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Bella Vista Ranch Phase II Handbook
(Title of Document)

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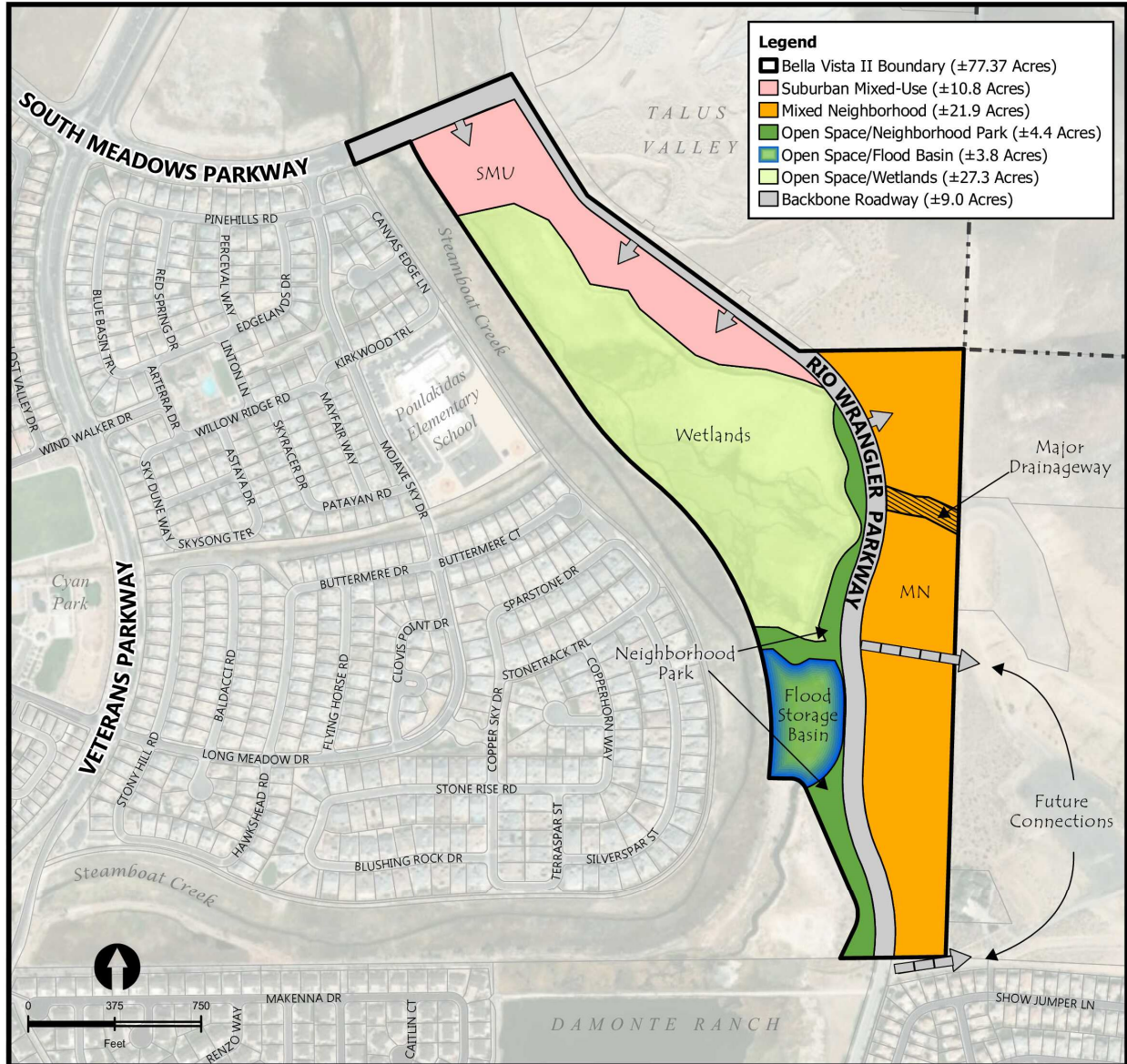
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Bella Vista Ranch

Phase II

PUD Design Standards

Reno, Nevada



Prepared for:
City of Reno

Amended on:
November 13, 2024

Bella Vista Ranch Phase II Planned Unit Development Handbook

Notice is hereby given that the Planned Unit Development Handbook for Bella Vista Ranch Phase II was revised by the Reno City Council on November 13, 2024. A copy of the revised, certified handbook is attached hereto and incorporated herein.

The revision supersedes and terminates the applicability of the most recent version recorded on May 10, 2022 as document no. 5301826.

Dated this _____ day of _____, 2025.

Name of Authorized Agent

Signature of Authorized Agent

STATE OF NEVADA)
) SS
COUNTY OF WASHOE)

On this _____ day of _____, 2025, before me, a Notary Public, personally appeared _____, personally known to me or proved to me on the basis of satisfactory evidence to be the person whose names is subscribed to the within instrument and acknowledged to me that she executed in the same in their authorized capacity, and that by their signature on the instrument the person, or the entity upon behalf of which the person acted, executed the instrument.

I certify under PENALTY OF PERJURY under the laws of the State of Nevada that the foregoing paragraph is true and correct.

WITNESS my hand and official seal.

Signature of Notary Public

(seal)

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- B. Flood Control Master Plan – Quadknopf Consulting**
- C. Wetland Mitigation Plan - Gibson & Skordal**
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I. PROJECT DESCRIPTION

The ±77.37-acre Bella Vista Ranch Phase II Planned Unit Development (PUD) is located in the southeastern portion of the City of Reno (Figure 1). The PUD includes a mixture of residential, commercial, neighborhood park, and open space uses. The intent of the PUD is to preserve the proposed open space and wetlands, including the flood storage improvements, and create two (2) development areas which will be developed for subsequent subdivision into individual building lots, multi-family housing, and non-residential building sites. One development area will allow a mix of residential and non-residential uses that will support the future development, and the surrounding neighborhoods, while the other will be limited to only residential uses. This will allow for the development of a range of housing types and options.

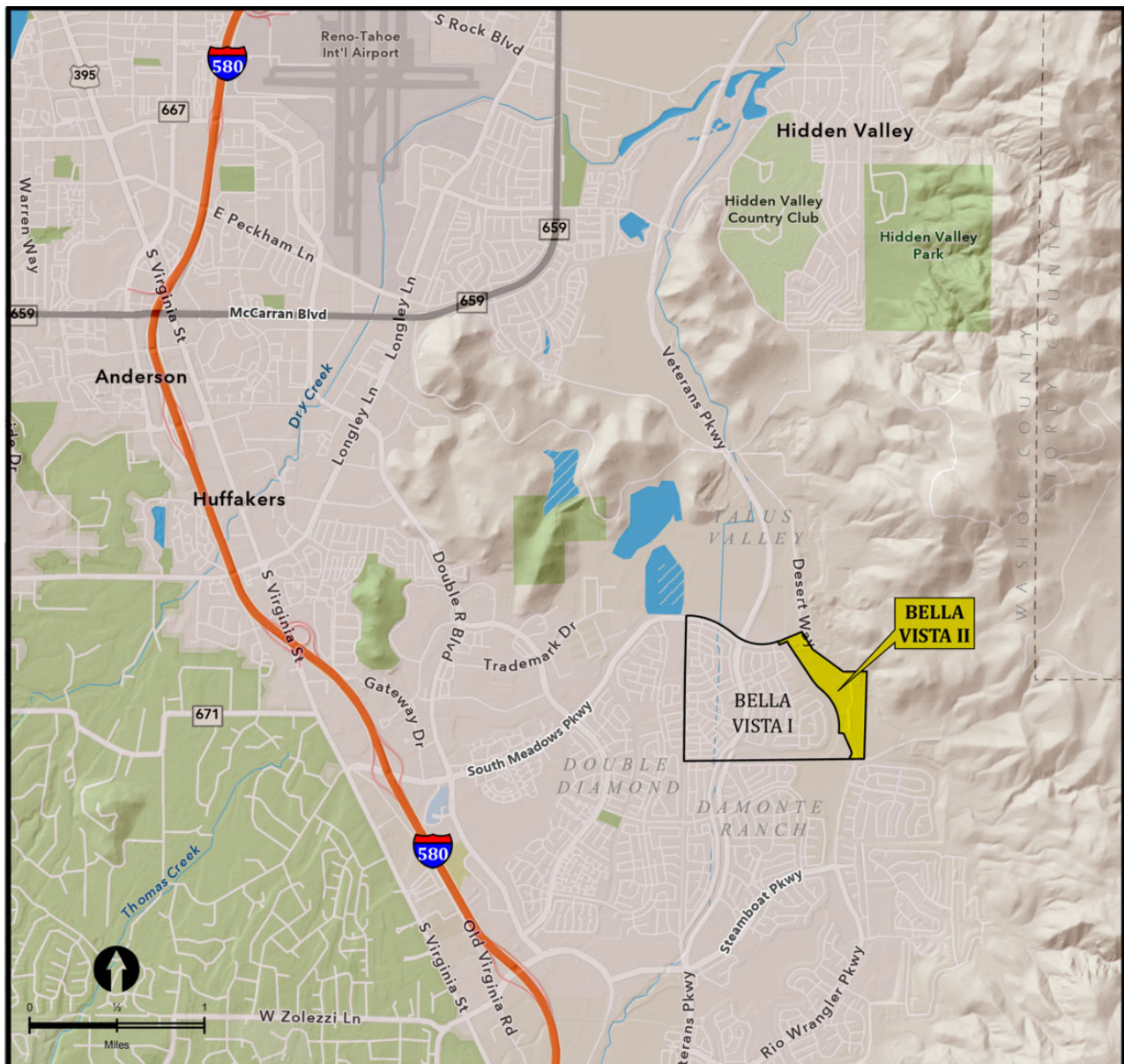


FIGURE 1
Location Map

A. Development Concept

The Bella Vista Ranch Phase II PUD consists of a mixture of residential, commercial, and open space/parks. Residential uses will be allowed within the Mixed-Neighborhood (MN) land use and will allow for single-family detached, single-family attached, and multi-family uses at densities ranging from 6 to 30 dwelling units per acre (du/ac). The Suburban Mixed-Use (SMU) land use will include a mix of residential and neighborhood commercial uses. Parks Greenways and Open Space (PGOS) land use provides a total of ± 35.5 acres and will include a ± 4.4 neighborhood park, ± 3.8 acres of flood storage basin and ± 27.3 acres of wetlands (WM-1), (as shown on **Figure 2**).

The maximum density, total number of dwelling units and the maximum non-residential square footage for each village is shown on **Table 1**, page 14. The maximum number of dwelling units within the entire Bella Vista II PUD shall not exceed 609 dwelling units (residential) and the commercial square footage shall not exceed 117,612 square feet (non-residential).

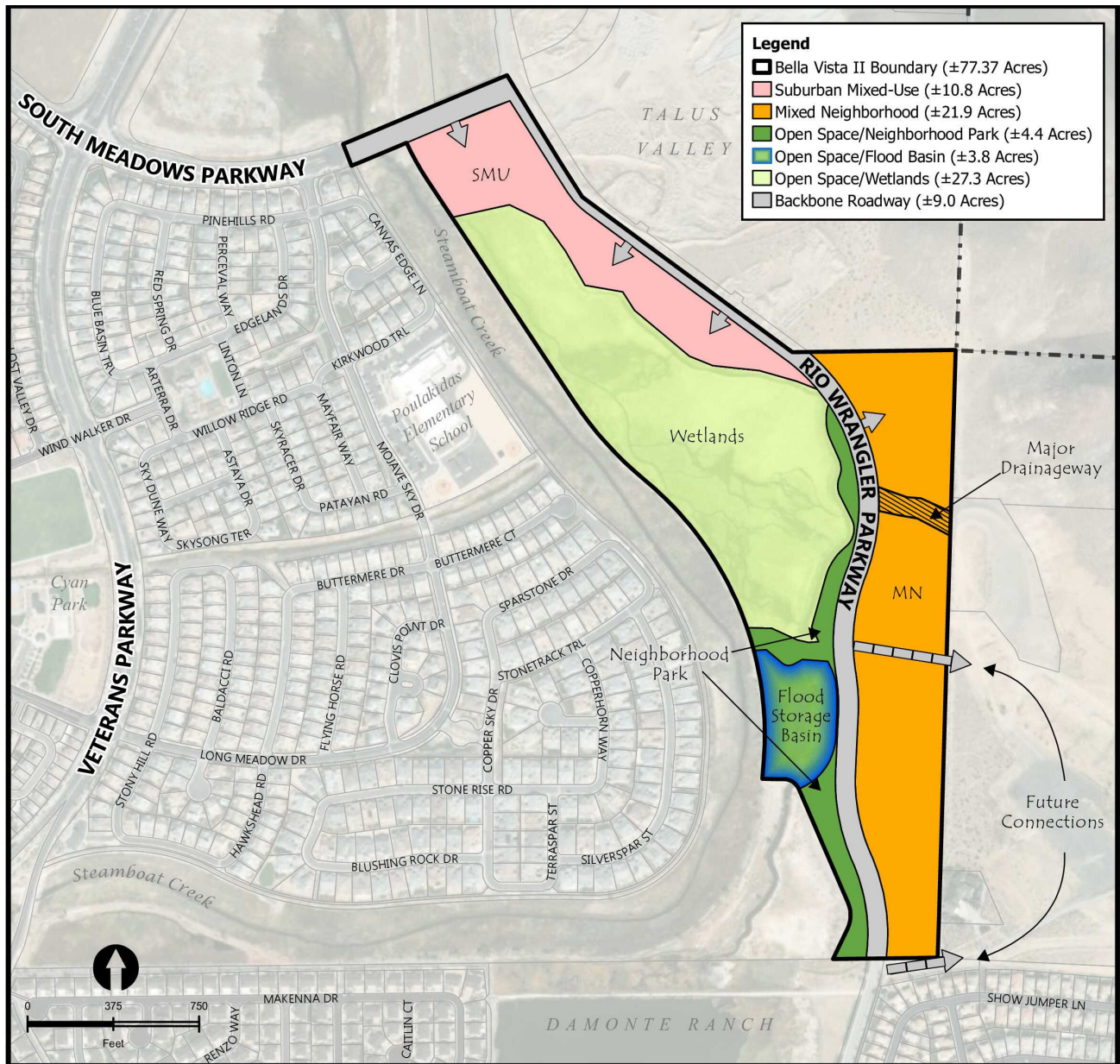


FIGURE 2
Land Use and Phasing Plan

B. Site Features Influencing Site Plan Design

Several onsite and offsite environmental constraints were considered when influencing site plan design. These are identified in **Figure 3**, Dominant Site Features.

Onsite Features

The entire site is virtually flat with a modest slope from south to north. Environmental onsite constraints include:

- i. The jurisdictional wetland area (WM-1) that will be set-aside as permanent open space and enhanced as part of the Steamboat Creek Restoration program discussed in Appendix C are identified as “wetlands” in **Figure 3**. This area is proposed to be located within the ±27.3 acres of wetlands (WM-1), as shown on **Figure 2** and will not be developed.
- ii. One major drainageway as identified to be within the MN land use in **Figure 2** is defined as a disturbed drainageway. It will be restored per City of Reno code 18.04.104 Drainage Way Protection, as amended and as further defined in the PUD. The final location of the major drainageway will be determined during the tentative map or major site plan review phase.
- iii. The existing Irrigation Ditch will not be significantly impacted as part of this PUD and is proposed to be within the PGOS land use as identified in **Figure 2**.

Offsite Features

Environmental Constraints off site include:

- iv. The Bella Vista I PUD re-aligned Steamboat Creek to the west. The current alignment of Steamboat Creek provides for one continuous and contiguous open space corridor linking all the wetlands and drainages on Damonte Ranch with the wetlands and drainages on the Bella Vista Ranch. The open space/neighborhood park buffer around the existing wetlands proposed in this development will enhance these features further and contribute to the contiguous open space corridor, (refer to “Steamboat Creek” in **Figure 3**).
- v. Feral horses have migrated into this portion of the Bella Vista Ranch since the ranch fences were removed with construction of the Steamboat Creek restoration project. To address this issue, a Feral Horse Protection Plan has been developed for this PUD, (refer to **Figure 15**).

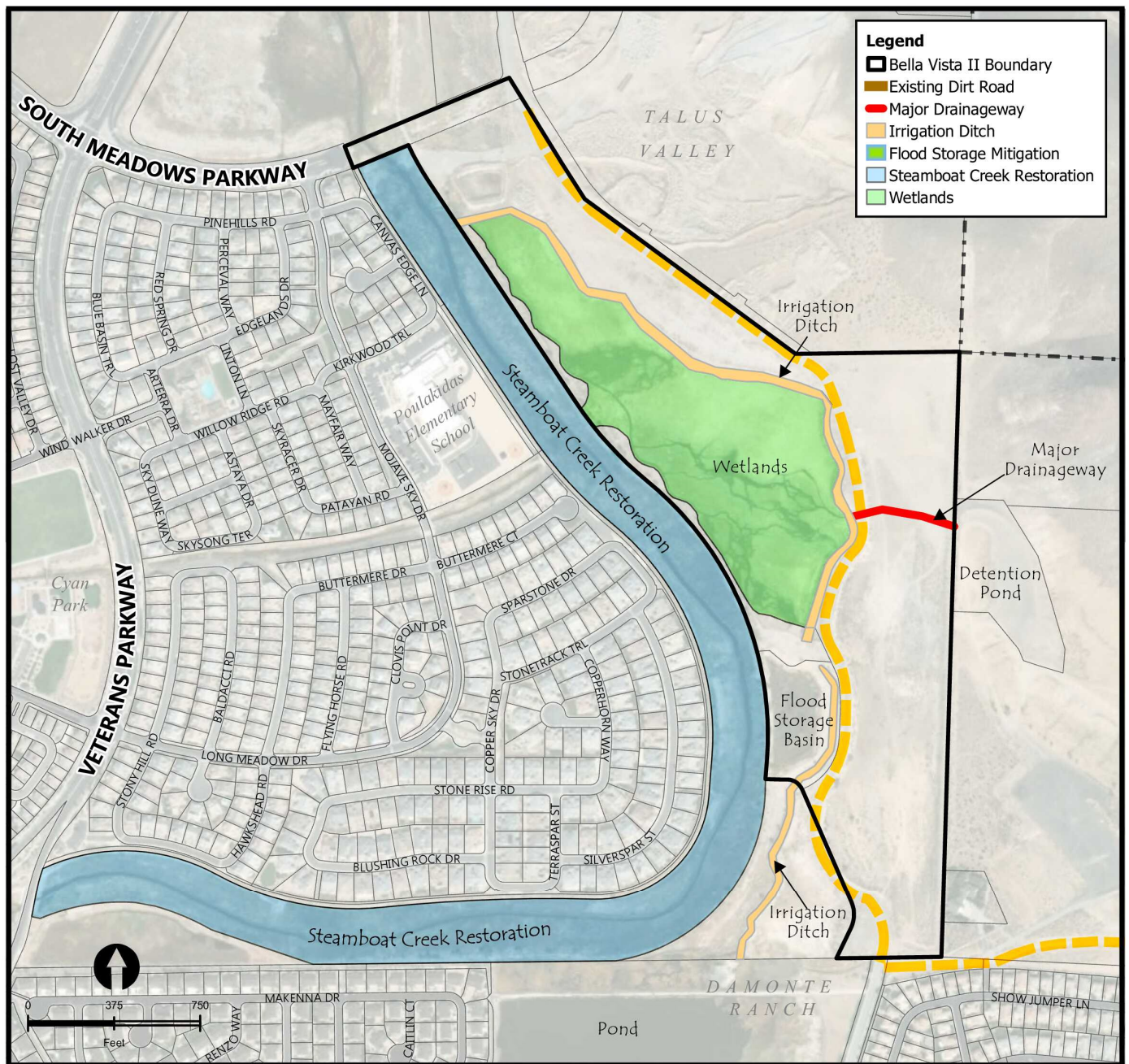


FIGURE 3
Dominant Site Features

C. Phasing

Phasing Strategy

The intent of the phasing strategy is to provide a balanced and effective approach to the buildout of the project. The phasing plan is a statement of the Master Developer's intentions related to the pattern and timing of construction. The phasing described presents a likely and logical sequence for development but may change due to factors including changes in market demands for the various types of land uses, the pace of individual developers and the availability of financing.

It is anticipated that the project will be developed in two (2) phases. The first phase includes the SMU Land Use, in the north half of the site. The second phase includes Mixed Neighborhood (MN) in the south half of the site and the neighborhood park.

Major Infrastructure Phasing

The following represents the Developer's anticipated timing for the construction of the major backbone infrastructure and how it will be phased. It is based on current market conditions and anticipated construction seasons, both of which could change over time. The trunk sanitary sewer, water trunk line, gas, electric, phone and cable distribution facilities will be constructed to serve each phase, (refer to **Figure 4**). On-site public improvements to service individual lots or projects such as, sanitary sewer, water, storm drain, gas, electric and phone shall be constructed with each residential subdivision, multi-family or non-residential building permit.

Mass Grading

Mass grading may occur prior to the design and approval of major infrastructure and/or at the same time as grading on adjacent parcels to allow for the mass grading associated with backbone infrastructure. This is anticipated to occur in Phase I in conjunction with the half street improvements on adjacent parcels. The grading of the Major Drainageway is anticipated to be within Phase 2 and will be completed with the development of the MN land use. During this phase the final location will be determined based on the type of development proposed and would need to be addressed through a site plan review or the tentative map process.

Backbone Roadways

Phase I:

The extension of South Meadows Parkway shall be constructed by the adjacent developer to the north (Talus Valley) or by the Bella Vista II Master Developer, whichever is first. This also may include half street improvements prior to development of the Bella Vista II PUD. The final improvement plans shall be submitted with final maps or with building permit submittal for the extension (refer to **Figures 8A & 8B**). All necessary Right of Way dedication maps, easements, adjacent landscape corridor and sound wall/fencing improvement plans and bonding for the improvements shall be included with the submittal.

The northwest $\pm 1,300$ feet of Rio Wrangler half street improvements shall be constructed by the adjacent developer (Talus Valley). The northeast half of Rio Wrangler Parkway, including sidewalks, landscaping and fencing shall be constructed by the Bella Vista II Master Developer. The northwestern portion of Rio Wrangler Parkway within the SMU will be constructed prior to, or in coordination with, the development of the SMU Land Use.

Phase II:

Prior to approval of the first building permit submittal for any project in the MN Land Use, final improvement plans shall be submitted for review for the south $\pm 2,700$ feet of Rio Wrangler Parkway from the SMU Land Use in the north to the current terminus or Rio Wrangler Parkway to the south (refer to **Figure 5**). All necessary R.O.W. dedication maps, easements, adjacent landscaping, and sound wall/fence improvements shall be included with the submittal.

Construction of Phase A and B of the Backbone Roadways will occur after approval of the plans. Bonding for the improvements shall be provided with the building permit.

Sanitary Sewer Trunk Lines

Prior to approval of the first building permit submittal for any project, final improvement plans shall be submitted for staff review of the sanitary sewer system to serve the site (refer to *Figure 4*). All necessary easements and bonding for the improvements will be included.

Water Main

Prior to approval of the first building permit for any project, final improvement plans shall be submitted for staff review of the water main construction to serve the site, (refer to **Figure 4**). All necessary easements and bonding for the improvements will be included.

Public Amenities Phasing

A ±4.4 acre public neighborhood park, will be constructed prior to the buildout of the MN land use. The open space and 8-foot-wide asphalt trail associated with or adjacent to each phase will be constructed by the Master Developer prior to completion of each phase.

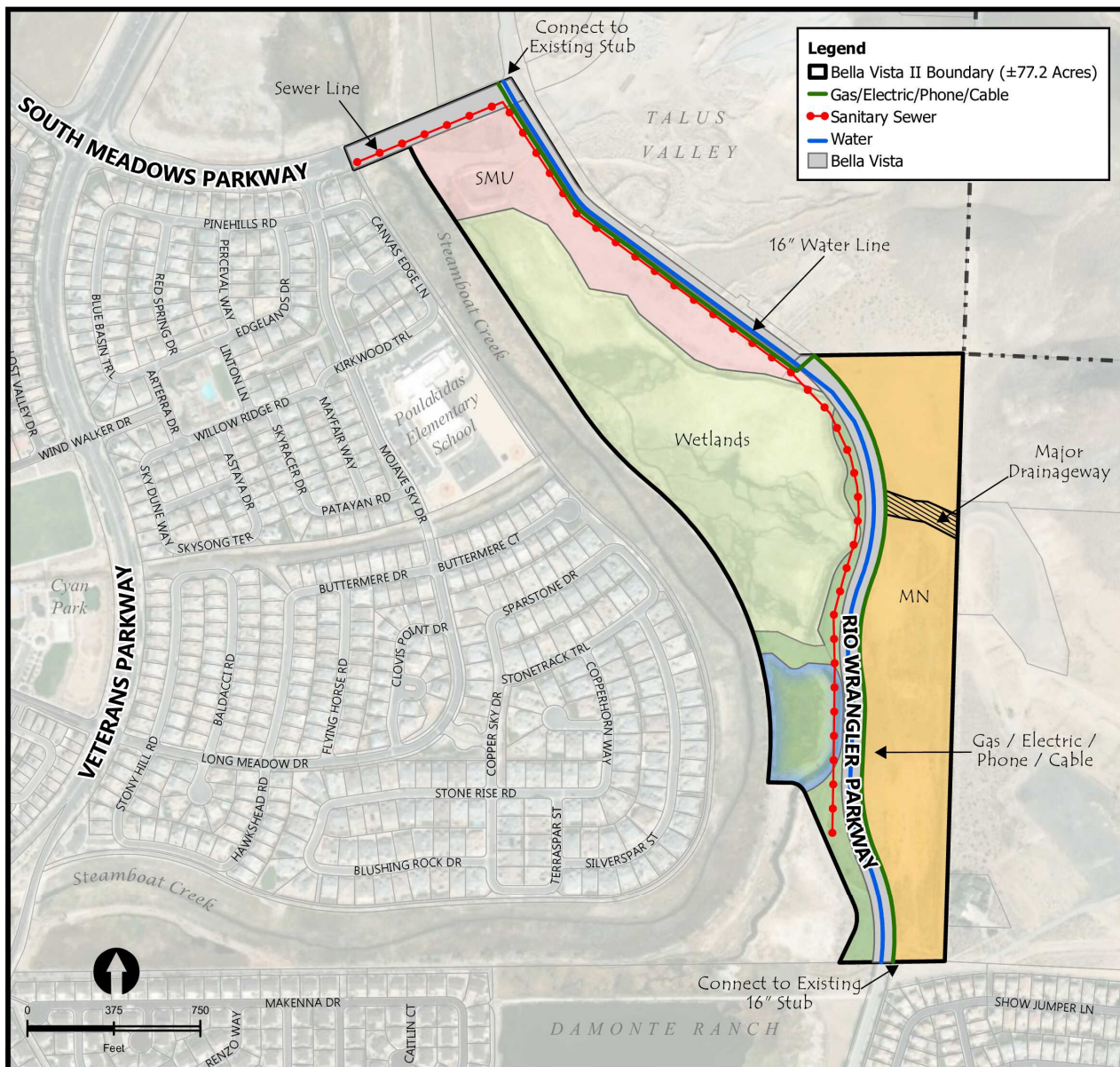


FIGURE 4
Major Infrastructure Phasing

II. SERVICES & FACILITIES

A. Traffic and Circulation Plan

Per the Traffic Study prepared by Headway Transportation on (December 22, 2023), the project is expected to generate 7,752 average daily trips with 545 trips occurring during the AM peak hour and 588 trips occurring during the PM peak hour. Traffic will have some impact on the adjacent street network. However, the proposed improvements will generally improve traffic for the surrounding area with the extension of South Meadows Parkway and Rio Wrangler Parkway. All tentative/final map applications and building permit submissions shall adhere to the recommendations in the Master Traffic Study and include an updated traffic letter with each tentative map/building permit, to show compliance with the Master Traffic Study, (refer to **Appendix A**), street types and design standards are outlined in detail in Section III, Design Standards, Section F.

