



I-80 landscape and aesthetics corridor plan

RECOMMENDED STANDARDS



I-80 FROM
VERDI TO WEST
WENDOVER
& US 95 FROM
WINNEMUCCA TO
MCDERMITT

DESIGN WORKSHOP
Mackay & Somps
JW Zunino & Assoc.
CH2MHill
Jones & Jones

June 20, 2005

RECOMMENDED STANDARDS

This document contains additional guidelines and standards that are recommended beyond those described in the *I-80 Landscape and Aesthetics Corridor Plan*. These guidelines and standards are presented for consideration and possible future adoption by NDOT. They address the various aspects of landscape and aesthetics enhancement and describe a level of quality that NDOT projects can ultimately strive for. NDOT management and staff will review these standards and open a discussion as to their appropriateness and applicability to standard NDOT practice.



In conjunction with the Corridor Plan, this document presents additional standards and guidelines that are recommended to further enhance the level of landscape and aesthetics along Nevada's highways.

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1.0 PROJECT DESIGN PROCESS

1.1 The design guidelines described in Chapter 5 of the *Corridor Plan*, suggest an appropriate minimum level of landscape and aesthetics enhancement for future NDOT projects. For these guidelines to prove effective, they should be adhered to whenever possible. However, it is understood that unforeseen design conditions will arise and a project's design may not meet the recommendations of the *Corridor Plan* and design guidelines.

In these cases, it is recommended that a brief memorandum or some other form of documentation detailing the conditions and potential solutions be provided for review. Prior to granting approval for a specific project, an NDOT review board would then evaluate the rationale presented and reach a final determination as to the acceptability of the variance.

The purpose of the variance process would be to ensure alternative design solutions remain true to the spirit of the *Corridor Plan* and design guidelines. It is likely that documentation and review would reduce or eliminate the implementation of inferior solutions that could detract from the overall landscape and aesthetics of the I-80 corridor.

2.0 SIGNAGE

2.1 In addition to signs promoting the anti-littering campaign at highway stops that include food and beverage services, it is recommended that signs be placed along the highway corridors at regular intervals. This would effectively extend the anti-littering message across the state and remind travelers that litter impacts the visual quality of the corridor. NDOT would provide the specific messages to be located on each sign.

2.2 Furthermore, it is important to provide travelers with information regarding facilities and resources. Therefore, it is suggested that one informational sign be placed along both approaches to interchange areas. These signs would meet the standards of the Nevada Place Name Sign Program and identify the facilities available at the interchange.

3.0 COLOR PALETTE APPLICATION

3.1 Key goals of the color palette application standard are to achieve a true color representation and produce a low maintenance, long-lived application. Therefore, it is suggested that an acrylic stain be used for concrete color application. For steel components, an approved three-coat paint system is recommended.

3.2 Visually, the contrast created between recent site work and the existing landscape can be significant. To minimize these impacts, it is important for new structures and treatments to be visually consistent with what exists on site, especially when dealing with rock cuts and soil-coloring in rural areas. Rock staining and soil-coloring treatments, such as Permeon™ and/or accelerated weathering techniques, are recommended to match new treatments with existing areas.

4.0 NON-MOTORIZED TRANSPORTATION SYSTEMS

4.1 Non-motorized transportation systems (NMT) form an additional network of movement around a given area. Often times, they share right-of-way (ROW) space with traditional motorized transportation. For these reasons, it is suggested that highway crossings, shoulder use, signage, and education be considered throughout the planning and design process of all NMT systems.

4.2 To fully accommodate NMT into transportation corridor planning and design, several recommendations related to bike lanes and pathways have been identified. First, bikeways with a minimum width of five feet should be incorporated within the highway ROW where possible. Additionally, providing minimum five foot wide bike lanes across bridges and underpasses is suggested. Connections to existing walkways and path systems are essential and should be provided. When space allows and an enhanced NMT is desirable, a 12-foot wide (with a two foot clear zone on each side) multi-purpose pathway is recommended. Additional features such as lighting and retaining walls could be included as part of the enhanced NMT.

