Design Guidelines

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PURPOSE OF DESIGN GUIDELINES

Design Guidelines provide the framework for improving the aesthetics of existing, new, and retrofit highway projects. They are written statements of recommendations to meet the segment design objectives. Guidelines should not be mistaken as new standards for highway design. They represent recommendations for design solutions.

Guidelines approach corridor aesthetics as a comprehensive effort, intentionally avoiding a project-to-project approach. Guidelines assist in the development of design. Adherence to the guidelines in planning, design, and operations accomplishes the following goals:

- Interpreting the design themes of each landscape design segment.
- Creating visual unity among all highway structures and facilities.
- Selecting finishes, color palettes, and surface patterns that are compatible with the surrounding landscape.
- Incorporating transportation art motifs and media that represent the landscape design segment themes.

The guidelines, accompanied by concept diagrams, sketches, or photographs, demonstrate ways in which to achieve the design intent.

NDOT will review each project design for consistency with these guidelines and the overall Landscape and Aesthetics Corridor Plan. The full design team – NDOT staff, communities, engineers, project managers, landscape architects, consultants, contractors, and maintenance crews – is strongly encouraged to:

1) Become familiar with design guidelines for the design segment in which a project is located. The guidelines direct the design toward creating aesthetic unity within the design segment.
2) Understand the site context. The landscape surrounding the proposed project – including predominant materials, colors, and structures, as well as natural and cultural resources and social elements – provides direction for enhancement.
3) Seek early review of the project. Changes are much easier to make at the beginning of the project than at the end. Involving others early in the planning/design process helps ensure that the project is both economically and aesthetically feasible.

How to Use the Design Guidelines

The Design Guidelines are divided into four sections, described below. The full design team as well as potential partnering entities, such as communities and other organizations, should be familiar with each section.

1) **Design Process Guidelines**:
   Describe the necessity of integrating landscape and aesthetics at the beginning of every project.
2) **Lake of the Sky Guidelines**:
   Describe the vision, components, and management plan for the Lake of the Sky Landscape Design Segment associated with Lake Tahoe.
3) **Community and Urban Context Guidelines**:
   Describe guidelines for facilities and amenities that are primarily influenced by local communities, depending on right-of-way extents.
4) **Highway Facilities Guidelines**:
   Describe guidelines that are primarily influenced by NDOT's standards, including structures, grading, roadside services, and construction practices.

(1) *The Corridor Plan provides NDOT with the ability to facilitate improvements and to provide highways that support the vision and needs of a community.*

(2) *The purpose of these guidelines is to create a cohesive highway corridor that is compatible with Nevada's existing landscape, communities, and urban areas.*

SECTION ONE: Design Process Guidelines

These guidelines describe the necessity of integrating landscape and aesthetics at the beginning of every project.

1.0 PROJECT DESIGN PROCESS

1.1 Integrate landscape and aesthetics at the onset of the planning, design, and engineering phases of all highway projects.

Landscape and aesthetics should not be an afterthought to a highway project.

- Landscape and aesthetics are an integral part of the planning, design, and engineering of all highway projects.
- NDOT's structure inventory report regarding type, size, and location of highway structures should include information on landscape and aesthetics. It should also provide justification for proposed structures that do not meet the design guidelines.
- Engineering design should incorporate landscape and aesthetics to create highway structures and facilities that are effective, safe, and aesthetically appealing.

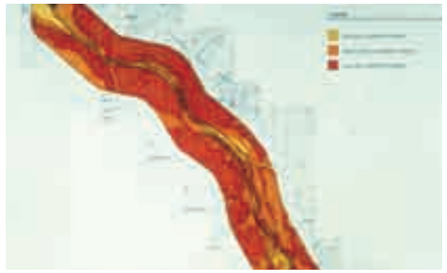
1.2 Understand the design segment theme and select design concepts that interpret the theme.

- Review the vision and objective for the landscape design segment as described in the Corridor Plan and ensure that the theme guides the project design.
- Understand the site context, including the viewshed analysis and landscape design segment objectives described within the Plan.
- Ensure project design successfully interprets the landscape design segment theme.

1.3 Understand the site context, including the surrounding landscape, and conduct a comprehensive analysis.

- Conduct a comprehensive site analysis for each project. The site inventory for each project should extend beyond project boundaries

LANDSCAPE AND AESTHETICS IS NOT AN AFTERTHOUGHT TO ENGINEERING, BUT THE STARTING POINT FOR INTEGRATED, CONTEXT SENSITIVE SOLUTIONS.



(1) *Understanding the corridor conditions and context is a critical part of the design process.*

(2) *Computer simulation of a planned highway at the conceptualization of the project provides greater understanding of highway layout and potential impacts to environmental resources.*

(3) *Photo simulation of a highway project allows visualization of physical design and improves communication of design concepts.*

to analyze the site and surrounding landscape. Ensure the planning and design of the highway project responds to this comprehensive analysis.

- Consider characteristics such as precipitation, topography, ground cover, size and location of plant material, visual conditions, soils, site drainage, rock outcroppings, and other natural features that are located on, and surrounding, the site. Additionally, cultural context such as archaeological and cultural resources and categories, such as historic settlement patterns, are important.

1.4 Use a variety of sketches, three dimensional modeling, and other tools to visualize and detail the highway.

As the level of design progresses from general to specific, highway layout and facilities should be visualized through a variety of methods to create a high quality system.

1.5 Visualize design concepts in three dimensions.

Plan view design does not accurately represent the experience of the traveler along the highway or illustrate issues of visual design. Therefore, it is important to understand design concepts in their three-dimensional framework.

- Utilize sketches, models, and digital visualization tools. "Roadway Explorer" is an excellent tool to utilize for this purpose.

1.6 Consider landscape and aesthetics costs in conjunction with baseline costs.

Landscape and aesthetics should be considered simultaneously with a project's capital budget and estimates. In addition to determining a project's baseline construction cost, allocation of budgets and resources for landscape and aesthetics should be clearly outlined at the start of a project.

1.7 Estimate maintenance costs during design to calculate the total life cycle cost for landscape and aesthetic treatments.

Maintenance is a key component to the success of landscape and aesthetic treatments.

- Design new projects that are low maintenance.
- Consider maintenance routines required for the design program, and identify areas that may need additional attention.
- Create maintenance agreements with local agencies as necessary to establish appropriate practices and levels of maintenance over the life of the project.

(4), (5), (6), (7) *This series of highway design studies shows the level of design progression from general to specific as well as the need to use a variety of modeling tools to visualize and detail the highway.*

SECTION TWO: Lake of the Sky Guidelines

Guidelines for Lake of the Sky segment establish the vision of highway aesthetics for highways within and entering into the Lake Tahoe area.

1.0 LAKE OF THE SKY DESIGN PRINCIPLES

1.1 Create an environmentally sensitive highway with recreational links to facilities within and entering the Tahoe Basin.

The vision for these highways is organized around the idea that the road is an integral part of a spectacular landscape. As such, it should respond to and be respectful of the land and the spirit of place (see illus. 1). It is recognized that a large number of people use the road for access to recreation. Providing highway facilities that reduce the conflict between bicyclists and vehicles is important. Constraints such as steep slopes, narrow rights-of-way, funding, and environmental coordination are elements that must be considered and addressed during the design phase.

- Highlight the experience of the surrounding Sierra Nevada mountains, Lake Tahoe, drainages, meadows, forests, plants, animals, and people.
- Establish a model for future highways in environmentally sensitive areas and project a system of the highest quality .
- Provide access to highly utilized recreation destinations.
- Allocate funds from the Southern Nevada Public Lands Management Act to elevate the Lake of the Sky highway system to a level equal to the status of the landscape through which it passes.

1.2 Utilize enhanced guidelines for nationally significant areas.

An elevated standard is applied to areas of national significance. Within the US 395, West US 50, SR 28, SR 207, and SR 431 Cor-

(1) *Highway facilities should fit seamlessly within the landscape. Roadways should be sensitively sited and designed within areas of scenic importance.*

(3) *Interpretive signage should reflect the relationship between roadway design and environmental resources and preservation.*

(5) *Rest area design should provide environmentally friendly access to the lake and reduce the impact of unrestrained roadside parking. Formalized roadside facilities provide direct access to recreation opportunities. Signage and parking information should be available to direct travelers to appropriate parking areas.*

(2) *Colors and simple patterning of walls and barrier rails should be the standard in areas of national significance.*

(4) *Highway design and bridges should facilitate natural wildlife migration patterns along drainage ways.*

(6) *Boardwalks and other construction methods should be used within the shorezone to minimize disturbance. Interpretive signage reinforces the need for users to minimize their impact on natural resources.*

ridor Plan area, the Lake Tahoe Basin is an area of significant importance. As such, an accentuated level of hardscape treatment (see illus. 2) should be provided as the standard level of treatment for the Lake of the Sky design segment.

- The base level of landscape treatment type should be accentuated hardscape with native revegetation softscape.
- Features such as concrete barriers, retaining walls, and drainage elements should have aesthetic treatments that respond to the landscape setting.
- Additional specific guidelines describing elevated treatments for this roadway are included within the individual guideline sections.

1.3 Components.

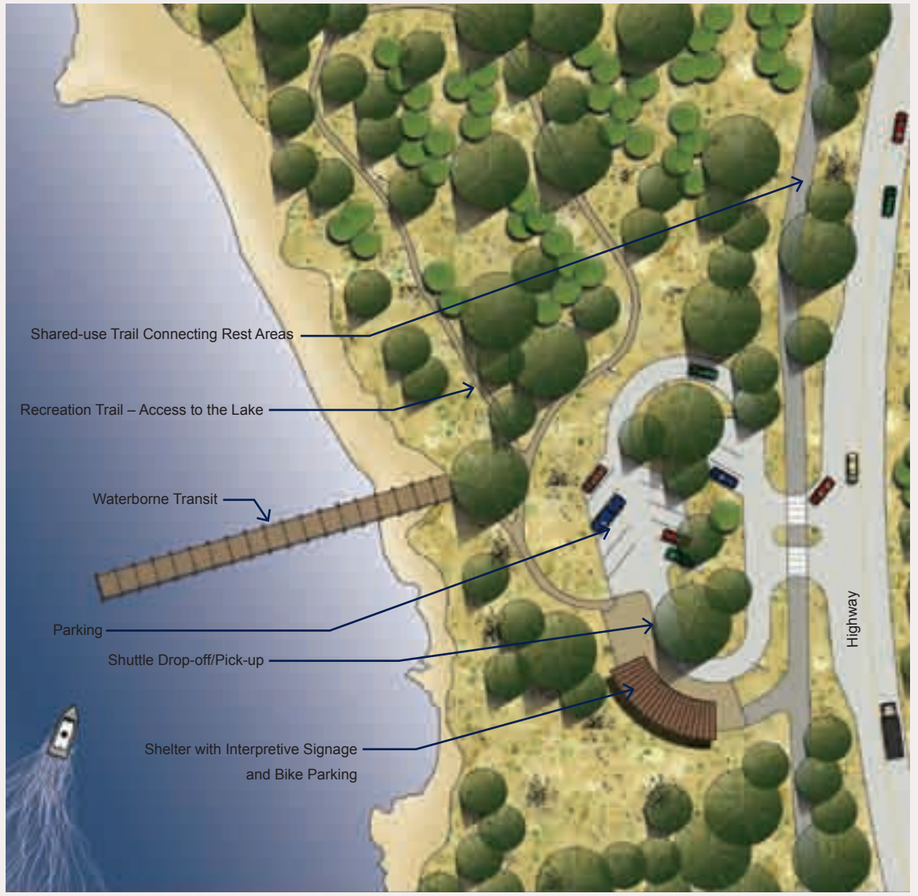
Due to the high level of recreation around Lake Tahoe, a coordinated system of rest areas should be established and linked by shared-use trails to identify access points to the lake. Implementing the vision will require innovative design solutions to deal with the legitimate implementation challenges posed by the narrow right of way, steep terrain, and TRPA regulations.

- Restrict roadside parking and install a shuttle system to relieve traffic congestion along the roadway.
- Connect trails to a waterborne transit system where appropriate (see illus. 7).
- Promote awareness of the natural environment through a system of signage and interpretative information.
- Interpret features of the highway that improve the compatibility between the highway and its natural setting (see illus. 3 on page 3.4).
- Incorporate wildlife habitat corridors throughout the highway and retrofit existing facilities to increase connectivity (see illus. 4 and 5 on page 3.4).
- Utilize innovative design solutions to deal with the legitimate implementation challenges.

1.4 Corridor management plan.

Recreation and the highway are inter-related within the Tahoe Basin. Both recreation facilities and the roads that serve them have carrying capacities. Therefore special management mechanisms are needed for the Lake of the Sky Landscape Design Segment. Every attempt has been made to make these guidelines compatible with future plans.

- Corridor management plans are required for scenic byways in order to comply with SAFETEA-LU (Safe, Accountable, Flexible, Efficient Transportation Equity Act - A Legacy for Users) funding requirements.
- Include a strategy for working with federal and state agencies, TRPA, Caltrans, and other community development/resource protection organizations.
- Identify methods to protect and enhance the byway's intrinsic qualities and character.
- Preserve and restore the natural settings along the highway through the use of site-sensitive materials.
- Establish scenic easements in areas of potential future development to protect scenic resources.
- Solicit public and agency input in the development of a specialized management plan that will guide highway planning and design within the Lake of the Sky segment.



(7) *Multi-use rest areas accommodate both travelers and others in search of recreation access. Facilities are linked by a shared-use trail and provide waterborne transit opportunities to promote alternative transportation and reduce the traffic load on roadways.*

SECTION THREE: Community and Urban Context Guidelines

These guidelines include facilities that are primarily influenced by local community desires but may benefit from NDOT's support. A community's highway is important and serves as a primary component of the public realm. Even though NDOT is not responsible for facilities outside of the right-of-way, it recognizes the need to work with local jurisdictions to create context-sensitive solutions.

NDOT understands the need for flexibility, and it functions as a facilitator in supporting a community's vision and goals for the highway. The guidelines found in this section are meant to enhance established traffic engineering and road design practice. No single solution will transform a community's highway through downtown. Rather, communities should carefully evaluate and consider several options and thoroughly understand the issues at hand in order to create a highway that fulfills the collective goals of the partnership established between the community and NDOT. Neither NDOT nor the community can accomplish the goals on their own.

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1.0 COMMUNITY GATEWAYS

1.1 Establish gateways that clearly express community identity.

Gateways are highly visible areas specially designed and maintained to convey the first impression and identity of neighborhoods, communities, towns, cities, and regions.

- Provide an impressive visual aesthetic.
- Utilize appropriate landscape and/or structural techniques to screen unsightly land uses.

1.2 Integrate the gateway into the highway facilities.

Gateways should be part of a larger design intent, coordinated with community facilities, and using materials that are repeated throughout the town (see illus. 2). Refer to Softscape and Hardscape Types and Treatments (pages 1.6-1.9) and Softscape Type guidelines (pages 3.39-3.46), for more details about the types of features and plants to consider for community gateways.

- Community gateways need to be integrated with highway structures and landscape.
- Architectural elements may include transportation art, rock walls, accent lighting, and signage.
- Utilize bridges to establish community identity.
- Ensure that community gateways are distinctive, memorable, and functional.

1.3 Ensure community gateways contribute to community identity and clearly define community identity points.

Highlight community entrances with clear and attractive signage, using landscape materials that reflect the community character. Execute the design in a clear, consistent, and bold manner. Repetition of the design is the basis for the unique identity of the corridor.

- Signage should be appropriately sized and incorporated into an architectural or sculptural element consistent with the community's character, the environmental context, and the corridor's theme (see illus. 3).
- Landscape plantings should include layers of low water-use plant material arranged to enhance the architectural elements and reinforce the transition into the community.

1.4 Locate gateways at likely future growth boundaries.

Community gateways mark the entrances/exits and designate the transition to increased development. Gateways marking downtowns may be used to improve community identity and draw motorists into the heart of town.

- Downtown gateways should complement the community gateway while reflecting the special character of the city center.

1.5 Engage agencies and organizations in the planning and design process.

Engage applicable State and local agencies, as well as local stakeholders and organizations in the planning, design, and implementation of community gateways.

(1) Avoid *cluttering community entries with numerous signs. Although the entry signage shown above is currently used, it is not advocated.*

(2) Preferred *signage uses materials and forms that compliment the Town's unique design aesthetic.*

(3) *Gateways create a visitor's first impression of a community and should therefore engage local stakeholders in the planning, design and implementation of such features to ensure they reflect the community's vision.*

2.0 COMMUNITY-BASED STREET SYSTEMS ISSUES

2.1 Consider improvements to the surrounding street system before widening the highway through communities.

Wide streets discourage pedestrian activity and have a negative economic impact. Secondary streets that are not performing well influence the way in which a highway operates as a community main street. Improvements to other major and minor streets impact the functionality of a main street.

- Traffic improvements should be considered in context with surrounding transportation patterns. Improvements to other streets allow potential lane width reductions along the highway and provide additional space for landscape and aesthetics.
- Improvements to surrounding city streets may include utilizing parallel streets, implementing a truck bypass, improving the local street network, and using parallel, one-way streets (see illus. 2).

2.2 Shorter blocks encourage pedestrian activity and provide more corner lots, essential for local businesses.

Short blocks with connecting streets characterize traditional main streets.

- Utilize short blocks of up to 400 feet where possible to encourage pedestrian activity in downtowns.

2.3 Consider routing trucks onto a parallel street and encourage vehicular traffic through main street.

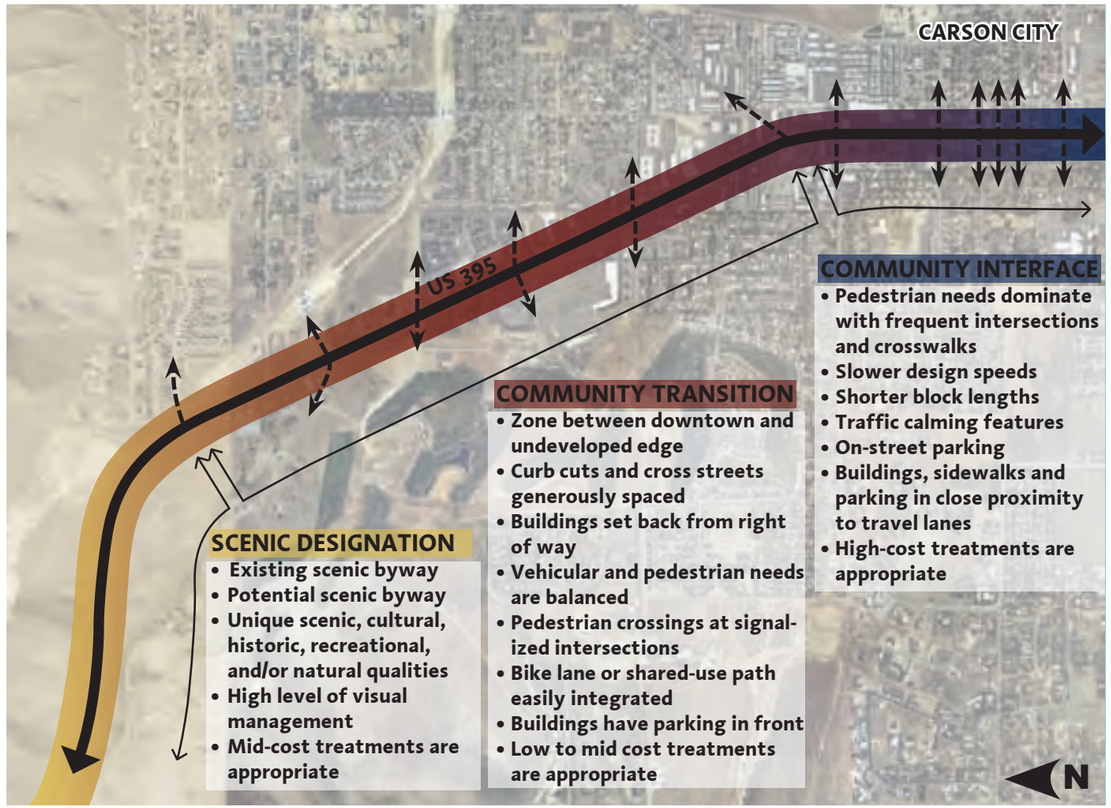
Truck traffic requires more space for turning movements and increases noise levels and fumes within the community. Wide streets discourage pedestrian activity and can harm the town's economic potential.

- Diverting truck traffic away from the local main street may distribute traffic loads more evenly and improve the function of the main street.
- Vehicular traffic should continue through main street where feasible in order to support community businesses and facilities.
- Parallel streets should have few interruptions and maintain a fairly direct connection that may be improved to accommodate truck traffic.

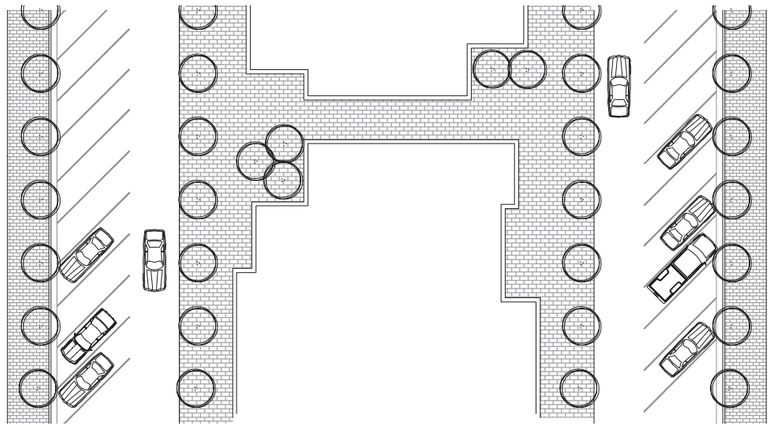
2.4 Avoid bypasses and only use them in limited applications.

