



# ***Design & Maintenance Guidelines US 380 Lincoln, New Mexico National Historic Landmark***

***New Mexico Department of Transportation:  
Context Sensitive Solutions Unit  
&  
Cultural Resources Bureau***

***February, 2010***



# **Design and Maintenance Guidelines US 380 Lincoln, New Mexico National Historic Landmark**

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## Abstract

The Federal Highway Administration and the New Mexico Department of Transportation (NMDOT) have proposed various improvements to US 380 within the Lincoln County Historic District from Milepost 91.5 to 102.5. This area includes the Lincoln National Historic Landmark (NHL) from Milepost 95.3 to 98.6. Individual projects within the corridor will be developed in independently-functioning phases. Preliminary engineering for all phases is sufficient for developing a project footprint and completing consultation under Section 106 of the National Historic Preservation Act. This consultation has resulted in a programmatic agreement that allows for effect determinations and mitigations to be completed as individual project phases are advanced. These design guidelines are developed in accordance with Stipulation II.C of the programmatic agreement.

The planning process for this road has been extensive and dates back to the late 1990s. At that time, the US 380 study corridor extended from Carrizozo to Hondo and included the Lincoln NHL. The results of the Section 106 consultation for this larger corridor led to a Finding of No Significant Impact (FONSI) that specifically excluded the Lincoln County Historic District pending evaluation of more contextually appropriate alternatives. In 2006, the process of developing these contextually appropriate alternatives began with the initiation of a Context Sensitive Solutions (CSS) process for the Lincoln County Historic District.

During these public CSS meetings, a decision matrix was created by the stakeholders to develop and evaluate roadway alternatives. Historic and Context Preservation was a major category of the decision matrix, with additional categories including Safety, Design, and Accessibility. Success measures for Historic and Context Preservation, the category most pertinent to the cultural landscape, included compatibility with the historic character of the community; avoiding physical deterioration; minimizing impacts to viewsheds; and minimizing impacts to the environment.

During a June 2007 public meeting with the National Park Service, the State Historic Preservation Officer (SHPO), and NMDOT District 2, it was agreed that a study of the cultural landscape was an appropriate tool for addressing these contextual concerns. Through continued discussion between NMDOT and SHPO, it was agreed that a Cultural Landscape Inventory (CLI) was needed to evaluate the integrity of the cultural landscape within the NHL and identify specific contributing features. The cultural landscape study area was defined by the administrative boundaries of the NHL and was subdivided into 95 component landscapes based on property boundaries and other definable and manageable subdivisions. Component landscapes involve land administered by the BLM, the Lincoln State Monument, private land, and NMDOT-owned right-of-way.

The CLI findings have influenced the project development throughout the preliminary design process, resulting in a recommended alternative that includes separate roadway typical sections within Lincoln and outside of the village, traffic calming measures, pedestrian enhancements, drainage improvements within the village, and the replacement of a bridge west of Lincoln. Specific treatment options for the final design of this preferred alternative are presented in the following pages. The intention of these design guidelines is to allow for the necessary travel and safety improvements while preserving the contributing landscape features and overall historic character within the NHL. While the CLI and the specific recommendations of this document are limited to the NHL, many of these recommendations can also be applied to the broader Lincoln County Historic District and should be utilized in this larger area as appropriate.

# Table of Contents

Introduction .....	1
General Goals & Objectives.....	2
Specific Maintenance and Design Guidelines .....	3
Land Use .....	3
Access .....	3
Parking Locations .....	3
Circulation Networks .....	3
Walkways and Crossings .....	3
Speed Limits .....	7
Traffic Calming Measures .....	7
Typical Section .....	9
Special Event Considerations .....	11
Vegetation Related to Land Use.....	11
Tree-thinning and Pruning .....	11
Reseeding .....	11
Noxious weed management.....	12
Buildings, Structures, & Objects .....	12
Bridges: .....	12
Retaining walls .....	13
Drainage Structures .....	13
Views and Vistas .....	13
Scenic Pull-outs.....	15
Signing.....	15
Roadway Transitions .....	16
Archaeological Sites .....	16
Avoidance.....	16
Mitigation .....	16
Small-scale Elements .....	16
Safety Barrier .....	16
Fencing.....	17
Hand rails .....	17
Cost.....	18
Record of Treatment .....	19
Bibliography .....	20
Appendix A: Visual Analysis	
Appendix B: Vegetation Management	



# Design Guidelines for US 380 through the Lincoln National Historic Landmark

## Introduction

Before its association with Billy the Kid, Lincoln was well established as a Hispanic acequia-based farming hamlet located in a valley near a perennial stream. As was common with Hispanic cordillera villages, land was divided into long and narrow *vara* strips to ensure equal access to acequia irrigation. Lincoln also exhibits a characteristic linear development along a central access route fronted by long adobe buildings clustered near a defensive structure.



Figure 1: Lincoln (Lincoln County Heritage Trust)

A later influx of Anglo settlers and cattle ranching preceded the famous Lincoln County War, culminating in an 1878 gun battle that played out largely along Lincoln's main street. The significance of these events and Lincoln's high degree of preservation contributed to a National Historic Landmark (NHL) designation in 1960.

Today, Lincoln's main street is designated US 380, a paved two-lane highway. In considering effects to the NHL from roadway projects and general maintenance, the Federal Highway Administration (FHWA) and the New Mexico Department of Transportation (NMDOT) agreed to the New Mexico Historic Preservation Officer's (SHPO) request to consider the cultural landscape within the Lincoln NHL.

While ideal to have a Cultural Landscape Report completed as a first step in project planning (Davis 2005:17), the design schedule of some US 380 projects required a phased approach. Initially, a Cultural Landscape Inventory (CLI) evaluated the landscape integrity and described features along the project corridor within the NHL (Brown and Brown 2009). Initial field results from the CLI were used during preliminary design to inform basic decisions such as the scope and placement of drainage improvements and the location of traffic calming measures. Subsequently, the CLI influenced the specific treatments presented below, which provide guidance for developing final project designs and conducting routine maintenance. In this way, the cultural landscape has influenced both the broad goals and specific designs for road projects throughout the NHL.

Additional direction for these design guidelines can be found in the draft *Lincoln State Monument General Management Plan* (Plan) (Kells and Craig 2006). The Plan identifies concerns with reconstructing the roadway, slowing traffic, addressing parking and drainage issues, as well as updating pedestrian walkways to current Americans with Disabilities Act (ADA) standards. The Plan also notes the desire, expressed through the public and the Lincoln Design Board, that the highway retain a rural character (Kells and Craig 2006:24-25). Stakeholders reiterated these concerns in additional public meetings between 2007 and 2009 (CH2M Hill 2009).

## General Goals & Objectives

The primary goal of this treatment plan is to allow for safety improvements throughout the Lincoln NHL while preserving the historic rural character of the community as well as to protect the historic structures and other character-defining features. This will be accomplished through:

1. Repair and maintenance of the existing roadway
2. Minimizing necessary safety adjustments to the roadway and structures
3. Designing required replacement structures to be consistent with surroundings
4. As needed, determine additional mitigation in consultation with SHPO

To accomplish these goals, Rehabilitation has been adopted as the primary intent of treatment. The National Park Service *Guide to Cultural Landscape Reports* (Page et al 1998:82) defines rehabilitation as:

*The act or process of making possible a compatible use for a property through repair, alterations, and additions while preserving those portions or features which convey its historical, cultural, or architectural values.*

Rehabilitation was chosen over the other NPS-defined management philosophies because of its inherent flexibility. This approach can accommodate changes in traffic volumes, fleet characteristics, and safety standards. Rehabilitating a historic roadway into a road appropriate for modern automotive travel is achieved through such adjustments as minor roadway widening, alignment improvements, and other safety updates (Davis 2005:37). The Secretary of the Interior standards for Rehabilitation are presented in the following sidebar.

### Secretary of the Interior Standards for Rehabilitation (Secretary of the Interior 1996)

1. *A property will be used as it was historically or be given a new use that requires minimal change to its distinctive materials, features, spaces, and spatial relationships.*
2. *The historic character of a property will be retained and preserved. The removal of distinctive materials or alteration of features, spaces, and spatial relationships that characterize a property will be avoided.*
3. *Each property will be recognized as a physical record of its time, place, and use. Changes that create a false sense of historical development, such as adding conjectural features or elements from other historic properties, will not be undertaken.*
4. *Changes to a property that have acquired historic significance in their own right shall be retained and preserved.*
5. *Distinctive materials, features, finishes, and construction techniques or examples of craftsmanship that characterize a property will be preserved.*
6. *Deteriorated historic features will be repaired rather than replaced. Where the severity of deterioration requires replacement of a distinctive feature, the new feature will match the old in design, color, texture, and where possible, materials. Replacement of missing features will be substantiated by documentary and physical evidence.*
7. *Chemical or physical treatments, if appropriate, will be undertaken using the gentlest means possible. Treatments that cause damage to historic materials will not be used.*
8. *Archeological resources will be protected and preserved in place. If such resources must be disturbed, mitigation measures will be undertaken.*
9. *New additions, exterior alterations, or related new construction will not destroy historic materials, features, and spatial relationships that characterize the property. The new work will be differentiated from the old and will be compatible with the historic materials, features, size, scale and proportion, and massing to protect the integrity of the property and its environment.*
10. *New additions and adjacent or related new construction will be undertaken in such a manner that, if removed in the future, the essential form and integrity of the historic property and its environment would be unimpaired.*

## Specific Maintenance and Design Guidelines

The following treatment recommendations were developed in consultation with SHPO, New Mexico State Monuments, and the National Park Service (NPS). They are intended to meet the Secretary of the Interior's Standards for Rehabilitation of Historic Properties. The treatment recommendations are organized by landscape characteristic with only the characteristics most pertinent to the roadway addressed.

### **Land Use**

Land Use is the organization, form, and shape of the landscape in response to land use (Page et al 1998:53). Contributing features that pertain to this characteristic include agriculture, ranching, and heritage tourism. Farming and ranching are evidenced by field boundaries and acequias in and around Lincoln that are still present while heritage tourism is seen in the development of the Lincoln State Monument with its multiple historic buildings open to the public and re-enactments of historic events (Brown and Brown 2009).