It is recommended that issues such as human scale of structures, safety, and access to facilities be considered in the planning and design of NMT. All trails and walkways should be located outside of

the roadway clear zone and the distance between NMT pathways and the travel lane should be maximized. It is suggested that connections from NMT pathways to rest areas and other roadside facilities be provided.

4.3 To enhance the feeling of comfort and safety on pathways, care should be taken to avoid a "tunnel" effect. Increased buffer zones that avoid narrow entrapment zones between sound walls, adjacent private walls, and right-of-way control fencing are recommended. Sound walls, barrier rails, and other vertical elements could be offset from pedestrian pathways to reduce a tunnel-like feeling. An appropriate number of entrance/exit points at public corridors and neighborhoods should be provided. To provide adequate escape routes in case of emergency, it is suggested that 660 feet be the maximum distance between access points along NMT. For underpasses, opening width and height and adding intermediate sky lights at points along the tunnel are recommended to allow sunlight into the tunnel.

4.4 To enhance the experience along NMT's, providing a linear park character is advised. Well identified access points, directional signage, lighting, benches and seating areas, drinking fountains, shade structures, and other user amenities could be provided to create a safe and usable pedestrian/bicycle environment. Creating

view points and connections to other statewide and regional trail system plans is recommended.

5.0 BRIDGES

5.1 It is recommended that bridges be designed to accommodate additional elements and structures that are proposed. For example, extra width could be added to the bridge design to accommodate pedestrian corridors. In areas where sound walls are required on bridges, extra width is also suggested. This allows for sound walls to be completely separated from concrete barriers. Concrete barrier rails could be designed to accommodate the attachment of street identification signs.

5.2 A minimum 6' vertical abutment structure is recommended on bridges. This guideline aids in maintaining visually proportional dimensions on bridges. Using vertical abutments also minimizes the need for steep slopes and slope paving, both of which are discouraged.

5.3 When protection fencing is required, chain link fencing with a color application (vinyl clad or painted finish) and steel post supports is suggested.

6.0 RETAINING WALLS, SOUND WALLS, AND VISUAL SCREEN WALLS

6.1 The *Corridor Plan* states retaining walls and sound walls should not exceed 14 feet vertical height without a step or change in

wall plane whenever possible. The recommended standard is that this guideline be followed in all cases. Furthermore, walls used only for visual screening should not exceed 10 feet regardless of a step or change in wall plane. This will minimize the "tunnel" effect created by long stretches of tall, unbroken vertical walls.

6.2 To minimize the construction of unnecessary sound walls, it is recommended that sound walls be compliant with Federal regulations with regard to required location and sound attenuation standards.

7.0 LIGHTING AND UTILITIES

7.1 Individual projects will require different lighting specifications that are unique to the type of use, design speed, etc. However, to maintain consistency across the corridor it is recommended that standard lighting consist of a 30' high pole with a galvanized finish, a concrete foundation with acrylic stain base color application, and a high pressure sodium luminaire.

7.2. As part of general construction, it is suggested that electrical service for project lighting and sleeving for future electrical, water supply, and/or communication services be provided. This will help minimize post-construction utility installations that can be costly and damaging to existing structures and landscapes.

8.0 FENCING

8.1 To provide a more visually continuous corridor, minimizing the use of fencing in urban right-of-way areas is advised. Where chain-link fencing is required, it is recommended that a color-coated, acid washed, or stained chain-link fencing with steel post supports be used.

9.0 GRADING

9.1 To minimize the use of slope paving and encourage smooth slope transitions, grading slopes to 3H:1V or less with a maximum slope of 2H:1V at any condition is recommended. This standard could be accomplished through other suggested guidelines including the use of vertical abutments and stepped retaining walls.

10.0 ROCK CUT AND EXCAVATION

10.1 Preserving the existing character of natural bedding planes, fractures, and rock joints is an important goal of the guidelines included in the *Corridor Plan*. Therefore, designing rock cuts based on a careful analysis of the rock's natural character is encouraged.