Bypasses are utilized to divert traffic around communities, particularly when heavy traffic conditions obstruct the functionality of main street. However, bypasses reduce the interaction between travelers and communities.

- A bypass may work in certain cases where the highway is designated as part of the freight system or heavy traffic volumes overload a well-designed street system.
- If a bypass is used, maintain connectivity for bicyclists and pedestrians and provide direct connections back to community business districts.



(1) *As highways travel through communities, the function of the road changes as development increases at its edges. Improvements to other streets allow the highway to function more smoothly as it incorporates landscape and aesthetic elements.*



(2) *Parallel, one-way street systems may be used to improve traffic patterns and provide additional space for landscape, pedestrian improvements, or additional commercial development.*

3.0 SIDEWALKS

3.1 Provide a 10 to 15 foot sidewalk width for downtown areas where possible.

A wider sidewalk allows for more pedestrian activities along the street (see illus.1-4).

- Additional width may be required to accommodate transit shelters, outdoor dining, and retail.
- A sidewalk may be 8 feet wide in constrained circumstances. Minimum sidewalk width is 6 feet.

3.2 Provide continuous sidewalks throughout downtown areas.

The ability of pedestrians to access and move through downtown areas depends on the connectivity of sidewalks and paths, as well as appropriate design and placement of crosswalks.

- Establish connections to other sidewalks or path systems where town centers transition into suburban or rural areas.

3.3 In town centers, provide pedestrian amenities (benches, drinking fountains, transit shelters, kiosks, trash receptacles, newspaper racks, banners, and decorations).

Streetscapes that appear lively and inviting attract travelers and support local businesses (see illus. 5 and 6).

- Street furnishings should be consistent with surrounding architectural styles and the overall landscape segment theme.
- Maintain a minimum 5 feet of clear space around street furniture to accommodate pedestrian movement.
- Provide wide sidewalks and curb extensions as locations for benches.

3.4 Use distinctive paving to highlight sidewalk areas immediately adjacent to the inside face of curb.

Sidewalk areas can be organized into two zones – the amenity zone and the pedestrian zone. The amenity zone is adjacent to the curb and should be a minimum of 2 feet wide, but preferably 4 feet or greater, depending on the sidewalk width.

- Distinctive paving treatments may be used in this area to distinguish it from pedestrian movement areas.
- Treatments should be consistent over a block length, but may vary from block to block.
- Street trees, planters, benches, transit shelters, signs, utility poles, and other elements are located in the amenity zone.
- Elements should be grouped together or placed in a way that leaves a minimum open area of 8 feet between them, allowing passage from the sidewalk to the street.

3.5 Provide pleasant seating opportunities along every block in the downtown area.

Seating is essential in a comfortable pedestrian environment (see illus. 7).

- Arrange seating to accommodate a variety of views.
- Locate benches and gathering spaces to absorb sun on cold days and provide shade on hot days.
- Ensure that communities commit to maintain and clean street furniture as part of

***(1)** Eight foot sidewalks allow minimal 2-way pedestrian traffic and street furnishings.*

***(2)** Ten foot sidewalks provide enhanced user comfort and space.*

***(3)** Twelve foot sidewalks allow room for outdoor dining and sidewalk displays.*

***(4)** Fifteen foot sidewalks create area for high levels of pedestrian activity.*

***(5)** In areas of adequate right-of-way, wide sidewalks should be encouraged in order to promote pedestrian activity.*

***(6)** Appropriate organization of lighting, street furnishings and planting areas lead to a successful pedestrian experience.*

***(7)** Creating pleasant and protected areas for pedestrians to sit is an important component of active downtown areas. Seating areas can be interspersed with on-street parking spaces.*

maintenance agreements that are negotiated prior to construction.

3.6 Consider under-grounding utilities to provide additional space for sidewalk enhancements.

Utilities should be consolidated to minimize poles and other sidewalk obstructions (see illus. 8).

- Coordinate signage with utility poles, where feasible.
- Avoid placing signs and utilities in pedestrian areas.

3.7 Incorporate transit shelters to promote pedestrian and non-motorized transportation (NMT) opportunities.

Coordinate transit stops with local transportation agencies or Metropolitan Planning Organizations (MPO).

- Locate bus pull-outs on the far-side location of intersections.
- Minimize conflicts between vehicles, passengers, pedestrians, and cyclists (see illus. 9).

3.8 Consider using artistic paving and historical marker insets to accentuate downtown areas.

- Celebrate distinctive areas with accentuated paving materials.
- Consult artists for ideas to improve the community downtown.
- Paving patterns should coordinate with intersection designs and overall community character (see illus. 10).

(8) *The placement of lighting and other utilities should be considered in conjunction with providing appropriate space for unobstructed pedestrian movement.*

(9) *Locate transit stops to minimize conflicts between vehicles, pedestrians, and cyclists.*

(10) *Historical markers inlaid in paving enhance place-making.*

4.0 STREET TREES AND PLANTING STRIPS

4.1 Carefully select plant species.

- Select trees that thrive in the local climate and consider species whose roots, seasonal flowers or fruit will not disrupt sidewalks (see illus. 1).
- Evaluate trees based on site-specific characteristics as well as design intent.
- Considerations for physical characteristics include form, height, spread, height to canopy bottom, canopy density, trunk size, root habit, rate of growth, and longevity.
- Consider habitat requirements affecting plant growth, including soil type, soil oxygen deficiency resistance, salt resistance, irrigation need, shade tolerance, heat tolerance, air pollution resistance, and wind resistance.
- Minimize maintenance costs by avoiding trees with excessive maintenance requirements including flowers, foliage, fruit, and twigs.
- Consider common insect and disease problems that consistently require maintenance, or are life threatening.
- Maintain storefront visibility and reduce pedestrian conflicts by selecting trees whose form remains intact when limbed up 7 to 8 feet (see illus. 2).
- Consider tree height over traffic lanes. Canopies should appear natural when trimmed to 13 feet.
- Select plants that will provide a variety of ornamental characteristics, such as seasonal color, fruit, texture, bark, and foliage.
- Plant species according to the softscape type and treatment designated by the design objectives.
- Avoid planting a single species in suburban areas due to the risk of a pest or disease destroying an entire street tree planting.
- Downtown districts may be highlighted through a formalized street tree pattern.

(1) *Choose tree species that are appropriately sized, do not drop fruit or seed pods, and are easy to maintain.*

(2) *Trees should be placed so that they do not block the view of business names and entries.*

4.2 Properly place trees in sidewalk conditions. Maximize the lifespan of trees to reduce the cost of tree replacement.

- Protect trees from damage by car doors. Where on-street parking is provided, allow adequate room between trees and cars (2 feet minimum, 3 feet to 4 feet ideal, see illus. 3). Trees may be placed between parking spaces to minimize damage.
- Allow for root aeration and potential water harvesting through the use of tree wells (4 foot by 4 foot minimum, 5 foot by 5 foot ideal). Dry-set pavers may also be used, ensuring adequate root aeration.
- Consider light placement as part of tree spacing and placement (typically 25 feet to 40 feet).
- Place trees so they do not block vehicular site lines or building access ways. Maintain visibility of traffic signals, directional signage and access to entry drives.

4.3 Street tree plantings may be varied to distinguish downtown areas from transition zones and accentuate wayfinding. Small trees in combination with medium and large trees can reinforce wayfinding in towns.

- Distinctive trees may be used within downtown areas to distinguish them from other commercial areas.
- Key intersections and gateways may be designated by clustering smaller trees or other distinctive groupings (see illus. 4 and 5).

4.4 Utilize hanging baskets, containers, and other vertical elements where feasible. In areas of limited rights-of-way, hanging baskets, moveable planters, and other vertical elements may be used to provide structure or to accent street tree plantings.

- Hanging baskets may be incorporated into the street design and attached to light fixtures or buildings to provide visual relief and enhance the aesthetics (see illus. 6).
- Baskets may be replaced with wreaths or other seasonal accents during dormant seasons.
- Moveable planters add flexibility to the streetscape design (see illus. 7).
- Avoid placing containers within clear zones and immediately adjacent to curbs where high levels of heat and vehicle exhaust are more prevalent.
- No container should be used if planter widths exceed 25% of the entire sidewalk width.
- Select neutral container colors that harmonize with brick pavers, concrete sidewalks, most building facades, and the myriad color combinations produced by annual plantings.
- Container design should be simple and understated (see illus. 8).
- Use a consistent planter type within communities and provide groupings where possible. Containers should be sited near street corners (as long as clear visibility is maintained for drivers), to flank entrances to landmark buildings, or to physically and visually define outdoor café spaces.
- Combined height of containers and plantings should not obstruct the view of either motorists or pedestrians at street intersections and access drives.

(3) *Place street trees where they are protected from car door damage and in areas where they easily facilitate pedestrian movement.*

(4) *Varied street tree types may be used to distinguish key areas and gateways.*

(5) *Used consistently, street trees help define the extent of downtown districts and neighborhoods. A change in planting type and spacing can be used to signal transition zones between downtown and outlying areas.*

(6) *Baskets may be hung from light poles in areas that have limited room for street trees.*

(7) *Coordinate container colors with sidewalk and other site features.*

(8) *Container color and form should be simple and understated.*

4.5 Buffer sidewalks from the roadway through the use of planting strips or raised planters where possible.

Planting strips provide opportunities to absorb runoff water and decrease overall drainage requirements. Additionally, they create areas to store snow during removal periods throughout the winter.

- Where space is not required for widened sidewalks or on-street parking, provide planting strips (ideal 5 feet minimum width) or raised planters (see illus. 9 and 10).
- Planting strip design should consider the placement of benches, signs, bicycle racks, and other street furniture.
- Raised planters should incorporate seat walls to provide additional pedestrian seating.
- Consider providing 3 feet of hard surface between planting strips and parallel on-street parking to accommodate motorists upon exit from their vehicles.

4.6 Ensure that communities commit to maintain and provide irrigation for streetscape plantings.

The success of a streetscape program within communities requires dedication to maintenance and irrigation of planted areas.

- Streetscape plantings should not be provided without community endorsement and support.
- Avoid spray irrigation systems where possible, and do not overspray onto walkways and into gutters.
- Irrigation and maintenance may be funded through community beautification committees and other community organizations.

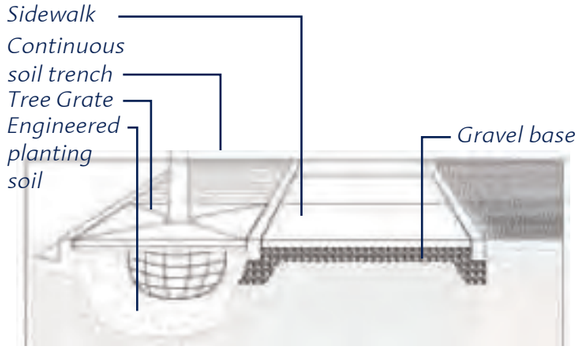
4.7 Use engineered planting soil for street tree plantings.

Trees planted in urban conditions and as part of street tree programs face unique challenges. The soil under adjacent sidewalks and roadways is typically compacted to support the paving. This compaction inhibits root growth and spread, causing shallow root growth and tree stress. Engineered planting soils (see illus. 11) include mixtures of soil, loam, stone, water, and a moisture-retaining polymer or sand that transfers weight-bearing loads from stone to stone in the gravel, leaving the soil between the stones unaffected by compaction. This type of engineered soil creates a larger root volume with increased porosity, nutrient-holding capacity, and drainage for a healthier tree root growth environment.

- Engineered planting soils should be used around root balls of street trees.
- Continuous trenches of engineered planting soil are recommended between street trees.
- Locate trenches parallel to curbs and under non-mortared brick pavers. Trenches provide greater volumes of soil for root growth and permit air and water to reach tree zones.

(9) *Street trees can be combined with planting strips to buffer pedestrian zones from traffic. Plant height should not block sight distances.*

(10) *Raised planters create a buffer between vehicles and pedestrians, and offer additional seating options.*



(11) *Engineered planting soil can increase the lifespan of street trees by allowing tree roots to grow and expand into areas that otherwise would be inaccessible.*

5.0 GRAPHICS AND SIGNAGE

5.1 Create a standard system of signage that aids wayfinding within communities while also providing information about local facilities and organizations.

- Provide a coordinated signage system that reflects the distinctive character of special districts (see illus. 1).
- Graphics can take the form of signs, banners, information kiosks, or pavement inscriptions or inlays (see illus. 3).
- Materials and designs should be clear and simple, so as to be easily read and quickly understood by pedestrians or motorists, as appropriate.

5.2 Locate and size signage and graphics so that they are easily read and understood by both cars and pedestrians.

- Pedestrian-scaled signage should be placed at heights that can be easily seen from the sidewalk (see illus. 2).
- Signage designed for motorists can be larger, and placed at heights and intervals that can be easily seen and understood at higher traveling speeds.

5.3 Provide community graphics such as banners to promote special events and define special districts and neighborhoods.

- Create a coordinated system of signage that describes community events and reinforces community character (see illus. 5).
- Banners that span the roadway should be used sparingly and in more commercial locations. Banners can be installed permanently, or as seasonal and temporary forms of signage.

5.4 Use distinctive signage to direct motorists through the heart of the community.

Truck traffic is often not desired within downtown areas and separate truck routes may be established. Vehicular and tourist traffic, however, is desirable.

- Ensure that signage appropriately directs vehicular traffic to promote tourism and support local businesses.

5.5 Coordinate light fixture design with graphics and signage.

- Banners may be incorporated into light fixtures and should be considered as part of the design. Graphics should be consistently displayed (see illus. 4).
- Customized light fixtures reinforce context-sensitive solutions.

5.6 Utilize a consistent color palette within local communities.

Local jurisdictions may choose a color palette for fixtures and amenities that corresponds with the community's vision.

- Colors should respond to the natural setting and subtly enhance the community without overpowering the streetscape design.
- Color should complement the NDOT color palette for structures within the right-of-way.

(1) *Clear and distinctive signage serves as wayfinding for both motorists and pedestrians.*

(2) *Signage scaled for pedestrians can be used to identify individual business within a downtown area.*

(3) *This kiosk provides community event information and reflects the character of the Carson City capital complex.*

(4) *Banners promote special districts and reinforce community character.*

(5) *Banners can be used to identify festivals or seasonal activities that may be of interest to local citizens and visitors.*

SECTION FOUR: Highway Facilities Guidelines

These guidelines pertain to highway facilities that are primarily influenced by NDOT's standards, including structures, grading, roadside services, and construction practices. The guidelines found in this section are meant to enhance established traffic engineering and road design practice. No single solution will transform the highway. Partnerships may be created with communities and other agencies and organizations to accomplish landscape and aesthetic treatments in addition to supporting landscape and aesthetic elements that impact areas outside of the right-of-way. Established partnerships and design teams should carefully evaluate and consider several options and thoroughly understand the issues at hand in order to create a highway that fulfills their collective goals. Neither NDOT, communities, nor other agencies or organizations can accomplish the goals on their own.

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1.0 NON-INTERSTATE STATEWIDE GATEWAYS

1.1 Provide statewide gateway features crafted from the land where US 50 and US 395 enter Nevada from California.

Identify statewide entry points to welcome travelers to Nevada.

- Non-interstate gateways should be understated and relate to the scale of the road (see illus. 1 and 2).
- Include the Nevada name and state seal.
- Utilize vernacular forms and stone material from local sources.
- Use softscape treatment types identified in the landscape design segment.

(1) *Statewide gateways located in urban areas may be integrated into the streetscape design to welcome and thank visitors upon entrance and exit.*

(2) *Non-interstate gateways create a memorable entry experience and respond to the scale of the road.*

(3) *Architectural features at gateways utilize local materials that reflect the surrounding landscape.*

(4) *Use combinations of vernacular materials and forms to reinforce local character.*

(5) *Bridges can subtly reinforce entries by echoing local architectural character.*

2.0 REST AREAS, VIEWPOINTS, AND PULL-OFFS

2.1 Provide a comprehensive roadside service program.

Roadside services are key components of the highway corridor, particularly where long distances separate developed areas. Provide a comprehensive roadside service program throughout the corridor. The road services matrix on the opposite page describes varying levels of service stops and associated program elements. Refer to the Specific Corridor Features maps (pages 2.16, 2.27, 2.39, and 2.50) for potential road service facility locations.

- Locate rest areas to provide safe stopping points.
- Connect rest areas located in highly utilized recreation areas with a shared use trail.
- Incorporate facilities for transit stops where necessary.
- Buffer roadside services from the highway, or provide an access road when located off the highway.
- Consider 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.
- Consider siting activity pull-offs where they provide access to activities located adjacent to the highway.
- Locate truck parking so as not to disrupt views and other features.

2.2 Ensure rest area design reflects the local setting.

All rest areas, viewpoints, and pull-offs should readily accommodate travel needs and reflect the corridor's design theme (see illus. 1 and 2).

- Utilize vernacular forms and local materials to create rest areas that blend seamlessly with the surrounding landscape.
- Avoid using makeshift, adapted site facilities with no distinctive architectural style.
- Concrete barriers and brightly painted pole bollards should not be used for parking delineation or site boundaries at rest areas and pull-offs.
- Sustainable architecture may be appropriate for many highway service areas where water, energy, and landscape resources are difficult to secure and maintain.
- Provide lighting in scale with the site development.
- Articulate space, frame views, and provide shade through the use of landscape plantings and/or architectural features.

2.3 Retrofit existing rest areas.

Analyze existing rest area structures, buildings, amenities, and layout for their visual interest. Renovate to improve the aesthetics and user comfort of existing road service facilities.

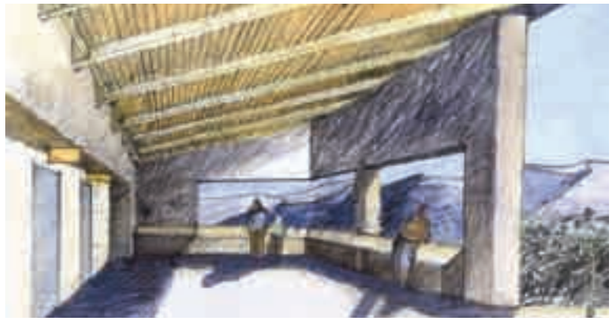
2.4 Locate viewpoints and points of interest to take advantage of visual access to the features of interest.

Give special attention to existing or potential views, vistas, and cultural or historical attractions (see illus. 3, 4 and 5) that are unique to the site or have outstanding resource value, such as Native American heritage and emigrant history.

- Locate viewpoints at the following locations:

(1) *Rest area architecture should blend vernacular forms with sustainable technology to preserve the character and resources of a place. Complete rest areas include picnic facilities with shade structures.*

(2) *The design of rest area structures should incorporate plantings, materials, and landscape features that reinforce the corridor's design theme.*



(3) *Rest stops should be situated within the environment to take advantage of impressive views of the surrounding landscape.*

(4) *This rest area location takes advantage of unique site qualities such as vistas and opportunities for wildlife viewing.*

(5) *A sheltered structure at a point of interest gives travelers a protected place to enjoy views.*

ROAD SERVICES MATRIX

	Description	Landscape Treatment	Program Elements
ROADSIDE PULL-OFF	Roadside pull-offs provide facilities for drivers to exit the highway for a brief period. Facilities and minimal parking are provided to accommodate the abbreviated stay. (Referred to as "Rest Stop" under former NDOT naming conventions.)	• Native plant revegetation to enhanced native landscape types • Standard hardscape type	• Site-specific interpretive signage • No toilets or running water • Trash containers • Limited car and Recreational Vehicle parking • Scenic overlooks • Located according to unique or outstanding features • Shade canopy (vegetation or structure)
VIEWPOINTS AND POINTS OF INTEREST	Viewpoints and points of interests present opportunities to view unique vistas, geologic and historic features, or cultural landmarks. Interpretive elements are integrated into the site design, and Place Name Signage and Travel Information elements are provided to establish the relationship between highway and place. Typically, the length of stay is short and parking is limited.	• Native plant revegetation to enhanced native landscape types • Standard to accentuated hardscape types	• Located according to travelers' needs and unique site features • Site-specific interpretive signage • Toilets/no running water • Handicap accessible • Picnic tables and shade structures • Trash containers • Paved car and Recreational Vehicle parking • Telescopes/viewfinders • Nature walks or short trails • Seating Areas • Shade canopy (vegetation or structure)
BASIC REST AREA AND COMMUNITY REST AREA	Basic Rest Areas are typically located throughout the state offering site specific interpretive information. They offer limited restroom facilities and may or may not include running water, depending on availability. Typically, these rest areas are located adjacent to scenic views, unique historical, cultural or environmental features. Community rest areas provide facilities within the town's infrastructure and function as a pocket park or town square.	• Enhanced native landscape type • Standard to accentuated hardscape types	• Located according to traveler's needs and unique site features • Site-specific interpretive signage • Toilets/no running water • Emergency call box • Handicap accessible • Picnic tables and shade structures • Trash containers • Paved car and Recreational Vehicle parking • Paved truck parking • Nature walks or short trails • Seating Areas • Shade canopy (vegetation or structure) • Local community information
COMPLETE REST AREA	Complete Rest Areas are typically located at 60-mile intervals throughout the state and are usually situated outside of developed areas. They feature fully-operable facilities in combination with interpretive information on regionally significant cultural and historical sites. Complete Rest Areas also provide travelers with picnic facilities and include children's play areas and pet areas.	• Regionally adapted landscape type • Focal hardscape type	• Regional interpretive signage • Running water and flushing toilets • Emergency call box and telephones • Drinking fountains • Vending machine services (at manned sites) • Handicap accessible • Picnic tables and shade structures • Trash containers • Bicycle storage units • Recreational Vehicle dump station • Paved car and Recreational Vehicle parking • Paved truck parking • Telescopes/viewfinders • Interpretive and overlook features • Children's play area • Pet rest facilities • Shade canopy (vegetation or structure) • Local community information
GATEWAY REST AREA	Gateway facilities convey first impressions and identity. Special features may be incorporated to highlight the area through design interpretation of the place. Gateways may be associated with any level of rest stop in the listing. The incorporation of local community information regarding amenities, events and interpretative elements, improves the interface between the highway and the communities it serves.	• Regionally adapted landscape type • Landmark hardscape type	Program elements are consistent with the type of Road Service Area provided. Specific elements include: • Regional services information • Interpretation of regional sites and features • Information on regional recreational attractions
WELCOME CENTER	Welcome Centers are located along major entry routes to the state. They offer introductions to the state and travelers can find access to useful travel information. Welcome Centers include a staffed information kiosk.	• Regionally adapted landscape type • Landmark hardscape type	• Located at major entry routes to state • Informational Services • Staffed visitor center • State-wide interpretive signage • Running water/flushing toilets • Emergency call box and telephones • Drinking fountains • Vending machine services • Handicap accessible • Picnic areas and shade structures • Trash containers • Bicycle storage units • Paved car and Recreational Vehicle parking • Paved truck parking • Improved trails • Children's play area • Pet rest facilities • Shade canopy (vegetation or structure) • Telescopes/viewfinders

- Carson Valley (SR 207 and US 395)
- Washoe Valley (US 395),
- Truckee Meadows (SR 431 and US 395)
- Lake Tahoe (SR 28, SR 431, and US 50)
- Topaz Lake, Spooner Summit
- Carson River (US 395)

- Design the viewpoint to reflect the surrounding setting and unique features.
- Coordinate the preservation and management of scenic vistas and unique features with the appropriate organizations and groups.
- Evaluate viewpoints periodically to ensure the integrity of the view.
- Consider the use of scenic easements to protect views and vistas.
- Limit the construction of outdoor advertising and other elements and structures that detract from the quality of the landscape.