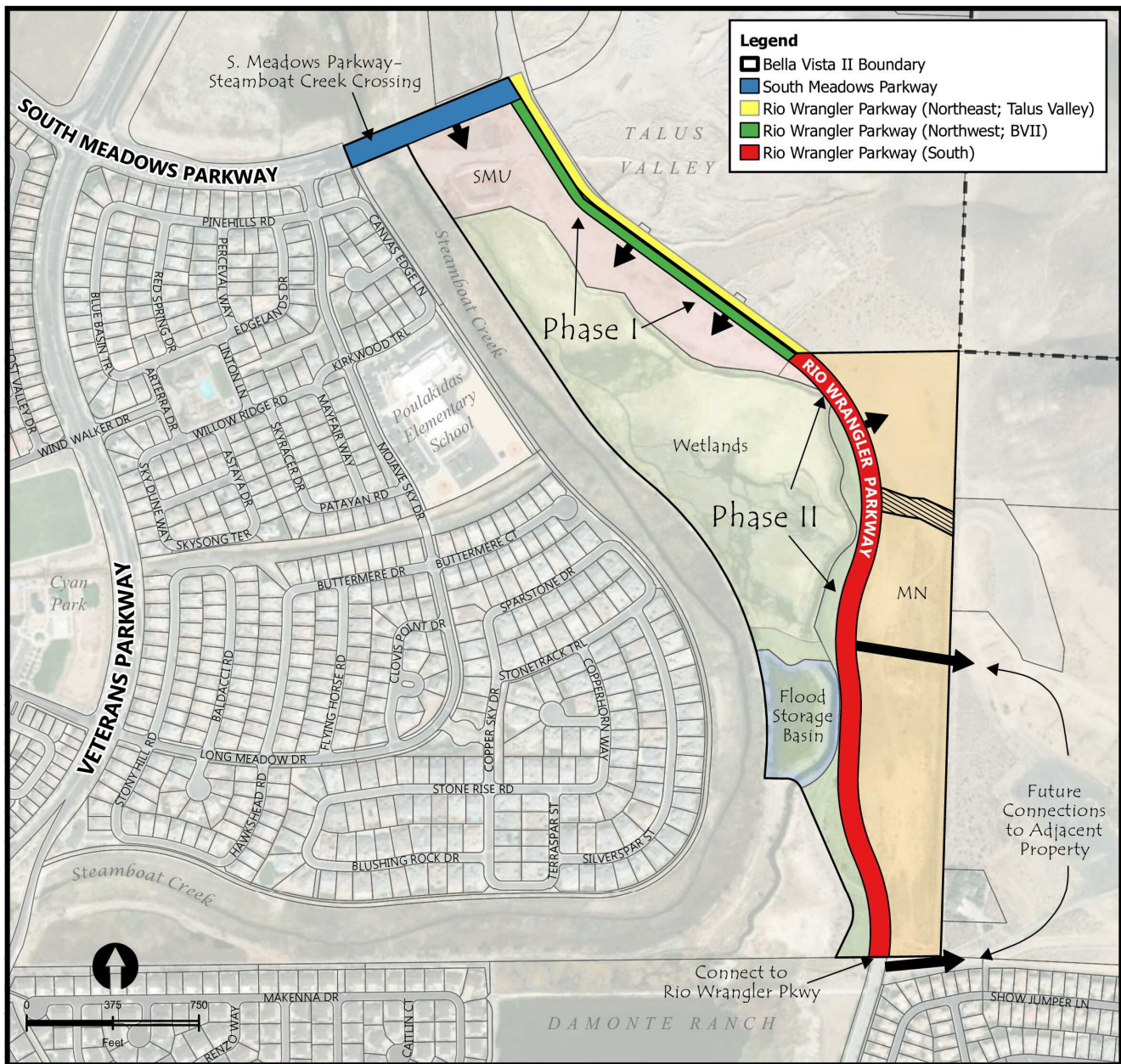


Figure 5
Major Roadways

B. Parks, Trails, and Open Space

A primary objective for this development is the inclusion of strategically located and accessible open space. To accomplish this objective, an interconnected system of sidewalks and trails is planned. The design standards for this pedestrian and bicycle circulation system are contained in Section II.

Parks

A ±4.4 acre neighborhood public park will be located in the south central portion of the project between the open space wetlands and Rio Wrangler Parkway, (refer to **Figure 2**). The park will be passive and will include a maximum one (1) acre of turf area for outdoor play. This park shall be connected to a sidewalk and trail system and provide access to other open space areas and developments throughout the PUD, (refer to **Figure 6**). The park will be constructed by the developer and maintained by the HOA as discussed in the Maintenance section of this PUD. The park will be designed to the approval of the City of Reno and constructed by the property developer.

The developer shall not receive credit towards the Residential Construction Tax (park fees) to construct the park. All Residential Construction Tax fees collected from this project shall be used to construct additional amenities within Cyan Park, located within the Bella Vista Ranch PUD to the west of this project which is within the same Park District. The proposed trail system within this PUD will connect to the adjacent trail networks and provide additional pedestrian connectivity.

The Residential Construction Tax Agreement for this project shall be completed and approved by the Reno City Council prior to or simultaneously with the certification of this PUD. The approved Agreement is attached as appendix H to this PUD. Refer to **Section III**, for additional design standards and implementation requirements.

Trails, Sidewalks, and Bike Lanes

Trails, sidewalks and bike lanes will be provided in accordance with **Figure 6**. Sidewalks and bike lanes will be provided on both sides of the arterial roadways. A pedestrian/bike multiuse trail will be provided along the east side of the wetland consolidation area and linear park. The arterial roadway sidewalks will connect to the trails in the Damonte Ranch area to the south. The arterial roadway sidewalks and pedestrian/bike trails will also connect to the Steamboat Creek Corridor and the parkway trails in the Bella Vista Ranch PUD to the west, (refer to **Figure 6**). The local pedestrian street sidewalks will provide internal connection from the developments to the trails and sidewalks and provide additional pedestrian access over South Meadows Parkway including safe pedestrian access to Nick Poulakidas Elementary School and Depoali Middle School to the west.

Open Space

Open space will be located within and adjacent to natural areas, such as the Steamboat Creek corridor, and manmade open space areas, such as the major drainageway. Trails and sidewalks will be located within the open space and provide connectivity throughout the PUD and connect to existing and proposed trail networks in the surrounding neighborhoods, (refer to **Figure 6**).

C. Wetlands

The delineation of federally protected wetlands on this property was completed with approval of the individual Corps of Engineers permit number # 200400683, (refer to **Appendix C**). One of the two delineated wetlands covered by this permit (WM-1) exist within this PUD (refer to **Figure 2** and **Figure 3**). Any enhancements within wetland area must be consistent with the Final Wetland Mitigation Plan approved by the Corps of Engineers through individual permit listed above under Section 404 of the Clean Water Act and the City of Reno Wetlands and Stream Environment Protection Standards, as amended. The wetland mitigation plan prepared by Gibson & Skordal, Wetlands Consultants dated February 2005, and the 404 permit dated October 2005 is located in Appendix C and includes additional details regarding the mitigation plan. All wetland improvements should also be in compliance with the City of Reno Wetlands and Stream Environment Ordinance, RMC 18.12.1801-1808, as amended.

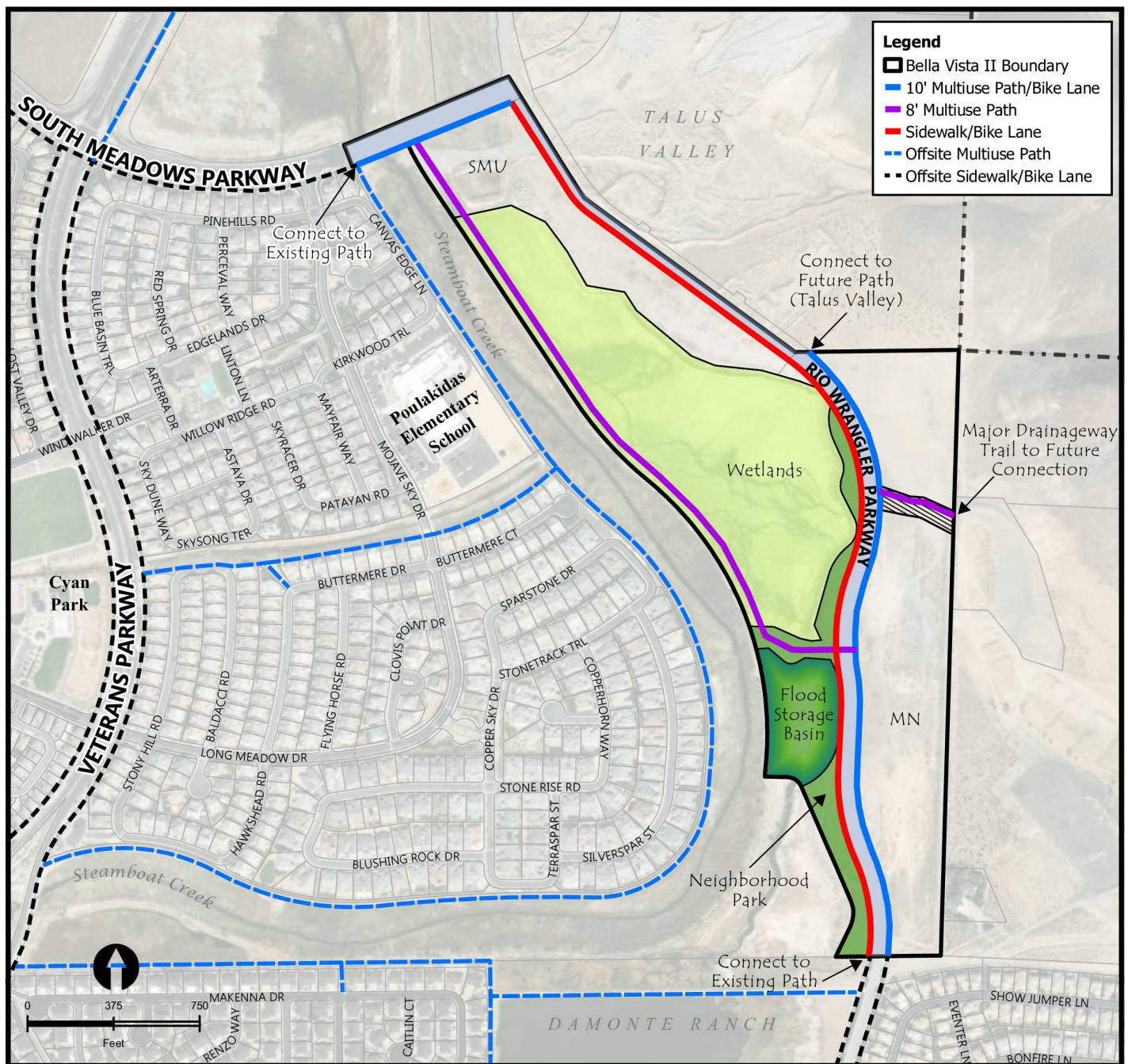


FIGURE 6
Open Space/Trail, Sidewalk and Bike Lane Plan

D. Stormwater Management

Site Drainage

The property slopes to the west/northwest very gradually at a typical gradient of less than half a foot per hundred feet (0.5%). The Steamboat Creek Restoration Project, adjacent to the west side of the site, was designed to provide 5 year and 100 year outfall drainage for the Phase II PUD. The City of Reno Public Works Design Manual and the standard details for Public Works shall be the design standards for on-site storm drainage system designs and construction. All on-site stormwater management and drainage improvements shall adhere to the Flood Control Master Plan prepared by QuadKnopf Consulting, dated January 11, 2006 and all updates or addenda thereto, (refer to **Appendix B**).

Flood Potential

The current Federal Emergency Management Agency (FEMA) DFIRM maps, dated March 2009, indicate that the site is not affected by the Zone A (100-year floodplain) from Steamboat Creek.

Floodplain Mitigation

The Flood Control Master Plan prepared by Quad Knopf Consulting, dated January 11, 2006 specifies how the 100-year floodplain was mitigated, (refer to appendix B). In summary, the approved flood control plan removed the developable portions of the site from the 100-year floodplain by constructing the Steamboat Creek Natural Corridor (SCNC). The current FEMA DFIRM maps dated March 2009 document that the site is not within the 100 year floodplain. Refer to appendix B-3 for a copy of the March 2009 DFIRM map. All floodplain mitigations shall adhere to the Flood Control master Plan and all updates or addenda thereto.

As noted in the QuadKnopf study, the following steps have been completed to remove the project from the 100-year floodplain:

- Approval from the Corps of Engineers of the 404 Individual Permit # 200400683. Permit received February 2005, copy in appendix C.
- Approval of the CLOMR for Phase II by FEMA received August 8, 2007, copy in appendix B.
- Approval of the LOMR for Phase II by FEMA received April 25, 2008, copy in appendix B.

Detention – Flood Storage

The Flood Control Master Plan prepared by QuadKnopf Consulting, dated January 11, 2006, specifies how the detention/flood storage issues are to be addressed for this PUD. (refer to appendix B). All flood storage and detention improvements shall adhere to the Flood Control Master Plan and all updates or addenda thereto.

Flood Mitigation Update

The Steamboat Creek channel work adjacent to the PUD area has been completed with the development of Bella Vista I and will not be changed with the development of this property. The adjacent property to the north (Talus Valley) has an approved CLOMR that addresses the existing and proposed conditions downstream of Bella Vista II. Additional work on the downstream improvements isn't warranted based on the proposed development in Bella Vista II. Therefore, onsite drainage will be addressed appropriately at the time of tentative maps or site plan review when details of the development are known and impacts can be further analyzed.

E. Major Drainageway

The existing drainageway noted in **Figure 3**, is defined as a major drainageway because it drains more than 100 acres. It is also categorized as a “disturbed drainageway”, as defined by Reno Municipal Code. The majority of this drainageway currently runs through the middle of the adjacent property to the east and is undistinguishable topographically. This drainageway terminates as it drains into the existing irrigation tail water ditch just west of the Desert Way (see Figure 3). The portion of the drainageway proposed for development shall be restored per City of Reno code 18.04.104. The Major Drainageway location will be finalized during the tentative map or through a Major Site Plan Review (MSRP).

F. Emergency Services

Police

A police impact fee will be collected for each residential unit and non-residential square foot constructed within the PUD in accordance with RMC Section 18.04.1206.

Fire

The Developer and the City previously executed a Fire Station Development Agreement. This revised agreement is called the First Amended Public Facility Site Agreement and includes development in this PUD as well as the Bella Vista Ranch PUD to the west. This revised First Amended Public Facility Site Agreement outlines funding fee agreements to help the City provide fire

service needs for the PUD. This funding is through a per-household and non-residential square foot fee to be collected at building permit. This revised First Amended Public Facility Agreement was completed and approved by the Reno City Council prior to certification of this PUD. The Agreement is appendix G of this PUD handbook.

The fee shall be paid into a dedicated account for this purpose prior to approval of any building permit for this PUD, as specified in the First Amended Public Facility Site Agreement.

G. Common Area Maintenance

General

This PUD will have Protective Covenants that address maintenance and enforcement of activities and will remain under the control of the Owners Association. These areas include parkways, open space areas and trails along drainage ways located outside of the public right-of-way. Project Protective Covenants (CC&R's) will clearly define maintenance responsibilities of the Owners Association versus the responsibility of individual property owners.

The City of Reno shall not be responsible for maintenance of any onsite private parks, common area improvements, private streets, storm drain channels, detention basins, other flood control facilities or the Steamboat Creek Restoration. The Owners Association or Drainage Maintenance District shall be responsible for maintenance of these facilities.

Drainage District

The Bella Vista Ranch (Phase I) PUD created and established a Drainage Maintenance District called the Cyan Drainage District (CDD), which has the powers and duties to contract for design, construction, and maintenance of drainage facilities throughout the Bella Vista Ranch PUD. This project shall incorporate into the existing CDD the areas identified as Wetlands and Flood Storage Basin in the Land Use Plan (**Figure 7**). It is intended that the project will be incorporated into the existing CDD via an annexation and/or supplemental declaration process.

The CDD shall be required to remove all vegetation from detention basins, flood storage areas, and low flow channels every two (2) years or as allowed by the Corps of Engineers permit. If the CDD fails to perform this periodic maintenance, then the City has the right to enter the property and perform said maintenance. If the City removes the vegetation from detention basins and low flow channels, then the City is entitled to receive reimbursement for these services from the CDD.

III. DESIGN STANDARDS

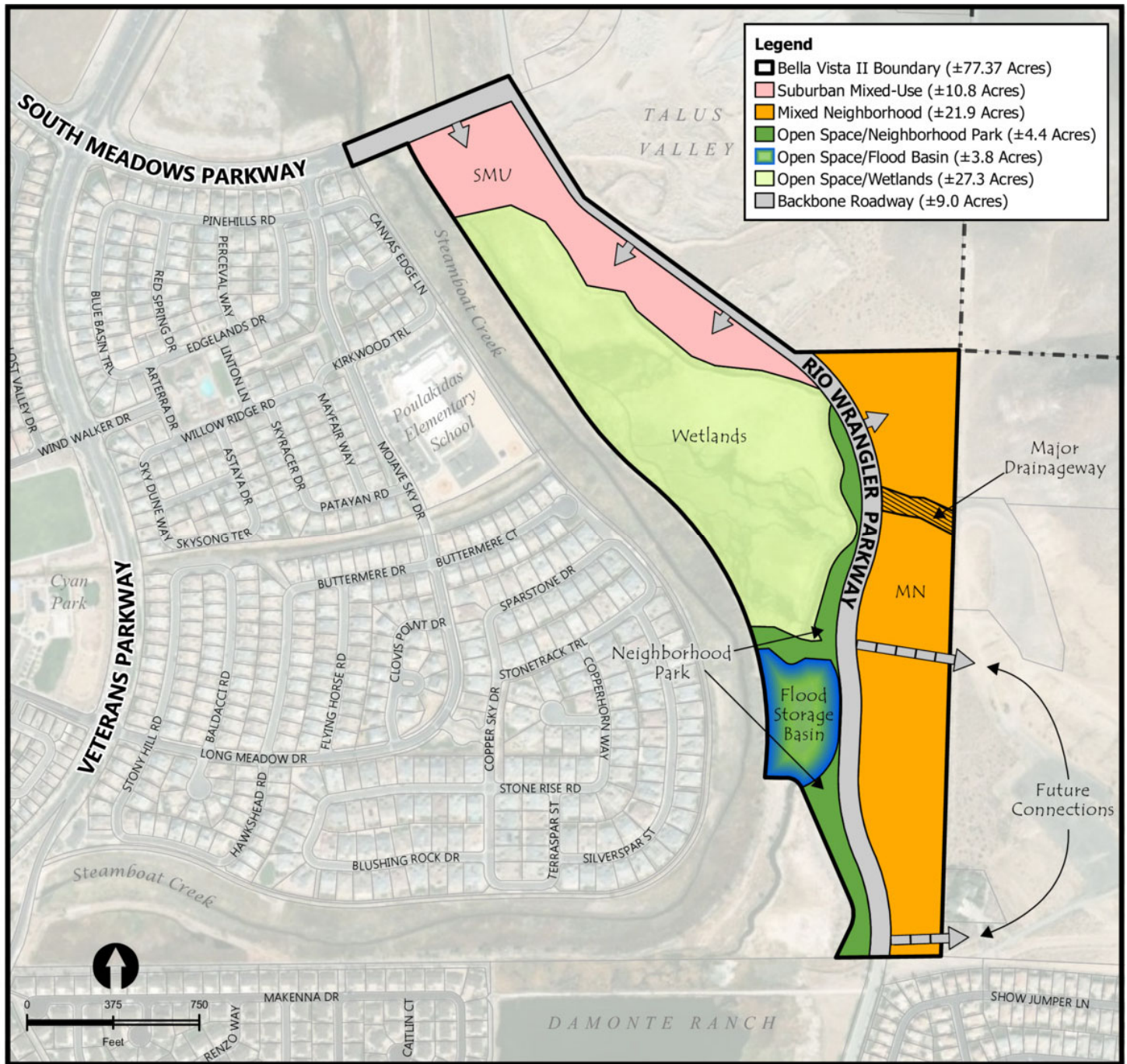


FIGURE 7
Land Use

A. Land Use Descriptions

Allowed uses include detached and attached single family residential, multi-family residential, lower intensity non-residential, parks, greenways/wetlands, and open space. The maximum density, total number of dwelling units and the maximum non-residential square footage for each village is shown on Table 1. The maximum number of dwelling units within the project shall not exceed 609 units (residential) and the non-residential square footage shall not exceed ±117,612 square feet (non-residential).

The Development Plan and Development Standards contained herein are intended to depict the general development vision for the PUD. Sufficient flexibility shall be allowed to permit detailed planning and design at the time of actual development. The acreage of each land use category may be increased by up to 10% if it is demonstrated that additional acreages are necessary due to constraints and/or design considerations to accommodate the project, to the satisfaction of the Administrator. This provision shall not exceed a cumulative total of 10% for each land use category. Changes in excess of 10% shall require an amendment to the Development Standards Handbook. Residential densities and residential dwelling unit allocation may be interchangeable between villages and will be defined fully with the tentative map for any given residential village.

**TABLE 1
LAND USE BREAKDOWN**

Village/Area ⁴	Bella Vista II Land Use ⁵	Size (Acres)	Min. Net Residential Density ³	Max. Gross Residential Density ⁴	Approx. Dwelling Units ¹	Min. Non-Residential Area	Max. Non-Res. Intensity (sq. ft.) ²
SMU	SMU	±10.8	15 du/ac	30 du/ac	324	5 Acres	117,612
MN	MN	±22.0	6 du/ac	30 du/ac	285	N/A	N/A
Neighborhood Park	PGOS	±4.4	-	-	-	-	-
Flood Storage Basin	PGOS	±3.8	-	-	-	-	-
WM-I	PGOS	±27.4	-	-	-	-	-
South Meadows Pkwy/ Rio Wrangler Pkwy	ROW	±9.0	-	-	-	-	-
Total		±77.4			609¹		117,612²

Notes:

1. The total amount of residential dwelling units by Village may vary but shall not exceed 609 units throughout the Bella Vista II PUD.
2. The total amount of non-residential may vary as long as the total floor area from non-residential development does not exceed 117,612 square feet throughout the SMU Land Use and a min of 5-acres is provided.
3. Minimum Net Density is calculated by dividing the total number of lots by the total acreage of lot area.
4. Max Gross Density is calculated by dividing the total number of lots by the total Village acreage.
5. All primary and accessory uses listed as permitted on **Table 2**, can be established by right, subject to compliance with the standards contained in this PUD. With the exception of tentative maps required to sell individual lots, no further discretionary review is required for each permitted unless otherwise stated in Table 2 below.

Suburban Mixed-Use

The Suburban Mixed-Use (SMU) land use category allows a mix of retail, commercial, employment, and high-density residential uses that are more appropriate near the two main arterials (South Meadows Parkway & Rio Wrangler Parkway). The mix of uses will serve the existing surrounding developments and the future developments and provide the area with additional residential opportunities. Trails within the SMU area will connect to the existing trail network to provide additional transportation opportunities.

Characteristics specific to the SMU area include:

- Buildings oriented along the main arterials.
- Bike and pedestrian connectivity is required throughout the site and connect to existing adjacent facilities.
- Signage will be limited to monument style only along Rio Wrangler Parkway.
- Design standards are outlined in Section D and E.

Mixed Neighborhood

The Mixed Neighborhood (MN) land use category includes a mix of housing types and can range from higher density housing including; multi-family, alley loaded town homes and condos, to lower density housing types including, triplex and duplex attached housing, zero lot single-family, and traditional single-family detached housing. These standards will allow for range of multi-generational housing, innovative designs, and community amenities that will provide a transition between commercial and lower intensity uses.

Characteristics specific to the MN area include:

- Provide a range of housing types
- Within walking distance to amenities such as retail, commercial centers, parks, and schools and connected with by trails and other bike and pedestrian facilities.
- Design Standards are outlined in Section D.

Parks, Greenways, and Open Space

The Parks, Greenways, and Open Space will protect the natural wetlands identified in WM-1 that connect with the floodways and Flood Storage Basin developed in the original Bella Vista PUD and take advantage of the close proximity to the Steamboat Creek. A ±4.4 acre Neighborhood Park will allow active and passive recreation and help to provide a transition with the natural elements of the property, with the development located in Villages 1 and 2. An extensive network of trails and bike and pedestrian paths will connect throughout the PGOS area and provide recreation opportunities to the surrounding and future developments.

