Appendix D
I-70 Mountain Corridor Context Sensitive Solutions Aesthetic Guidance

AESTHETIC GUIDANCE INDEX

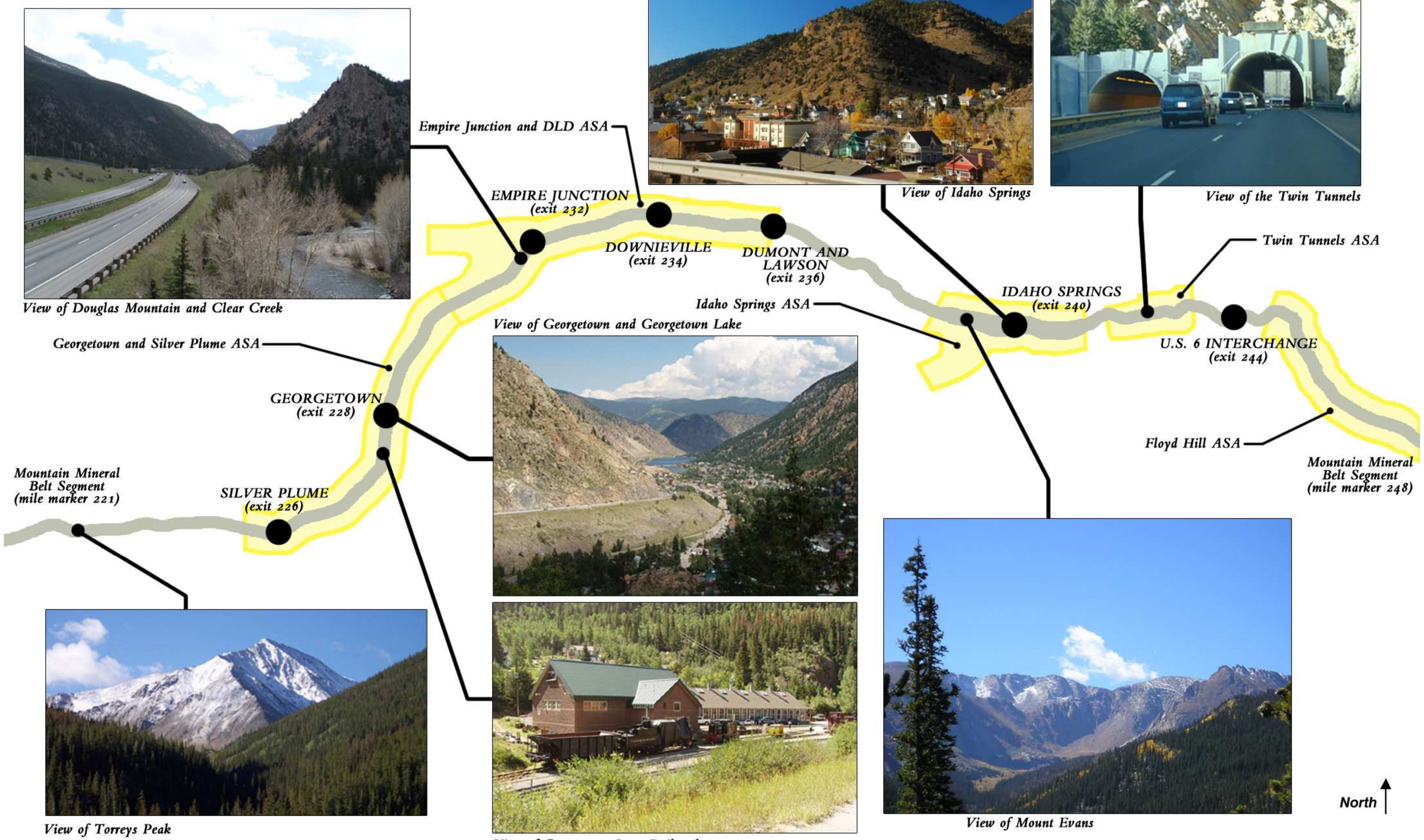
Rich in mining history, the Mountain Mineral Belt design segment rises from the foothills. Dotted with historic towns including Idaho Springs and Georgetown, the Mountain Mineral Belt offers scenic views, lush forests, rocky hillsides, waterways, and access to local and regional destinations and recreational opportunities.

The Mountain Mineral Belt design segment contains five Areas of Special Attention (ASA) including Floyd Hill, Twin Tunnels; Idaho Springs; DLD and Empire Junction; and Georgetown and Silver Plume. Information on Areas of Special Attention can be found in corresponding ASA reports located under the Design tab on the I-70 CSS Website. The locations of each ASA in the Mountain Mineral Belt design Segment can be found on the Features of Special Significance Map in this document.

Additional resources for the I-70 Mountain Corridor can be found at http://i70mtncorridorcss.com/. These resources include, but are not limited to, I-70 Mountain Corridor Design Criteria, Area of Special Attention Reports, Stream and Wetland Ecological Enhancement Program (SWEEP), Sediment Control Action Plans (SCAP), I-70 Visual Context Maps, A Landscape Level Inventory of Valued Ecosystems (ALIVE), Linkage Interference Zones (LIZ), Colorado Department of Transportation Drainage Manual, Context Statements, Core Values and the decision making process.

FEATURES OF SPECIAL SIGNIFICANCE MAP

This diagram describes unique and important views, landscape features, recreational points, cultural/historic elements, and roadway facilities that contribute to the special character found in the Mountain Mineral Belt design segment. These elements should be considered as having special significance in the corridor and provide the best examples of the context to be preserved and enhanced.



View of Douglas Mountain and Clear Creek

View of Idaho Springs

View of the Twin Tunnels

View of Georgetown and Georgetown Lake

View of Torreys Peak

View of Georgetown Loop Railroad

View of Mount Evans

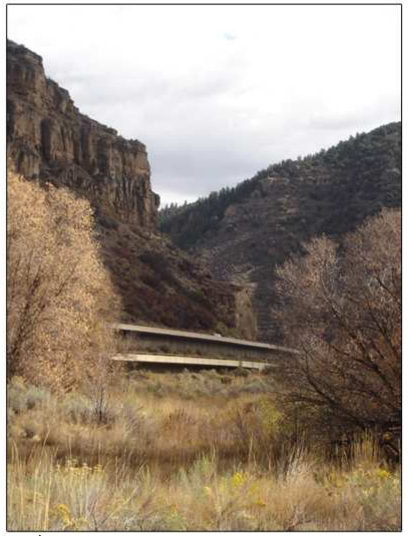
01 | TRANSPORTATION AND LAND RELATIONSHIPS

Elevating structures, retaining embankments, adapting design to topographic conditions, and respecting the historic limits of disturbance are techniques available for both retro-fitted and new construction. The desired result is a transportation facility that minimizes the alteration of land and avoids slopes that appear artificially constructed.

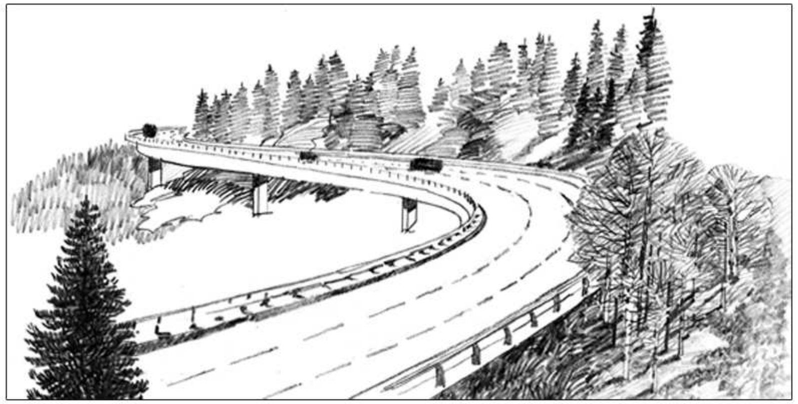
ADAPTING THE HIGHWAY TO EXISTING TOPOGRAPHY

Design Strategies to Be Employed

- Design eastbound and westbound travel lanes as independent alignments as described in the Design Criteria.
- Utilize split elevations for eastbound and westbound travel lanes in areas of steep topography. Structured and elevated roadway design solutions will minimize the level of disturbance on steep slopes (A, B, C).
- The roadway should respect the sinuosity of the valley floor and natural hydrology (D).
- Use structural retaining devices to minimize earthwork and stay within existing limits of disturbance (E).
- Locate the centerlines of eastbound and westbound travel lanes as close as possible to the existing topography to minimize the use of cut and fill embankment. Alternatively, utilize structured or elevated road alignments to provide greater design flexibility.



A | Using a split elevation for the travel lanes will adapt the corridor to the steep slopes found in this segment.



B | Elevated solutions can fit into the landscape and respond to sudden changes in topographic, hydrologic, or environmental conditions.

C | Elevated roadways will minimize disturbance on steep slopes.

D |The roadway should respect the sinuosity of the valley floor and creek.

E | Structural retaining devices should be utilized to stay within the existing limits of disturbance.

02 | TRANSPORTATION FACILITIES ALIGNMENT

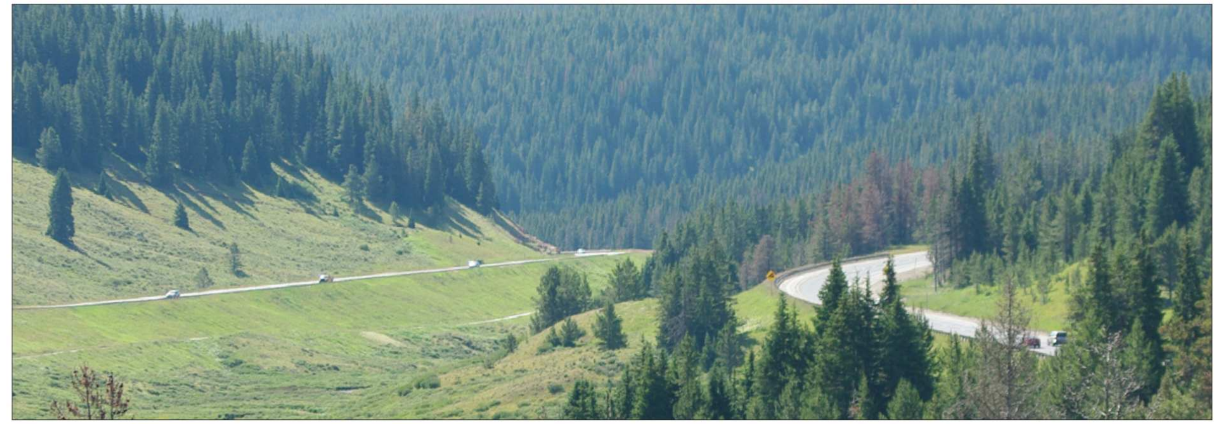
In newly constructed sections, when horizontal lane separation can be developed beyond the minimum median standard, it is advisable to separate the eastbound and westbound lanes by a desired distance of 80 to 1,500 feet. A median of this width can provide a method for managing water quality, storing snow, preserving vegetation, restoring the disturbed landscape, adapting to topographical conditions, and providing a tangible buffer to the opposing lane.

The minimum horizontal separation between lanes will be maintained. As an alternative condition, a vertical elevation separation between lanes of at least 6 feet may be established to adapt the corridor to the mountainous and topographic conditions. Where vertical elevation separation exists in the current alignment, it should be preserved in any new design. The vertical separation will also eliminate the need for high barriers and devices that shield oncoming headlights.

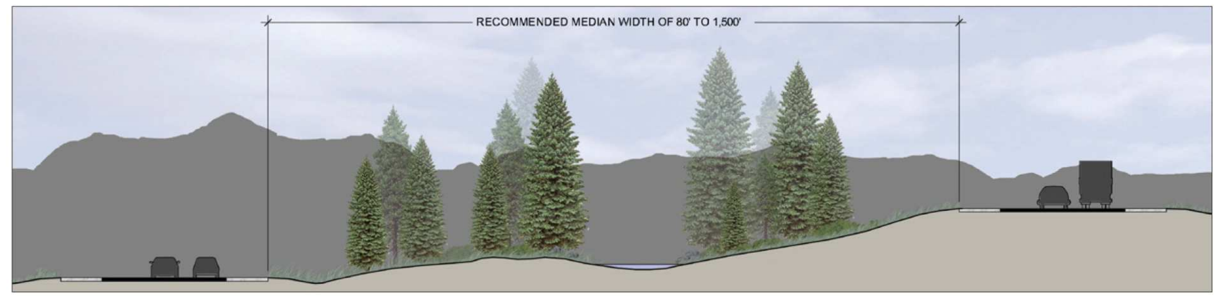
MEDIANS AND LANE SEPARATIONS

Design Strategies to Be Employed

- Incorporate variable widths of medians and include plants and landscape materials characteristic of the various landscape types found along this segment (A).
- Preserve the existing median width as described in the Design Criteria or separate eastbound and westbound lanes by a preferred distance of 80’ to 1,500’ (B). A minimum median width that allows a clear zone without guardrail or barriers is described in the Design Criteria.
- Preserve the existing vertical separation as described in the Design Criteria or separate eastbound and westbound lanes by at least 6’ in elevation in locations where it is difficult to achieve the desired horizontal separation (C, D).
- Look to Vail Pass as a design precedent for substantial and variable median widths, successful landscape revegetation, and the integration of recreation and habitat within the median and right-of-way (A).

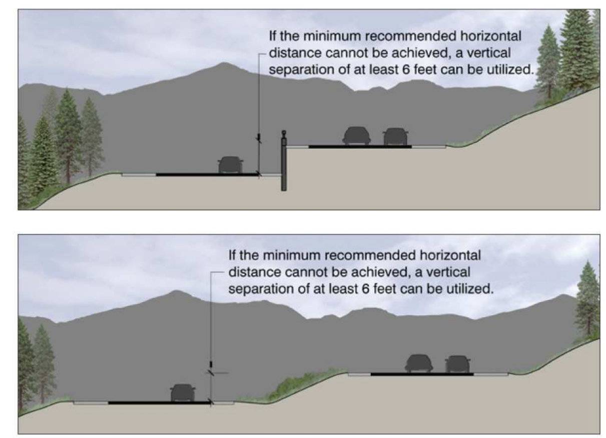


A | Medians of variable width blend the transportation corridor with natural landscape and drainage patterns.



B | A median of 80’ to 1,500’ provides separation of the travel lanes and allows space for landscape and hydrologic features.

C | Where steep topography restricts median width, a vertical separation of at least 6’ should be implemented.



D | Vertical separation can be accomplished through structured or embankment solutions, or a combination of both.

03 | STRUCTURES THAT SUPPORT TRANSPORTATION FACILITIES

Visual design continuity should exist throughout the corridor, linking existing and new transportation facility structures. Bridges should be of similar proportion and structural components should be designed using like materials and finishes.

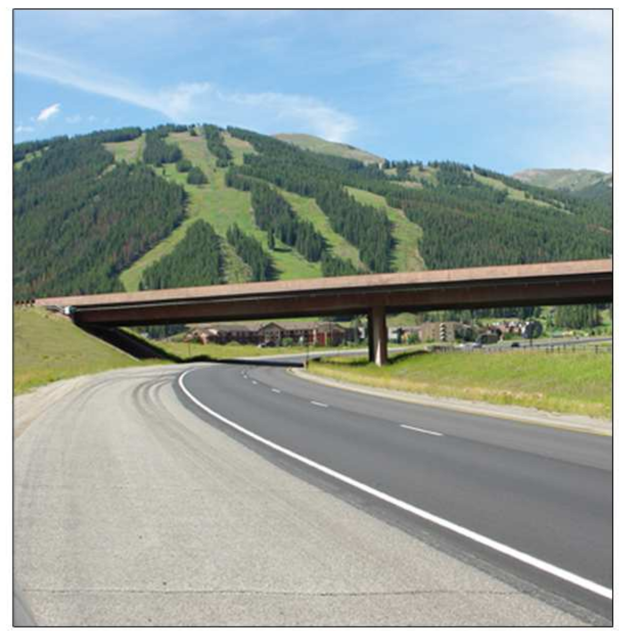
Each retaining wall should be constructed of single material with a visually simple texture that renders a shadow pattern on the surface. Retaining walls that include decorative pictorial patterns and multiple materials, shapes, and styles create visual confusion and should not be used in the corridor.

EXISTING HIGHWAY FEATURES

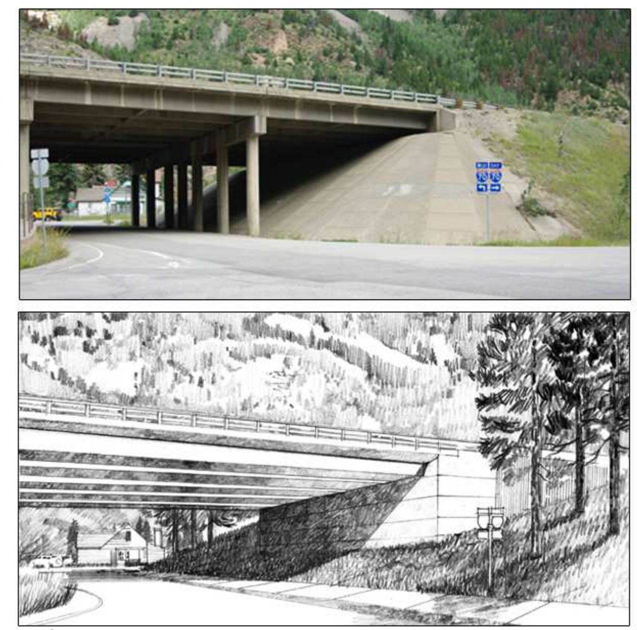
Design Strategies to Be Employed

- In areas of retrofit construction, utilize the Aesthetic Guidance and refer to the existing character of structures and facilities across the segment to achieve a consistent design aesthetic, rather than a series of disconnected and random structures.
- New construction should incorporate the Aesthetic Guidance and be of the same design family as existing facilities (A, B, C).
- Consider individual projects as part of the larger context of facilities.

