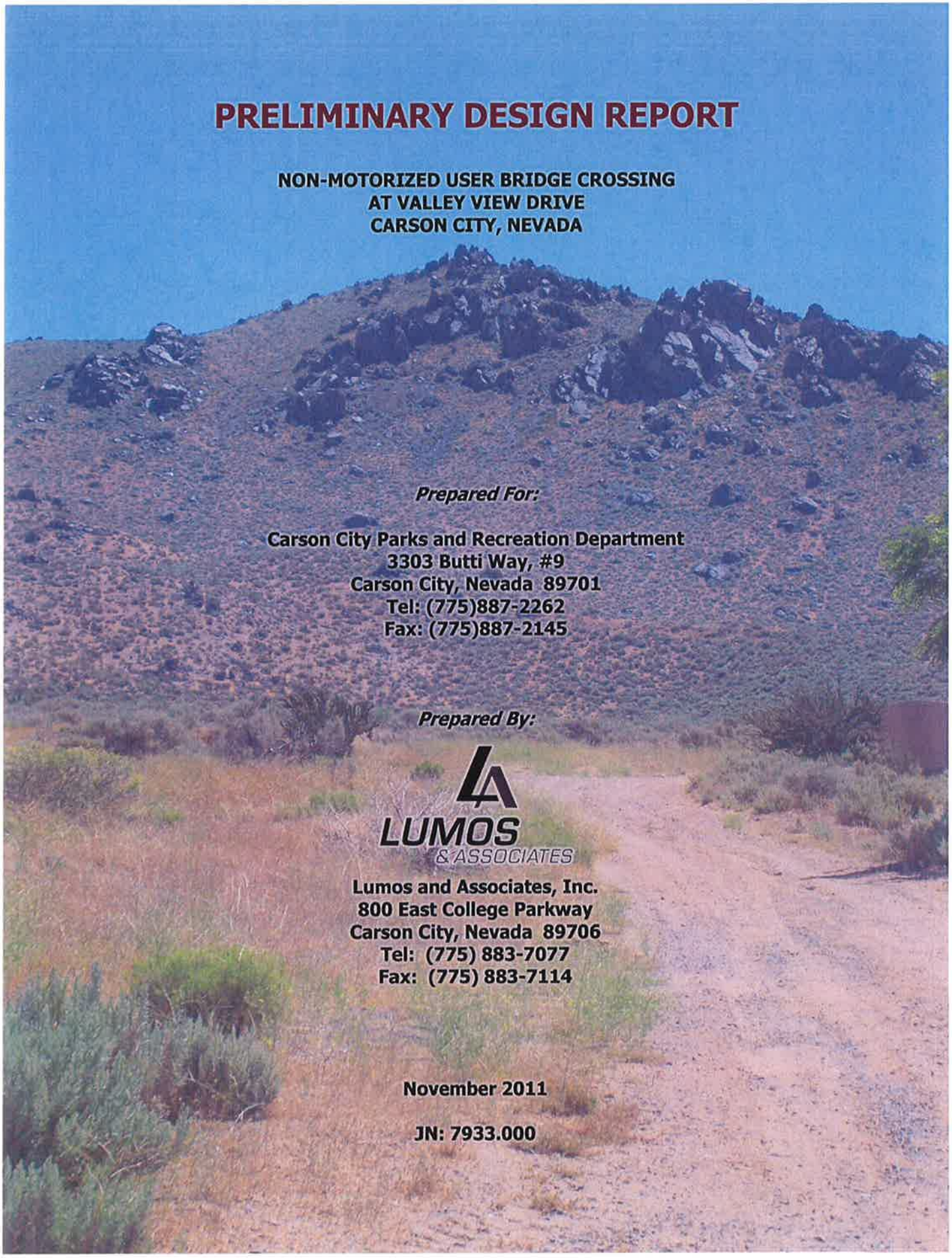
PRELIMINARY DESIGN REPORT

NON-MOTORIZED USER BRIDGE CROSSING
AT VALLEY VIEW DRIVE
CARSON CITY, NEVADA



Prepared For:

Carson City Parks and Recreation Department
3303 Butti Way, #9
Carson City, Nevada 89701
Tel: (775)887-2262
Fax: (775)887-2145

Prepared By:

Lumos and Associates, Inc.
800 East College Parkway
Carson City, Nevada 89706
Tel: (775) 883-7077
Fax: (775) 883-7114

November 2011

JN: 7933.000

EXECUTIVE SUMMARY

INTRODUCTION

Valley View Drive has traditionally been the main path of travel for equestrians, hikers, and mountain bikers to access the Prison Hill Recreation Area trail system (Prison Hill) from the west side of South Edmonds Drive. However, the construction of Phase 2B of the Carson City Freeway (freeway) will bisect Valley View Drive between Line Drive and South Edmonds Drive and will cut-off this route to Prison Hill. The idea for the Non-Motorized User Bridge Crossing (bridge) at Valley View Drive was conceived by local equestrian user groups that frequently use Valley View Drive. The equestrians approached the Carson City Open Space Advisory Committee (OSAC) four years ago and advocated for a bridge at Valley View Drive. The OSAC requested $50,000 be allocated from the Quality of Life Initiative (Q18) Funds by the Board of Supervisors as seed money for construction. The Board of Supervisors approved this request and the funds were administered by the Carson City Parks and Recreation Department (Parks Department). The Parks Department discussed the feasibility of the project with the Nevada Department of Transportation (NDOT), and NDOT recommended that the money should be used to develop a preliminary design report and plan. NDOT stated they would be more receptive to endorsing the project if there was a preliminary design to review and if the possible conflicts with the construction of the freeway had been addressed.

Lumos and Associates, Inc. (Lumos) was tasked with developing a Preliminary Design Report for the proposed bridge and met with NDOT, the Parks Department, and the Carson City Public Works Department to discuss various aspects of the bridge project and how it relates to the future freeway. This meeting established that the bridge shall meet NDOT standards and shall be similar in look and appearance to the existing NDOT freeway bridges. Another meeting was held with the bridge users to discuss various features of the bridge. The users provided helpful information as to what deck surface, railing type, etc. would be most favorable to them, which has been implemented in the preliminary design where feasible.

The purpose of this report is to analyze the various options of bridge construction, to determine the best choice of construction type for the bridge, and to provide a preliminary design narrative and plans for the selected construction type. Lumos partnered with Hyytinen Engineering, a structural engineering firm, to evaluate the structural components of the construction type alternatives and to develop the preliminary bridge design. Lumos evaluated cost, constructability, design criteria, aesthetics, and amenities of the chosen bridge type. Since there are currently no funds available to construct the bridge, Lumos discussed potential funding sources and provided an Opinion of Probable Costs that can be used to pursue grants and other monies. Lumos also discussed the approximate timeline for the bridge design, permitting, agency coordination, and construction. Although phasing of the proposed bridge project is an option, this report does not address construction stages or timelines for potential phasing.

BENEFITS

Carson City has developed a *Unified Pathways Master Plan* as part of an ongoing effort to provide off-street routes to connect schools, residential neighborhoods, open space, and recreational areas within Carson City. The Carson Area Metropolitan Planning Organization (CAMPO), the Parks Department, and Lumos have recently completed the "Carson City Freeway Corridor Multi-Use Path Alignment Alternatives Study", which evaluates possible alignments for a paved path along Phase 2 of the freeway corridor. This multi-use path will be a continuation of the path constructed along Phase 1. For the freeway segment between Koontz Lane and Clearview Drive, the preferred path alignment is along the west side of the NDOT right-of-way. Although the Koontz Lane and Clearview Drive bridges will allow pedestrians and mountain bikers/bicyclists to cross from the proposed multi-use path to the east side of the freeway, the bridges do not have facilities for equestrian users. A non-motorized bridge crossing over the freeway would provide a location for equestrians to safely cross the freeway and would also provide a crossing for pedestrians and mountain bikers/bicyclists where they do not have to contend with vehicle traffic. The project's bridge crossing is proposed at Valley View Drive because it has historically been used by equestrians in southeast Carson City to access the Prison Hill Recreation Area. The bridge will be part of an overall plan to connect the various trail systems in Carson City, as proposed in the Carson City *Unified Pathways Master Plan* and the CAMPO *Regional Transportation Plan.*