B. Permitted Uses

TABLE 2 BELLA VISTA II PERMITTED USES <i>P = Permitted by Right</i> <i>SPR = Site Plan Review Required</i> <i>CUP = Conditional Use Permit Required</i> <i>A = Permitted as Accessory Use</i>			
Use Category/Specific Use Type	BVII Land Use		
	SMU	MN	PGOS
Residential			
Dwelling, Single-Family Detached		P	
Dwelling, Duplex	P	P	
Dwelling, Triplex	P	P	
Dwelling, Fourplex	P	P	
Dwelling, Single-Family Attached	P	P	
Dwelling, Multi-Family	P	P	
Dwelling, Live/Work	P	P	
Manufactured Home	P	P	
Assisted Living Facility	P		
Group Home	P	P	
Commercial Sales and Services			
Animal Clinic, Hospital, or Training Facility (No Shelters, Commercial Boarding/Kennels)	P		
Bakery, Retail	P		
Bar, Lounge, or Tavern	CUP		
Carwash	P		
Child Care Center	P		
Cleaners, Commercial	P		
Convenience Store	P		
Financial Institution	P		
Automated Teller Machine, Freestanding	P		
Gas Station	CUP		
General Retail, less than 10,000 Square Feet	P		
Laboratory	CUP		
Medical Facility, Day Use Only	P		
Microbrewery, Distillery, or Winery	P		
Office, General	P		
Personal Service, General	P		
Plant Nursery or Garden Supply	P		
Restaurant	P		
Restaurant with Alcohol Service	P		
Recreation, Entertainment, and Amusement			
Amusement or Recreation, Inside	P		
Public Park or Recreation Area	P	P	P
Lodging			
Hotel	P		
Institutional, Public, and Community Service			
Communication Facility, Equipment Only	P	P	
Library, Art Gallery, or Museum	P		
Public Transit or School Bus Shelter	P	P	P
Religious Assembly	P	CUP	
School, Primary or Secondary (Public or Private)	SPR	SPR	
School, Vocational or Trade	SPR		
Utilities, Major	CUP	CUP	

TABLE 2 BELLA VISTA II PERMITTED USES			
<i>P = Permitted by Right</i> <i>SPR = Site Plan Review Required</i> <i>CUP = Conditional Use Permit Required</i> <i>A = Permitted as Accessory Use</i>			
Use Category/Specific Use Type	BVII Land Use		
	SMU	MN	PGOS
Utilities, Minor	P	P	P
Industrial, Manufacturing, Wholesale, Distribution and Transportation			
Custom and Craft Manufacturing	P		
Food Processing/Wholesale Bakery	P		
Mini-Warehouse	CUP		
Accessory Uses			
Accessory Dwelling Unit (ADU)		A - SPR	
Caretaker Quarters	A		
Child Care, In Home (1-6 Children)		A	
Child Care, In Home (7-12 Children)		A-SPR	
Community Center, Private	A	A	
Drive Through Facility (Food & Non-Food Service)	A		
Gaming Operation, Restricted	A		
Home Occupation	A	A	
Sidewalk Cafes	A		

Notes and Additional Use Requirements:

- Primary Uses not listed in Table 2 are not allowed, unless approved by the Master Developer and the City of Reno Zoning Administrator.
- Allowed Temporary Uses are as defined in RMC Section 18.08.201 Table 3-1, as amended, under the NC zoning districts for SMU, and Residential for the MN land use, and PGOS in the RMC.
- A CUP is required for uses that open before 6am or stay open past 11pm.
- A CUP is required for uses that require deliveries before 6am or past 11pm.

C. Residential Design Standards

Lot and parcel standards for all permitted residential uses are outlined in **Table 3** and are specific to the land use established in **Figure 7**. The land use establishes the base design standards for each village within this PUD. These standards shall apply to all residential development applications and building permit requests, except parcel maps establishing roadways. Each development application or building permit request shall comply with the design standards for residential in the SMU or MN land use categories. These standards determine the bulk, density, intensity, site and building design standards within the PUD.

Residential uses such as single-family attached/detached, condos, and multi-family dwelling units, and any accessory structures shall be sited on lots/parcels to conform to the minimum lot and parcel standards as outlined in **Table 3**. Standards not addressed on **Table 3** shall be consistent with the NC-Neighborhood Commercial zoning district for SMU (RMC 18.02.310, as amended) and the MF-30 Multi-Family Residential zoning district for MN (RMC 1802.210, as amended).

TABLE 3 RESIDENTIAL-LOT/PARCEL STANDARDS		
Density/Intensity Standards (a)	SMU	MN
Dwelling Units per Acre Max.(du/ac)	30	30
Landscape Area (Multi-Family/Attached/Condos) (b)	20%	20%
Max. Building Height (feet)	35	35
Minimum Yard & Setbacks (feet)		
Front Yards (b)(c)	10	10
Garage Setback (face of garage)	3 or 20	3 or 20
Side Yards	0 or 5	0 or 5
Rear Yards	10	10
Building Separation	20 (10 if less than 50 units)	
Accessory Structures (d)		
Driveways (feet long)	20	20
Min. usable open space (sf/unit)	100	100

Notes and Additional Requirements:

- Setbacks for Suburban Mixed-Use and Mixed Neighborhood may be modified with a tentative map or a minor/major deviation to address unique housing products.
- Single-family detached products will require the entire front yard to be landscaped. Front yard setbacks for residential projects shall apply to the front face of the house or garage. All garages shall be served by driveways not less than 3 or 20 feet in length. Side loaded garages may meet the same front yard setbacks as the house. Builders may provide for variations (but no less than the minimum setbacks) in front yard setbacks and/or building articulation to create an interesting streetscape.
- Minimum front yard setback shall be 20 feet adjacent to arterial or collector streets.
- Accessory building setbacks shall conform to Reno Municipal Code Title 18.08.203 Table 18.08.9B Bulk, Dimensional, Density and Intensity Standards for accessory structures and uses, as amended and based upon the land use for the project as described in the first paragraph of section III C of this PUD.

Residential Architectural Elements

Exterior Elements

Exterior materials shall include a combination of patterns and textures to provide a range of products with similar styles and architectural accents. Sample material boards shall be reviewed and approved by the BVROA. Siding materials shall be continued down to within 8 inches of finished grade on all elevations to eliminate large areas of exposed foundation. Building materials shall be compatible in scale with the design of the residences. Materials must also be compatible throughout each village.

Exterior Colors

All exterior color schemes as shown on sample color boards, shall be reviewed and approved by the BVROA. Exterior colors shall be in harmony with the natural setting. Color intensity shall be kept low for large surfaces.

Facades and Articulation

Architectural features such as: varying window sizes and shapes, shutters, broken planes and pitched roofs, covered entries and porches, porch rails, columns and trim detailing help to define the fronts of the homes and garages; and shall be incorporated into the design of the residences.

Large blank walls, roofs, non-articulated garage doors, are not permitted. Side entry garages are permitted.

Building materials and architectural features, compatible with the front of the houses shall be provided on all sides of the homes. Rear and side elevations adjacent to common open space areas shall be finished in a similar manner as the front elevations, subject to review and approval by the BVROA.

Roofs

Roof colors shall be consistent with the color scheme of the buildings. Varying pitched roofs are encouraged. A variety of pitched roofs may be provided. The BVROA shall review and approve the color palette of roofing within each village.

Roof materials shall be applied to comply with snow load and high wind standards. Materials may include:

- 1) Concrete or clay tile (flat or barrel),
- 2) Non-reflective architectural metal,
- 3) 40-year architectural grade composition shingles,
- 4) 40-year fiberglass composition shingles

Roof materials, however, must be consistent throughout each village.

House Plans

Each village shall have a minimum of four distinct house plans. House design shall vary throughout each village with no one elevation repeated for abutting homes, or mirrored across the street. Adjacent lots may share the same floor plan, but must have different elevations.

Exterior Lighting

Lighting shall be integrated with the architectural design of the individual residences. Lights shall be shielded to prevent light spillage onto adjacent properties or streets.

Flood lights are not permitted. Motion detector actuators are permitted with designer fixtures only and subject to approval by the BVROA.

Miscellaneous Design Elements

Awnings, Trellises, Patio Covers, Decks and Other Accessory or Ancillary Structures

Awnings, trellises, patio covers, second story decks and other accessory or ancillary structures including granny flats and casitas, provided by builders, shall be consistent in material, color and architectural character as the main structure and must be reviewed and approved by the BVROA. Protrusions into the setback will be allowed in accordance with RMC, as amended

Chimneys

Exterior materials of chimneys shall be compatible with the exterior materials and colors used on the house.

D. Non-Residential Design Standards

Lot and parcel standards for all permitted non-residential uses are outlined in **Table 4** and are specific to the land use established in **Figure 7**. The land use establishes the base design standards for each village within this PUD. These standards shall apply to all nonresidential development applications and building permit requests, except parcel maps establishing roadways. Each development application or building permit request shall comply with the design standards for nonresidential in the SMU or PGOS land use categories. These standards determine the bulk, density, intensity, site and building design standards within the PUD.

Non-residential structures and any accessory structures shall be sited to conform to the minimum lot and parcel standards as outlined in **Table 4** below or can be modified with a tentative map or a minor or major deviation to address unique products.

TABLE 4 NON-RESIDENTIAL – LOT DEVELOPMENT STANDARDS		
Density/Intensity Standards	SMU	PGOS
Floor Area Ratio (FAR) Max.	None	N/A
Landscape Area	20%	20%
Building Height (feet)	35	35
Lot Size		
Minimum Lot Width (feet)	None	
Minimum Lot Size	None	
Yard & Setback Dimension		
Front Yards (feet) (c)	10	20
Side Yards (feet)	0 or 10	0 or 10
Rear Yards (feet)	10	15
Building Separation (feet)	20	20
Setbacks from Adjacent Residential Uses		
All Yards (feet)	20 or height of building, whichever is greater	

Notes:

- All architectural design standards per Reno Municipal Code 18.08.301 (a) (10), and 18.12.305(b) as amended.
- Front yard setbacks adjacent to Rio Wrangler Parkway shall be 25 feet.

E. Street Design Standards

Streets within this PUD include arterials, collectors, and local streets as identified in **Figure 5**, Major Roadways. The Master Developer will be responsible for construction of the arterial and collector streets and associated improvements. Arterial/collector streets shall be improved with paving, curb, gutter, sidewalk, fencing and landscaping in accordance with **Figures 8A, 8B, 9A, 9B, 10A, and 10B**. Local streets and associated improvements will be constructed by the developer. Local streets are defined as public or private streets within individual villages and will be identified during the tentative map or building permit process. Local Streets are not depicted in **Figure 5**.

Intersection Spacing

The on-site residential collector streets and local streets intersecting South Meadows Parkway and Rio Wrangler Parkway shall meet Regional Transportation Commission (RTC) spacing requirements for moderate access control arterials. An updated traffic letter supporting the Traffic Report shall be required to be submitted with each tentative map or building permit to determine intersection design. The intersection locations depicted in **Figure 5** are subject to change and will be finalized during the tentative map process.

Arterial Streets (South Meadows Parkway)

South Meadows Parkway extension will include the extension of South Meadows Parkway from the existing terminus in Bella Vista. This will include a culvert crossing over Steamboat Creek and eventually connect to Rio Wrangler Parkway. There are two cross sections proposed which will be designed to arterial street standards as outlined in **Figure 8A & 8B**.

Since this street is planned for in the adjacent property (Talus Valley), the Bella Vista II Master Developer shall only be responsible for half street improvements. Once complete, South Meadows Parkway shall be improved with paving, curb, gutter, sidewalk, fencing/sound walls (where applicable), and landscaping. The Master Developer South Meadows Parkway will construct two travel lanes, a bike lane, and a 10-foot wide shared use path for the South Meadows Parkway Steamboat Creek Crossing (**Figure 8B**), and the remaining portion of South Meadows Parkway will include the center 14 ft. landscaped median, south 2 lanes, and south 21-feet of landscape with a 10-foot wide shared use path (**Figure 8A**). The north half of South Meadows Parkway will be constructed by others (Talus Valley).

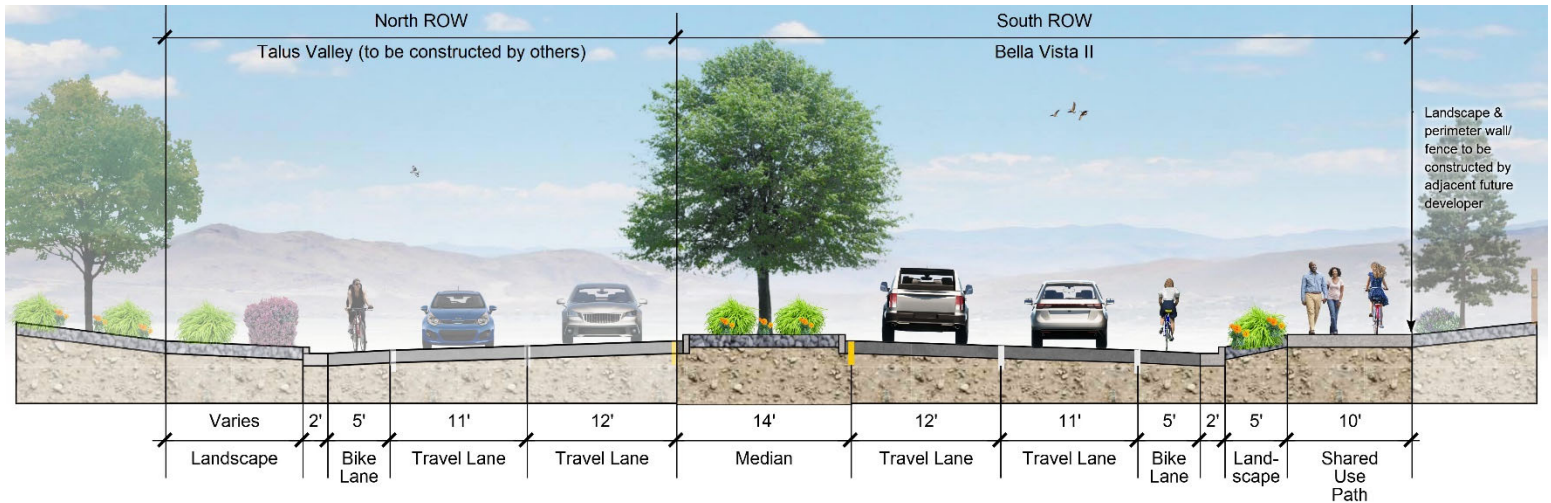


Figure 8A
South Meadows Parkway

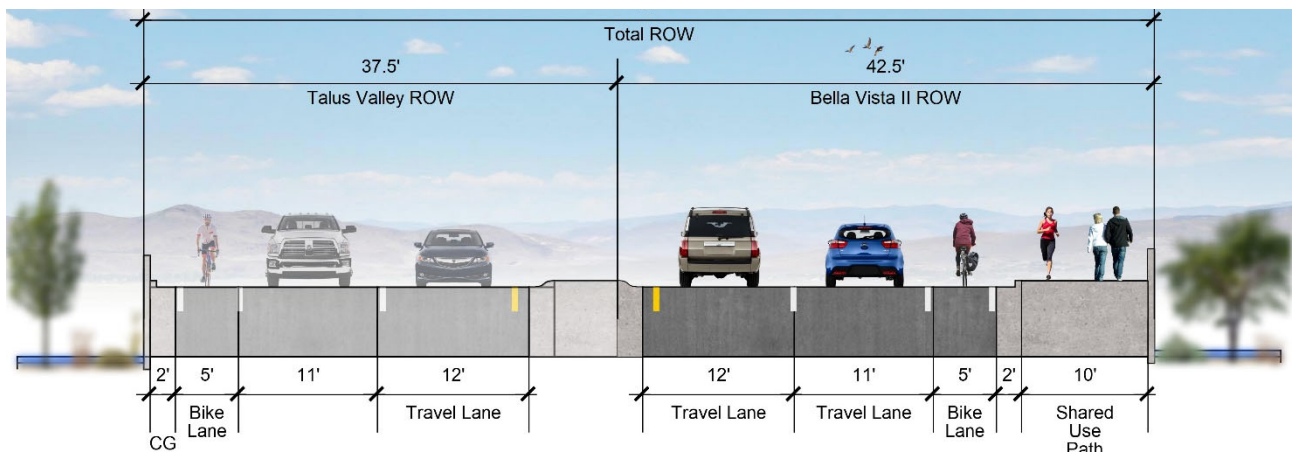


Figure 8B
South Meadows Parkway – Steamboat Creek Crossing

Arterial Street Parking and/or Direct Residential Access

On street parking and/or direct residential driveway access is not permitted on arterial streets.

Arterial Intersection Entry Treatment

Intersections of arterial with designated major or village entrances are encouraged to incorporate signage and enhanced landscape.

Arterial Street Fencing/Walls

Required fencing/wall design and materials shall be in accordance with **Figure 12**. Required fencing design and materials, including alternative fencing design shall be in accordance with **Figure 11**.

Solid fencing, six (6) feet in height shall be consistent throughout the project in accordance with **Figure 11**. When changes in elevations occur, fences shall be stepped in equal intervals, rather than sloped. Fencing along arterial/collector streets shall include pilasters, spaced at least every 80 feet. Fencing along Arterials Streets adjacent to a non-residential use are not required.

Arterial Street Signs

All street signs, traffic signs and directional signs that control vehicular traffic along arterial streets shall

be standard city signs with standard posts.

Arterial Street Utility Standards

Above ground utility appurtenances shall be screened from public view from all streets. Screening shall be accomplished with the use of berms, walls, fences, blending colors and/or vegetation. If fences or walls are used, materials shall be consistent with arterial and collector walls or fencing and rock veneer walls.

Utility buildings and structures shall be designed to fit into the architectural character of the adjacent residential or non-residential community. Where feasible, utility appurtenances and buildings shall be located in planter areas and not in turf areas.

Arterial Street Horizontal, Vertical and Pavement Section Design

Design of arterial roadways shall be per the City of Reno Public Works Design Manual. The exception is intersection spacing, which shall be provided in accordance with RTC standards.

South Meadows Parkway Crossing of Steamboat Creek

The South Meadows Parkway crossing of the Steamboat Creek design details shall include exterior treatments and railings as approved by the Army Corps of Engineers through their individual permit and to the satisfaction of city staff. Design details for this crossing shall be submitted with improvement plans for the construction of the south half of South Meadows Parkway. This section may be completed by the Master Developer or by others (Talus Valley).

Arterial Street Landscape/Streetscape

Landscape will be designed in accordance with Reno Municipal Code Sections 18.04.801 through 18.04.809, as amended.

Collector Streets (Rio Wrangler Parkway)

Rio Wrangler Parkway will be constructed to collector street standards as outlined in **Figure 9A and 9B**. Rio Wrangler Parkway will run north to south from the future extension of South Meadows Parkway to the current termination of Rio Wrangler Parkway in Damonte Ranch.

Rio Wrangler is proposed to be completed in two phases. Phase A will include the northwest $\pm 1,300$ foot section of Rio Wrangler Parkway and will be constructed with only half street improvements within the Bella Vista II PUD, (**Figure 9A**). This will include half of the center landscaped median, the west lane (southbound), west bike-lane, and the west 20 feet of landscape, sidewalk and fence improvements, (all landscaping, retaining and walls/fence shall be maintained by the project HOA). The eastern portion of half street improvements will be completed by others (Talus Valley).

The southern $\pm 2,700$ feet of Rio Wrangler Parkway will include full street improvements as identified in **Figure 9B**.

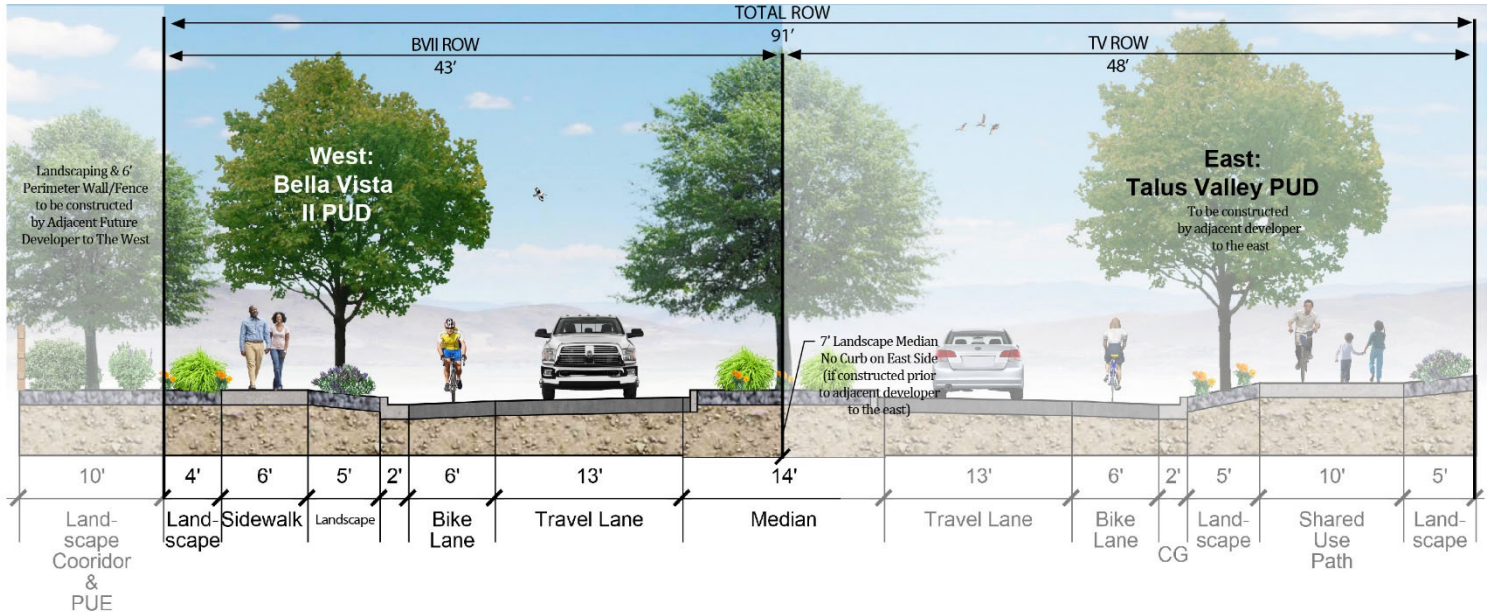


Figure 9A
Collector Street Section- Rio Wrangler Parkway (Phase A)

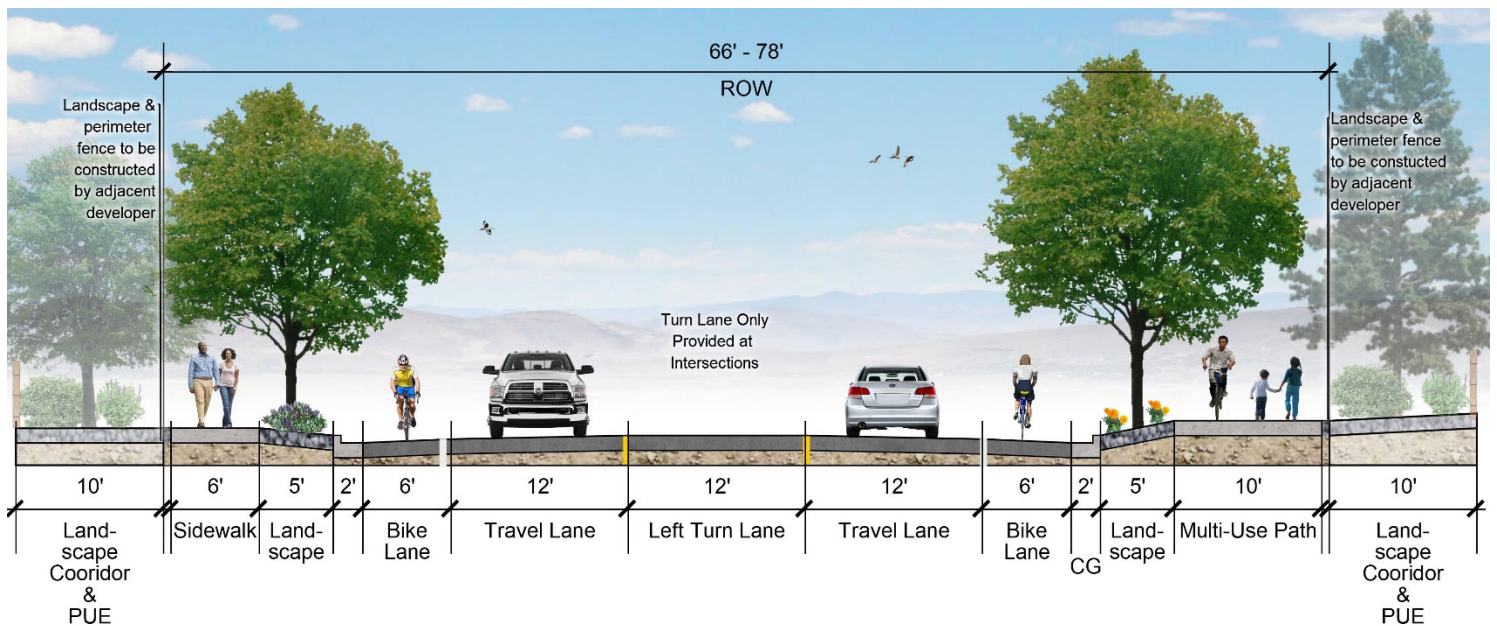


FIGURE 9B
Collector Street Section – Rio Wrangler Parkway (Phase B)

Collector Street Parking and/or Direct Residential Access

On street parking and /or direct residential parking access is not permitted on arterial streets.

Collector Street Sidewalk/Trail Connections

Sidewalks/Trails along collectors for all projects shall be connected to sidewalks within residential and non-residential villages and arterial streets, collector streets and sidewalk trails within access easements to open space paths, as appropriate.

Collector Street Fence or Equivalent

Collector street fence design and materials shall be in accordance with **Figure 11**. As an alternative, a 4-foot or higher change in elevation from the roadway to adjacent lots, combined with a 4-foot fence, may be substituted to provide views of the wetland corridor and linear park. All fencing, landscaping, and sidewalks along arterial/collectors shall be maintained by the project Owners Association.