Acequias and fields will be addressed through avoidance as they are primarily located outside of the US 380 right-of-way. Heritage tourism however is much more entwined with the roadway and requires additional consideration of access and parking locations.

**Access:** Existing access will be maintained to all historic structures and businesses while maintaining US 380 as a safe and efficient transportation facility.

**Parking Locations** are also a major consideration. Currently, there is very little restriction for on-street parking and off-street parking locations are found only at the Courthouse, on the west end of Lincoln, and the Visitors Center, in the middle of town. NMDOT will work closely with the Bureau of Land Management to assist with their plans to develop additional off-street parking on the north side of US 380 near the Courthouse.

Additional considerations will involve limiting on-street parking near buildings of major historic significance. These buildings include the

Courthouse, the McSween house lot, the Torreon, Luna House, and Montano Store. Limited-time parking would be allowed in front of the Tunstall store as it currently functions as a post office. Similarly, the Wortley is a historically significant building and a privately-owned business. As such, the owner will be consulted on whether or not to allow on-street parking in front of the building. Parking will not be restricted in front of private residences. A map showing the parking prescription is presented in Map 2 below.

No-parking locations will be indicated in ways designed to blend with the rural and historic character of the community and reduce the amount of modern signage required. Examples would include bollards reminiscent of hitching posts as seen in Map 2 below.

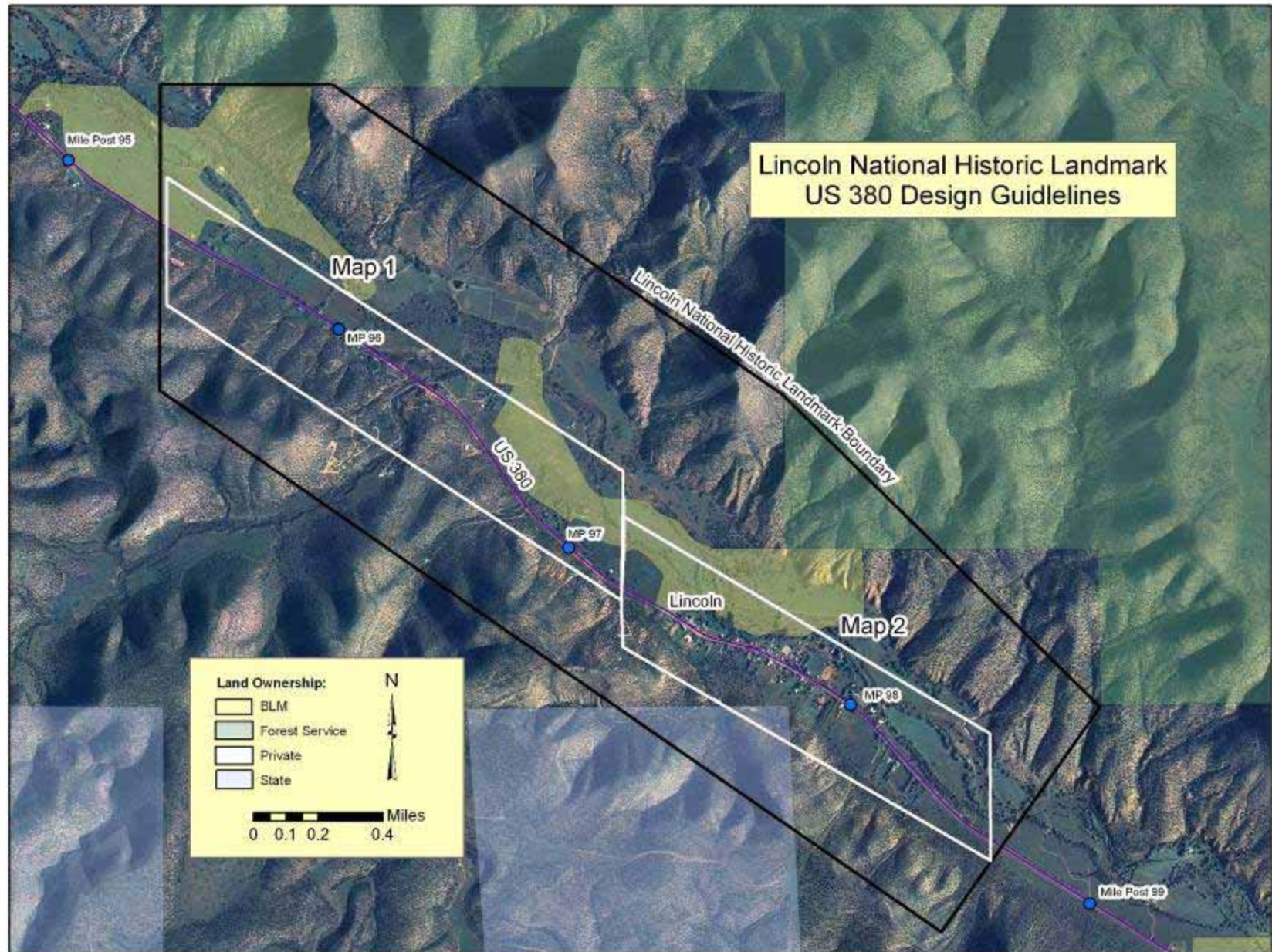
### **Circulation Networks**

Circulation Networks are spaces, features, and materials that constitute systems of movement (Page et al 1998:53). Contributing features that pertain to this characteristic include canals, pathways, and of course, US 380 itself (Brown and Brown 2009).

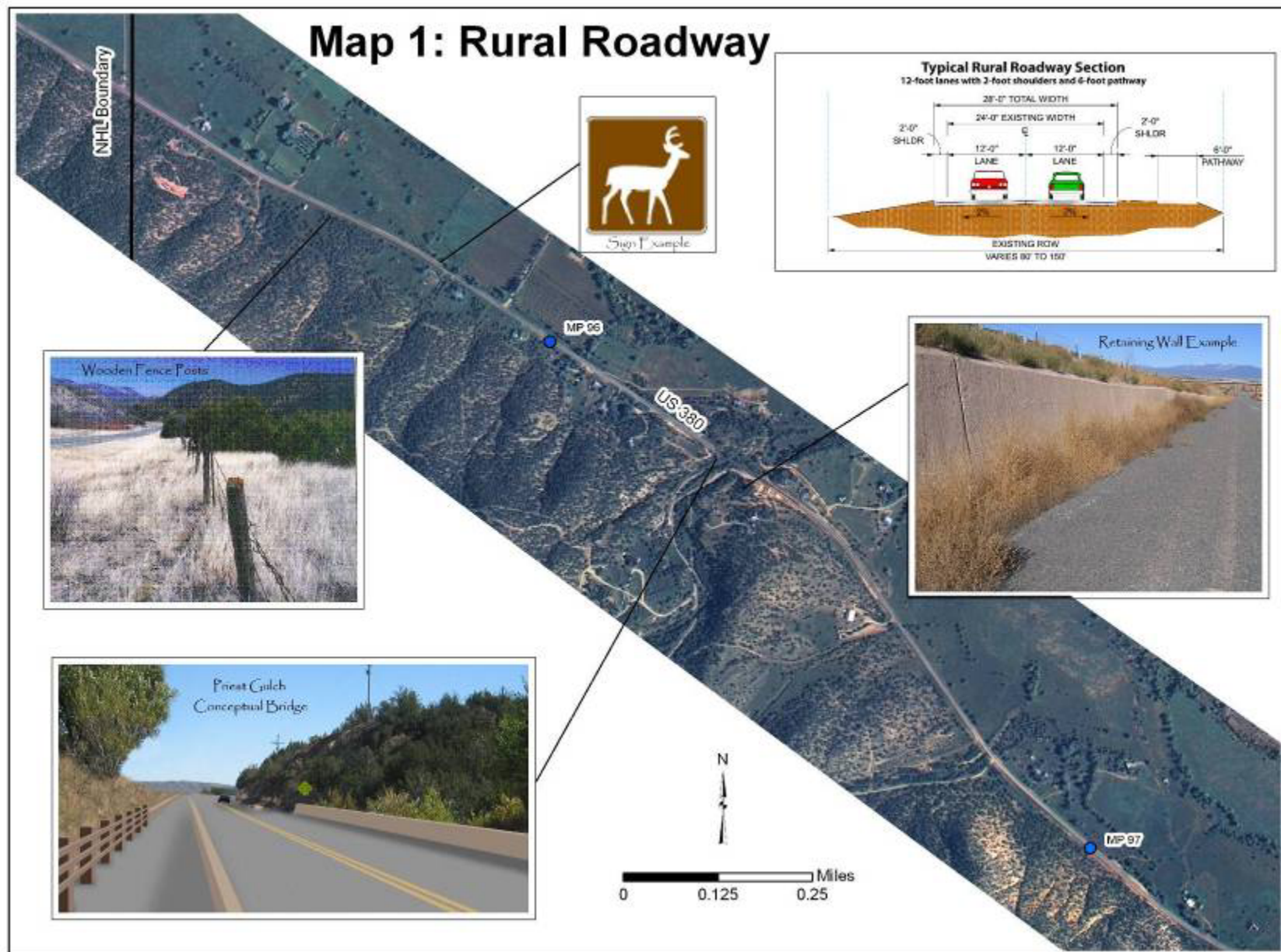
Pedestrian considerations are a primary concern in Lincoln. Pedestrians, both local and tourist, currently cross the street, photograph buildings, and generally circulate in a fashion that conflicts with vehicular traffic. The resulting treatment recommendations include pedestrian walkways and crossings, speed limits, additional traffic calming, and the roadway typical section.

**Walkways and Crossings** are a critical component of the Lincoln circulation system. ADA-compliant trails using native crushed aggregates bound with polymers have been successfully used elsewhere by NPS and United States Forest Service (USFS) (Figure 5).









