the existing Design Criteria cannot be met, or in which the impact of meeting the criteria would be too great. Should this be the case, a design exception must be requested. Design exceptions may assist a designer in finding a transportation solution that balances impacts to scenic, historic, and culturally or environmentally sensitive areas while still providing for safety and mobility. Designers should think innovatively, consider the Core Values, and take into account the flexibility available to them when designing a transportation solution for the I-70 Mountain Corridor.

Design exceptions may be granted for the following justifications:



- Complementing surrounding physical characteristics
- Enhancing safety
- Increasing capacity
- Reducing costs
- Protecting the environment
- Preserving historic and scenic elements
- Interfacing with multiple modes of transportation
- Utilizing new technology or innovative approaches
- Doing the right thing

I-70 Mountain Corridor Design Criteria:

Design Criteria		Remarks
Design Speed	<p>For I-70, 65 MPH design speed.</p> <p>For Advanced Guideway System (AGS), dependent on technology.</p>	<ol style="list-style-type: none"> 1) Posted speed of 55 MPH on I-70. 2) Federal Highway Administration (FHWA) 13 controlling criteria and Colorado Department of Transportation (CDOT) Design Criteria apply. 3) Technology-appropriate Design Criteria will apply to AGS.
Alignment	<p>Eastbound highway lanes, westbound highway lanes, and the AGS will be designed as separate, independent alignments.</p> <p>The three alignments will maintain no less than the existing median width or create a clear zone that does not require a guard rail or barrier.</p> <p>No loss of existing vertical separation of highway lanes will occur in any section.</p>	<ol style="list-style-type: none"> 1) Provides a recovery zone. 2) Median required for snow removal and maintenance. 3) Separation prevents headlight glare, improving safety and maintenance conditions. 4) Separate alignments will adapt to topographic conditions. 5) See Illustration 1 for highway cross section.



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Design Criteria		Remarks
Slope Cut and Fill	<p>Limits of physical disturbance shall be less than 40 vertical feet from the top of the pavement or rail platform to the farthest edge of cut or fill.</p> <p>Cut and fill embankment will not exceed a slope of 2.5:1 (H:V).</p> <p>All roadway retaining walls over 12' in height will be installed below the elevation of the roadway.</p>	<ol style="list-style-type: none"> 1) Planting, re-vegetation, and restoration of slopes will be successful with flatter slope embankment. 2) Slopes will be more easily maintained and erosion and sediment transport will be manageable. 3) See Illustrations 1 and 2.
Disturbance	<p>Construction will be fully contained with areas of historic or current disturbance if no centerline change occurs.</p> <p>New alignments must be consistent with Design Criteria for slope cut and fill.</p>	<ol style="list-style-type: none"> 1) Existing maintenance problems will be resolved or improved by staying within the existing limits of disturbance. 2) Construct without increasing the disturbance zone.
Rock Cut	<p>A geotechnical analysis report will be completed and reviewed prior to any proposal to create rock cuts for an alignment.</p> <p>If rock cuts are required, naturalized custom cuts methods are required. Rock cuts shall be constructed using scatter blasting techniques and provide for adequate rockfall area at the base.</p>	<ol style="list-style-type: none"> 1) Allows for understanding of rock formations at an early planning stage to potentially avoid rock cuts. 2) Avoids rockfall mesh and reduces maintenance. 3) Scatter blasting techniques provide a naturalized cut and allows safety from rockfall to be incorporated in the design.



