

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 recommended methods to meet the segment design objectives. These guidelines are not standards; however, they represent a vision for landscape and aesthetics across Nevada's highways.

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:

- Interpret the design themes of each landscape design segment
- Create visual unity among all highway structures and facilities
- Select finishes, color palettes, and surface patterns that are compatible with the surrounding landscape
- Incorporate 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:

- 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.
- 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 – provide direction for enhancement.
- 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 as 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) **Destiny of the West Guidelines**
Describe the vision, components, and management plan for the Destiny of the West design segment associated with Lake Mead, Hoover Dam, and Boulder City.
- 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), (2) The Design Guidelines have been divided into two major categories: those that are directed toward community-based enhancements and those related to highway facilities improvements.

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.

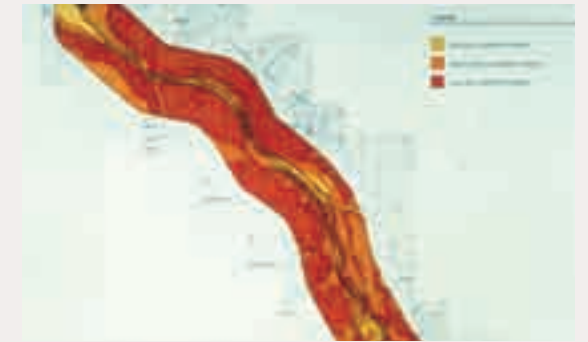
1.2 Understand the design segment theme and select design concepts that interpret the theme.

- 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 to analyze the site and surrounding landscape. Ensure the planning and design of the highway project respond 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, archaeological and cultural resources and categories, such as historical settlement, are important.

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



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



(2) Computer simulation of a planned highway at the conceptual phase of the project.



(3) Photo simulation of a highway project helps visualize the physical design.

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.

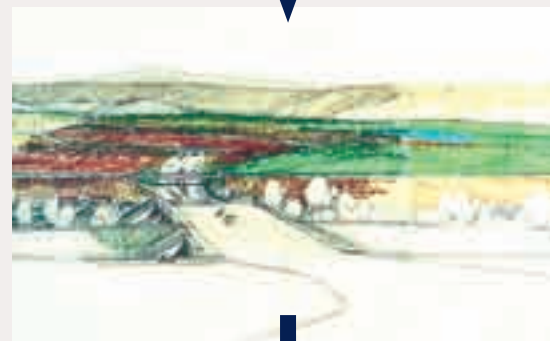
1.6 Consider landscape and aesthetics costs in conjunction with baseline costs.

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) Utilizing several different methods of design study and visualization results in an integrated and context sensitive solution.

SECTION TWO: Destiny of the West Design Guidelines

Guidelines described under the Destiny of the West Design Principles set the vision of highway aesthetics for roadways within and entering into the Boulder City/Hoover Dam area. These guidelines are in addition to the community and urban context and highway facilities guidelines described in sections three and four.

1.0 DESTINY OF THE WEST DESIGN PRINCIPLES

1.1 Create an environmentally sensitive highway that preserves the scenic quality of the Hoover Dam area.

The vision is organized around the idea that the road is an integral part of the landscape. As such, it should respond to and be respectful of the land and the spirit of place. The experience and importance of the highway should include the surrounding Eldorado and River Mountains, Lake Mead, Colorado River, Mojave Desert plants, wildlife, and residents of Boulder City. The road should serve as a model for highways, providing access to highly utilized recreation destinations while maintaining an elevated level of environmental sensitivity. An opportunity exists for the alignment, design, and construction of the Hoover Dam and Boulder City Bypass to follow these guidelines and serve as an example of context-sensitive highway design.

1.2 Utilize enhanced guidelines for nationally significant areas.

An elevated standard is applied to areas of national significance. Hoover Dam and its surrounding landscape represent an important piece of United States history and displays a very high level of scenic quality. Therefore, a foundational landscape type of accentuated hardscape with native revegetation softscape should exist for the Hoover Dam sub-segment, located within the Destiny of the West Landscape Design Segment. Features such as concrete barriers, retaining walls, and drainage elements



(1) Enhanced guidelines and treatment levels should be used to reinforce the cultural and natural significance of the Destiny of the West design segment.



(2) Much of the land adjacent to this corridor is owned by federal agencies. Partnerships are necessary to manage long-term scenic quality.



(3) The Hoover Dam's historic and national importance demands an accentuated level of treatment for all design.

should feature aesthetic treatments that respond to the landscape setting. Additional specific guidelines describing elevated treatments for this section of roadway are included within the individual guideline sections.

1.3 Design components of the Destiny of the West.

Due to the high level of tourism and recreation at the Hoover Dam, a coordinated system of rest areas and viewpoints should be established and linked by shared-use trails. The rest area should include a state welcome center that works in concert with the Hoover Dam interpretive facility and provides additional travel information for the state of Nevada. This system will establish specific areas for travelers to park and experience the scenic beauty of the area and help ease congestion resulting from roadside parking and sight-seeing.

A system of specific signage and interpretive elements can promote awareness of the historical importance and environmental aspects of this area. Welcome centers, rest areas, and scenic viewpoints provide an excellent venue for signage and information that enhances the visitor experience and understanding of the area.

Wildlife habitat corridors should be incorporated throughout the highway's design and retrofits should occur to increase connectivity.

1.4 Partner with existing federal agencies to create a consistent vision and manage the highway for long-term scenic quality.

US 93, near Hoover Dam, is not recommended for scenic byway designation because the majority of land adjacent to the roadway is under federal ownership. However, coordination with the federal agencies involved is critical to developing a comprehensive vision for the corridor. Individual management plans should be consulted to identify and address any conflicting ideas. Eventually, an overall management plan should be created through a team-based approach that clearly defines methods to protect and enhance the roadway's defining scenic and environmental qualities.



(1) The scenic quality of the Destiny of the West segment is especially valuable and should be presented to visitors through a coordinated system of rest areas and viewpoints.

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, thoroughly understanding 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, coordinate with community facilities, and use materials that are found throughout the town. Refer to Softscape and Hardscape Types and Treatments (pages 1.3-1.9) and Softscape Type Guidelines (pages 3.40-3.46), 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.
- 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) A thoughtful combination of hardscape and softscape elements will enhance community gateways.



(2) Artistic sculptural elements add a focal touch to community gateways.



(3) Entry monuments that can be recognized from a distance introduce travelers to upcoming communities.

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.

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.

- Where possible, utilize short blocks of up to 400 feet to encourage pedestrian activity in downtowns.

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

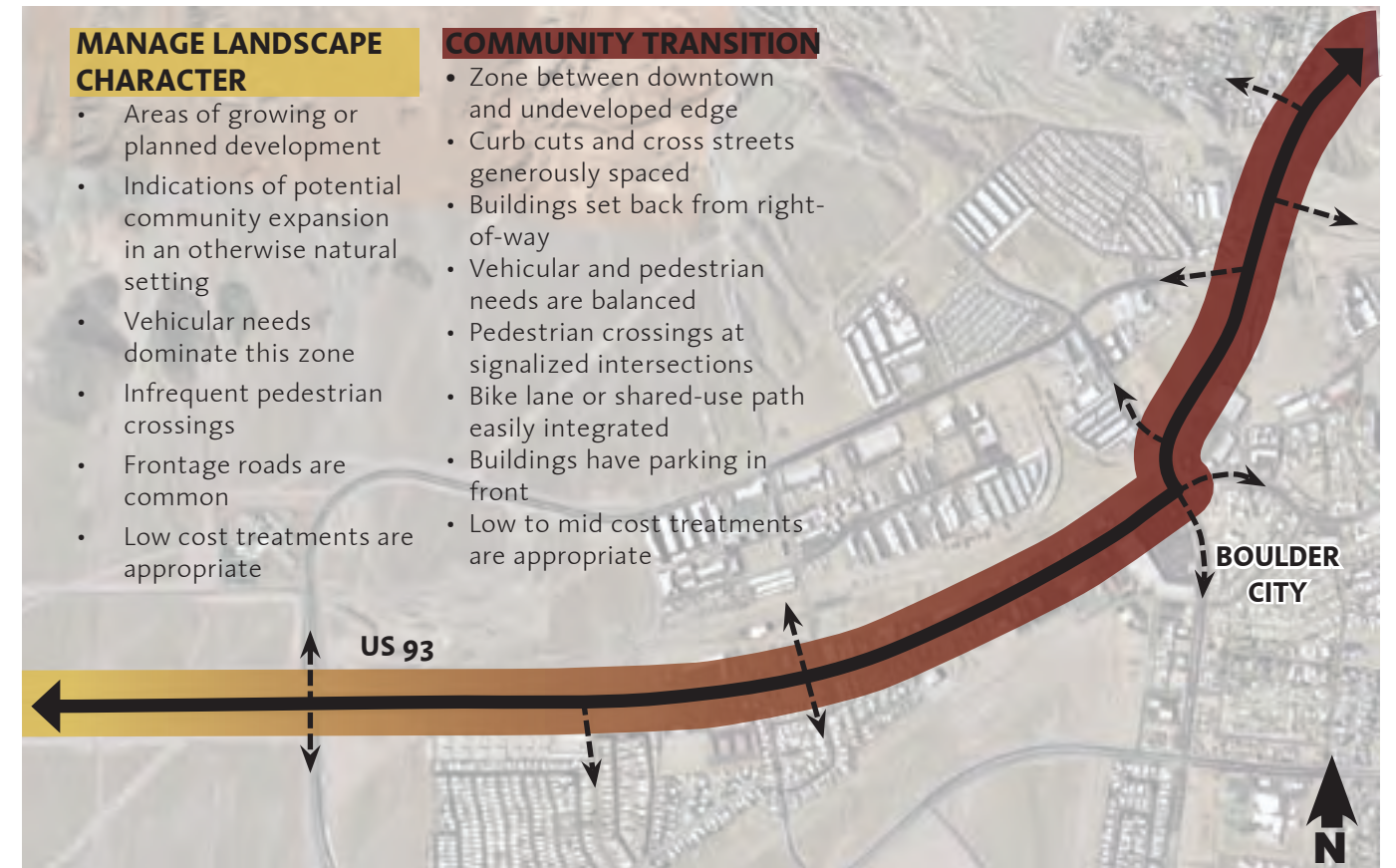
Truck traffic requires more space for turning movements and increases noise levels and fumes within the community. Wide streets discourage pedestrian activity and can harm the town's economic potential.

- 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 from high speed automobile travel to pedestrian-oriented main streets.



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

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.

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

- Street furnishings should be consistent with surrounding architectural styles and the overall landscape segment theme.
- Maintain a minimum five 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.

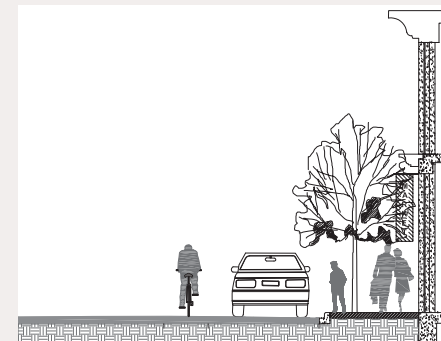
Sidewalk areas can be organized into two zones – the amenity zone and the pedestrian zone. The amenity zone is adjacent to the curb and should be a minimum of two feet, but preferably four feet or greater, depending on the sidewalk width.

- 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 eight feet between them, allowing passage from the sidewalk to the street.

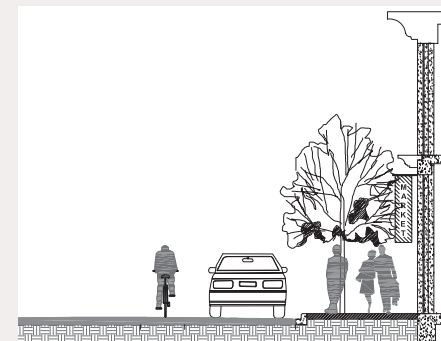
3.5 Provide pleasant seating opportunities along every block in the downtown area.

Seating is essential in a comfortable pedestrian environment.

- 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 maintenance agreements that are negotiated prior to construction.



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



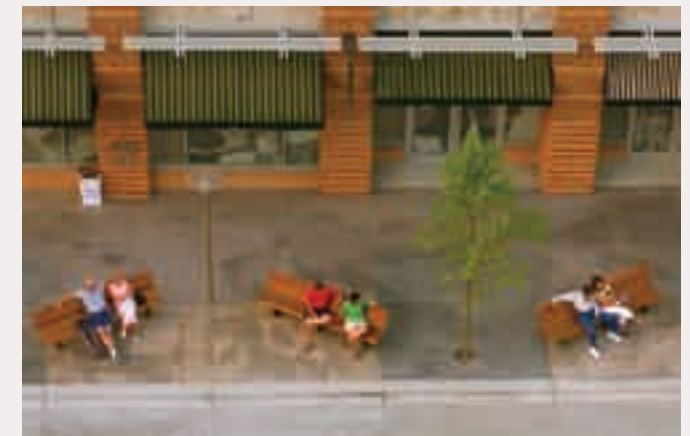
(2) Ten foot sidewalks provide enhanced user comfort and space.