10.2 As mentioned in the Color Palette Application standard, the contrast created between recent site work and the existing landscape can be significant. To minimize these impacts, it is important for new rock cuts to be visually consistent with what exists on site. Rock staining and soil-color-

ing treatments, such as Permeon™ and/or accelerated weathering techniques, are recommended to match new treatments with existing areas.

11.0 DRAINAGE

11.1 Implementation of naturalized drainage channel designs and infiltration methods is encouraged by the *Corridor Plan*. In order to accomplish this goal, it is recommended that asphalt or concrete paved drainage ditches and check dams not be used.

12.0 EROSION CONTROL

12.1 Permanent erosion control is necessary to reduce long-term maintenance and environmental impacts. Rock mulch and successful revegetation are recommended as solutions for permanent erosion control.

13.0 WATER HARVESTING

13.1 Incorporating water harvesting into the grading and drainage system is encouraged. The following techniques and features are recommended for use in water harvesting:

Swales, or gently sloping trenches, may be used to collect, slow down, and divert runoff water. Swales may carry runoff from the road surfaces, or they may be a continuation of natural drainage patterns. Swales on slopes can be located in "eyebrow" patterns to hold water for vegetation on irregular slopes. The goal is to

increase soil moisture and localized water retention to enhance plant growth.

Basins are suggested for use to collect and infiltrate stormwater. These can be used as locations for planting and should be sited in low areas.

Pumice wicks are rock-filled excavations that contain water. The pumice rock is porous and absorbs water. Pumice drains are typically located below planted areas so the water is made available to the vegetation. Water can be routed from a collection area to the pumice wick.

Water-absorbent polymer products (e.g. Terra-Sorb™, SoilMoist™), also referred to as root-watering crystals, planting gels, and water retention granules, are suggested as part of a water harvesting program. These polyacrylamide-based granules are designed to absorb up to 400 times their own weight. Water is held near the root zone and slowly released to plant roots over an extended period of time. To use these products, the fine-grade version is mixed with water, then bare root seedlings are dipped in the mixture just prior to planting. Medium-grade products are saturated with water and then mixed with backfill soil.

SoilMoist™ can reduce watering by 50%, and lasts three to five years. The product

can be used with hydro seeding or added to soil prior to seeding. It can then be activated by the application of water.

13.2 Solid water irrigation supplements such as the DRiWATER / Rainbird Irrigation Supplement are a recommended option for providing temporary watering. DRiWATER is a non-toxic, time-release solid water product consisting of water (98%) and solid food ingredients (2%). Bacteria naturally found in soil gradually break down the food grade ingredients of DRiWATER and convert DRiWATER back into liquid. The capillary activity in the soil then carries and maintains the moisture throughout the root zone for an extended period of time. A DRiWATER carton can release water for two to three months, after which it should be reapplied until the plant material is established.

14.0 IRRIGATION

14.1 Temporary watering may be required for containerized native plants for a period of approximately one to two years, depending on the success rate of revegetation. As revegetation has important consequences in regard to permanent erosion control, temporary watering is advised to help ensure plant establishment.

14.2 If a non-domestic water source is used for irrigation, a filter system is recommended to prevent the clogging of emitters.

15.0 GROUND TREATMENT SOFTSCAPE TYPE

- 15.1** To enhance visual appearance and prevent erosion, uniform applications of rock mulch in variable sizes of stones and textures are recommended for exposed landscape areas.
- 15.2** To match new site work with the existing landscape, ground treatment colors that blend with native soil and tone down glare are encouraged.
- 15.3** An application of rock mulch (4" depth in place, 2"-6" size, and from a Nevada source) is suggested for erosion control when necessary.