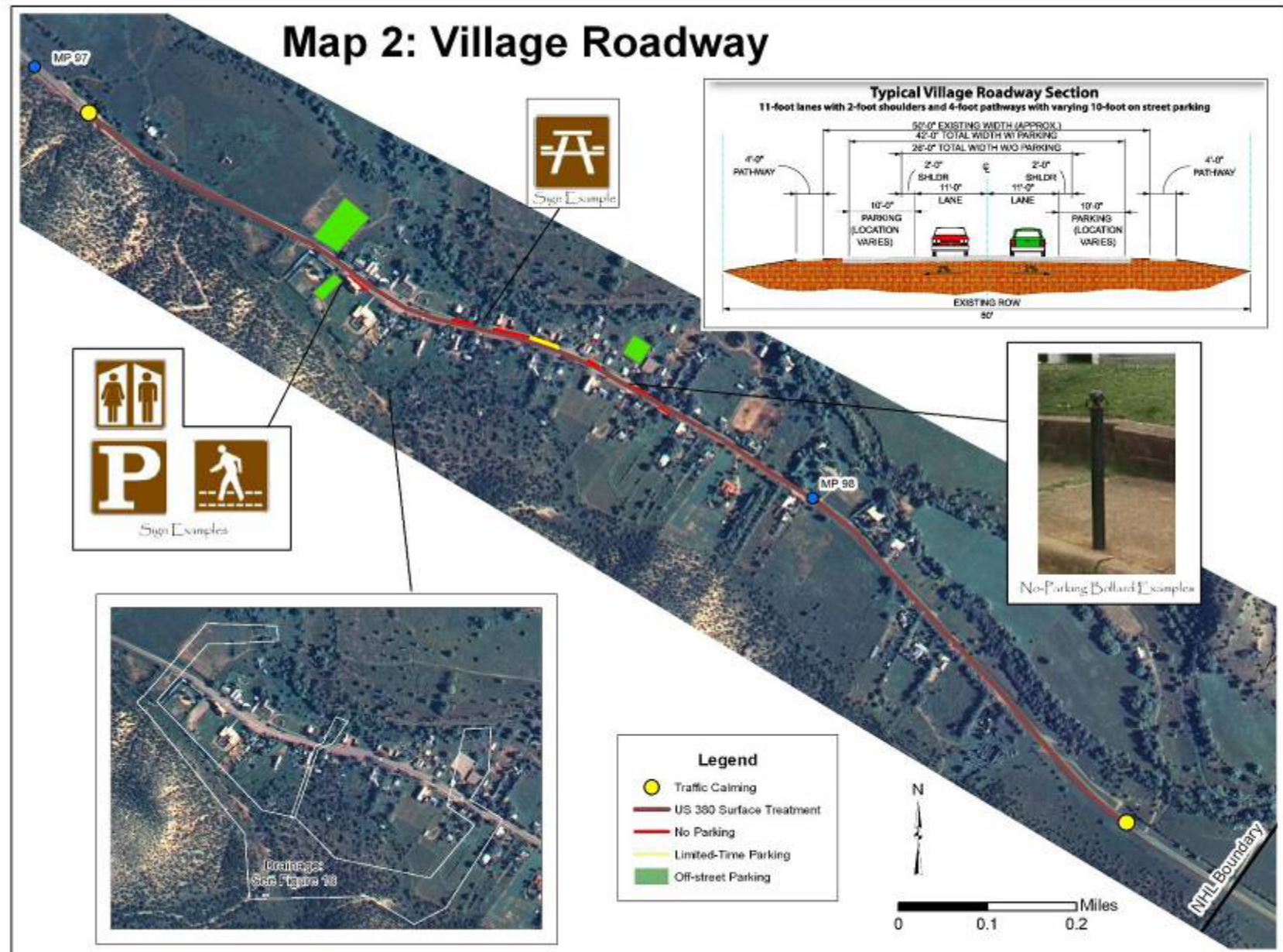






Figure 4: ADA-compliant trail (Bergmann 2000)

Such use in Lincoln could unobtrusively provide off-roadway pedestrian and wheelchair means of accessing historic structures and places. These could tie to similarly-constructed trails on adjacent private or state monument lands so that a seamless pedestrian circulation system would be in place.

Such trails may qualify for FHWA Transportation Enhancement (TE) funding under the provision for 'facilities for pedestrians and bicycles'. Applications for these funds can be championed by a local government agency such as Lincoln County. See <http://www.fhwa.dot.gov/environment/te/1999guidance.htm> for additional information.

Pedestrian road crossings are also essential to any pedestrian circulation system. Providing clearly-defined crossings at critical locations with appropriate signage for both pedestrians and motorists will need to be considered as part of a comprehensive approach. Further discussion concerning signage is provided in the Views and Vistas section of this report.

**Speed Limits** within the village currently range from 30-35 mph. A reduction in speed to 25-30 mph, along with other traffic calming measures discussed below, will help reduce vehicle/pedestrian conflicts. Furthermore, the resume speed signs will be placed far enough out of the village so motorists do not prematurely return to a higher speed.

**Traffic Calming Measures:** The need for traffic calming is accentuated by heavy truck traffic that speeds through Lincoln. To address this issue, the option of building a bypass around Lincoln was evaluated. However, a Lincoln bypass would still be located within the NHL and would involve a tremendous amount of disturbance to this environmentally pristine and culturally significant area. For these reasons, the bypass option was not considered feasible (CH2M Hill 2009:4-14).

The option of requiring trucks to use routes other than US 380 was also considered. A precedent for this exists in Pennsylvania where trucks were banned from a portion of US 209 through the Delaware Water Gap National Recreation Area. This action was not easily achieved and required an act of Congress during the Regan Administration (Philadelphia Inquirer 1983). The NMDOT design team discussed the option of a US 380 truck ban with Transportation Commission Chairman Johnny Cope in 2008. The Chairman did not support the request because the alternative routes (US 70 and NM 48) already have a higher average daily traffic count, would cause longer truck routes, involve more difficult horizontal and vertical grades, and the alternative routes travel through several incorporated communities. For these reasons, a truck ban is not considered feasible.

With the bypass and truck ban options unattainable, the need for traffic calming through the village became clear. Traffic calming is defined as a combination of mainly physical measures that reduce the negative effects of motor vehicle use, alter driver behavior, and improve conditions for non-motorized street users. Traffic calming measures evaluated here include transverse rumble strips, speed feedback signs, traffic islands at the village entrances, converging chevrons, traffic cameras, and lane narrowing within the village. The pros and cons of each traffic-calming type are presented below.



*Transverse rumble strips* are a series of travel lane pavement strips altered in various ways so as to cause the tires of a passing automotive vehicle to vibrate audibly as a warning of a road hazard (Figures 5 and 6).



Figure 5: Rumble strips (FHWA)

They have been found to reduce speeds by up to 2 mph (FHWA 2009). The primary concern with this technique is the additional noise produced when cars drive over them. While additional noise could potentially conflict with attempts to interpret historic events in Lincoln, additional research has shown noise resumes to normal levels within 250 ft (Finley and Miles 2007). The placement of transverse rumble strips could be placed 250 ft beyond the village where most historic interpretation will take place.

*Speed feedback signs* are signs that give real-time feedback of a vehicle's actual speed to the driver (Figure 7).

Speed feedback signs have proved effective in other rural settings in New Mexico. Although a modern contrivance at odds within an historic setting, if placed in outside the village setting the signs could still



Figure 7: Speed feedback sign

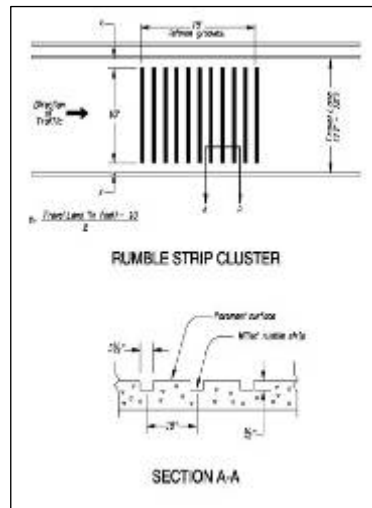


Figure 6: Rumble strip

prove effective. Speed feedback signs have still been shown to reduce the average rate of speed by up to 7mph. (FHWA 2009) There are many options available to customize these to a particular locale.

*Traffic islands* are raised areas in the center of a street built to separate lanes of traffic and allow pedestrians to wait safely until they can cross (Figure 8).



Figure 8: Traffic island

Islands have been found to reduce speed by 5-10 mph in Leeds, UK (United Kingdom Traffic Bureau). While additional noise is not an issue with traffic islands, there is a concern with the visual intrusion and its potential to conflict with historic interpretation. Traffic islands could be incorporated without widening the road or increasing the height by more than 1 ft yet they do constitute a new visual element within the landscape. The visual analysis maps in Appendix A indicate that the traffic islands may be visible from historic buildings. While a 1 ft high by 2 ft-wide island would be minimal element, it still presents a concern expressed by various stakeholders.

*Converging chevrons* are painted chevrons in the travel lane typically spaced so that the driver is given the perception that they are speeding up (Figure 9). This encourages driver to slow down. The chevrons also alert drivers that they are entering a different

area. They are a low cost solution and have been used in work zones and along horizontal curves to slow speeds.



Figure 9: Converging chevrons (FHWA)

They have been found to reduce speed by up to 2 mph (FHWA 2009). While the chevrons do not represent a 3-D element, they are visually prominent and, by nature of their design, require an extensive length to be effective. As with the traffic control islands this could cause conflicts with historic interpretation.

One additional traffic calming measure would be traffic cameras that can photograph speeding vehicles and send a ticket to the driver in the mail. While potentially an effective traffic calming measure, there are some legal questions about using these cameras in a non-incorporated community. Pending resolution of legal ambiguities, the placement of any such measures should be carefully considered so as to be visually unintrusive within the Village of Lincoln.

Based on the above analysis, ***transverse rumble strips combined with speed feedback signs (placed more than 250 ft outside the village) would be the most effective and contextually sensitive traffic calming techniques.*** Potential placement of these items is indicated as “traffic calming” locations shown earlier on Map 2.