2.5 Coordinate locations of rest areas with recreational access points.

Coordinate locations of rest areas with regional trail systems, particularly within the Tahoe Basin where trails provide additional access to the lake and other areas of interest (see illus. 8).

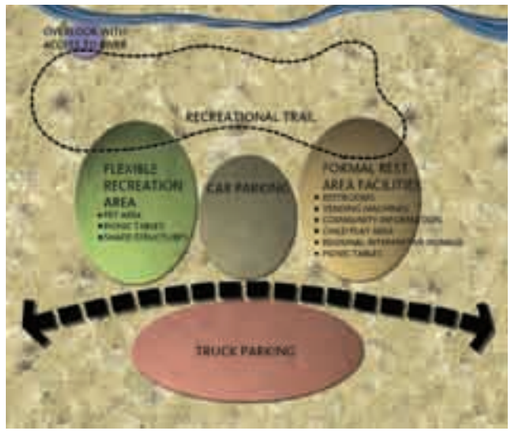
- Coordinate with appropriate agencies to provide informational signage for recreational activities.
- Coordinate the location of park-and-ride lots, rest areas, and activity pull-offs with transit stops to encourage use of public transportation, particularly in areas of heavy tourist traffic.

2.6 Provide community rest areas within designated towns.

Community rest areas have the dual benefit of serving as town parks and engaging travelers with local businesses (see illus. 10).

- Develop community rest areas through cooperative agreements with local municipalities.
- Provide information about local and regional activities, businesses, and points of interest.

***(8)** Coordinating rest area locations with public access points and regional trails creates an additional benefit to the rest area facility.*



***(6)** Conceptual layout of rest area amenities responds to environmental context and separates truck parking from view corridors.*

***(9)** Viewpoints and points-of-interest are separated from the highway and offer opportunities to view distinctive environmental features.*

***(7)** Rest areas should include a series of buildings or structures that reflect a homestead arrangement. Outdoor spaces should be considered as part of the building layout.*

***(10)** Community rest areas provide parks and gathering spaces for residents as well as serving traveler needs. Pedestrian connections to local businesses and attractions encourage travelers to explore the community.*

3.0 TRANSPORTATION ART

3.1 Engage artists early in the design and development stages of highway projects to ensure an integrated and comprehensive art program.

Transportation art should not be an afterthought or decoration (see illus. 1,2 and 3).

- Incorporate art as part of the design process as a means of interpreting the corridor's theme.
- Integrate art as part of functional aspects of highway facilities.
- Artists should coordinate with community members, landscape architects, and architects throughout the design process.
- Scale artwork based on travel speed, slope, and sight distance.

3.2 Create regionally appropriate and meaningful art.

Art enhances the travel experience and can create the first impression of a place. Transportation art should clearly express a meaning and purpose that relates to the surrounding locale, the unique culture and environment of the area, and the travel experience. Patterns and objects used thoughtfully, and even abstractly, can and should evoke a response that connects travelers to the uniqueness of the site and/or the surrounding landscape.

- Patterns imprinted on a highway structure should be designed as an artistic composition of objects, imprints, or patterns.
- Patterns should offer an appropriate level of complexity and interest to the place and highway travel speed.
- Avoid the use of repetitive, overused symbols and patterns.
- Consider artwork that utilizes light and shadow to create pattern and images.
- Avoid monotony in the duplication of repetitive literal pictorial application.

3.3 Ensure artwork expresses an excellence of craftsmanship, quality, truthfulness, and originality.

Transportation art should complement the overall design of highway facilities. Materials and forms should be carefully considered to ensure the long-term suitability of the project.

- Select a composition of materials that are durable for the projected life span of the project.
- Avoid the use of ready-made, randomly placed, stand-alone objects, or imprints that portray little meaning.
- Use evocative artistic expressions that engage observers and complement highway structures and the surrounding landscape.
- Elements of highway art should not be obvious or forged. Rather, transportation art should depict an excellence of craftsmanship, quality, truthfulness, and originality.

3.4 Consider each art piece as part of a larger whole.

Highway art can be carefully crafted, giving the simplest of all elements a very powerful effect. When planning transportation art, the entire design segment and overall corridor should be considered (see illus. 4).

- Consider surrounding landscape views.
- Art should be scaled at a size relative to the surrounding landscape and highway speed.
- Avoid distracting art pieces. Consider glance recognition and the intensity of surrounding features in order to prevent safety issues.

(1)

(2)

(3)

(1),(2),(3) *Involving artists early in the design process helps ensure the resulting project is representative of the community's vision and fits into the functionality of the highway facility. The images above are part of a mural designed by artist Stephen Farley in which photos from the general public were converted to glazed ceramic tile and incorporated into the design for a community gateway.*

(4) *Although simple in concept, the ribbon sculpture along the above wall is a dynamic art piece that responds to the scale and speed of travel along the adjacent roadway.*

3.5 Ensure transportation art supports the landscape design segment themes.

Transportation art is not a typical highway project, and the choice of appropriate subject matter and media is essential to obtaining the desired expression for each landscape design segment theme. Choose art subjects that support the landscape design segments' themes, such as:

Great Basin Forest
- Subtle Statewide Gateway to Nevada
- Topaz Lake
- Pinyon and Juniper Forests
- Outdoor Recreation
- Native American Heritage
- Forestry
- Mountain Views

Capital Crossroads
- Ranching
- Wildlife
- Job's Peak
- Outdoor Recreation
- Birding
- Carson River
- Historic settlements
- State Capital
- Railroad
- Mining
- US Mint

Lake of the Sky
- Subtle Statewide Gateway to Nevada
- Outdoor Recreation
- Lake Tahoe
- Native American Heritage
- Forestry
- Sierra Nevada Wildlife and Plant Communities
- Scenic Views
- Historic Logging and Flumes – Connection to Mining

Edge of the Sierra
- Subtle Gateway Marking the Arrival to Nevada
- Outdoor Recreation
- Washoe Lake
- Reno History and Museums
- Native American Heritage
- Forestry
- Great Basin/Sierra Nevada Wildlife and Plant Communities
- Scenic Views
- Truckee Meadows

Enhance bridges, pedestrian structures, noise walls, and retaining walls with appropriate motifs and consider sculptural ornamentation, decoration, and landmark features.

3.6 Engage local agencies and organizations in the planning process.

Relationships with local agencies as well as the Nevada Arts Council should be developed to assist in the review and implementation of proposed transportation art projects.

- Consider transportation art at the onset of project development.
- For Community Matching Fund and Transportation Art programs, refer to the guidelines outlined in the current *Landscape and Aesthetics Community Match Procedures Manual: Guidelines, Applications, Instructions and Forms for the Community Matching Funds and Transportation Art Program*, NDOT.

(5) *Metal trees enhance place-making and are integrated as part of the design process.*

(7)

(8)

(7),(8) *Cultural symbols can be integrated into bridges to highlight important crossings.*

(6) *Light and shadow can be used to create pattern and images.*

(9) *Streetscape design may include artwork within community centers and along sidewalks to enhance the sense of place.*

4.0 SIGNAGE

4.1 Provide a standard, cohesive system of service signage.

NDOT manages the Tourist Oriented Directional Signage System (TODS). TODS are preferred over numerous private individual business signs and billboards. Work with local community agencies and businesses to develop and locate TODS. Refer to the Outdoor Advertising discussion (pages 1.28 -1.29) for more information about billboards along the corridor.

4.2 Implement a Statewide Place Name Sign Program.

A comprehensive place recognition signage program should be implemented through partnership initiatives with local communities and agencies. The program and sign types are described on pages 1.12-1.13. Areas of interest within the design segments that could be highlighted include:

- Historic Features: Historic flumes, railroads, emigrant trails, State Railroad Museum, and V & T Railroad (from Virginia City to Carson City), inverted siphon near Duck Hill, Genoa, Mormon Station, and Bowers Mansion;
- Wildlife and Natural Areas: Tahoe Rim Trail and wildlife viewing areas in the Tahoe Basin, Washoe and Carson Valleys;
- Geographic Features: Lake Tahoe, Logan Shoals, Glenbrook Canyon, Carson River, Topaz Lake, Washoe Valley, Slide Mountain, Mt. Rose, and Stonehouse and Steamboat Hot Springs;
- Cultural/Recreational Resources: Mount Rose Scenic Byway (SR 431), Carson City State Capitol and Historic District, Dayton Historic District, sovereign lands and reservations of the Washoe and Paiute tribes, Tahoe Pyramid Bikeway, and Virginia City National Historic District, Rock Point Mill Site, and Stead Airport (site of Reno Air Races).

- Use a consistent color and material for signs.
- Use signs that are high quality and as durable as other standard highway signs.
- Use the MUTCD as a guide for signage requirements.

4.3 Create a family of iconic symbols to represent features.

Encourage the recognition of cultural and environmental features through iconic imagery.

- Signage should depict the general physical shape of the point of interest.
- Establish icons to represent general categories of interest within the Nevada landscape. Illustration 1 shows examples of symbols to represent the categories. Unique icons may be created for areas of national significance such as Lake Tahoe. Additional symbols should be developed to represent Nevada landmarks/historic points, emigrant trails, scenic byways, and Native American features. Engage Nevada tribes to develop a universal symbol that is both appropriate and simple to represent the state's Native American resources.
- Features and points of interest to be recognized in this program will be coordinated with NDOT, NDSP, Native American Tribes, and the State Historic Preservation Office.
- Name and labels included shall be consistent with State archives and map naming conventions. Consider travel speed when descriptions are used. Lettering less than 6 inches in height can be difficult to read at high speeds.
- Final icon and name approval will rest with NDOT.

EXAMPLE CATEGORIES OF ICONIC SYMBOLS FOR PLACE NAME SIGNS

(1) Universal symbols represent Nevada's cultural and environmental features as part of the Place Name Sign Program. Additional categories such as Nevada landmarks/historic points and Native American features should be developed to provide straightforward icons that symbolize these resources.

4.4 Implement an Audio Interpretation Program.
Develop and coordinate an audio/multimedia interpretative program with the Statewide Place Name Sign Program. This program could be implemented via broadcast radio, CD or DVD programs, wireless Internet hotspots, satellite transmission, or other media that allows travelers to access additional information from their car.

- Information may include cultural and natural resources, tourist opportunities, and services along the corridor.
- Link the Audio Interpretation Program to the Statewide Place Name Sign Program and state welcome centers in order that travelers can access specific information on selected sites.
- Utilize synchronous technologies that allow users to control how and when they access this additional information.
- Incorporate the program into the Intelligent Transportation System regional informative architecture to allow messages to be updated in real time and coordinated with AMBER alert and 511 traveler information messages.
- Coordinate with programs, organizations, agencies, and municipalities along the corridor, and explore ways in which to expand the Audio Interpretation Program.

4.5 Coordinate the Statewide Place Name Sign Program with the national Watchable Wildlife program and with other community driven programs.
Work with other agencies, civic groups and municipalities to provide interpretive signage where applicable.

4.6 Highlight scenic byway entrances with signage that is coordinated with the Statewide Place Name Sign Program.
Reflect the place and character of the area with iconographic images incorporated on scenic byway signs (see illus. 7).

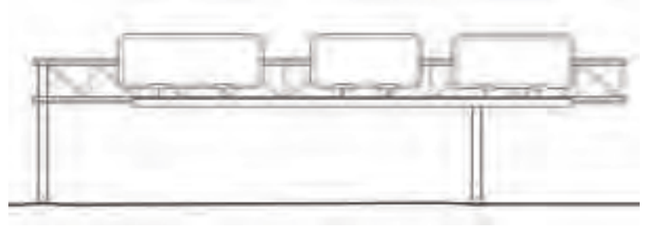
4.7 Incorporate the anti-littering campaign.
Anti-littering messages located at highway stops that include food and beverage services will provide an immediate reminder to travelers.

- Work with local vendors to place the anti-littering messages on disposable cups, plates, and other items likely to be tossed out the vehicle window.
- Along non-interstate roadways, utilize pole signage anti-littering signs.
- Develop signage that engages Nevada residents and encourages active participation in maintaining clean and beautiful highways.

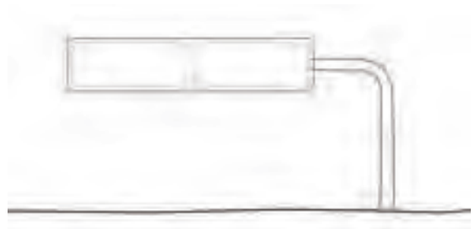
4.8 Simplify signage supports used on bypasses and elevated bypasses.

- Use single arm monotube systems for freeway signage support where possible.
- Minimize the number of trusses used in order to reduce visual clutter (see illus. 8 and 9).

(7) *Scenic byways should include a specific pictorial graphic that is related to the place.*



(8) *Sign bridge with numerous trusses is visually cluttered.*



(9) *Single arm monotube with one signage board clarifies appearance of information.*

5.0 COLOR PALETTE APPLICATION

5.1 Use a uniform, consistent color palette for all highway structures.

Standard NDOT practice should utilize a uniform and consistent color palette for all new and existing highway structures that complements the surrounding landscape. Base and accent stain or paint colors for all highway structures along the US 395, West US 50, SR 28, SR 207, and SR 431 Corridor have been selected. To ensure accurate color reference, the colors are matched to the Dunn Edwards system (see illus. 2).

- Each highway structure should use a selection of one base color and up to two accent colors, chosen from the palette. No more than two accent colors should be used per site.
- Ensure roadway structures within a single landscape design segment utilize the same base color and accent color(s).
- When existing structures require refinishing, they should be stained or repainted to be consistent with the selected color palette.
- Specific town logos and transportation art are exempt (refer to Transportation Art guideline, page 3.19).

5.2 Ensure accent colors highlight structural aspects.

Accent colors should highlight structural aspects and/or details of highway structures, such as the beam of a bridge or a bridge railing.

- Ensure accent color application logically responds to and reinforces structural features or change in materials.

5.3 Use color composition on bridges to visually reinforce structural elements.

Use the base and accent colors to reinforce the structural elements and integrity of a bridge.

- Concrete bridge spans, super-structure support, and slope paving should be selected from the landscape segment base color.
- Railing and other features incorporating a material change should utilize accent colors. In addition, steel bridge spans should use an accent color.

5.4 Blend new rock cuts and/or soil with the surrounding landscape.

Match new rock and soil treatments with existing rock and soil color to blend disturbed areas with the surrounding environment.

- Use this process for any corridor project in which rock cuts are included.
- Blend newly excavated soil and rock with existing weathered rock.
- Where possible, the application should occur in a central location and away from sensitive receiving waters.

(1) *The landscape inspires the color palette for each landscape design segment. Base colors correspond to the landscape design segment's environmental features.*

BASE COLORS

Great Basin Forest
#6223

Capital Crossroads
#6215

Lake of the Sky
#6223

Edge of the Sierra
#6215

ACCENT COLORS

Any two accent colors may be selected from the following. All landscape design segments use this accent color palette.

DE 5537

DE 5936

DE 6013

DE 6040

DE 6097

DE 6224

(2) *The proposed color palette refers to the Dunn Edwards paint system and should be used for reference purposes only.*

(3) *The color palette was field tested in morning, afternoon and evening conditions.*

(4) *The Carson City Bypass successfully applied the color palette.*

6.0 ROADWAY DESIGN

6.1 Reduce the appearance of a wide right-of-way through communities.

Every effort should be made to keep the roadway as narrow as possible. Wide roads allow for faster vehicular travel speeds, negatively impacting the safety of pedestrians.

- Consider reducing the number of lanes. Four lane highways may be retrofitted to two travel lanes or two travel lanes and a turn lane when other street systems are improved and overall traffic patterns move effectively.
- The appearance of a wide roadway may be reduced through the use of vertical elements, curb extensions, and a narrow shy distance (side clearance from fog line to edge of structure). Utilize a one to two foot shy distance from curbs and medians in downtown areas to reduce speed.
- Provide passing lanes outside of rural communities rather than only within town to reduce the number of lanes within town and slow travel speeds. Highways that only provide passing lanes within communities encourage higher travel speeds through town because it is the only opportunity to pass slower traffic.

6.2 Consider the use of rumble strips in transition zones to signal a speed reduction.

Changes in paving material and roughened paving provide a visual and audible cue to drivers to slow down.

- Rumble strips may be combined with enhanced roadside treatments such as plantings and gateways to reinforce the entry into pedestrian areas.
- Avoid placing rumble strips in bike lanes, and do not use in situations where bikes share travel lanes.

6.3 Provide curbs no greater than 6 inches in height in downtown areas.

Curbs define the edge of the highway and delineate the pedestrian zones within communities. Curbs greater than 6 inches in height may restrict pedestrian movement and create difficult transitions at pedestrian crossings.

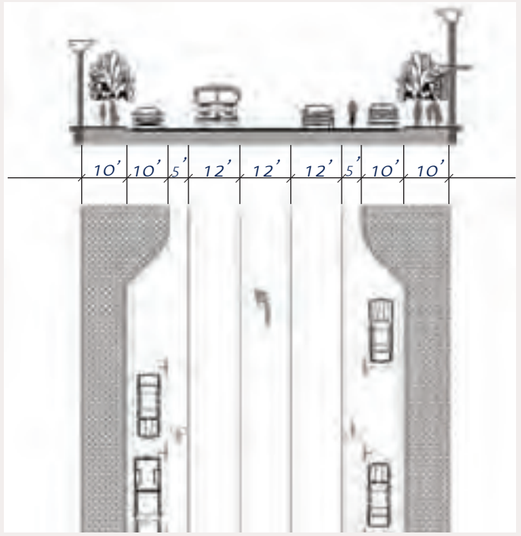
6.4 Utilize on-street parking in community interface zones to buffer the sidewalk from traffic.

On-street parking accommodates access to local businesses and slows traffic (see illus. 1-2).

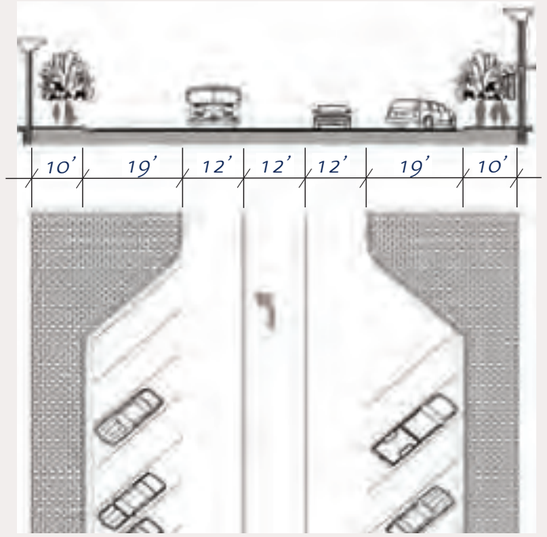
- Use curb extensions to enhance the visibility of pedestrians crossing the street.
- Angle parking should only be used in areas of very low travel speeds.
- Provide a bike lane between parking and travel lanes to create a buffer.
- When bike lanes are not incorporated, consider using a wider outside travel lane or parking area to minimize conflicts with opening doors.
- For all forms of on-street parking, maintain adequate visibility and buffer zones between travel lanes and parking to prevent conflicts with through traffic.