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Design Criteria		Remarks
Bridge Structures	<p>Bridge structures will not utilize slope paving techniques and will require a closed-end abutment design with a minimum vertical height of 8', measured below the bridge girder.</p> <p>Bridge embankments shall be 2.5:1 maximum.</p>	<ol style="list-style-type: none"> 1) Avoids the maintenance of slope paving. 2) Provides a method of incorporating re-vegetation and landscape into bridge slopes. 3) A clear span over streams and drainages avoids water quality construction impacts and reduces maintenance and pier scour. 4) Provides benefits below bridges for vehicle clearance, wildlife crossing, solar access, and re-vegetation success. 5) See Illustrations 3 and 4.
Sound Attenuation	<p>Sound buffering and attenuation will be designed in conjunction with the horizontal and vertical alignment to eliminate the need for noise mitigation.</p> <p>Mitigation, if required, will integrate landforms, landscape planting buffers, and walls.</p>	<ol style="list-style-type: none"> 1) Design can minimize or eliminate additional noise mitigation. 2) If sound walls are required, see Illustrations 5 and 6.

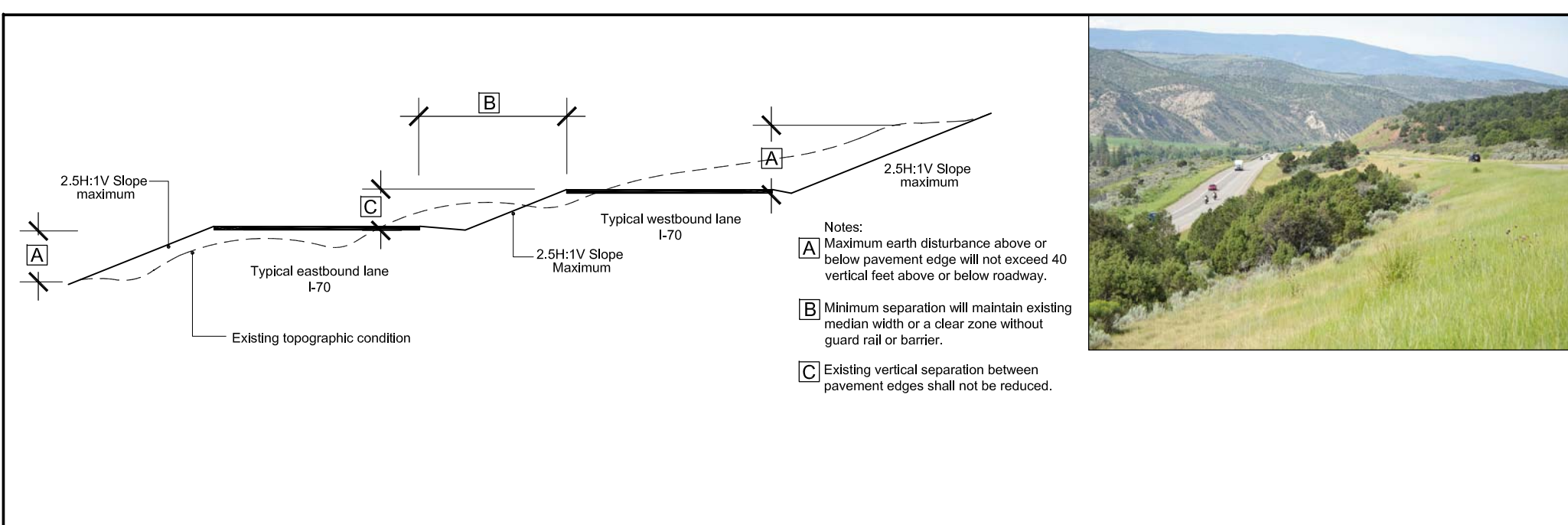


ILLUSTRATION 1: DESIGN CRITERIA FOR ALIGNMENT AND CUT AND FILL

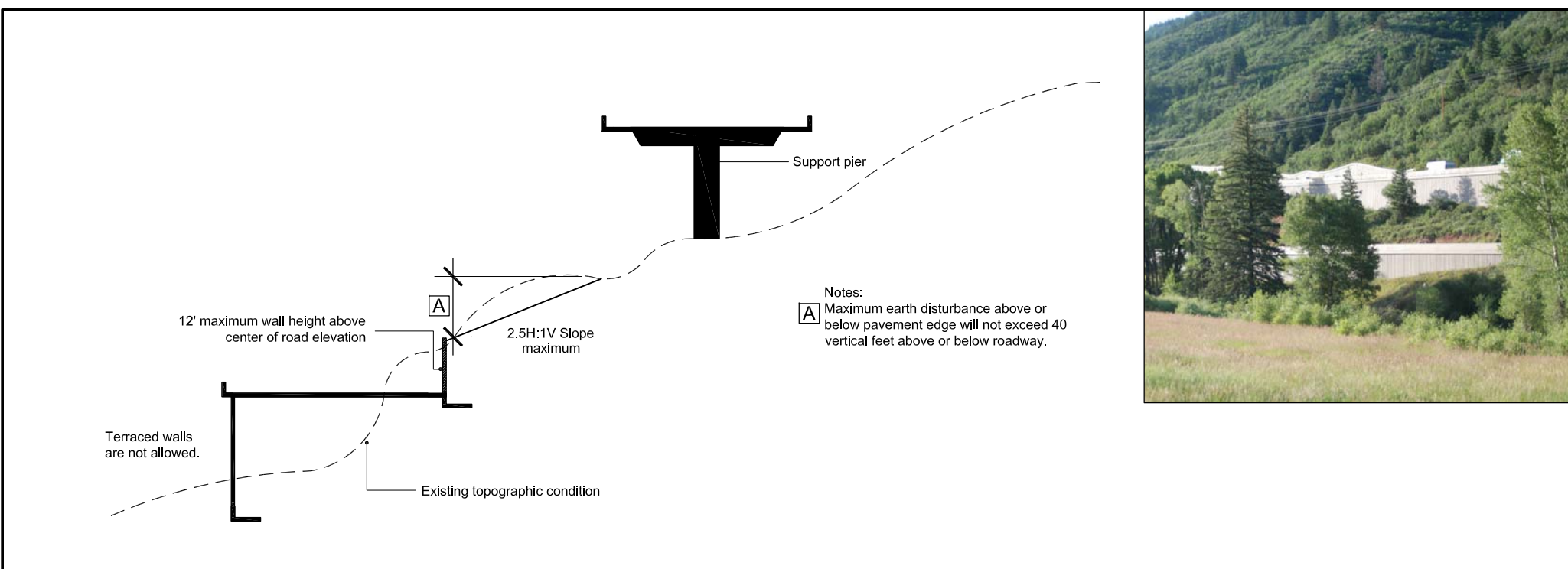


ILLUSTRATION 2: DESIGN CRITERIA FOR CUT AND FILL

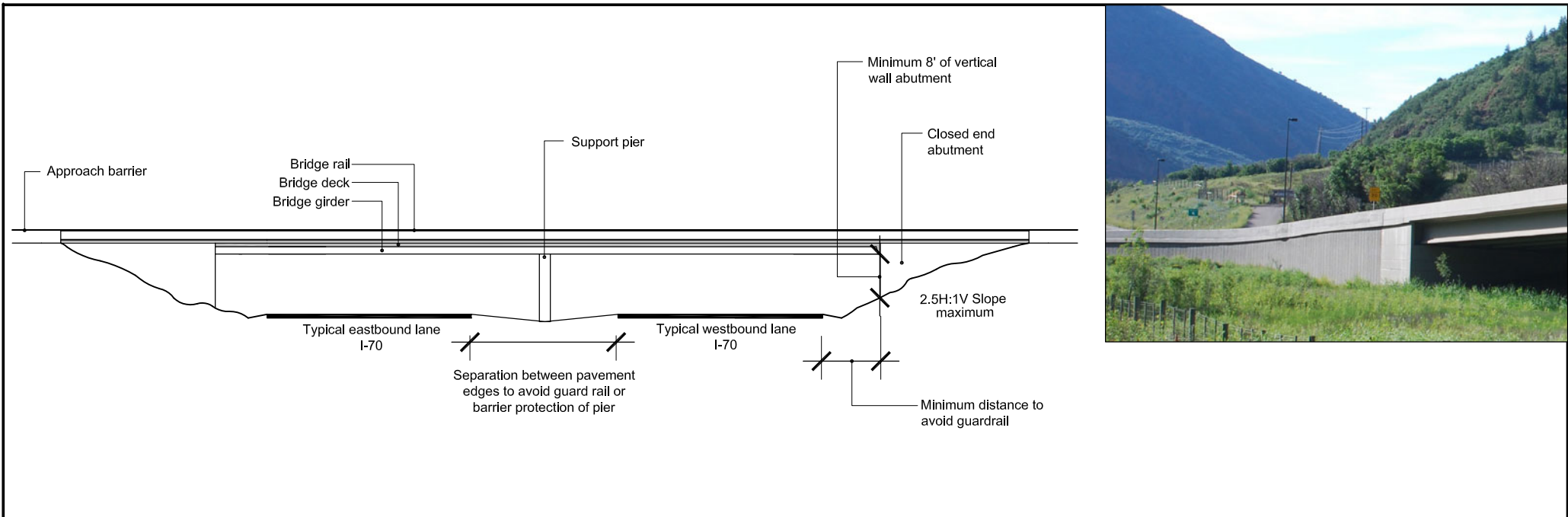


ILLUSTRATION 3: DESIGN CRITERIA FOR BRIDGE STRUCTURES OVER I-70

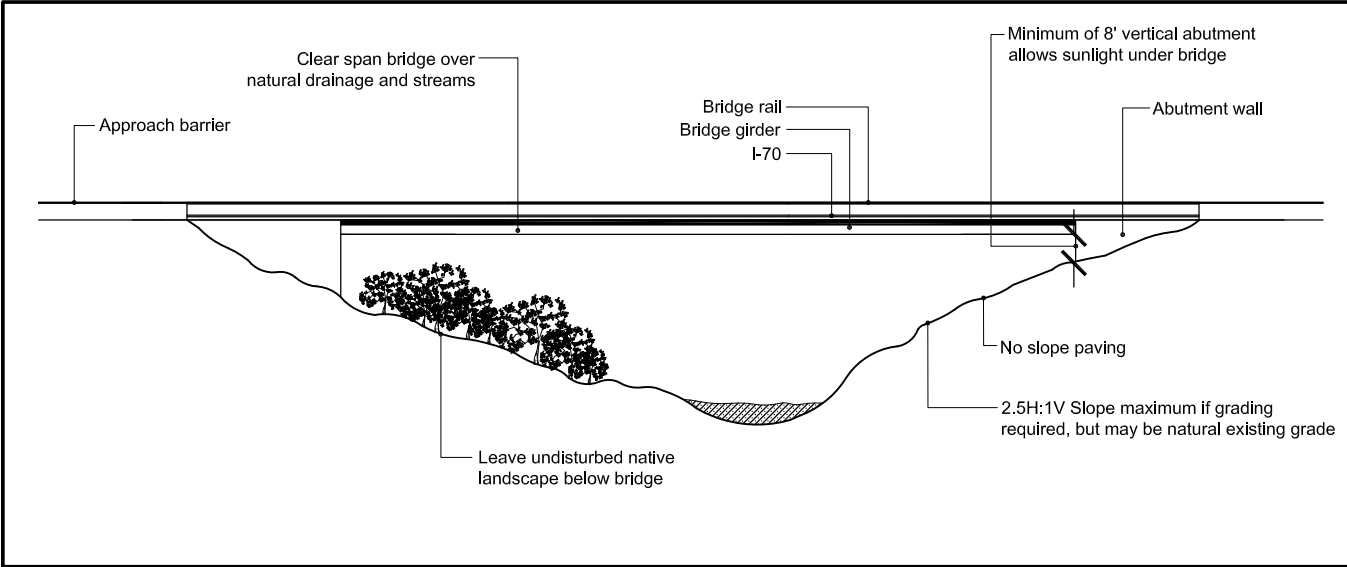


ILLUSTRATION 4: DESIGN CRITERIA FOR I-70 BRIDGE OVER NATURAL FEATURES OR OTHER ROADWAYS



Sound buffering and attenuation will be designed in conjunction with the horizontal and vertical alignments to eliminate the need for noise mitigation.