Lane striping and surface coloration that affect the appearance of a narrow roadway may also provide a slight traffic calming effect.

These considerations are presented in the typical section discussion below.

**Typical Section** can be referred to as the roadway prism or cross section and is composed of a vertical slice taken across a typical segment of the road (Davis 2005). Characteristics include lanes, shoulders, tapers, and drainage channels and toe of slope (Wallace 2004:20).

Taking into consideration the input from the general public, the historic nature of the village, as well as the current and projected roadway traffic, two different typical sections were developed. The first is for the village itself and the second is for the area outside the village. In addition to the physical dimensions of the typical section, treatments such as shoulder width, pavement coloration, and routine pavement maintenance are also discussed.

*Physical dimensions* of both the village and rural typical sections are presented in Figure 10 below. The village typical section includes two 11-ft driving lanes, 2-ft shoulders, a 10-ft parking areas (2-ft paved and 8-ft gravel) in selected locations, and separate 4-ft pathways on either side.

In contrast, the rural typical section includes two 12-ft driving lanes with 2-ft shoulders and a separated 6-ft pathway on the north side of the road.

*Narrow roads and shoulders* have the support of the local population in that they maintain a ‘country road’ feeling while maintaining requisite safety. The inclusion of a parallel multi-use trail tying into the Bureau of Land Management (BLM) Ft. Stanton trail system would be an effective way of incorporating multi-use needs of bicyclists and pedestrians. Such a trail would need to have appropriate surfacing and measures, such as bollards, to discourage all-terrain vehicle (ATV) use.

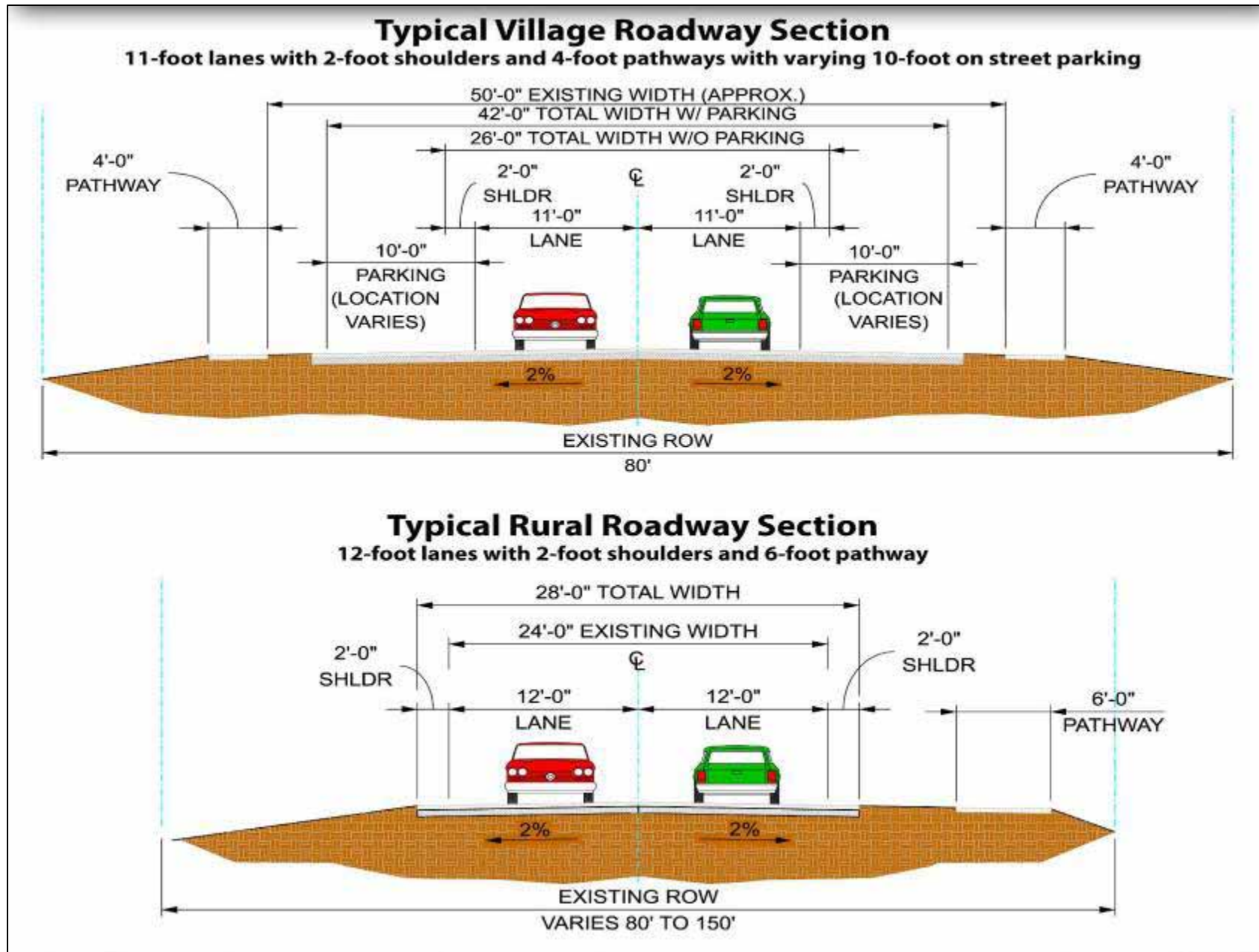


Figure 10: Village and rural typical sections (CH2M Hill 2009)



*Rustic paving* has been discussed as a measure to reflect the historic nature of Lincoln (Figure 11). The Lincoln Plan for Preservation and Growth (1974:31)



Figure 11: Rustic Paving (FHWA)

expresses a desire to return US 380 to a dirt road. While this is not an option NMDOT would consider, a rustic pavement may more closely approximate the original roadway surface and still provide adequate safety and performance. Using earth-colored aggregates as a chip-seal finish or the

coloration of an asphalt binder would supply the requisite engineering functionality while providing a surface most similar to the original dirt roads found in Lincoln before macadam became widely used.

*Routine maintenance* is necessary to maintain a safe facility and extend the life of the roadway. These activities center on re-striping the side and center-lines which wear over time, sealing cracks which cause pavement deterioration, and occasionally chip-sealing the surface to extend pavement life. While this routine maintenance is not expected to change the character of the roadway, care should be taken to match the chip-seal color within the village. Likewise, cracks should be sealed with a clear epoxy to avoid visual pollution and restriping should not change lane or shoulder width.

### Special Event Considerations

Special community events such as the annual Old Lincoln Days can create special parking, pedestrian crossing, and speed control considerations. Temporary in-street pedestrian signs (Figure 12) at established crosswalks along with



Figure 12: Temporary signs

other considerations can address these concerns. A special use permit, issued by NMDOT District 2, will likely be required to implement these treatments. NMDOT can work with the Old Lincoln Days sponsor, the Lincoln Pageant and Festival Corporation, to develop a permit application that could be re-submitted in subsequent years.

### Vegetation Related to Land Use

Vegetation related to land use includes indigenous or introduced trees, shrubs, vines, ground covers, and herbaceous materials (Page et al 1998:53). Contributing features that pertain to this characteristic include ornamental trees and shrubs, orchards, pastures, and gardens (Brown and Brown 2009). The following considerations are presented for the roadside vegetative environment.

**Tree-thinning and Pruning** in the right-of-way outside of village should follow the prescription in Appendix B. This prescription is designed to maintain a rural feel by letting some trees remain while removing enough to increase visibility and allow for a safe recovery area immediately adjacent to the roadway.



Figure 13: Example of tree thinning and pruning

**Reseeding** after project construction should use native vegetation as indicated in the example plan presented in Appendix B.

**Noxious weed management** includes addressing the Musk thistle, Fuller's teasel, and poison hemlock located in the right-of-way (Marron and Associates 2009). These Class B noxious weeds, are non-native plants and are inconsistent with Lincoln's Period of Significance. As such, they will be treated with herbicides according to normal District 2 practices. This treatment will be limited to only those areas where the weeds are present

Siberian elm, saltcedar, and field bindweed are Class C noxious weeds. These plants are not native but are well established in the area. Also, in the case of Siberian Elm, their establishment began during Lincoln's Period of Significance and they provide shade and contribute to the rural character of the area. Removal of these plants should only be undertaken if they are being replaced with native trees. Prior to any tree removal, a specific vegetation plan will be presented to the Lincoln Design Board and SHPO.

Routine roadside mowing will be an element of each of the above considerations. Mowing next to the roadside will keep trees and shrubs from growing too close to the road, preserve the viewshed, and minimize the amount of grass available as forage or wildfire fuel.

### ***Buildings, Structures, & Objects***

Buildings, structures, and objects are three-dimensional constructs such as houses, barns, garages, stables, bridges, and memorials (Page et al 1998:53). Contributing features that pertain to this characteristic include several of the Lincoln residences, schools, churches, outbuildings, canals, culverts, and bridges (Brown and Brown 2009). Within the roadside environment, treatment is considered for bridges, retaining walls, and drainage structures.

**Bridges:** The Priest Gulch Bridge, located within the NHL and west of Lincoln, is in need of replacement. The bridge was determined not to be a contributing landscape feature and the need for replacement was such that the final design preceded these guidelines. Nonetheless, the cultural landscape was considered in several ways during project design:

- Expansive slope retaining walls were eliminated from the original design in order to avoid creating a new visual element.
- The original length of roadway approach work was drastically reduced and the existing roadway prism was matched so that the remaining roadway within the NHL would not be pre-determined.
- Weathered guardrail and natural-toned concrete barriers will be used to better blend with the landscape and meet driver expectations for a rural roadway.

The wall barrier used to separate the bridge travel lanes from the adjacent pedestrian path will be 42 inches tall (Figure 14). Despite the natural-tone concrete color, the barrier height will still take away from the traditional bridge-crossing experience in which one can see the adjacent land. However, due to the amount of truck traffic on the road, this barrier height is necessary to protect against trucks with a higher axle height and center of gravity.