6.5 Integrate art, softscape, and hardscape as part of a simple landscape treatment for roundabouts.

- Roundabout design should express the segment theme and community vision.
- Sensitively site transportation art and plantings.
- Treatments should complement and coordinate with the surrounding environment and landscape features and be part of an integrated design approach.



(1) *Parallel parking is best in areas where visibility and traffic flow are concerns.*



(2) *Where room and travel speeds allow, angled parking creates more parking spaces.*

(3) *Street systems have a large influence on the social and economic impacts of a community. Reducing the visual width of the street, allowing for on-street parking, and implementing a truck bypass are examples of ways in which communities can greatly reduce the negative impacts of a highway.*

7.0 MEDIANS

7.1 Revegetate medians along rural highways to integrate the highway with the landscape.

Utilize native plant material to revegetate medians along rural highways to create a more natural and consistent visual experience (see illus. 1).

7.2 Utilize median plantings and treatments to enhance a community's image.

Landscaped medians beautify wide streets by breaking up large expanses of pavement and making the street feel narrower. Medians can include a combination of rock mulch, signage, plantings, and boulders that help to identify the character of the place (see illus. 2 and 3).

- Avoid use of asphalt paving in medians. Stamped, colored concrete or pavers should be used in narrow medians (less than 5 feet wide). Paving score patterns and texture should be simple and coordinate with surrounding architecture and pedestrian areas. Colored concrete should use the segment's base color (see Color Palette guideline page 3.23) or coordinate with adjacent pedestrian walkways.
- The placement of plantings and treatments should direct pedestrians and facilitate the vehicle operator's view. Selected plant species should also be suitable for the harsh roadway environment.
- Planted medians are generally the width of the center turn lane but can be as narrow as 5 feet. Regardless of width, medians need to be designed to allow for safe maintenance as well as for anticipated plant growth.
- Design medians to allow for adequate percolation of water to avoid irrigation water infiltrating into the road base/subbase and causing pavement failure.

7.3 Utilize medians to reduce potential vehicle-pedestrian conflicts and to enhance pedestrian walkability.

Medians function to improve pedestrian visibility by minimizing turning conflicts and directing and separating traffic. They provide an effective way of reducing conflicts between pedestrians and vehicles, allowing pedestrians to incrementally cross the traffic lanes.

- Medians may be constructed with curbs and combined with pedestrian refuge islands.
- Future development, access management, usage patterns, available right-of-way, and changing transportation demands should be examined when determining if raised medians are the appropriate solution for the roadway.

7.4 Direct stormwater to planted medians and landscaped planting strips where feasible.

Utilize drainage swales within medians to handle excess stormwater runoff (see illus. 4 and 5).

- Carefully design curbs, gutters, catch basins, and drain grates for ease of maintenance.
- Ensure pedestrian movement is not unduly impacted by ponding water.
- In areas where run-off may contain high levels of salt, select salt-tolerant plants.

(1) *Native revegetation is appropriate for highway medians in rural settings.*

(2) *A combination of planting and streetscape elements helps identify the character of the place.*

(3) *Medians provide the opportunity for planting and design details that help define distinct areas within a community. Breaks in the median provide a safe haven and allow pedestrians to cross lanes incrementally. These refuge islands provide pedestrians with an additional level of security.*

(4) *Rock lined medians, alone or in combination with drainage swales, allow for runoff of excess stormwater.*

(5) *Landscaped medians beautify streets and create context sensitive solutions.*

8.0 PEDESTRIAN CROSSINGS

8.1 Improve pedestrian safety at crossings.

Motorists can see striped crosswalks from a greater distance (see illus. 1).

- Utilize a zebra striping pattern for painted crosswalks.
- Crosswalk striping should correspond to the width and location of sidewalks.

8.2 Use alternative paving type, coloring, or other means to visually highlight pavement in pedestrian crossings.

Crosswalks may be marked with distinctive paving material, colors, and texture (see illus. 3).

- Concrete is preferred over brick for its durability. Concrete may be stained, embossed with patterns, or constructed with unit pavers to give crossings a distinctive feel in particular areas.
- Textures and materials should provide a visual contrast with the adjacent road surface, however, they must also provide a smooth travel surface and good traction.

8.3 Reduce curb-to-curb distances at crosswalks. Incorporate curb extensions as part of the highway system when on-street parking is provided. Provide refuge islands to break up long crosswalks.

Curb extensions reduce the crossing distance for pedestrians, increase visibility for motorists and pedestrians, prevent illegal parking at corners, and provide additional room for people waiting to cross the street.

- Curb extensions should extend into the street no further than the edge of the travel or bike lane.
- Curb extensions may be used at mid-block crossings and are beneficial when combined with pedestrian refuges.
- Refuge islands are located at crosswalks in the middle of streets to provide a safe waiting area for pedestrians.
- The waiting area in refuge islands should align with the crosswalk and be as wide as the crosswalk to allow persons with disabilities to cross without obstruction.
- Refuge islands may include additional pedestrian safety features such as bollards and flashing signage to enhance their visibility.

8.4 Alert motorists to pedestrian crossings through the use of signage and flashers.

Pedestrian signals work in conjunction with traffic signals to assign right-of-way at intersections (see illus. 2).

- Active signals are preferred over passive signals.
- Pedestrian signals are appropriate at all intersections with traffic signals where crossing is permitted.

8.5 Provide appropriate lighting to enhance visibility of pedestrians by motorists.

Pedestrian-scale lighting and motor vehicle-scale lighting should complement each other in an effort to ensure that both pedestrian crossing areas and travel lanes are effectively illuminated.

***(1)** Zebra striped crossings require less maintenance and are more noticable than standard parallel striping.*

***(2)** Flashing pedestrian crossing signals enhance pedestrian visibility. In the image above, sensors on either side of the crosswalk activate flashing lights in the pavement when pedestrians cross the street.*

***(3)** Use of colored paving at pedestrian crossings elevates the importance of the pedestrian.*

- Accentuated lighting may be used at crossing points to further distinguish crossing locations.

8.6 Consider pedestrian facilities as part of roundabout design.

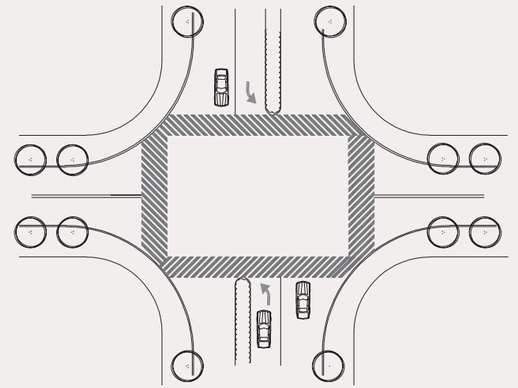
Pedestrian crossings at roundabouts should balance pedestrian convenience, pedestrian safety, and roundabout operations.

- Crossings at roundabouts implement the same design strategies identified for typical crosswalks but also need to consider the unique geometry of the roundabout design.

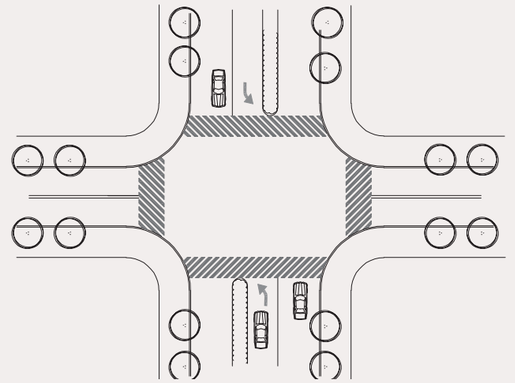
8.7 Balance the need for adequate vehicular turning radii with pedestrian needs.

A tighter turn or shorter radius forces drivers to slow down, allowing them to see pedestrians and make quick stops. Additionally, they create more sidewalk space for pedestrian amenities (see illus. 4 and 5).

- Reduce corner radii where feasible to shorten and align pedestrian crossings while reducing vehicle turning speed.
- Reduce the use of slip lanes (channelization) where possible to minimize pedestrian/vehicular conflicts.

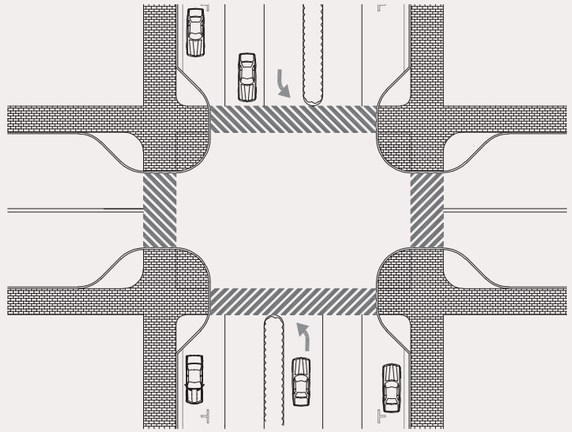


(4) *Pedestrian movement is directly affected by turning radii. Larger radii increase traffic speed and crossing distance for pedestrians, thereby reducing pedestrian comfort.*

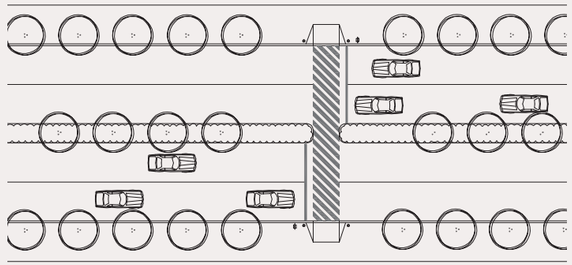


(5) *Tighter, shorter turning radii reduce traffic speed and shorten pedestrian crossing distances. In these situations, motorists are better able to see pedestrians and stop quickly.*

(6) *Tighter turning radii provide sidewalk space for landscape enhancements and clear delineation of crossing points.*



(7) *Curb extensions are easily integrated into roadways with on-street parking. Consider the use of curb extensions in highly utilized pedestrian areas in order to provide pedestrian amenities and reduced crossing distances.*



(8) *Breaks in the median provide a safe haven and allow pedestrians to cross lanes incrementally. Pedestrian refuge islands provide an additional level of security while crossing.*

9.0 NON-MOTORIZED TRANSPORTATION SYSTEMS (NMT)

9.1 Consider aesthetics as part of bicycle facility design.

Users of non-motorized transportation systems are more likely to use facilities that include aesthetic treatments and that link to critical destinations.

- Minimize underpass length to allow for natural lighting (see illus. 1).
- Utilize transportation art consistent with the segment theme (see illus. 2).

9.2 Engage agencies and organizations in the planning and design process.

Ensure proper planning conveniently accommodates NMT while minimizing adverse safety and environmental impacts.

- Engage Federal, State and local agencies as well as local user groups and organizations in the planning, design, and implementation of non-motorized transportation facilities.
- Ensure the maintenance of connections to regional trails and pedestrian systems.
- Consult the statewide bicycle and pedestrian plans prepared by NDOT.
- Provide signage to trail heads and regional trails to encourage NMT use.

9.3 Integrate NMT into the right-of-way.

Where topography, site conditions, and land use warrant, separate bicycle paths may be built in the right-of-way.

- Ensure that direct connections are made to existing and future trail systems and shared-use pathways (see illus. 3).

9.4 Incorporate designated bike lanes within the roadway to link regional bike trail systems.

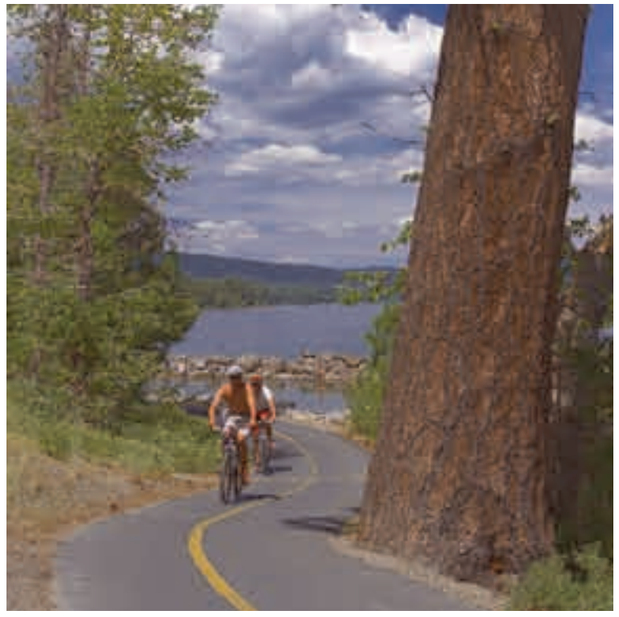
Within developed community areas, bike lanes provide access to regional bike trail systems and to local community facilities.

- Stripe, sign, and provide a painted bike lane symbol for designated bike lanes to promote driver awareness, better define travel lanes, and enhance user comfort (see illus. 4).
- Enhanced paving or pavement markings may be used in downtown areas.
- In areas of limited right-of-way and low speeds, bicyclists may share travel lanes in order to accommodate street improvements such as widened sidewalks and on-street parking. However, bike lanes should be included as part of the roadway whenever possible.

9.5 Consider bicycle facilities as part of roundabout design.

(1) *The length of underpasses should be minimized where possible in order to allow natural lighting.*

(2) *Daylighting and aesthetic imprints accentuate underpasses making them more inviting.*



(3) *Highly utilized recreation areas should have a shared-use trail linking destination points.*

(4) *Bike lanes should be signed, striped, and designated with a bike symbol.*

10.0 BRIDGES

10.1 Use a consistent bridge design.

Bridges are prominent features in the landscape and can significantly affect the visual quality of the environment. NDOT standard bridge design incorporates a concrete and steel I-girder, or concrete and steel box girder bridge structure of similar proportion, finish, and barrier rail design. The major structural elements – piers, girders, and abutments – also serve as the major architectural features.

- Aesthetic qualities must consider proportion, rhythm, balance, and unity. Refer to the *Aesthetic Guidelines for Bridge Design* (Minnesota Department of Transportation) for a complete discussion.
- Bridge form should be simple and uncomplicated (see illus. 2 and 3).
- Large amounts of slope paving should be avoided (see illus. 3).
- Street names should be embossed on the bridge span, providing place identification for the motorist.
- Where special conditions arise and larger or different bridge spans or types are required, ensure landscape and aesthetic aspects are incorporated into the standard design type.

10.2 Use simple sub-structure and support features.

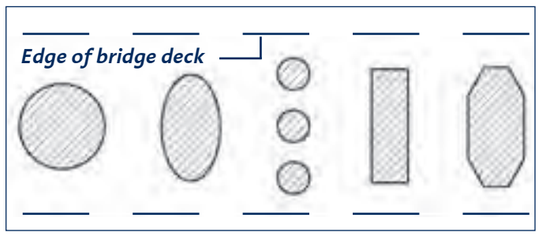
Use simple sub-structure and support features with strong proportional relationships in all standard bridge design.

- Avoid "V," "Y" or flared support shapes in sub-structure and support features.
- Use simple geometric shapes to minimize the support profile as well as the number of supports required (see illus. 1).
- When bridge supports involve stream crossings, a column shape must account for bridge scour.

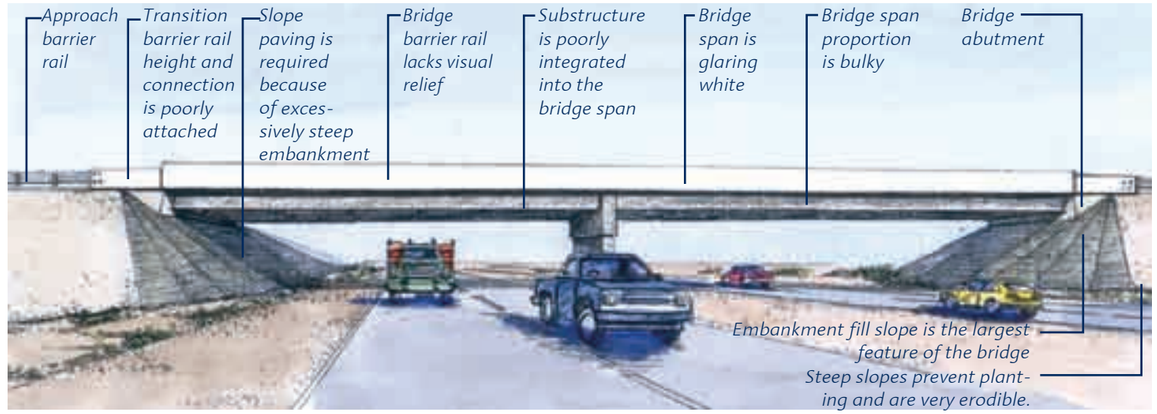
10.3 Use visually transparent bridge rail structures.

Consider open rail design of steel rail or concrete barrier and steel, both to create a more refined bridge with a lighter appearing span, and to maintain scenic views and views to the surrounding landscape.

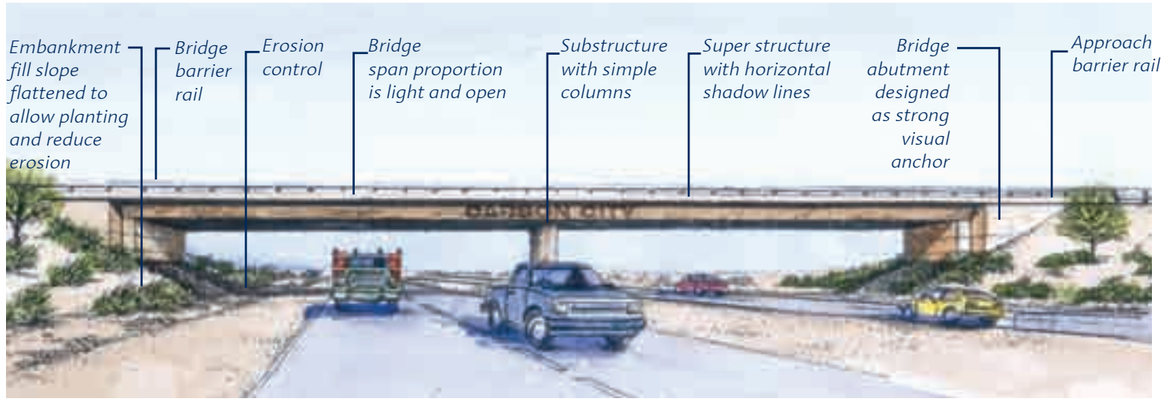
- Use shadow lines and patterns to avoid blank surfaces where safety mandates a solid concrete barrier.



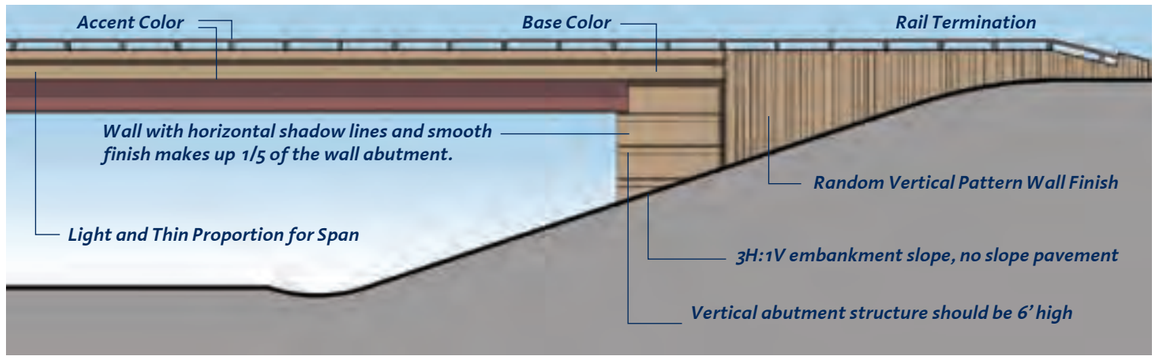
(1) *Sample bridge support cross sections.*



(2) Avoid *components and proportions lacking visual appeal.*



(3) Preferred *landscape and aesthetic treatments that improve the appearance of the bridge when applying design guidelines from this section.*



(4) Preferred *bridge design elements for this corridor.*

10.4 Consider fill embankments and approach rails as part of the bridge design.

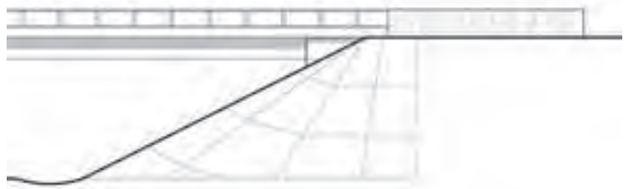
All NDOT bridge design should consider fill embankments and approach rails in concert with the abutment, bridge barrier rail, and superstructure (see illus. 10).

- Materials, height, and attachment details should be carefully considered when connecting guardrails to the bridge to avoid joining incompatible materials and creating abrupt vertical changes at connection points.
- Avoid slope paving at bridge embankments, grade to a slope of 3H:1V to allow for slope revegetation (see illus. 5-9).

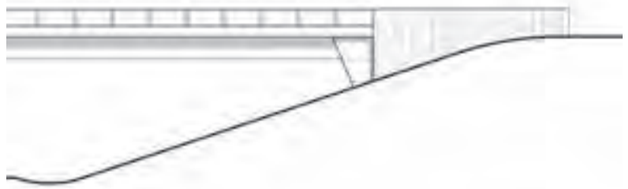
10.5 Use landscape or rock mulch to stabilize embankments.