Solid fencing, six (6) feet in height shall be consistent throughout the project in accordance with **Figure 11**. When changes in elevations occur, fences shall be stepped in equal intervals, rather than sloped. Fencing along collector streets shall include pilasters, spaced at least every 80 feet. Fencing along Collector Streets adjacent to a non-residential uses are not required.

Collector Street Intersection Entry Treatment

Intersections of collectors are encouraged to include signage and enhanced landscape for village entrances.

Collector Street Signs

All street signs, traffic signs and directional signs that control vehicular traffic along collector streets shall be standard City signs with standard posts.

Collector Street Utility Standards

Above ground utility appurtenances shall be screened from public view from all streets. Screening shall be accomplished with the use of berms, walls, fences, blending colors and/or vegetation. If fences or walls are used, materials shall be consistent with arterial and collector fencing and rock veneer walls.

Utility buildings and structures shall be designed to fit into the architectural character of the adjacent residential community or non-residential development. Utility appurtenances and buildings shall be located in planter areas and not in turf areas, where feasible.

Collector Street Horizontal, Vertical and Pavement Section Design

Design of collector roadway shall be per the City of Reno Public Works Design Manual. The exception is intersection spacing, which may be provided at ¼ mile intervals.

Collector Street Landscape/Streetscape

Landscape will be designed in accordance with Reno Municipal Code Sections 18.04.801 through 809, as amended.

Local Streets

Local streets are defined as any street including project entry streets, cul-de-sacs and loop streets within an individual residential village or non-residential project. Local Residential/Pedestrian and local streets may be public or private, to be determined at the time of Tentative Map or building permit submittal and approval. Local streets shall be constructed by the builders of each individual village. Village entrances will be constructed by the Master Developer or at the Master Developer's discretion, the builder of each individual village.

Alternative local street sections may be proposed during the tentative map process to accommodate unique housing types or to accommodate off street parking. Alley's may be designed in accordance with the City of Reno Public Works Design Manual.

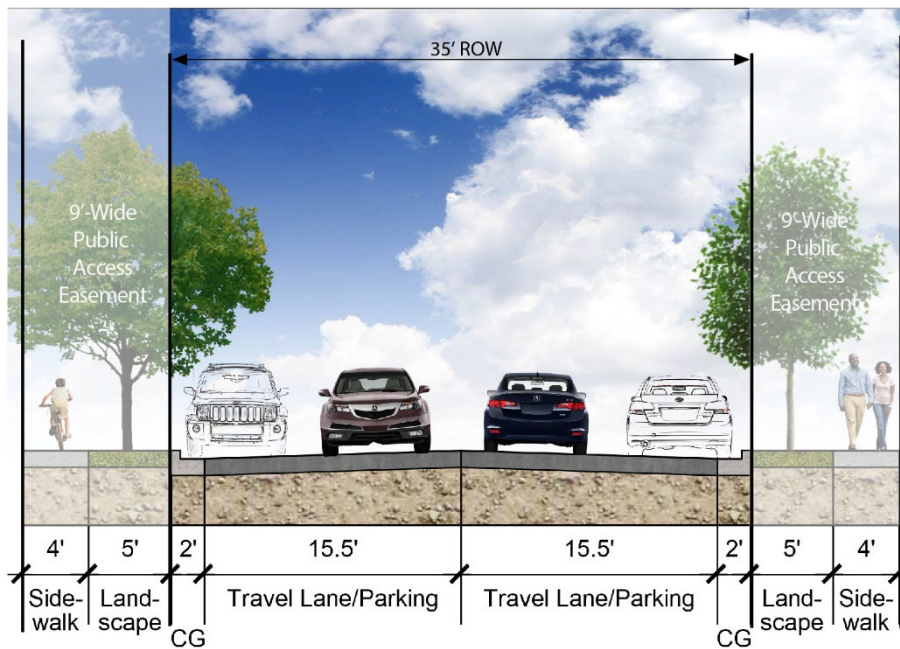


FIGURE 10A
Residential and Non-Residential Local Street (Pedestrian)

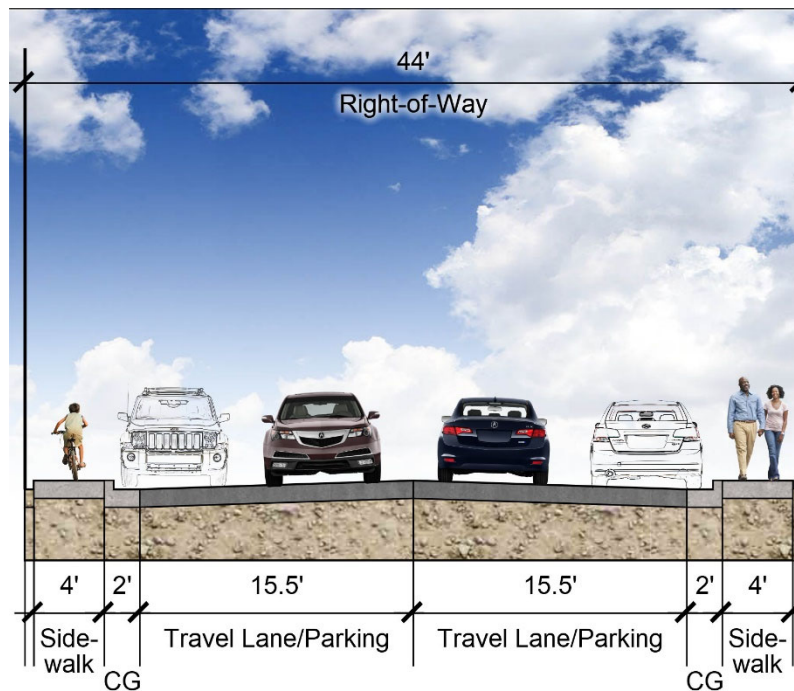


FIGURE 10B
Residential and Non-Residential Local Street

Local Street Improvements

Local public streets shall be improved with paving, curb, gutter landscaping and sidewalks as applicable in accordance with **Figure 10A & 10B**.

Alternate street sections including private street or streets with landscaped parkways may be provided by the individual builder subject to approval by the Master Developer and the City of Reno at the time of tentative map or building permit review.

Local Streets Parking and/or Direct Access

On street parking and/or direct residential driveway access within villages is permitted.

Local Street Sidewalk Connections

Sidewalks within villages for all projects shall be connected to sidewalks along arterial streets, collector streets and sidewalk trails within access easements to open space paths, as appropriate. The City of Reno shall approve all connections with each tentative map or building permit submittal.

Local Street Fencing

Fencing adjacent to local residential/pedestrian and local streets shall comply with requirements outlined under Arterial/Collector street fencing as specified in **Figure 11** of this PUD.

Local Street Signs

All street signs, traffic signs and directional signs that control vehicular traffic along local streets shall be standard city signs with standard posts.

Local Street Landscape/Streetscape

Landscape will be designed in accordance with Reno Municipal Code Sections 18.04.801 through 809, as amended.

F. Major and Village Entrances

Entry monuments may be provided on arterials and collectors for each village or project entrance. The Developer will be responsible for construction of the major and village entrances. The BVROA will ultimately be responsible for the maintenance of the major and village entrances. The individual villages will utilize entrance concepts that include monumentation signs, lighting, fencing, and landscaping. If a private gated entrance is desired, builders must submit specific plans for median modifications and gates to the City of Reno for review and approval with each tentative map or building permit as applicable.

Additional details regarding signs, lighting, landscaping, and fencing are outlined below;

Signs

Each sign may include the name of the individual village and the master project name and logo. Builder names may not be listed on the signs. All signs shall meet the requirements of RMC Chapter 18.05 as amended.

Lighting

Entrance signs may be lighted with ground mounted direct lighting sources. No internal illumination of signs shall be permitted.

Landscaping

All major and village entrances shall be enhanced with irrigated landscaping in accordance with Reno Municipal Code Sections 18.04.801 through 809, as amended.

G. Open Space and Public Park Design Standards

Open Space

Open space includes the Wetlands Consolidation Corridor, major drainageway, parks, pathways, trail access parcels to open space and other open space land that is not developed with roadways, or located on individual lots within the residential or non-residential portion of this PUD. Common open space, including the park and trails, shall be open and available for use by the general public (unless located in a private gated community). These facilities shall be maintained by an Association or the

Public Park

The public park will be designed to the approval of the City of Reno and constructed by the project Developer or the City of Reno. The Developer shall not receive credit towards the Residential Construction Tax (park fees) to construct the park. The park will not be dedicated to the City of Reno. The park will be approximately 4.4± acres in size and will be located in the south-central portion of the Bella Vista II PUD (refer to **Figure 7**).

All Residential Construction Tax fees collected from this project shall be used to improve the park in the Bella Vista Ranch PUD (Cyan Park) located to the west of this project, which is located within the same Park District.

I. Facilities

A minimum of three (3) of the **following facilities will be constructed within approximately 3.0 acres of the park:**

- Picnic Areas (to include tables and benches)
- Par Course (exercise equipment)
- Play Structure
- Horseshoes or similar amenities of scale (as approved by the administrator)
- Turf Open Play Areas (maximum of 1 acre in size)
- Trail Head/Parking Area along a public street

The following facilities will be constructed in the remaining portion of the park:

- Trails
- Native vegetation and existing un-disturbed vegetation
- Seating/viewing areas

II. Timing and Implementation

Provide plans for construction of the park to the City, including the above amenities, with application for the first residential building permit. Complete construction of the park improvements within one year of the date of City approval of the park construction plans. The applicant may request one, 1 year time extension (2 total years) to complete the park improvements without amending the PUD.

III. Fencing

Fencing associated with the park, may be provided adjacent to or within the park. The following area or activity delineation fencing shall be provided:

- 1) Split rail fencing as depicted in **Figure 14A**.
- 2) Vinyl coated brown chain link fencing associated with sports fields or courts.
- 3) Rockery walls and/or rock veneer walls consistent with the streetscape walls.

IV. Landscape

The park will be landscaped and irrigated in accordance with Reno Municipal Code Sections 18.04.801 through 809, as amended. Evergreen massing is encouraged adjacent to residential lots.

V. Lighting

All lighting shall be approved by the City of Reno and shall utilize state of the art “dark sky lighting” techniques. Lighting in the park shall be minimized where possible but may include the following:

- 1) Parking Lot Lights – Fully shielded lighting including “shoebox” style lights shall be provided in parking lots and shall not exceed 20 feet in height.

VI. Pathways

Pathways within the park shall connect to sidewalks within the individual villages, sidewalks within trail access areas, open space trail pathways and sidewalks along arterial streets as appropriate. Pathways to and from individual lots are not permitted. A pathway/sidewalk circulation and connection plan to the park shall be reviewed and approved by the city with each tentative map or

building permit.

VII. Utilities

Above ground utility appurtenances shall be screened from public view. Screening shall be accomplished with the use of berms, fences, walls, blending colors, and/or vegetation.

Utility buildings and structures shall be designed to fit into the architectural character of the adjacent development. Utility appurtenances and buildings shall be located in planter areas and not in turf areas. All utilities must meet the design standards outlined in **Table 4** of this PUD.

H. Fencing Plan/Design Standards

A combination of fencing types will be used throughout the Bella Vista Ranch II to provide consistency and to help protect the open space throughout the development. Furthermore, fencing/walls along the arterial and collector streets will help separate the villages and provide privacy and help to reduce traffic noise. Walls/fences along arterial/collector streets adjacent to non-residential development is not required.

The following types of fences are proposed throughout the development as depicted in **Figure 11** below:

- Masonry Sound Wall with Pilaster
- Arterial /Collector Street Fence
- Split Rail/Open Metal Fence
- Temporary Feral Horse Fence

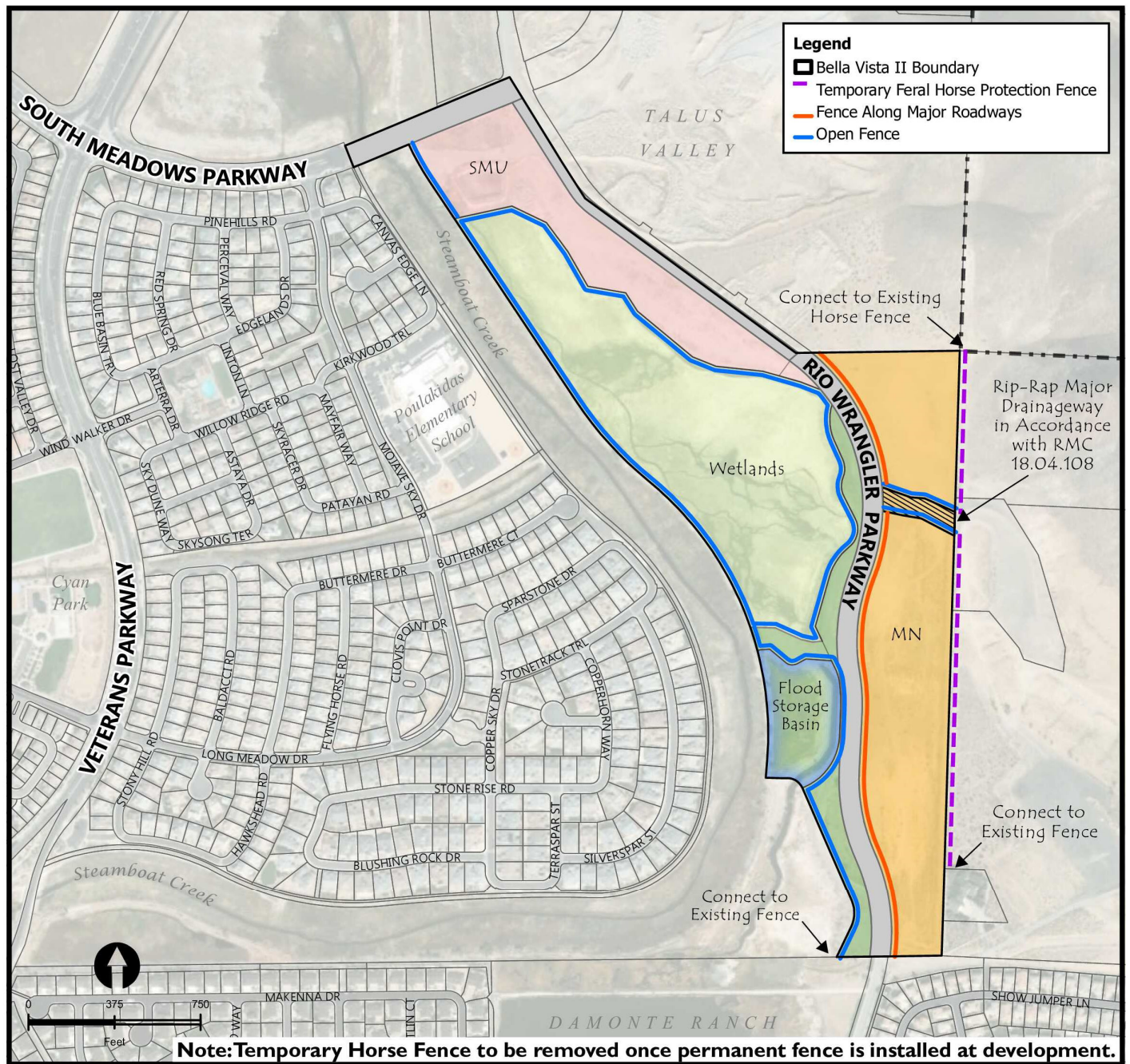
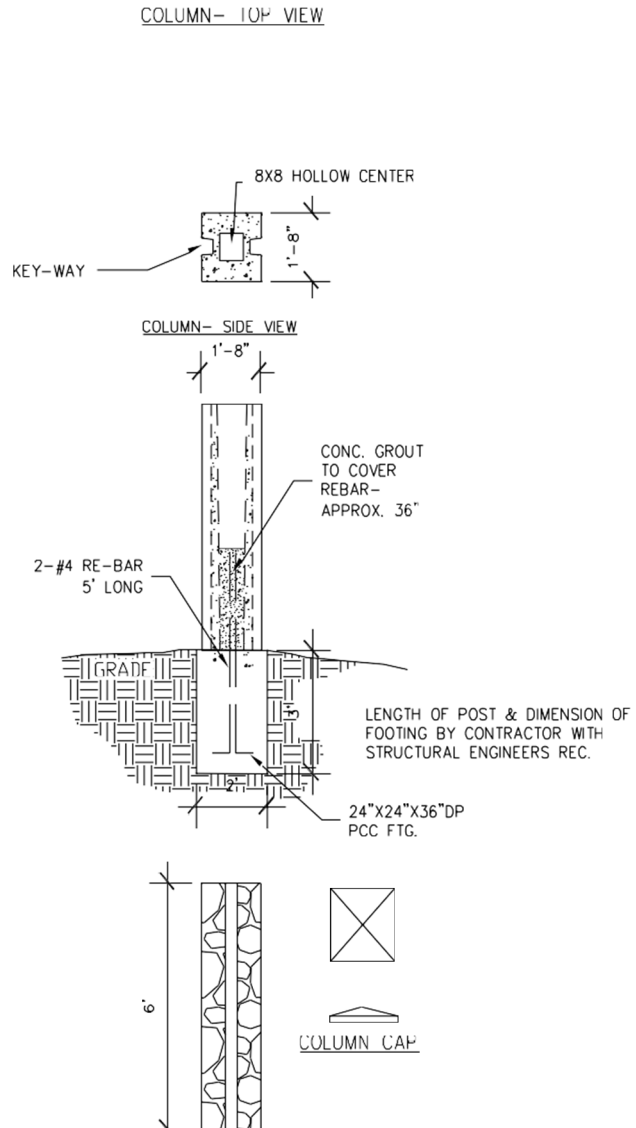
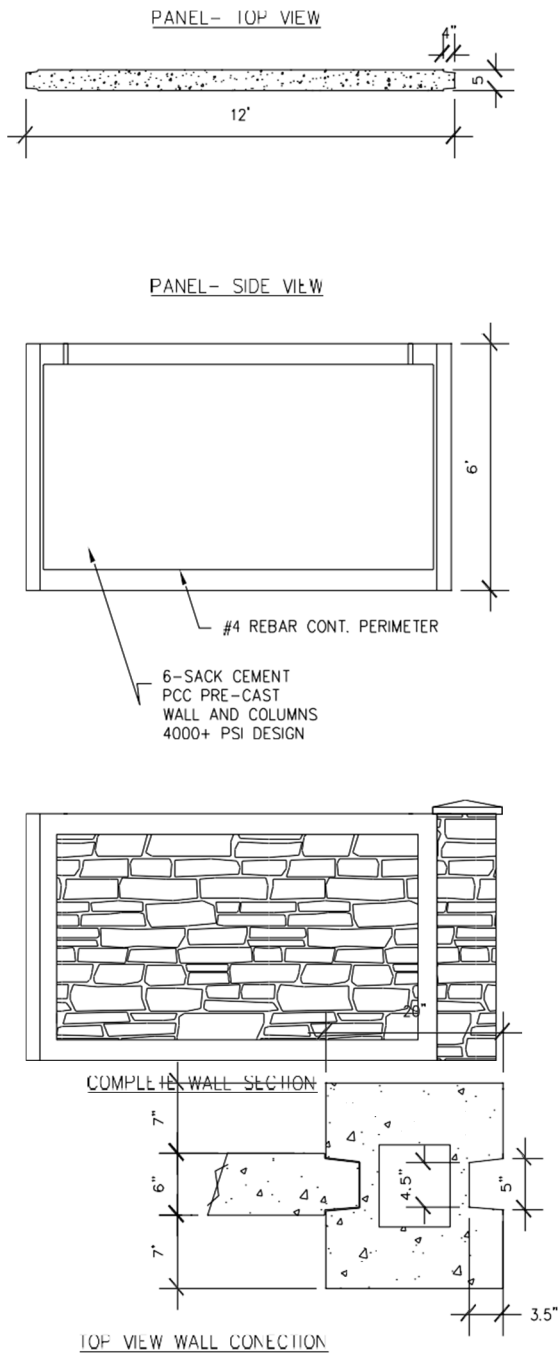


FIGURE 11
Fence Locations



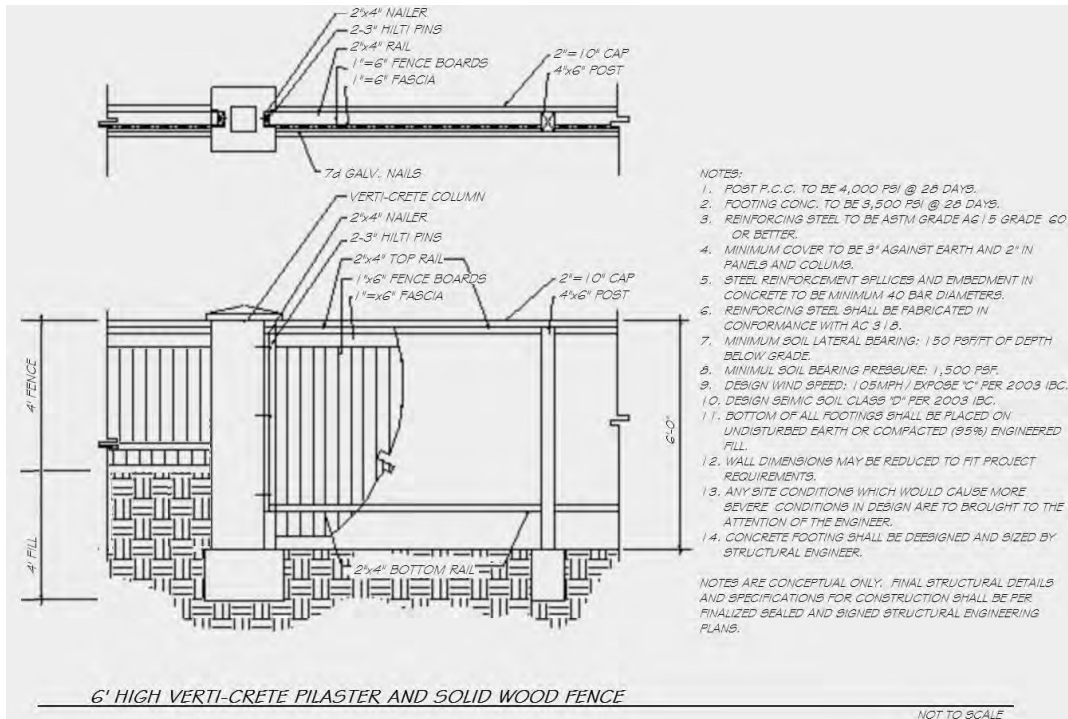
NOTES

1. POST AND PANEL CONCRETE TO BE 4000 PSI.
2. FOOTING CONC. TO BE 3000 PSI.
3. MIN. SOIL LATERAL BEARING; 150 PSF/FT. OF DEPTH BELOW GRADE.
4. MIN. SOIL BEARING PRESSURE; 1500 PSF.
5. DESIGN WIND SPEED 105 MPH/EXPOSE "C" PER 2003 IBC
6. WALL DIMENSIONS MAY BE REDUCED TO FIT PROJECT REQUIREMENTS.
7. REFER TO STRUCT. ENG. DRAWINGS BY VERTICRETE

VERTI-CRETE PRE-CAST SOUNDWALL

not to scale

FIGURE 12
Masonry Sound Wall with Pilaster



NOTES:

1. See **Figure 11**, for Typical Locations.
2. The alternative 4 foot fence section and 4 feet of vertical grade change shall include the pilasters and all other details of the standard 6 ft. fence.

FIGURE 13
Arterial/Collector Street Fence

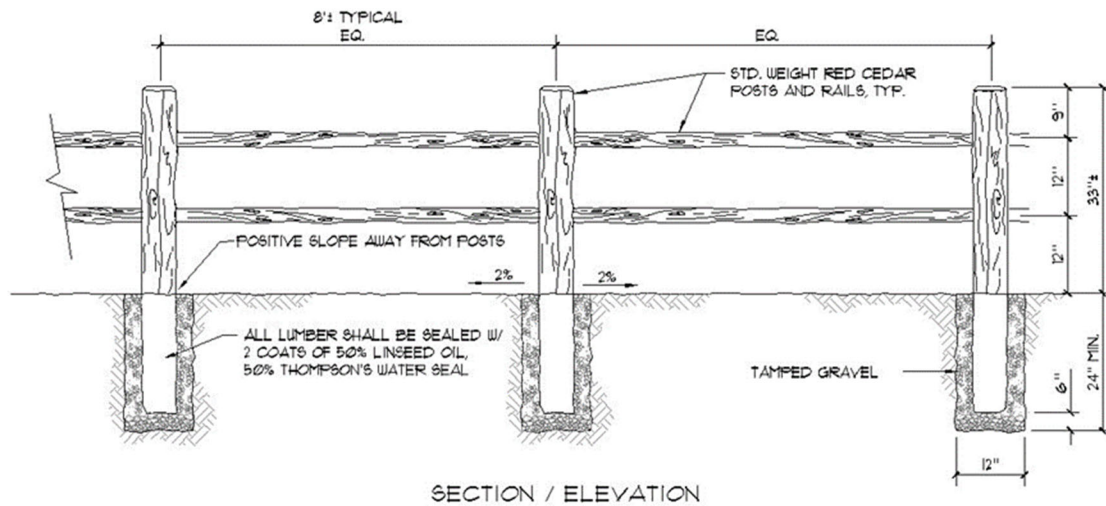


FIGURE 14A
Split Rail Fence

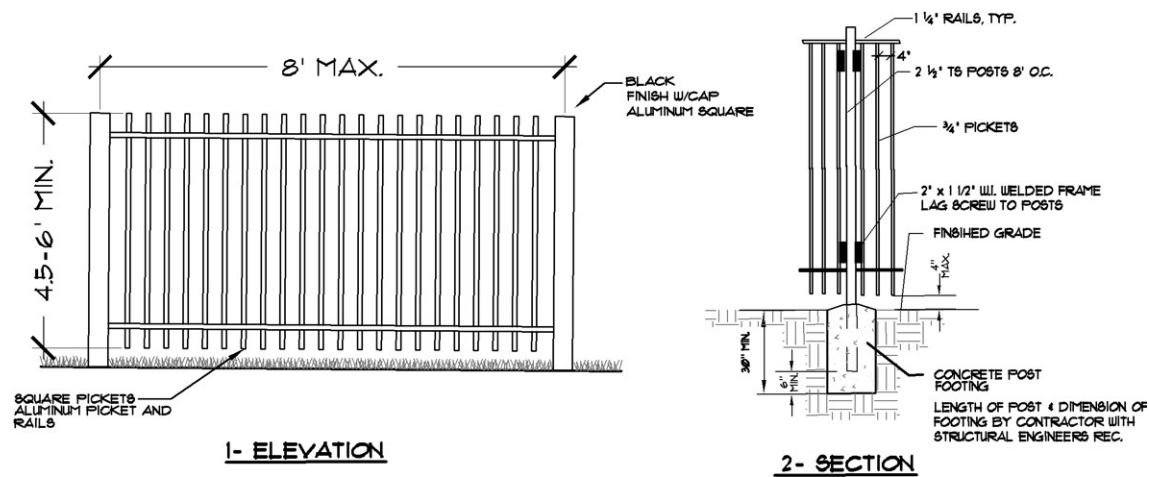


FIGURE 14B
Open Metal Fence

Open Fence types will be between the major drainageway and open space areas and residential lots shall be provided for delineation purposes throughout the project. Fencing shall consist of open metal and split rail fencing. (refer to **Figure 14A & 14B**). Open metal fencing shall be used at rear and side yards adjacent to the major drainageway and open space areas. Split rail fencing shall typically be used in front yard setbacks to delineate private lots vs. public open space areas. It will also be used along trails to provide separation from streets and wetland areas along the open space corridor, (refer to **Figure 11**).