Figure 14: Priest Gulch Bridge (CH2M Hill).

A second bridge, Structure No. 8534, spans the Rio Bonito east of Lincoln. This bridge, built in 1984, is currently in good condition and there are no near-term plans for rehabilitation or replacement. While located outside of the NHL, the bridge is on the eastern boundary of the county-defined Lincoln Historic District and many of the same design elements should be considered as this bridge eventually will require rehabilitation or replacement.

**Retaining walls** would ideally not be needed within the corridor. Rather, slopes would be graded to mimic natural grades whenever possible. A geotechnical analysis indicates some level of slope adjustment will be needed near Priest Gulch and other areas in the corridor (Lommler 2009). In these areas requiring structural help, geotextiles and naturalistic gunnite applications compose the preferable option.

If retaining walls are absolutely necessary, using a stepped-series of smaller walls, as seen below in Figure 15, is the next favorable option. A sheer wall is the least desirable option but may be necessary due to limited right-of-way or other unique engineering concerns. The overall appearance of any wall will be complimented with a natural-toned surface color (see Map 1 above) or a texturized finish copied from an existing wall in the Lincoln vicinity.

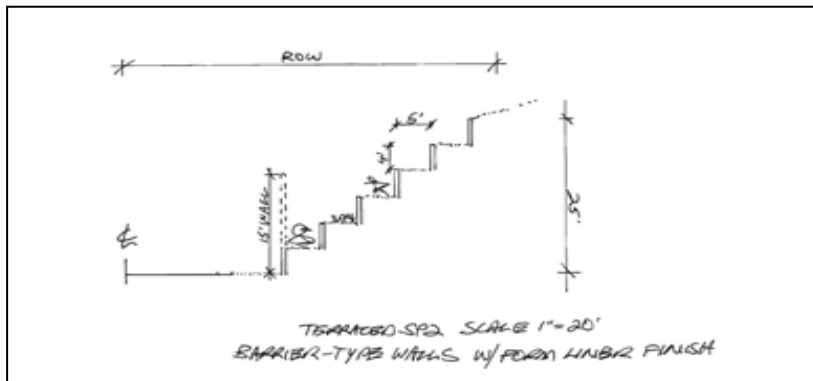


Figure 15: Terraced retaining wall

Existing rock walls along pedestrian paths will be maintained and additional new ones could be constructed, if needed, as part of pedestrian pathway accommodation.

### Drainage Structures

Several historic drainage rock headwalls are located throughout the US 380 corridor. These drainage headwalls should be avoided and preserved in place. The routine maintenance that will be needed to periodically clean out these structures will not affect the structures in any way.

Protecting the historic buildings of Lincoln from flood has been a constant concern for several years (State Planning Office 1974, Kells and Craig 2006, CH2M Hill 2009). This need to address drainage in the village is balanced with visual, historic building, and property owner concerns. An extensive analysis found drainage swales to be the only feasible option for safely directing runoff from the hills to the south of Lincoln into the Rio Bonito on the north side of Lincoln.

The need to provide optimal flood control while considering the concerns listed above resulted in a recommendation of a channel extending northwest from the slopes behind the Courthouse and a second channel beginning from the same point and extending northeast, crossing US 380 near the Luna house and Lincoln State Monument Visitor's Center (Figure 16). The northwest channel would have a top width of 35 ft, a bottom width of 5 ft and 3:1 slopes while the northeast channel would have a 37-ft top width, 5-ft bottom width and 4:1 slopes. Limited maintenance work will also be needed on an existing channel that runs through the Lincoln Park, in between Dr. Wood's office and Dr. Watson's house. Together, this drainage work will convey 80% of the 100-year flood.

These drainages would have permeable surfaces so that herbaceous plant material can 'cloak' the swales to the extent possible and make them visually merge into the adjacent fields and pastures. Also, Figure 16 shows how the Luna House/Visitors Center crossing would be visually masked by a small knoll behind the Montoya Store. NMDOT will coordinate extensively with the Lincoln Monument to ensure parking and access to the Visitors Center are maintained during construction.

### Views and Vistas

Views and vistas are features that create or allow a range of vision which can be natural or designed and controlled (Page et al 1998:53). Contributing features that pertain to this characteristic include adjacent grass and juniper/pinon-covered hillsides, as well as views of agricultural and grazing fields and orchards (Brown and Brown 2009). Within the roadside environment, treatment is considered for scenic pull-outs, signage, and roadway transitions.



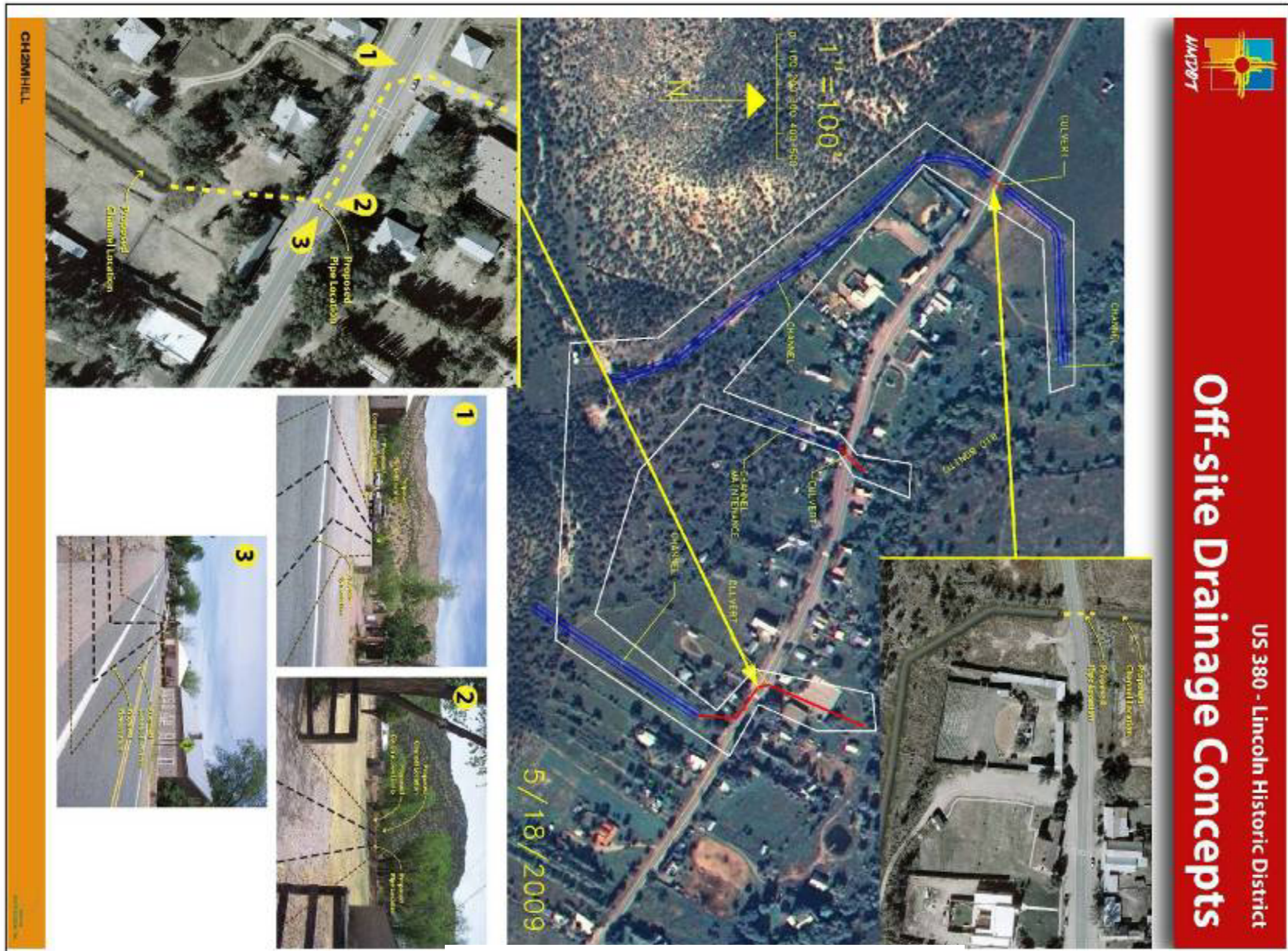


Figure 16: Offsite Drainage Concepts (CH2M Hill)

**Scenic Pull-outs:** Inherent in the design of roads with narrow shoulders such as is proposed in the Lincoln Historic District is the need to have vehicular pull-outs so that visitors can stop to enjoy scenic views and have their vehicle safely out of the travel lanes. The pull-outs would be placed at appropriate intervals and consist of extended shoulder widths up to 8 ft for discrete lengths. The pull-outs would also have the added benefit of providing a safe place for traffic speed enforcement pull-overs. Such pull-outs can also qualify for transportation enhancement or scenic byway funding under provisions for scenic and historic highways.



Figure 17: Scenic Pull-out

**Signing:** To preserve views, signage should be minimized and centralized, focused on entry areas and at each end of the village. The NM 300 project north of Santa Fe conducted a signing analysis and found that they were able to reduce the square footage of signs from an originally proposed 300 sq ft down to 200 sq ft (NMDOT 2006). A similar analysis will be undertaken as each phase of the US 380 corridor is further developed. Included in the square footage should be 'cultural attraction' signing as allowed by the Manual of Uniform Traffic Control Devices (Figure 18). These signs

blend well with surrounding elements and increase awareness and appreciation of the area's historic significance. This is in contrast to flashing warning signs, which should be kept outside of view from the village if needed.