Contour grade embankments and use landscape planting to maintain embankment. Use rock retaining walls to establish suitable flat landscape areas where right-of-way is narrow.

- Ensure mulch materials match bridge structure color and the surrounding landscape (see Color Palette guideline for appropriate color selection, page 3.23).
- Use rock mulches, stone rip-rap, or decorative slope paving (minimally) to stabilize abutments below the bridge.
- When slope pavement is used, include integral color or stain to match base color palette.

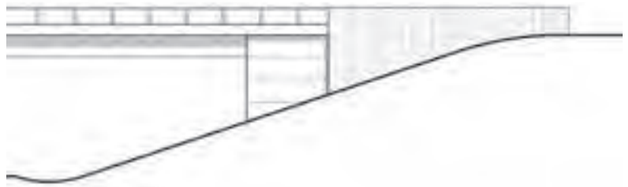


***(5) Avoid** 2:1 slope as primary bridge abutment and the need for slope pavement.*



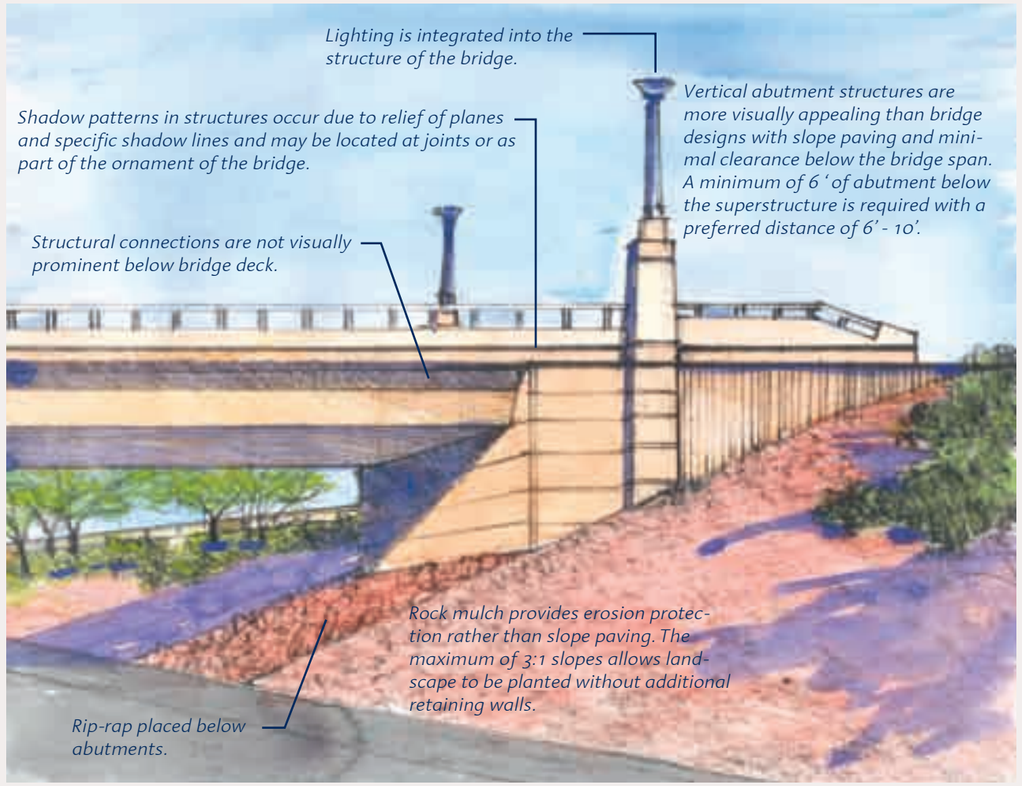
***(6) Avoid** weak proportions in bridges with shallow or undersize abutments.*

***(7) Avoid** characteristic shapes that do not visually support the structure.*



***(8) Preferred** use of bridges with retaining wall abutment and 3:1 slope is intended for the corridor.*

***(9) Preferred** use of a batter to the abutment is a desirable feature.*



***(10)** Bridge abutment and barrier rail designed as a composition with jointing and materials consistently applied into a well proportioned bridge*

***(11)** Consider rail features and open bridge spans as part of bridge design to evoke a sense of character that relates to surrounding development and historical influences.*

10.6 Select vandalism-resistant finishes.

Finish type, color, and surface patterns are important design elements in coordinating the structure with the surrounding landscape. Select bridge finishes of appropriate color (see Color Palette guideline, page 3.23) and vandal-resistance.

- Where appropriate, structures with detailed treatments located in urban areas should be treated with non-sacrificial anti-graffiti finish.
- Color and finish selections will assist in reinforcing the design intent of the bridge structure.

10.7 Create a visual design unity among all existing and new structures.

Ensure bridges coordinate with noise walls, retaining walls, and other highway structures.

- Establish a visual design relationship that coordinates materials, patterns, color, and other design elements of structures (see illus. 14).
- Establish a visual design continuity between existing bridges and other structures by implementing a paint/stain retrofit program to unify color schemes where they vary within a corridor.

10.8 Design bridges to accommodate additional elements and structures that are required.

Accommodate pedestrian corridors and other additional structures with extra width. In areas where noise walls are required on bridges, the bridge should be widened to allow for noise walls that are completely separated from concrete barriers (refer to Noise Reduction and Walls guideline 11.5, page 3.33, image 9). Street name identification should be placed on the concrete barrier rail.

10.9 Accentuate locations where bridges cross major water bodies, drainage courses, or canyons.

Utilize landscape treatments in order to highlight crossings and connect motorists to the landscape (see illus. 13).

- Consider the integration of a grade-separated pedestrian crossing into structure when possible.
- Coordinate with local jurisdictions to determine the need for these features.

10.10 Retrofit existing bridges.

Bridges are gateway features to cities and communities.

- Aesthetic treatments such as staining should be the basic treatment for updating existing structures.
- Where possible, include segment-appropriate artistic motifs with sculptural ornamentation and decorations (see illus. 12).

10.11 Provide direct connections from bypasses back to the community core.

Heightened levels of landscape and aesthetic treatments, including effective signage, should mark exits to downtown areas.

- Increasing density of landscape and architectural elements heightens the sense of arrival into community centers.

(12) *Aesthetic retrofits to existing bridges within the Reno urban area improve the sense of place and character. Travelers entering Reno from the Reno-Tahoe International Airport recognize a community that cares about its image.*

(13) *Architectural details and columns provide opportunities accentuate prominent drainages.*

(14) *Subtle bridge materials enhance place-making and add visual interest.*

11.0 NOISE REDUCTION AND WALLS

11.1 Consider grading to minimize wall height.

Where possible, use an embankment slope with landscape planting to buffer sound (see illus. 1), or use a combination of earth forms and noise walls to achieve structural integrity and buffer sound while limiting actual wall height.

- This guideline does not change or supersede Federal noise wall requirements, which specify the location of noise walls according to adjacent land uses and a sound level threshold approaching 67 decibels.
- Noise walls should not be greater than 14 feet in height without a step in the wall plane.
- Walls used only for visual screening may not be taller than 10 feet.
- Use natural barriers and land forms when possible.

11.2 Provide landscape planting and setback space between the vehicle recovery zone and the noise wall.

When necessary, work with developers to ensure adequate right-of-way is provided for sound abatement.

- Consider grading to minimize wall height. Landscape plantings in front of walls will soften the appearance of large wall faces (see illus. 2).
- Ensure planting and maintenance is provided.

11.3 Select a simple design palette.

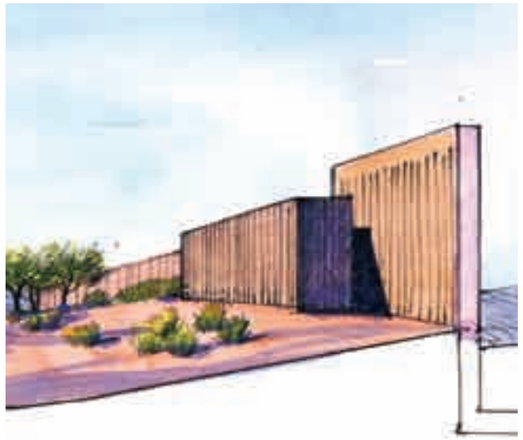
Choose a simple design palette of material, pattern, color, and texture that coordinates with the corridor's landscape design segment theme for retaining walls and noise walls.

- Maintain consistent use of the selected material, pattern, color, and texture. The required prototypical surface pattern is shown in illustration 3.
- Avoid using multiple materials, such as steel and concrete or CMU, on continuous spans of wall.
- Post and panel systems are not encouraged for noise wall construction, and should be used only for temporary applications. If a post and panel system is used, it should be constructed with a single material, preferably pre-cast concrete for all components (see illus. 5).
- Use visual design themes and/or pictorial motifs comprised of simple patterns and surface texture, and carefully design the motifs composition (height and position) on the wall (see illus. 6).
- Noise walls over 12 feet in height require special graphic or pattern treatment (refer to Transportation Art guideline, page 3.19, for more information about appropriate subject matter).

11.4 Create visual breaks and interruptions to avoid monotony along noise walls.

Use staggered and/or curved walls of varying lengths to provide visual interest along extended stretches of noise wall (see illus. 1).

- Avoid abruptly ending noise walls. Use a wall return of 3 feet for noise walls located outside of the clear zone.
- Battered walls, also known as inclined walls, can provide additional interest.
- Shadow patterns can be introduced to create visual interest that shift and change throughout the day.

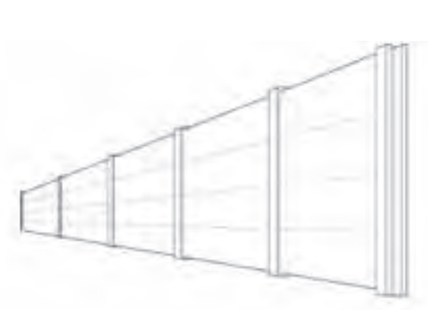


(1) *Grading, in combination with walls, will reduce the height of walls while still meeting federal noise standards.*

(2) *Integrate noise walls into highway right-of-way with landscape planting between wall and roadway. The setback also allows earth contour grading to vary the wall heights and base grade.*

(3) Preferred *prototypical surface pattern is rusticated variable vertical ribbing. Dimensions vary between 2"-8" apart.*

(4) *A wall return of three feet is recommended for noise walls outside the clear zone at the beginning of the wall facing the driver.*



(5) Avoid *post and panel system for permanent noise wall application.*

(6) *Focal noise wall imprint adds an additional layer of interest to noise walls.*

(7) *The integration of vertical vegetation visually softens noise walls.*

- Use appropriate ornamentation to break up the surface of long, uninterrupted spans.

11.5 Separate noise walls from other highway structures and set back from travel lanes.

Ensure noise walls are carefully planned for and integrated with the design of the highway and/or bridge.

- Avoid attaching noise walls to concrete barriers, bridges, and/or retaining structures. When noise walls are attached to such structures, use compatible materials, colors, and forms.
- Recess noise walls a minimum of 30 feet from edge of travel lane where possible. Noise walls may be placed on top of concrete barriers only when no other practical solution exists.
- Consider drainage impacts when locating or placing walls as the area flanked by walls will need to freely drain.

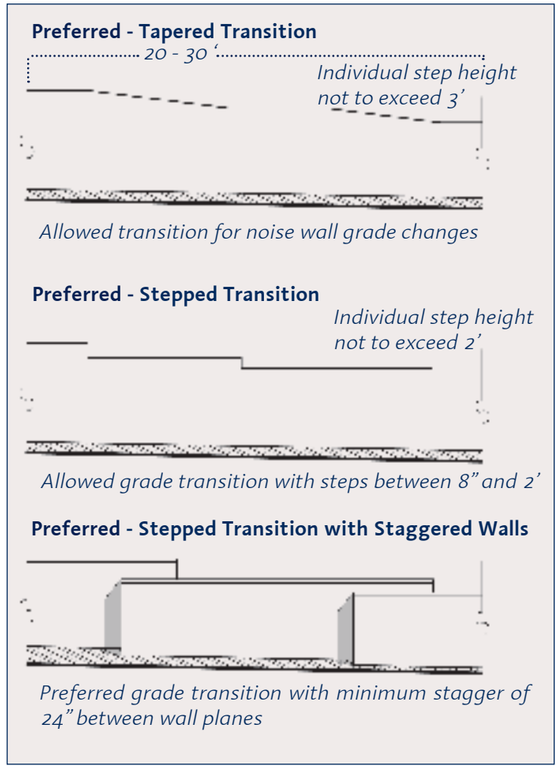
11.6 Encourage noise-compatible land uses adjacent to highway corridors.

At the planning level, encourage land uses that are compatible with highway noise, such as commercial and light industrial areas.

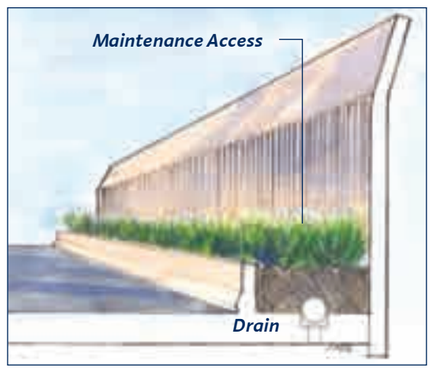
- Noise sensitive facilities (schools, churches, etc.) require sound abatement strategies.
- Coordination at the planning stages is critical to avoid conflicts.

11.7 Retrofit noise walls that do not meet recommended requirements.

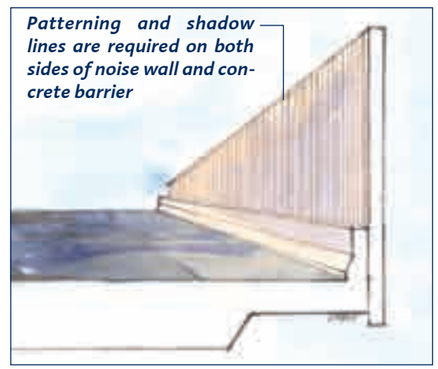
- Painting should be the basic treatment to improve existing structure aesthetics.
- Enhancements could include the application of artistic motifs with sculptural ornamentation and decorations, or visual relief by modulating the top edge of walls.



(8) *Using curved or staggered walls reduces the impact of a monolithic structure. Keep lines of the wall faces and tops clean and simple.*



(9) *Walls approaching bridges can be adapted with a setback and planting strip. A flare of the upper one-fourth of the wall further prevents an enclosed, narrow passage. Design flared walls so they do not become top-heavy and cause hazards to motorists and pedestrians.*



(10) *When concrete barrier and noise walls coexist without buffer space, wall is integrated into concrete barrier rail.*

12.0 CONCRETE BARRIERS AND GUARD RAILS

12.1 Stain concrete barriers to blend the roadway into the surrounding environment.

- Concrete barriers should be stained to match the segment's base color (see illus. 1). Refer to Color Palette guideline, page 3.23, for more information on color selection.

12.2 Avoid bright and shiny guard rails.

Use acid-washed steel guardrails where appropriate (see illus. 2).

(1) *Stained concrete barriers should use colors from the design segment's color palette.*

(2) *Acid washed steel guardrail should be used along the majority of highways.*

13.0 LIGHTING

13.1 Avoid over-lighting.

Excessive high mast lighting can create light pollution along a corridor and impact views to the surrounding landscape.

- Study current lighting level standards to determine levels needed for safety only. Adjust current standards, if necessary, and apply the minimum height, illumination, and number of light masts required.
- Focus attention on luminance versus illumination (i.e. brightness of pavement versus brightness of light).
- Along all sections of the corridor, use lighting fixtures that minimize light pollution and provide even light dispersion.
- Eliminate lighting where possible.
- Use cobra head or shoebox-type pole and fixtures instead of high mast lighting where appropriate.

13.2 Use a consistent lighting fixture and pole.

In central commercial districts and town centers, use light fixtures and lamps that are consistent with surrounding architectural styles.

- Use a durable, powder-coated finish for light poles of a color that matches other structures and the surrounding landscape. Typically use colors that blend with the background and do not visually overwhelm.
- Use poles and fixtures with consistent maintenance requirements and procedures for lighting types used within the same maintenance district.
- Use accent color palette for poles (refer to Color Palette guideline, page 3.23, for more information).
- Select a sleek and simple pole configuration (see illus. 5).
- Allow for context-sensitive design in fixtures and poles where appropriate, particularly in areas such as historic sites (see illus. 2 and 3).
- Consider color properties when selecting lamps. Metal halide lamps are preferred in pedestrian areas. Mercury vapor lamps produce favorable lighting for enhanced landscape treatments. Energy efficient high-pressure sodium lamps are commonly used for large portions of the roadway.

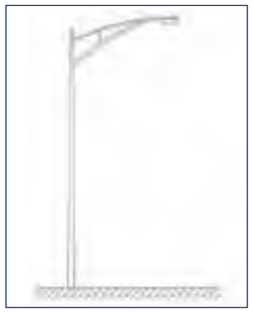
13.3 Lighting height and brightness should be consistent with pedestrian scale needs in downtown or heavily pedestrian-oriented areas.

Create desirable pedestrian environments by using pedestrian-scale lighting along sidewalks.

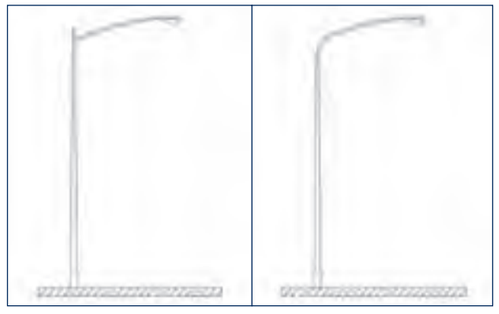
- Fixtures should be more closely spaced than conventional "cobra head" street lights.
- Lighting height and brightness should clearly illuminate walking paths.

(1) *A change in lighting height and style emphasizes the transition into a community.*

(2), (3) *Sculptural lighting reflects urban character in a landmark setting (above). Context-sensitive lighting reflects community character in special districts (above right).*



(4) Avoid *this type of pole design in favor of more streamlined attachments.*



(5) Preferred *type of fixture and pole configuration.*

(6) *Limit use of high mast lighting.*

14.0 FENCING

14.1 Ensure right-of-way fencing blends with the landscape.

Fencing can be used in non-urban areas to delineate the highway right-of-way and control access.

- Use wire fencing that blends with the landscape and conforms to current Nevada Revised Statutes.
- Ensure right-of-way fencing is well maintained.
- Minimize the use of fencing within rights-of-way where possible.
- In urban areas use colored steel fencing such as powder-coated, acid-washed, or stained-galvanized fencing that visually recedes into the urban background.

(1) *Fencing should not visually distract travelers from the overall landscape. Use simple, multi-strand wire fencing that blends with the landscape.*

(2) *In urban areas, use colored steel fencing or stained-galvanized fencing that visually recedes.*

15.0 GRADING AND RETAINING WALLS

15.1 Avoid creating steep slopes.

Smooth, moderately inclined slopes will blend more readily with the surrounding landscape, are safer to maintain, and are less vulnerable to erosion.

- Flattened fill slopes can assist in decreasing erosion. Flattened slopes also reduce the need for guardrails and provide better accident recovery in the roadside clear zone.
- Acquire adequate right-of-way to provide enough land to construct the desired slope and grade.
- In some locations, steeper slopes may be unavoidable to protect important natural or cultural resources adjacent to the highway.

15.2 Create smooth landform transitions and revegetate slopes.

- Use finish-grading techniques such as slope rounding at the top and bottom of cuts to create smooth landform transitions that blend with the natural terrain (see illus. 1).
- Carefully grade slopes around natural outcrops and abrupt topography to improve aesthetics and allow for easier and more cost-effective maintenance.
- Topographic patterns should be considered with proposed grading. Valleys, high points, and ridges require graded transitions rather than abrupt embankment cuts or fills.
- At a minimum, ensure that all constructed slopes are revegetated (refer to Native Plant Revegetation Softscape Type guideline, page 3.40).

15.3 Create artful earthwork.

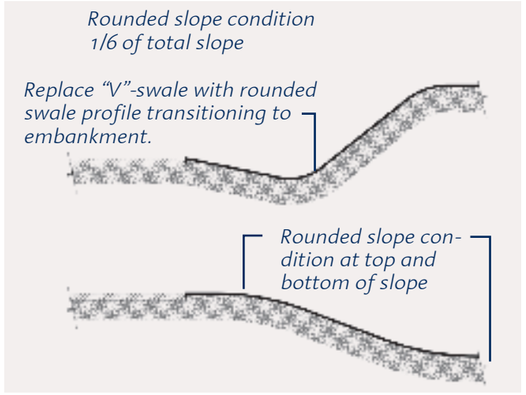
Create landforms that respond to the uniqueness of the site, the surrounding landscape, and the roadway travel experience.

- Contour grade to create effective planting embankments, shadow patterns, and artful earthwork.
- Where feasible, grade slopes to provide for water harvesting (reclaimed surface runoff).

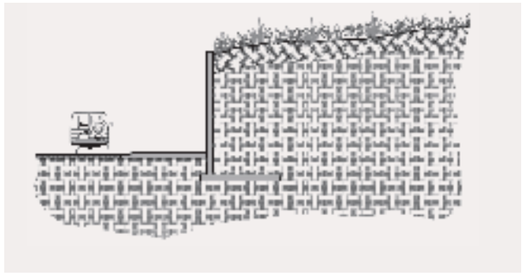
15.4 Utilize retaining walls that reflect surrounding landform and soil colors to minimize large slope cuts.