Fencing of common open space will be associated with rear and side yards of individual lots located adjacent to open space, the major drainageway and streets. Additional fencing, may be provided by the builder of each village, if locations and fence types are approved by the City of Reno prior to the approval of the applicable tentative map or building permit.

I. Major Drainageway Design Standards

The major drainageway has been identified as a disturbed major drainageway and will be restored per City of Reno code 18.04.104 Drainage Way Protection, as amended. For any development proposed in the MN land use designation and within the area identified in **Figure 7** as 'Major Drainageway', improvement plans shall be submitted detailing the location/relocation plans for the entire major drainageway corridor. These shall either be submitted through the Tentative Map or Major Site Plan Review process.

Major Drainageway Edge Treatments

Transitional landscaping will be utilized to blend the ornamental landscape associated with residential lots or non-residential development and the natural revegetated drainageway area. This transition area will average ten (10) feet in width along edges without a trail and eighteen (18) feet in width with a trail (Refer to **Figure 11**). All revegetation specifications shall be approved by the City of Reno with each adjacent Final Map or building permit.

Signage

Signage to discourage users from entering sensitive areas will be provided adjacent to Steamboat Creek and drainage way areas. Pedestrian oriented signs shall be compatible throughout the entire Bella Vista Ranch PUD. The signage plans shall be submitted for approval to City Parks staff, prior to approval of the first Final Subdivision Map or issuance of building permit.

Site Furnishings

Site furnishings such as benches and trash receptacles will be placed along the pathway areas every

1,000 feet along channels, subject to approval by the City of Reno with each Final Map or non-residential building permit as applicable.

J. Common Open Space Design Standards

Common open space includes land located within the linear open space corridor and/or drainage way areas, and adjacent to residential lots or streets. An open space trail network is provided within the project and is shown on **Figure 6**.

Landscaping

Landscaping and irrigation shall be provided on common open space that is located between residential lots and streets or adjacent to the major drainageway and other open space areas. Landscaping within these defined areas shall be provided by the builder of each village that abuts common open space in accordance with Reno Municipal Code Sections 18.04.801 through 809, as amended.

Pathways and Trails

Pathways adjacent to the major drainage way and along Steamboat Creek shall be asphalt, a minimum 8 feet in width (refer to **Figure 6**). Pathways will be constructed by the Master Developer or at the Master Developer's discretion, the builder of each abutting village. Village builders shall ensure that pathways connect to sidewalks within the individual villages; pathways within trail access areas; and sidewalks along arterials and residential collector streets, as appropriate. Construction plans for pathway connections to villages shall be provided with the adjacent Final Map or building permit as applicable.

K. Feral Horse Protection Plan/Design Standards

It is the intent of this PUD to keep the feral horses that roam this area safe and free. The plan calls for contiguous horse fencing along the east side of the MN land use with no gaps while connecting to adjacent fence to keep them along the eastern range in accordance with NRS 569.431 and RMC 18.04.108, as amended.

Temporary Fencing

The proposed temporary fencing will be installed prior to any development. This will keep the horses away from conflicts with other uses until development and permanent fencing is installed, (refer to **Figure 15**). Once permanent fencing is installed it will be monitored and maintained by the Master Developer or HOA in accordance with RMC 18.04.108, as amended.

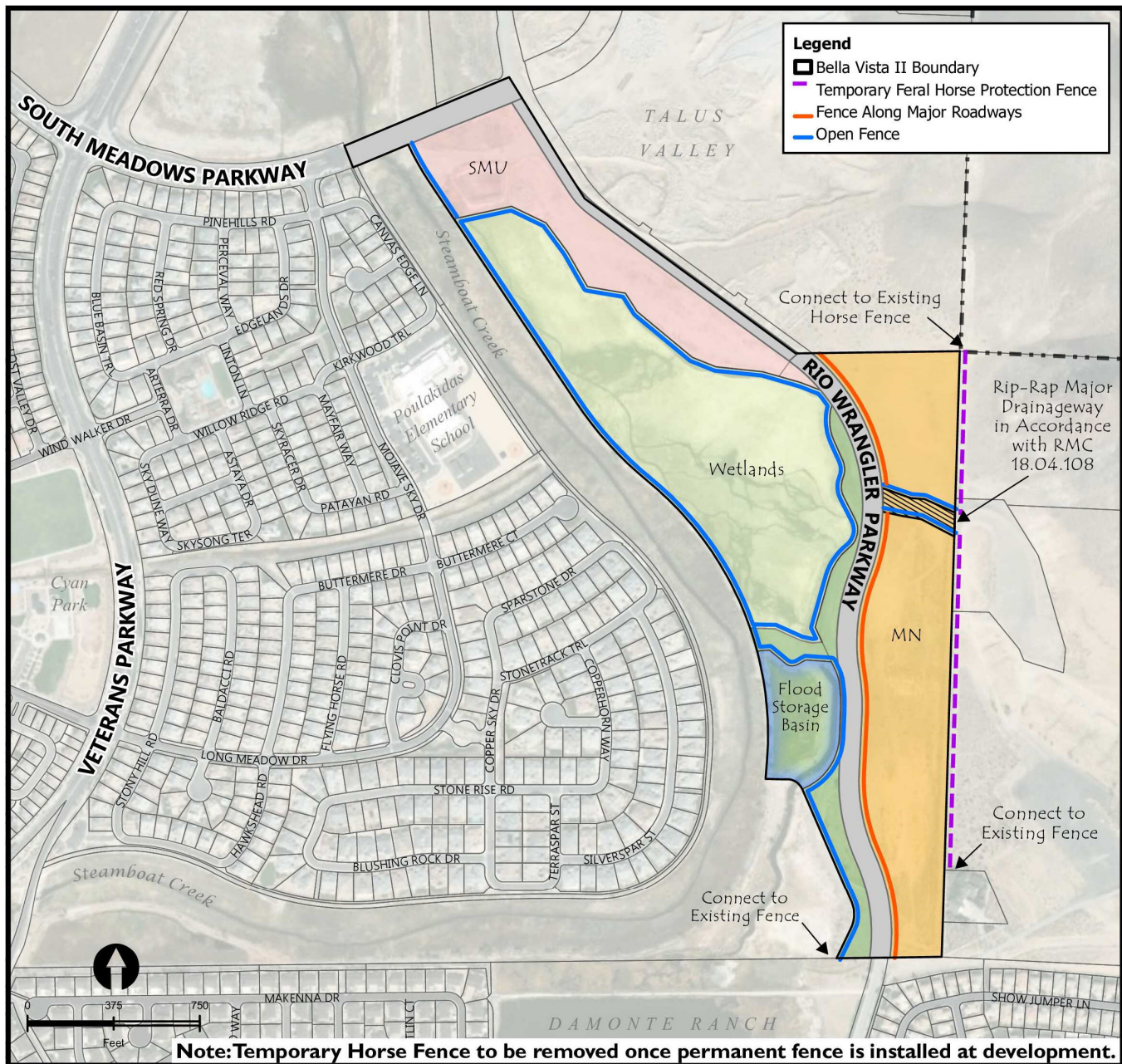


Figure 15
Feral Horse Protection Plan

With development of each project, the individual village or project developer will be responsible for installation of permanent perimeter fencing per **Figures 12, 13, 14A, & 14B**, of this PUD, as applicable. Temporary fencing, along future development boundaries may be installed as specified on **Figure 15**, or an alternative design may be utilized subject to approval by the City of Reno. A fencing plan shall be required with each final map or building permit as applicable, to demonstrate compliance with the intent of this section. All temporary and permanent perimeter fencing shall be constructed in compliance with the requirements of NRS 569.431 thru .471.

The Corps of Engineers has required that the mitigated wetland area along the creek be fenced to keep the horses out of the jurisdictional wetlands south of South Meadows Parkway.

Signage

With construction of Rio Wrangler Pkwy., lighted horse hazard traffic signs shall be required to be installed within the PUD boundary located along Rio Wrangler Parkway to the satisfaction of the City of Reno Public Works staff.

L. Conflicts with Reno Zoning Code

In the event of a conflict between these design standards and City Code, these standards shall govern development of Bella Vista II. When a specific standard is not addressed by the PUD, then the applicable section of Reno Municipal Code, as amended, at the time of review shall prevail.

IV. IMPLEMENTATION

A. Design Review

These Design Standards will be used by the City of Reno and relevant government agencies to review each tentative map, multi-family, or non-residential site plan/building permit proposal for conformance with the overall design objectives and standards contained in this PUD.

It will be the responsibility of each Parcel Developer to comply with the Design Standards in preparation of landscape design plans.

B. Applicability of Land Use and Development Standards

Where there is a conflict between standards within this PUD and cited city code sections, the standards in this PUD shall prevail. Where the provisions of this PUD do not address a specific subject, the provisions of the Reno Municipal Code Title 18 or other ordinances governing the development of land, which are in effect at the time of application, shall apply. All other conflicts shall be resolved by the Administrator.

C. Administration

The Bella Vista Ranch Phase II PUD shall be administered by the Administrator, or their designee as defined by the City of Reno Annexation and Land Development Code. The Administrator shall have the authority to interpret and apply this PUD handbook.

There shall be a master developer in place from the first stage of development of the PUD. This master developer shall continue throughout the development of the PUD until and unless a master homeowners association or other entity is created to serve the role of the master developer. The role of the master developer, for the purposes of this PUD shall be:

- a) To prescribe and administer methods and procedures to ensure and control the quality of development that occurs in this PUD.
- b) Maintain all common area improvements, storm drain channels, detention basins and other flood control facilities.
- c) Construct, or have constructed, all parks, pathways, trails and sidewalks.

D. Flexibility

The Development Plan and Development Standards contained herein are intended to depict the general development vision for the PUD. Sufficient flexibility shall be allowed to permit detailed planning and design at the time of actual development. The acreage of each land use category may be increased by up to 10% if it is demonstrated that additional acreages are necessary due to constraints and/or design considerations to accommodate the project, to the satisfaction of the Administrator. This provision shall not exceed a cumulative total of 10% for each land use category. Changes in excess of 10% shall require an amendment to the Development Standards Handbook. Residential densities and residential dwelling unit allocation may be interchangeable between villages and will be defined fully with the tentative map for any given residential village. With each tentative map application, the Master Developer and/or applicant shall provide an accounting of the overall residential unit allocations, and updated land use category acreages approved to date. The total number of residential units shall not exceed 609 units or 117,612 square feet of non-residential without an amendment to the Development Standards Handbook.

E. Modifications

The Administrator shall have the ability to administratively update the PUD to reflect RMC amendments that impact the PUD. The Master Developer shall be notified of any administrative changes by the Administrator prior to final approval of such changes. Minor deviations shall be subject to written approval from the Master Developer. The Administrator also shall have the ability to grant minor deviations as outlined in RMC 18.08.804 as amended. Deviations of 10% or more shall conform to the City of Reno Major Deviation process as outlined in RMC 18.08.802, as amended.

F. Green Development Practices

This PUD will include leading edge practices for the reuse of treated effluent. Low Impact Development (LID) best practices shall be utilized in the design and construction of all non- residential or residential developments to increase water infiltration and improve water quality. Any ordinances the city adopts that prescribe green building practices will be required in this PUD as they become effective. Plans demonstrating application of best practices or conformance with adopted green development standards shall be provided with each tentative map, conditional use permit, site plan review, and/or building permit.

To encourage the passive utilization of solar energy, this PUD will not restrict the reasonable use of solar facilities in the CC&R documents for the development. The PUD will not allow building heights in excess of those set forth in the **Tables 3 & 4** and will require the placement of houses or non-residential structures such that excessive shadows are not cast that restrict the use of solar facilities, both within and adjacent to the project.

G. Hours of Operation

Hours of operation for exterior construction activity or heavy equipment operation within the PUD shall be limited as follows:

- a) Monday – Friday 7:00 a.m. to 6:00 p.m.;
- b) Saturday – 8:00 a.m. to 6:00 p.m.;
- c) There shall be no construction on Sundays.
- d) A sign with the approved construction hours shall be posted on site for the full duration of construction activity.
- e) Hours of Operation shall not apply to dust control or storm water management operations. A note to this effect shall be placed on the title sheet of all building permit plan sets.
- f) Exceptions to construction hours for the pouring of concrete slabs, interior construction hours or other modifications (roadway paving, utility installation, etc.), a plan detailing the construction operations and provisions to minimize impacts on nearby residential areas shall be submitted and approved to the satisfaction of the Administrator.

H. Open Space Deed Restrictions

All designated open space and common areas intended for open space uses shall be deed restricted per Reno Municipal Code Section 18.09.208, as amended.

I. NV Energy Substation

The owner, his agent or designee shall notify and disclose to all potential buyers, renters and tenants within the project that there is an existing electrical power substation located approximately 1,450 feet northeast of the PUD which may be expanded in the future.

J. Health Department Wind Sensor Condition

Prior to issuance of each building permit, or approval of each final map, as applicable, the applicant shall have plans approved to install a wind sensor unit in all on-site areas containing turf.

K. Airport Avigation Condition

Prior to issuance of each building permit, or approval of each final map, as applicable, the property owner(s) shall grant an Avigation Easement to, and acceptable to, the Airport Authority of Washoe County over the entire ±77.3 acre property. The property owner(s) shall provide the Planning Department with appropriate documentation indicating the Avigation Easement has been granted and accepted by the Airport Authority of Washoe County.

L. Review Process

Prior to the submittal of a development application to the City, the proposed development shall be reviewed by the Master Developer at their sole discretion. Each development application submitted to the City shall include written documentation of approval from the Master Developer.

Written approval by the Master Developer does not constitute City approval of a development application. The construction of individual projects, including accessory structures shall follow the City of Reno building permit process. For some uses where a tentative map, conditional use permit, or site plan review is required, these processes shall precede the building permit process, as applicable.

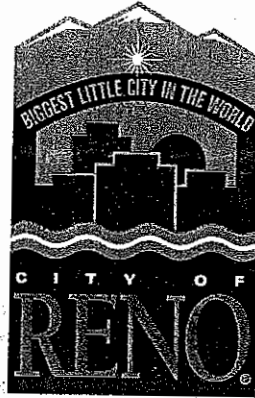
Appeals:

The applicant or developer may appeal any decision, comments, or recommendations of the Administrator in accordance with RMC Section 18.08.307(J), as amended.

Attachment 1
Zoning Ordinance & City Council Certification Letter

Lynnette R. Jones
City Clerk
(775) 334-2030
JonesL@reno.gov

Beverly Beaty-Benadom
Deputy City Clerk
(775) 334-2030
Beaty-BenadomB@reno.gov



Office of the City Clerk
Central Cashiering (775) 32032
Parking Tickets (775) 334-2293

FILED THIS DATE

10 / 30 / 12

BY: BBB
CITY CLERK

October 30, 2012

Corona Cyan, LLC
P.O. Box 19627
Reno, NV 89521

RE: Case No. LDC10-00051 (Bella Vista Ranch Phase II) - Zoning Map Amendment

Dear Applicant:

At a regular meeting held October 24, 2012, the City Council passed and adopted Ordinance No. 6259, approving the above referenced zoning map amendment.

Sincerely,

Beverly Beaty-Benadom
Lynnette R. Jones
City Clerk

LRJ:bbb

xc: Community Development
Jeff Mann, Parks, Recreation & Community Services
Vern Kloos, Community Development
Randy Walter, Places Consulting Services, Inc.
Corona Cyan, LLC, Dallas, TX

EXPLANATION: Matter underlined is new; matter in brackets and stricken [--] is material to be repealed.

BILL NO. 6823

ORDINANCE NO. 6259

ORDINANCE TO AMEND TITLE 18, CHAPTER 18.08 OF THE RENO MUNICIPAL CODE, ENTITLED "ZONING," REZONING A ±77.37 ACRE SITE LOCATED SOUTHEAST OF THE EASTERN TERMINUS OF SOUTH MEADOWS PARKWAY, NORTH OF THE NORTH TERMINUS OF RIO WRANGLER PARKWAY AND EAST OF STEAMBOAT CREEK FROM ±65.24 ACRES OF UT40 (UNINCORPORATED TRANSITION - 40 ACRES) AND ±12.13 ACRES OF LLR2.5 (LARGE LOT RESIDENTIAL - 2.5 ACRES) TO PUD (PLANNED UNIT DEVELOPMENT) ON ±77.37 ACRES TO ALLOW FOR DEVELOPMENT OF MIXED RESIDENTIAL (UP TO 30 DU/AC), COMMERCIAL, PARK AND OPEN SPACE USES; TOGETHER WITH OTHER MATTERS PROPERLY RELATING THERETO.

SPONSORED BY: RENO CITY PLANNING COMMISSION

THE CITY COUNCIL OF THE CITY OF RENO DOES ORDAIN:

SECTION 1. Chapter 18.08 of the Reno Municipal Code is hereby amended by adding thereto a new section to be known as Section 18.08.102(b).1265 relating to a ±77.37 acre site located southeast of the eastern terminus of South Meadows Parkway, north of the north terminus of Rio Wrangler Parkway and east of Steamboat Creek and more particularly described in the attached "Exhibit A" and rezoning said property from ±65.24 acres of UT40 (Unincorporated Transition - 40 acres) and ±12.13 acres of LLR2.5 (Large Lot Residential - 2.5 acres) to PUD (Planned Unit Development) on ±77.37 acres to allow for development of mixed residential (up to 30 du/ac), commercial, park and open space uses, the same to read as follows:

Sec. 18.08.102(b).1265. The zoning of the City of Reno as heretofore established is hereby amended in the manner shown on the map labeled Case No. LDC10-00051, thereby changing the use of land indicated therein, relating to a ±77.37 acre site located southeast of the eastern terminus of South Meadows Parkway, north of the north terminus of Rio Wrangler Parkway and east of Steamboat Creek and more particularly described in the attached "Exhibit A", and rezoning said property from ±65.24 acres of UT40 (Unincorporated Transition - 40 acres) and ±12.13 acres of LLR2.5 (Large Lot Residential - 2.5 acres) to PUD (Planned Unit Development) on ±77.37 acres to allow for development of mixed residential (up to 30 du/ac), commercial, park and open space uses.

SECTION 2. This Ordinance shall be in effect from and after its passage, adoption and publication in one issue of a newspaper printed and published in the City of Reno; and upon approval of a finding of conformance of the Project of Regional Significance by the Truckee Meadows Regional Planning Agency, certification by City Council of the PUD Handbook for LDC10-00051 and recordation of the PUD Handbook for LDC10-00051.

SECTION 3. The City Clerk and Clerk of the City Council of the City of Reno is hereby authorized and directed to have this Ordinance published in one issue of the Reno-Gazette Journal, a newspaper printed and published in the City of Reno.

PASSED AND ADOPTED this 24th day of October, 2012, by the following vote of the Council:

AYES: Sferrazza, Hascheff, Gustin, Zadra, Dortch, Aiazzi

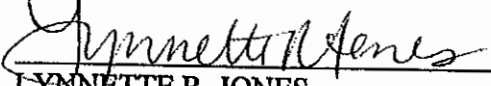
NAYS: None

ABSTAIN: None ABSENT: Cashell

APPROVED this 24th day of October, 2012.


for DAVE AIAZZI
ROBERT A. CASHELL, SR.
MAYOR OF THE CITY OF RENO

ATTEST:


LYNNETTE R. JONES
CITY CLERK AND CLERK OF THE CITY
COUNCIL OF THE CITY OF RENO, NEVADA



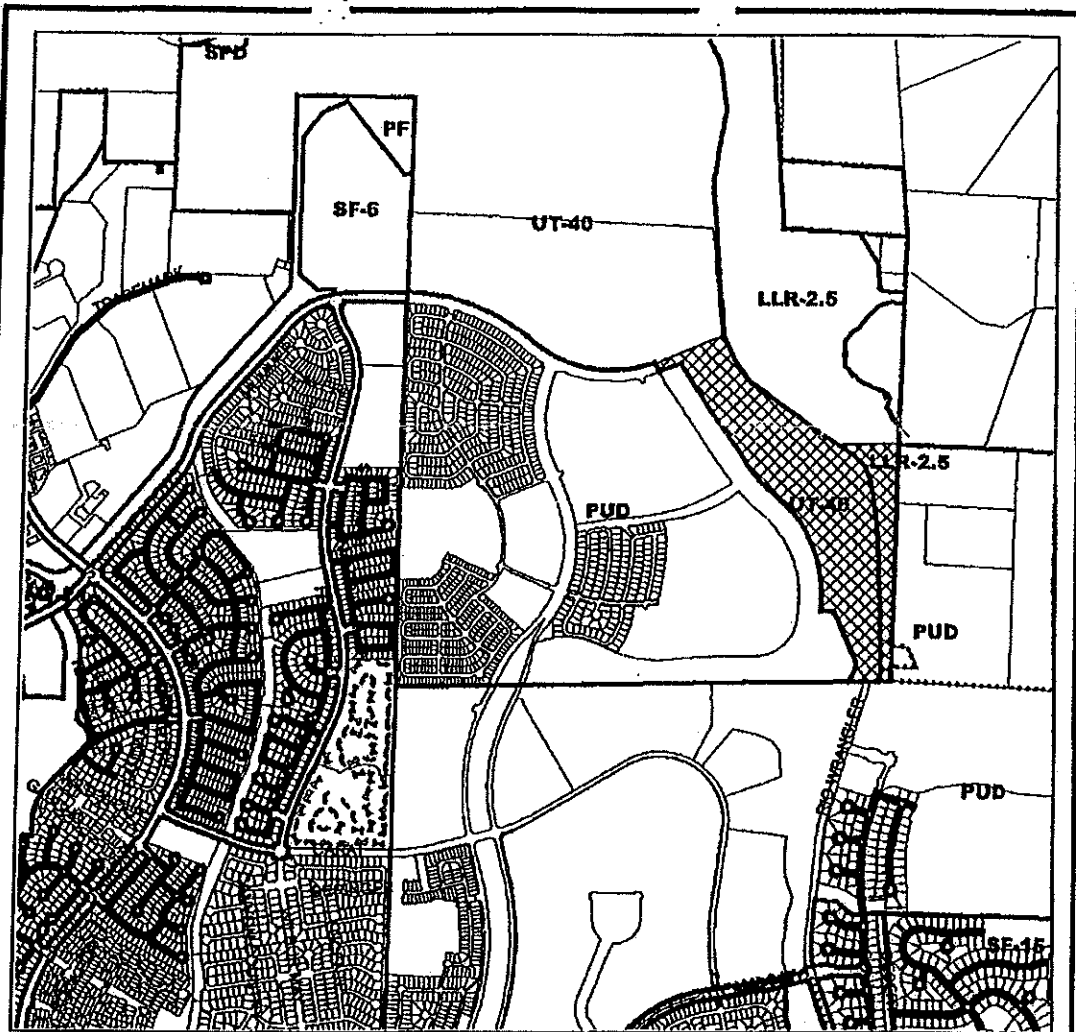
EFFECTIVE DATE: October 26, 2012.

EXHIBIT A

**BELLA VISTA RANCH PHASE II
LEGAL DESCRIPTION**

Parcel C of Parcel Map No. 4526, filed in the office of the County Recorder of Washoe County, State of Nevada, on March 10, 2006 as File No. 3359967, of the Official Records.

THIS PARCEL CONTAINS 77.37 ACRES MORE OR LESS



LDC10-00051

**Bella Vista Ranch, Phase II
Zoning Map Amendment**

 Subject Site  City Limits  Zoning

From: ±65.24 acres Unincorporated Transition (40 acres); and
±12.13 acres - Large Lot Residential (2.5 acres)

To: ±77.37 acres Planned Unit Development (PUD)



0 250 500 1,000 1,500 2,000
Feet

The information herein is approximate
and is intended for display purposes
only. Reproduction is not permitted.
For additional information, please
contact the City of Reno
Community Development Department.
Map Produced: November 9, 2010



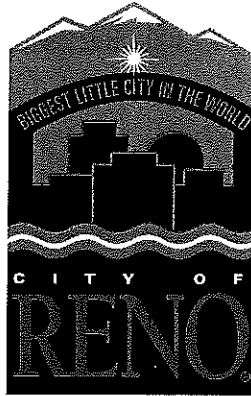
**Community Development
Department**

450 Sincich Street Phone: 334-2083
P.O. Box 1900 Fax: 334-2043
Reno, NV 89505 www.cityofreno.com

ISS: 8 PLANNING Planning Code Maps LDC10-00051

Lynnette R. Jones
City Clerk
(775) 334-2030
JonesL@reno.gov

Beverly Beaty-Benadom
Deputy City Clerk
(775) 334-2030
Beaty-BenadomB@reno.gov



Office of the City Clerk
Central Cashiering (775) 32032
Parking Tickets (775) 334-2293

January 18, 2013

FILED THIS DATE
1 / 18 / 13
BY: BBB
CITY CLERK

Corona Cyan, LLC
P.O. Box 19627
Reno, NV 89521

RE: Case No. LDC10-00051 (Bella Vista Ranch Phase II) – Certification of Planned Unit
Development Design Standards Handbook

Dear Applicant:

At a regular meeting held January 16, 2013, the Reno City Council certified the Bella Vista Ranch Phase II Planned Unit Development (PUD) Design Standards Handbook. The amendments were tentatively approved by the Reno City Council on October 10, 2012.