(3) 12 foot sidewalks allow room for outdoor dining and sidewalk displays.



(4) 15 foot sidewalks create space for high levels of pedestrian activity.



(5) Wider sidewalks allow for a broad range of pedestrian amenities such as benches, lighting, and outdoor dining.



(6) Important road intersections and pedestrian crossings can be identified with stamped concrete or changes in paving material.



(7) Continuous sidewalks, street trees, and pedestrian amenities are part of a complete main street system that enhances community character and pedestrian safety.

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

Utilities should be consolidated to minimize poles and other sidewalk obstructions.

- 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).

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

- Locate bus pull-outs on the far-side location of intersections.
- Minimize conflicts between vehicles, passengers, pedestrians, and cyclists
- 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. 2).



(1), (2) Enhanced paving patterns set within a main street environment show community character and cue pedestrians toward safe circulation.

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
- 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 seven to eight feet.
- 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, 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 single pest or disease that could destroy an entire street tree planting.



(1) Low maintenance, drought-resistant plant materials are ideal selections for median and sidewalk plantings along this corridor.

- Downtown districts may be highlighted through a formalized street tree pattern.

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 (two feet minimum, three feet to four feet ideal). Trees may be placed between parking spaces to minimize damage.
- Allow for root aeration and potential water harvesting through the use of tree wells (four foot by four foot minimum, five foot by five 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 accessways. 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.

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.
- Baskets may be replaced with wreaths or other seasonal accents during dormant seasons.
- Moveable planters add flexibility to the streetscape design.
- 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 countless color combinations produced by annual plantings.
- Container design should be simple and understated.
- 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.



(1) This mixed line of street trees aids in wayfinding and provides much needed shade in the desert climate.



(2) The use of a continuous line of street trees in a downtown environment improves visual connectivity and place making.



(3) Strategically-located bike racks make alternative means of transportation more convenient.



(4) Tree grates protect trees from unwanted root compaction along street environments.

4.5 Buffer sidewalk 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.

- Where space is not required for widened sidewalks or on-street parking, provide planting strips (ideal five feet minimum width) or raised planters (see illus. 1).
- 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 three 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 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 rooting volume with increased porosity, nutrient-holding capacity, and drainage for a healthier environment for tree root growth.

- 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.



(1) Planting strips (five foot minimum width) provide aesthetic enhancement and increase pedestrian safety by buffering sidewalks from the roadway.



(2) Using a variety of species protects plantings from disease and creates a more visually interesting street quality.



(3) Moveable elements such as concrete planters and benches allow for flexibility within the sidewalk system.

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.
- Graphics can take the form of signs, banners, information kiosks, or pavement inscriptions or inlays.
- 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. 3).
- 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.
- 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 desirable within downtown areas and separate truck routes may be established. Vehicular and tourist traffic, however, is sought after.

- 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.
- 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), (2) Banners and signage can be used to advertise community events and amenities. These should be displayed in a consistent manner with lighting elements and directly incorporated onto light poles when possible.



(3) A wayfinding map placed at a highly visible downtown location can be an important device to guide tourists to local businesses.

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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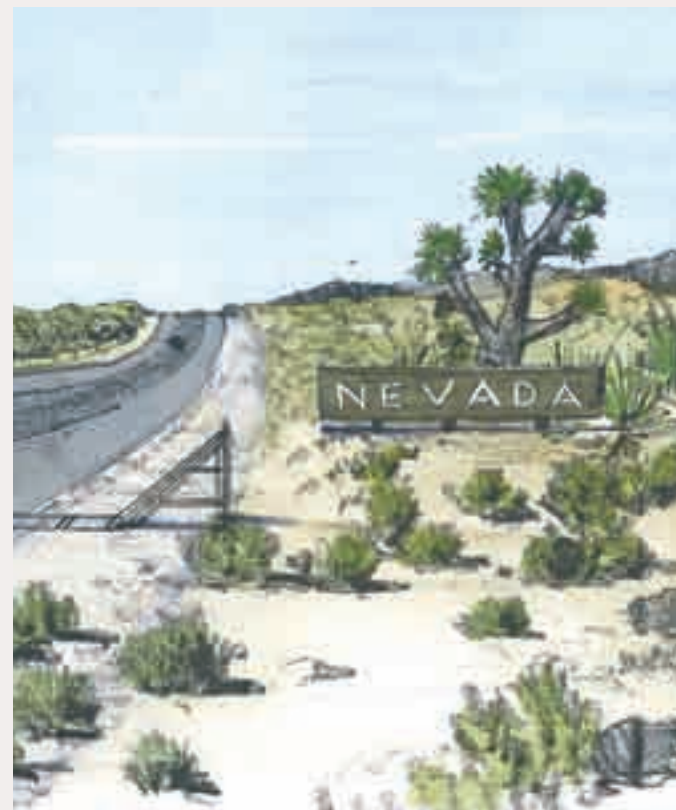
1.0 WELCOME CENTERS AND NON-INTERSTATE STATEWIDE GATEWAYS

1.1 Provide a vibrant, visually rich welcome center at Boulder City.

Promote and provide information about statewide travel opportunities and services. Promote the welcome center as an important civic facility, and ensure that it maintains a strong visual presence. The gateway welcome center should convey the identity of Nevada, ensuring that the entry experience is notable and memorable. Welcome centers should also signify departure from Nevada, leaving the traveler with a positive memory. Program components offered at centers include interpretation of time, history and the Mojave Desert landscape. Conduct a feasibility study to determine the appropriate location for the welcome center and potential partnerships for construction, operation, and maintenance.

1.2 Provide non-interstate statewide gateway features crafted from the land and place where US 95 enters Nevada from California.

Use local materials and vernacular forms in combinations that subtly reinforce the character of the local landscape. Non-interstate gateway features should be understated and relate to the scale of the road. Each statewide gateway feature shall include the Nevada name and state seal, feature stone material from local sources, and use planting types identified in the landscape design segment.



(1) The gateway at the California-Nevada border along US 95 should consist of simple design elements.



(2) Use of existing materials and patterns in statewide gateways accentuate connection to place and history.



(3) Welcome centers should present local culture, materials, and architecture in a dramatic fashion to communicate the region's identity and attract visitors.

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 2.17, 2.18, 2.27, 2.36) 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 the highway.
- Locate truck parking so as to not 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.

- 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 with 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 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:

- Eldorado Valley (US 95)
- Hoover Dam (US 93)
- Railroad Pass (US 95)
- Kyle Canyon (US 95)
- Lee Canyon (US 95)
- Indian Springs (US 95)



(1) Using architecture to frame scenic views helps connect visitors to the larger landscape.



(2) Viewpoints should be placed at key viewing areas, and built with materials and forms reflective of their surroundings.



(3) Road service facilities that use local materials and color palettes blend into the landscape and maintain the unique character of the place.

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.)	<ul style="list-style-type: none"> • Native plant revegetation to enhanced native landscape types • Standard hardscape type 	<ul style="list-style-type: none"> • 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 interest 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.	<ul style="list-style-type: none"> • Native plant revegetation to enhanced native landscape types • Standard to accentuated hardscape types 	<ul style="list-style-type: none"> • 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 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.	<ul style="list-style-type: none"> • Enhanced native landscape type • Standard to accentuated hardscape types 	<ul style="list-style-type: none"> • 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.	<ul style="list-style-type: none"> • Regionally adapted landscape type • Focal hardscape type 	<ul style="list-style-type: none"> • 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.	<ul style="list-style-type: none"> • Regionally adapted landscape type • Landmark hardscape type 	<p>Program elements are consistent with the type of Road Service Area provided.</p> <p>Specific elements include:</p> <ul style="list-style-type: none"> • 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.	<ul style="list-style-type: none"> • Regionally adapted landscape type • Landmark hardscape type 	<ul style="list-style-type: none"> • 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

- 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.

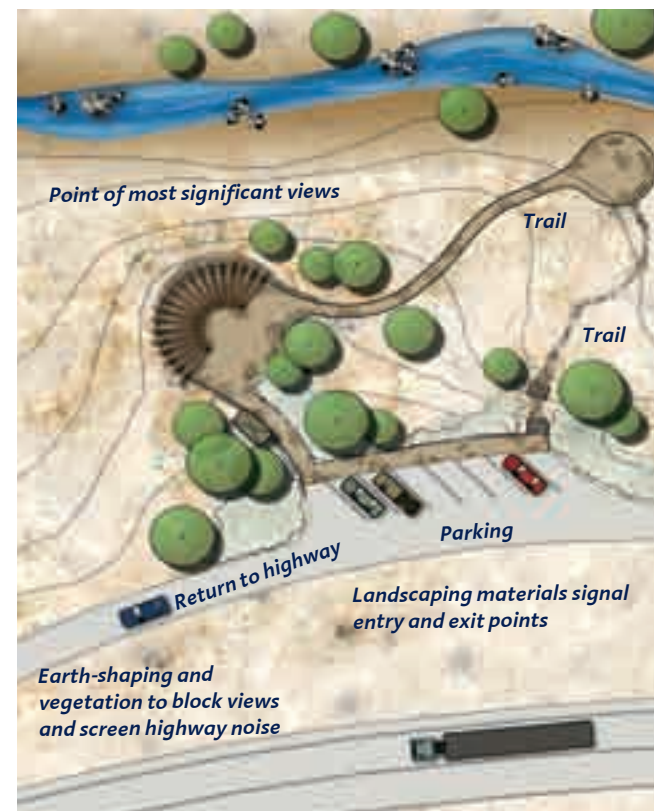
Coordinate locations of rest areas with regional trail systems.

- 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.

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



(1) Prototypical viewpoint / point of interest.



(2) Connections to regional trail systems can be incorporated at recreational gateways, viewpoints, and rest areas.



(3) Self-weathering materials should be used for architectural elements at rest areas and viewpoints.



(4) Local materials and colors can be used to integrate parking areas into the natural setting.



(5) Shade structures should be designed to disappear in their surroundings.



(6) Interpretive signage included along trails inform travelers about their surroundings.



(7) Viewpoints that are elevated from the ground can be used to attract visitors.

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.

- Incorporate art in the design process as a means of interpreting the corridor's theme
- Integrate art as part of the functional aspect 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 a level of complexity and interest appropriate 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 forced. 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.

- Consider views to the surrounding landscape.
- 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) Transportation art should be as interesting when seen from a distance as it is in close proximity.



(2) Street elements can be designed as artful objects.



(3) Transportation art can be designed as a part of all highway elements including bridges, walls, and drainage basins.

3.5 Ensure transportation art supports the Landscape Design Segment themes.

Transportation art is not a typical 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:

Mountain Desert Vista

- Subtle gateway marking the arrival to Nevada
- Travel
- Mojave Desert landscape and wildlife features
- Outdoor recreation
- Native American heritage
- Mining
- Mountain views
- Geology

Destiny of the West

- Subtle gateway marking the arrival to Nevada
- Travel / tourism
- Hoover Dam
- Outdoor recreation
- Lake Mead National Recreation Area
- Colorado River
- Hydroelectric power

Mojave Desert Vista

- Threshold/gateway; arrival to Las Vegas
- Travel / tourism
- Outdoor recreation
- Mojave Desert landscape and wildlife features

- Native American heritage
- Mining
- Death Valley Historic Trail
- Mountain views
- Geology
- Nevada Test Site
- Yucca Mountain
- Desert National Wildlife Refuge
- Humboldt-Toiyabe National Forest

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*.



(1) Murals can be used in downtown environments to tell the cultural and natural history of a community.



(2) Decorative imprint motifs can be created with a custom form liner and used to decorate walls.



(3) Cultural symbols sandblasted into stone describe aspects of the historic emigrant traveler.

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 1.14-1.15) for more information about billboards along the corridor.