Contrary to terraced high wall cuts, staggering, terracing, and progressive offset of retaining walls can stabilize slopes and reduce erosion while smoothly blending into surrounding landforms, (see illus. 2 and 3).

- Select retaining structures or slope stabilization methods that blend with the surrounding landscape and encourage revegetation.
- Provide landscape plantings in front of walls to soften their appearance.
- Provide a minimum of 8 feet between terraces to provide for landscape planting.



(1) *Smooth transitions between cut and fill slopes and existing conditions can be accomplished by rounding the slopes.*



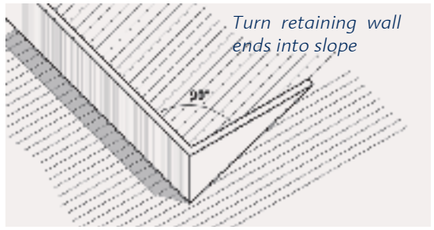
(2) Avoid *the tunnel effect created by a retaining wall greater than 14 vertical feet.*

(3) Preferred *designs incorporate a step or change of plane for a retaining wall greater than 14 vertical feet.*

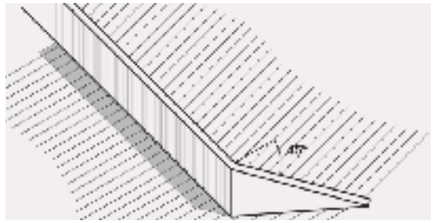
- Carefully design gabion walls. Color should be dark and muted to match soil and surrounding landscape. Wire mesh should match stone color. Plant terraces with native vegetation to break-up visual impacts.
- Retaining walls should be consistent within a segment and utilize a simple design palette and anchor to the earth (see illus. 5 and 9).
- Utilize a simple design palette. Avoid using multiple materials such as steel, concrete, keystone block, or CMU on walls. Exterior finish for retaining walls should have the same visual appearance independent of the type of wall.
- For MSE walls, rectangular shaped panels with vertical joints with a consistent pattern are preferred. All panels should have a rusticated variable vertical pattern that extends across the entire surface (see illus. 6, 7, and 10).

(4) Preferred *gabion systems that utilize dark, muted stone. Wall should not appear to be an artificial system.*

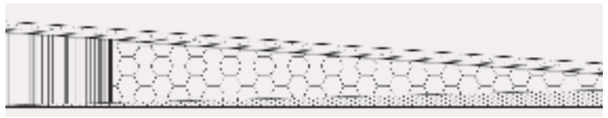
(8) Avoid *gabion retaining walls that utilize large light-colored rocks. Narrow spaces between terraces prevent the ability to plant native vegetation for visual relief.*



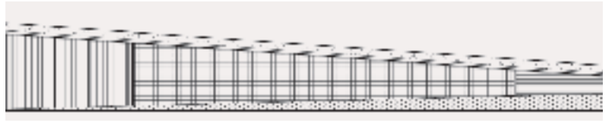
(5) *Turning the ends of retaining walls "anchors" them into the earth and creates a finished end to the retaining wall.*



(9) *Retained slopes with walls should return to meet uphill grade.*



(6) Avoid *small scale joints, octagon, or cruciform shaped panels. These are only acceptable when textured with a rusticated variable vertical pattern.*



(7) Avoid *multiple materials, shapes, and joint patterns*

(10) Preferred *finish is rusticated with variable vertical texture and pattern. Surfaces should have a single finish whether MSE, cast-in-place, or other wall type is used. Consistency with other structures is required.*

16.0 ROCK CUT AND EXCAVATION

16.1 Analyze rock geology.

Provide a multi-disciplinary team of civil engineers, geotechnical engineers, and landscape architects to ensure that the inherent character of a rock's natural bedding planes, fractures, joints, and overall stability is carefully analyzed and informs the design of all rock cuts.

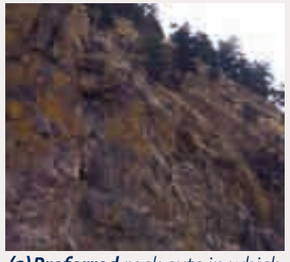
- Conduct careful rock geology, site, and cost analysis, and design rock cuts to avoid the need for rock fall protection fencing.

16.2 Design rock cuts to be natural in form, texture, and color in relationship to the surrounding landforms.

- Blend rock cuts to match natural rock forms and use naturalized bedding planes to avoid creating an unnatural rock face (see illus. 2).
- Ensure all designed landforms are natural in appearance and blend with the topography and geology of the surrounding landscape (see illus. 5).
- Match new rock and soil excavations with existing rock and soil using rock staining, soil-coloring treatments, and/or accelerated weathering techniques.
- Where site conditions and cost analysis permit, acquire adequate right-of-way to provide enough land to design and build the desired rock cut slope and grade.

(1) Avoid *straight cuts and benches with custom naturalized cuts.*

(4) Preferred *custom benching follows the natural formation of the rock and accomplishes the same elevation change as shown in illustration 1.*



(2) Preferred *rock cuts in which natural bedding planes were used to excavate naturalized landform.*

(3) Avoid *securing slopes with concrete facing when possible. When necessary, use colored concrete that resembles natural rock face textures.*

(5) Preferred *re-sculpted rock cut changes artificial slope banks into naturally occurring landforms. Plan cuts that terrace, bench, and use bedding planes found in rock formations are the final design of any rock slope.*

17.0 DRAINAGE

17.1 Use naturalized channel design and infiltration methods.

Avoid paving drainage ditches or check dams with asphalt or concrete. Where possible, secure check dams with rock and use naturalized channel design and infiltration methods to enhance, both functionally and visually, highway drainage systems (see illus. 1).

- In unique situations, utilize geotextiles, impervious mats, or stone lining to maintain the appearance of a natural channel.
- Excessive flow velocities and erosion potential may demand paved drainage surfaces. Consider the use of open cell concrete block with native grass or rock mulch.
- Vary the size of rock treatments. Meander naturalized treatments so that they feather into the landscape (see illus. 3).

17.2 Revegetate drainage infrastructure.

Drainage detention and infiltration areas should be shaped with natural undulating edges and bottoms rather than angular embankment slopes (see illus. 2).

- Upper slopes of drainage detention basins should be revegetated or covered with appropriate ground treatment (refer to Ground Treatment Softscape Type guideline and Native Revegetation Softscape Type guideline, page 3.40).

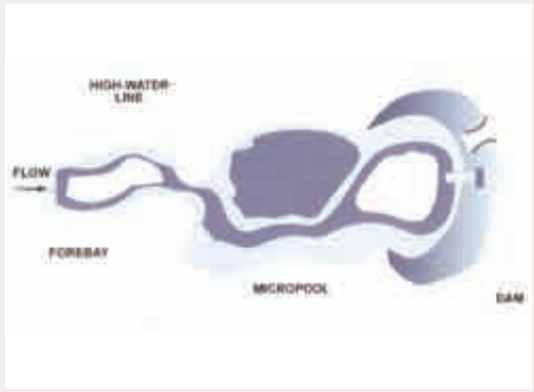
17.3 Naturalize culvert ends.

- Use rock to naturalize inlets and outlets.
- Culverts should not be exposed except at the end of headwalls and endwalls or with mitered end sections.
- When it is essential to have portions exposed, they should be stained to blend with the surroundings.
- Consider whether trails or wildlife passages can be coordinated with culverts.

17.4 Create small-scale detention basins in the Lake Tahoe watershed to protect lake and stream zone water quality in a manner consistent with current NDOT practices.

- Use native rock, soil, and organic materials to line retention basins. Open cell concrete block may be used. Revegetate basin with native grass to cover units.
- Add native vegetation along the margins of the basins to blend with surrounding landscape (see illus. 4).
- Promote infiltration, while preventing erosion and stabilizing biotic soil conditions.

(1) *Rock-lined drainage channels are an attractive alternative to concrete or unlined ditches.*



(2) *Design of detention basin uses naturalized, curvilinear shapes instead of "V" channels.*

(3) *Feather rock treatments into surrounding landscape so they appear more natural.*

(4) *Small detention features lined with rock and native vegetation allow slow infiltration of runoff.*

18.0 EROSION CONTROL

18.1 Stabilize soils to ensure successful revegetation and to control erosion. Use native materials for stabilization and revegetation, to blend with surrounding landscape.

- Use techniques such as heavy textured soil and/or gravel mulches to slow water run-off and provide dust control.
- Where water concentrates, riprap material and/or geotextile reinforcement may be used to avoid erosion.
- Permanent revegetation efforts can be improved by providing in situ topsoil, native vegetation fragments, and rocks and improving soil salvage techniques and seed mixes.
- Provide uncompacted topsoil surfaces (approximately 85% compaction) prior to seeding.

18.2 Refer to temporary and permanent erosion control best management practices as prepared and documented by NDOT.

(1) *Native rock and vegetation add aesthetic value while stabilizing slopes.*

(2) *Application of soil stabilizer aids in dust and erosion control.*

19.0 WATER HARVESTING

19.1 Maintain soil moisture and improve water retention by preserving topsoil, site surfacing, site grading, track walking, applying mulches and tackifiers, sensitively siting features, and using permeable paving or cisterns.

The collection of runoff for use in landscape design is especially important in arid climates. Increase the availability of natural water by directing runoff and precipitation into areas such as planting beds prior to moving it off site into drainage structures. Water harvesting methods also reduce the amount of runoff, thereby reducing non-point source pollution, erosion, and flooding while recharging the groundwater. Soil moisture and water retention can be maintained and enhanced in several ways, including:

- **Topsoil Preservation:**

  Stripping and salvaging the existing topsoil, vegetation seeds, and plant fragments for later reapplication should occur at every site requiring disturbance. This live topsoil contains organisms, seeds, and plant fragments that increase the potential success of revegetation and increases both the quantity of organic matter and permeability of the soil.

- **Site Surfacing:**

  Rock surface composition should simulate the original or adjacent surface cover or be integrated as part of the overall design. Create artful water harvesting features that contribute to the aesthetic quality as well as functionality of landscape treatments. Placing rocks and shaping landforms to create depressions increases water retention and provides moisture to the plants (see illus. 1). Rocks create impervious cover, resulting in water harvesting for the remaining soil and seeds. Rocks also create a rough, uneven surface, thereby slowing water runoff, allowing water to collect and increasing infiltration. Rock mulches retain moisture and protect plants by reducing evaporation, providing wind protection, and moderating the soil temperature so that it is cool in the summer and warm in the winter, effectively lengthening the growing period.

- **Site Grading:**

  Grade surfaces to slow water flow, encouraging absorption. Instead of a continuously angled slope, position breaks or depressed areas around planted areas. Contour slopes allowing water to infiltrate around vegetation. Prevent erosion by minimizing slope angle and directing water flow.

- **Track Walking:**

  Where possible, track walk all slope surfaces to stabilize material and minimize potential erosion. Track walking should be performed perpendicular to the contour.

- **Mulches and Tackifiers:**

  Use mulch and tackifiers to hold seed and topsoil cover and assist with moisture retention during germination. Mulches such as bark or straw can be used to stabilize seeds and topsoil and assist in moisture retention during plant germination and growth.

- **Siting of Features and Facilities:**

  Thoughtful consideration should be given to the siting of features and facilities. Rest area and other facilities where vegetation is desired should be located where natural surrounding upland topography can provide increased water to the planted areas. Within interchanges, planted areas should be sited where roadway runoff can be directed to provide water to these areas before it enters structured drainage systems. This method enhances plant growth, and supplements the irrigation needed for high water use plants, thereby reducing the cost of irrigation. Features used to direct or store water can be part of the aesthetics of design.

- **Permeable pavements:**

  Pavements such as flagstone or permeable asphalt should be used where appropriate to aid in the infiltration of precipitation in urban areas.

- **Water Storage in Cisterns or Tanks:**

  In some cases it may be desirable to store water in a cistern for later use. Storage provides the most control and flexibility in the use of harvested water. Cisterns collect water throughout the year and store it until it is needed during the height of summer. Consider the need for mosquito abatement during design. Water should not be stored in open systems for long periods of time. Cisterns can be sculptural and incorporated into an aesthetic design, or they can be large and relatively flat, and located under a parking lot.

***(1)** The naturally contoured slope allows for water collection around rock outcroppings and promotes vegetation growth.*

19.2 Use natural and/or artificial products to collect, store, and release water for plant use.

Use products such as:

- Pumice wicks
- Polymer products
- Diatomaceous earth
- Wattles

20.0 IRRIGATION

20.1 Select efficient and effective irrigation systems.

Select efficient and easily maintained drip irrigation systems that have a central controller.

- Consider the use of reclaimed water, including fully treated effluent and water harvesting techniques, as a supplement to irrigation.
- If a non-domestic water source is used, include a filter system to prevent clogging of emitters.
- Consider threaded emitters as opposed to punch-in types to minimize vandalism.

20.2 Provide appropriate irrigation for each softscape type.

The early stage of revegetation growth demands the most water use and is most critical to the establishment of young plants in an arid climate. As revegetation becomes more established and mature, the demand for water will lessen to the point of complete removal.

- Temporary watering is required for containerized native plants for a period of approximately one to two years, depending on the success rate of revegetation.
- Permanent irrigation to individual plants is required for all enhanced native, regionally adapted, and regional ornamental softscape types.
- When a water source is not available, consider water harvesting methods or the use of vertical elements and structures.

20.3 Manage the high concentration of salts.

Nevada's desert soils often concentrate salts at the outer edge of the wetted soil volume, including near the soil surface, particularly in drip irrigation situations.

- Salt management techniques include flushing the soil periodically with heavy watering and/or planting salt tolerant materials.

***(1)** Drip irrigation is required for all enhanced native, regionally adapted, and regional ornamental softscape types even after they have reached maturity.*

***(2)** Certain plant species such as Ephedra and Rabbitbrush are adapted for survival in saline soils.*

21.0 SOFTSCAPE TYPES AND TREATMENTS

GENERAL GUIDELINES

21.1 Consider aesthetics and maintenance of selected softscape treatment.

In all non-paved areas, select ground treatments that meet both aesthetic and maintenance requirements.

21.2 Select appropriate plant sizes.

Minimum plant size used should consider plant survival and the visual effect of the material.

- Consider sunlight, water requirements, and wind exposure when placing plant material.

21.3 Preserve healthy trees and vegetation.

Mature vegetation is an integral part of community identity and an important public resource that enhances the quality of life.

- Preserve areas that have been previously landscaped with ornamental plant materials that are in good condition, form, and health.
- Include a tree inventory listing all protected trees and other landscape materials within the right-of-way.
- Include a listing of species, size, and condition of each tree, index of trees to remove or preserve, and specifications for tree maintenance during construction.

***(1)** Softscape treatments within the right-of-way should be adapted to the specific environmental conditions of the region.*

GROUND TREATMENT SOFTSCAPE TREATMENT

21.4 Implement appropriate ground treatment and softscape type.

Use recommended softscape and ground treatment types to assist with erosion and dust control, consistent with NDOT specifications.

- Rock mulch, where used, should complement and/or match the surrounding natural environment.
- For rural areas, ground treatment should be derived from natural patterns found in playas, foothills, or ephemeral drainages.
- For landscaped areas in urban settings, use rock mulches to create patterned and textured ground treatments.
- Implement a ground treatment retrofit program to treat areas of bare soil.

21.5 Coordinate ground treatment with surrounding landscape.

Ground treatment should coordinate in size, texture, color, and aggregate mix with the surrounding landscape.

- Mulches composed of multi-sized rock that resemble natural patterns of surrounding soils should be considered as a matching technique.

(1) *Mulches that utilize natural elements help to blend disturbed areas with their natural surroundings.*

NATIVE REVEGETATION SOFTSCAPE TREATMENT

21.6 Apply native revegetation softscape along open, rural highways.

Reestablish the native conditions using the native revegetation softscape type. The native revegetation softscape type is the background planting for the majority of the corridor and should be implemented as indicated in the landscape design segments.

- Roadsides should be revegetated after a fire to reduce erosion and snow drift.
- Plant density and spacing should mimic surrounding conditions, incorporating scattered rock mulch to reduce erosion and improve revegetation success.
- Distribute scattered rock mulch in a pattern similar to that found in the surrounding landscape instead of a thick, even spread of rock mulch.
- Select an appropriate native plant palette based on elevation, soil conditions, and ecosystem type.

21.7 Carefully select native plant species.

In addition to plant species identified in *Mapping Ecosystems along Nevada Highways and the Development of Specifications for Vegetation Remediation* (Tueller, et all 2002), use the list of native plant species provided for revegetation efforts. Plant palettes are not restrictive. They provide a starting point for plant selection.

- Ensure the plant palette selected for the site complements existing desirable vegetation in the surrounding landscape.
- Use native plant species to create plant communities with variations in plant height and width.
- Additional plants not included in the adjacent list can be included upon review and approval.

(1) *Native plant materials of northern Nevada includes: Sagebrush, Bitterbrush, and Rabbitbrush.*

21.8 Revegetation methods.

- Reestablish native conditions using the native plant revegetation softscape type. Select perennial grasses, forbs, and shrubs that will establish with little or no maintenance over the long term. Incorporate the Native Wildflower Program in revegetation efforts. Select plants that have been evaluated for drought tolerance, salt and alkali tolerance, seedling vigor, fire retardant characteristics, growth habit, suitable soil groups, seeding rates, Pure Live Seed (PLS), availability, and general costs of native seed sources. Ecosystem categories and suitable plant species have been identified for revegetation specifications along Nevada's highways in *Mapping Ecosystems Along Nevada Highways and the Development of Specifications for Vegetation Remediation* (Tueller et al, 2002). Tueller's report offers a complete description of suitable plant species and plant communities, soil classification units, and best management practices for vegetation remediation, and should be used as a guide for revegetation.

- Salvage existing native plants and topsoil prior to construction. Species salvagability depends on location, size, soils, and analysis of plant value, including potential survival rate. Salvaged plants can be utilized at revegetation sites to improve roadside aesthetics and to provide mature plants that would otherwise take years to establish. Where existing native plants can not be re-used, chip salvaged plants and incorporate into the topsoil. In addition, ensure native topsoil is collected and stored for reuse. Native topsoil provides a seed source and important bacteria for salvaged plant establishment and growth. 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. Organic mulches may be used to improve soil quality. Firmly anchor mulches to the site. Carefully analyze the site to determine the need for fertilizers and pH amendments.

- Salvage and stockpile native rock mulch. Existing rock naturally blends with the landscape. Re-use of existing materials should be considered as part of site design.

- Apply a prescribed soil treatment such as plowing, disking, harrowing, furrowing, hydroseeding, applying mulches (such as straw), and using tackifiers (such as dark colored netting). Soils should be roughened before and after planting to create favorable seed sites, particularly for grass and forb seeds. In silty conditions, a soil stabilizer, such as a hydromulch, or a matting material can reduce potential dust problems. On some sites, deep ripping can loosen hardpan and improve seeding success. In conditions of steep cuts and slopes greater than 40%, slope disking may create seed pockets. Use scattered rock mulch in coordination with revegetation. This mulch provides seed pockets and protects plant establishment.