LOCATION

The proposed bridge will be located on Valley View Drive in southeast Carson City, Nevada and will span the freeway between the Valley View Drive and Line Drive intersection and the Valley View Drive and South Edmonds Drive intersection.

CONSTRUCTION TYPE

Lumos evaluated three options for the proposed bridge construction type: cast-in-place concrete, pre-fabricated steel trusses, and pre-fabricated girders (concrete or steel). Lumos assessed the constructability and cost of each construction type and also discussed the various advantages and disadvantages. Some of the advantages/disadvantages considered were constructability, vibration characteristics, appearance, traffic control, safety requirements, etc.

Based on our analysis, the preferred alternative is to use a pre-fabricated girder bridge, incorporating precast concrete girders, for the construction of the Non-Motorized User Bridge Crossing at Valley View Drive. The bridge will be similar in appearance to the existing freeway bridges, will cost the least amount to build of the options, will be more durable and have less maintenance issues than a steel bridge, will transmit less vibration than a steel bridge, and the amenities requested by the users can be more easily incorporated.

DESIGN

The proposed bridge will be 208 feet long and 28 feet wide and consist of two spans with a center pier support and will slope from east to west at approximately 3.6%. A common concern with multi-use paths on bridges is a horse's reaction to other users on the bridge or to movement under the bridge. The proposed bridge will consist of an equestrian path centered between two pedestrian/bicyclist paths, which will give more visual separation from the horse to

the traffic below. The equestrian pathway will be 12 feet wide and will be covered with an 8-inch layer of granular soil. The two pedestrian/bicyclist pathways will be six (6) feet wide each and will have a concrete surface. Additionally, the pathways will be separated by 54-inch tall, 12-inch thick concrete walls to provide further protection between the pedestrians/bicyclists and equestrians. The exterior railing for the bridge will consist of a 60-inch high concrete barrier rail as the base and a chain link fence barricade on the upper portion similar to the railings on the Koontz Lane and Clearview Drive bridges.

At each end of the bridge, a transition will be constructed from the bridge deck surface to existing grades. Mount/Dismount areas are proposed to be located in the vicinity of the transition areas and will include a concrete mounting block. This will allow a location for the equestrian users to dismount their horses before crossing the bridge, if they so choose. The east and west ends of the proposed bridge will be a confluence of pedestrians, mountain bikers/bicyclists, equestrians, and vehicles. Signs, pavement, markings, and lighting will be incorporated into the design to manage user movements.

The bridge structure will be within the NDOT right-of-way, but a portion of the transition from the bridge to existing grades on both the west and east ends will be within Carson City right-of-way. The project site limits will not encroach on private lands.

NDOT COORDINATION

Since the bridge will be located within the NDOT right-of-way and will cross over the freeway, it is crucial to examine all aspects of the project as it relates to the freeway construction plans. Lumos has identified several potential conflicts that should be coordinated with NDOT and could be modified during the final design phase of the freeway. Some potential low cost changes include the relocation of a freeway sign and landscaping improvements.

NDOT has developed an architectural treatment plan for the freeway bridges, which involves assigning a specific surface treatment, coating type, and color type to each element of the NDOT bridges. The Valley View Drive bridge colors and finishes shall match the NDOT architectural treatments of the Koontz Lane and Clearview Drive bridges.