A | The strong sculptural design of existing structures along Vail Pass should serve as a precedent for new construction.



B | The bridge at Copper Mountain presents an aesthetic character with color, shadow, and box girder construction.



C | A new design for the facility shown above would remove slope paving and incorporate guidance for the design of bridge structures, planting, and pedestrian connections.

03 | STRUCTURES THAT SUPPORT TRANSPORTATION FACILITIES

Visual design continuity should exist throughout the corridor, linking existing and new transportation facility structures. Bridges should be of similar proportion and structural components should be designed using like materials and finishes.

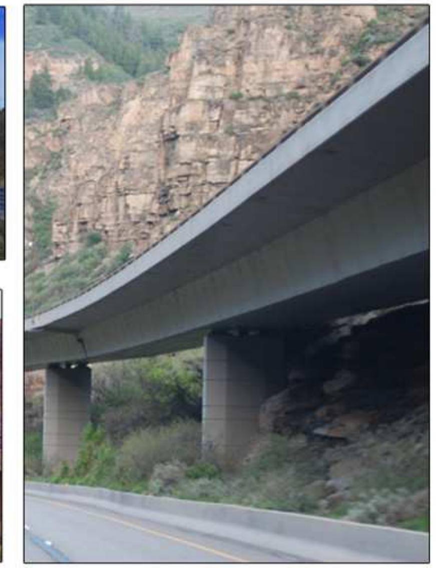
Each retaining wall should be constructed of single material with a visually simple texture that renders a shadow pattern on the surface. Retaining walls that include decorative, pictorial patterns, and multiple materials, shapes, and styles create visual confusion and should not be used in the I-70 Mountain Corridor.

BRIDGE STRUCTURES

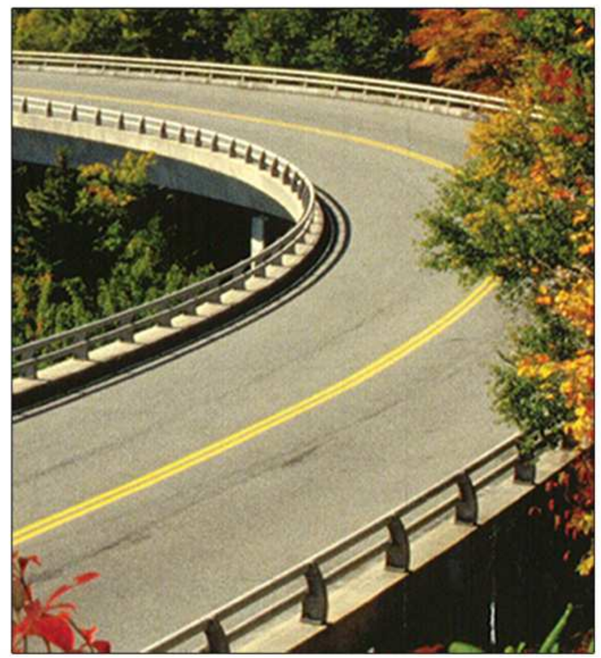
Design Strategies to Be Employed

- Utilize closed end abutment designs which have a minimum vertical height of 8'as described in the Design Criteria.
- Simple and elegant bridge design is more appropriate than complex shapes and geometries. The elegant design provides an aesthetic contrast to the complexity of the surrounding mountain landscape (A, D).
- Create a clean, uncluttered appearance below the bridge and eliminate the exposed support pier face condition. The Aesthetic Guidance recommends a box girder design.
- Incorporate thoughtful and deliberate shadow patterns on super structures and abutments. The overhang of the bridge deck should be equal to 2/3 the height of the girder to produce the desired shadow on the superstructure (B, D).
- Treat the color of bridges and other structures in a manner consistent with this segment's color palette. Fussy and jarring color schemes are inappropriate for this segment. See section 06 | Color Selection and Consistency for additional details and color palette.
- Consider attached metal rails or 24"-high concrete wall with attached metal rail rather than solid concrete barrier for bridge rails (C, D).
- Slope paving is not allowed in this segment as described in the Design Criteria. The intent is to extend the existing landscape underneath bridges (D). See Section 07 | Earthwork, Embankment, and Restoration of Existing Disturbance and Section 09 | Landscape Planting, Revegetation, and Topsoil Management for strategies to accomplish this.
- Use a consistent material for approach rail and bridge rails. Ensure the point of attachment between the two does not sacrifice the appearance of continuity (E).
- Utilize a concrete wall face with a simple vertical or horizontal texture pattern on bridge abutments.
- Plant trees on the bridge embankment slope to anchor the ends of the bridge and connect the span to the embankment (D).
- Avoid disturbing the natural landscape below bridges except in places where a pier is constructed.
- Avoid locating piers in a stream or river where scour could occur.

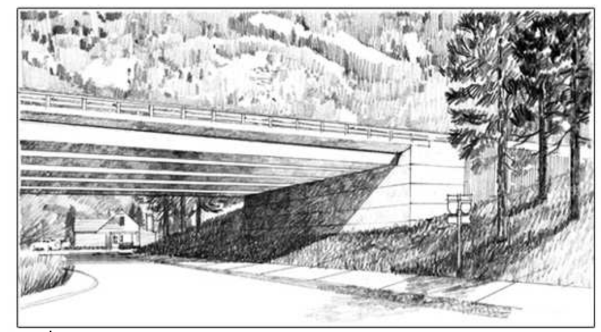
A | Bridges with simple forms, color, and shadow patterns exhibit an aesthetic contrast to the complexity of the natural landscape.



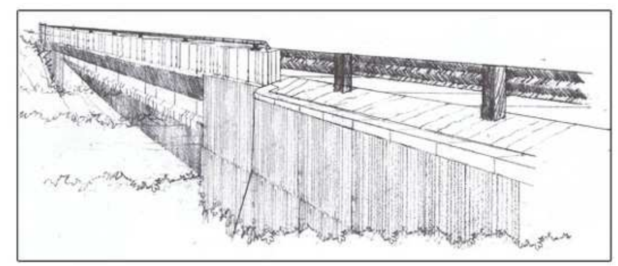
B | Deep overhangs and shadow lines add visual depth and give the bridge superstructure a thin appearance.



C | Utilizing attached metal rails on bridges rather than concrete barriers adds to the transparency and thin appearance of the span.



D | Open pedestrian connection, transparent bridge rail, vertical abutment, deep shadow line, and landscape planting strategies.



E |Ensure the point of attachment between approach rail and bridge rail does not sacrifice the appearance of continuity.

03 | STRUCTURES THAT SUPPORT TRANSPORTATION FACILITIES

Visual design continuity should exist throughout the corridor, linking existing and new transportation facility structures. Bridges should be of similar proportion and structural components should be designed using like materials and finishes.

Each retaining wall should be constructed of single material with a visually simple texture that renders a shadow pattern on the surface. Retaining walls that include decorative pictorial patterns and multiple materials, shapes, and styles create visual confusion and should not be used in the I-70 Mountain Corridor.

RETAINING WALLS SUPPORTING THE HIGHWAY

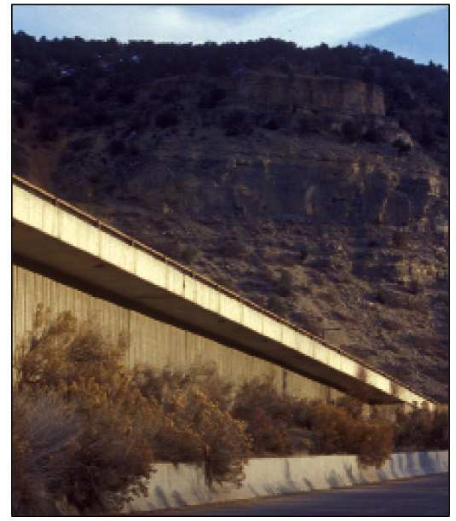
Design Strategies to Be Employed

- Install roadway retaining walls greater than 12' in height below the elevation of the roadway as described in the Design Criteria.
- Provide space for landscape screening treatments in front of all retaining walls that are visible from the roadway or adjacent communities (A).
- Incorporate wall materials that have a consistent texture and pattern (B).
- Employ simple vertical textures and patterns on walls to create shadows and interest (B).
- Use grading strategies to minimize the height of retaining walls along the corridor (C).
- Utilize landscape platforms and turn the ends of walls to meet with the grades of hills and slopes to ensure that retaining walls are integrated with adjoining slopes (D).
- Design walls with a single material, style, and method rather than a mix of materials -even if wall height varies.
- Design walls to include an appropriate cap with an overhang to create shadows and interest.

TUNNELS

Design Strategies to Be Employed

- Provide lighting and light colored reflective surfaces in the tunnel to eliminate the black hole effect.
- Flare tunnel portals and extend them out from the rock cut face. The use of headwalls perpendicular to the travel lanes is strongly discouraged (E).

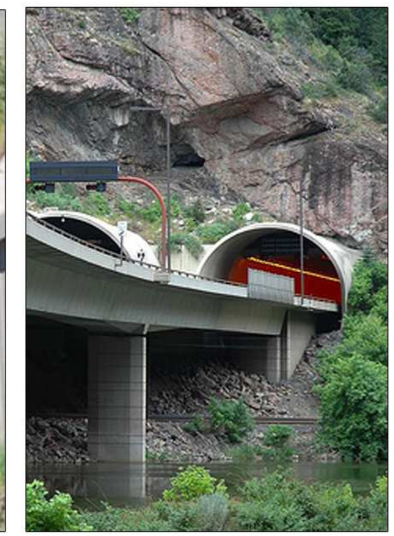


A| Where possible, allow for landscape screening to buffer the view of retaining walls.

B| Simple vertical textures provide depth and shadow to large wall faces.

C| Incorporate earthwork solutions in conjunction with retaining walls in order to limit retaining wall height.

D| Turning the ends of walls helps integrate them into the adjoining slope.



E| Flare tunnel portals and extend them out from the rock cut face.

04 | INTERCHANGES

Newly constructed Interchanges shall consider the context in which they are planned. The goal for interchanges is to efficiently use land, reduce visual prominence, and integrate with the landscape context and existing land uses. In narrow canyons, for example, compact designs should be used. In locations adjacent to existing communities – where limitations on space and reduction in visual prominence will be key in planning for contextual solutions – interchange alternatives that use little land area may be preferred. In all designs, understand the visual prominence and scenic influences of the facility. Provisions for landscape planting should be incorporated into the available interchange open space and be reflective of the surrounding native landscape.

INTERCHANGE DESIGN

Design Strategies to Be Employed

- Consider the urban design implications associated with interchanges - including connections to the local road network, pedestrian circulation, and adjacent land uses (A, C).
- Ensure smooth and seamless access into the community (A).
- Utilize a compact interchange design to avoid consuming more land than necessary. Utilize vertical walls to facilitate this style of design (C).
- Provide substantial landscaping in median areas to create a transition from the transportation corridor to the community environment (B).
- See Section 11 | Community Interface for the hierarchy of interchanges in this segment.

A| Idaho Springs has three interchanges - exit 241 contains vehicular-oriented land uses, exit 240 is the front door to the community and provides access to historic downtown, major residential areas, and Mount Evans, and exit 239 is for local access.

B| Interchanges should exhibit a compact design and include dense landscaping in median areas to create a transition from the transportation corridor to the community environment.

C| Community circulation must be considered at the onset of interchange design to ensure the creation of comfortable pedestrian spaces.

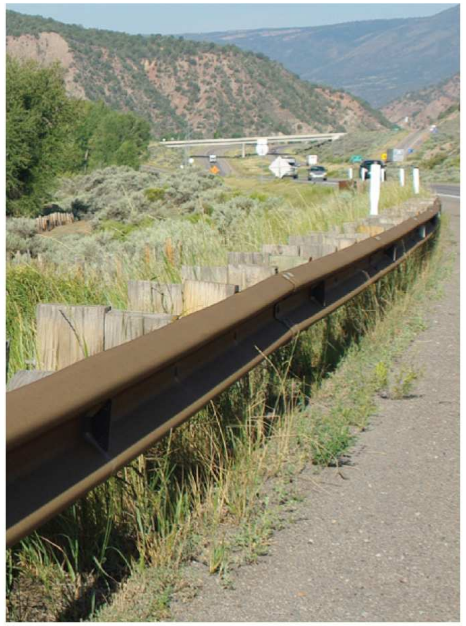
05 | GUARDRAILS, BARRIERS, AND EDGE DELINEATION

Guardrails will be constructed using Type 3 Guardrail-W Beam with a rusted rail finish and wooden posts. Any concrete barrier rail will be colored to match the segment color selection. An identical design will be used throughout the corridor. A recovery zone is preferable to guardrail or barriers for protection from edge obstacles.

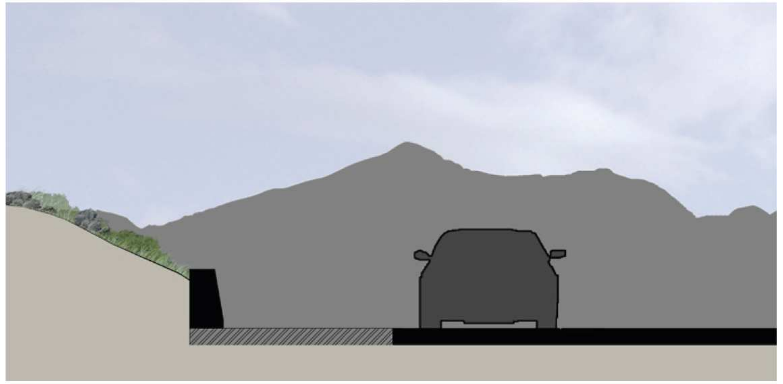
GUARDRAILS, BARRIERS, AND EDGE DELINEATION

Design Strategies to Be Employed

- Use Type 3 Guardrail W-beam with wooden posts for guard rails. Eliminate the use of galvanized "W" rails (A).
- Color concrete barriers using the selected colors from the design segment color palette in order to blend the roadway into the surrounding environment. See Section 06 I Color Selection and Consistency for color palette.
- Incorporate landform and planting directly with concrete barrier walls (B).
- The use of cable rail is strongly discouraged in this segment due to the long term maintenance costs and aesthetics.
- Utilize continuous concrete barriers rather than segmented movable barriers (C).
- Provide edge delineation through applied markings and reflectors rather than painting bright contrasting colors on concrete barriers.



A| Type 3 Guardrail W-beam should be used for guard rails throughout this design segment.



B| Planting and landform should be incorporated with barrier rail walls.

C| Continuous concrete barriers with a consistent color application should be utilized rather than segmented barriers.

06 | COLOR SELECTION AND CONSISTENCY

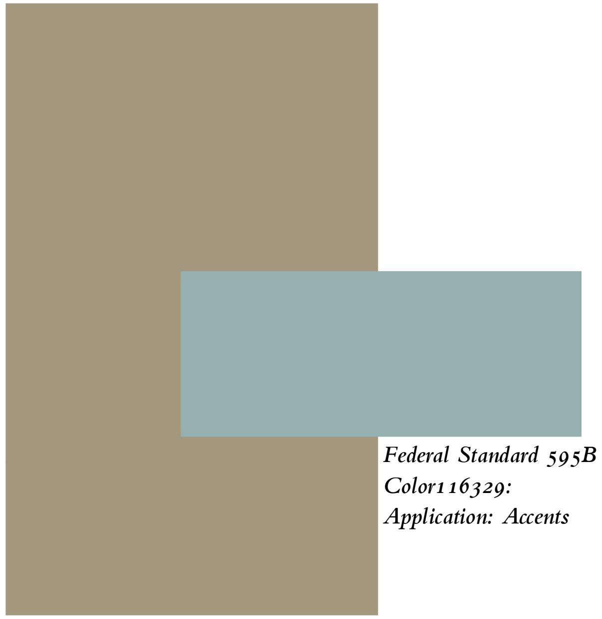
A color palette has been selected for use and is described in the guidance for each individual design segment. Color selected for transportation features – including light standards, sign supports, and other vertical construction – will blend into the background of the natural and built environment.

COLOR SELECTION AND APPLICATION

Design Strategies to Be Employed

- Apply this segment's color palette to transportation structures and associated facilities within this segment - including sound walls, retaining walls, lighting, signage, bridges, etc. The colors selected for this segment complement the unique features found here and provide consistency across the entire design segment (A).
- The base color for this design segment is a beige tone consistent with the dominant color of the bridge and overpass structures found in Glenwood Canyon (B).
- Accent color for this design segment is a light blue green tone currently found in this segment and should not be more than 15% of the painted structure (D).
- Apply the base color to the dominant sections of the structure. Utilize accent colors to highlight smaller details that are attached to the overall roadway structure.
- Vertical metal features - such as light poles, sign poles, and highway edge facilities - should be colored with US Forest Service Brown color (E).
- Vertical metal features less than 8" in diameter or 10' in height may be excluded from vertical metal features color palette.