4.2 Implement a statewide Place Name Sign Program.

A comprehensive place name signage program should be implemented through partnership initiatives with local communities and agencies. The program and sign types are described on page 1.10-1.11. Areas of interest within the design segments that could be highlighted include:

- Historic features: Searchlight mining shaft, Boulder City historic district, Clark County Heritage Museum, Boulder Dam Hotel, Floyd Lamb State Park
- Wildlife and natural areas: Lake Mead National Recreation Area, Desert National Wildlife Refuge, Mojave Desert, Cottonwood Cove, Colorado River, Corn Creek, Red Rock Canyon National Conservation Area
- Geographic features: Christmas Tree Pass, Spirit Mountain, McCullough Mountain, Black Mountain, Black Canyon
- Cultural/recreational resources: Fort Mojave Indian Reservation, Las Vegas Paiute Indian Reservation, Lake Mead National Recreation Area

4.3 Create a family of iconic symbols to represent features.

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

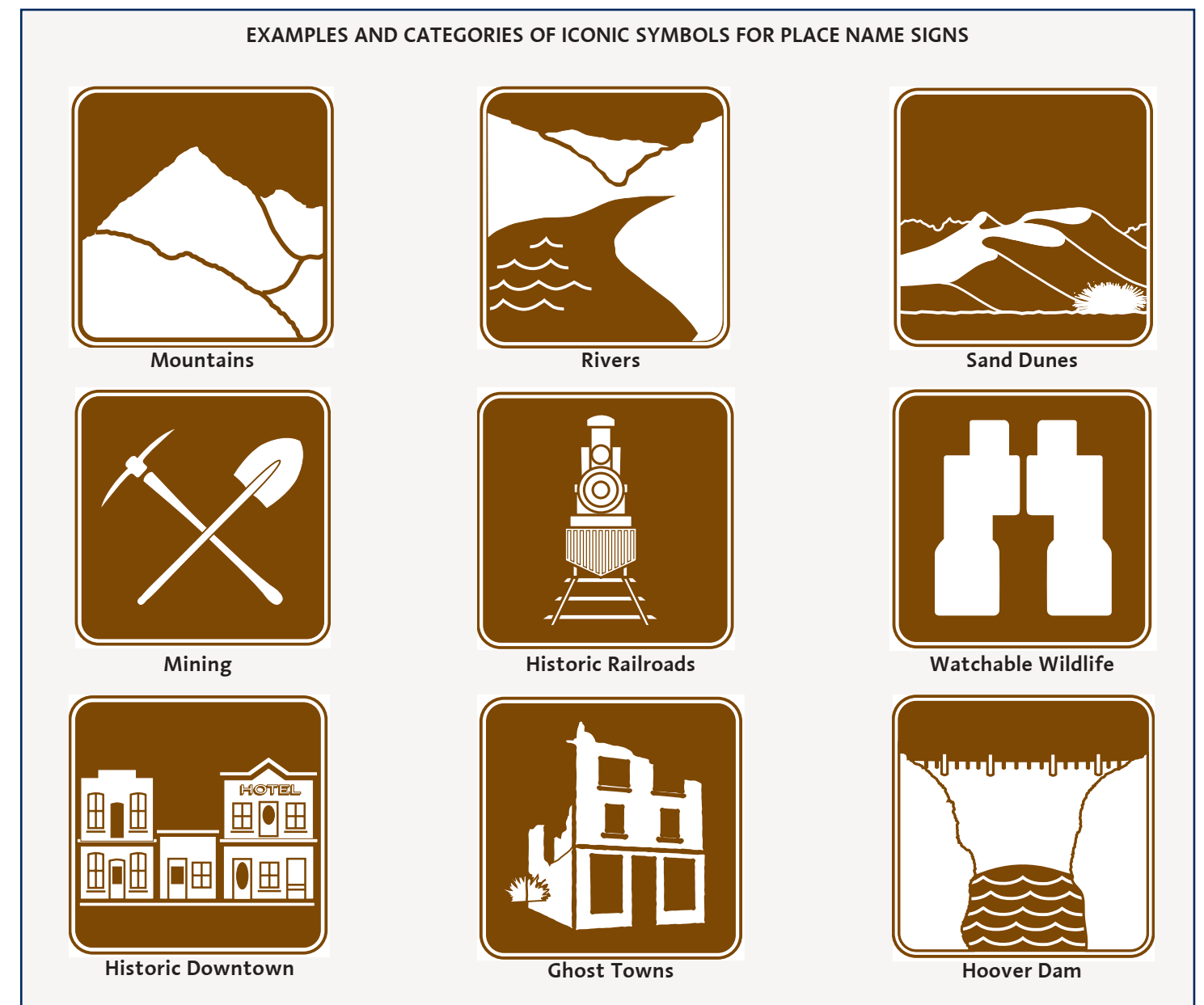
- Signage should depict the general physical shape of the point of interest.
- Establish icons to represent general categories of interest within the Nevada landscape. Illustration 1 shows examples of symbols to represent the categories. Additional symbols should be developed to represent Nevada landmarks/historic points, emigrant trails, 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, State Parks, 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 names and labels 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.

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 so 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 information architecture to allow messages to be updated in real time and be coordinated with AMBER alert and 511 traveler information messages.



(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 the resources.

- 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.

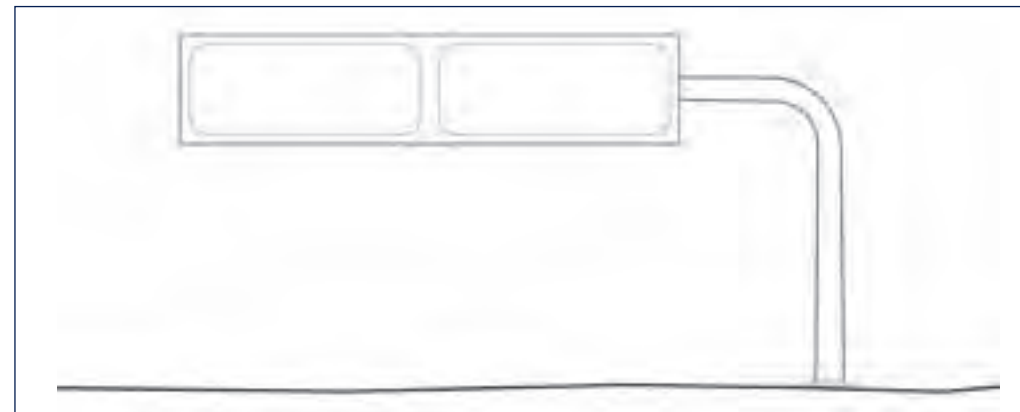
4.7 Incorporate the anti-littering campaign.

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

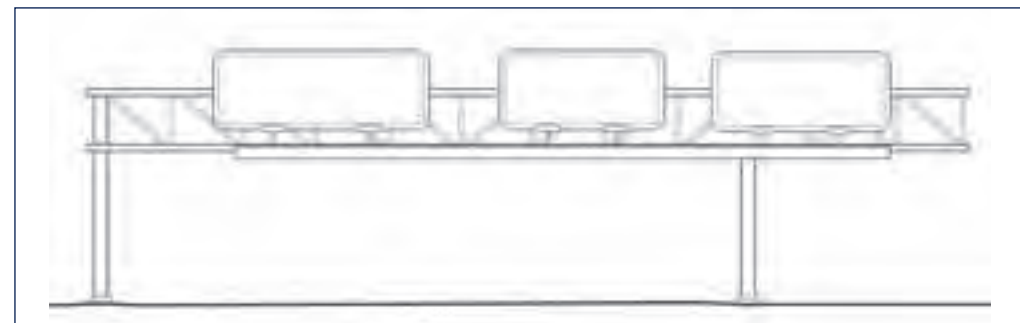
- Work with local vendors to place the anti-littering messages on disposable cups, plates, and other items likely to be tossed out the vehicle window.
- Along non-interstate roadways, utilize pole signage anti-littering signs.
- Develop signage that engages Nevada residents and encourages active participation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



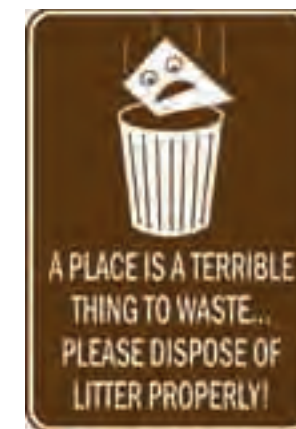
(9) Single arm monotube with one signage board clarifies appearance of information.



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



(9) As part of the anti-litter campaign, highway graphics and signage will be posted along the highway where trash accumulation is the most significant.



(3), (4), (5) Examples of proposed anti-littering signage.



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

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 Southern US 95 and US 93 Corridor have been selected. To ensure accurate color reference, the colors are matched to the Dunn Edwards system, and are shown on the right.

- 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 different accent colors should be used per site.
- Ensure roadway structures within a single landscape design segment use 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.

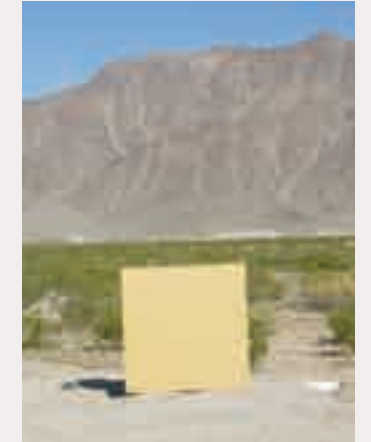
5.4 Blend new rock cuts and/or soil with the surrounding landscape.

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.



(2),(3) Potential color palette choices were tested on site along the corridor to identify colors that best complement the landscape.

BASE COLORS		ACCENT COLORS	
	Mountain Desert Vista #DE 6074		#DE 6027
	Destiny of the West #DE 6047		#DE 6089
	Mojave Desert Vista #DEC 717		#DE 5325
	Hoover Dam Structures #DE 6214		#DE 6013
			#DE 5978
			#DE 5914
			#DEC 777
			#DE 5537

(4) The proposed color palette refers to the Dunn Edwards paint system. For reference purposes only.

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 six inches in height in downtown areas.

Curbs define the edge of the highway and delineate the pedestrian zones within communities. Curbs greater than six 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.

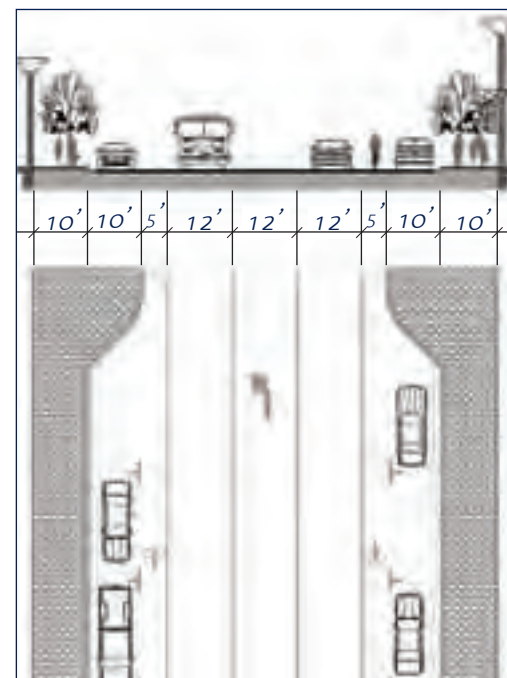
- Use curb extensions to enhance the visibility of pedestrians crossing the street
- Angled parking should only be used in areas of very low travel speeds.
- Provide a bike lane between parking and travel lanes to create a buffer.
- When bike lanes are not incorporated, consider using a wider outside 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.

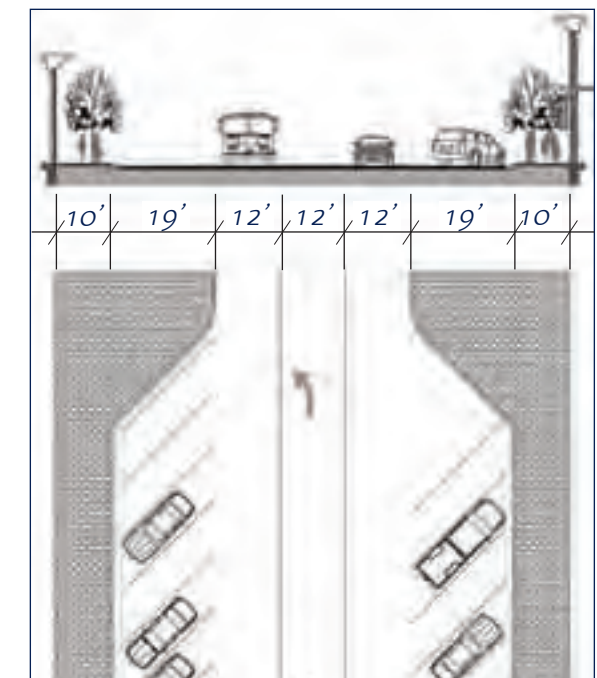
- Landscape treatments within a roundabout should express the segment theme and community vision.
- Sensitive site transportation art and plantings.
- Treatments should complement and coordinate with the surrounding environment and landscape features and be part of an integrated design approach.



(1) Street elements such as on-street parking, bollards, landscaping, and bulb-outs delineate distinct zones for automobiles and pedestrians and provide visual cues to slow down.



(2) Parallel parking can be incorporated in relatively narrow right-of-way areas and helps delineate traffic and pedestrian zones.



(3) Angled parking can generate more parking spaces than parallel parking but requires more right-of-way distance and very low travel speeds.

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.

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.