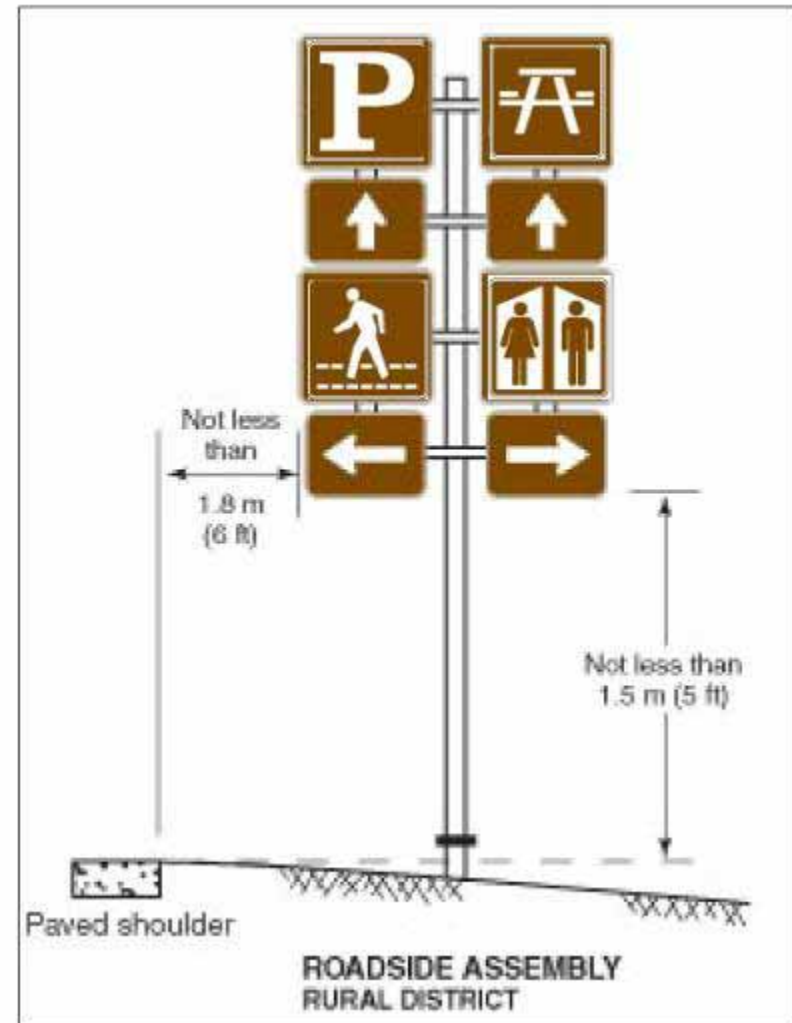


Figure 18: Cultural attraction signage (adjusted from MUTCD)



**Roadway Transitions** from paved shoulder, to right-of-way, to pedestrian path should be soft and gradual (Figure 19). This transition is characterized by the use of rustic pavement, unpaved gravel parking areas, crushed-aggregate pedestrian path, retention of native vegetation, and the absence of curb-and-gutter.



Figure 19: Gradual transitions from shoulder to path (Art Interlink)

## Archaeological Sites

Archaeological sites contain surface and subsurface remnants related to historic or prehistoric land use (Page et al 1998:53). Several archaeological sites, including historic ruins, abandoned acequias, and prehistoric remains, are located adjacent to the roadway (Brown and Brown 2009). Avoidance is the preferred treatment option with archaeological mitigation proposed when avoidance is not achievable.

**Avoidance** would be achieved by modifying the project design, to the extent possible, so as to stay out of the site boundaries.

**Mitigation** would be undertaken if a site cannot be avoided. FHWA will develop an appropriate treatment plan in consultation with SHPO and other agencies, as stipulated in the Lincoln Programmatic Agreement.

## Small-scale Elements

Small-scale elements are elements that provide detail and diversity combined with function and aesthetics (Page et al 1998:53). Contributing features that pertain to this characteristic include cellars, cisterns, some commercial signs, old farm equipment, some fences, 1920s vintage fire hydrants, historical signs, and masonry walls (Brown and Brown 2009). Within the roadside environment, treatment is considered for guardrail, fencing, and hand rails.

**Safety Barrier**, such as the weathered guardrails or cable barriers used on US 70 and NM 300 respectively, would be appropriate for any location needing safety barrier. Weathered guardrails (Figure 20)



Figure 20: Weathered guardrail

have the advantage of appearing aged while still providing safety. Cable barriers (Figure 21) present very little



Figure 21: Cable Barrier

visual impediment to scenic vistas yet provide the requisite safety. Either barrier type may be more appropriate in a given situation.



**Hand rails** for the foot path, if needed, and the bridge are an additional consideration. The railing should be as unobtrusive as

Diagram illustrating the Elevation View of Rail, showing various components and dimensions:

- Dimensions:**
  - Variable segments: (10'-0" MAX.)
  - 1" STD. PIPE HANDRAIL (1.315" O.D.) @ 36" FROM GRADE (MAX.)
  - Variable segments: (10'-0" MAX.)
  - Variable segments: (10'-0" MAX.)
- Components:**
  - 2" STD. PIPE GUARD RAIL (2.375" O.D.)
  - 1/2" E BRACKET
  - KICKER BAR
  - EXPANSION JOINT INSERTS
  - TYPICAL 1/8"
  - 1/2" E BRACKET
  - KICKER BAR
  - FINISH GRADE (EMBEDMENT)
  - 1'-0"
  - SLOPE
  - NOTE: POSTS TO REMAIN VERTICAL, RAIL PARALLEL TO GRADE.
  - SEE SHEET 3 FOR FOUNDATIONS DETAILS.
  - FINISH GRADE

US 380 Design Guidelines, Lincoln New Mexico

## Cost

Treatment plan options range from the simple to the complex. Many have costs which are not easy to identify as they are part of a larger design solution (such as the typical roadway) or they are such a routine cost of doing business for the DOT that they do not merit special mention (such as striping). Following are particular treatment plan options which do have identifiable costs either absolute or relative to standard practices.

### *Land Use*

In keeping with the typical section, **parking** in this village setting could be comprised of a basecourse or paved surface. Similarly, no-parking areas could be denoted with bollards. Bollard styles range from the strictly utilitarian, such as wooden or steel posts imbedded in concrete, to the more elaborate which might include lighting or removability options. With a minimum of three utilitarian bollards per location, a basecourse parking spot would be approximately \$750-1,250 per regulation (10' X 20') spot. A paved spot would be in the \$6,000-\$8,000 range

### *Circulation Networks*

ADA-compliant **multi-use trails** in the village setting approach the cost of more urban treatments, such as concrete, however would be more visually and tactilely appropriate. Current costs are about \$75 per linear foot of run for a 5' wide path with a flush metal edging treatment.

**Rumble strips** as a traffic calming technique are inexpensive. Recent FHWA data suggests a cost of approximately \$0.40/LF or approximately \$30 a 6-strip set plus set-up charges.

**Speed feedback signs** have many potential options, the simplest can cost approximately \$1,500 installed not including the cost of getting power to them. Solar power supplies are available at extra expense.

**Rustic paving** is a unique solution for small applications and can cost 2-3 times more than traditional paving solutions. This additional cost is mitigated somewhat by limiting the rustic paving to the surface treatment only and focusing on the minimal typical section found within the village (11-ft lanes and 2-ft shoulders).

Portable **special event** signage (image on pg.13) can cost as little as \$50 per sign.

### *Vegetation Related to Land Use*

**Tree thinning** for safety reasons in the roadside environment entails removing lower branches or entire trees over 6" in diameter within the clear zone. Commercial rates for such thinning can run \$1,000-\$2,000 an acre.

**Revegetation** expenses vary depending on the terrain which is being treated. Class 'A' seeding is used only on relatively flat land and averages \$1,300/acre while the more intensive steep slope seeding can run \$8,400/acre

### *Buildings, Structures, and Objects*

**Bridges** are complex structures with many possible constituent parts. The Priest Gulch bridge has an estimated budget of \$1.3 million.

**Retaining walls** have a wide range of application and styles which influence their cost. In this context the challenges of working in a sensitive roadside environment can escalate the cost of work. Generally poured-in-place steel-reinforced concrete retaining walls with appropriate footings and aesthetic treatment can run \$50-60 per square face foot.

**Drainage** solutions proposed for the village area would require finalization before realistic cost data could be assigned. While a placeholder of \$500,000 was originally assigned to this project, the final cost could be 2-3 times this amount depending on options chosen.

## ***Views and Vistas***

**Scenic pull-outs** function as an extension of the roadway and typically include paving and striping. The approximate cost of a simple 5 car pull-out contiguous to the road would be approximately \$30,000. Interpretative signage or trash receptacles could add an additional \$5,000 to the expense.

Cultural attraction **signage** can reduce overall signage costs by centralizing formerly free-standing signs. A typical 5 or 6-arm sign can cost approximately \$300-400.

## ***Archaeological Sites***

Archaeological excavation can vary widely depending on site characteristics and how much of the site will be impacted. Costs can range from \$80,000 to over \$300,000 and should be considered relative to the potential design, right-of-way, and construction costs required to avoid or minimize impacts.

## ***Small-Scale Elements***

Proposed **safety barriers** range from weathered guardrail to wire cable and the installed costs run from \$13 to \$20 per linear foot respectively.

**Fencing** within the NHL usually means replacing like with like. Thus, wooden posts with barbed wire or a game-oriented wire is appropriate. The costs of fencing can run from \$3 to \$5/LF

Pedestrian **handrails** are part of the Priest Gulch Bridge design and may be useful in the village setting along walking paths where grades require. Simple utilitarian railings can run \$100 per linear foot.

## **Record of Treatment**

The record of treatment establishes an account of all physical changes to the cultural landscape resulting from treatments recommended in these design guidelines. Consultation under Section 106 of the National Historic Preservation Act (NHPA) will be

sufficient to record the treatment, especially since the US 380 corridor will be developed over an extended time period (Page et al 1998:121-122).

The NHPA requires a federal agency to consider the effects of proposed projects to historic properties. Over time, these letters will track the incremental changes and adjustments to the roadway. For any projects that may not involve federal funds, consultation will still be completed as part of the New Mexico Cultural Properties Act, maintaining a complete record of project activity for the corridor. These consultation letters, along with final design plans will be included as an addendum upon completion of NHPA consultation as each project is developed.