Color Palette



Federal Standard 595B Color116329: Application: Accents

Federal Standard 595B Color 30372: Application: All road structures

Federal Standard 595B Color20059: Application: All vertical features

A| A consistent color palette provides the traveler a clear experience that is free from confusing or inappropriate visual cues.

B| Application of segment base color and accent color on bridge structure.

C| The application of color on lighting and signage complements the surrounding landscape context.

07 | EARTHWORK, EMBANKMENT, AND RESTORATION OF EXISTING DISTURBANCE

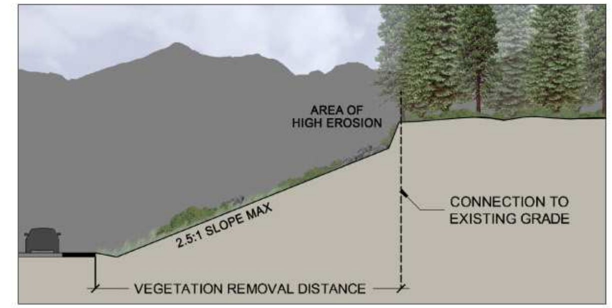
All site grading and existing disturbance restoration in the corridor should utilize landforms that reflect the patterns and diversity naturally occurring throughout the segment. Earthen embankments are natural reflections of the landscape and should mimic the patterns found in pre-existing conditions. Grading should avoid scarring on steep slopes, as well as the negative visual effects that result. New rock cuts will be naturalized with custom shaping and coloration will be applied to reduce the contrast between new cuts and existing rock faces.

EARTHWORK AND GRADING

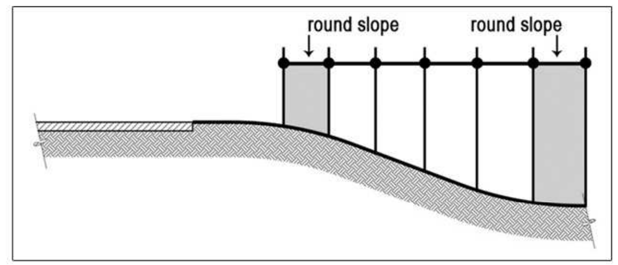
Design Strategies to Be Employed

- Limit slopes to 2.5:1 (H:V) maximum and physical disturbance to less than 40 vertical feet from the edge of pavement or rail platform to the farthest edge of cur or fill as described in the Design Criteria.
- Round the top and bottom of the slope to provide a stable area for revegetation and transition the embankment back into natural grade. When viewed in elevation, this rounded transition should occur over the last 1/6th of the slope top and toe (A, B).
- When clearing vegetation is necessary for earthwork, the roadway design may remove more vegetation than required in order to create a natural and irregular edge, allow a naturalized rounding of the slope, frame scenic views, and create islands of significant existing trees and shrubs (C, D).
- Use a warped or variable slope technique in areas where the terrain is rolling and road work requires frequent shifts between cuts and fills.
- Soften transitions by laying back the slopes more at the ends of the cuts and fills than in the middle.
- Vary the slope of the embankment through the length of a large cut or fill area. A consistent slope should not be used for a longitudinal length greater than 300’(D).
- Replicate the diversity of natural slope conditions in new earthwork design and construction (D).

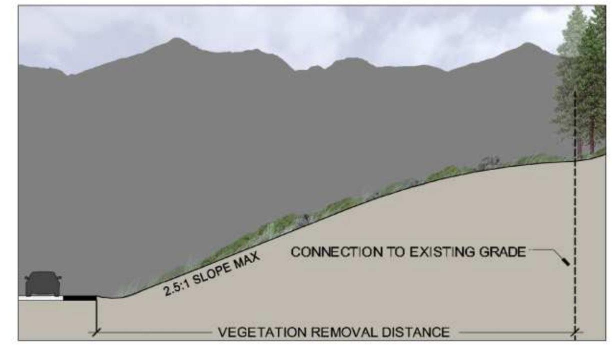
A| Rounding the top and toe of the slope blends embankments into the existing landscape and facilitates revegetation of constructed slopes.



Typical methods deliver an engineered slope poorly integrated into existing grade.



B| To transition into existing grade, round the slope over the last one sixth of the top and toe of the embankment.



C| The preferred method requires additional clearing to round grading properly, yet creates a more natural slope and vegetation condition.

D| Utilizing variable slopes through the length of an embankment mimics the natural patterns.

07 | EARTHWORK, EMBANKMENT, AND RESTORATION OF EXISTING DISTURBANCE

All site grading and existing disturbance restoration in the corridor should utilize landforms that reflect the patterns and diversity naturally occurring throughout the segment. Earthen embankments are natural reflections of the landscape and should mimic the patterns found in pre-existing conditions. Grading should avoid scarring on steep slopes, as well as the negative visual effects that result. New rock cuts will be naturalized with custom shaping and coloration will be applied to reduce the contrast between new cuts and existing rock faces.

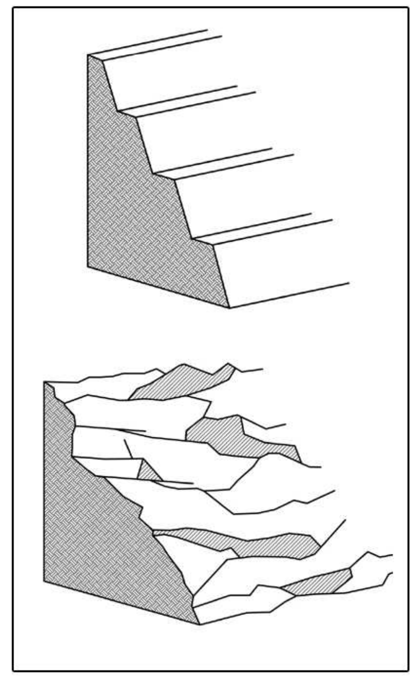
ROCK CUTS AND MODIFICATION

Design Strategies to Be Employed

- Use scatter blasting techniques and random rock drilling at varying depths to cause rock to break in natural patterns and expose natural rock fractures as described in the Design Criteria (C).
- The geologic properties of rock within this segment serve as the basis for strategies to contain rock fall in order to maintain these natural forms. The design team should include a multidisciplinary group of geotechnical engineers, civil engineers, and landscape architects whose role is to maintain the inherent character of the natural bedding planes, fractures, joints, and overall stability of rock along the segment. Refer to the Design Criteria.
- Based on careful geological, site, and cost analyses, rock cuts should strive to minimize the need for rock fall protection.
- Employ custom naturalized cuts and staggered benches and avoid the use of straight vertical cuts and benches that have a sheer, unnatural appearance (A, C).
- Allow natural rock outcrops along the segment to be left in earthwork rather than covered up or removed. When a rock cut is necessary, place bench-boulders within the slope to be visually compatible with existing rock outcrops (B).
- Design new rock cut slopes along this segment to blend with existing rock formations. Use rock staining, soil-coloring treatments, and/or accelerated weathering treatments to match new rock and soil excavations with existing rock and soil (D).
- Evaluate moving road away from the rock face to avoid rock fall protection.
- For rock fall protection, use naturally sculpted benches and ledges across the face of rock instead of human-made features. When required, the use of natural contours supplemented with retention devices (such as protection fencing or mesh screens) can be used to minimize the extent of benching (A).
- Utilize tieback and other anchoring strategies to preserve and stabilize rock formations rather than the installation of rock fall protection devices.
- Consider low reflectivity and color matching materials for rock safety structures. Rock safety structures that include earth-tone colors will match the patterns of surrounding rocks (E).
- When mesh rock fall draping is required, it should follow the existing natural contours of the rock face. The end of the mesh material should terminate in a hidden condition to reduce visual clutter on the rock face.
- Where feasible, sculpture new rock cuts to include soil pockets within rock ledges. The soil pockets will present opportunities for revegetation that reflect the natural patterns found along this segment (A).
- Implementation of these strategies will be especially important in areas of steep, rocky terrain, including:
  - *Mile marker 247-241, due to highway widening*
  - *Mile marker 242-243, due to a possible third bore at Twin Tunnels*
  - *Georgetown and Silver Plume*
  - *Fall River Road/Saint Mary's Glacier*

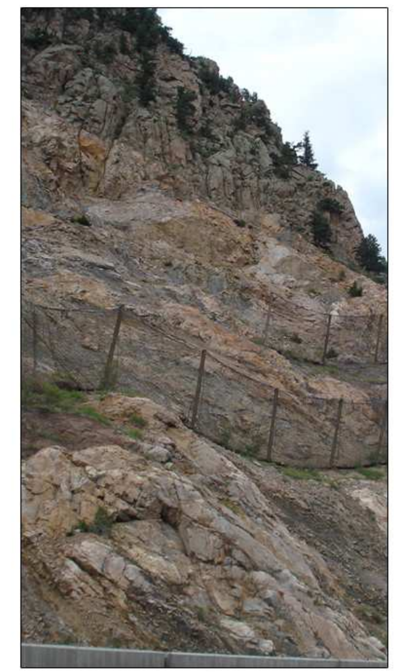
A| Rock cuts should include naturalized benches with planting pockets to mimic the surrounding landscape.

B| Allow rock outcrops and boulders to be left in earthwork to create a more natural appearance.



C| Scatter blasting and random drilling techniques result in a more natural appearance by breaking rock along existing fracture lines and bedding planes.

D| Color staining techniques will blend new rock cut with existing rock features.



E| Rock fall protection devices, when required, should utilize self-weathering and/or earth-toned materials.

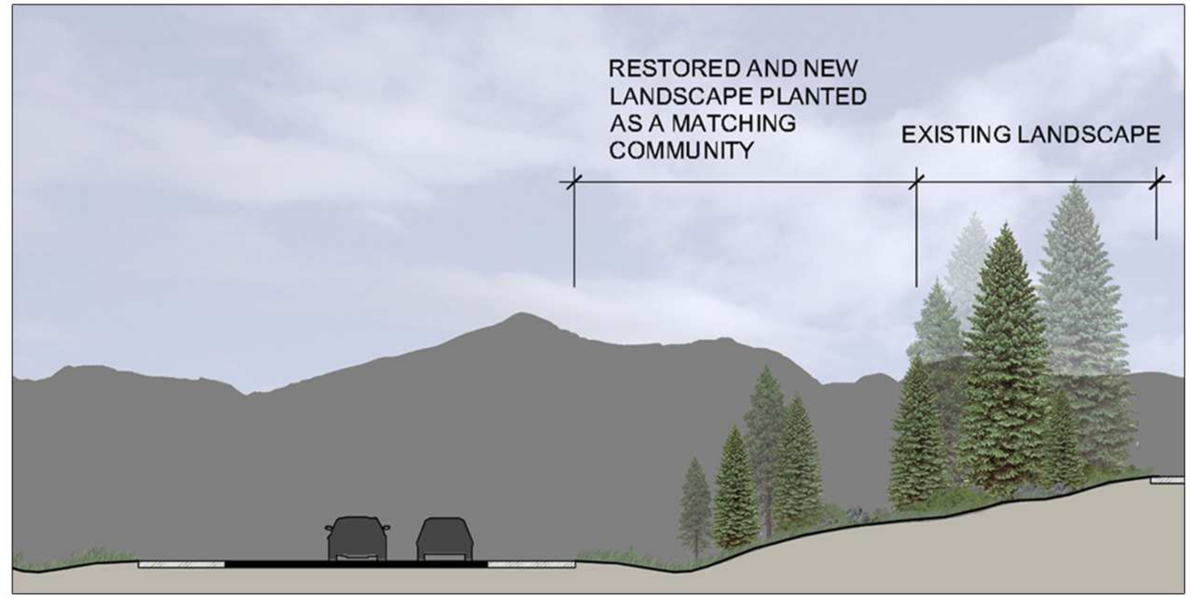
07 | EARTHWORK, EMBANKMENT, AND RESTORATION OF EXISTING DISTURBANCE

All site grading and existing disturbance restoration in the corridor should utilize landforms that reflect the patterns and diversity naturally occurring throughout the segment. Earthen embankments are natural reflections of the landscape and should mimic the patterns found in pre-existing conditions. Grading should avoid scarring on steep slopes, as well as the negative visual effects that result. New rock cuts will be naturalized with custom shaping and coloration will be applied to reduce the contrast between new cuts and existing rock faces.

RESTORATION AND NATURALIZED APPEARANCE OF DISTURBED AREAS

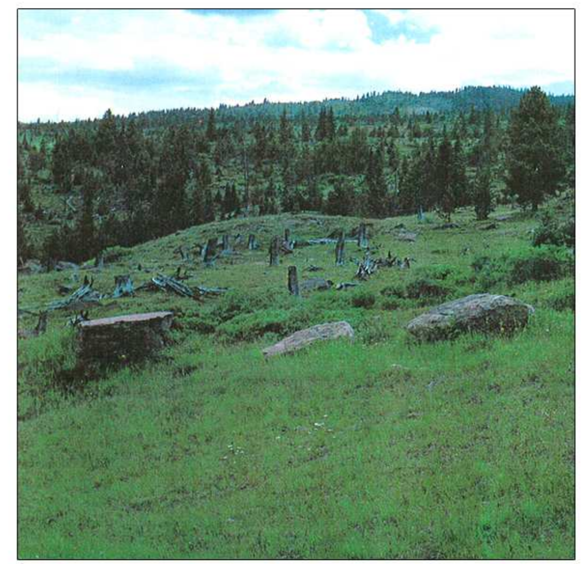
Design Strategies to Be Employed

- Restore graded areas with a landscape pattern that resembles the existing natural plant community (A). See Section 09 | Landscape Planting, Revegetation, and Topsoil Management for strategies to accomplish this.
- Use large-scale rip-rap and talus (including boulders) in conjunction with native grass, wildflower, shrub, and tree species for restoration on steep slopes (B).
- Utilize a variety of plant material - including trees, shrubs, and herbaceous plants - in revegetation efforts to ensure long-term establishment and success (C).
- Analyze the location and amount of native topsoil prior to construction. Strip, store, and ultimately reuse any topsoil removed during construction within this segment in order to retain the seed bank and bacteria in the soil.
- Grind and chip existing shrubs and other plants grubbed in the area of disturbance and mix with topsoil prior to reuse to increase organic matter and regenerative capacity.
- Ensure more successful plant establishment by using temporary and permanent drip irrigation techniques.
- Increase the success of revegetation by track walking with earthwork equipment to create small depressions and pockets for water capture.
- Implement control measures and ongoing maintenance to prevent the spread of invasive weed species.



A| Areas of disturbance should be restored using a mixture of native landscape plants, rocks, stumps, and other natural materials to mimic and blend with the existing surroundings.

B| Boulders and talus rock used in conjunction with native planting will stabilize and restore steep slopes to a more natural condition.



C| Replanting disturbed areas with a variety of plant material - including grasses, shrubs, and trees - promotes the long-term success of the restoration.

07 | EARTHWORK, EMBANKMENT, AND RESTORATION OF EXISTING DISTURBANCE

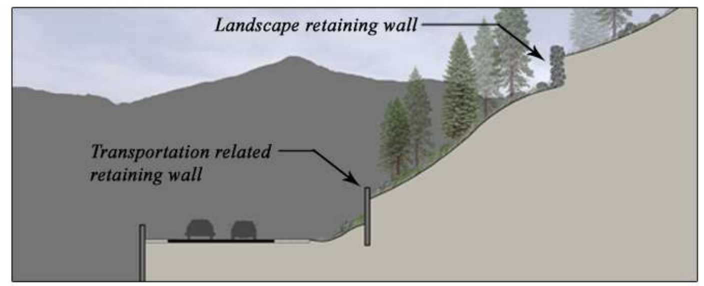
All site grading and existing disturbance restoration in the corridor should utilize landforms that reflect the patterns and diversity naturally occurring throughout the segment. Earthen embankments are natural reflections of the landscape and should mimic the patterns found in pre-existing conditions. Grading should avoid scarring on steep slopes, as well as the negative visual effects that result. New rock cuts will be naturalized with custom shaping and coloration will be applied to reduce the contrast between new cuts and existing rock faces.

LANDSCAPE RETAINING WALLS

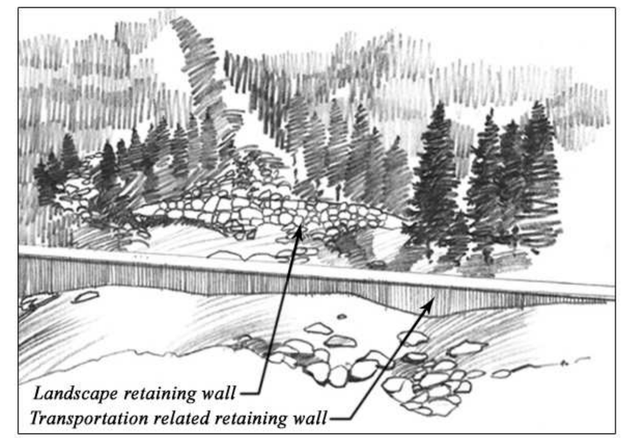
Design Strategies to Be Employed

- Landscape retaining walls are defined as being completely set within the existing landscape - not associated with the roadway structure or surface - and are generally small in size. Walls that retain earth specifically for the purpose of creating the road platform are *not* landscape walls. Walls of this sort should be treated as part of the transportation facility.
- Small retaining walls, separated from the transportation facility and set entirely in the landscape, should utilize materials found in the natural surroundings - including boulders, rock, or talus (A, B).
- The design of these landscape-associated walls is in contrast to the aesthetic of walls directly related to transportation facilities (B).