- Avoid using asphalt paving in medians. Stamped, colored concrete or pavers should be used in narrow medians (less than five feet wide). Paving score patterns should be simple and coordinate with surrounding architecture and pedestrian areas. Colored concrete should be the segment's base color (see Color Palette guidelines, 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 five 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/sub-base 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 because they allow 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, 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.

- 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), (2) Medians should be designed to accommodate stormwater runoff where possible and be planted with low maintenance, drought-resistant plant materials.

8.0 PEDESTRIAN CROSSINGS

8.1 Improve pedestrian safety at crossings.

Motorists can see striped crosswalks from a greater distance.

- Utilize a zebra striping pattern for painted crosswalks (see illus. 1).
- 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.

- 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. They can 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 be in line with the crosswalk and 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 signs, 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.

- 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.

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



(1) Pedestrian crossings should be visually highlighted with zebra striping or changes in paving type.



(2) Refuge islands provide a safe place for pedestrians to wait while crossing high traffic areas.



(3) Contrasts in paving color and texture indicate to motorists that they are approaching a pedestrian crossing.

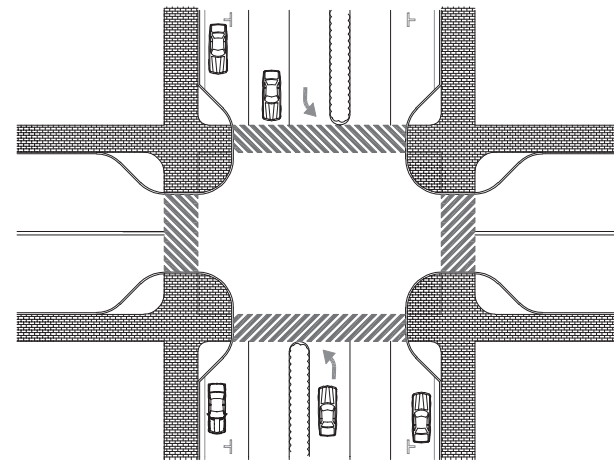


(4) Crossings with focal paving patterns provide detail that is visually appealing to pedestrians and signifies that the road was created with their safety in mind.

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.



(1) Consider the use of curb extensions in highly utilized pedestrian areas in order to provide pedestrian amenities and reduced crossing distances.

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.

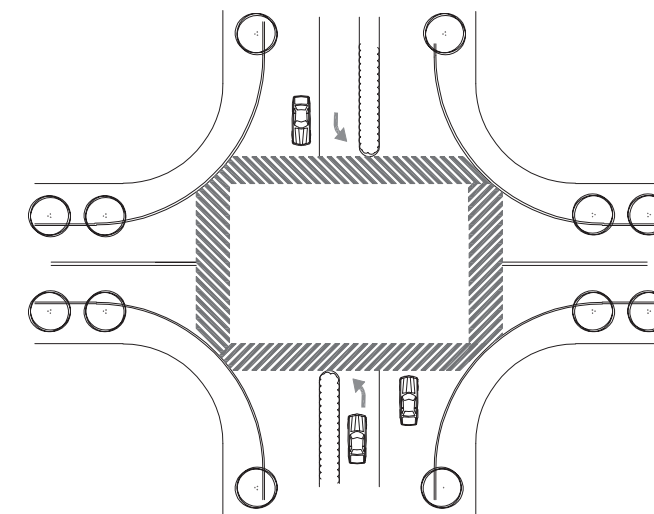
- Reduce corner radii where feasible to shorten and align pedestrian crossings while reducing vehicle turning speed.
- Reduce the use of slip lanes (channelization) where possible to minimize pedestrian/vehicular conflicts.



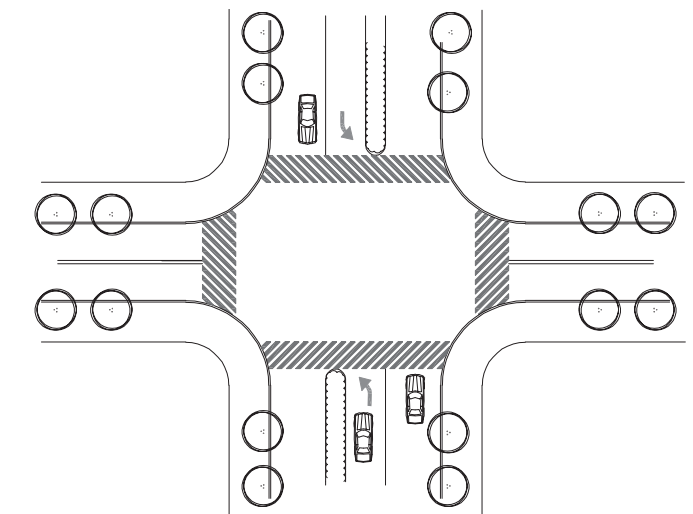
(2) Streetscape elements help define pedestrian gathering places and safe crossing zones.



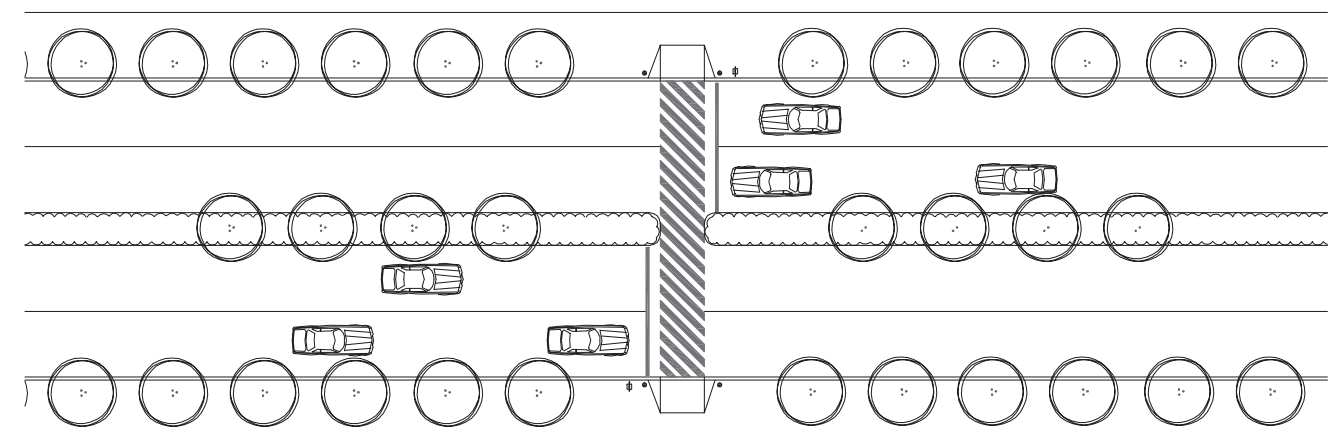
(3) Pedestrian crossings at roundabouts require additional identification through striping and paving changes due to the unique geometry of these intersections.



(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. Motorists are better able to see pedestrians and make quick stops.



(6) 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.
- Utilize transportation art consistent with the segment theme.

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.

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.
- 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) Regional multi-modal trail systems should be integrated into the highway right-of-way wherever possible.



(2) Native materials should be used for all trail system hardscape and softscape treatments.

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.
- Large amounts of slope paving should be avoided.
- 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.

- 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.

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.

- 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.

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.

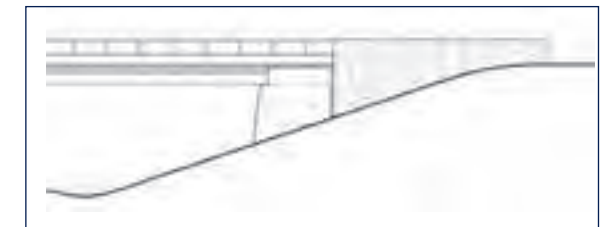
- Ensure mulch materials match bridge structure color and the surrounding landscape (see Color Palette guideline for appropriate color selection, page 3.23).
- Use rock mulches, stone rip-rap, or decorative slope paving (minimally) to stabilize abutments below the bridge.
- When slope paving is used,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



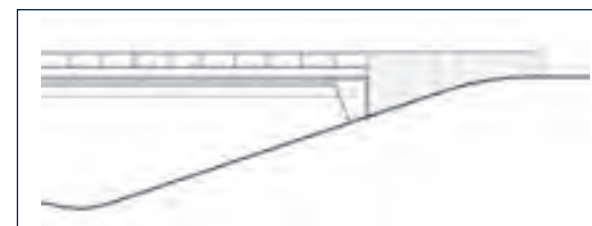
(1) Integrate simple bridge design into the embankment and add landscape planting.



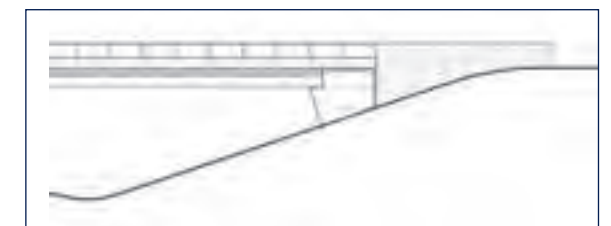
(2) Consider bridges with retaining wall abutments and 3:1 slopes.



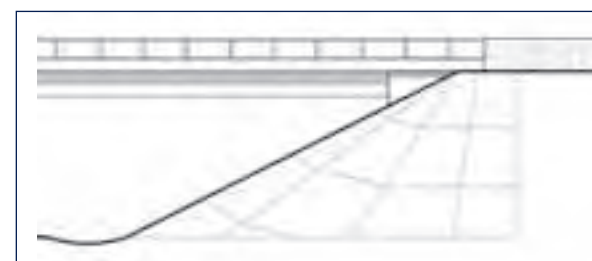
(3) Consider using a battered abutment.



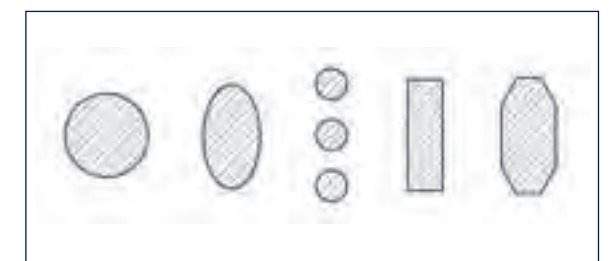
(4) Avoid weak proportions in bridges with shallow or undersized abutments.



(5) Avoid characteristic shapes that do not allow the structure to be visually supported.



(6) Avoid 2:1 slopes as the primary bridge abutment and the need for slope paving.



(7) Consider simple geometric shapes to minimize the profile of bridge supports.

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.
- 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 1 1.5, page 3.33,

illus. 7). 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.

- 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.

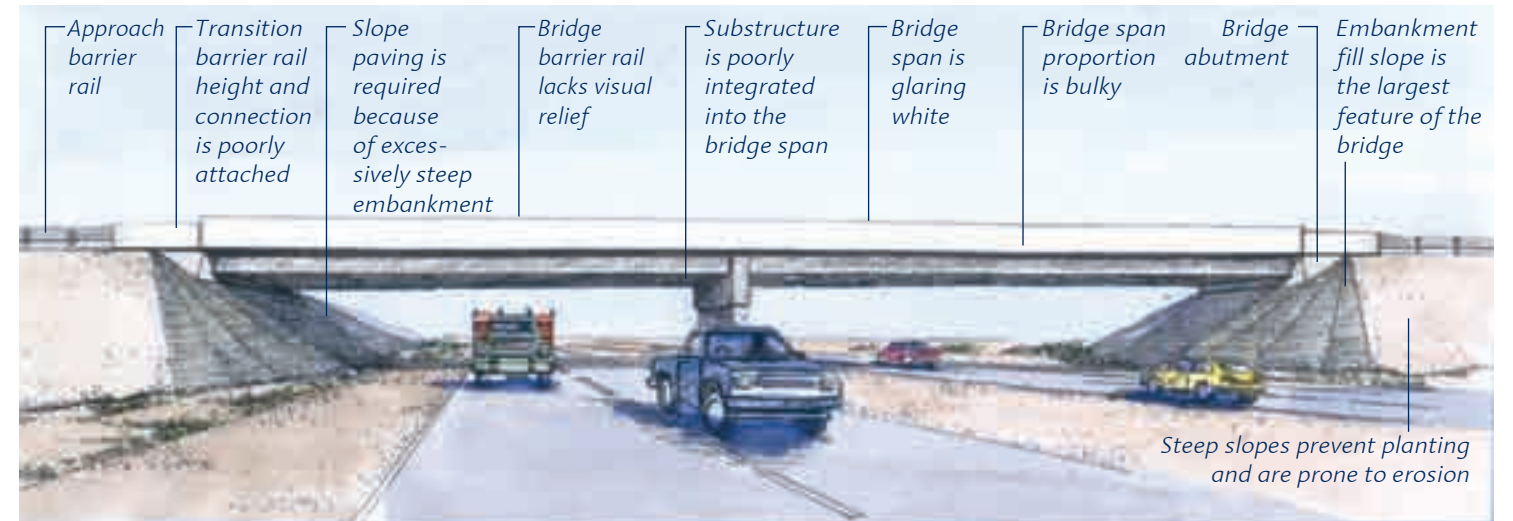
Bridges are gateway features to cities and communities.