In order to effectuate the PUD, the handbook must be recorded at the Washoe County Recorder's Office in accordance with NRS 278A.

Sincerely,

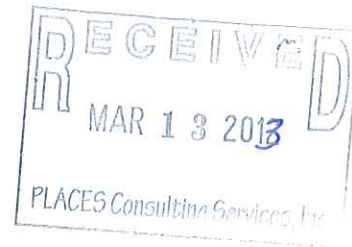
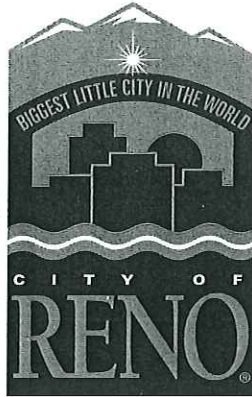
for 
Lynnette R. Jones
City Clerk

LRJ:bbb

xc: Community Development
Vern Kloos, Community Development
Jeff Mann, Parks, Recreation & Community Services
Randy Walter, Places Consulting Services, Inc.

Lynnette R. Jones
City Clerk
(775) 334-20300
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Beaty-BenadomB@reno.gov



Office of the City Clerk
Central Cashiering (775) 32032
Parking Tickets (775) 334-2293

FILED THIS DATE
3 / 12 / 13
BY: BBB
CITY CLERK

March 12, 2013

Corona Cyan, LLC
P.O. Box 19627
Reno, NV 89521

RE: Case No. LDC10-00051 (Bella Vista Ranch Phase II) - Zoning Map Amendment –
AMENDED LETTER

Dear Applicant:

At a regular meeting held October 10, 2012, and following a public hearing thereon, the Reno City Council approved the request for a zoning map amendment from ± 65.24 acres of UT40 (Unincorporated Transition - 40 acres) and ± 12.13 acres of LLR2.5 (Large Lot Residential - 2.5 acres) to PUD (Planned Unit Development) on ± 77.37 acres to allow for development of mixed residential (up to 30 du/ac), commercial, park and open space uses, by ordinance, subject to Condition A, as follows:

- A. Approval of the Bella Vista Ranch Phase II Planned Unit Development is subject to the modifications to the PUD Handbook as noted in Exhibit A, the Conditions contained in Exhibit B and any modifications made by the Planning Commission and City Council at their respective public hearings. The modifications and revisions shall be incorporated into the PUD Handbook and submitted to staff in both paper and two electronic versions (PDF and Word) for review within two months of the date of Regional Planning approval of a Project of Regional Significance. The PUD shall be approved and certified by the City Council within four months of the date of Regional Planning's approval of the Project of Regional Significance. Failure by the applicant to conform to either time deadline shall render this approval null and void.

Corona Cyan, LLC
Case No. LDC10-00051 (Bella Vista Ranch Phase II)
March 12, 2013
Page 2

This is a project of Regional Significance as it will generate more than 6,250 average daily trips ($\pm 11,027$ ADT) and more than 187,500 gallons per day of sewage ($\pm 263,760$ GPD). The ± 77.37 acre site is located southeast of the eastern terminus of South Meadows Parkway, north of the north terminus of Rio Wrangler Parkway and east of Steamboat Creek.

The approved zoning map amendment will become effective upon passage and adoption of the appropriate ordinance, and subject to approval of the Project of Regional Significance by the Regional Planning Agency.

Sincerely,


for Lynnette R. Jones
City Clerk

LRJ:bbb

xc: Community Development
Jeff Mann, Parks, Recreation & Community Services
Vern Kloos, Community Development
Randy Walter, Places Consulting Services, Inc.

Enclosure: Exhibit B

EXHIBIT B

These conditions shall be added to Section IV Implementation of this PUD or language incorporated into the appropriate section of the PUD, as applicable, prior to Council certification and recordation of this PUD.

Washoe County District Health Department:

Condition No. 1

Prior to issuance of each building permit, or approval of each final map, as applicable, the applicant shall have plans approved to install a wind sensor unit in all on-site areas containing turf.

Airport Authority:

Condition No. 2

Prior to issuance of a building permit, or approval of a final map, as applicable, the property owner(s) shall grant an Avigation Easement to, and acceptable to, the Airport Authority of Washoe County over the entire +/- 77 acre property. The property owner(s) shall provide the Planning Department with appropriate documentation indicating the Avigation Easement has been granted and accepted by the Airport Authority of Washoe County.

Disclosures for the Shooting Range and Gravel Pit:

Condition No. 3

A provision shall be added to the PUD Handbook requiring the owner, his agent or designee to notify and disclose to all potential buyers, renters or tenants within the project that the existing shooting range and gravel pit uses located adjacent to the east and northeast sides of this PUD have valid special use permits and are allowed to operate indefinitely. These uses may generate noise and other associated activity, which may be objectionable. The gravel pit is allowed to operate Monday through Saturday from 7 am to 7 pm and includes the ability to operate rock crushing, asphalt and other associated outdoor materials processing activities as outlined in their special use permit. The shooting range is allowed to operate seven days a week between the hours of 8 am and 10 pm.

Disclosure for potential expansion of existing NV Energy electrical substation:

Condition No. 4

A provision shall be added to the PUD Handbook requiring the owner, his agent or designee to notify and disclose to all potential buyers, renters or tenants within the project that there is an existing electrical power substation located approximately 1,450 feet northeast of the PUD which may be expanded in the future.

Park Development Standards and Administration:

Condition No. 5-deleted not necessary

The applicant shall complete and have approved by staff a Park Development Standards and Administration section which shall be incorporated as an appendix into the PUD Handbook.

Attachment 2
Clerks Letter, Regional Planning Letter

Lynnette R. Jones
City Clerk
(775) 334-20300
JonesL@reno.gov

Beverly Beaty-Benadom
Deputy City Clerk
(775) 334-2030
Beaty-BenadomB@reno.gov



Office of the City Clerk
Central Cashiering (775) 32032
Parking Tickets (775) 334-2293

January 18, 2013

Corona Cyan, LLC
P.O. Box 19627
Reno, NV 89521

FILED THIS DATE

1 / 18 / 13
BY: BBB
CITY CLERK

RE: Case No. LDC10-00051 (Bella Vista Ranch Phase II) – Zoning Map Amendment –
NOTICE OF FINAL ACTION, DECISION OR ORDER

Dear Applicant:

On October 10, 2012, the Reno City Council approved the above referenced zoning map amendment, subject to passage and adoption of the appropriate ordinance, and subject to approval of this Project of Regional Significance by the Regional Planning Agency. On October 24, 2012, the Council passed and adopted Ordinance No. 6259.

On November 14, 2012, the Regional Planning Commission (RPC) held a public hearing and determined that the above matter conforms with the comprehensive Regional Plan. Please see the attached letter dated November 17, 2012.

Sincerely,

Beverly Beaty-Benadom
for Lynnette R. Jones
City Clerk

LRJ:bbb

xc: Community Development
Vern Kloos, Community Development
Jeff Mann, Parks, Recreation & Community Services
Randy Walter, Places Consulting Services, Inc.

2 enclosures



REGIONAL PLANNING COMMISSION

MEMBERS

Dennis Romeo, Chair
Dina VanderWell, Vice-Chair
Vangha Hartung
Roy Hibdon
Tom Lean

Jackie Peterson
Doug Voeltz
Kevin Welske
Jason Woosley

Kimberly H. Robinson, Executive Director

November 15, 2012

Kimberly H. Robinson
Executive Director of Regional Planning, and
Clerk of the Regional Planning Commission
One East First Street, Suite 1100
Reno, Nevada 89501

Received by Clerk: 11-17-12 HR

Mailed: 11/17/12 8X

Dear Ms. Robinson:

On November 14, 2012, the Regional Planning Commission (RPC) held a public hearing and determined that the following matter conforms with the comprehensive Regional Plan:

Regional Plan Conformance Review – Project of Regional Significance, Bella Vista Ranch Phase II Planned Unit Development (PUD) (CR12-014) – a project of regional significance for traffic generation in excess of 6,250 average daily trips (±11,027 ADT) and sewage generation in excess of 187,000 gallons per day (±263,751 gallons/day). The ±77.57 acre project site is located southeast of the eastern terminus of South Meadows Parkway, north of the northern terminus of Rio Wrangler Parkway and east of Steamboat Creek.

This letter has been filed with the Clerk of the Regional Planning Commission on this date and constitutes notice of final action under NRS 278.0235, "Actions against Agency: Commencement," unless a petition for review is timely filed by a person seeking review of the RPC action or determination pursuant to section 1.3 of the Regional Planning Governing Board's *Regulations on Procedure*.

Please do not hesitate to contact me at 775/321-8392 if you have any questions on this matter.

Sincerely,

Blenna Reid
Senior Planner

cc: Fils CR12-014

Fred Turner, City of Reno
Lynette Jones, City of Reno
Armando Ornelas, City of Sparks

Bill Whitney, Washoe County
Debra Goodwin, RTC
Vern Kloos, City of Reno

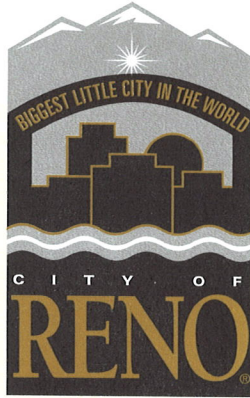
1105 Terminal Way, Suite 316, Reno, NV 89502

775/321-8385; Fax 775/321-8386

www.tmrpa.org

Attachment 3
Development Services Amendment Decision Letter

Chris Pingree
Director of Development Services
Development Services Department
P. O. Box 1900
Reno, NV 89505



March 9, 2022

Andy Durling, AICP
Wood Rodgers, Inc.
1361 Corporate Boulevard
Reno, NV 89502

Re: ADM22-00005 (Bella Vista Ranch Phase II PUD Handbook Minor Modification)

Dear Mr. Durling:

Per Reno Municipal Code (RMC) 18.08.505 (h)(2) "Minor Amendments to PUD Plans," the Administrator may approve minor amendments to an adopted PUD. The proposed minor amendment is requesting to update the Rio Wrangler Parkway road cross-section within the approved Bella Vista Ranch Phase II PUD Handbook. Public notice regarding the request was issued and no comments were received.

It has been determined that the requested minor amendment to the adopted Bella Vista Ranch Phase II PUD Handbook, as noted in the attached red-lined copy, are consistent with the findings outlined in RMC 18.08.505 (h)(2). The request is **approved, subject to recordation of the amended PUD Handbook with approved minor modifications incorporated.**

Any person aggrieved by the decision of the Administrator who alleges that there is an error in the decision, may appeal the decision to the Hearing Examiner within 10 calendar days from the date of this decision. The written notice of appeal must briefly specify the grounds of the appeal on the appropriate form and be accompanied by the necessary fees. If the Hearing Examiner denies or modifies the appeal, the applicant may appeal to the City Council within 10 calendar days of the Hearing Examiner decision by filing a notice of appeal with the City Clerk.

Sincerely,

A handwritten signature in blue ink, appearing to read "Chris Pingree", is written over a light blue circular stamp.

Chris Pingree, Director of Development Services
Development Services Department

xc: Mikki Huntsman, City Clerk
Nathan Gilbert, AICP, Senior Planner
Sunny Hills Ranchos, Via Oro Avenue, Long Beach, CA 90810

Appendix A
Traffic Study – Solaegui Engineers

Mikki Huntsman
City Clerk
(775) 334-2030
HuntsmanM@reno.gov



Office of the City Clerk
City Clerk's Office (775) 334-2030
Central Cashiering (775) 334-2032
Records (775) 348-3932

January 16, 2024

Sunny Hills Ranchos
4001 Via Oro Ave. Ste. 210
Long Beach, CA 90810

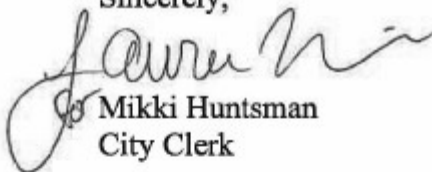
FILED THIS DATE
1 / 16 / 24
BY: fur
CITY CLERK

RE: Case No. LDC24-00031 (Bella Vista Ranch Phase II PUD Amendment)
APN: 165-011-37, 48, 49, 50, & 51
Adopted Ordinance No. 6687

Dear Applicant:

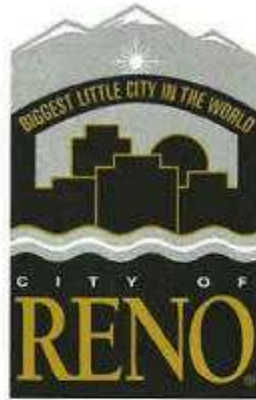
At the regular meeting of the Reno City Council on November 13, 2024, following a public hearing, the Reno City Council passed and adopted Ordinance No. 6687 approving a PUD Amendment to the Bella Vista Ranch Phase II Planned Unit Development (PUD) handbook to: a) reduce the amount of nonresidential from $\pm 178,600$ sq. ft. to $\pm 117,612$ square feet; b) increase the maximum dwelling units from ± 575 units to ± 609 units; and c) modify the allowed land uses, design standards, development standards, and street design standards on a ± 77.37 acre site located southeast of the eastern terminus of South Meadows Parkway, north of the northern terminus of Rio Wrangler Parkway and east of Steamboat Creek within the Bella Vista Ranch Phase II PUD zoning district.

Sincerely,


Mikki Huntsman
City Clerk

xc: Development Services
Leah Piccotti, Development Services
Andy Durling, 1361 Corporate Blvd. Reno, NV 89511

Mikki Huntsman
City Clerk
(775) 334-2030
HuntsmanM@reno.gov



Office of the City Clerk
City Clerk's Office (775) 334-2030
Central Cashiering (775) 334-2032
Records (775) 348-3932

January 17, 2024

Sunny Hills Ranchos
4001 Via Oro Ave. Ste. 210
Long Beach, CA 90810

FILED THIS DATE
1 / 17 / 2025
BY: WAT
CITY CLERK

**RE: Case No. LDC24-00031 (Bella Vista Ranch Phase II PUD Amendment) –
NOTICE OF FINAL ACTION, DECISION, OR ORDER
APN: 165-011-37, 48, 49, 50, & 51
Certification of Planned Unit Development Handbook (Bella Vista Ranch Phase II)**

Dear Applicant:

On November 13, 2024, following a public hearing, the Reno City Council passed and adopted Ordinance No. 6687 approving a PUD Amendment to the Bella Vista Ranch Phase II Planned Unit Development (PUD) handbook to: a) reduce the amount of nonresidential from $\pm 178,600$ sq. ft. to $\pm 117,612$ square feet; b) increase the maximum dwelling units from ± 575 units to ± 609 units; and c) modify the allowed land uses, design standards, development standards, and street design standards on a ± 77.37 acre site located southeast of the eastern terminus of South Meadows Parkway, north of the northern terminus of Rio Wrangler Parkway and east of Steamboat Creek within the Bella Vista Ranch Phase II PUD zoning district. The final PUD- Bella Vista Ranch Phase II handbook is hereby certified and will be effectuated upon recordation with the Washoe County Recorder's Office in accordance with NRS 278A.

Sincerely,

Mikki Huntsman
City Clerk

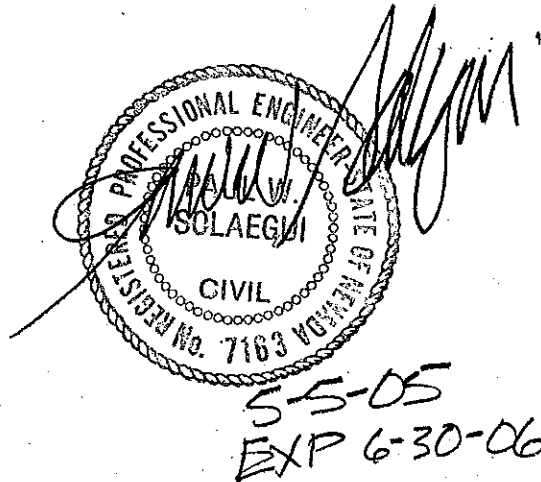
xc: Development Services
Leah Piccotti, Development Services
Andy Durling, 1361 Corporate Blvd. Reno, NV 89511

Enclosed;

Final Certification - PUD-Canyons Handbook

BELLA VISTA RANCH PHASE 2
TRAFFIC ANALYSIS

MAY, 2004



Prepared by:
Solaegui Engineers, Ltd.
715 H Street
Sparks, Nevada 89431
(775) 358-1004

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BELLA VISTA RANCH PHASE 2

TRAFFIC ANALYSIS

EXECUTIVE SUMMARY

The Bella Vista Ranch phase 2 development is located in the City of Reno, Nevada. The project site, which includes phase 1 and phase 2, is located east of Wilbur May Parkway at the east end of South Meadows Parkway. Phase 1 was previously presented in the Bella Vista Ranch Traffic Analysis dated December, 2004. The phase 2 site is northeast of the phase 1 site, which is south of South Meadows Parkway-Rio Wrangler Parkway extension and east of Steamboat Creek. The project site is currently undeveloped land. The purpose of this study is to address the phase 2 development's impact upon the adjacent street network. The South Meadows Parkway intersections with the I-580 northbound and southbound ramps, Double R Boulevard and Double Diamond Parkway have been identified for intersection capacity analysis. The ramps at the I-580/South Meadows Parkway interchange, South Meadows Parkway, Double R Boulevard, Double Diamond Parkway, Prototype Drive, Pioneer Parkway and Rio Wrangler Parkway have been identified for roadway capacity analysis.

The Bella Vista Ranch phase 2 development will include the construction of 1,700 single family dwelling units. The project is expected to generate 14,091 average daily trips with 1,200 trips occurring during the AM peak hour and 1,373 trips occurring during the PM peak hour.

Traffic generated by Bella Vista Ranch phase 2 project will have some impact on the adjacent street network. The following recommendations are made to mitigate project traffic impacts.

It is recommended that any required signing, striping or traffic control improvements comply with Nevada Department of Transportation and City of Reno requirements.

It is recommended that a traffic signal be installed at the South Meadows Parkway/Double Diamond Parkway intersection when warranted.

It is recommended that the on-site collector streets and local streets intersecting Pioneer Parkway meet Regional Transportation Commission spacing requirements for high access control arterials.

It is recommended that the on-site collector streets and local streets intersecting South Meadows Parkway and Rio Wrangler Parkway meet Regional Transportation Commission spacing requirements for moderate access control arterials.

INTRODUCTION

STUDY AREA

The Bella Vista Ranch phase 2 development is located in the City of Reno, Nevada. The project site, which includes phase 1 and phase 2, is located east of Wilbur May Parkway at the east end of South Meadows Parkway. The phase 2 site is northeast of the phase 1 site, which is south of South Meadows-Rio Wrangler Parkway extension and east of Steamboat Creek. Figure 1 shows the location of the project site. The purpose of this study is to address the project's impact upon the adjacent street network. The South Meadows Parkway intersections with the I-580 northbound and southbound ramps, Double R Boulevard, and Double Diamond Parkway have been identified for intersection capacity analysis. The ramps at the I-580/South Meadows Parkway interchange, South Meadows Parkway, Double R Boulevard, Double Diamond Parkway, Prototype Drive, Pioneer Parkway and Rio Wrangler Parkway have been identified for roadway capacity analysis.

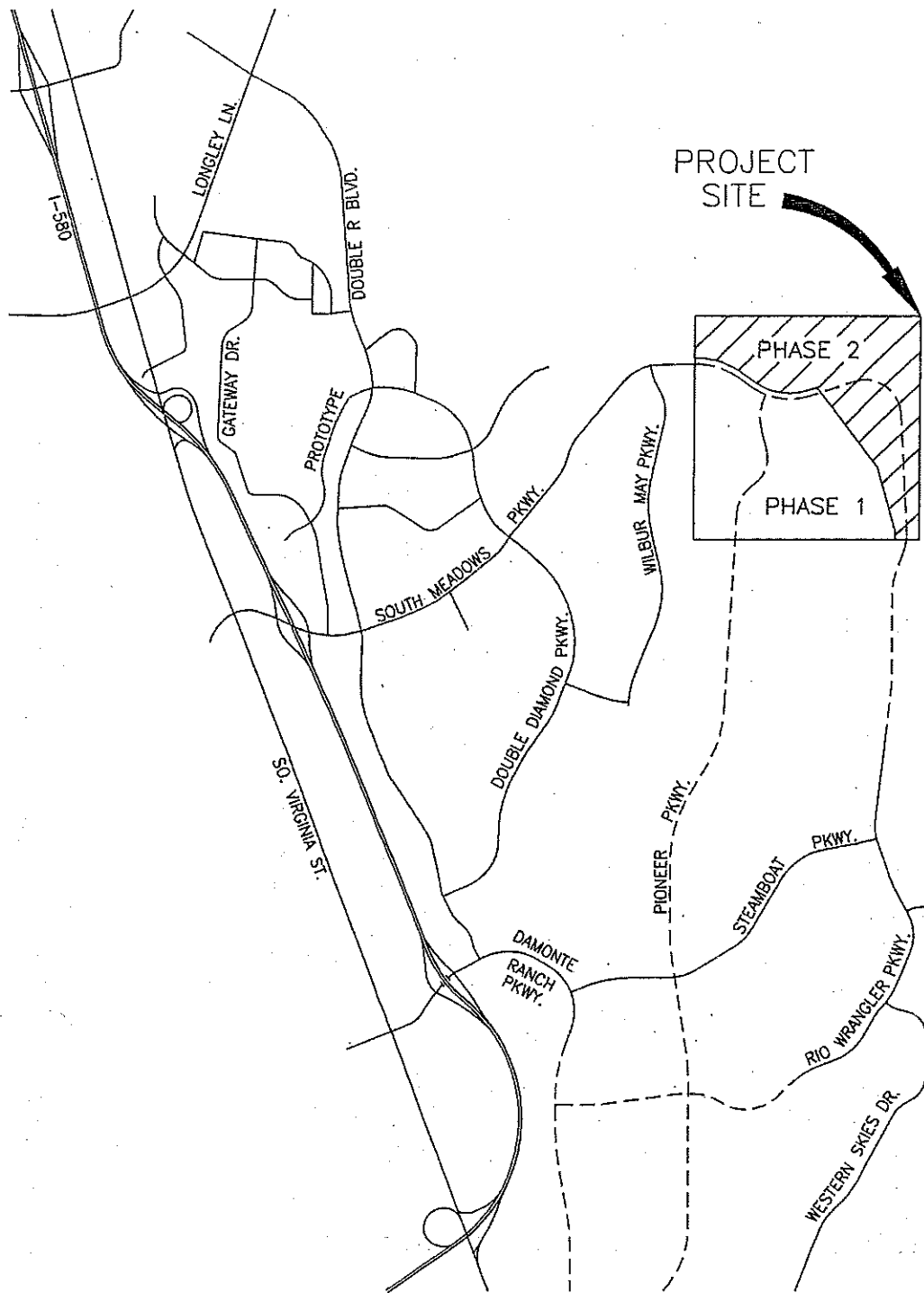
EXISTING AND PROPOSED LAND USES

The project site is currently undeveloped land. Adjacent development includes residential and commercial development to the west and undeveloped land to the north, south and east. The Bella Vista Ranch phase 2 development will include the construction of 1,700 single family dwelling units. The adjacent phase 1 development to the southwest also includes the construction of 1,700 single family dwelling units, which results in a total of 3,400 single family dwelling units within the overall project site.

EXISTING AND PROPOSED ROADWAYS AND INTERSECTIONS

South Meadows Parkway is a six-lane roadway with three lanes in each direction from South Virginia Street to just east of Double R Boulevard and a four-lane roadway further east to the project's west property line. The speed limit is posted for 35 miles per hour. Roadway improvements include curb, gutter and sidewalks and a raised center median with left turn pockets at key intersections. With development of phases 1 and 2, South Meadows Parkway will be extended east where it will intersect Pioneer Parkway and ultimately connect to Rio Wrangler Parkway east of Pioneer Parkway.

Double R Boulevard is generally a four-lane roadway with two lanes in each direction between Damonte Ranch Parkway and Double Diamond Parkway (north) and between Amston Road and Longley Lane. Double R Boulevard is a six-lane roadway with three lanes in each direction between Double Diamond Parkway (north) and Amston Road. The speed limit is posted for 45 miles per hour. Roadway improvements include curb, gutter and sidewalks in most areas and a raised center median with left turn pockets at key intersections.



BELLA VISTA RANCH PHASE 2

VICINITY MAP

FIGURE 1

Double Diamond Parkway is a four-lane roadway with two lanes in each direction from Double R Boulevard north to Double R Boulevard south. The speed limit is posted for 35 miles per hour. Roadway improvements include curb, gutter and sidewalks in most areas and a raised center median with left turn pockets at key intersections.

Prototype Drive is a two-lane roadway with one lane in each direction west of Double R Boulevard. The speed limit is posted for 25 miles per hour. Roadway improvements include curb, gutter and sidewalks in most areas and a center two-way left turn lane.

Pioneer Parkway does not currently exist. Pioneer Parkway will ultimately be constructed as a north-south roadway from Geiger Grade to north of South Meadows Parkway. Pioneer Parkway might become the alignment for the East Connector (alternate A alignment).

Rio Wrangler Parkway is a two-lane roadway with one lane in each direction from Steamboat Parkway to just south of Western Skies Drive and a four-lane roadway with two lanes in each direction further south of Western Skies Drive. The speed limit is posted for 45 miles per hour with a 15 mile per hour school speed limit zone adjacent to the Damonte High School. Roadway improvements include curb, gutter and sidewalks. A raised center median exists adjacent to the school and south of Western Skies Drive. Rio Wrangler Parkway will ultimately extend from Steamboat Parkway north into the phase 2 site, turn west and connect to South Meadows Parkway at the intersection with Pioneer Parkway within the project site.

The South Meadows Parkway/I-580 interchange is a diamond interchange. The southbound off-ramp contains two lanes at the freeway-ramp junction and the northbound off-ramp, northbound on-ramp, southbound on-ramp and each contain one lane at the freeway-ramp junction.