As this record begins to develop NMDOT will provide periodic updates to the Lincoln Design Board, at intervals of their request, concerning maintenance and construction activity. Similarly, NMDOT will ensure local maintenance crews are aware of the guidelines and operate within these recommendations.



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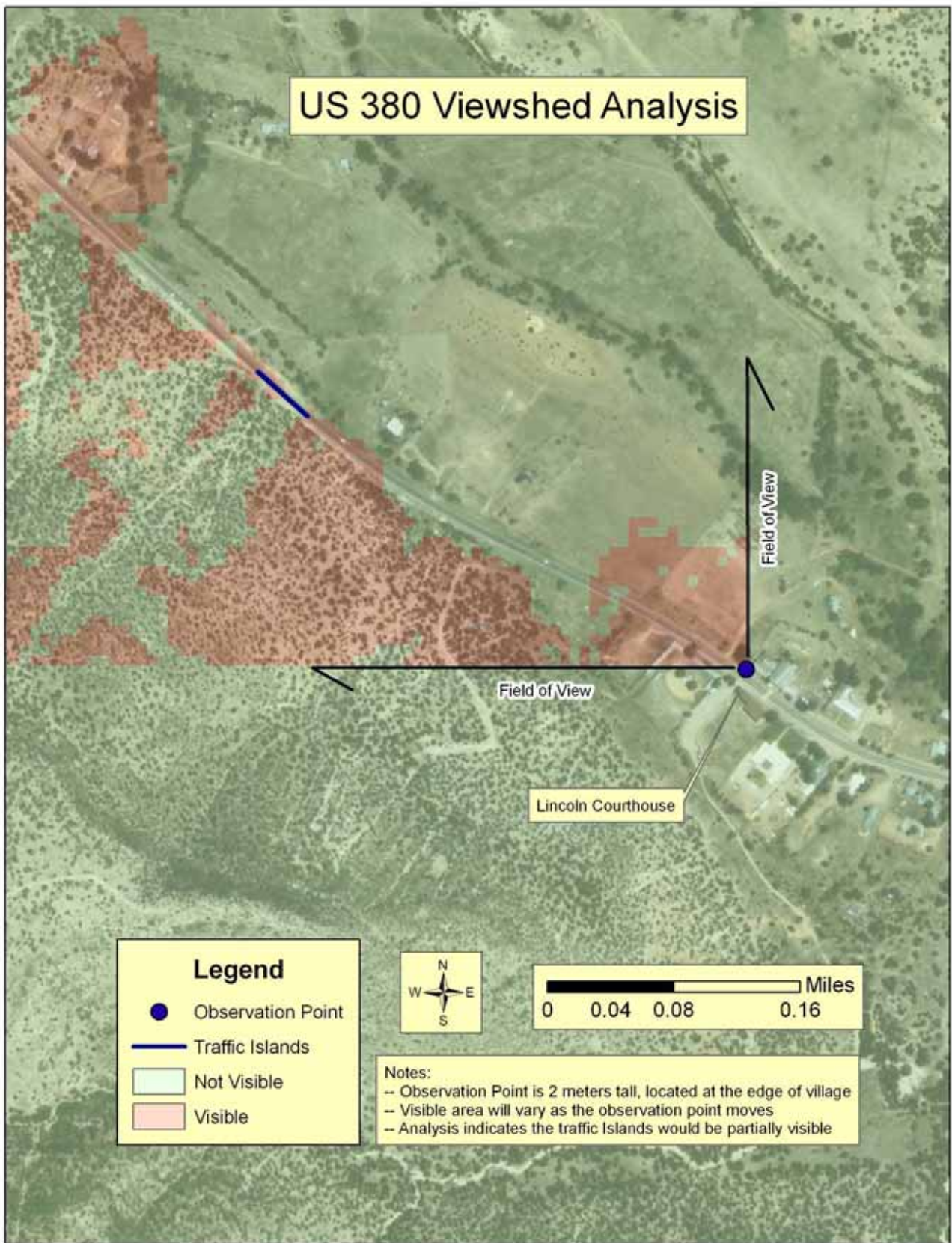
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## **Appendix A: Visual Analysis**

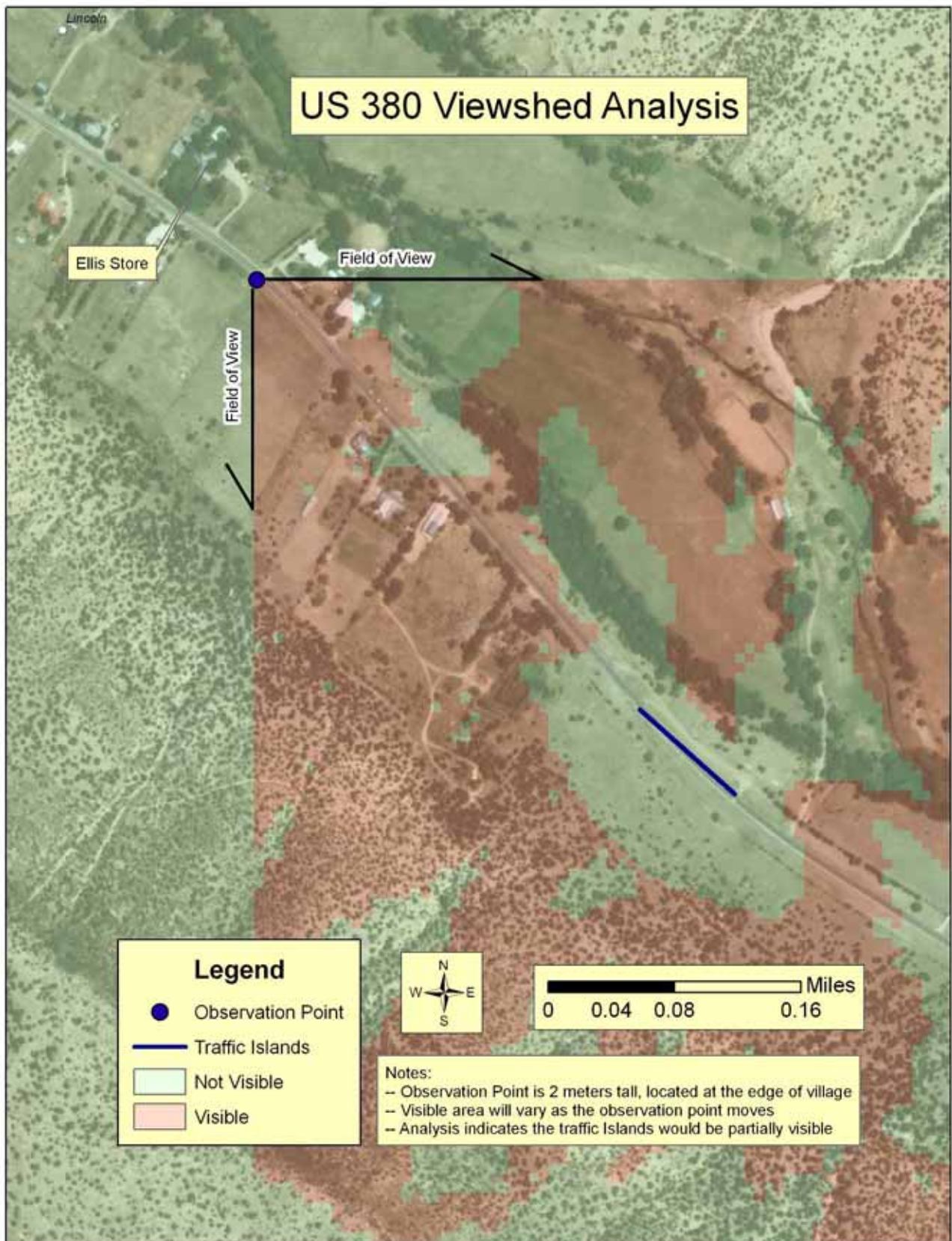


## US 380 Viewshed Analysis





## US 380 Viewshed Analysis



## **Appendix B: Vegetation Management**



# **Description of Tree-Thinning Work Along US 380, Lincoln Historic District**

1. An area extending 30 feet south of the white shoulder stripe will be defined as the Recovery Zone. In this zone:

- All trees, brush, and existing stumps will be removed.
- Existing and new stumps will be removed to 4 inches or less above ground level.

2. From the outside edge of the Recovery Zone to the right-of-way fence will be thinned. Thinning will include:

- Removal of all existing brush.
- Removal of trees with less than a 9 inch diameter at breast height (DBH).
- Leave trees will be spaced no closer than 30 feet from each other.
- Leave trees will be pruned to variable heights from 5 feet to 7 feet above ground level.

3. Additional considerations include:

- Wood over 5 inches in diameter will be stacked and offered for personal or commercial use. Wood stacks shall not exceed two feet in height, 10 feet in length and four feet in width. A minimum distance of five feet will be left between stacks. Stacks will be placed no closer than 30 feet from the white shoulder stripe of the road.
- Remaining slash and wood will be removed, chipped and removed, or chipped and spread on disturbed soils to minimize erosion.
- All equipment will be rubber tired or rubber tracked to minimize ground disturbance.
- No tree removal will be allowed within the cultural resource sites noted on the Environmental Commitments Sheet.

**REVEGETATION/EROSION CONTROL PLAN**  
**CN-CD206 Priest Gulch Bridge Lincoln County, NM**  
**Class "A" and Class "C" Seeding**

**A. ERODIBLE SURFACE AREA**

ALL REQUIREMENTS OUTLINED IN THE FEDERAL ENVIRONMENTAL PROTECTION AGENCY (EPA) NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES) AND THE NEW MEXICO CLEAN WATER ACT SHALL BE STRICTLY ADHERED TO DURING THE COURSE OF CONSTRUCTING THIS PROJECT. EXPOSED AREAS OF DISTURBANCE SHALL BE KEPT TO A MINIMUM TO PERFORM PROJECT CONSTRUCTION AND SHALL BE PROTECTED BY THE APPLICATION OF TEMPORARY SOIL STABILANT AS STATED BELOW AND ANY OTHER SEDIMENT CONTROL DEVICES REQUIRED UNTIL PERMANENT MEASURES ARE APPLIED.