Figure 12 - Native Revegetation Plant Palette

Plant Palette - Great Basin Areas

	Height x Width	*Exposure to Sun*	*Water Requirement*	*Seasonal Interest*
Upper Elevations				
Big Sagebrush Sites				
Shrubs:				
Artemisia tridentata - Big Sagebrush	1.5' to 6' x 10'	Full sun	minimal	Aromatic
Chrysothamnus viscidiflorus - Green Rabbitbrush	2' x 3'	Full sun	minimal	Yellow flowers
Erigonum ovalifolium - Cushion Buckwheat	1' x 1'	Full sun	minimal	Yellow flowers
Ephedra viridis - Green Ephedra	3' x 3'	Full sun	minimal	Evergreen
Prunus fasciculata - Desert Peach	4' x 4'	Full sun	minimal	Small white flower
Purshia tridentata - Bitterbrush	6' x 6'	Full sun	minimal	Yellowish spring *color*
Salvia dorrii - Purple Sage	2' x 2'	Full sun	moderate	Blue flowers
Grasses:				
Achnatherum thurberianum - Thurber's needlegrass	24" x 24"	Full sun	minimal	Grass
Agropyron spicatum - Bluebuch Wheatgrass	18" x 12"	Full sun	moderate	Grass
Agropyron trichophorum - Pubescent Wheatgrass	18" x 12"	Full sun	moderate	Grass
Bromus inermis - Smooth Brome	12" x 12"	Full sun	moderate	Grass
Festuca idahoensis - Idaho Fescue	12" x 12"	Full sun	moderate	Grass
Leymus triticoides - Creeping Wildrye	24" x 24"	Full sun	moderate	Grass
Poa ampla - Big Bluegrass	up to 4' tall x 1'	Full sun	moderate	Grass
Forbs:				
Argemone munita - Prickly Poppy	36" x 36"	Full sun	minimal	Large white flowers
Castilleja spp. - Indian Paintbrush	12" x 8"	Full sun	moderate	Brilliant flowering color
Helianthus annuus - Sunflower	8' x 2'	Full sun	moderate	Large yellow flower
Linum lewisii - Prairie Flax	24" x 24"	Full sun	minimal	Delicate blue flowers
Lupinus spp. - Lupine	12" x 12"	Full sun	minimal	Brilliant flowering color
Penstemon palmeri - Palmer's penstemon	36" x 24"	Full sun	minimal	Large fragrant flowers
Vicia dasycarpa - Woolypod Vetch	18" x 12"	Full sun	moderate	Purpleish flowers
Pine and Juniper Woodland Sites				
Trees:				
Amelanchier alnifolia - Serviceberry	12' x 6'	Full sun	minimal	Bluish-purple fruit
Juniperus osteosperma - Utah Juniper	shrubby to 20-30'	Full sun	minimal	Yellowish green foliage
Pinus aristata - Bristlecone Pine	20' x 15'	Full sun	minimal	Evergreen
Pinus monophylla - Single-leaf Pinyon Pine	20' x 15'	Full sun	minimal	Evergreen
Pinus ponderosa - Ponderosa Pine	100' x 30'	Full sun	minimal	Evergreen
Shrubs:				
Artemisia nova - Black Sagebrush				
Artemisia tridentata - Big Sagebrush	1.5' to 6' x 10'	Full sun	minimal	Aromatic
Cercocarpus ledifolius - Curl-leaf Mountain Mahogany	15' x 10'	Sun to light shade	minimal	Narrow green leaves
Chrysothamnus spp. - Rabbitbrush	5' x 5'	Full sun	minimal	Golden flowers
Ephedra spp. - Mormon Tea	3' x 3'	Full sun	minimal	Evergreen
Kochia prostrata - Summer Cypress	3' x 3'	Sun to light shade	minimal	Gray-green foliage
Purshia tridentata - Bitterbrush	6' x 6'	Full sun	minimal	Yellowish spring color
Rhus trilobata - Skunkbush Sumac	5' x 15'	Full sun	minimal	Yellow to red fall color
Grasses:				
Bromus inermis - Smooth Brome	12" x 12"	Full sun	minimal	Grass
Leymus glaucus - Blue Wild Rye	36" x 24"	Sun to light shade	minimal	Grass
Poa sandbergii - Sandberg's Bluegrass	12" x 12"	Full sun	minimal	Grass
Pseudoroegneria spicata - Bluebunch Wheatgrass	36" x 24"	Full sun	minimal	Grass
Forbs:				
Castilleya spp. - Indian Paintbrush	12" x 8"	Full sun	moderate	Brilliant flowering color
Geranium viscosissimum - Sticky Purple Geranium	24" x 12"	Sun to light shade	minimal	Purple flowers
Linium lewisii - Prairie Flax	12" x 12"	Full sun	minimal	Delicate blue flowers
Lupinus spp. - Lupine	12" x 12"	Full sun	minimal	Brilliant flowering color
Penstemon palmeri - Palmer's penstemon	36" x 24"	Full sun	minimal	Large fragrant flowers
Sanguisorba minor - Small Burnet	12" x 24"	Sun to light shade	moderate	Unique foliage

- Collect native seed. Initiate a process for native seed collection at the start of each project where revegetation is designated. Native seed should be collected from a site in close proximity to the revegetation area. Because unpredictable weather patterns can affect seed availability, plan ahead to ensure usable seed. Native seed can also be purchased through seed companies or BLM nurseries.

- Monitor revegetation during construction to ensure the specified materials and installation methods have been used. Plan and budget for maintenance of revegetation and weed control areas until the desired species are established. In addition, continue to monitor revegetation plantings for up to five years after construction to ensure successful establishment. Include temporary irrigation if needed. Provide training for NDOT staff who oversee revegetation administration. Failures in revegetation can often be attributed to poor installation and maintenance practices.

- 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 species. In much of the corridor, however, re-establishing native plant communities may take many years. Use biotic or organic forms of control, such as temporary mulches, to prevent invasive species from establishing. Provide regular and frequent monitoring of new plantings to identify when additional forms of control may be needed.

Plant Palette - Great Basin Areas (cont.)

	Height x Width	Exposure to Sun	Water Requirement	Seasonal Interest
Lower Elevations Big Sagebrush Sites				
Shrubs:				
Artemisia tridentata - Big Sagebrush	1.5 to 6' x 10'	Full sun	minimal	Aromatic
Atriplex canescens - Fourwing Saltbush	5' x 7'	Full sun	minimal	Narrow gray leaves
Chrysothamnus viscidiflorus - Green Rabbitbrush	2' x 3'	Full sun	minimal	Yellow flowers
Ephedra viridis - Green Ephedra	3' x 3'	Full sun	minimal	Evergreen
Krascheninnikouia lanata - Winterfat	3' x 3'	Full sun	minimal	Yellowish flower clusters
Prunus andersonii - Desert Peach	5' x 5'	Full sun	minimal	Pinkish flowers
Purshia tridentata - Bitterbrush	6' x 6'	Full sun	minimal	Yellowish spring color
Rhus trilobata - Skunkbush Sumac	5' x 15'	Full sun	minimal	Yellow to red fall color
Grasses:				
Achnatherum hymenoide - Indian Ricegrass	24" x 24"	Full sun	minimal	Grass
Achnatherum speciosum - Desert Needlegrass	24" x 24"	Full sun	minimal	Grass
Leymus cinereus - Basin Wildrye	36" x 24"	Full sun	moderate	Grass
Leymus triticoides - Creeping wildrye	24" x 24"	Full sun	moderate	Grass
Poa ampla - Big Bluegrass	36" x 24"	Sun to light shade	moderate	Grass
Poa secunda - Sandberg Bluegrass	36" x 24"	Sun to light shade	moderate	Grass
Pseudoroegneria spicata - Blue Bunch Wheat Grass	36" x 24"	Full sun	minimal	Grass
Forbs:				
Ipomopsis aggregata - Scarlet Gilia	3' x 1'	Full sun	minimal	Delicate red flowers
Linum lewisii - Prairie Flax	12" x 12"	Full sun	minimal	Delicate blue flowers
Lupinus spp. - Lupine	36" x 36"	Full sun	minimal	Blue flowers
Medicago sativa - Alfalfa	36" x 12"	Full sun	moderate	Pinkish flowers
Melilotus officinalis - Yellow Sweet Clover	48" x 24"	Full sun	moderate	Small yellow flowers
Penstemon eatonii - Firecracker Penstemon	36" x 24"	Full sun	minimal	Red flower spike
Penstemon palmeri - Palmer's Penstemon	36" x 24"	Full sun	minimal	Large fragrant flowers
Oenothera tanacetifolia - Tansy-leaf evening primrose	6" x 12"	Full sun	moderate	Bright yellow flowers
Sanguisorba minor - Small Burnet	12" x 24"	Sun to light shade	moderate	Unique foliage
Solidago spectabilis - Goldenrod	18" x 12"	Sun to light shade	moderate	Yellow flowers
Sphaeralcea coccinea - Globe Mallow	12" x 12"	Full sun	minimal	Orange flowers
Vicia spp. - Vetch	36" x 12"	Full sun	moderate	Pinkish flowers
Salt Desert Shrub - Shadscale and Bailey's Greasewood Sites				
Shrubs:				
Atriplex canescens - Fourwing Saltbush	5' x 5'	Sun to light shade	minimal	Yellow flowers
Atriplex confertifolia - Shadscale	3' x 3'	Full sun	moderate	Flowering spikes
Atriplex gardneri - Gardner Saltbush	1.5' x 3'	Full sun	minimal	Evergreen
Grayia spinosa - Spiny Hopsage	3' x 3'	Full sun	minimal	Evergreen
Kochia prostrata - Prostrate Summer Cypress	3' x 3'	Sun to light shade	minimal	Gray-green foliage
Grasses:				
Achnatherum hymnenoides - Indian Ricegrass	12" x 6"	Full sun	minimal	Grass
Agropyron sibericum - Siberian Wheatgrass	24" x 12"	Full sun	moderate	Grass
Distichlis spicata - Saltgrass	6" x 6"	Full sun	minimal	Grass
Elymus elymoides - Squirreltail	18" x 12"	Full sun	minimal	Grass
Hilaria jamesii - Jame's galleta	6" x 6"	Full sun	minimal	Grass
Leymus triticoides - Creeping Wildrye	24" x 24"	Full sun	moderate	Grass
Sporobolus airoides - Alkali Scaton	36" x 18"	Full sun	minimal	Grass
Forbs:				
Oenothera spp. - Evening Primrose	48" x 24"	Full sun	moderate	Small yellow flowers
Melilotis officinalis - Yellow Sweet Clover	48" x 24"	Full sun	moderate	Small yellow flowers
Sphaeralcea coccinea - Globe Mallow	12" x 12"	Full sun	minimal	Orange flowers

Plant Palette - Great Basin Areas (cont.)

	Height x Width	Exposure to Sun	Water Requirement	Seasonal Interest
Salt Desert Shrub-Black Greasewood Sites				
Shrubs:				
Atriplex canescens - Fourwing Saltbush	5' x 5'	Sun to light shade	minimal	Yellow flowers
Atriplex lentiformis - Quail Bush	5' x 5'	Full sun	minimal	Yellow flowers
Chrysothamnus nauseosus - Rabbitbrush	2' x 3'	Full sun	minimal	Yellow flowers
Kochia prostrata - Kochia	3' x 3'	Sun to light shade	minimal	Gray-green foliage
Sarcobatus vermiculatus - Greasewood	3' x 3'	Full sun	minimal	Bright green foliage
Grasses:				
Agropyron elongatum - Tall Wheatgrass	36" x 18"	Full sun	minimal	Grass
Distichlis spicata - Salt Grass	6" x 6"	Full sun	minimal	Grass
Elymus elymoides - Squirreltail	18" x 12"	Full sun	minimal	Grass
Leymus cinereus - Great Basin Wildrye	36" x 24"	Full sun	moderate	Grass
Sporobolus airoides - Alkali Sacaton	36" x 18"	Full sun	minimal	Grass
Forbs:				
Melilotus officinalis - Yellow Sweet Clover	48" x 24"	Full sun	moderate	Small yellow flowers
Oenothera pallida - White Evening Primrose	48" x 24"	Full sun	moderate	Small white flowers
Sphaeralcea ambigua - Desert Globe Mallow	36" x 36"	Full sun	moderate	Orange flower color
Streamside Sites ***(use only in streamside conditions)***				
Trees and Shrubs:				
Alnus incana - White Alder	25' x 12'	Full sun to shade	moderate	Bright green
Alnus tenuifolia - Mountain Alder	25' x 15'	Full sun to shade	high	Greenish yellow catkins
Baccharis glutinosa - Water Willow	6'x 6'	Full sun	high	White flowers
Betula occidentalis - Water Birch	40' x 25x	Full sun	moderate	Copper bark
Cornus sericea - Red-Twigged Dogwood	15' x 15'	Full sun to shade	moderate	Red fall color
Populus freemontii - Fremont Cottonwood	60' x 30'	Full sun	moderate	Bright lemon yellow in fall
Populus tremuloides - Quaking Aspen	50' x 25'	Full sun	moderate	Golden yellow in fall
Populus trichocarpa - Black Cottonwood	75' x 30'	Full to part sun	moderate	Yellow fall color
Salix boothii - Willow	15' x 10'	Full sun	high	Narrow green leaves
Salix lasiolepsis - Lance-leaf Willow	8' x 6'	Full sun	high	Narrow green leaves
Salix lasiandra - Pacific Willow	40' x 25'	Full sun	high	Narrow green leaves
Sambucus coerulea - Blue Elderberry	7' x 10'	Sun to light shade	moderate	Creamy white flowers
Spirea densiflora - Spirea	2' x 3'	Sun to light shade	moderate	Pink flowers
Grasses:				
Agropyron riparium - Streambank Wheatgrass	36" x 24"	Full sun	moderate	Grass
Carex nebraskensis - Nebraska sedge	24" x 12"	Full sun	high	Grass
Poa palustris - Fowl Bluegrass	48" x 24"	Sun to light shade	moderate	Grass
Hordeum brachyantherum - Meadow Barley	24" x 12"	Full sun	moderate	Grass
Juncus balticus - Baltic Rush	48" x 24"	Full sun	high	Grass
Forbs:				
Aconitum columbianum - Columbian monkshood	5' x 3'	Sun to light shade	high	Bright blue flowers
Agastache urticifolia - Nettleleaf Giant Hyssop	18" x 6"	Sun to light shade	moderate	Blue Flowers
Geranium viscosissimum - Sticky Purple Geranium	24" x 12"	Sun to light shade	minimal	Small pinkish flowers
Mertensia longiflora - Small Bluebells	6" x 6"	Sun to light shade	moderate	Small purple flowers
Veratrum californicum - California False Hellebore	6' x 2'	Sun to light shade	high	Large flower spike
Wyethia mollis - Mule's Ear	2.5' x 2.5'	Sun to light shade	minimal	Orange flowers

Plant Palette - Forested/Pine Areas

	Height x Width	Exposure to Sun	Water Requirement	Seasonal Interest
Forested Pine/Fir Sites				
Trees:				
Pinus aristata - Bristlecone Pine	20' x 15'	Full sun	minimal	Evergreen
Pinus jeffreyi-Jeffrey Pine	90'x30'	Full Sun	moderate	Evergreen
Pinus contorta murrayana – Lodgepole Pine	80'x30'	Full Sun	moderate	Evergreen
Shrubs:				
Ceanothus velutinus - Snowbush	6'x6'	Full Sun	moderate	Glossy green leaves
Quercus vaccinifolia - Huckleberry Oak	2'x4'	Sun to light shade	moderate	Gray green leaves
Amelanchier alnifolia - Serviceberry	12'x6'	Full Sun	minimal	Bluish-purple fruit
Prunus melanocarpa - Chokecherry	20'x12'	Full Sun	moderate	Dark fruit
Ceanothus integerrimus - Whitehorn	8' x 8'	Sun to light shade	moderate	Semi-evergreen
Cercocarpus ledifolius - Mountain Mahogany	15'x10'	Sun to light shade	minimal	Narrow green leaves
Arctostaphylos patula - Manzanita	6' x 6'	Full sun	moderate	Evergreen, white flower
Ceanothus prostrates - Squaw Carpet	6"x8'	Sun to light shade	minimal	Glossy green leaves
Artemisia tridentata vaseyana – Mountain Big Sagebrush	1.5-6'x10'	Full sun	minimal	Aromatic, gray green
Purshia tridentata – Bitterbrush	4' x 6'	Full sun	minimal	White flowers sp/sum
Grasses:				
Bromus marginatus – California Brome	12"x12"	Full sun	minimal	Grass
Bromus intermis – Smooth Brome	12"x12"	Full sun	minimal	Grass
Festuca arundinacea – Tall Fescue	36"x18"	Full sun	moderate	Grass
Agropyron smithii – Western Wheatgrass	12"x12"	Full sun	minimal	Grass
Agropyron trichorophum - Pubescent wheatgrass	30"x12"	Full sun	low-moderate	Grass
Poa ampla – Sherman Big Bluegrass	30"x18"	Full sun	low-moderate	Grass
Forbs:				
Wyethia mollis – Wolly mules ears	1' x 1.5'	Sun to light shade	low-moderate	Flowers
Penstemon palmeri – Palmers Penstemon	6'x3'	Sun to light shade	minimal	Flowers
Lupinus alpestris – Mountain Lupine	1' to 3'x2'	Sun to light shade	minimal	Flowers
Aquilegia formosa – Columbine	1.5' to3'x2'	Sun to light shade	minimal	Flowers
Phacelia campanularia – California Bluebells	6" to 18"x1'	Sun to light shade	minimal	Flowers

(1) Native revegetation softscape types should be used to repair and restore roadsides along the majority of the highway.

ENHANCED NATIVE SOFTSCAPE TREATMENT

21.9 Apply enhanced native softscape along transition zones and as part of simple gateway treatments.

Enrich the native softscape palette with the enhanced native softscape type. The enhanced native softscape type is the second most commonly used plant palette throughout the corridor and should be utilized as shown in the landscape design segments. The enhanced native softscape type enriches the Great Basin and Sierra Nevada plant palettes with a mix of vertical heights and densities.

- Typical applications are specified for transition zones into communities as well as simple gateway treatments.
- A variety of native species are planted in moderately dense patterns to create this landscape.
- Enhanced native softscapes use the plant material of the native revegetation palette as a base and add a limited number of regionally adapted trees, shrubs, and other materials for diversity in form.
- Plants are placed in massings and at a closer proximity to one another than in the surrounding native landscape..

21.10 Carefully select enhanced native plant species.

In addition the plants listed in the native revegetation softscape type, the following list of plants comprise the enhanced native softscape type. Use these species to create plant communities with variations in plant height and width.

- Ensure the plant palette selected for the site complements existing vegetation in the surrounding landscape.
- Use existing vegetation as a cue to selecting appropriate plant species.
- Additional plants not listed above or adjacent may be included upon review and approval.

(1) *The enhanced native softscape type utilizes a combination of native and non-native plants to create a planting arrangement with varying heights and widths.*

Figure 13 - Enhanced Native Plant Palette

Plant Palette

	Height x Width	*Exposure to Sun*	*Water Requirement*	*Seasonal Interest*
Trees:				
Acer ginnala - Amur Maple	15' x 12'	Sun to light shade	moderate	Bright red fall color
Acer glabrum v. torreyi - Rocky Mountain Maple	15' x 15'	Light shade	moderate	Orange-red fall color
Acer grandidentatum - Wasatch Maple	30' x 30'	Full sun	moderate	Red/gold fall color
Celtis reticulata - Netleaf hackberry	30' x 30'	Full sun	low	na
Cupressus arizonica - Arizona Cypress	60' x 25'	Sun to light shade	moderate	Evergreen
Elaeagnus umbellate - Autumn Olive	14' x 14'	Full sun	moderate	Red globose fruits
Juniperus osteosperma - Utah Juniper	Shrub to 20'-30'	Full sun	minimal	Yellowish green foliage
** Pinus aristata* - Bristlecone Pine	20' x 15'	Full sun	minimal	Evergreen
Pinus edulis - Pinyon Pine	20' x 15'	Full sun	minimal	Evergreen
Pinus monophylla - Single-leaf Pinyon	50' x 25'	Full sun	minimal	Evergreen
Quercus gambelii - Gamble Oak	25' x 25'	Full sun	minimal	Red fall color
Rhus spp. - Sumac	15' x 15'	Full sun	minimal	Yellow to red fall color
Shrubs:				
Atriplex canescens - Fourwing Saltbush	6' x 6'	Sun to light shade	minimal	Narrow green leaves
Buddleia davidii - Butterfly Bush	10' x 8'	Full sun	moderate	Colorful flowers
Caragana pygmaea - Dwarf Peashrub	3' x 5'	Sun to light shade	moderate	Yellow flowers
Cytisus spp. - Broom	7' x 6'	Full sun	minimal	Bright yellow flower
Foresteria neomexicana - Desert Olive	8' x 12'	Full sun	minimal	Narrow green leaves
Kochia spp. - Kochia	6' x 6'	Full sun	minimal	Narrow green leaves
Perovskia spp. - Russian Sage	3' x 1.5'	Full sun	moderate	Lavendar spike flowers
Potentilla spp. - Cinquefoil	1.5' x 2'	Sun to light shade	minimal	Yellow flower
Rosa woodsii - Woods rose	3' x 5'	Sun to light shade	moderate	Light pink flower sp/sum
Rhus spp. - Skunkbush and Aromatic Sumac	6' x 8'	Sun to light shade	minimal	Yellow to red fall color
Sambucus spp. - Elderberry	7' x 10'	Sun to light shade	moderate	Creamy white flowers
Shepherdia argentea - Silver Buffaloberry	10' x 10'	Sun to light shade	moderate	Red fruit in winter
Shepherdia rotundifolia - Roundleaf Buffaloberry	15' x 10'	Sun to light shade	low	Evergreen
Spirea spp. - Spirea	varies	Sun to light shade	moderate	Pink flower
Forbs and Grasses:				
Achillea millefolium - Yarrow	3' x 2'	Sun to light shade	moderate	White flowers
Artemisia - Silver Mound	18" x 24"	Full sun	moderate	Silver-green foliage
Aster spp. - Daisy	18" x 24"	Full sun	moderate	Large colorful flowers
Coreopsis verticulata - Cut-Leaf Coreopsis	18" x 24"	Full sun	moderate	Yellow flower
Echinacea purpurea - Purple Coneflower	18" x 12"	Full sun	moderate	Large purple flowers
Eriogonum spp. - Sulphur Flower	12" x 36"	Full sun	minimal	Bright yellow flowers
Gaillardia grandiflora - Blanket Flower	24" x 12"	Full sun	moderate	Red and yellow flowers
Hesperaloe parviflora - Red Yucca	3' x 4'	Full sun	minimal	Pinkish-red flowers
Linum lewisii - Prairie Flax	12" x 12"	Full sun	minimal	Delicate blue flowers
Lupinus - Lupine	12" x 12"	Full sun	minimal	Brilliant flowering
Penstemon strictus - Strictus Bandera	28" x 18"	Sun to light shade	moderate	Small purplish flowers
Rudbeckia fulgida - Goldsturm Blackeyed Susan	18" x 24"	Full sun	moderate	Brilliant flowering color
Sedum spectibile 'Autumn Joy' - Sedum Autumn Joy	24" x 24"	Full sun	moderate	Pink flowers
Elymus cenereus - Ashy wildrye	24" x 18"	Full sun	low	Grass
Miscanthus sacchariflorus- Silver Banner Grass	6' x 4'	Full sun	moderate	Grass
Miscanthus sinensis - Japanese Silver Grass	3' x 4'	Full sun	moderate	Grass

** Note: Pinus aristata to be used only on forested pine or fir sites.*

REGIONALLY ADAPTED SOFTSCAPE TREATMENT

21.11 Apply regionally adapted softscape in urban areas and locations of high visibility.

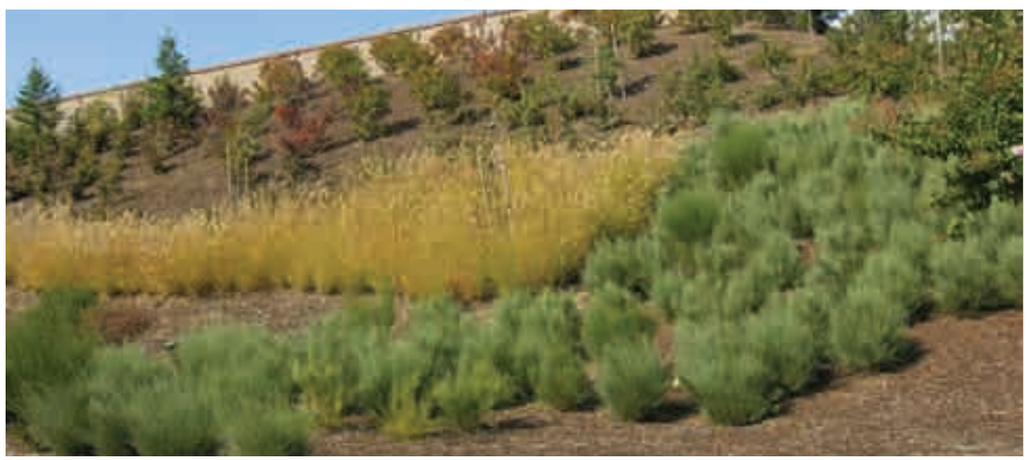
Use the regionally adapted softscape type where identified in each landscape design segment (refer to Chapter Two, Sections Two - Five). This softscape type utilizes the Great Basin and Sierra Nevada plant palettes along with other low-water use plants that are well adapted to local conditions.