- 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.

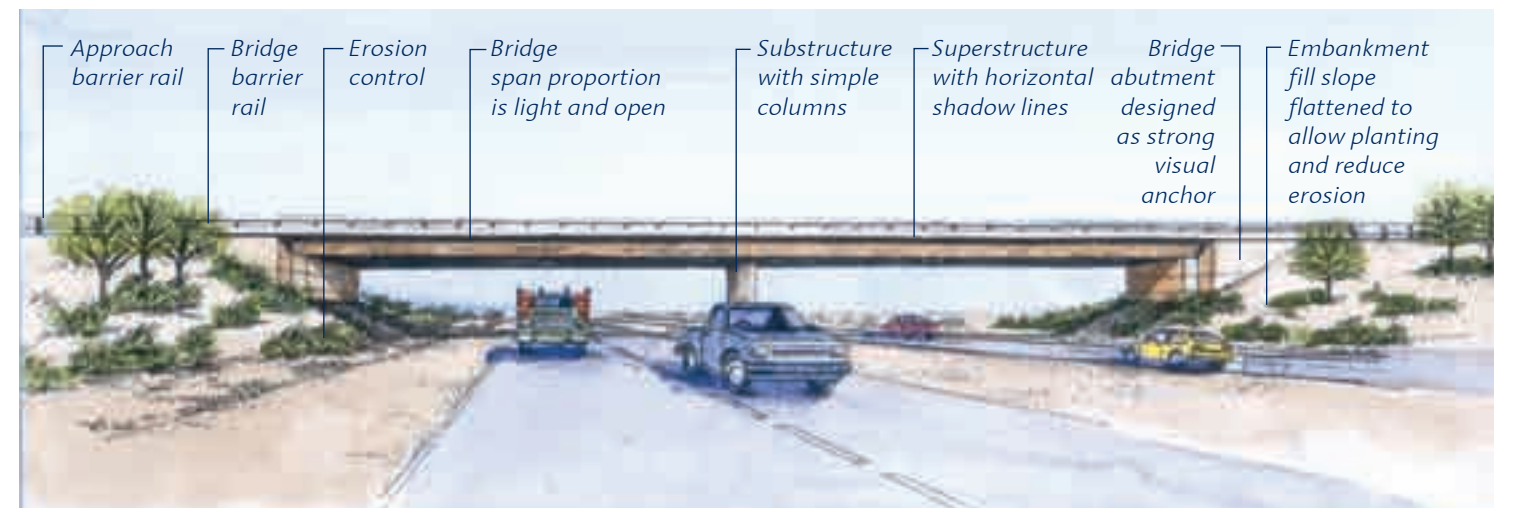
10.11 Provide direct connections from bypasses back to the community core.

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

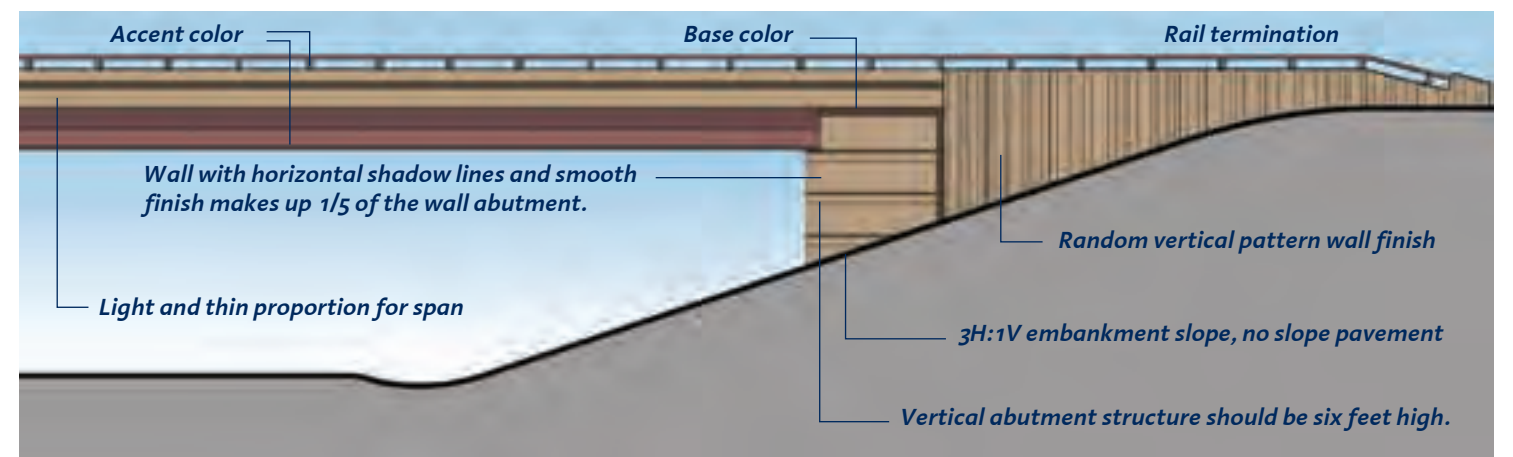
- Increasing density of landscape and architectural elements heightens the sense of arrival into community centers.



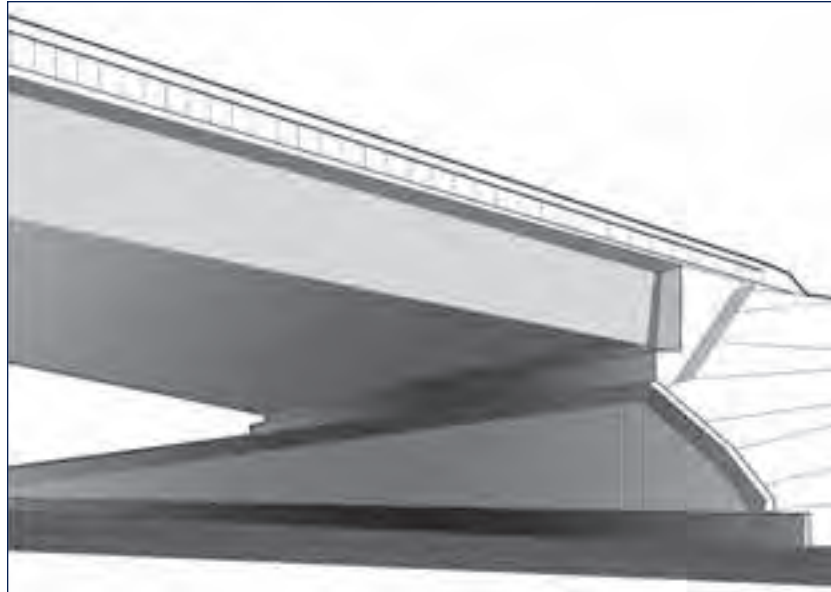
(1) Avoid components and proportions lacking visual appeal.



(2) Consider the recommended landscape and aesthetic treatments and guidelines to improve the appearance of bridges.



(3) A combination of preferred bridge design elements will result in a more visually attractive structure.



(1) Avoid bridge structure design that creates walls parallel to the travel lane. Utilize graded slope and abutments.



(2) Bridge design can integrate retaining walls and terraces to minimize steep slopes and create areas for landscape planting.



(3) Symmetry and correct proportions significantly enhance the visual appeal of structures. The bridge color selection emulates the natural colors of the landscape so as not to distract from the view of the horizon.



(4) Special bridge design elements such as native stone, color treatments, and cable systems can be used to create a focal feature.

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, 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 ten feet.
- Use natural barriers and earth forming 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 facades.
- 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 5.
- 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.
- 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.
- 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.

- Avoid abruptly ending noise walls. Use a wall return of three 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.
- Use appropriate ornamentation to break up the surface of long, uninterrupted spans.



(1) Rusticated variable vertical pattering adds visual interest.



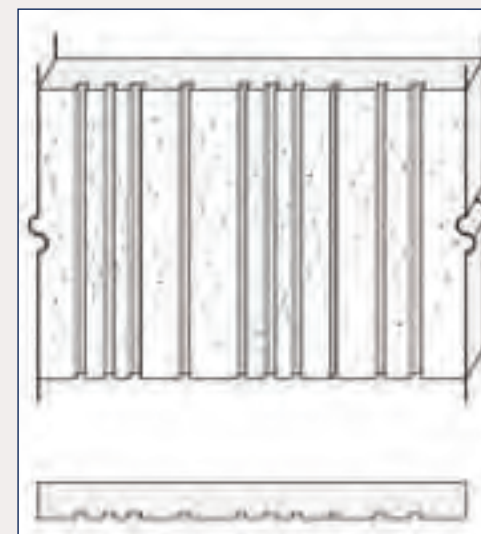
(2) Retaining and noise walls should be separated from concrete barriers and other structures to allow space for landscape planting.



(3) Form liners can be used to produce details in wall patterns.



(4) Form-lined concrete and decorative railings can be used to create a desert visual design theme.



(5) The required prototypical surface pattern is rusticated variable vertical ribbing. Dimensions vary between two to eight inches apart.



(6) Landform and plant materials can be used to buffer road noise from adjacent land uses.

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 areas flanked by walls will need to freely drain.

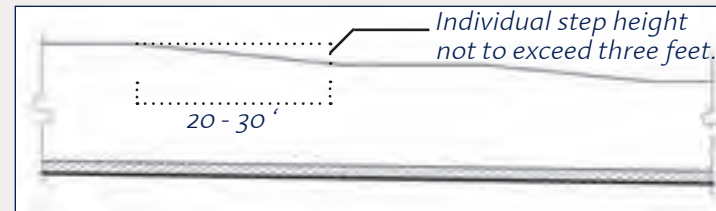
11.6 Encourage noise-compatible land uses adjacent to highway corridors.

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

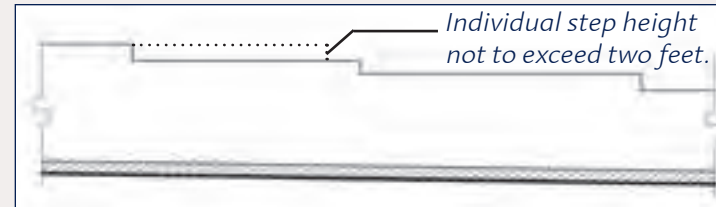
- Noise sensitive facilities (schools, churches, etc.) require sound abatement strategies.
- Coordination at the planning stages is critical to avoid conflicts.

11.7 Retrofit noise walls that do not meet recommended requirements.

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



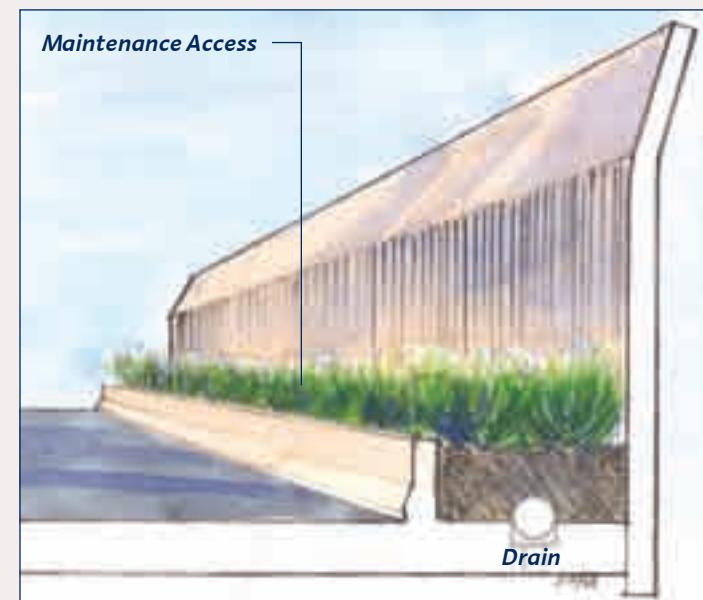
(1) Consider - Tapered Transition: Allowed transition for noise wall grade changes of less than three feet.



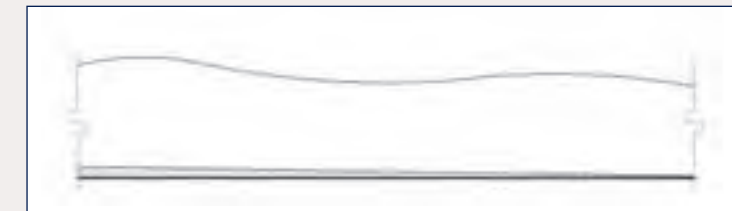
(3) Consider - Stepped transition: Allowed transition for noise wall grade changes between eight inches and two feet.



(5) Avoid - Angular wall top: Not allowed for top of noise walls.