**B. TEMPORARY SOIL STABILANT**

TEMPORARY SOIL STABILANT SHALL BE APPLIED TO ALL EXPOSED SOIL AREAS WHICH ARE NOT BEING ACTIVELY WORKED. A HYDROSEEDER SHALL BE KEPT READILY AVAILABLE TO THE PROJECT SITE TO PERFORM THIS WORK. THE SOIL STABILIZING SUBSTANCE SHALL BE A POLYMERIC EMULSION CONSISTING OF AT LEAST 46% SOLIDS BY WEIGHT, AND AT LEAST 90% BY WEIGHT OF THESE SOLIDS SHALL BE ACRYLIC. INGREDIENTS SHALL BE AS FOLLOWS: SOIL PENETRANT (SODIUM SILICATES @ 3.5% MIN. OF TOTAL WEIGHT), COALESCING AGENT (POLY ETHOXYLATED ETHANOL @ 1% MIN. OF TOTAL WEIGHT), ACRYLIC COPOLYMERS (METHACRYLATES AND ACRYLATES @ 40% OF TOTAL WEIGHT). THE SUBSTANCE SHALL CONTAIN AN ANTIFOAMING AGENT AND A COLOR ADDITIVE TO ASSIST THE APPLICATOR IN UNIFORM APPLICATION OF THE PRODUCT AND WILL DISAPPEAR FROM THE SURFACE WITHIN 36 HOURS. THIS SUBSTANCE SHALL BE SIMILAR TO SOIL SEAL BY SOIL STABILIZATION PRODUCTS OR APPROVED EQUAL. ALL MANUFACTURER'S INSTRUCTIONS REGARDING THE PRODUCT INCLUDING APPLICATION RATES SHALL BE FOLLOWED. EXPOSED SOIL AREAS SHALL BE TREATED WITH TEMPORARY SOIL STABILANT AS OFTEN AS NEEDED TO CONTROL EROSION.

**C. PERMANENT MEASURES**

PRIOR TO COMMENCING THE SEEDING OPERATION, THE PROJECT MANAGER, LANDSCAPE ARCHITECT AND SEEDING CONTRACTOR'S REPRESENTATIVE SHALL REVIEW AREAS TO BE TREATED TO DETERMINE THE APPROPRIATE CLASS OF SEEDING AND TO INSURE THAT SLOPES HAVE BEEN CONSTRUCTED PROPERLY. SEEDING EQUIPMENT SHALL ALSO BE INSPECTED DURING THIS PERIOD TO INSURE PROPER OPERATION. ANY WORK DONE PRIOR TO THIS INSPECTION SHALL BE REJECTED. ALL AREAS TO BE SEEDED SHALL BE AS DIRECTED BY THE PROJECT MANAGER AND/OR THE LANDSCAPE ARCHITECT. AREAS 4:1 OR FLATTER SHALL BE TREATED WITH CLASS "A" SEEDING.



HAY MULCH FOR CLASS "A" SHALL BE BARLEY STRAW AT THE RATE OF 1.5 TONS PER ACRE. MULCH SHALL BE APPLIED AS SOON AS POSSIBLE AFTER THE SEED IS APPLIED. ALL SEEDED AREAS SHALL BE MULCHED THE SAME DAY THEY ARE SEEDED. ANY SEEDED AREAS NOT MULCHED THE SAME DAY SHALL BE REJECTED AND RESEEDED AND NO EXTRA PAYMENT SHALL BE MADE THEREFOR.

MULCH ANCHORING TACK FOR CLASS "A" SEEDING SHALL BE THE SAME AS THE TEMPORARY SOIL STABILANT EXCEPT THAT IT IS APPLIED AS AN OVERSPRAY AFTER SEED AND MULCH ARE IN PLACE. TACK SHALL BE APPLIED AT A SUFFICIENT RATE SO AS TO PREVENT MULCH FROM MOVING DUE TO WINDS OR TURBULENCE CREATED BY TRAFFIC ON THE ROADWAY. AREAS WHERE MULCH FAILS TO ADHERE SHALL BE REMULCHED AND TACKED AND NO EXTRA PAYMENT SHALL BE MADE THEREFOR.

ALL AREAS TO BE SEEDED SHALL BE AS DIRECTED BY THE PROJECT MANAGER AND/OR THE LANDSCAPE ARCHITECT. AREAS 4:1 OR FLATTER SHALL BE TREATED WITH CLASS "A" SEEDING USING THIS SEED LIST AND SPECIFICATIONS. SLOPES STEEPER THAN 4:1 SHALL BE TREATED WITH CLASS "C" SEEDING USING THIS SAME SEED LIST.

CLASS "C" SEEDING (MULCH SEEDING WITH HYDROSEEDER AS PER 2007 NMDOT STANDARD SPECIFICATIONS TABLE 632.3.2:1), SHALL BE APPLIED TO SLOPES STEEPER THAN 4:1 UP TO AND INCLUDING 1.5:1. EXCLUDE ANY BARE ROCK OUTCROPPINGS OR SLOPES FROM SEEDING TREATMENT. INCLUDE ANY SLOPES WITH GEOGRID IN CLASS "C" SEEDING TREATMENT.

CONTRACTORS' CAMPSITES, STOCKPILE AREAS AND ANY OTHER NONDESIGNATED HAUL ROAD OR DISTURBED AREA SHALL BE TREATED WITH CLASS "A" SEEDING AND NO MEASUREMENT OR PAYMENT WILL BE MADE THEREFOR.

PRIOR TO PERFORMING SEEDING OPERATIONS ALL WEED SPECIES WHICH MAY HAVE GROWN IN AREAS TO BE SEEDED AND WILL INTERFERE WITH THE SEED AND MULCH MAKING CONTACT WITH THE SOIL SHALL BE REMOVED.

**\*\*SEED MIX**

(CERTIFIED SEED OF NAMED VARIETIES ARE REQUIRED IF AVAILABLE)

<u>SPECIES</u>	<u>ORIGIN</u>	<u>LB PURE LIVE SEED PER ACRE</u>
Andropogon gerardi (BIG BLUESTEM)		
Agropyron smithii (WESTERN WHEATGRASS)	BARTON OR ARRIBA	
Bouteloua gracilis (BLUE GRAMA)	HACHITA OR LOVINGTON	
Bouteloua curtipendula (SIDEOATS GRAMA)	VAUGHN OR NINER	
Distichlis spicata strict (INLAND SALTGRASS)	N. NM	





Eragrostis trichodes (SAND LOVEGRASS)	N.M. REGION	1.0
Festuca arizonica (ARIZONA FESCUE)	REDONDO	1.0
Hilara jamesii (Galleta)	VIVA	1.0
Oryzopsis hymenoides (INDIAN RICEGRASS)	PALOMA	1.0
Schizachyrium scoparium (LITTLE BLUESTEM)		1.0
Setaria leucopila (PLAINS BRISTLEGRASS)	N.M. REGION	1.0
Sporobolus airoides (ALKALI SACATON)		1.0
Sporobolus cryptandrus (SAND DROPSEED)	N.M. REGION	0.5
Atriplex canescens (FOUR WING SALTBUH)		0.5
Linum lewisii (BLUE FLAX)		0.1
Coreopsis lanceolata (LANCELEAF COREOPSIS)		0.1
Gaillardia pulchella (FIREWHEEL)		0.1
Machaeranthera bigelovii (PURPLE ASTER)		0.1
TOTAL		16.4

ON-SITE SEED SAMPLING & TESTING MAY BE DONE AT THE DISCRETION OF THE NMDOT. ALL SEED CERTIFICATES FROM SEED SUPPLIER MUST BE PROVIDED TO PROJECT MANAGER BEFORE SEEDING COMMENCES

#### SEEDING DATES

- \*A. PERIOD A TO B = MAY 1 THROUGH MAY 31
- B. PERIOD B TO E = JUNE 1 THROUGH AUGUST 31
- C. PERIOD C TO D = NONE
- >D. PERIOD E TO A = SEPTEMBER 1 THROUGH APRIL 30

\*WATER FOR PERIOD A TO B SHALL BE APPLIED ACCORDING TO SECTION 632.39 OF THE STANDARD SPECIFICATIONS AT THE FOLLOWING RATES AND SHALL BE CONTINUED UNTIL JUNE 14: FIRST TWO WEEKS - FOUR APPLICATIONS OF ONE INCH EACH, TIMED THREE DAYS APART. SUBSEQUENT WEEKS - ONE INCH PER WEEK WATERING DURING THIS PERIOD SHALL BE CONSIDERED INCIDENTAL TO THE SEEDING ITEM AND NO MEASUREMENT OR PAYMENT SHALL BE MADE THEREFOR.

>DURING THIS PERIOD, DISTURBED AREAS SHALL BE DISCED AND MULCH APPLIED AS IN CLASS "A" SEEDING AND NO SEED SHALL BE APPLIED. THIS WORK SHALL BE PAID AT 65% OF THE CLASS "A" SEEDING UNIT BID PRICE. THE FOLLOWING SEEDING SEASON CLASS "E" SEEDING (WEED REMOVAL, IF NEEDED, OVER SEEDING APPLICATION) SHALL BE PERFORMED AND THE REMAINING 35% OF THE CLASS "A" UNIT BID PRICE SHALL BE PAID. IF THE PROJECT IS CLOSED OUT, IT SHALL BE THE RESPONSIBILITY OF THE PROJECT MANAGER TO ADVISE THE CONSTRUCTION BUREAU OF THE NEED TO INITIATE A PROJECT TO PERFORM PERMANENT SEEDING THE NEXT SEEDING SEASON.

ANY PROPOSED CHANGES OR MODIFICATIONS TO THIS PLAN SHALL BE DISCUSSED WITH THE LANDSCAPE ARCHITECT PRIOR TO MAKING SUCH CHANGES OR MODIFICATIONS. Questions: Contact NMDOT Landscape Architect William Hutchinson, 505 827 9862)