Carson City, Gardeners Reclaiming Our Waysides (GROW), and NDOT have developed an aesthetic treatment concept for the entire freeway dubbed "Carson City's History in Motion". The project consists of landscaping and placing sculptural features at bridges and grade separations. Each bridge has been assigned a "theme" that represents the history and culture of Carson City (e.g. The Pony Express, Basque Sheepherders, V&T, etc.). The proposed bridge would provide an opportunity for an additional theme to be implemented.

NDOT completed a final Environmental Impact Statement (EIS), dated May 21, 1986, for the freeway corridor. If funding for the proposed bridge project is obtained from a federal agency, the EIS may need to be re-evaluated to confirm that the conditions of the original freeway EIS are still applicable. Re-evaluating the EIS will incur additional costs to the project.

Although the bridge project will be administered by Carson City, it will span the NDOT freeway. An agreement will need to be established between Carson City and NDOT to determine who will have ownership and maintenance responsibility of the bridge.

PROJECT TIMELINE

Assuming that the preferred alternative, a pre-fab girder bridge with precast concrete girders, will be used and that all funding is in place, the timeline for the completion of the bridge would consist of approximately six (6) months for engineering and design, six (6) months for agency review and permitting, and nine (9) months for construction. However, the construction period could increase due to unforeseen difficulties in material procurement and possible weather delays.

FUNDING AND OPINION OF PROBABLE COST

Currently, no funding is in place for the design or construction of the bridge from either Carson City or NDOT. Therefore, it will be the task for the users to petition various funding sources for grants or other monies available for recreation/trail projects. The local equestrian, cycling, hiking, and mountain biking organizations can be proactive by using this Preliminary Design Report as a tool to promote the project, write grant applications, speak to legislative officials, and appeal to agencies for funding. With support from NDOT and Carson City, this project will have more merit when approaching government officials.

The Opinion of Probable Cost for the proposed bridge is approximately **$2,700,000** in present day dollars. This includes engineering, construction management, EIS re-evaluation, traffic control, earthwork, site work, bridge structure, and a 20% contingency.

PRELIMINARY DESIGN REPORT

NON-MOTORIZED USER BRIDGE CROSSING

AT VALLEY VIEW DRIVE

CARSON CITY, NEVADA

Prepared For:

Carson City Parks and Recreation Department
3303 Butti Way, #9
Carson City, Nevada 89701
Tel: (775)887-2262
Fax: (775)887-2145

Prepared By:

Lumos and Associates, Inc.
800 East College Parkway
Carson City, Nevada 89706
Tel: (775) 883-7077
Fax: (775) 883-7114