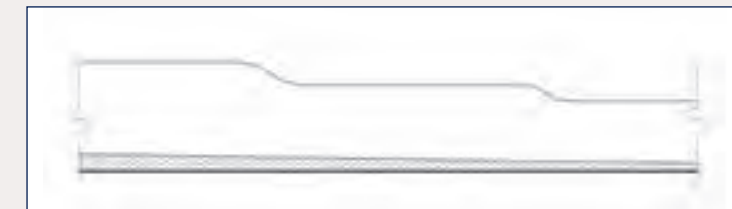
(7) Walls approaching bridges can be adapted with a setback and planting strip. A flare of the upper one-quarter of the wall further prevents an enclosed, narrow passage. Design flared walls so they do not become top-heavy and cause hazards to pedestrians and motorists.



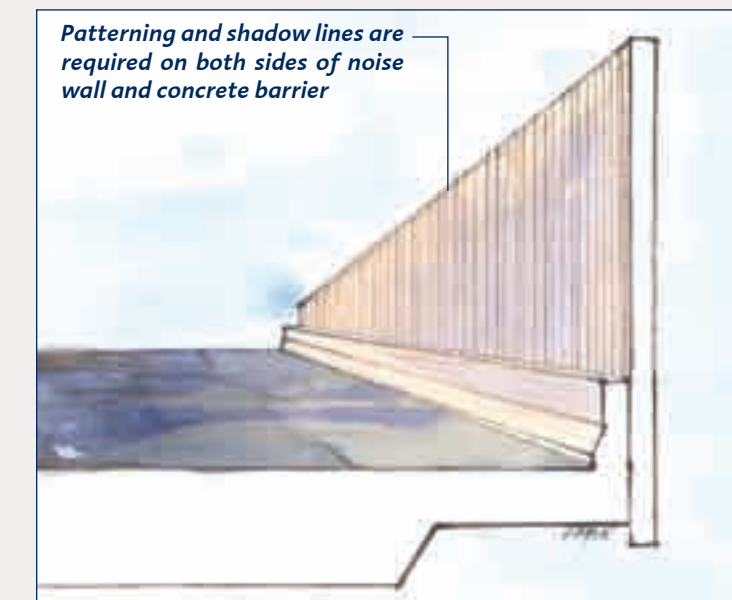
(2) Consider - Curved: Allowed transition for top of noise wall.



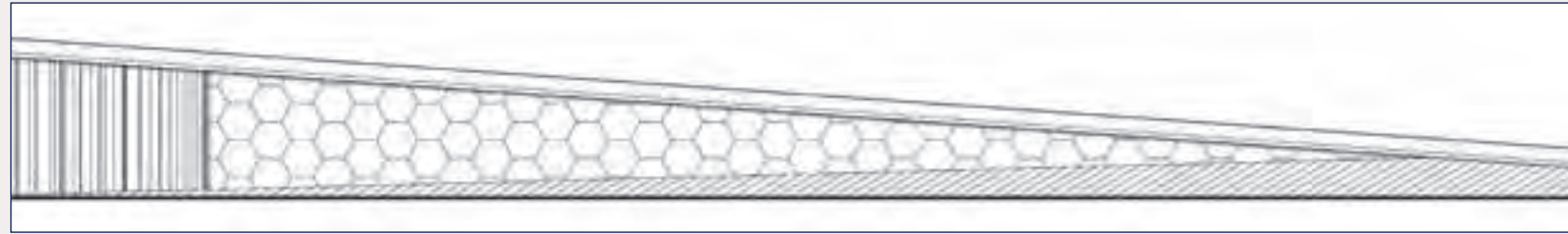
(4) Consider - Stepped transition with staggered walls: Preferred transition for noise wall grade changes. Provide a minimum stagger of 24 inches between wall planes.



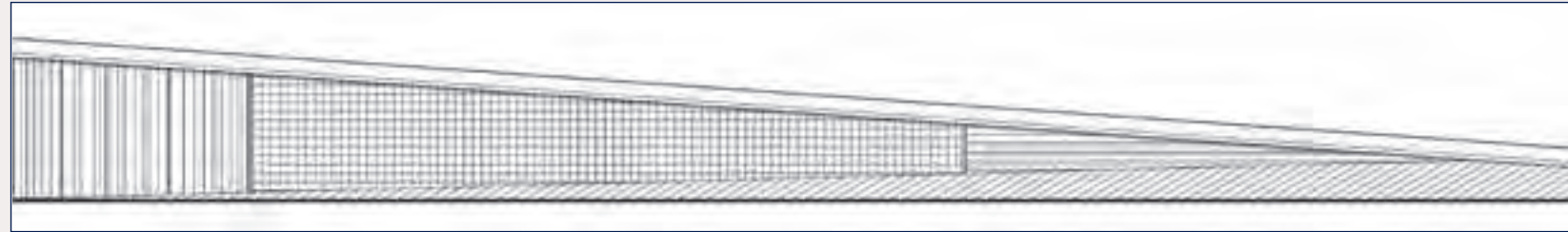
(6) Avoid - Eased transition: Not allowed for top of noise walls.



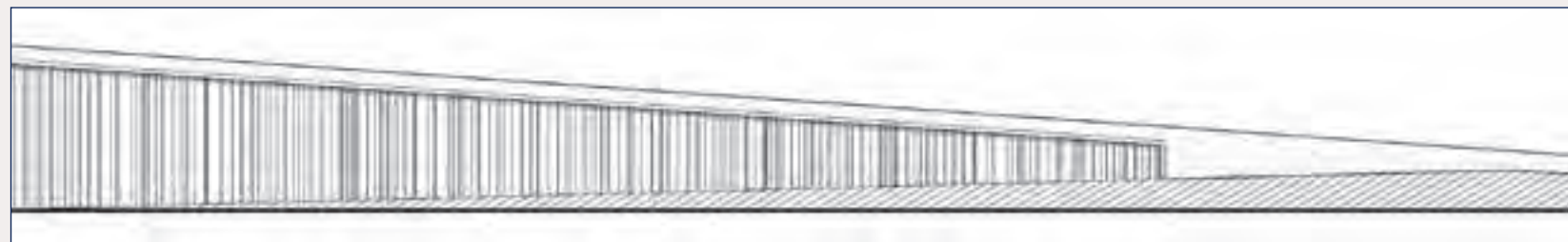
(8) When concrete barrier and noise walls co-exist without buffer space, wall is integrated into concrete barrier rail.



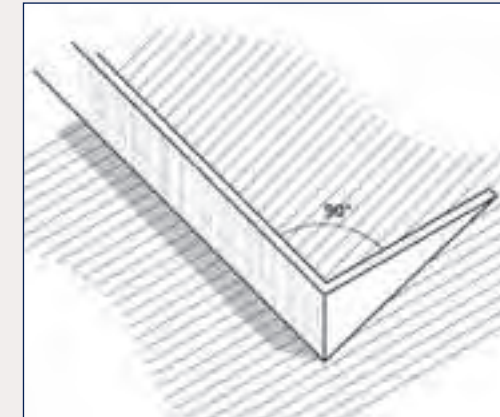
(1) Avoid small scale joints, octagon, or cruciform shaped panels. These are only acceptable when textured with a rusticated variable vertical pattern.



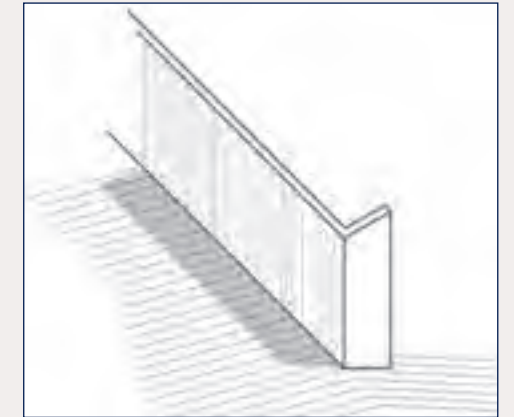
(2) Avoid using multiple materials, shapes, and joint patterns.



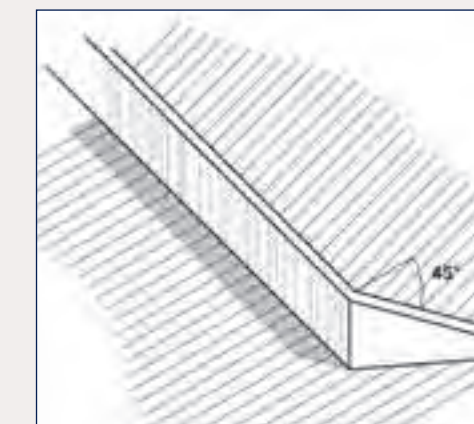
(3) Consider the preferred rusticated variable vertical texture and pattern. Surfaces should have a single finish whether MSE, cast-in-place, or other wall type is used. Consistency with other structures is required.



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



(5) A minimum wall return of three feet is required for noise walls at the beginning of the wall facing the driver.



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

12.0 CONCRETE BARRIERS AND GUARDRAILS

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. Refer to Color Palette guideline, page 3.23, for more information on color selection.

12.2 Avoid bright and shiny guardrails.

Use acid-washed steel guardrails where appropriate.



(1) Acid-washed steel guardrail blends into the surrounding landscape better than shiny galvanized steel.

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.

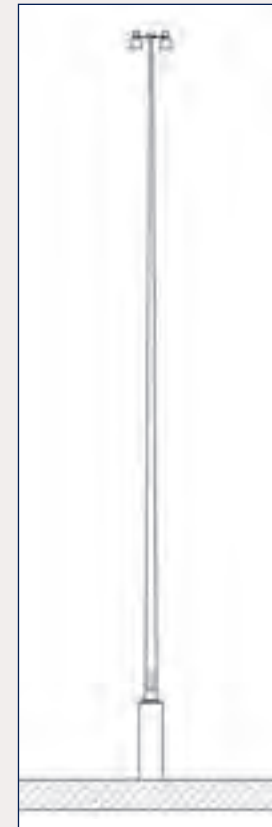
- Use a durable, powder-coated finish for light poles of a color that matches other structures and the surrounding landscape. Typically use colors that blend with the background and do not visually overwhelm.

- 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.
- Allow for context-sensitive design in fixtures and poles where appropriate, particularly in areas such as historic sites.
- 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.

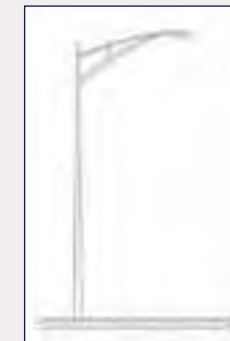
- Fixtures should be more closely spaced than conventional “cobra head” street lights.
- Lighting height and brightness should clearly illuminate walking paths.



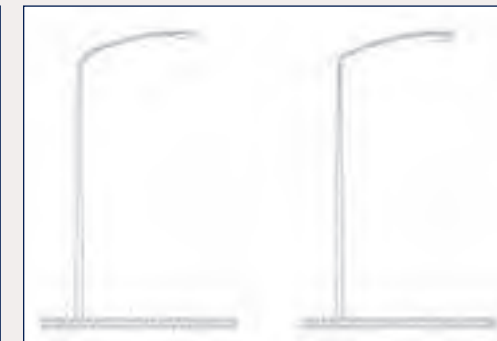
(2) Limit use of high mast lighting.



(1) Lights can be incorporated in the bridge design as a feature of the approach.



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



(4) Consider these preferred fixture and pole configurations.



(5) Powder coat coloring helps blend poles into the surrounding environment.

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) Three-strand fencing maintains the rustic character of the rural segments of the corridor and minimizes the visual impact of fencing on the driver.

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.

- 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 3.44).

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).

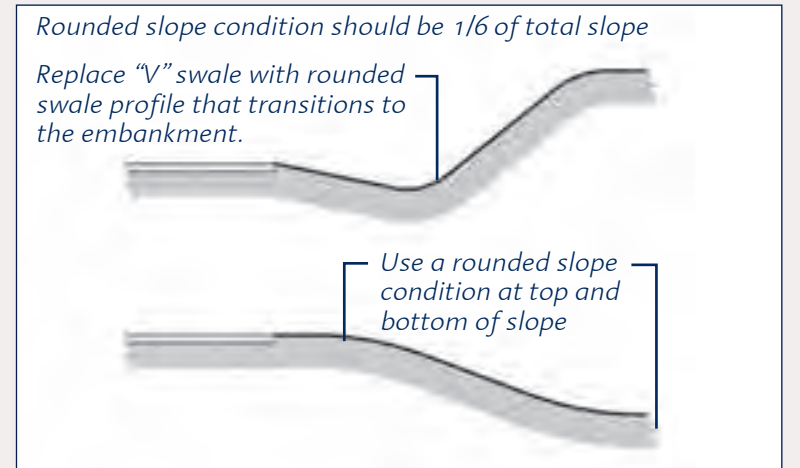
15.4 Utilize retaining walls that reflect surrounding landform and soil colors to minimize large slope cuts.