The South Meadows Parkway/I-580 southbound ramp intersection is a signalized four-leg intersection with protected phasing for the westbound left turn movement. The north approach contains one left turn lane, one shared left turn-through lane, and one exclusive right turn lane separated by a raised corner island. The east approach contains dual left turn lanes and three through lanes. The west approach contains three through lanes and one exclusive right turn lane. The south approach is the on-ramp to I-580.

The South Meadows Parkway/I-580 northbound ramp intersection is a signalized four-leg intersection with protected phasing for the eastbound left turn movement. The south approach contains one shared left turn-through-right turn lane. The east approach contains two through lanes, one shared through-right turn lane, and one exclusive right turn lane. The west approach contains dual left turn lanes and three through lanes. The north approach is the on-ramp to I-580.

The South Meadows Parkway/Double R Boulevard intersection is a signalized four-leg intersection with protected phasing for all left turn movements. The north and south approaches each contain dual left turn lanes, two through lanes, and an exclusive right turn lane separated by a raised corner island. The east and west approaches each contain dual left turn lanes, two through lanes, and a shared through-right turn lane separated by a raised corner island.

The South Meadows Parkway/Double Diamond Parkway intersection is an unsignalized four-leg intersection with stop sign control on all approaches. The north approach contains one left turn lane, one through lane, and one exclusive right turn lane. The south and east approaches each contain one left turn lane, one through lane, and one shared through-right turn lane. The west approach contains one left turn lane, two through lanes, and one exclusive right turn lane separated by a raised corner island.

Project access at phase 1 is provided only by South Meadows Parkway without connections to Pioneer Parkway and Rio Wrangler Parkway. At phase 2, additional access is provided by Rio Wrangler Parkway, and Pioneer Parkway (East Connector alignment A) or Pioneer Parkway and East Connector alignment D.

TRIP GENERATION

In order to assess the magnitude of traffic impacts of the proposed development on the key roadways and intersections, trip generation rates and peak hours had to be determined. Trip generation rates were obtained from the Seventh Edition of *ITE Trip Generation* (2003) for Land Use 210: Single Family Detached Housing. Bella Vista Ranch Phase 2 will include the construction of 1,700 single family dwelling units. Trips generated by the project were calculated for an average weekday and for the weekday peak hours between 7:00 and 9:00 AM and between 4:00 and 6:00 PM, which correspond to the peak hours of adjacent street traffic. Table 1 shows a summary of the average daily traffic volumes and peak hour volumes generated by phase 1, phase 2 and the total development.

TABLE 1
TRIP GENERATION

<u>DEVELOPMENT</u>	<u>ADT</u>	<u>AM PEAK HOUR</u>			<u>PM PEAK HOUR</u>		
		<u>IN</u>	<u>OUT</u>	<u>TOTAL</u>	<u>IN</u>	<u>OUT</u>	<u>TOTAL</u>
PHASE 1							
Single Family Housing							
1,700 Dwelling Units	14,091	300	900	1,200	865	508	1,373
PHASE 2							
Single Family Housing							
1,700 Dwelling Units	<u>14,091</u>	<u>300</u>	<u>900</u>	<u>1,200</u>	<u>865</u>	<u>508</u>	<u>1,373</u>
TOTAL	28,182	600	1,800	2,400	1,730	1,016	2,746

TRIP DISTRIBUTION AND ASSIGNMENT

The distribution of the project traffic to the key roadways and intersections was based on existing and anticipated peak hour traffic patterns and the locations of attractions and productions in the area. The directions of approach are shown in Figure 2 for project phase 1, and phase 2 with East Connector alignments A and C. The phase 1 project directions of approach were determined based on a worst case scenario that assumes that the phase 1 dwelling units will build-out prior to the construction of Pioneer Parkway and Rio Wrangler Parkway to the site. The phase 2 project directions of approach assumed that Pioneer Parkway and Rio Wrangler Parkway have been constructed to the site and that the East Connector has been constructed, either on alignment A or alignment C. The East Connector alignment A would be on the Pioneer Parkway alignment through the project site. The East Connector alignment D would be south and east of the project site with connections to the project site via Pioneer Parkway and Rio Wrangler Parkway from the south.

The project trips were subsequently assigned to the key intersections based on these directions of approach. Figure 3 shows the AM and PM peak hour phase 1 project trip assignment at the key intersections. Figures 4 and 5 show the peak hour phase 2 project trip assignments at the key intersections during the AM and PM peak hours for the East Connector alternate A and C alignments, respectively. The phase 1 project directions of approach and trip assignment were not adjusted as a result of the completion of the additional roadway connections for the phase 2 project. Consequently, the combined project trip assignment for phases 1 and 2 is a worse case and therefore, conservative.

EXISTING AND PROJECTED TRAFFIC VOLUMES

The existing AM and PM peak hour traffic volumes at the key intersections were obtained from traffic counts taken during December, 2004. The existing AM and PM peak hour traffic volumes at the key intersections are shown in Figure 6. Figure 7 shows the existing plus project phase 1 traffic volumes at the key intersections during the AM and PM peak hours. Figures 8 and 9 show the existing plus project phases 1 and 2 traffic volumes during the AM and PM peak hours with East Connector alignment A and D, respectively.

Four scenarios were obtained directly from the Regional Transportation Commission's (RTC) traffic forecasting model: 2012 base plus phase 1 traffic volumes, 2030 base plus phases 1 and 2 traffic volumes with East Connector alternate A alignment, and 2030 base and 2030 base plus phases 1 and 2 traffic volumes with East Connector alternate C alignment. Figure 10 shows the average daily traffic (ADT) volumes for the 2012 base plus phase 1 traffic volumes. Figure 11 shows the ADT volumes for the 2030 base plus phases 1 and 2 project traffic volumes with East Connector alternate A alignment. Figure 12 shows the ADT volumes for the 2030 base and 2030 base plus phases 1 and 2 project traffic volumes with alternate alignment C. RTC's modeling data sheets are included in the appendix.

TRIP DISTRIBUTION AND ASSIGNMENT

The distribution of the project traffic to the key roadways and intersections was based on existing and anticipated peak hour traffic patterns and the locations of attractions and productions in the area. The directions of approach are shown in Figure 2 for project phase 1, and phase 2 with East Connector alignments A and C. The phase 1 project directions of approach were determined based on a worst case scenario that assumes that the phase 1 dwelling units will build-out prior to the construction of Pioneer Parkway and Rio Wrangler Parkway to the site. The phase 2 project directions of approach assumed that Pioneer Parkway and Rio Wrangler Parkway have been constructed to the site and that the East Connector has been constructed, either on alignment A or alignment C. The East Connector alignment A would be on the Pioneer Parkway alignment through the project site. The East Connector alignment D would be south and east of the project site with connections to the project site via Pioneer Parkway and Rio Wrangler Parkway from the south.

The project trips were subsequently assigned to the key intersections based on these directions of approach. Figure 3 shows the AM and PM peak hour phase 1 project trip assignment at the key intersections. Figures 4 and 5 show the peak hour phase 2 project trip assignments at the key intersections during the AM and PM peak hours for the East Connector alternate A and C alignments, respectively. The phase 1 project directions of approach and trip assignment were not adjusted as a result of the completion of the additional roadway connections for the phase 2 project. Consequently, the combined project trip assignment for phases 1 and 2 is a worse case and therefore, conservative.

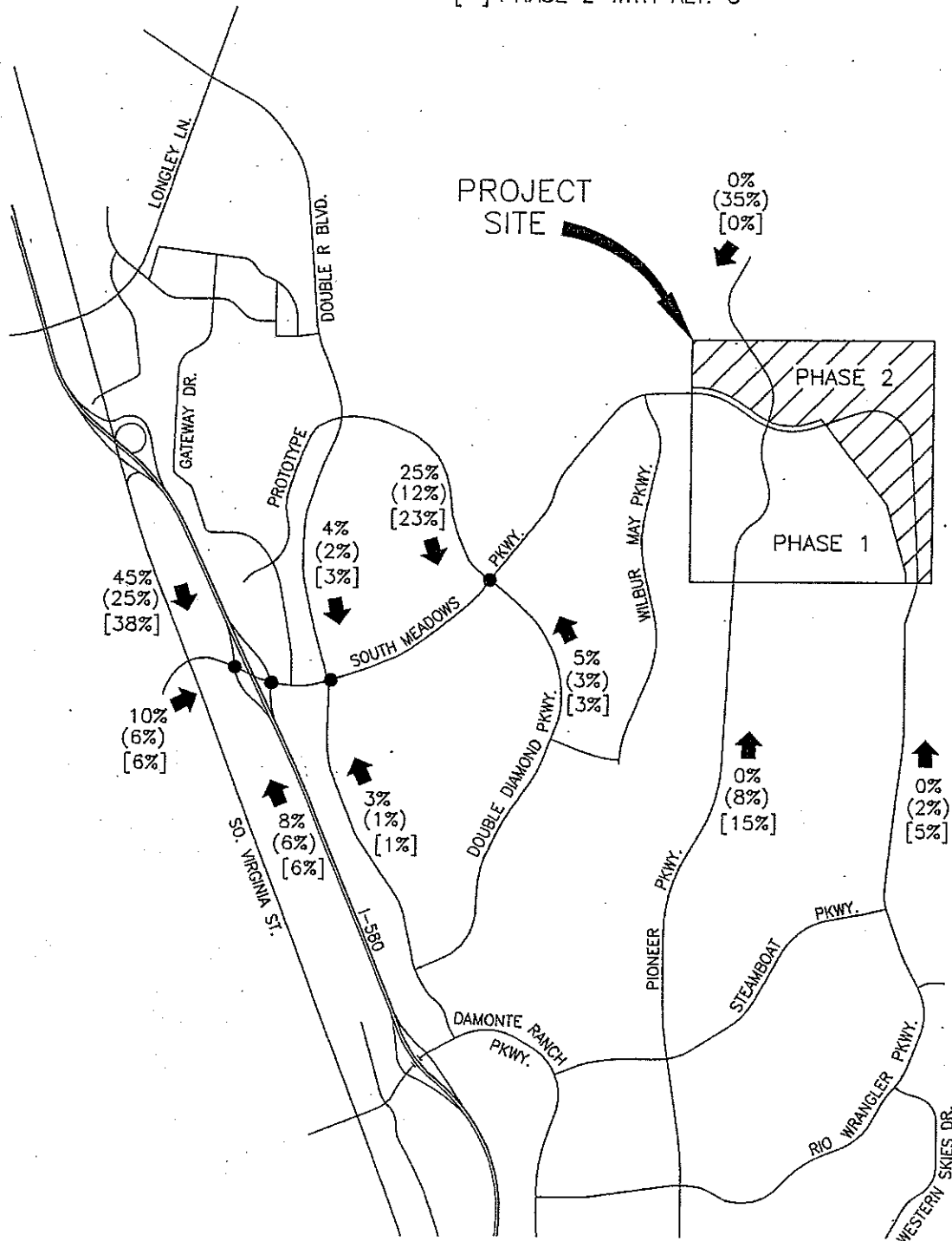
EXISTING AND PROJECTED TRAFFIC VOLUMES

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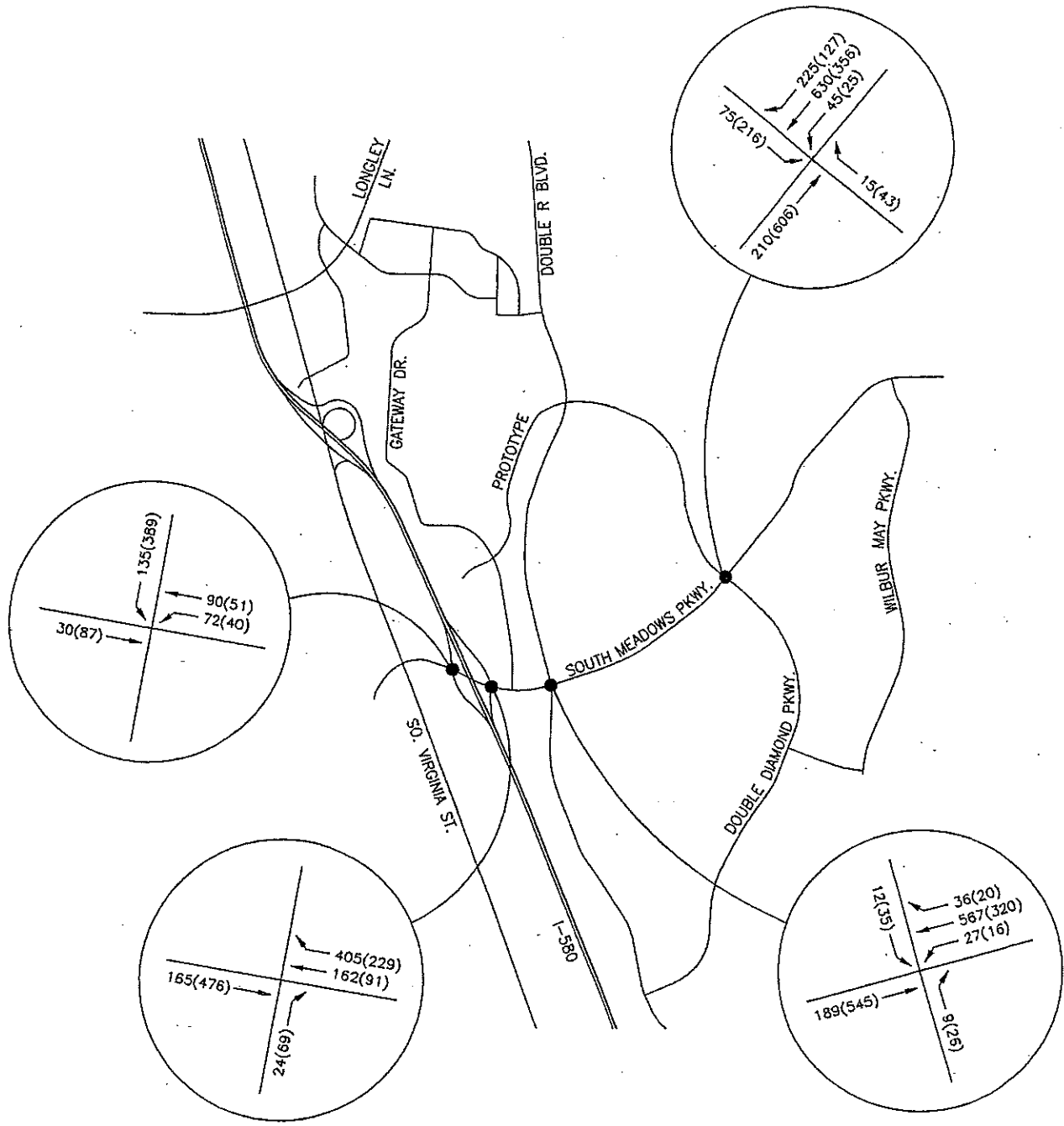
Four scenarios were obtained directly from the Regional Transportation Commission's (RTC) traffic forecasting model: 2012 base plus phase 1 traffic volumes, 2030 base plus phases 1 and 2 traffic volumes with East Connector alternate A alignment, and 2030 base and 2030 base plus phases 1 and 2 traffic volumes with East Connector alternate C alignment. Figure 10 shows the average daily traffic (ADT) volumes for the 2012 base plus phase 1 traffic volumes. Figure 11 shows the ADT volumes for the 2030 base plus phases 1 and 2 project traffic volumes with East Connector alternate A alignment. Figure 12 shows the ADT volumes for the 2030 base and 2030 base plus phases 1 and 2 project traffic volumes with alternate alignment C. RTC's modeling data sheets are included in the appendix.