16.0 NATIVE PLANT REVEGETATION SOFTSCAPE TYPE

- 16.1** To increase the success of revegetation, planting seeds between August 15 and November 15 for fall seeding and between March 1 and May 15 for spring seeding is advised. Seeding should occur prior to a period of adequate moisture, and when soil temperatures are suitable for seed germination, early seedling growth, and establishment. Fall seeding is typically best for northern Nevada conditions and occurs from August 15 to November 15. In addition, it is suggested seed sites be protected from mechanical disturbance and mulched prior to germination. Supplemental irrigation is encouraged for

at least two full seasons of growth to help with plant establishment.

- 16.2** A drill, broadcast, or hydro-mulching seeding method is recommended. Drill seeding is the preferred method of seed planting on slopes up to 4H:1V. Tractor-drawn drills place seed on disturbed sites, working with the natural contours of the slope. If the soil is rocky or contains other large debris, the rangeland drill or specific modifications of it are often the most effective machines for revegetation drill seeding.

Broadcast seeding is suggested for slopes steeper than 4H:1V, extremely rocky sites, remote sites, and inaccessible sites. Soil preparation is recommended to provide a good seed bed. If a site is susceptible to high dust hazard, seeds may be applied as water-based slurry using a hydro-slurry or hydro-mulching method.

- 16.3** Selecting plant material with sufficient "lead time" and careful planting is encouraged. Plant materials may be bare-rootstock, balled and burlap, or container-grown. Mature transplants typically must be ordered in advance to ensure their availability at the appropriate planting time. In many cases, greenhouse plants need to be hardened to withstand the temperature extremes that may be encountered at the planting site.

- 16.4** One gallon container size for groundcovers and perennials, minimum five gallon container size for shrubs and cacti, and minimum 24-inch box for trees are recommended to increase the likelihood of successful plant establishment.

- 16.5** Refer to Chapter 5 - Design Guidelines of the *Corridor Plan* and the *Recommended Native Plant Revegetation Plant Palette* for information regarding plant selection for Native Revegetation softscape areas and a Native Revegetation softscape type plant list.

17.0 ENHANCED NATIVE SOFTSCAPE TYPE

- 17.1** One gallon container size for groundcovers and perennials, minimum five gallon container size for shrubs and cacti, and minimum 24-inch box for trees are recommended to increase the likelihood of successful plant establishment.

- 17.2** Refer to Chapter 5 - Design Guidelines of the *Corridor Plan* and the *Recommended Enhanced Native Plant Palette* for information regarding plant selection for Enhanced Native softscape areas and an Enhanced Native softscape type plant list.

18.0 REGIONALLY ADAPTED SOFTSCAPE TYPE

- 18.1** One gallon container size for groundcovers and perennials, minimum five gallon container size for shrubs and cacti, and

minimum 24-inch box for trees are recommended to increase the likelihood of successful plant establishment.

- 18.2** Refer to Chapter 5 - Design Guidelines of the *Corridor Plan* and the *Recommended Regionally Adapted Plant Palette* for information regarding plant selection for Regionally Adapted softscape areas and a Regionally Adapted softscape type plant list.

19.0 REGIONAL ORNAMENTAL SOFTSCAPE TYPE

- 19.1** One gallon container size for groundcovers and perennials, minimum five gallon container size for shrubs and cacti, and minimum 24-inch box for trees are recommended to increase the likelihood of successful plant establishment.

- 19.2** Refer to Chapter 5 - Design Guidelines of the *Corridor Plan* and the *Recommended Regional Ornamental Plant Palette* for information regarding plant selection for Regional Ornamental softscape areas and a Regionally Adapted softscape type plant list.

20.0 WILDLIFE CROSSINGS AND PROTECTION

20.1 Understanding current and historic migratory routes and daily wildlife movements to situate crossing structures in appropriate locations is recommended. Researching additional information that tracks locations of wildlife-automobile collisions is also encouraged. Features that are designed to minimize these types of accidents should be explored.