NOVEMBER 2011

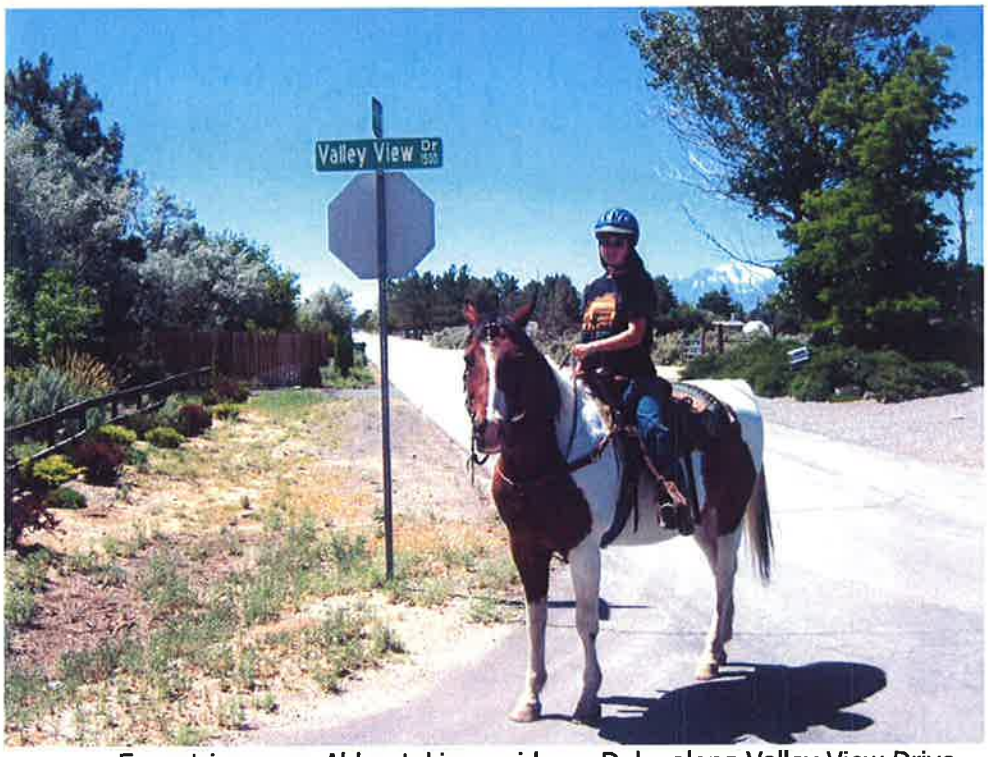
JN: 7933.000

TABLE OF CONTENTS

*Cover Photo – Valley View Drive looking east towards Prison Hill Recreation Area

1.0 INTRODUCTION AND PURPOSE

Valley View Drive has traditionally been the main path of travel for equestrians, hikers, and mountain bikers to access the Prison Hill Recreation Area (Prison Hill) trail system from the west side of South Edmonds Drive. However, the construction of Phase 2B of the Carson City Freeway (freeway) will bisect Valley View Drive between Line Drive and South Edmonds Drive and will cut-off this route to Prison Hill. The idea for the Non-Motorized User Bridge Crossing (bridge) at Valley View Drive was conceived by local equestrian user groups that frequently use Valley View Drive. Although there are bridges crossing the freeway corridor at Koontz Lane to the north and Clearview Drive to the south, these bridges are not suitable for equestrian users due to the close proximity to traffic and unfavorable walking surfaces for horses. The equestrians approached the Carson City Open Space Advisory Committee (OSAC) four years ago and advocated for a bridge at Valley View Drive. The OSAC requested $50,000 be allocated from the Quality of Life Initiative (Question 18) funds by the Board of Supervisors as seed money for construction. The Board of Supervisors approved this request and the funds were administered by the Carson City Parks and Recreation Department (Parks Department). The Parks Department discussed the feasibility of the project with the Nevada Department of Transportation (NDOT), and NDOT recommended that the money should be used to develop a preliminary design report and plan. NDOT stated they would be more receptive to supporting the project if there was a preliminary design to review and if the possible conflicts with the construction of the freeway had been addressed.



Equestrian user, Abby, taking a ride on Duke along Valley View Drive

Lumos and Associates, Inc. (Lumos) was tasked with developing a Preliminary Design Report for the proposed bridge and met with NDOT, the Parks Department, and the Carson City Public Works Department to discuss various aspects of the project and how it relates to the future freeway. This meeting established that the bridge shall meet NDOT standards and shall be similar in look and appearance to the existing NDOT freeway bridges. Another meeting was held with the bridge users to discuss various features of the bridge. The users provided helpful information as to what deck surface, railing type, etc. would be most favorable to them, which has been implemented in the preliminary design where feasible.

The Equestrian Design Guidebook for Trails, Trailheads, and Campgrounds provides design recommendations for equestrian bridges and offers valuable information on preferred features for equestrian users. Lumos has recently completed the "Carson City Freeway Corridor Multi-Use Path Alignment Alternatives Study" (Multi-Use Path Study) for the Parks Department and Carson Area Metropolitan Planning Organization (CAMPO). The *Designing Sidewalks and Trails for Access, Part II: Best Practices Design Guide* was used for design recommendations for both *Recreation Trails* and *Shared Use Paths.* In addition, the American Association of State Highway Officials (AASHTO) *Guide for the Development of Bicycle Facilities* and the NDOT *Structures Manual* were also used as a reference. These documents, together with input from the Carson City Public Works Department, Parks Department, NDOT, and users, have been utilized to develop the preliminary design for the Non-Motorized Bridge Crossing at Valley View Drive.