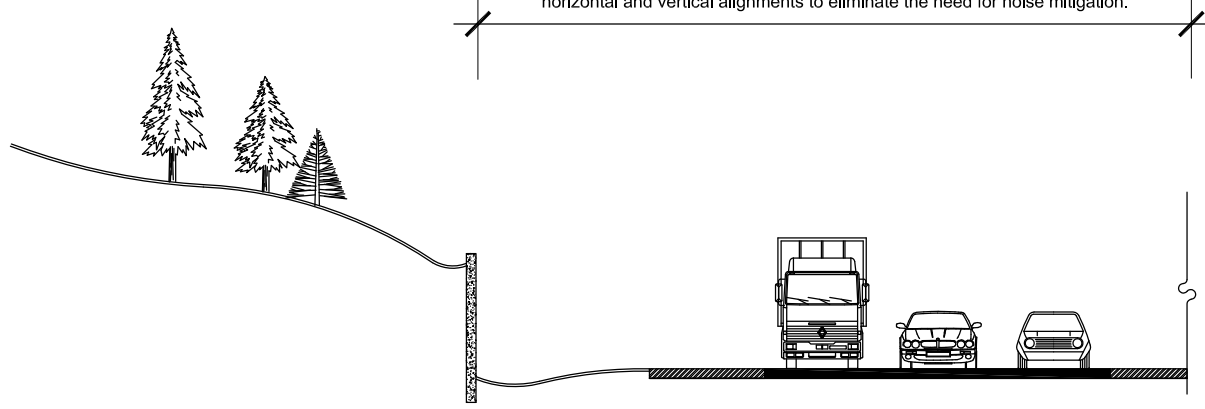


ILLUSTRATION 5: DESIGN CRITERIA FOR SOUND ATTENUATION



Sound wall design is integrated with landform, grading, and landscape.

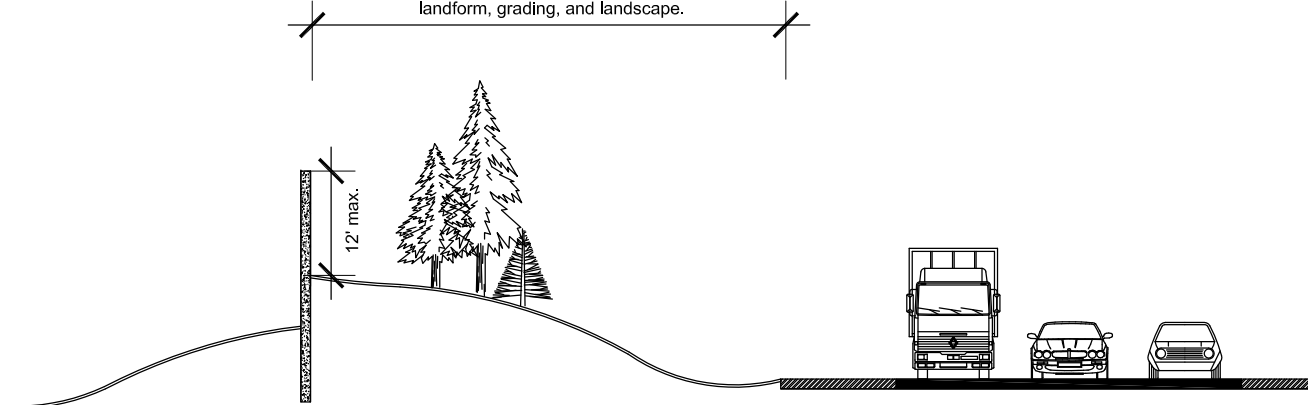


ILLUSTRATION 6: DESIGN CRITERIA FOR SOUND WALL DESIGN