A| Landscape retaining walls are completely set within the existing landscape and should complement the surrounding natural materials, textures, and colors.



B| Landscape retaining walls should be distinct from retaining walls associated with the transportation infrastructure by being more organic in nature.



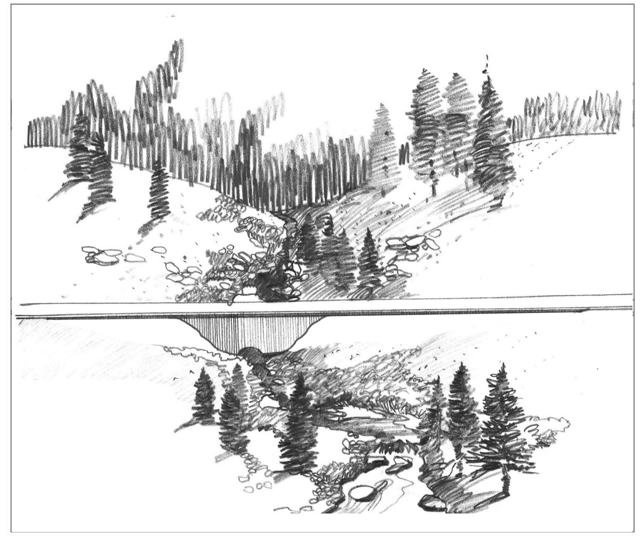
08 | HYDROLOGIC FEATURES

Hydrologic features such as streams, intermittent drainages, ponds, and wetlands that may be affected by any transportation facility construction should be designed to reflect the surrounding environment. Channels, ponds, drainages on slopes, and riparian environments hold high ecological and scenic value. Therefore, they require aesthetic design consideration as part of their implementation.

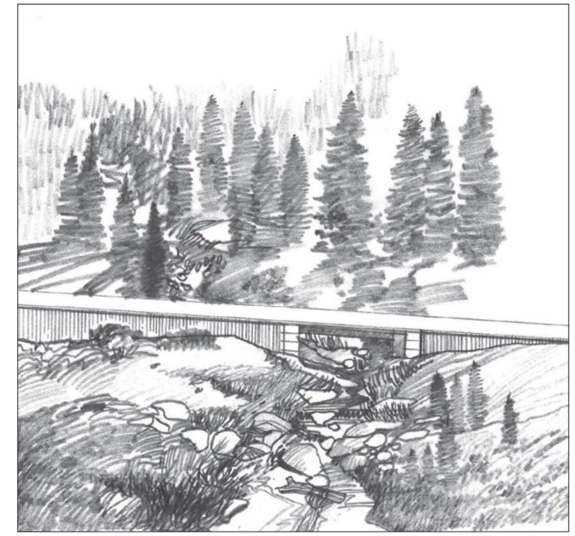
STREAMS AND HYDROLOGIC FEATURES

Design Strategies to Be Employed

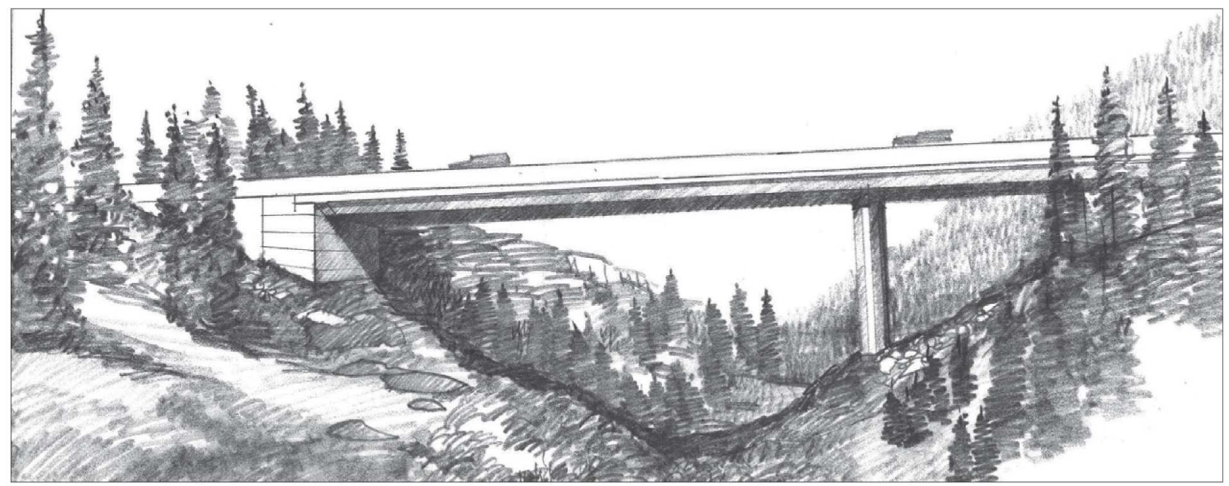
- Employ the recommendations of the Stream and Wetland Ecological Enhancement Program (SWEEP) Memorandum of Understanding as they pertain to hydrologic function, enhancement, and preservation. Use the SWEEP Implementation Matrix to guide design at each phase of the project.
- Incorporate the recommendations any Sediment Control Action Plans (SCAPs) and other appropriate documents to address sediment management.
- Analyze the entire stream course to understand the overall hydraulic and geomorphologic conditions as a foundation for the design of stream enhancements, including landform, planting, edge conditions, and drop structures.
- Treat stream edges with a variety of rock, plant materials, and landform appropriate to the functional aspects of individual drainages and stream courses.
- Design stream and hydrologic enhancements with a sinuous and meandering aesthetic to blend with existing drainage and landscape patterns (A, B).
- Pursue aesthetic and functional restoration of natural channels, including Clear Creek, where they have been previously damaged or modified by roadway improvements.
- Allow sedimentation ponds and features to perform water quality functions and then drain into natural hydrologic patterns.
- Utilize natural rock, riparian planting, and stream channel improvements to preserve and/or enhance the visual quality of features, including streams, ponds, and waterfalls.
- Use naturalized channel design for stream crossings on the uphill and downhill sections (A, B).
- Vary the size of rock treatments. Meander naturalized treatments so that they feather into the landscape as a naturally appearing stream.
- Treat varying sizes of drainages in a manner appropriate to their hydrologic function and importance. Bridge perennial streams and significant drainages to minimize disturbance and preserve the hydrologic and visual quality of the landscape. If the top of bank exceeds 30' in length, then a bridge is recommended. It is expected that stream channels will not be impacted by construction (A, B, C).



A | Seasonal and ephemeral stream courses can be placed in a culvert for short sections as they cross the corridor. Naturalized channels should be maintained and enhanced on both the uphill and downhill sections as a landscape and visual feature.



B | Intermittent and perennial streams should be bridged to preserve their hydrologic function and visual quality.



C | Open bridge solutions span significant landforms and stream corridors and leave undisturbed drainages below, minimizing environmental disturbance and impacts to the hydrologic and visual characteristics of the watershed.

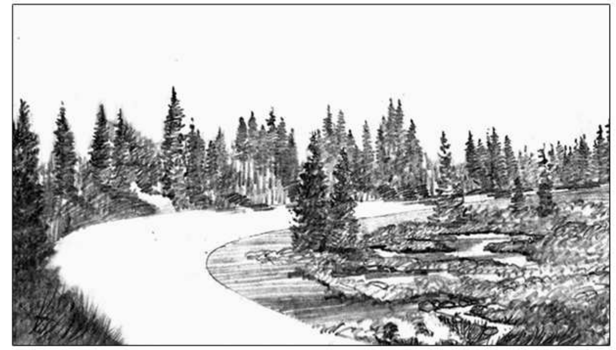
08 | HYDROLOGIC FEATURES

Hydrologic features such as streams, intermittent drainages, ponds, and wetlands that may be affected by any transportation facility construction should be designed to reflect the surrounding environment. Channels, ponds, drainages on slopes, and riparian environments hold high ecological and scenic value. Therefore, they require aesthetic design consideration as part of their implementation.

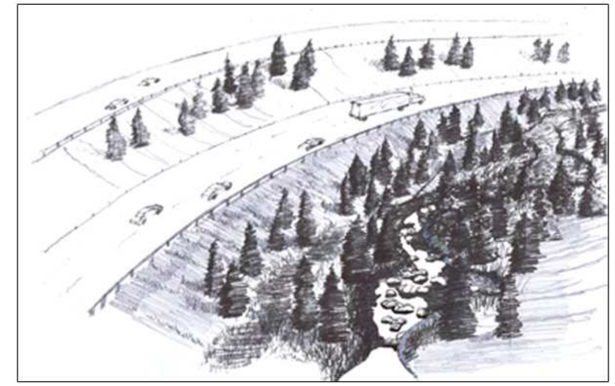
STREAMS AND HYDROLOGIC FEATURES

Design Strategies to Be Employed

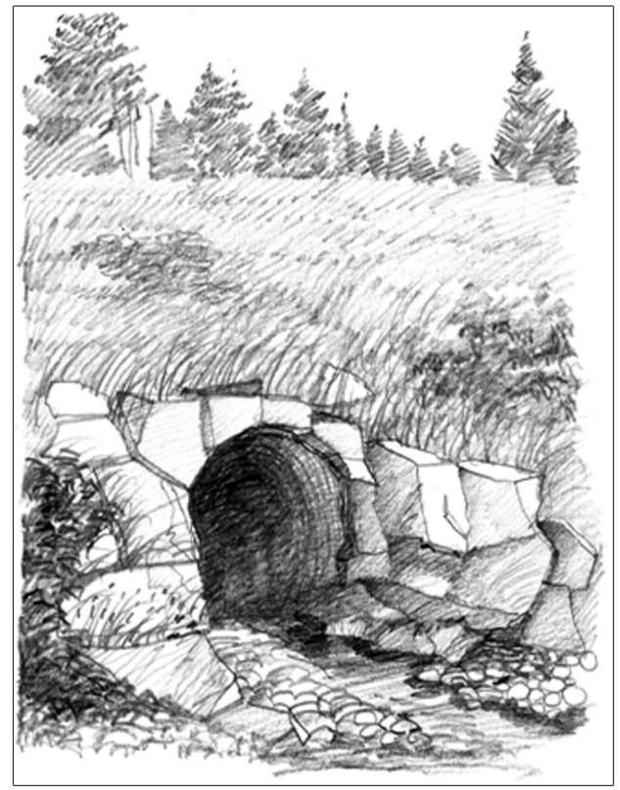
- Creeks should not be straightened or channelized in order to accommodate roadway improvements. Roadways should accommodate creek or stream sinuosity and natural appearance (B).
- Shape wetlands, pond edges, and shorelines with naturalized forms to appear as if they were existing features (A).
- Utilize naturally placed rock and aggregate at culvert outlets to provide a natural appearance (E).
- Detention basins should be revegetated or covered with appropriate ground treatment in order to reduce the look of an engineered landscape.
- Design drop structures and other stream improvements with natural materials rather than concrete structures (C, D).



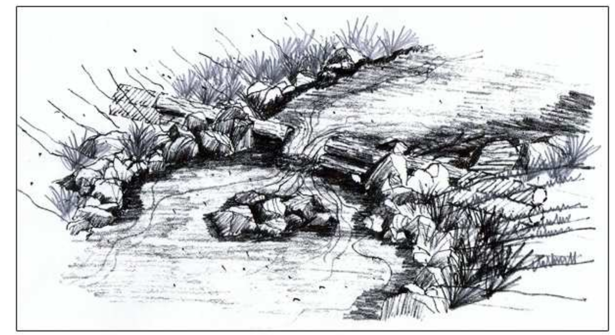
A| Naturally designed wetlands contribute to water quality.



B| Allow enough room for natural creek alignment. Do not channelize the creek.



E| Culvert with natural material at outfall.



C| Drop structure using indigenous log construction.

D| Drop structure using indigenous rock construction.

09 | LANDSCAPE PLANTING, REVEGETATION, AND TOPSOIL MANAGEMENT

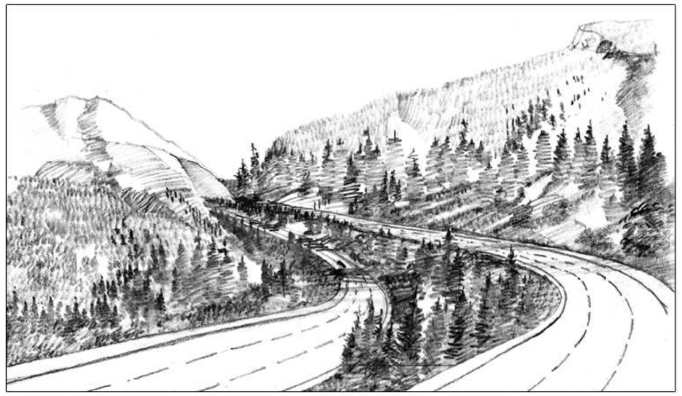
A landscape planting program will be included with every project in the corridor. The program – which will be completed in partnership with agencies and communities - will include a plan for landscape type, maintenance, and funding. Trees, shrubs, herbaceous plants, and native grasses will be incorporated into every new project. The incorporation of new landscape is essential to restoring the natural appearance of land after construction and to restoring the visual conditions of the corridor.

Salvaging, storing, and redistributing topsoil in all disturbed areas is a required practice throughout the corridor. The native topsoil contains a natural seed bank, moisture-retaining capacity, and nutrients to support plant growth. When these resources are managed properly, successful revegetation and long-term restoration can be achieved. Restoring disturbed areas eliminates the appearance of artificial construction, creating an authentic representation of the site's natural conditions.

REPLICATION OF EXISTING LANDSCAPE PATTERNS

Design Strategies to Be Employed

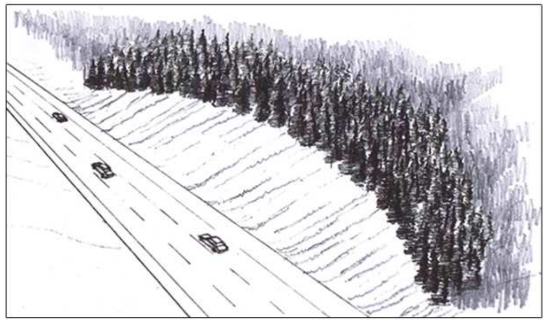
- Evaluate sites for elevation, solar orientation, soil conditions, and Mountain Mineral Belt ecosystem type (sub-alpine, montane, foothills, or riparian). Refer to CSS I-70 Visual Context Maps for general information.
- Plant selections should be reviewed for drought tolerance, salt and alkali tolerance, seedling vigor, fire retardant characteristics, growth habit, suitable soil groups, and seeding rates. Natural Patterns and distribution of plants is the predominate landscape principle. Ensure that the selected plant palette complements the site-specific existing vegetation. See section 09 | Landscape Planting. Restored plant communities should have variations in plant height, size, and width (A, B).
- Minimize the linear effect of vegetation clearing (D, E).
- Create a continuous habitat pattern by extending planting across the full extent of medians and roadway edges (A).
- Mimic surrounding conditions of plant density and spacing, species composition, and plant community structure (A, B).
- Blend existing rock and natural materials from the site with the landscape. Save and reuse native rock, stumps, and other natural materials in conditions such as boulder fields, talus slopes, or ground cover that emulates the existing landscape. Reuse of existing materials should be considered part of the site design (C).

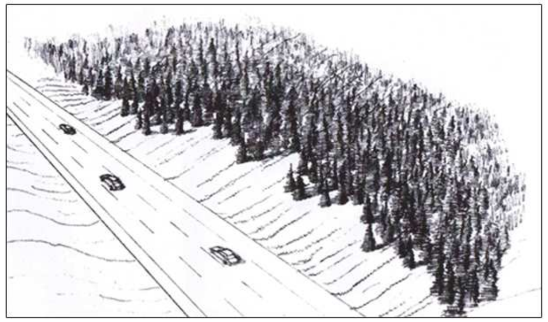
A| The existing landscape should appear to extend across the transportation corridor. Clusters of trees and other plant material representative of the life zone should be planted in the median space to accomplish this.

B| Areas of disturbance should be restored using native landscape plants that range in species, height, density, and distribution to mimic and blend with the existing vegetation.

C| Rocks, stumps, and other natural materials should be salvaged, stored, and reused in the restoration of disturbed areas.



D| Uniform clearing lines create an unnatural edge.



E| Staggered clearing lines provide a natural appearance.