The purpose of this report is to analyze the various options for bridge construction, to determine the best choice of construction type for the bridge, and to provide a preliminary design narrative and plans for the selected construction type. Lumos has partnered with Hyytinen Engineering, a structural engineering firm, to evaluate the structural components of the construction type alternatives and to develop the preliminary bridge design. We will evaluate cost, constructability, design criteria, aesthetics, and amenities of the chosen bridge type. Since there are currently no funds available to construct the bridge, we will discuss potential funding sources and provide an Opinion of Probable Costs that can be used to pursue grants and other monies for construction of the bridge. We will also discuss the approximate timeline for the bridge design, permitting, agency coordination, and construction. Although phasing of the proposed bridge project is an option, this report does not address construction stages or timelines for potential phasing. A preliminary design has been developed that illustrates a proposed site layout, bridge profile, and structural details and shows how the bridge can be integrated into the freeway corridor.

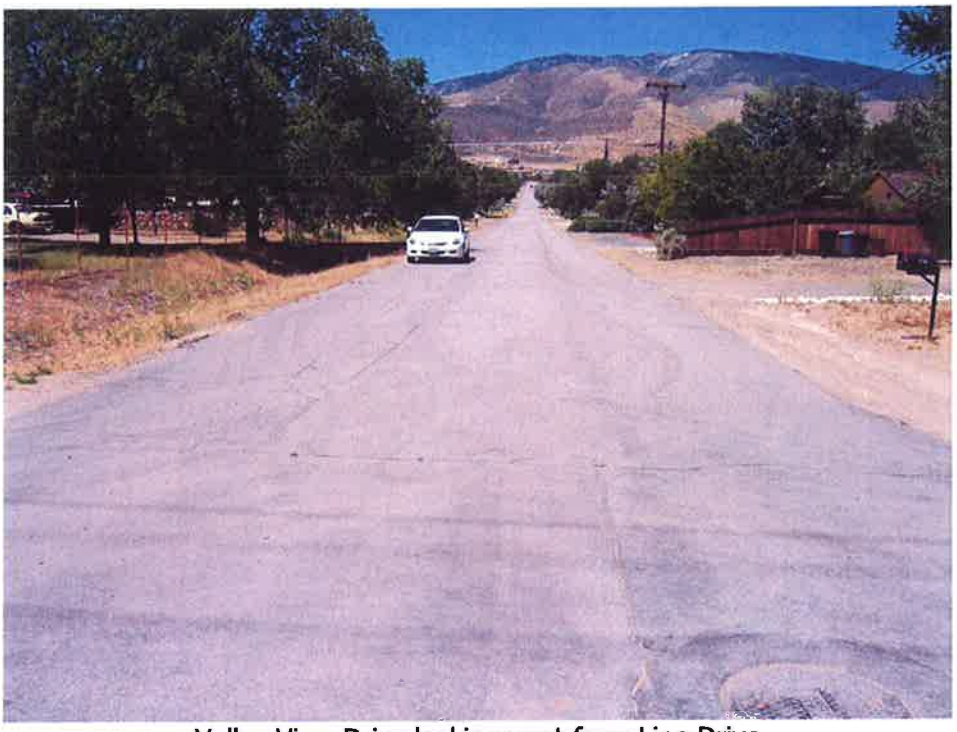
2.0 PROJECT LOCATION

The proposed bridge will be located in Carson City, Nevada within the Southwest ¼ of Section 28, Township 15 North, Range 20 East M.D.B.&M. Valley View Drive, which is in southeast Carson City, runs east from Center Drive and extends west from Conte Drive. Once the freeway is constructed, it will divide Valley View Drive between Line Drive to the west and South Edmonds Drive to the east. The proposed bridge will span the freeway between these two intersections and will approximately follow the original alignment of Valley View Drive (See Figure 1 in Appendix A).