- Typical applications includes welcome centers, gateways, rest areas, urban areas, and other high visibility locations.
- Plants are arranged in greater densities, forming over-story and under-story layers, to create a richness of color, texture, form, and seasonal change, enhancing the desert garden.

21.12 Carefully select regionally adapted plant species.

Use regionally adapted plant species. In addition to the plants listed in the native revegetation and enhanced native softscape types, the following list of plants should be used to comprise the regionally adapted softscape type.

- Use plant species to create plant communities with variations in plant height and spread.
- Additional plants not listed above or adjacent may be included upon review and approval.



(1) Regionally adapted aoftscape types should be used in areas where a highly visible landscape is desirable.

Figure 14 - Regionally Adapted Plant Palette

Plant Palette

	Height x Width	*Exposure to Sun*	*Water Requirement*	*Seasonal Interest*
Trees:				
Acer freemanii - Autumn Blaze Maple	40' x 30	Sun to part Shade	moderate	Grown for foliage
Acer ginnala - Amur Maple	15' x 12'	Sun to part shade	moderate	Red fall color
Cedrus atlantica 'Glauca' - Blue Atlas Cedar	40' x 40'	Full sun	minimal	Evergreen
Cedrus deodara - Deodor Cedar	70' x 30'	Sun to part shade	minimal	Evergreen
Celtis occidentalis - Hackberry	50'x 25	Sun to part shade	minimal	Green foliage
Fraxinus pennsylvanica 'Urbanite' - Urbanite Ash	70' x 35'	Sun to part shade	moderate	Yellow green
Koelreuteria paniculata - Golden Rain Tree	45' x 25'	Full sun	moderate	Yellow flowers
Picea pungens - Colorado Spruce	75' x 30	Sun to part shade	moderate	Evergreen
Pinus nigra - Austrian Pine	120' x 40'	Full sun	moderate	Evergreen
Pyrus calleryana - Ornamental Pear	50' x 25	Full sun	moderate	White flowers
Quercus macrocarpa - Bur Oak	100' x 60'	Sun to part shade	moderate	Fall color
Quercus rubra - Red Oak	100' x 60'	Sun to part shade	moderate	Fall color
Shrubs:				
Aronia melanocarpa- Chokeberry	4' x 4'	Full sun	minimal	Pink flowers
Buddleia daviddii - Butterfly Bush	7' x 7'	Full sun	moderate	Purple flower
Caryopteris spp. - Blue Mist Spirea	48" x 36"	Full sun	moderate	Purple flowers
Ceanothus cuneatus - Buckbrush	6' x 6'	Full sun	low	White flowers
Chamaebatiaria millefolium - Fernbush	5' x 5'	Full sun	minimal	Unique foliage
Cotinus coggygria - Smoke Tree	12' x 10'	Full sun	moderate	Pink flowers
Cotoneaster spp. - Cotoneaster	4' x 4'	Sun to light shade	moderate	White-pink flower
Cytisus spp. - Broom	7' x 6'	Full sun	minimal	Yellow flowers
Eriodictyon californica - Yerba santa	4' x 5'	Full sun	minimal	White flowers
Foresteria neomexicana - Desert Olive	8' x 12'	Full sun	minimal	Green foliage
Genista lydia - Lydia Broom	36"x 36"	Full sun	moderate	Bright Yellow
Juniperus spp. - Juniper	6' x 3'	Full sun	minimal	Evergreen
Mahonia aquifolium - Oregon Grape	8' x 4'	Sun to light shade	minimal	Green foliage
Mahonia repens - creeping mahonia	1' x 4'	Full sun	low	Evergreen
Potentilla spp. - Cinquefoil	2.5' x 2.5'	Sun to light shade	minimal	Yellow flowers
Prunus besseyi - Western Sand Cherry	3' x 3'	Full sun	moderate	White flowers
Prunus glandulosa - Pink Flowering Almond	3' x 3'	Sun to light shade	minimal	Green foliage
Spirea spp. - Spirea	4' x 4'	Sun to light shade	moderate	Showy flowers
Perovskia spp. - Russian Sage	6' x 6'	Full sun	moderate	Lavendar flowers
Shepherdia argentea - Silver Buffaloberry	15' x 12'	Sun to light shade	moderate	Silver foliage
Sumac spp. - Rhus	6' x 4'	Full sun	minimal	Red fall foliage
Forbs:				
Aurinia saxatilis - Basket of Gold	12" x 24"	Full sun	minimal	Groundcover
Cerastium tomentosum - Snow-In-Summer	6" x 12"	Full sun	minimal	White/near white
Coreopsis spp. - Coreopsis	24" x 24"	Full sun	moderate	Yellow
Echinacea purpurea - Purple Coneflower	18" x 18"	Full sun	moderate	Pinkish flowers
Hemerocallis spp. - Daylily	18 x 24"	Full sun	moderate	Various color
Knipfolia spp. - Red Hot Poker	24" x 24"	Full sun	minimal	Poker like flowers
Lavandula spp. - Lavender	18" x 18"	Full sun	moderate	Purple flower
Phlox subulata - Creeping Phlox	6" x 18"	Sun to light shade	moderate	Nice pink flowers
Zauschneria californica - California Fuchia	12" x 20"	Full sun	minimal	Red blooms
Campsis radicans - Trumpet Vine	24" x 24"	Full sun	minimal	Red blooms
Parthenocissus quinquefolia - Virginia Creeper	12" x 48"	Full sun	minimal	Fall color
Grasses:				
Calamagrostis acutiflora 'Karl Foerster' - Foerster's Feather Reed Grass	4' x 5'	Full sun	moderate	Grass
Erianthus ravennae - Ravenna Grass	7' x 4'	Full sun	moderate	Grass
Festuca spp. - Blue Fescue	12" x 12"	Full sun	moderate	Grass
Helictotrichon sempervirens - Blue Oat Grass	24" x 24"	Full sun	moderate	Grass
Panicum virgatum - Switch Grass	6' x 6'	Full sun	moderate	Grass
Stipa gigantea - Giant Feather Grass	7' x 6'	Sun to light shade	moderate	Grass

REGIONAL ORNAMENTAL SOFTSCAPE TREATMENT

21.13 Apply regional ornamental softscape type in areas of extremely high importance.

Use the regional ornamental softscape type to enhance culturally significant landmarks and features. The regional ornamental softscape type is the rarest treatment and should be used where identified in the landscape design segments (refer to Chapter Two, Sections Two - Five).

- It is typically used in areas of extreme high importance as part of place-making.
- This softscape type emphasizes the unique cultural elements of a particular urban environment.
- The use of non-native, ornamental plant species in this softscape type accentuates the composition possibilities inherent in form and color.
- Dynamic ornamental forms, colors, and textures enhance the native Great Basin and Sierra Nevada landscape in complementary patterns.

21.14 Carefully select regional ornamental plant species.

In addition to the plants listed in the native revegetation, enhanced native, and regionally adapted softscape types, the following list of plants comprise the regional ornamental softscape type.

- The species listed represent those plants with significant cultural value.
- Alternative plants that have the same form and characteristics, thereby evoking a similar cultural meaning, may be more desirable if the alternative plant is better suited to the environmental conditions, requires less maintenance, and is more drought-tolerant.
- Additional plants not listed above or adjacent may be included upon review and approval.

Figure 15 - Regional Ornamental Plant Palette

Plant Palette

	Height x Width	*Exposure to Sun*	*Water Requirement*	*Seasonal Interest*
Trees:				
Crataegus douglasii - Douglas hawthorn	25' x 12'	Full sun	moderate	Large thorns
Gleditsia triacanthos inermis - Honeylocust	60' x 40'	Sun to light shade	moderate	Unique branching
Picea pungens 'Glauca' - Colorado Blue Spruce	60' x 20'	Sun to light shade	moderate	Evergreen
Rhus spp. - Sumac	15' x 15'	Full sun	minimal	Bright red fall foliage
Robinia spp. - Locust	50' x 25'	Full sun	moderate	Yellowish-green
Sequoia gigantea - Giant Redwood	80'x 35'	Full sun	moderate	Evergreen
Sorbus aucuparia - Mountain ash	30' x 25'	Sun to light shade	moderate	Bright red fall color
Tilis tomentosa - Silver Linden	45' x 20'	Full sun	low	White flower
Shrubs:				
Forsythia spp. - Forsythia	6' x 4'	Full sun	moderate	Bright yellow flower
Hibiscus syriacus - Rose of Sharon	10' x 6'	Sun to light shade	moderate	Large flowers
Lonicera spp. - Honeysuckle	6' x 6'	Sun to light shade	moderate	Small flowers
Rosa spp. - Rose (native yellow climbing rose)	Varies	Full sun	moderate	Bright yellow flowers
Syringa spp. - Lilac	15' x 15'	Sun to light shade	moderate	Pink flowers
Viburnum spp. - Viburnum	8' x 8'	Sun to light shade	moderate	Bright red berries
Grasses, Forbs, and Perennials:				
Aster - Michaelmas Daisy	12" x 12"	Full sun	moderate	Long bloom time
Festuca spp. - Blue Fescue	12" x 12"	Full sun	moderate	Grass
Hemerocallis spp. - Daylily	24" x 18"	Full sun	moderate	Yellow flowers
Iris spp. - Iris, Tall Bearded	36" x 10"	Full sun	moderate	Large purple flowers
Leucanthemum x superbum - Shasta Daisy	24" x 12"	Sun to light shade	moderate	Long bloom time
Saccarum ravennae - Plume Grass	10' x 6'	Full sun	moderate	Grass

(1) *Regional ornamental softscape types utilize diverse plant palettes to create distinctive landscapes for areas that deserve unique treatment.*

22.0 WILDLIFE CROSSINGS AND PROTECTION

22.1 Engage appropriate agencies in the planning and design of wildlife crossings.

Engage Federal, State, and local agencies and wildlife professionals in the initial stages of planning and design through implementation of wildlife crossings.

- Coordinate information on historic migratory routes and daily wildlife movements to situate crossing structures in appropriate locations.
- Research information that tracks where wildlife-related automobile accidents have occurred, and explore designs to minimize these collisions.

22.2 Use ecologically-appropriate wildlife crossing structures that meet the needs of specific wildlife species in order to improve movement corridors and safety along the corridor.

Analyze wildlife behavioral traits so that designed crossing structures are effective in meeting the needs of all species that will use the structure.

- Specific design criteria varies with each species. Consider larger species, such as deer, and small species such as coyotes.
- Ensure structures complement the primary defense strategy for each wildlife species. For instance, animals such as deer, and elk depend on good visibility as a key defense mechanism.
- Use open-span bridges and culverts that are oriented perpendicular to the road in order to reduce the overall length and improve visibility. Proportionately increase the size of the underpass as the length increases.
- Restore vegetation leading up to wildlife crossings and provide cover to shield the entrance to each wildlife crossing from the road while maintaining clear visibility through the crossing.
- Within underpasses, incorporate naturally-occuring materials that exist in adjacent areas.
- Wildlife underpasses or overpasses combined with fencing have the highest documented rates of success for large and small animals. Most successful crossing structures are open-span bridges with sloping sidewalls (see illus. 1).
- Road underpasses may be constructed of concrete boxes, elliptical metal culverts, or open span bridges. Increased width and height of structures usually correlate with increased use by large mammals. Sizes range from 6.5 foot by 6.5 foot culverts for small animals, to an opening width of 40 feet by a height of 16 feet for larger animals. Use natural bottoms for all underpasses that also accommodate streams or drainage patterns. Determine the actual size, location, and type of structure on a site-by-site basis.
- Placement of underpasses in relation to an animal's habitat is crucial. The habitat within the crossing structure should also be enhanced to encourage wildlife use. Restore vegetation leading up to wildlife crossings and provide cover to shield the entrance to each wildlife crossing from the road while maintaining visibility through the crossing.
- Limit human use of the underpass structures when possible.

22.3 Use different types of fencing as appropriate for different animals.

- Recommended fencing for deer is an 8 foot high, variable-expanded metal mesh fence. Metal mesh fencing should be fastened to metal wire. Barbed wire is unacceptable. Fencing should occur on both sides of the road, and should extend to the underpass or overpass entrance.
- Incorporate breaks, known as jump-outs, in areas with continuous fencing to enable wildlife trapped within the road corridor to escape and return to habitat areas.

22.4 Develop a monitoring system for all major wildlife crossings to document crossing use and to collect data for similar projects.

Several studies in other states indicate that significant movement and migratory disruptions have occurred due to highway construction. Movement and behavior at crossings and other highway locations should be monitored to help improve success of these facilities as part of on-going interagency cooperative research.

22.5 Observation points and watchable wildlife opportunities for observing animal movement may be possible in the design of crossings.

Consideration should only be given when observation points are designed to not interfere with wildlife movement.

22.6 Retrofit existing highway facilities within the Lake of the Sky design segment to restore wildlife migration patterns.

Consider broad areas within the landscape where existing topography provides opportunities. Coordinate location with migration corridors.

22.7 Design wildlife crossing structures to blend with surrounding landscape.

Visually screened bridges and culverts recede into the landscape. Combine recreational trails and wildlife crossings as part of bridge and culvert crossings where feasible.

- Consider visual and scenic impacts of wildlife measures such as deer fencing in visually sensitve areas such as the Tahoe baisn.

***(1)** Wildlife crossing help to preserve critical habitat corridors.*

23.0 CONSTRUCTION PRACTICES

23.1 Clear the site only within the limits of construction.

Avoid the visual scars and plant disturbance from excessive site disturbance.

23.2 Protect important environmental, landscape, and cultural features.

Identify and protect all areas to be preserved prior to construction. These include trees, shrubs, landscape and cultural features, and environmentally sensitive areas.

- Fence areas where vegetation is to remain, and avoid disturbance and compaction of the ground.
- Maintain and enhance existing groundcover to ensure the area is left in a condition consistent with the surroundings.

23.3 Utilize Best Management Practices (BMPs) and appropriate short term stabilization measures to prevent erosion and sedimentation during construction.

Perform a site risk assessment prior to construction to determine the threat of introducing sediments and pollutants into nearby surface waters and drainage systems.

- Utilize short term BMPs to reduce sedimentation and pollutant runoff during construction.
- Consider site specificity, timing of execution, and application of man-made devices and/or vegetative or organic cover to stabilize banks during construction.
- Research alternatives to hard surface paving.
- Give preference to other sediment control devices including sediment basins, diversion earth forms, vegetative buffer areas, channel linings, energy dissipaters, seeding and mulching.

23.4 Carefully manage and dispose of waste material.

Asphalt millings inhibit slope revegetation, contaminates adjacent soils, and create a cluttered, unfinished appearance.

- Avoid placing disposed milled asphalt on highway shoulders.

23.5 Salvage and store topsoil and native plant materials.

After soil erosion and sediment control measures have been implemented and before grading work begins, remove and store topsoil for project reuse.

- Salvage areas should be designated on plans and staked on the site.
- Salvaged plant materials should be stored and maintained during construction, prior to replanting.
- Stripped topsoil in excess of the quantity required for the project should be stored at specified locations for future use.
- Topsoil of lesser quality can be blended with soil amendments to improve condition for final bedding.

23.6 Carefully consider location/reclamation of construction areas.

Construction staging areas, borrow pits, and other construction areas must be carefully located and returned to a condition that is equal to or better than original, and consistent with the Corridor Plan design guidelines.

(1) *Milled asphalt on highway shoulders detracts from the overall visual quality of the landscape.*

24.0 MAINTENANCE FACILITIES AND PRACTICES

24.1 Locate and screen maintenance staging areas in visually unobtrusive areas.

Maintenance staging areas should be adequately set back from the highway. Where possible, site facilities so they are screened from the highway by existing landforms.

- Screen maintenance areas, particularly stockpiles, borrow pits, and equipment, from the highway or from adjacent developed property.
- Consider security fencing, landscape, and architectural solutions.

Grading and drainage is the most important consideration in the site planning and design of a maintenance area in order to prevent any potential environmental damage from leachates in salt and gravel stockpiles. The NDOT *Best Management Practices Manual* outlines additional points for consideration when planning for maintenance staging areas including the following:

- Cover salt and sand piles to avoid watercourse and groundwater degradation.
- Provide space for equipment storage, vehicles, and supplies, as well as employee or visitor parking.
- Consider future expansion needs.

24.2 Coordinate with maintenance personnel when planning and designing maintenance areas.

Planning and design of maintenance areas requires close cooperation between designers and the personnel directly responsible for its use.

24.3 Consult BMPs and provide for efficient and effective maintenance of landscape and aesthetic treatments.

With few exceptions, new landscape and aesthetics projects are designed to be low maintenance. Refer to NDOT *Landscape and Aesthetics Maintenance Manual*. Provide areas where maintenance equipment can be conveniently located. Consider maintenance routines required for the design program, and identify areas that may need additional care or attention initially and/or as the project matures. NDOT maintenance practices include:

- Trash and debris removal.
- Surface finish maintenance (painting, patching, graffiti removal).
- Grading and earthwork.
- Ground treatment (raking, replacing mulch or decorative rock, reconfiguring drainage structures).
- Weed control.
- Plantings (interim, temporary, and permanent irrigation, trimming, pruning of shrubs and trees, manual weed control, fertilizing).
- Disease and pest management (including invasive species control).
- Repair and replacement of structural and electrical components, irrigation, signage, and lighting.

24.4 Create a visual design unity among all existing and new structures based on the design theme.

Ensure a visual design relationship exists among all highway structures. This includes coordinating materials, patterns, and color.

- Ensure structures can be readily patched or painted with matching colors. When paint or stain repair is made, make sure repairs cover the entire surface and extend to joints and logical edges.
- Use anti-graffiti treatment on detailed sculptural elements.
- District level maintenance teams should use the same color palette for all maintenance and repairs (refer to Color Palette guideline, page 3.23, for more information).
- If no logical edge or joint exists, feather edges of paint.

24.5 Avoid pruning or shearing plant material except as required to remove dead, damaged, or diseased plant part or to provide clear visibility for traffic conditions.

(1)*Landscapes require varying degrees of upkeep and should be designed with an understanding of the long-term maintenance implications.*

25.0 RECOMMENDATIONS FOR SUSTAINABLE HIGHWAY ENVIRONMENTS

25.1 Use three key principles in highway construction and natural resource management to create sustainable highway environment – avoid, minimize, and mitigate.

Concepts central to these principles include:

- Water conservation: efficiency, protection, and reuse.
- Construction materials selection: reduce, reuse, and recycle.
- Air quality protection.
- Energy efficiency: use renewable energy.
- Design innovation.

25.2 Techniques for creating sustainable highway environments.

- Develop systems to encourage sustainable highways. Develop performance standards, monitoring procedures, and promote coordination between environmental and transportation agencies.
- Preserve air quality. Use construction mitigation techniques to minimize dust from construction sites.
- Minimize energy consumption and incorporate alternative energy sources. Where possible, use solar powered electronic signs, low energy use lights (such as LED), and passive solar design.
- Use recycled materials for construction. When applicable, use reclaimed concrete and asphalt, scrap tires, plastics, steel slag, roofing shingles, coal fly ash, and composted municipal organic wastes.
- Reduce waste. Waste reduction concepts include right-of-way management, re-use of organic materials, water conservation, and selection of long-lived materials.

25.3 Utilize sustainable development principles in the design and construction of the highway corridor.

Sustainable design is a holistic philosophy that includes all aspects of function and construction operations including, but not limited to: energy use, air quality, material selection, energy generation, water conservation, heat and solid waste, habitat enhancement, and protection.

- Consider sustainability in both the design and construction of highway systems.
- Restore disturbed man-made and natural habitats.

(1) *Solar power provides a sustainable, renewable energy source in remote locations.*

(2) *Wind power generates a clean renewable energy source.*

(3) *Materials like this recycled plastic modular unit can be used in roadway construction.*