09 | LANDSCAPE PLANTING, REVEGETATION, AND TOPSOIL MANAGEMENT

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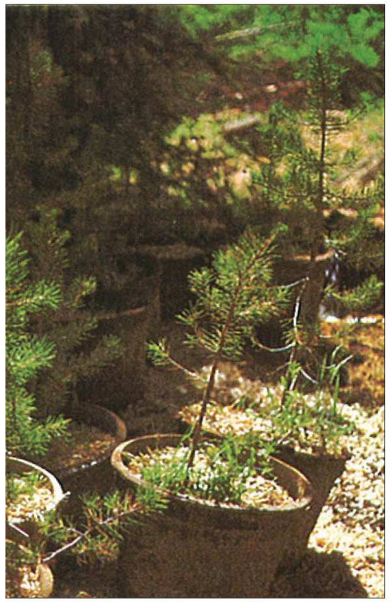
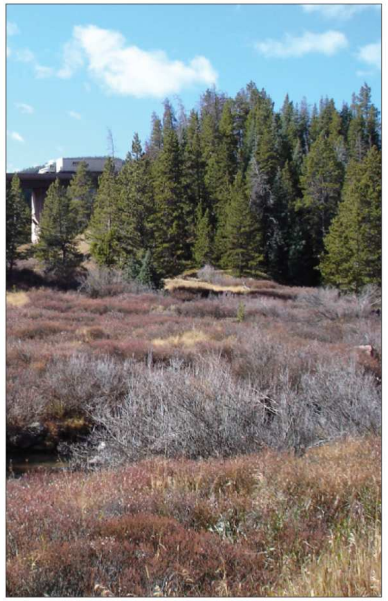
LANDSCAPE PLANTING

Design Strategies to Be Employed

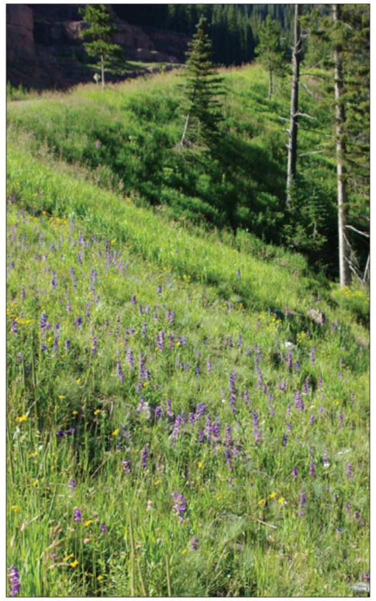
- Approximately 1/3 of existing native plants should be salvaged prior to construction. Select plants based on size, location, soils, plant value, and potential survival rate. Salvaged plants can provide mature specimens that would otherwise take years to establish. Where existing native plants cannot be reused, chip salvaged plants and incorporate them into the topsoil (A).
- Initiate a process for native seed collection prior to construction. Collect native seed from sites in close proximity to the revegetation area. Plan in advance for seed collection as several factors can affect seed availability. If native seed is not available, acquire alternatives through seed companies or Bureau of Land Management (BLM) nurseries.
- Nursery stock shall be source identified to within 1,000' of elevation.
- Monitor revegetation during construction to ensure the specified materials and installation methods have been used. Monitor and maintain areas of revegetation and weed control for up to 5 years beyond warranty limits to ensure successful native plant establishment.
- Develop a program to control noxious weeds and invasive plant species. In areas requiring revegetation, quickly establishing native species is the most effective method of controlling invasive weeds. Use biotic or organic forms of control, such as temporary mulches, to prevent invasive species from establishing.
- Incorporate the Federal Highway Administration (FHWA) Operation Wildflower Program in revegetation efforts.
- Utilize a central control for irrigation systems and consider the use of reclaimed water, including fully treated effluent and water harvesting techniques, as a supplement to irrigation.
- Provide temporary watering for containerized native plants for a period of approximately 2 to 3 years.
- Utilize the four ecosystem (foothills, montane, sub-alpine, and riparian) plant palettes appropriate to this design segment as a starting point to develop a full revegetation plant list tailored to the specific location of the project. Elevation and ecosystem information can be found on the CSS I-70 Visual Context Maps.



A| Existing native plants should be salvaged prior to construction and then replanted in conjunction with additional landscape material.



B| The plant palette should be utilized as an initial list when developing a full revegetation list.



C| The plant palette should be used in conjunction with wildflower and grass seed mixes.

FOOTHILL ECOSYSTEM (4,000' to 8,000') NATIVE SPECIES

Trees	Shrubs	Perennials/Grasses
• White Fir, *Abies concolor* • Box Elder, *Acer negundo* • Colorado Spruce, *Picea pungens* • Ponderosa Pine, *Pinus ponderosa* • Southwestern White Pine, *Pinus strobiformis* • Lanceleaf Cottonwood, *Populus x acuminate* • Douglas Fir, *Pseudotsuga menziesii* • Bigtooth Maple, *Acer grandidentatum* • Thinleaf Alder, *Alnus tenuifolia* • Rocky Mountain Birch, *Betula fontinalis* • Rocky Mountain Juniper, *Juniperus scopulorum* • Pinyon Pine, *Pinus edulis* • Quaking Aspen, *Populus tremuloides* • Gambel Oak, *Quercus gambelii*	• Saskatoon Serviceberry, *Amelanchier alnifolia* • Mountain Mahogany, *Cercocarpus montanus* • Red Twig Dogwood, *Conus sericea* • American Plum, *Prunus Americana* • Western Chokecherry, *Prunus virginiana* • Smith Buckthorn, *Rhamnus smithii* • Smooth Sumac, *Rhus glabra* • Sandbar Willow, *Salix exigua* • Silver Buffaloberry, *Shepherdia argentea* • Rock Spirea, *Holodiscus dumosus* • Three-Leaf Sumac, *Rhus trilobata* • Golden Currant, *Ribes aureum* • Bluestem Willow, *Salix irrorata* • Slivery Leadplant, *Amorpha caescens*	• Nodding Onion, *Allium cernuum* • Windflower, *Anemone multifida* • Chocolate Flower, *Berlandiera lyrata* • Purple Poppy Mallow, *Callirhoe involucrate* • Sundrops, *Calylophus lavandulifolius* • Plains Yellow Primrose, *Calylophus serrulatus* • Purple Prairie Clover, *Dalea purpurea* • Maximilian Sunflower, *Helianthus maximiliana* • Bush Morning Glory, *Ipomea leptophylla* • Gayfeather, *Liatris punctata* • Desert Four O'Clock, *Mirabilis multiflora*

MONTANE ECOSYSTEM (8,000' to 9,500') NATIVE SPECIES

Trees	Shrubs	Perennials/Grasses
• White Fir, *Abies concolor* • Engelmann Spruce, *Picea engelmannii* • Colorado Spruce, *Picea pungens* • Lodgepole Pine, *Pinus contorta latifolia* • Limber Pine, *Pinus flexilis* • Ponderosa Pine, *Pinus ponderosa* • Southwestern White Pine, *Pinus strobiformis* • Narrowleaf Cottonwood, *Populus angustifolia* • Douglas Fir, *Pseudotsuga menziesii* • Rocky Mountain Juniper, *Juniperus scopulorum* • Bristlecone Pine, *Pinus aristata* • Pinon Pine, *Pinus edulis* • Quaking Aspen, *Populus tremuloides* • Gambel Oak, *Quercus gambelii*	• Mountain Mahogany, *Cercocarpus montanus* • Red Twig Dogwood, *Conus sericea* • Western Chokecherry, *Prunus virginiana* • Rocky Mountain Willow, *Salix monticola* • Native Mountain Ash, *Sorbus scopulina* • Rock Spirea, *Holodiscus dumosus* • Whitestem Currant, *Ribes inerme* • Bristly Currant, *Ribes lacustre* • Western Thimbleberry, *Rubus parviflorus* • Red-Berried Elder, *Sambucus racemosa* • Bearberry, *Arctostaphylos patula* • Kinnikinnik, *Arctostaphylos uva-ursi* • Silver Sagebrush, *Artemisia cana*	• Aspen Daisy, *Erigeron speciosus* • Blanket Flower, *Gaillardia aristata* • Sticky Geranium, *Geranium viscosissimum* • Fairy Trumpets, *Ipomopsis aggregate* • Blue Flax, *Linum lewisii* • Bee Balm, *Mondarda fistulosa* • White-Tufted Evening Primrose, *Oenothera caespitosa* • Pasque Flower, *Pulsatilla patens* • Scarlet Bugler Penstemon, *Penstemon barbatus* • Mat Penstemon, *Penstemon caespitosus* • Smooth Penstemon, *Penstemon glaber* • Shell Leaf Penstemon, *Penstemon grandiflorus*

SUB-ALPINE ECOSYSTEM (9,500' TO 11,500') NATIVE SPECIES

Trees	Shrubs	Perennials/Grasses
• Subalpine Fir, *Abies lasiocarpa* • Engelmann Spruce, *Picea engelmannii* • Douglas Fir, *Pseudotsuaga menziesii* • Lodgepole Pine, *Pinus contorta latifolia* • Limber Pine, Pinus flexilis • Thinleaf Alder, *Alnus tenuifolia* • Bristlecone Pine, *Pinus aristata* • Quaking Aspen, *Populus tremuloides*	• Mountain Mahogany, *Cercocarpus montanus* • Native Mountain Ash, *Sorbus scopulina* • Bog Birch, *Betula glandulosa* • Bristly Currant, *Ribes lacustre* • Red-Berried Elder, *Sambucus racemosa* • Kinnikinnik, *Arctostaphylos uva-ursi* • Common Juniper, *Juniperus communis Montana* • Shrubby Cinquefoil, *Potentilla fruticosa* • Woods Rose, *Rosa woodsii* • Russet Buffaloberry, *Shepherdia Canadensis*	• Pearly Everlasting, *Anaphalis margaritacea* • Pussytoes, *Antennaria parvifolia* • Colorado Columbine, *Aquilegia caerulea* • Golden Columbine, *Aquilegia chrysantha* • Fringed Sage, *Artemisia frigida* • Silver Sage, *Artemisia ludoviciana* • Prairie Smoke, *Geum triflorum* • Silver Lupine, *Lupinus argenteus* • Sulphur Flower, *Eriogonum umbellatum* • Rocky Mountain Penstemon, *Penstemon strictus* • Bluemist Penstemon, *Penstemon virens* • Wand Bloom Penstemon, *Penstemon virgatus* • Showy Goldeneye, *Viguera multiflora* • Needle Grass, *Stipa neesiana*

RIPARIAN ECOSYSTEM NATIVE SPECIES

Trees	Shrubs	
• Box Elder, *Acer negundo* • Engelmann Spruce, *Picea engelmannii* • Narrowleaf Cottonwood, *Populus angustifolia* • Balsam Poplar, *Populus balsamifera* • Plains Cottonwood, *Populus sargentii* • Douglas Fir, *Pseudotsuaga menziesii* • Blue Spruce, *Picea pungens* • Peachleaf Willow, *Salix amygdaloides* • Rocky Mountain Juniper, *Juniperus scopulorum*	• Mountain Willow, *Salix nomticola* • Drummond's Willow, *Salix drummondiana* • Narrowleaf Willow, *Salix exigua* • Dewystem Willow, *Salix irrorata* • Pacific Willow, *Salix lucida* • Buffaloberry, *Shepherdia argentea* • Snowberry, *Symphoricarpos alba*	• Rocky Mountain Maple, *Acer glabrum* • Thinleaf Alder, *Alnus incana tenuifolia* • River Birch, *Betula fontinalis* • Red-Osier Dogwood, *Cornus sericea* • River Hawthorn, *Crataegus rivularis* • Strechberry, *Forestiera pubescens* • Chokecherry, *Prunus virginiana* • Skunkbrush, *Rhus trilobata*

Sources: Colorado State University Extension Gardening Series No. 7.421, No. 7.422, and No. 7.242
National Park Service Website, http://www.nps.gov/romo/naturescience/naturalfeaturesandecosystems.

09 | LANDSCAPE PLANTING, REVEGETATION, AND TOPSOIL MANAGEMENT

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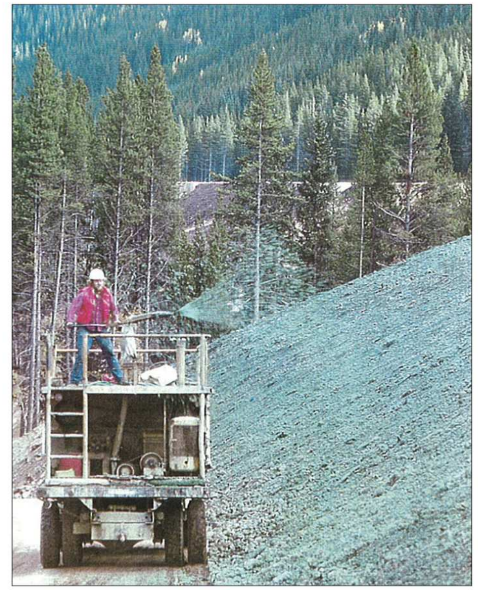
TOPSOIL MANAGEMENT

Design Strategies to Be Employed

- Ensure native topsoil is collected and stored for reuse to maintain the seed source and soil bacteria. Carefully remove, stockpile, and store the native topsoil of new construction projects to be used as final bedding material. Ensure native soil stockpiles are protected from the wind to avoid erosion and the creation of a dust hazard.
- Analyze the soil on the site to determine the need for fertilizers and pH amendments. This is particularly important if there is insufficient native topsoil on the site.
- Apply a prescribed soil treatment. Treatments such as plowing, disking, harrowing, furrowing, hydroseeding ensure successful re-establishment, as does applying mulches (such as certified straw), and using tackifiers. Soils should be roughened before planting to create favorable seed sites, particularly for grass and forb seeds (A, B).



A| Mulchs should be used to reduce dust and erosion impacts and promote successful revegetation.

B| Utilize soil retention blankets, mulches, and other revegetation techniques that improve the chances of successful re-establishment.

10 | WILDLIFE CORRIDORS AND CROSSINGS

Wildlife corridors and crossings planned for inclusion in the corridor will allow animals to move naturally without physical barriers. Wildlife crossings will provide for the species-appropriate clearances, clear sight lines, and buffering that will create usability for animals. Wildlife protection fences will blend into environment and utilize the same design throughout the corridor.

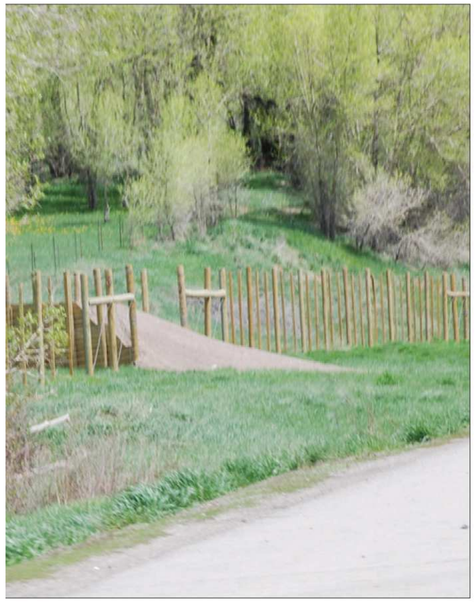
WILDLIFE FENCING AND CROSSINGS

Design Strategies to Be Employed

- Use open-span bridges to improve visibility for wildlife (A, B).
- Underpasses should incorporate naturally occurring materials that exist in adjacent areas on the ground surface. Reconstruct ground plane in a natural configuration using rocks, soil, plants, etc. to create a naturally appearing corridor (A).
- Apply Design Criteria and strategies for transportation structures to wildlife crossing structures.
- Coordinate roadway and bridge design with naturally occurring landform and associated wildlife movement patterns (A).
- Wildlife fencing and crossings should be designed in accordance with the A Landscape Level Inventory of Valued Ecosystems (ALIVE) Memorandum of Understanding (C).
- Use wooden pressure-treated posts with non-galvanized rectangular wire in the construction of wildlife fencing (C).
- Anchor ends of fencing into landform, rock faces, or structures rather than simply terminating posts and wire.
- Visually buffer wildlife fencing by integrating fencing into existing landforms and away from the road edge where possible.

A| Roadway and bridge design should consider naturally occurring landforms and wildlife movement patterns.

B| Underpasses that utilize open span bridges offer greater visibility for wildlife.



C| Fencing constructed with pressure treated posts will weather and blend into the landscape.

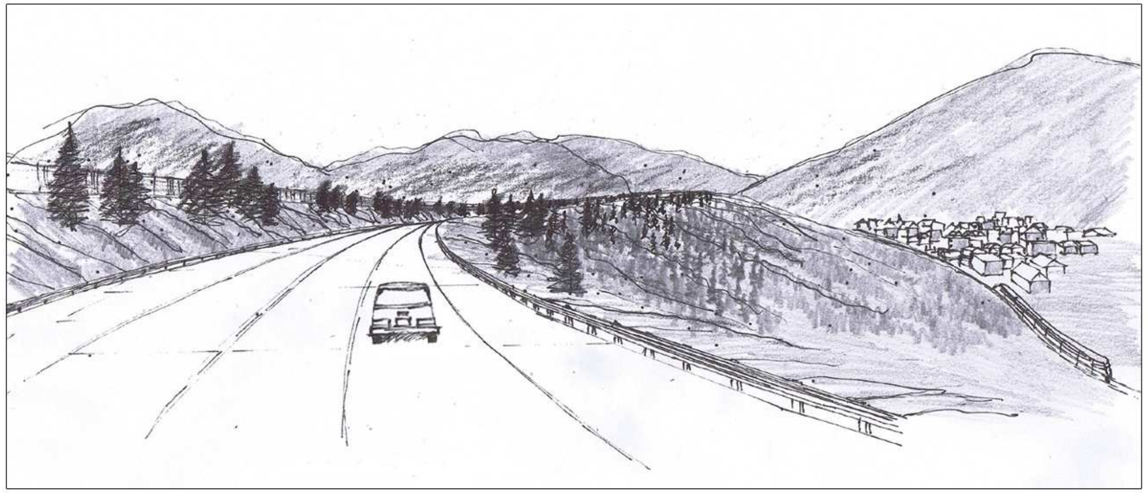
11 | COMMUNITY INTERFACE

A thoughtful transition between transportation alignments and adjacent community-oriented land uses will buffer noise and visual impacts and help preserve the quality of life for residents living and working next to the corridor. Alignment, landscape, earthwork, and structural solutions should include an evaluation of their potential interface with adjacent communities. Corridor designs that facilitate pedestrian and multi-modal connections across the transportation corridor strengthen mobility within the community and encourage successful land use patterns and circulation. The design of the corridor can further enhance the functionality of adjacent communities by appropriately identifying gateways, regional highway connections, and recreational or cultural activities. These primary interchanges and locations should be highlighted to visually communicate their importance to the traveler.