3.0 EXISTING CONDITIONS

Valley View Drive is a paved city street with minimal traffic that is typically limited to local residents. Currently, Valley View Drive is bordered by an open drainage ditch along the southern edge and a dirt shoulder on the northern edge, which has been used by equestrians as a route to Prison Hill. However, this route has been recently cut-off by a chain link fence that NDOT has constructed along the freeway right-of-way (ROW). Although the funding for construction of the freeway is uncertain at this time, NDOT has already begun some improvements in anticipation of the freeway construction. These improvements include, in addition to the ROW fencing, the construction of the Koontz Lane and Clearview Drive bridges, relocation of conflicting utilities, and construction of a drainage channel along the west side of South Edmonds Drive. South Edmonds Drive is a two-lane, paved city street and is classified by NDOT as a minor arterial. Although South Edmonds Drive does not have sidewalks or bike lanes, it has large, dirt shoulders, which Lumos has observed being used by pedestrians.

Valley View Drive dead end looking east towards Prison Hill.



Valley View Drive looking west from Line Drive

Valley View Drive looking east from South Edmonds Drive towards Prison Hill

South Edmonds Drive looking south from Valley View Drive

South Edmonds Drive looking north from Valley View Drive

Koontz Lane Bridge

Clearview Drive Bridge

The proposed freeway corridor will be approximately 220 feet wide and 18 to 23 feet below original ground elevations at the Valley View Drive crossing, with side slopes that fall at a 2:1 slope from the existing grade to the freeway road surface (See NDOT Phase 2B Freeway Plans in Appendix C). Per the freeway plans, a concrete barrier rail will be installed at the Valley View Drive dead end on the west side of the chain link fence and the slopes will be covered with a mix of hydroseed and rock slope stabilization. The plans also indicate that a freeway sign will be located approximately 75 feet south of the proposed bridge location. The items above will be addressed in *Section 6.7 NDOT Coordination.*

4.0 BENEFITS

Carson City has developed a *Unified Pathways Master Plan* as part of an ongoing effort to provide off-street routes to connect schools, residential neighborhoods, open space, and recreational areas within Carson City. The Multi-Use Path Study, which Lumos recently completed with the Parks Department, evaluates possible alignments for a paved path along Phase 2 of the freeway corridor, which will be a continuation of the path constructed along Phase 1. For the freeway segment between Koontz Lane and Clearview Drive, the preferred path alignment is along the west side of the NDOT ROW. Several existing east-west routes used by equestrians, hikers, pedestrians, mountain bikers, and bicyclists will be interrupted by the freeway, such as the Valley View Drive route to Prison Hill, and the proposed multi-use path will provide a link between these routes. Although the Koontz Lane and Clearview Drive bridges will allow pedestrians and bicyclists to cross from the west side of the freeway to the east side of the freeway, the bridges do not have facilities for equestrian users. A non-motorized bridge crossing over the freeway would provide a location for equestrians to safely cross the freeway and would also provide a crossing for pedestrians and bicyclists where they do not have to contend with vehicle traffic. The project's bridge crossing is proposed at Valley View Drive because it has historically been used by equestrians in southeast Carson City to access the Prison Hill Recreation Area. The bridge would provide connectivity between the Prison Hill Recreation Area to the east and the proposed multi-use path to the west.

5.0 CONSTRUCTION TYPE ALTERNATIVE ANALYSIS

5.1 Introduction

Lumos has evaluated three options for the proposed bridge construction type: cast-in-place concrete, pre-fabricated steel trusses, and pre-fabricated girders (concrete or steel). We assessed the constructability and cost of each construction type and also discussed the various advantages and disadvantages. Some of the advantages/disadvantages considered were vibration characteristics, appearance, traffic control requirements, safety requirements, etc.

The equestrian users expressed concern about how much the bridge would vibrate with the various construction types. Horses typically have trouble crossing bridges with too much vibration either from other bridge users or from the traffic below. Horses, as well as people, will react differently to various levels of vibration, which