20.2 In order to improve movement corridors and safety along the highway, wildlife crossing structures that are ecologically appropriate and meet the needs of specific wildlife species are encouraged. Wildlife behavioral traits can be analyzed to design effective crossing structures that meet the needs of all species that will use a structure. Designs that accommodate smaller species, as well as larger species, such as Pronghorn antelope, bear, mule deer, Bighorn sheep, Rocky Mountain goat, and mountain lions are suggested. Structures should be designed to complement the primary defense strategy for each wildlife species. For instance, animals such as deer, elk, Pronghorn antelope, and Bighorn sheep depend on good visibility as a key defense mechanism. Openness can be enhanced in under-crossings by using open-span bridges and culverts that are perpendicular to the road. This will reduce the overall length and improve visibility. Increasing the size of the underpass proportionally as the length increases is suggested.

- Restoring vegetation leading up to wildlife crossings and providing cover to shield the entrance to each wildlife crossing from the road is recommended. The habitat within the crossing structure can also be enhanced to encourage use by wildlife. However, maintaining visibility through the crossing is important.
- Within underpasses, it is important to incorporate natural substances similar to adjacent areas. Overpasses can be planted with a range of vegetation, including grasses, shrubs, and evergreen or deciduous trees. Deadfall can be included and will provide temporary shelter for small animals until more permanent vegetation is established. To simulate small ridges and valleys, three raised berms can be constructed on wildlife overpasses that extend the length of the crossing; one on each edge of the crossing structure and one through the middle of the structure.
- Wildlife underpasses or overpasses combined with fencing show the highest documented rates of success for large and small animals. Placement of wildlife crossings in relation to an animal's habitat is essential. The most successful crossing structures are open-span bridges with sloping sidewalls. In areas where the highway is divided, extending wildlife crossings under or over each road is encouraged as well as fencing the area between roadways to control wildlife movement.
- Road underpasses may be constructed of concrete boxes, elliptical metal culverts, or open span bridges. Increased width and height of structures typically results in increased use by large mammals. Sizes can

range from 6.5-feet by 6.5-foot culverts for small animals to an opening 40-feet wide by 16-feet high for larger animals. Underpasses that use natural bottoms and accommodate streams or drainage patterns are suggested.

- Limiting human use of underpass structures whenever possible is advised. Development that may discourage wildlife movement should be minimized near crossing structures.

20.3 Selecting appropriate types of fencing for different animals is recommended.

- At tortoise migration routes, use of an 18 inch to 24 inch high welded-wire mesh fence along both sides of the highway is suggested. Six inches should be located below ground to prevent tortoises from crawling under the fence. The fence can then be secured to a culvert that crosses beneath the road.
- Recommended fencing for Bighorn sheep or deer is an eight-foot high, variable expanded metal mesh fence. Metal mesh fencing fastened to metal wire is suggested. Barbed wire is unacceptable. Fencing should occur on both sides of the road and extend directly to the underpass or overpass entrance. Fencing in a wing pattern is recommended at both ends of the crossing structure, the length of which will vary depending upon specific site conditions. Fencing may end in areas that naturally deter wildlife movement. Visibility of fencing can be minimized by locating it on the downhill side when there is a cross-sectional change in grade and by using existing vegetative cover.

- Jump-outs are encouraged in areas with continuous fencing in order to provide opportunities for wildlife trapped within the road corridor to escape and return to habitat areas. Locating jump-outs adjacent to bridge structures and at a maximum interval of one mile is recommended.

20.4 The development of a monitoring system for all major wildlife crossings is suggested to document crossing use and collect data for similar projects. A negative impact on wildlife has been documented as a result of highway construction. Several studies in other states indicate significant movement and migratory disruptions have occurred. Monitoring movement and behavior at crossings and other highway locations can help improve the success of these facilities as part of ongoing inter-agency cooperative research.

20.5 Minimizing wildlife/motor vehicle conflicts is encouraged. Wildlife food and water sources (habitat decoys and guzzlers) can be established away from roadways to minimize the potential for wildlife crossing the highway. Food and water sources can also be located in proximity to habitat areas to minimize the segmentation of habitat. Reducing the attractiveness of roadsides to herbivores by planting unpalatable species is recommended.