PROTECTING ADJACENT COMMUNITIES

Design Strategies to Be Employed

- Consider alignment alternatives that improve community interface.
- Engage the adjacent community in a discussion about appropriate interface and where sightlines should be enhanced (A).
- Design the corridor in partnership with communities, agencies, and future project planners to create a buffer and transition from the transportation corridor to community-oriented land uses. Landscape, earthwork, and structural solutions may be used to create the appropriate transitions based on the adjacent land uses and character (B, C).
- Minimize impacts and consider the potential negative effects of roadway design on residential and commercial areas (B, C).



A| Provide appropriate visual buffers between transportation improvements and communities.

B| This community interface successfully uses a combination of landforms, walls, and planting solutions for noise reduction.

C| Where possible, earthwork and landscaping should be utilized to buffer community-based land uses from the corridor rather than stand-alone soundwalls.

11 | COMMUNITY INTERFACE

A thoughtful transition between transportation alignments and adjacent community-oriented land uses will buffer noise and visual impacts and help preserve the quality of life for residents living and working next to the corridor. Alignment, landscape, earthwork, and structural solutions should include an evaluation of their potential interface with adjacent communities. Corridor designs that facilitate pedestrian and multi-modal connections across the transportation corridor strengthen mobility within the community and encourage successful land use patterns and circulation. The design of the corridor can further enhance the functionality of adjacent communities by appropriately identifying gateways, regional highway connections, and recreational or cultural activities. These primary interchanges and locations should be highlighted to visually communicate their importance to the traveler.

LINKAGES AND CONNECTIONS

Design Strategies to Be Employed

- Open pedestrian underpasses to allow for maximum natural lighting to enhance a feeling of safety and comfort. The use of landscape and appropriate materials will contribute to the comfortable pedestrian environment (A).
- Plan and integrate transit connections and access into the corridor design to enhance the community interface with future transit systems.
- Consider the relationship of communities to the location of rest areas, recreation portals, chain-stations, etc. The location and design of these facilities will follow standard federal requirements, and will also consider potential community impacts and benefits such as resident access to recreation, traveler use of community services and amenities, tourist accommodations, etc.
- Locate safe pedestrian crossings in conjunction with existing or planned pedestrian circulation networks. Pedestrian networks should provide access to community parks, recreation trails, attractions, and businesses, as well as access between city districts (B, C).

A| Safety and accessibility is improved by open, day-lit connections and a clear separation of vehicular and pedestrian circulation.

B| Connections and linkages should facilitate access to nearby recreational trails and activities.

C| Pedestrian bridge crossings reconnect the community when bisected by the roadway.

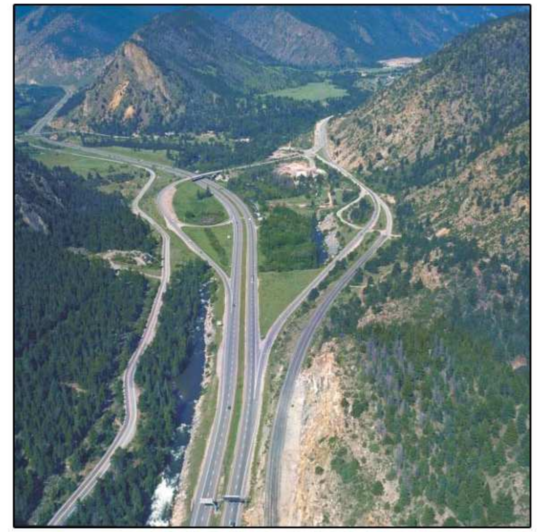
11 | COMMUNITY INTERFACE

A thoughtful transition between transportation alignments and adjacent community-oriented land uses will buffer noise and visual impacts and help preserve the quality of life for residents living and working next to the corridor. Alignment, landscape, earthwork, and structural solutions should include an evaluation of their potential interface with adjacent communities. Corridor designs that facilitate pedestrian and multi-modal connections across the transportation corridor strengthen mobility within the community and encourage successful land use patterns and circulation. The design of the corridor can further enhance the functionality of adjacent communities by appropriately identifying gateways, regional highway connections, and recreational or cultural activities. These primary interchanges and locations should be highlighted to visually communicate their importance to the traveler.

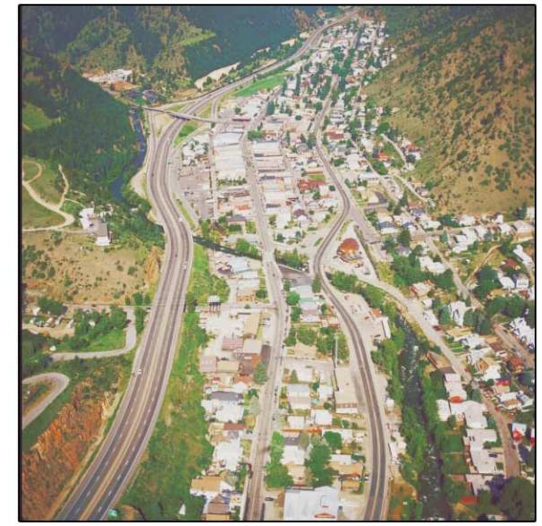
HIERARCHY OF ACCESS

Design Strategies to Be Employed

- Regional Access - Establish a hierarchy of importance for regional access points and apply the appropriate level of identification and design treatments (A). Criteria used to determine the hierarchy includes access to other areas of the state, important recreational or cultural features, and population served by the interchange. Primary interchanges should receive greater resources and landmark design quality as opposed to secondary and community interchanges. Interchanges of high importance include:
  - *US Hwy 40/Empire Junction (exit 233)*
- Community Access - Establish a hierarchy of importance for different interchanges serving the same community based on the functionality of particular interchanges (B). Important criteria used to determine the hierarchy of interchanges includes the presence of road corridors connecting with interchanges, access to major amenities, and connections to major attractions and civic destinations. This strategy will visually identify the *main access* serving particular communities along this segment including:
  - *Idaho Springs (exit 240)*
  - *Georgetown (exit 228)*
  - *Silver Plume (exit 226)*
- Traveler Services - Establish an appropriate level of identification and design treatments for interchanges pertaining to travelers services (C). Criteria used to determine the hierarchy includes easily accessible interchange configuration, visible services, and minimal interruption to the community. Interchanges servicing travelers include:
  - *Idaho Springs (exit 241)*
  - *Downieville (exit 234)*
- Local Access - Establish an appropriate level of identification and design treatments for local access (D). Criteria used to determine the hierarchy includes limited access to the community, services, recreation, or major amenities. These access points provide connection to primarily residential land use. Access points with local access include:
  - *Hidden Valley (exit 243)*
  - *Idaho Springs (exit 239)*
  - *Dumont and Lawson (exit 236)*
  - *Exit 232*



A | US Hwy 40 at Empire Junction (exit 233)



B | Idaho Springs (exit 240)

C | Downieville (exit 234)

D | Idaho Springs (exit 241)

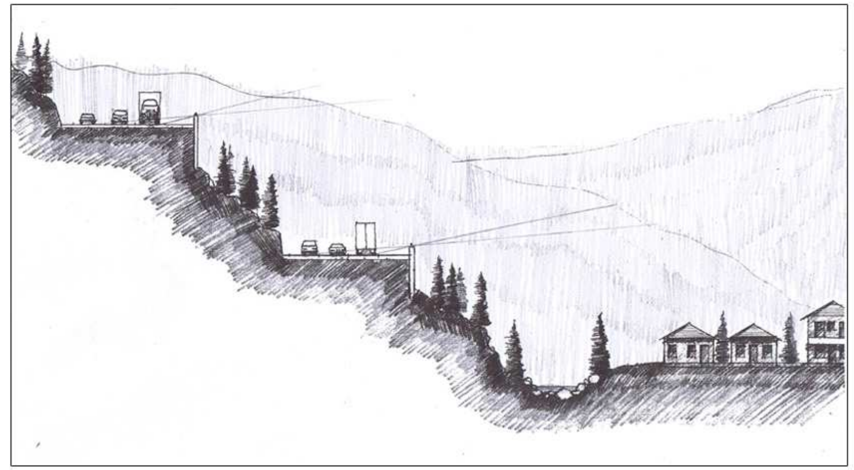
12 | SOUND ATTENUATION

A goal for the corridor is to eliminate the need for sound attenuation through facility design. Alternatives to sound walls will be considered in the search for sound attenuation solutions. No free-standing sound attenuation should be included in the corridor design. Sound walls should be avoided where possible. Cases in which sound walls are obligatory, such as those where right-of-way space is lacking, sound walls should incorporate landscape features and earth forms.

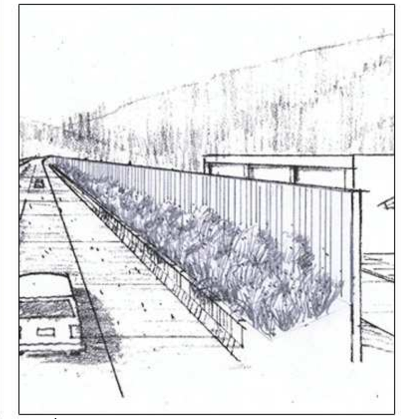
SOUND ATTENUATION

Design Strategies to Be Employed

- Initially address sound attenuation by considering vertical and horizontal alignment as described in the Design Criteria. The intent is to eliminate the need for sound attenuation through the appropriate design of the transportation facility (A).
- Utilize landform and berming strategies or integrated landform and wall systems for sound attenuation rather than stand-alone sound walls (B, C).
- Incorporate a 90 degree stepped or sinuous horizon line at the top of walls. Elevation changes should be 6” to 24” in height. Angular and irregular designs are not appropriate for this segment (F).
- Avoid placing sound walls on top of concrete barriers. Sound walls should be a consistent structure using a consistent material. As an alternative design, install sound walls separate from and parallel to barriers, leaving at least 8’ in between (D).
- Include simple, attractive textures and patterns on both sides of sound walls (i.e., sides facing local communities and lanes of traffic along I-70). Motifs or pictorial representations are not to be used on sound walls.
- Aesthetic treatments can be considered on sound walls facing communities with coordination and a signed agreement regarding costs and maintenance.
- Integrate sound walls into the right-of-way of the segment with landscape planting as a transition between soundwalls and the roadway. The use of grading and earthwork in the landscape area will allow for reductions in the height of the exposed sound walls (C).
- Incorporate landscape screening on both sides of the sound wall.
- Utilize variable grade options on both sides of sound walls to limit the height of the exposed wall to 12’ (C, E).
- The geometric alignment of sound walls should include variations created by earthwork, landscape or offset faces when viewed from the transportation facility.



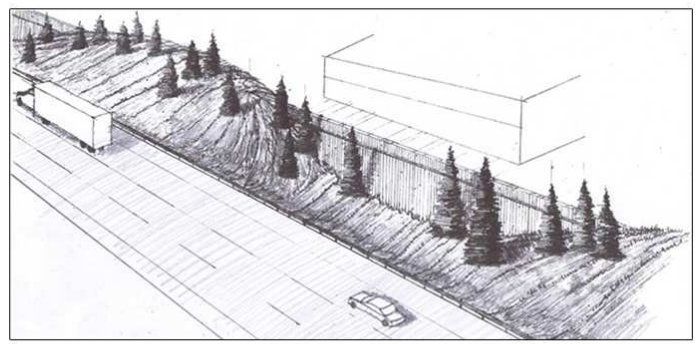
A | Initially, address sound attenuation by considering vertical and horizontal alignment alternatives as described in the Design Criteria.



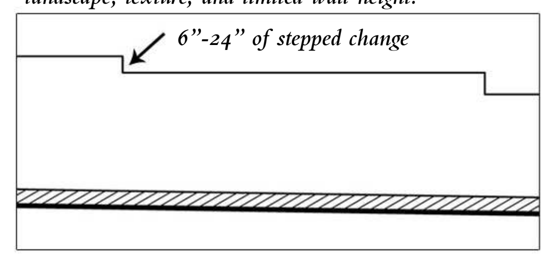
D | Separate but parallel sound walls with a minimum of 8’ to allow for landscape.

B | Use of landform and berming strategies.

E | When sound walls are required, utilize berming, landscape, texture, and limited wall height.



C | Utilize berms and landforms as much as possible to reduce need for exposed sound wall structures.



F | Elevation changes on the top of sound walls should occur in 6 to 24 inch increments.

13 | RECREATIONAL AND CULTURAL RESOURCE ACCESS

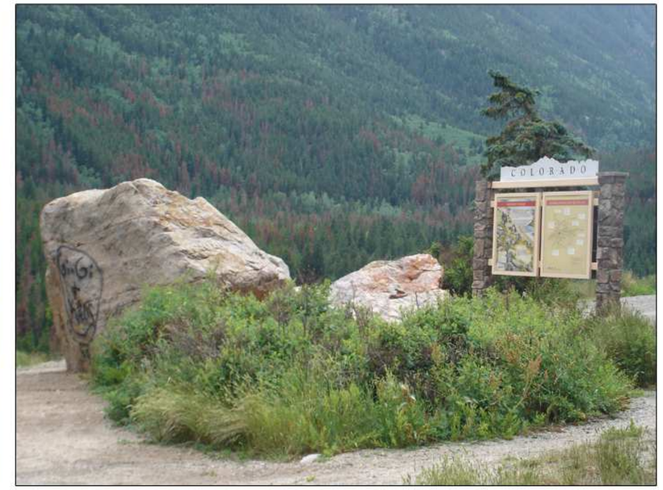
Working with local communities, the design of corridor facilities should facilitate access to the wealth of recreational and cultural resources that exist throughout the corridor. Clear and intuitive signage, parking areas, trailheads, and interpretive elements will draw attention to these resources and accommodate both travelers and local residents alike. Opportunities to combine functions into multi-use facilities that encourage efficient use of space and expose visitors to a variety of activities should be explored.

RECREATIONAL AND CULTURAL RESOURCE ACCESS

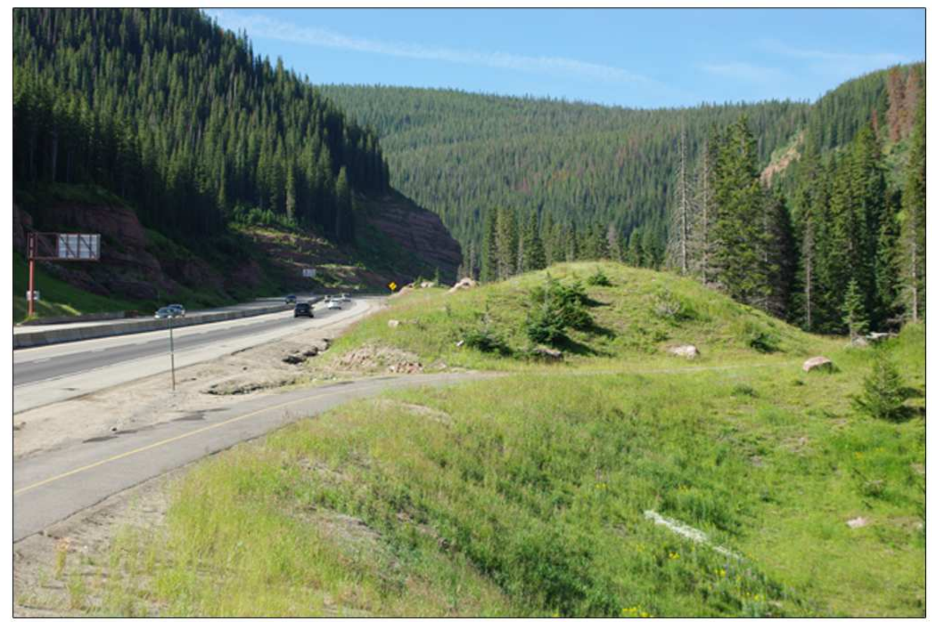
Design Strategies to Be Employed

- Designate rest area facilities, scenic areas, and viewpoints as *shared use* to accommodate both recreational users and travelers. Design these facilities in a deliberate manner to minimize potential conflicts between recreational users and travelers, and to provide interpretive signage, restrooms, and parking for cars and trailers (A).
- Utilize signage to indicate points of historical or cultural importance, recreation, natural history, or landmarks for travelers to note along the corridor (B).
  - o *Specific recreational points of interest may include:*
    - *Lawson Hole Whitewater Course (exit 234)*
    - *Rocky Mountain Easter Seals Camp (exit 232)*
    - *Georgetown Lake*
    - *Guanella Pass (exit 226)*
    - *Big Horn Sheep Viewing and Trailhead*
    - *Connections to Clear Creek Greenway Trail*
    - *Access to Central City/Blackhawk (exit 243)*
    - *Access to Mount Evans and USFS Visitors Center (exit 240)*
    - *Access to Grand County via US Hwy 40 (exit 233)*
    - *Access to Herman Gulch (exit 218)*
  - o *Historic and cultural points of interest may include:*
    - *USFS Visitors Center and Mount Evans*
    - *Idaho Springs Visitors Center*
    - *Idaho Springs Historic Downtown District*
    - *1893: Water Wheel and Argo Tunnel constructed.*
    - *1910: Argo Mill constructed.*
    - *1943: both Argo Tunnel and Mill are closed.*
    - *1978: Argo Gold Mine added to the National Register of Historic Places.*
    - *Georgetown Visitors Center*
    - *Georgetown and Silver Plume National Historic Landmark District*
    - *Georgetown Overlook*
    - *1884: Georgetown Loop Railroad constructed.*
    - *1984: Georgetown Loop Railroad was restored and opened in summer months for tourism.*
- Incorporate a landscaped buffer of at least 30' between the roadway shoulder and any adjacent trails or bike paths to minimize conflicts in locations where recreational trails parallel the roadway (C).