Staggering, terracing, and progressive offset of retaining walls can stabilize slopes and reduce erosion while blending more smoothly into surrounding landforms than terraced high wall cuts.

- 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 eight feet between terraces to provide for landscape planting.
- 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.

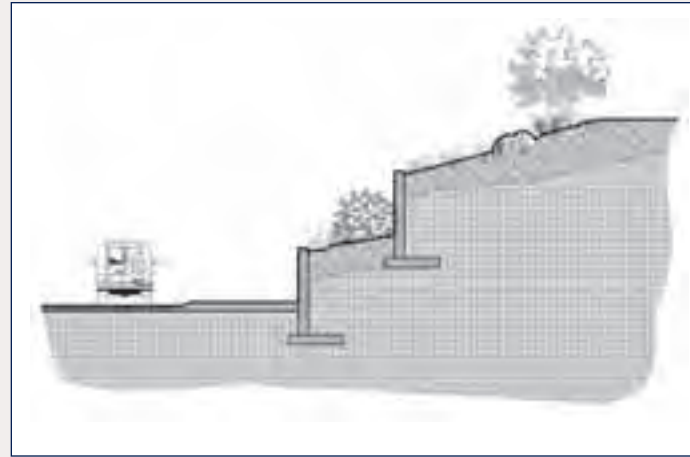


(1) Rounded slopes help smooth the transition between cut and fill slopes and existing topography.

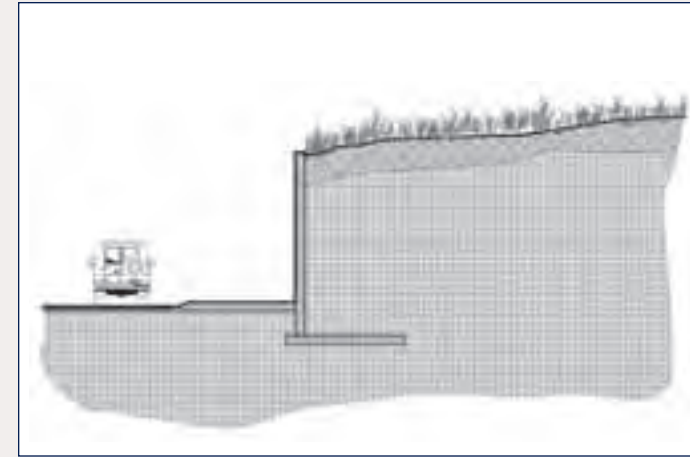


(2) Smooth transitions between cut and fill slopes and existing conditions can be accomplished by rounding the slopes.

- 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 in a consistent pattern are preferred. All panels should have a rusticated variable vertical pattern that extends across the entire surface.



(1) Consider a step or change of plane for retaining walls greater than 14 vertical feet.



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



(3) When gabion walls are necessary, ensure that the wire and stone colors complement one another and the surrounding landscape.

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 analyses, and design rock cuts that avoid the need for rock fall protection fencing.

- Blend rock cuts to match natural rock forms and use naturalized bedding planes to avoid creating an unnatural rock face.
- Ensure all designed landforms are natural in appearance and blend with the topography and geology of the surrounding landscape.
- 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.

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



(1) Rock cuts and excavation should be natural in form, shape, and texture. Rock formations, such as this rhyolite outcrop, have an inherent visual form that can be duplicated in custom rock excavations.



(2) Re-sculpted rock cuts change artificial slope banks into naturally occurring landforms. Plan cuts that terrace, bench, and use bedding planes found in existing rock formations.

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.

- 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 that blends with the surrounding soil.
- Vary the size of rock treatments. Meander naturalized treatments so that they feather into the landscape.

17.2 Revegetate drainage infrastructure.

Drainage detention and infiltration areas should be shaped with natural undulating edges and bottoms rather than angular embankment slopes.

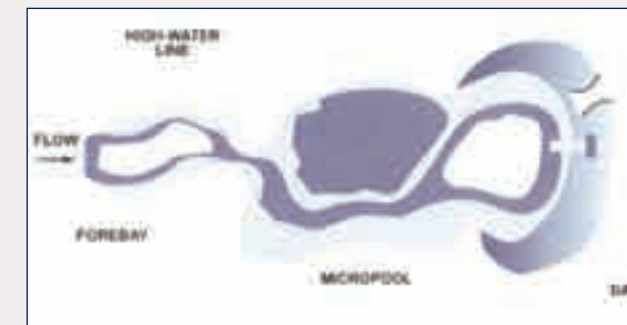
- Upper slopes of drainage detention basins should be revegetated or covered with appropriate ground treatment (refer to Ground Treatment softscape type guideline and Native Plant Revegetation softscape type guideline, page 3.41).

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.



(1), (2) Rock bed drainage reduces erosion, allows some water to infiltrate, and can provide irrigation for adjacent plant materials.



(3) Designing detention basins and stormwater uses with naturalized, curvilinear shapes is preferred over the use of "V" shaped channels.

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 prior to seeding (approximately 85% compaction).

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



(1), (2) Application of geo-textile fabrics aid in erosion control.



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



(4) Fiber rolls reduce sediment migrations.

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 re-application 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. 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 so that water slows and infiltrates 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 contours.
- **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 but relatively flat, and located under a parking lot.

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



(1) Water basins should utilize natural materials and be used as a water source for adjacent landscape areas.

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 to survive 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.

The 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. Previously landscaped areas with ornamental plant materials that are in good condition, form, and health shall be preserved. All softscape treatment projects shall include a tree inventory listing all protected trees and other landscape materials within the right-of-way. The plan should 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.

GROUND TREATMENT SOFTSCAPE TREATMENT**21.5 Implement appropriate ground treatment and softscape types.**

Use recommended ground treatment and softscape 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.

21.6 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.
- Distribute scattered rock mulch in a pattern similar to that found in the surrounding landscape instead of a thick, even spread of rock mulch.



(1) A mix of aggregate size and color helps re-establish disturbed slopes to a naturalized condition.



(2) Visual interest is enhanced by using stone ground cover of various sizes and color.

NATIVE REVEGETATION SOFTSCAPE TREATMENT**21.7 Apply native revegetation softscape along open, rural highways.**

Reestablish the native conditions using the native plant revegetation softscape type. The native plant 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.
- Plant density and spacing should mimic surrounding conditions, incorporating scattered rock mulch to reduce erosion and improve revegetation success.
- Select an appropriate native plant palette. Sites should be evaluated for elevation, soil conditions, and ecosystem type (for example, riparian, playa, or salt flat).

21.8 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 al 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.
- Salvage existing native plants and topsoil prior to construction. Species salvagability depends on size, location, soils, and analysis of plant value, including the potential survival rate. Salvaged plants can readily improve the roadside aesthetic by providing mature plants that would normally take many years to establish. Where



(1) The native plant palette near Searchlight includes a wide variety of plant colors, shapes, and heights.

existing native plants cannot 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.
- Additional plants not included in the adjacent list can be included upon review and approval.

21.9 Utilize proper revegetation methods.

- Reestablish native conditions using the native plant revegetation softscape type. Select perennial grasses, forbs, and shrubs that can be established 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 Remedia-*

tion (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, soils, and analysis of plant value, including the 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. 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.
- 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 coordinate with revegetation. This mulch provides seed pockets and protects plant establishment.

Figure 14 - Native Revegetation Plant Palette

	Height x Width	Exposure to sun	Water Requirement	Seasonal
North of Las Vegas Valley				
Lower Mojave/Creosote Zone				
Shrubs:				
<i>Atriplex hymenalytra</i> - Holly Leaf Saltbush	5' x 8'	Full sun	Low water use	Spring
<i>Atriplex lentiformis</i> - Quailbush	8' x 8'	Full sun	Low water use	Spring
<i>Coleogyne ramosissima</i> - Blackbrush	5' x 6'	Full sun	Low water use	Spring
<i>Larrea tridentata</i> - Creosote Bush	10' x 10'	Full sun	Low water use	Spring
Accents:				
<i>Echinocereus triglochiodatus</i> - Red Hedgehog Cactus	.4' x 1.25'	Full sun	Low water use	Year-Round
<i>Ferocactus cylindraceous</i> - Barrel Cactus	3' x 1.5'	Full sun	Low water use	Sp/Sum
<i>Opuntia basilaris</i> - Beavertail Cactus	1' x 3'	Full sun	Low water use	Spring
<i>Opuntia echinocarpa</i> - Silver Cholla	3' x 3'	Full sun	Low water use	Spring
<i>Mammillaria tetrancistra</i> - Mojave Fishhook Cactus	5' x 2'	Full sun	Low water use	Spring
<i>Yucca schidigera</i> - Mojave Yucca	12' x 6'	Full sun	Low water use	Spring
<i>Yucca brevifolia</i> - Joshua tree	30' x 15'	Full sun	Low water use	Spring
South of Las Vegas Valley				
Blackbrush Zone; Corridor Crosses Creosote-Bursage and Blackbrush Zones				
Trees:				
<i>Acacia greggii</i> - Catclaw	25' x 15'	Full sun	Low water use	Sp/Fall
<i>Chilopsis linearis</i> - Desert Willow	20' x 15'	Full sun	Low/Mod water use	Sp/Fall
<i>Prosopis glandulosa</i> - Honey Mesquite	25' x 35'	Full sun	Moderate water use	Summer
Shrubs:				
<i>Coleogyne ramosissima</i> - Blackbrush	5' x 6'	Full sun	Low water use	Spring
<i>Eriodictyon angustifolium</i> - Yerba Santa	4' x 6'	Full sun	Low water use	Sp/Sum
<i>Erigonum wrightii</i> - Wright’s Buckwheat	2' x 3'	Full sun	Low water use	Summer
<i>Erigonum fasciculatum</i> v. <i>poliofolium</i> - Flattop Buckwheat	3' x 4'	Full sun	Low water use	Spring
<i>Fallugia paradoxa</i> - Apache Plume	6' x 4'	Full sun	Low water use	Spring
<i>Psoralea fremontii</i> - Indigobush	5' x 5'	Full sun	Moderate water use	Sum/Fall
<i>Salvia mojavensis</i> - Mojave Sage	3' x 3'	Full sun	Low water use	Spring
Accents:				
<i>Agave utahensis</i> - Utah Agave	5' x 8'	Full sun	Low water use	Sp/Sum
<i>Mirabilis froebelii</i> - Desert Four O’Clock	4' x 4'	Full sun	Low water use	Summer
<i>Opuntia erinacea</i> - Old Man Cactus	2' x 4'	Full sun	Low water use	Spring
<i>Opuntia acanthocarpa</i> - Buckhorn Cholla	4' x 3'	Full sun	Low water use	Spring
<i>Yucca baccata</i> - Banana Yucca	3' x 3'	Full sun	Low water use	Summer
<i>Yucca schidigera</i> - Mojave Yucca	12' x 6'	Full sun	Low water use	Spring
Grasses:				
<i>Achnatherum hymenoides</i> - Indian Ricegrass	2' x 2'	Full sun	Low water use	Spring
<i>Bromus rubens</i> - Red Brome	1' x .5'	Full sun	Low water use	Winter
<i>Hilaria rigida</i> - Big Galleta	1' x .5'	Full sun	Low water use	Spring
<i>Stipa speciosa</i> - Desert Needlegrass	1' x .5'	Full sun	Low water use	Summer
Wildflowers:				
Wildflowers like the Prince’s Plume (<i>Stanleya pinnata</i>) and the Apricot-Mallow (<i>Sphaeralcea ambigua</i>) can be planted but if the soil is harvested and carefully maintained – all the necessary seeds should be contained within the soil. In the interest of preserving the most natural landscape and avoiding breaks in type or structure of vegetation – harvesting and re-using topsoil from the same area without wildflower re-seeding should provide an abundance of wildflowers native to that area.				
Native penstemons for Mojave:				
<i>Penstemon eatoni</i> - Eaton’s or Firecracker Penstemon	2' x 3'	Full sun	Low water use	Spring
<i>Penstemon parryi</i> - Parry’s Penstemon	4' x 2'	Full sun	Low water use	Spring
<i>Penstemon utahensis</i> - Utah Penstemon	1' x 1.5'	Full sun	Low water use	Spring
<i>Penstemon palmeri</i> - Palmer’s Penstemon	4' x 2'	Full sun	Low water use	Spring

- 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 that 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.



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



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

ENHANCED NATIVE SOFTSCAPE TREATMENT

21.10 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.

- Typical applications are specified for transition zones into communities as well as simple gateway treatments. The enhanced native softscape type enriches the Mojave Desert plant palettes with a mix of vertical heights and densities.
- 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.