A| Design rest areas and roadside facilities to accommodate travelers and recreational users.



B| Cultural, scenic, and recreational points of interest should be clearly identified and described by interpretive signage.



C| Utilize landforms and planting within a buffer of at least 30' to protect recreational trails from the roadway.

14 | ROAD SERVICES AND ADJUNCT FACILITIES

Road service areas and adjunct facilities along the corridor will be designed in conjunction with the roadway as a complete design effort. The utilization of colors, materials, architectural elements, and plant communities that are reflected in the adjacent landscape can integrate facilities into their surrounding context. Rest areas and viewpoints offer opportunities for multi-functional spaces that can provide traveler services and serve as launch points for recreational and/or cultural activities. However, roadside facilities that are directly related to safety and maintenance – such as chain stations – should remain dedicated to those specific functions. Visually screening maintenance and equipment areas will limit visual clutter and ensure a consistent relationship among the roadway, the traveler and the surrounding environment.

ROAD SERVICES

Design Strategies to Be Employed

- Research and review all appropriate documents and plans associated with rest areas, truck parking, chain stations, and other road service facilities that have been previously prepared.
- Design road service areas to consider and preserve major site resources and features such as topography, views and vistas, unique vegetation, geological features, wetlands, and other qualities native to the site and its surroundings (A, C).
- Utilize local materials, plantings, and landscape features to blend seamlessly with the surrounding landscape (A).
- Scale light levels and the height of light poles appropriately to create a pedestrian environment and to avoid light pollution.
- Locate truck parking in a manner so as not to disrupt views and other features.
- Site road service areas in relation to activities located adjacent to the highway (B).
- Coordinate with appropriate agencies to provide informational signage for shared-use activities.
- Incorporate park-and-ride lots, activity accesses and transit stops to encourage public transportation - particularly in areas of heavy tourist traffic.

A | Road service areas should utilize local materials and plantings as well as pedestrian-scale lighting.

B | The location of road service areas should be coordinated and integrated with recreational trails and access.

C | Road service areas should be designed to highlight and preserve site resources and scenic views.

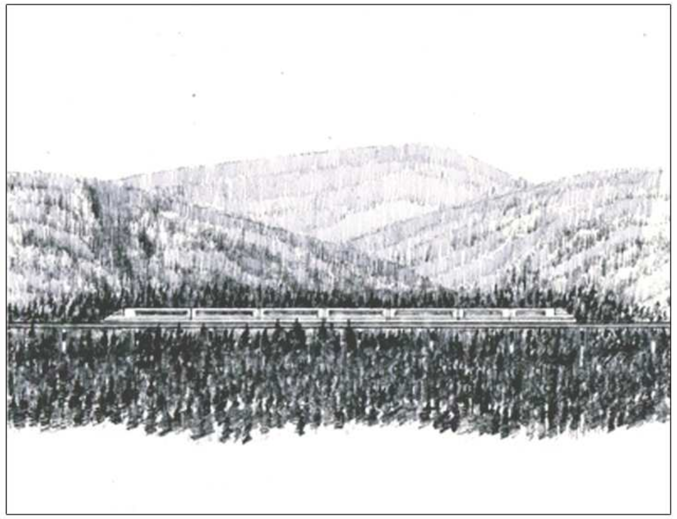
15 | ADVANCED GUIDEWAY SYSTEM

Transit infrastructure and facilities will be designed according to the same Aesthetic Guidance that applies to the roadway in order to develop a uniform, comprehensive design solution for the corridor. Structures that support transit infrastructure should share a design language that is common in form, color, and material to that utilized for the highway. This consistency will apply across all transit-associated facilities, including stations, yet allow several opportunities for location specific elements.

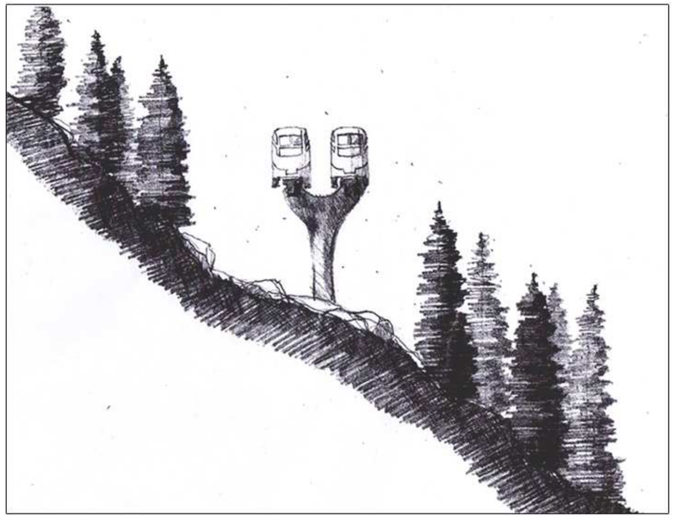
ADVANCED GUIDEWAY SYSTEM

Design Strategies to Be Employed

- Coordinate the location of transit support facilities throughout the I-70 Mountain Corridor with the Rocky Mountain Rail Authority High Speed Rail Feasibility Study and the I-70 Coalition Transit Land Use Study or most recent transportation implementation study.
- Transit facilities should be designed comprehensively to include urban design, architecture, engineering, and landscape architecture.
- Transportation facilities should connect communities with multi-modal facilities, transfers, and pedestrian circulation. Information systems can facilitate these connections and links. A uniform identity and design should be used for these elements.
- Advanced Guideway System (AGS) must have a separate alignment as described in the Design Criteria.
- Apply roadway Aesthetic Guidance to transit facilities.
- Design transit structures and facilities as described in the Design Criteria.
- Avoid locating the Advanced Guideway System (AGS) where it can be viewed silhouetted against the sky (A, B).



A| Locate the AGS with natural landscape foreground and background.



B| Reduce the visual prominence of the AGS by locating it below ridgelines with sensitivity to natural landforms and avoid straight line vegetation removal.

16 | TRANSPORTATION LIGHTING AND ILLUMINATION

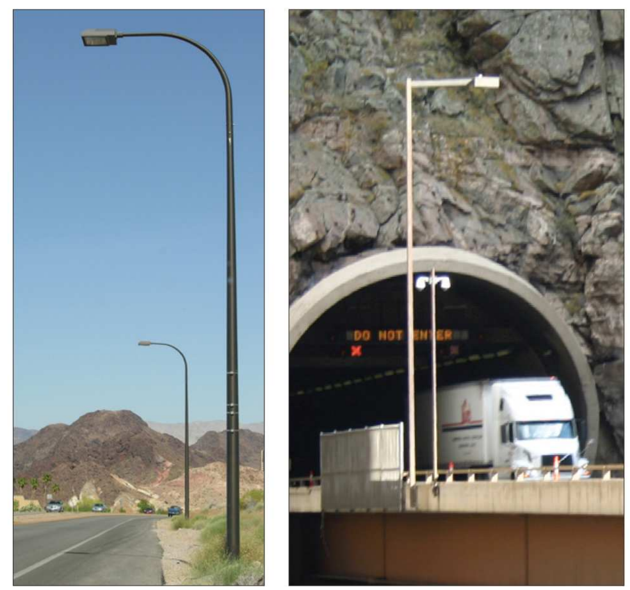
Corridor lighting will satisfy safety and functional needs while avoiding excessive light levels and high mast lighting applications. Light spillage and encroachment will be avoided in consideration of adjoining neighborhoods and the protection of the dark night sky.

LIGHTING

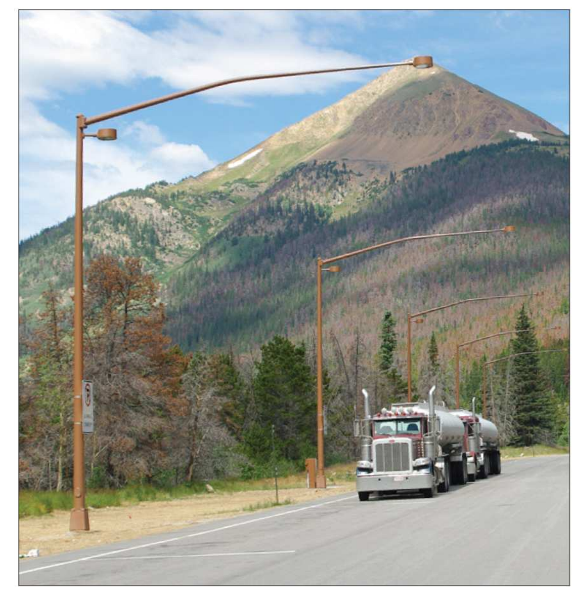
Design Strategies to Be Employed

- Select an elegant and simple pole configuration (B).
- Use a durable, powder-coated color finish for light poles and fixtures to match this design segment color palette.
- Focus attention on luminance versus illumination (i.e., brightness of pavement versus brightness of light) when establishing light levels to be provided.
- Use lighting fixtures that minimize light pollution and glare, provide even light dispersion, and fully conceal the light source. Use fixtures with full-cutoff luminaries.
- Avoid high mast lighting as it is not appropriate for this segment.
- Avoid metal halide light sources as they are not appropriate for this segment.
- Design lighting in accordance with the policies and programs of the International Dark Sky Association to minimize light pollution along the corridor.
- Prepare a lighting study as part of the design process that addresses lighting from multiple perspectives - including, but not limited to, minimum transportation lighting requirements, impacts on wildlife and recreation, and pedestrian perspectives.
- Use intelligent lighting systems for roadside facilities that are only functional during specific situations. For example, recent lighting upgrades at chain stations only activate when the chain law s in effect (C).
- Consider reflective lane striping.
- Focus lighting at major transportation and community interchanges consistent with their level of importance (A). These include:
  - *Base of Floyd Hill/US Hwy 6 (exit 244)*
  - *Hidden Valley (exit 241)*
  - *Idaho Springs (exits 239,240, and 241)*
  - *Fall River Road (exit 238)*
  - *Dumont and Lawson (exit 236)*
  - *Downieville (exit 234)*
  - *Empire Junction/US Hwy 40 (exits 232 and 233)*
  - *Georgetown (exit 228)*
  - *Silver Plume (exit 226)*
- Focus lighting at major roadway service areas and recreation portals consistent with their level of importance (C). These include:
  - *Bakerville Chain Station (WB mile 221)*
  - *Chain Station east of existing variable message sign (WB mile 223)*
  - *Georgetown Chain Station (EB & WB mile 228)*
  - *Georgetown Overlook*
  - *Idaho Springs scenic overlook and rest area (exit 239)*
  - *West of Twin Tunnel Chain Station (EB mile 241)*

A| Lighting should be concentrated at transportation and community access points appropriate with their level of importance including Idaho Springs (exit 240) and Silver Plume (exit 226).



B| Light poles should be of an elegant and simple design with full-cutoff luminaire fixtures. The image on the left is an ideal example.



C| Concentrate lighting and utilize intelligent systems at major road service areas like the chain-up station at Watrous Gulch (EB & WB mile 219).

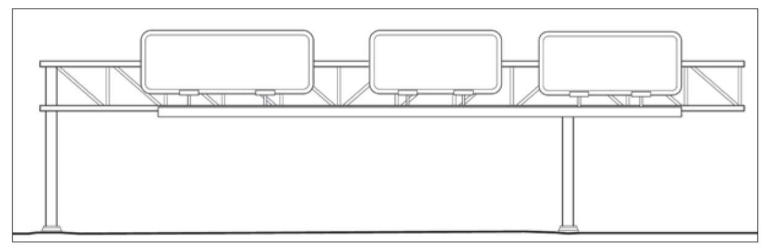
The traveler should enjoy the beauty of the surrounding landscape, and the traveler's dominant experience should be a clear and intuitive visual scene that is free of the clutter caused by signs of various types, sizes, materials, and purposes. Signage should be kept to a minimum. Where it is used, it should be simple and elegant – constructed with a palette of consistent, high-quality materials and colors. Commercial billboard advertisements and signage affect the visual integrity of the landscape and are not appropriate for the corridor.

SIGNAGE

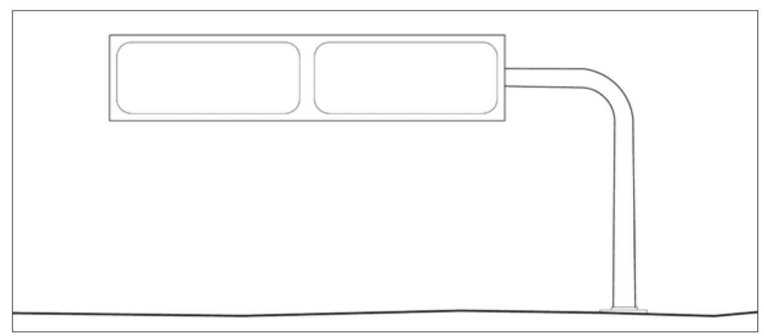
Design Strategies to Be Employed

- Design signage to meet all applicable Colorado Department of Transportation (CDOT) and Manual on Uniform Traffic Control Devises (MUTCD) standards.
- Prepare a conceptual signing plan to ensure signage can be located and implemented correctly within the context of the improvement at approximately 15% design stage.
- Apply a consistent color and material to signage support structures that match this segment's color palette. See section 06 | Color Selection and Consistency for additional details and color palette.
- Construct signs of a high quality and durable material.
- Use single-arm monotube systems for signage support rather than complex steel trusses to reduce visual clutter (A, B).
- Limit signage on the roadway identifying road services, communities, and cultural, recreational, or historical points of interest.
- Integrate signage into bridge structures. Eliminate *tacked on* appearance by considering placement as an early component of design.
- Complete the roadway signing plan as a part of FIR plans so that signs can be considered as an integrated part of the final structures and roadway design. This will avoid placing signs as an after-thought and protect sight lines to focal points along the corridor.

A| Single arm-monotube systems should be used.



Truss systems are not preferred.



B| Monotube supports for signage present a more elegant solution than the cluttered truss systems shown above.

18 | UTILITIES IN THE CORRIDOR

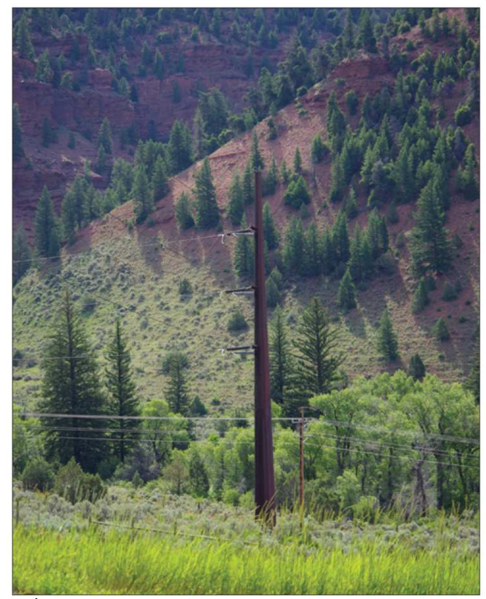
Utility infrastructure, such as power and gas distribution lines, can create poor visual quality in the corridor. Burying overhead lines, relocating them, and reducing the crossing of utility lines over the highway will avoid visual degradation. These scenic improvement opportunities must be considered in corridor projects.

UTILITIES

Design Strategies to Be Employed

- Consider placing utility lines underground to minimize conflict with high-value views to improve scenic and visual appearance.
- Realign utility corridors to avoid a direct or un-obscured view from the corridor.
- Add landscape plantings and landforms to screen and block views from the transportation corridor toward existing utility corridors.
- Avoid straight-line cut patterns in forests or dense vegetation. Varying cuts create a feathered or irregular pattern, providing a more natural appearance (A).
- Apply the appropriate color from this design segment color palette (B).

A| Straight, linear utility cuts appear highly unnatural and impact the scenic quality of the high alpine environment found in this segment.



B| Proper color application based on the surrounding natural context blends utility structures into the landscape.

19 | CONSTRUCTION MATERIAL MANAGEMENT

Materials used for construction will be managed to minimize the negative aesthetic implications of construction logistics. Materials acquisition, storage and clearance of excess cut and fill, and the disposal of waste materials will be predetermined and controlled with a pre-approved, corridor-wide Construction Management Plan. The plan will assist in anticipating where materials will be stored, sourced, used, and may include partnerships in future corridor projects.

MANAGEMENT OF CONSTRUCTION MATERIALS

Design Strategies to Be Employed

- Develop a construction management plan that describes the approach for cut and fill sources, storage, and logistics for materials prior to construction.
- Do not stockpile construction materials in medians or other areas of high visual or recreational value - even on a short-term or temporary basis (A, B, C).
- Manage dust on stockpiles and/or construction zones by using revegetation with annual grasses or mechanical methods.
- Place batch plants, stone crushing, or material storage should according to the construction management plan.

A| The approach to the Eisenhower Johnson Memorial tunnel presents a cluttered and confusing mix of construction and maintenance uses to the traveler.

B| The interchange at Empire Junction houses a maintenance yard.

B| Screen view to stored materials using structure and landforms.

I-70 Mountain Corridor CSS
Partnerships Powered by Context

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	For I-70, 65 MPH design speed. For Advanced Guideway System (AGS), dependent on technology.	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	Eastbound highway lanes, westbound highway lanes, and the AGS will be designed as separate, independent alignments. 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. No loss of existing vertical separation of highway lanes will occur in any section.	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.

Design Criteria		Remarks
Slope Cut and Fill	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. Cut and fill embankment will not exceed a slope of 2.5:1 (H:V). All roadway retaining walls over 12’ in height will be installed below the elevation of the roadway.	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	Construction will be fully contained with areas of historic or current disturbance if no centerline change occurs. New alignments must be consistent with Design Criteria for slope cut and fill.	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	A geotechnical analysis report will be completed and reviewed prior to any proposal to create rock cuts for an alignment. 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.	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.

Design Criteria		Remarks
Bridge Structures	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. Bridge embankments shall be 2.5:1 maximum.	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	Sound buffering and attenuation will be designed in conjunction with the horizontal and vertical alignment to eliminate the need for noise mitigation. Mitigation, if required, will integrate landforms, landscape planting buffers, and walls.	1) Design can minimize or eliminate additional noise mitigation. 2) If sound walls are required, see Illustrations 5 and 6.

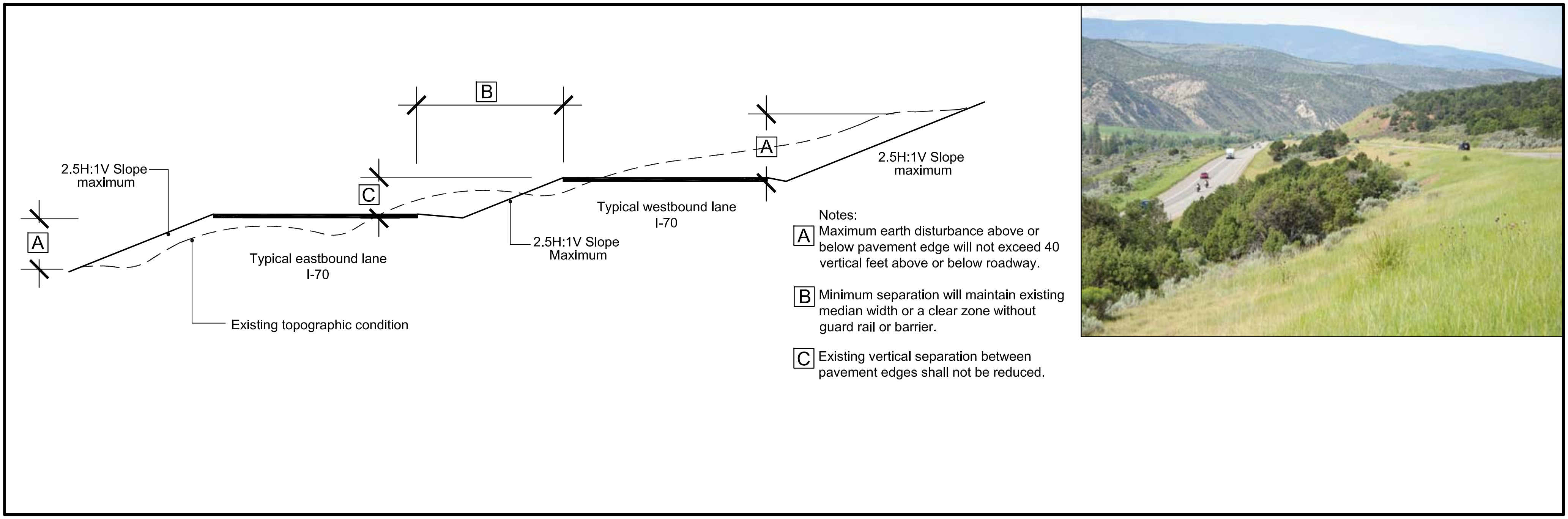


ILLUSTRATION 1: DESIGN CRITERIA FOR ALIGNMENT AND CUT AND FILL

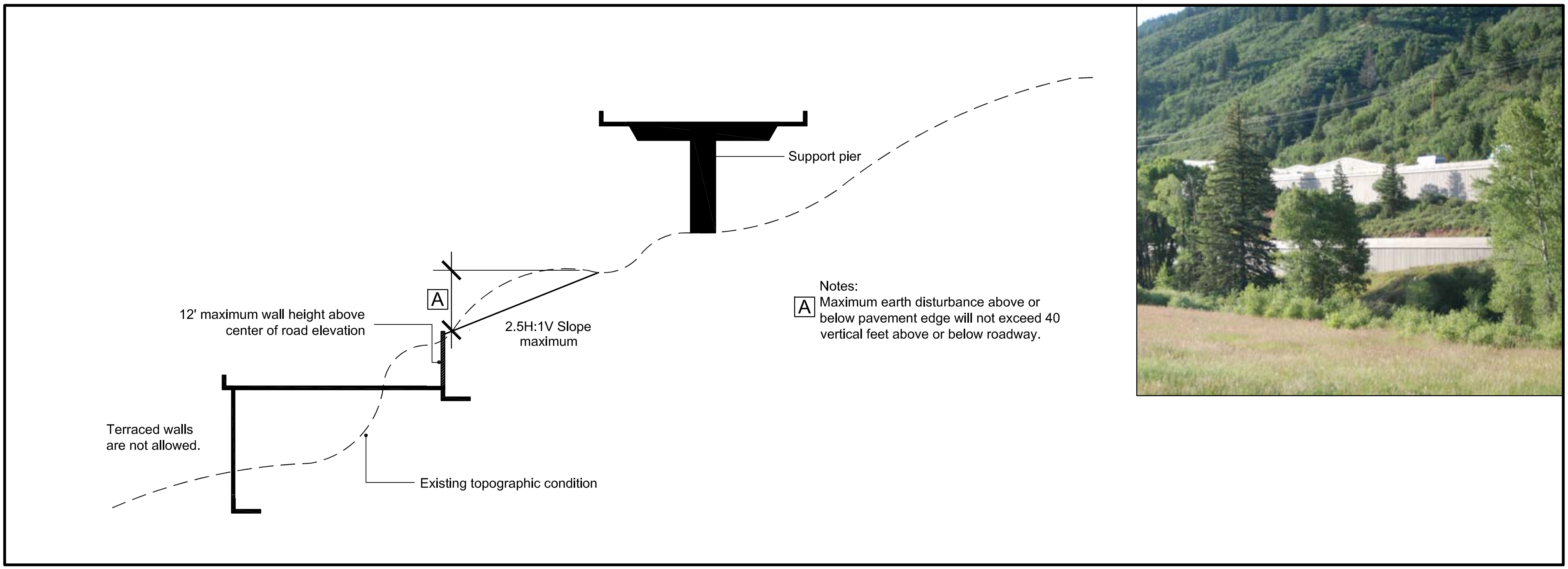


ILLUSTRATION 2: DESIGN CRITERIA FOR CUT AND FILL

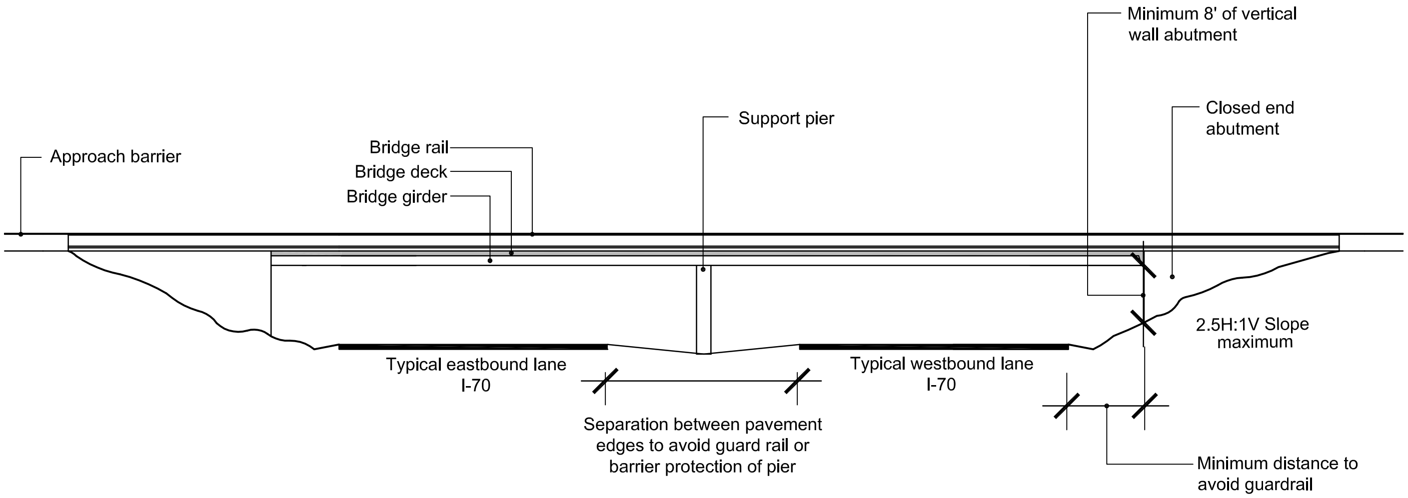


ILLUSTRATION 3: DESIGN CRITERIA FOR BRIDGE STRUCTURES OVER I-70

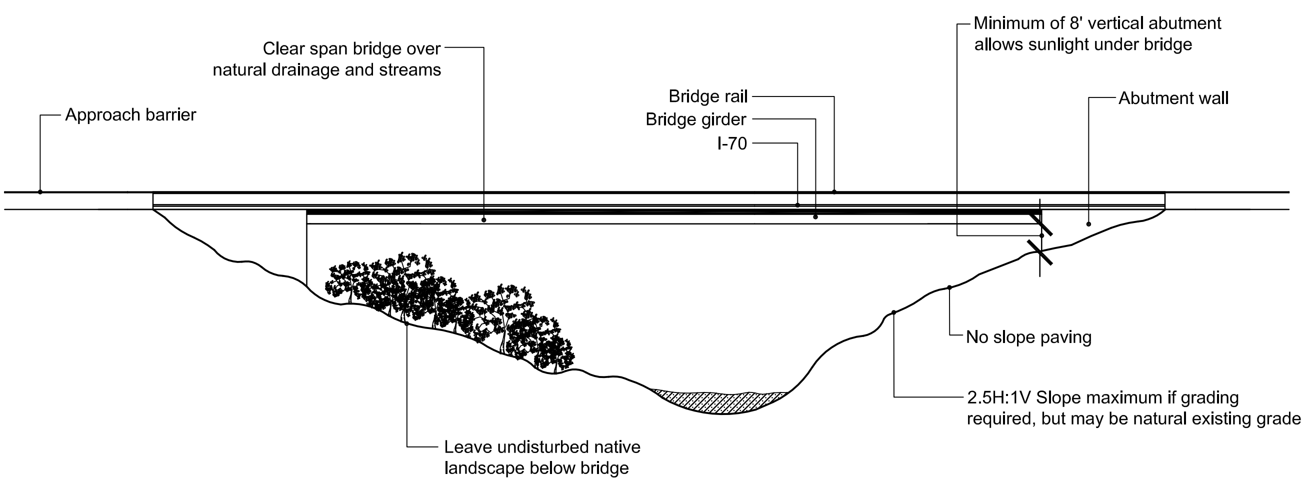


ILLUSTRATION 4: DESIGN CRITERIA FOR I-70 BRIDGE
OVER NATURAL FEATURES OR OTHER ROADWAYS

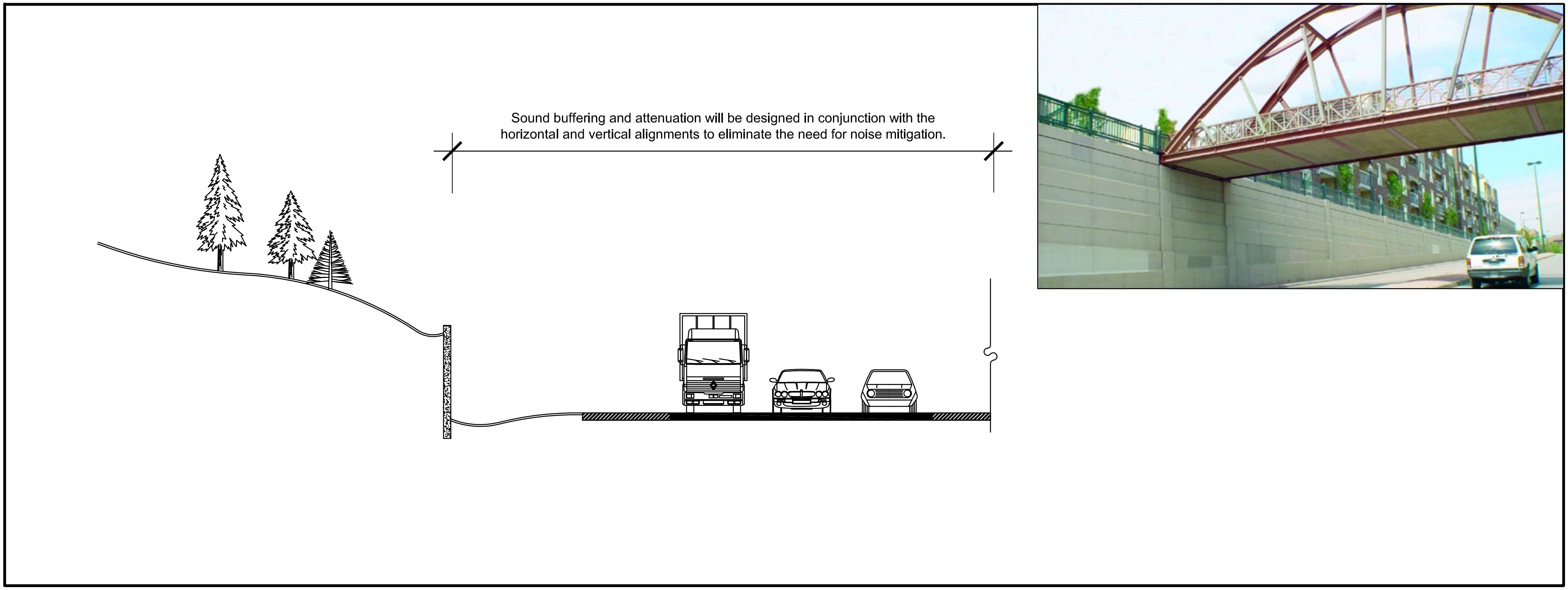


ILLUSTRATION 5: DESIGN CRITERIA FOR SOUND ATTENUATION

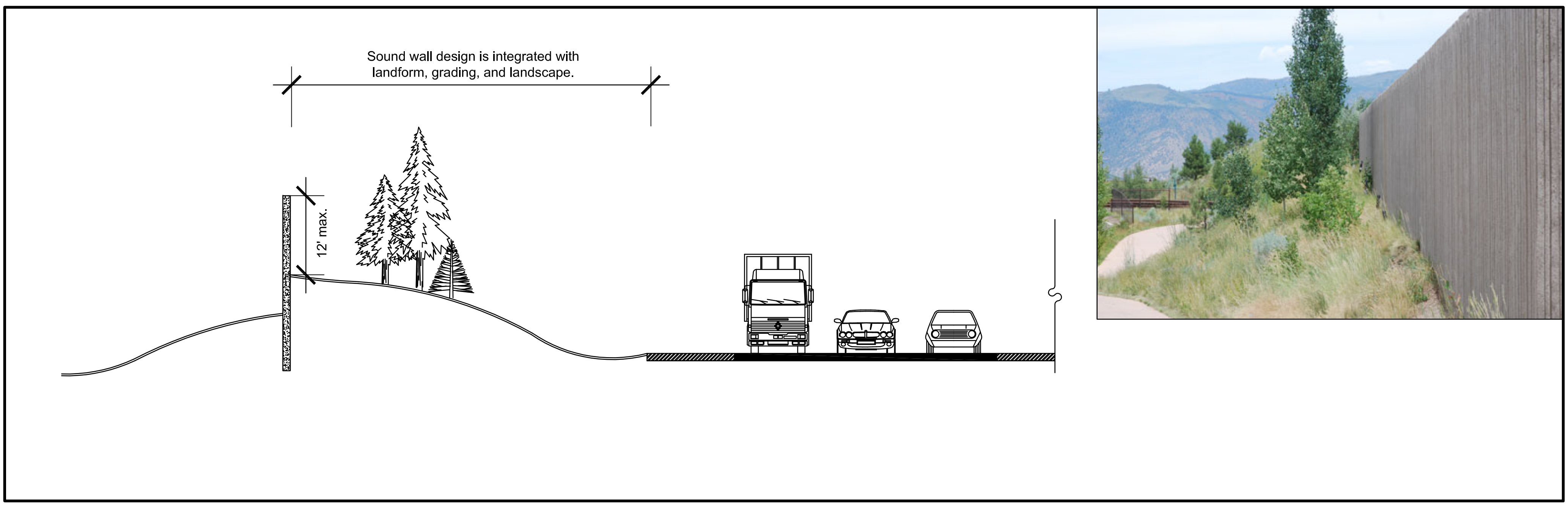


ILLUSTRATION 6: DESIGN CRITERIA FOR SOUND WALL DESIGN