21.11 Carefully select enhanced native plant species.

In addition to the plants listed in the native plant revegetation landscape type, the following list of plants comprise the enhanced native landscape 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 included in previous palettes or the adjacent list may be included upon review and approval

Figure 15 - Enhanced Native Plant Palette

	Height x Width	Exposure to Sun	Water Requirement	Seasonal Interest
Trees:				
<i>Salix exigua</i> - Coyote Willow	10' x 6'	Partial sun	Moderate water use	Spring
<i>Prosopis glandulosa</i> - Honey Mesquite	25' x 35'	Full sun	Moderate water use	Summer
<i>Prosopis pubescens</i> - Screwbean Mesquite	25' x 25'	Full sun	Moderate water use	Spring
<i>Quercus turbinella</i> - Desert Scrub Oak	8' x 12'	Full sun	Mod/Hi water use	n/a
<i>Acacia minuta</i> - Sweet Acacia	20' x 20'	Full sun	Low water use	Spring
<i>Prosopis chinensis</i> - Chilean Mesquite	25' x 40'	Full sun	Moderate water use	Summer
<i>Vitex agnus-castus</i> - Chaste Tree	25' x 25'	Full sun	Moderate water use	Summer
<i>Cercidium microphyllum</i> - Foothills Palo Verde	20' x 20'	Full sun	Moderate water use	Summer
<i>Prosopis velutina</i> - Velvet Mesquite	25' x 30'	Full sun	Moderate water use	Spring
<i>Cercis occidentalis</i> - Western Redbud	10' x 10'	Full/Partial sun	Moderate water use	Spring
Shrubs:				
<i>Encelia farinosa</i> - Brittlebush	3' x 4'	Full sun	Low water use	Spring
<i>Cassia nemophila</i> - Desert Cassia	6' x 6'	Full sun	Low water use	Spring
<i>Eremophila spp.</i> - Valentine or Emu Bush	4' x 4'	Full sun	Low/Mod water use	Winter
<i>Zauschneria californica</i> - Hummingbird Flower	2' x 3'	Full sun	Low water use	Sum/Fall
Accents/Grasses:				
<i>Tetaneuris acaulis</i> - Angelita Daisy	1' x 1.5'	Full/Part sun	Moderate water use	Sp/Sum/Fall
<i>Baileya multiradiata</i> - Desert Marigold	1' x 1'	Full/Part sun	Low water use	Sp/Sum/Fall
<i>Psilotrophe cooperi</i> - Paper Flower	1' x 1.5'	Full/Part sun	Low/Mod water use	Sp/Sum/Fall
<i>Opuntia engelmannii</i> - Engelmann's Prickly Pear	6' x 10'	Full sun	Low water use	Sp/Sum
<i>Opuntia santa-rita</i> - Santa Rita Prickly Pear	4' x 6'	Full sun	Low water use	Year round
<i>Scleropogon brevifolius</i> - Burrograss	1' x 1'	Full sun	Low water use	Spring

Note: See Native Revegetation Plant Palette for more plant options.



(1) Enhanced native softscape type utilizes greater plant massing and begins to add more color, texture, and verticality to the native palette.

REGIONALLY ADAPTED SOFTSCAPE TREATMENT

21.12 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. This softscape type utilizes the Mojave, Sonoran, and Chihuahuan plant palettes along with other low-water use plants that are well adapted to local conditions.

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

21.13 Carefully select regionally adapted plant species.

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

- Use plant species to create plant communities with variations in plant height and spread
- Additional plants not included in previous palettes or the adjacent list may be included upon review and approval

Figure 16 - Regionally Adapted Plant Palette

	Height x Width	Exposure to sun	Water Requirement	Seasonal
Trees:				
Fraxinus oxycarpa - Raywood Ash	35' x 25'	Full sun	Moderate water use	Spring
Fraxinus velutina 'Rio Grande' - Modesto Ash	50' x 30'	Full sun	Moderate water use	Spring
Gleditsia triacanthos inermis - Thornless Honey Locust	35' x 25'	Full sun	Moderate water use	n/a
Ulmus parvifolia - Drake Elm	60' x 70'	Full sun	Moderate water use	Fall
Cupressus arizonica - Arizona Cypress	70' x 30'	Full sun	Low/Mod water use	n/a
Eucalyptus microtheca - Coolibah Tree	40' x 25'	Full sun	Moderate water use	n/a
Acacia stenophylla - Shoestring Acacia	30' x 15'	Full sun	Low water use	Spring
Eysenhardtia orthocarpa - Kidneywood	10' x 6'	Full sun	Moderate water use	Spring
Rhus lanceolata - Flame Leaf Sumac	15' x 15'	Full sun	Low water use	Summer
Ungnadia speciosa - Mexican Buckeye	15' x 15'	Full/Part sun	Moderate water use	Spring
Celtis pallida - Desert Hackberry	8' x 10'	Full sun	Moderate water use	n/a
Shrubs:				
Buddleia davidii - Navajo Purple Butterfly Bush	8' x 6'	Full/Part sun	Low water use	Spring
Senna phyllodenia - Silver Leaf Cassia	6' x 6'	Full/Part sun	Low water use	Spring
Dodonea viscosa - Hopbush	10' x 6'	Full sun	Low water use	Year round
Rhus ovata - Sugar Bush	10' x 10'	Full/Part sun	Low water use	Spring
Salvia clevelandii - Chaparral Sage	4' x 6'	Full sun	Low water use	Spring
Phlomis fruticosa - Jerusalem Sage	4' x 3'	Full sun	Moderate water use	Sp/Sum
Justicia californica - Chuparosa	3' x 3'	Full/Part sun	Moderate water use	Summer
Tecoma x 'Goldstar' - Texas Yellow Star	20' x 8'	Full sun	Moderate water use	Summer
Senna oligophylla 'Outback' - Outback Cassia	3' x 3'	Full sun	Low water use	Sp/Sum
Cacti/Accents/Grasses/Groundcovers and Perennials:				
Fouquieria splendens - Ocotillo	18' x 10'	Full sun	Low water use	Spring
Coreopsis lanceolata - Sunray	1.5' x 1'	Full sun	Moderate water use	Sp/Sum
Hemerocallis spp. - Daylily	2' x 2'	Full/Part sun	Low water use	Spring
Nolina microcarpa - Bear Grass	4' x 6'	Full sun	Low water use	Spring
Penstemon spectabilis - Showy Penstemon	3' x 2'	Full sun	Low water use	Spring
Salvia leucantha - Mexican Bush Sage	3' x 3'	Full sun	Moderate water use	Sp/Fall/Win
Dasyliroia wheeleri - Desert Spoon	4' x 6'	Full/Part sun	Low water use	Sum/Fall
Hylotelephium x 'Autumn Joy' - Autumn Joy Sedum	1.5' x 1.5'	Full/Part sun	Low water use	Sp/Sum
Bulbine frutescens - Shrubby Bulbine	1' x 2'	Part sun	Low water use	Sp/Fall

Note: See Native Revegetation and Enhanced Native Plant Palettes for more plant options.



(1), (2) Regionally adapted softscape planting introduces non-native species that are adapted to the desert climate.

REGIONAL ORNAMENTAL SOFTSCAPE TREATMENT

21.14 Apply regionally ornamental softscape in areas of extremely high importance.

Use the regional ornamental softscape type to create cultural meaning, enhance a landmark feature, or both. The regional ornamental softscape type is the rarest treatment and should be used where identified in the landscape design segments.

- It is typically used in areas of extreme high importance as part of placemaking
- 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 Mojave Desert landscape in complementary patterns

21.15 Carefully select regional ornamental plant species.

In addition to the plants listed in the Revegetation landscape type, the enhanced native landscape type, and the regionally adapted landscape type, the following list of plants comprise the regional ornamental landscape 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 included in previous palettes or the adjacent list may be included upon review and approval

Figure 17 - Regional Ornamental Plant Palette

	Height x Width	Exposure to Sun	Water Requirement	Seasonal Interest
Trees:				
Olea europea 'Swan Hill' - Fruitless Olive Tree	30' x 30'	Full sun	Moderate water use	Summer
Pinus eldarica - Mondel Pine	50' x 30'	Full sun	Moderate water use	Summer
Pistacia chinensis - Chinese Pistache	40' x 20'	Full sun	Moderate water use	Fall
Sophora secundiflora - Mescal Bean	15' x 10'	Full sun	Moderate water use	Spring
Pithecellobium flexicaule - Texas Ebony	20' x 15'	Full/Part sun	Moderate water use	Sp/Sum
Palms:				
Chamaerops humilis - Mediterranean Fan Palm *	20' x 20'	Full sun	Low/Mod water use	Summer
Phoenix dactylifera - Date Palm*	50' x 25'	Full sun	Moderate water use	Year round
Trachycarpus fortunei - Windmill Palm*	20' x 20'	Full/Part sun	Moderate water use	Year round
Washingtonia filifera - California Fan Palm*	50' x 15'	Full sun	Low/Mod water use	Summer
Shrubs:				
Caesalpinia mexicana - Mexican Bird of Paradise	10' x 6'	Full sun	Moderate water use	Summer
Caesalpinia pulcherrima - Red Bird of Paradise	8' x 8'	Full sun	Moderate water use	Summer
Caesalpinia gillesii - Yellow Bird of Paradise	7' x 7'	Full sun	Moderate water use	Sp/Sum/Fall
Calliandra eriophylla - Fairy Duster	4' x 4'	Full/Part sun	Low	Sp/Sum/Fall
Eleagnus x Ebbingei - Ebbing's Silverberry	9' x 9'	Full sun	Moderate water use	Summer
Rosmarinus officinalis - Spreading Rosemary	2' x 8'	Full sun	Moderate water use	Summer
Caryopteris x clandonensis 'Dark Knight' - Blue Mist	3' x 4'	Full sun	Moderate water use	Sum/Fall
Justicia spicigera - Mexican Honeysuckle	3' x 4'	Full/Part sun	Low/Mod water use	Sp/Sum/Fall
Accents/Cacti and Grasses:				
Agave vilmoriniana - Octopus Agave	4' x 4'	Full sun	Low water use	n/a
Agave bracteosa - Spider Agave	2' x 3'	Full/Part sun	Low water use	n/a
Dasyliirion longissimum - Sotol	6' x 4'	Full sun	Low water use	n/a
Drosanthemum hispidum - Ice Plant	2' x 3'	Full sun	Low/Mod water use	Spring
Euphorbia charachias - Shrubby Spurge	3' x 2'	Full/Part sun	Moderate water use	Win/Sp
Hesperaloe parviflora 'Yellow' - Yellow Hesperaloe	4' x 4'	Full sun	Low water use	Sp/Sum/Fall
Muhlenbergia capillaries 'regal mist' - Regal Mist	3' x 6'	Full/Part	Moderate water use	Spring
Phormium tenax - New Zealand Flax	15' x 4'	Partial sun	Low/Mod water use	Sp/Sum
Pennisetum setacum 'rubrum' - Red Fountain Grass	3' x 3'	Full sun	Moderate water use	Year round

Note: See Native Revegetation, Enhanced Native, and Regionally Adapted Plant Palette for more plant options.

*Palm trees should rarely be used along the corridor. Species should only be chosen in areas of extremely high visual importance such as the resort corridor in Las Vegas.



(1) The regional ornamental softscape type requires permanent irrigation and is used to highlight points of significant interest and landmark quality.



(2) The regional ornamental softscape type adds to the identity and placemaking of areas of high importance.

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 on the occurrence of wildlife-related automobile accidents, 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 to design effective crossing structures that meet the needs for all species that will use a 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, elk, pronghorn, and bighorn sheep 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-occurring 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.
- 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 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 use by wildlife.
- Limit human use of the underpass structures when possible.

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

- At tortoise migration routes, use an 18 inch to 24 inch high welded-wire mesh

fence with 6 inches located below ground to prevent tortoises from crawling under the fence along both sides of the highway. Secure the fence to a culvert that crosses beneath the road.

- Recommended fencing heights for big-horn sheep or deer is eight feet, 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 an on-going interagency cooperative research.

22.5 Include observation points and watchable wildlife opportunities in the design of crossings.

Consideration should only be given when observation points do not interfere with wildlife movement.

22.6 Retrofit existing highway facilities within the Destiny of the West Landscape 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.



(1) Wildlife underpasses help maintain wildlife migration patterns and minimize vehicle/wildlife interaction.

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, avoid disturbance and compaction of the ground.
- Maintain and enhance existing ground-cover to ensure the area is left in a condition consistent with the surroundings.

23.3 Utilize Best Management Practices 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 BMP's to reduce sedimentation and pollutant run-off 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) The placement of asphalt millings on the highway shoulder creates a stark contrast between the road and the adjacent undisturbed landscape and should be avoided.

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 environmental damage that could result 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 Best Management Practices 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) Screening maintenance facilities from the road is recommended and helps minimize visual clutter in the traveler's view of the larger landscape.

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 incor-

porate 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, heating, 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 for lighting in remote areas.



(2) Wind power generates a clean renewable energy source and should be used if available.



(3) Consider recycled and reclaimed materials, such as plastic modular units, for roadway construction.