LEGEND

- KEY INTERSECTION
- PHASE 1
- (-) PHASE 2 WITH ALT. A
- [-] PHASE 2 WITH ALT. C

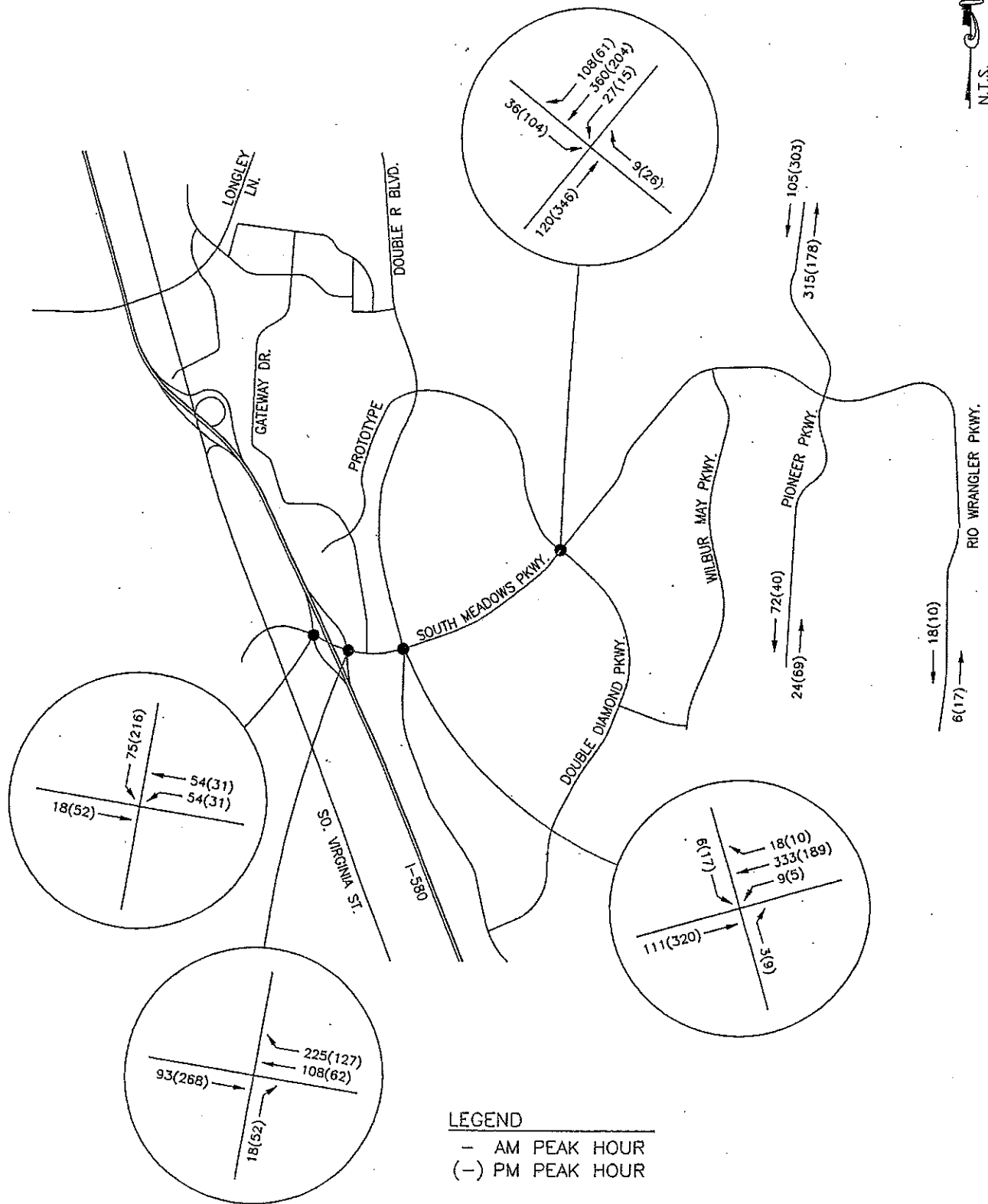


BELLA VISTA RANCH PHASE 2
DIRECTIONS OF APPROACH
FIGURE 2

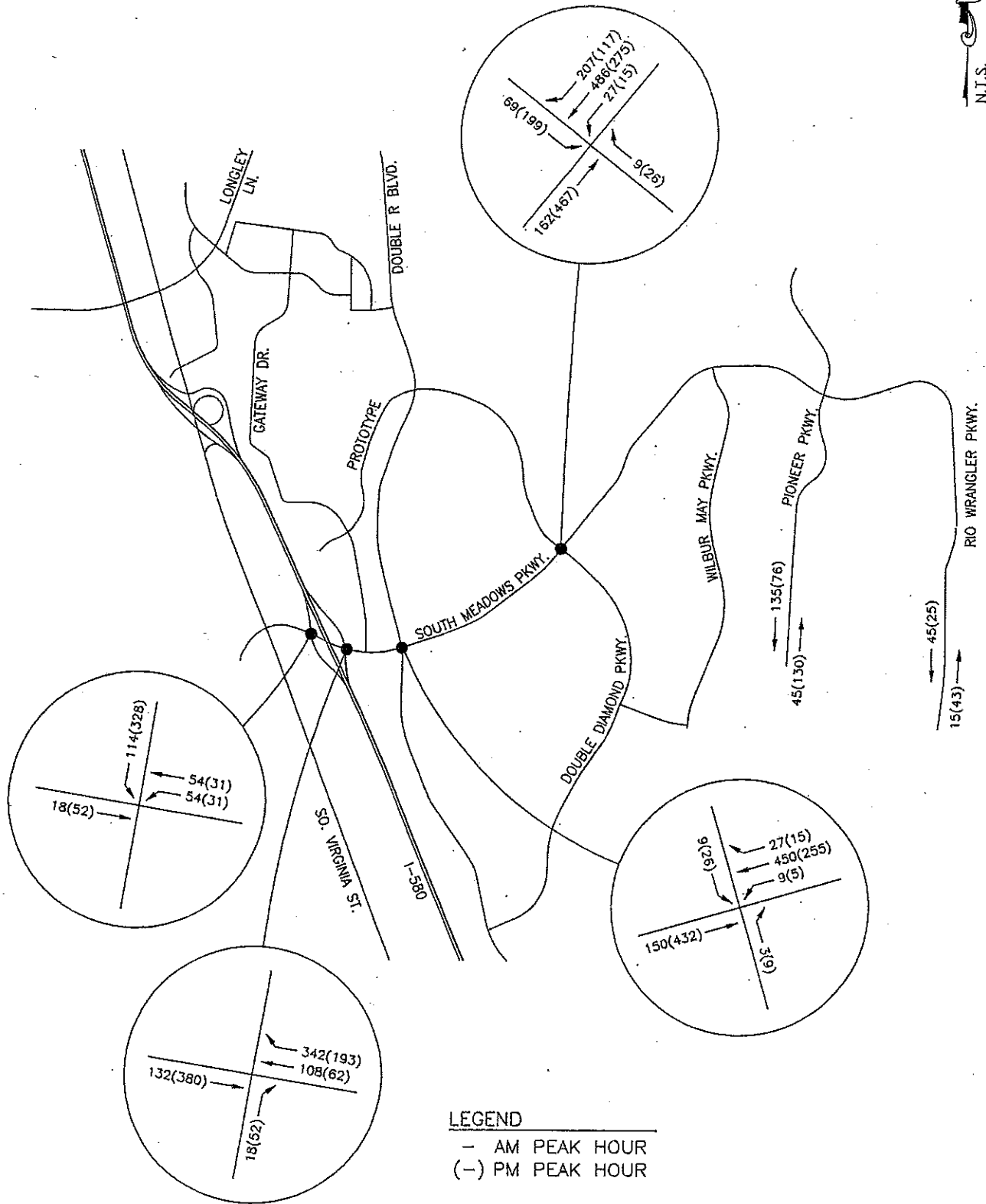


LEGEND
 - AM PEAK HOUR
 (-) PM PEAK HOUR

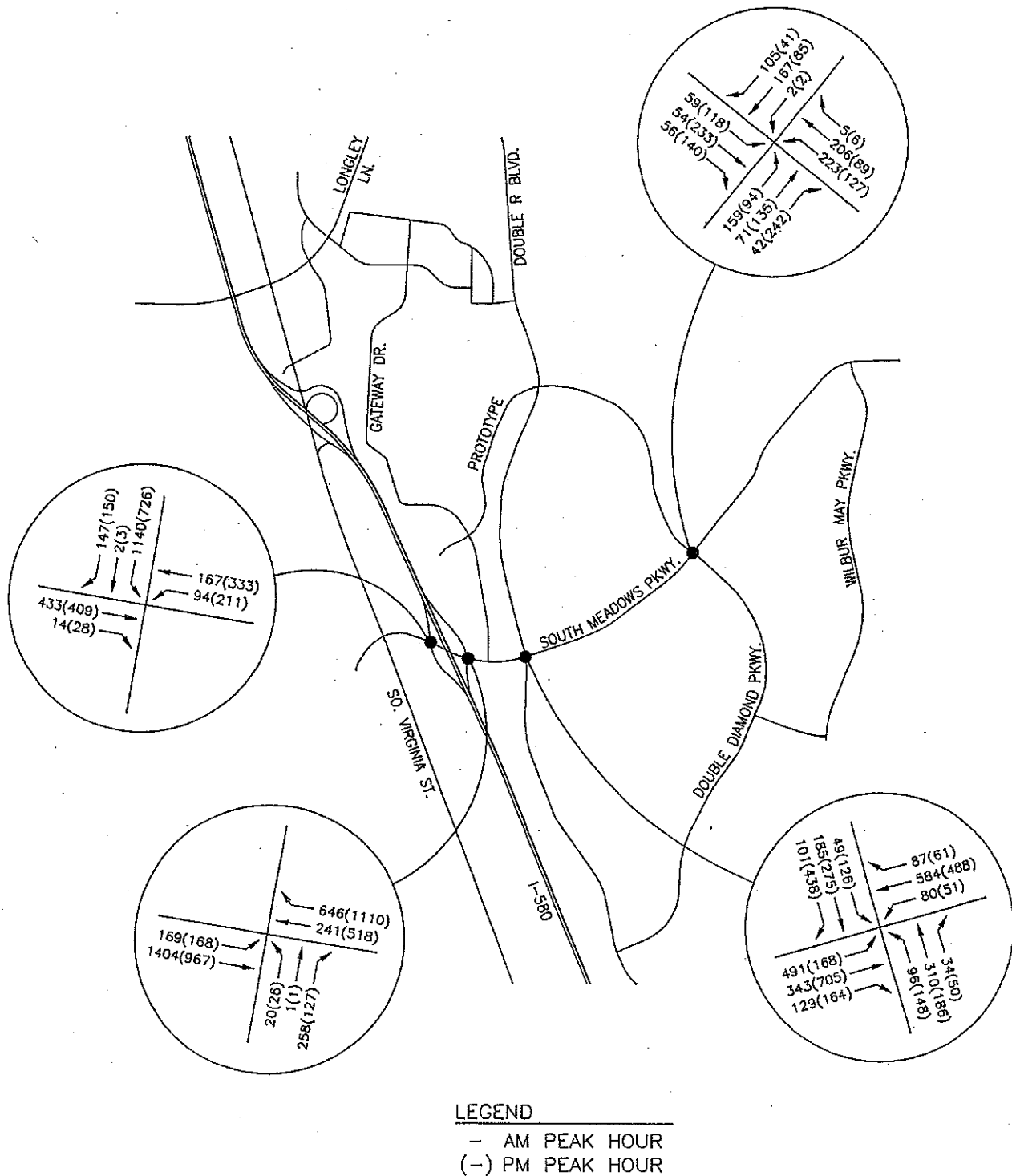
BELLA VISTA RANCH PHASE 2
 PHASE 1 PROJECT TRIP ASSIGNMENT
 FIGURE 3



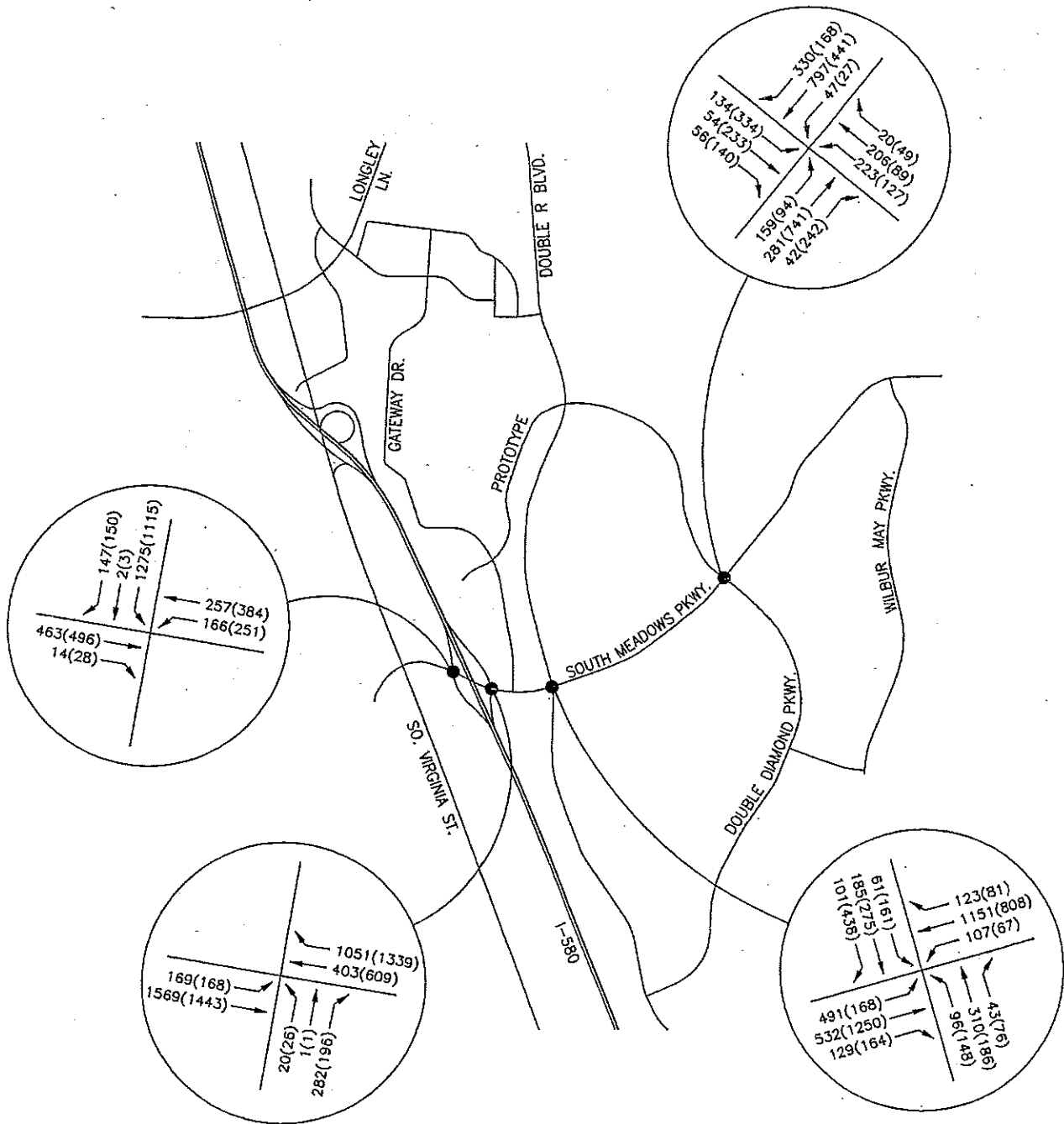
BELLA VISTA RANCH PHASE 2
PHASE 2 PROJECT TRIP ASSIGNMENT - ALT. A
FIGURE 4



BELLA VISTA RANCH PHASE 2
PHASE 2 PROJECT TRIP ASSIGNMENT - ALT. C
FIGURE 5



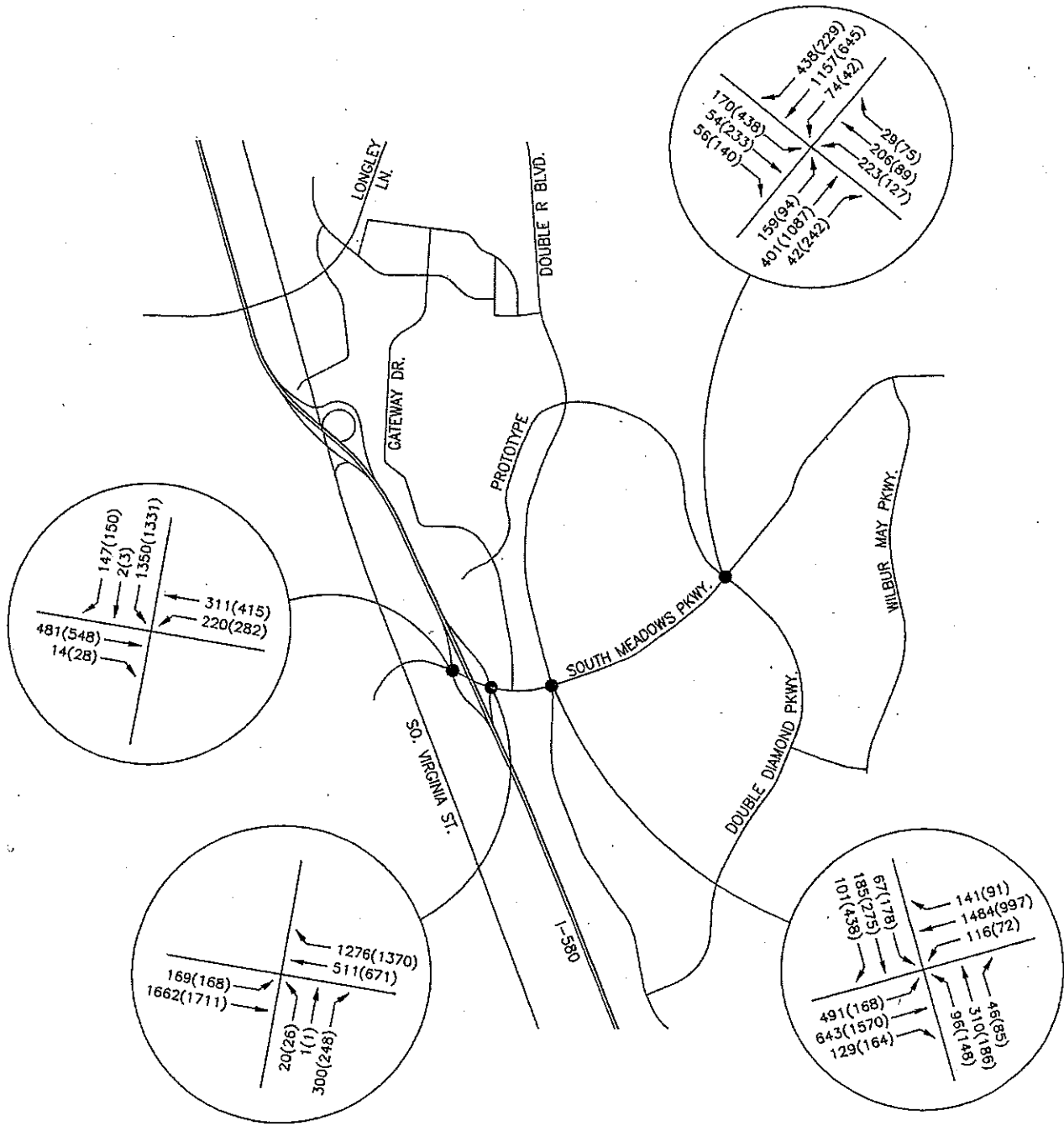
BELLA VISTA RANCH PHASE 2
EXISTING PEAK HOUR TRAFFIC VOLUMES
FIGURE 6



LEGEND

- AM PEAK HOUR
- (-) PM PEAK HOUR

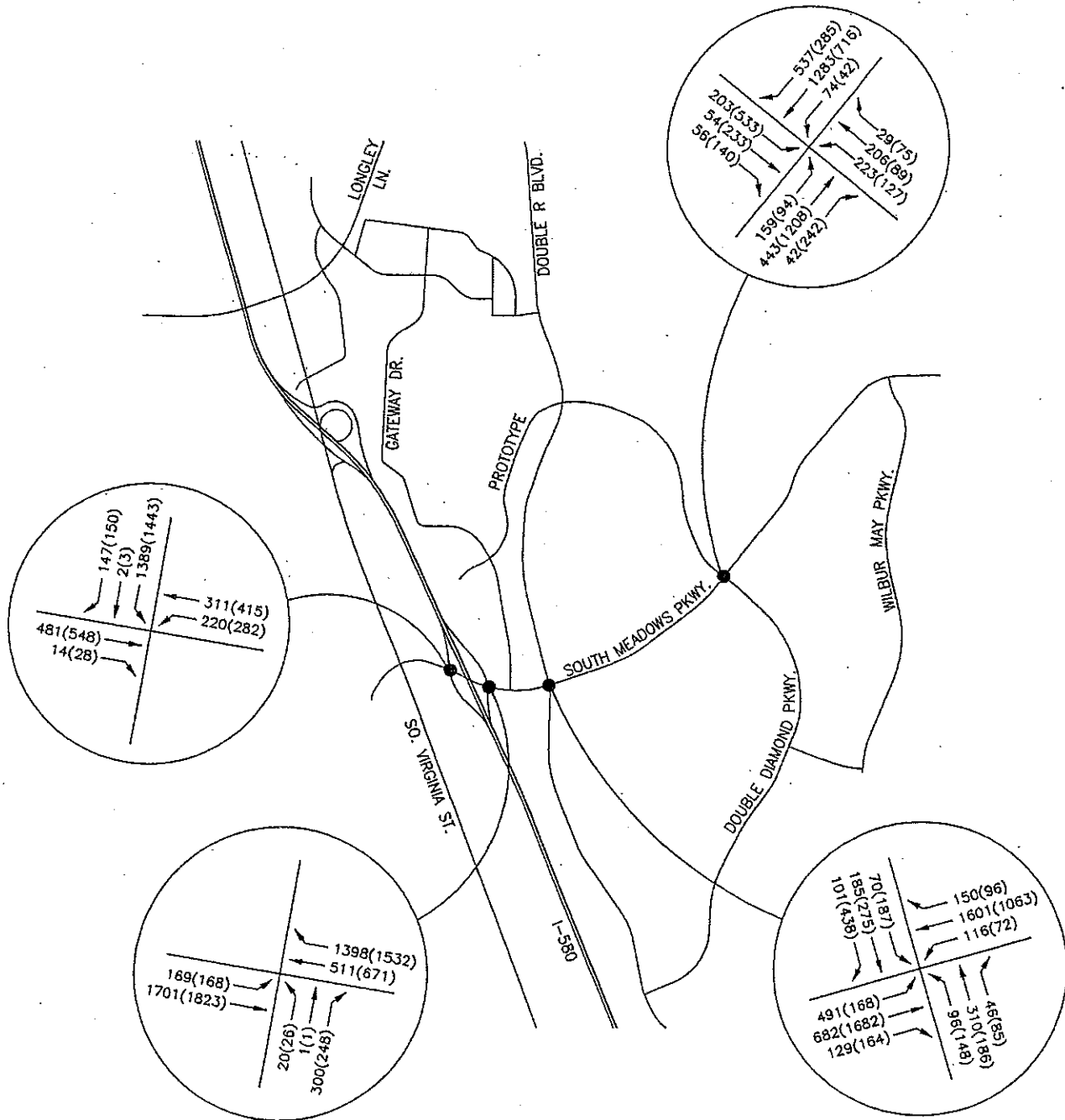
BELLA VISTA RANCH PHASE 2
EXISTING PLUS PHASE 1 TRAFFIC VOLUMES
FIGURE 7



LEGEND

- AM PEAK HOUR
- (-) PM PEAK HOUR

BELLA VISTA RANCH PHASE 2
EXISTING + PHASES 1 & 2 TRAFFIC VOLUMES - ALT. A
FIGURE 8

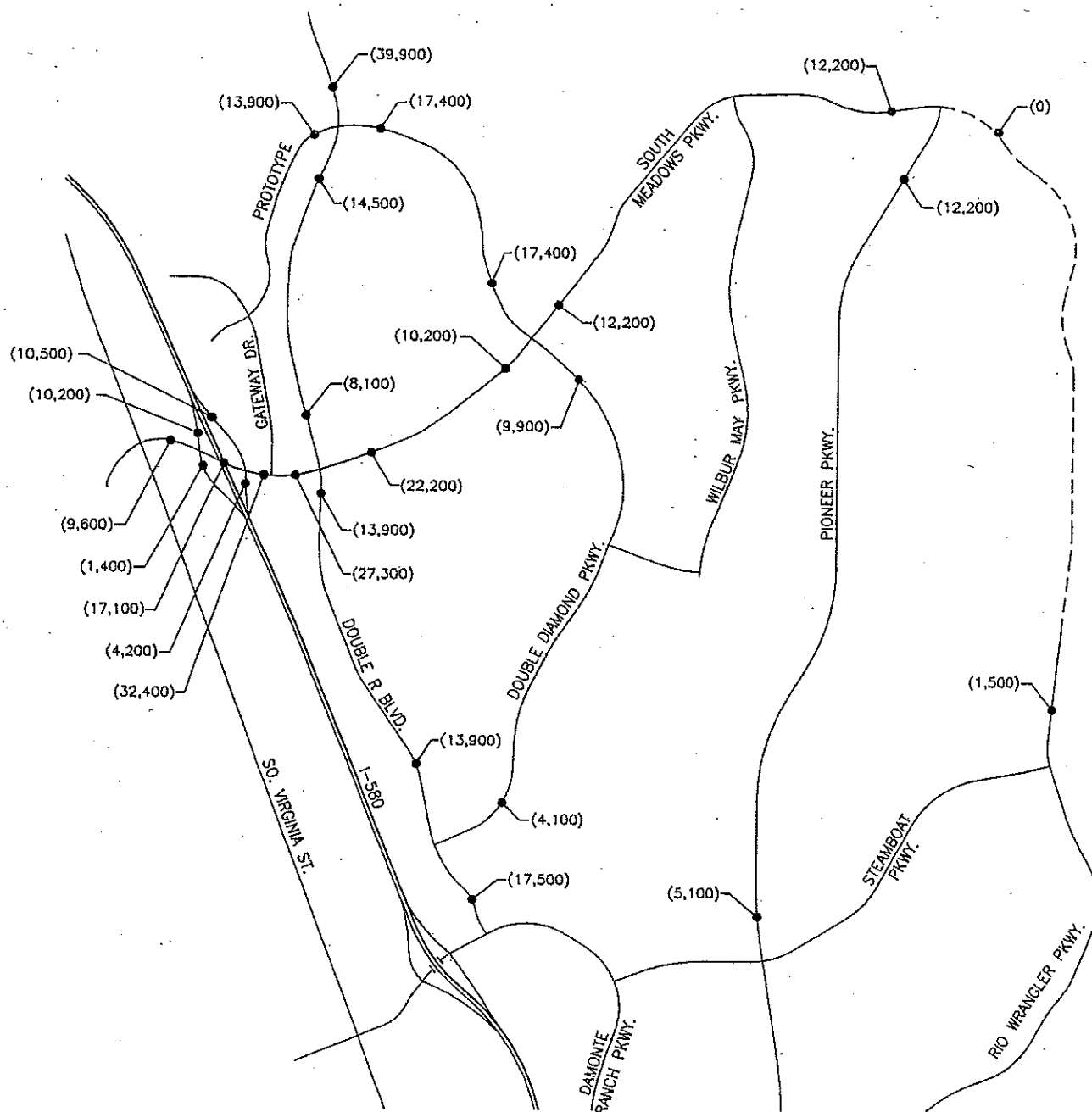


LEGEND

- AM PEAK HOUR
- (-) PM PEAK HOUR

BELLA VISTA RANCH PHASE 2
EXISTING + PHASES 1 & 2 TRAFFIC VOLUMES - ALT. C
FIGURE 9

(-) BASE + PHASE 1

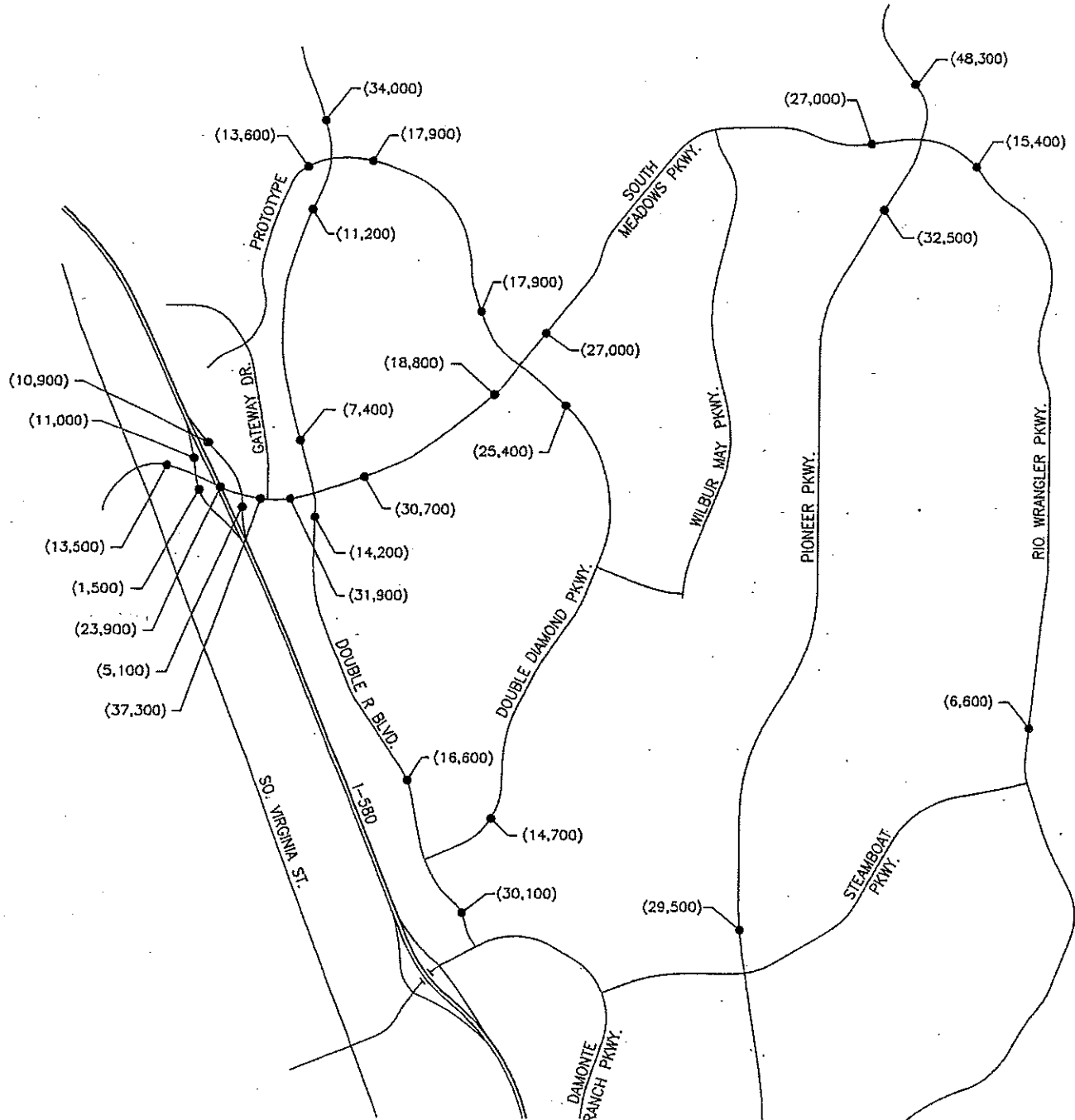


WITHOUT RIO WRANGLER AND POINEER CONNECTIONS

BELLA VISTA RANCH PHASE 2
2012 TRAFFIC VOLUMES
FIGURE 10

LEGEND

(-) BASE + PHASES 1 AND 2



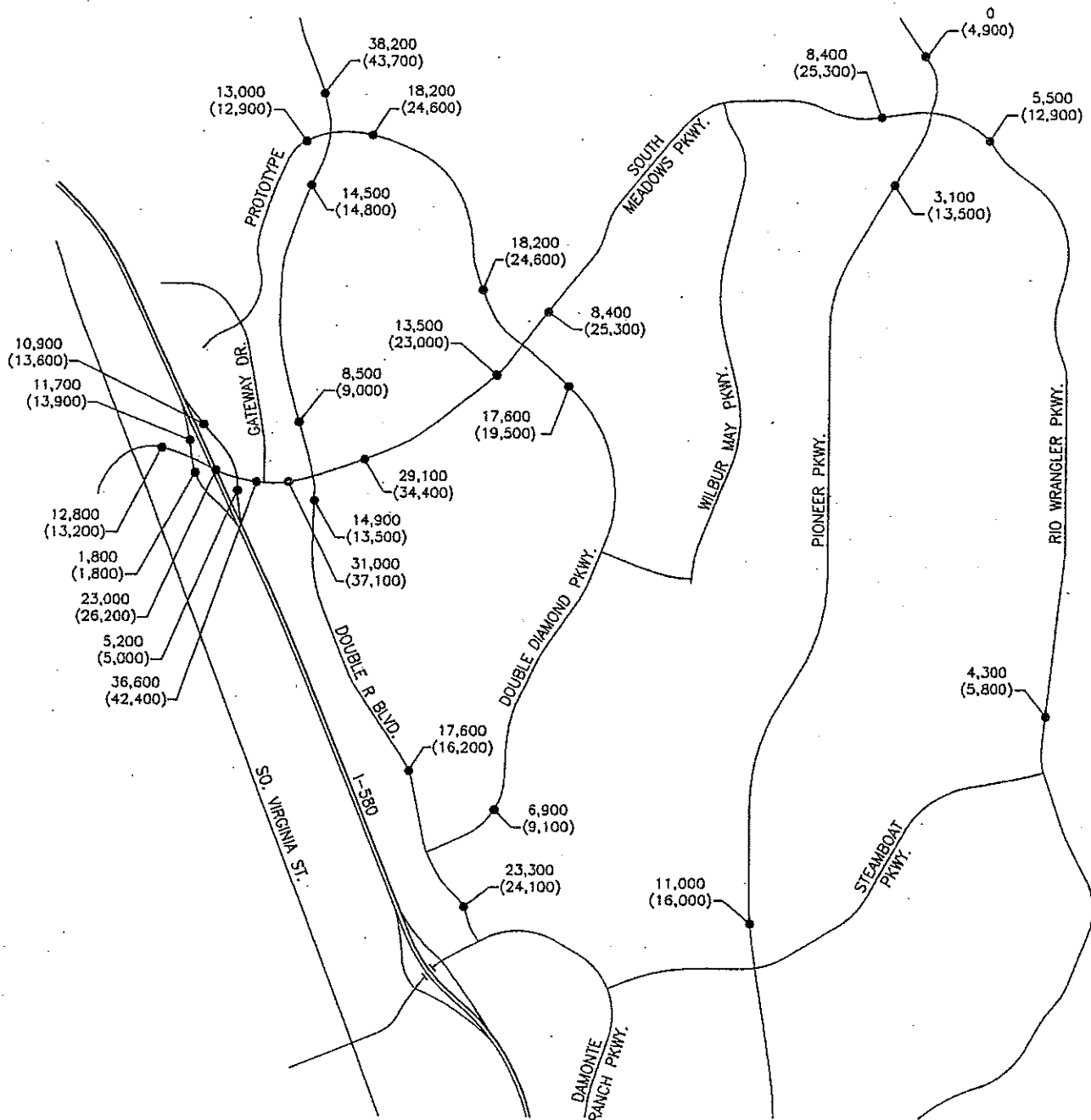
NOTE

WITH RIO WRANGLER AND PIONEER CONNECTIONS

BELLA VISTA RANCH PHASE 2
2030 TRAFFIC VOLUMES - EAST CONNECTOR ALTERNATE A
FIGURE 11

LEGEND

- BASE
(-) BASE + PHASE 1 + PHASE 2



NOTE

WITH RIO WRANGLER AND PIONEER CONNECTIONS

BELLA VISTA RANCH PHASE 2
2030 TRAFFIC VOLUMES - EAST CONNECTOR ALTERNATE C
FIGURE 12

INTERSECTION CAPACITY ANALYSIS

The South Meadows Parkway intersections with the I-580 northbound and southbound ramps, Double R Boulevard and Double Diamond Parkway were analyzed for capacity based on procedures presented in the *Highway Capacity Manual* (2000), prepared by the Transportation Research Board, for unsignalized and signalized intersections.

The result of capacity analysis is a "level of service" rating for each signalized intersection and unsignalized intersection minor movement. "Level of Service" is a qualitative measure of traffic operating conditions where a letter grade "A" through "F", corresponding to progressively worsening traffic operation, is assigned to the signalized intersection or unsignalized intersection critical movement.

The *Highway Capacity Manual* defines "level of service" for all-way stop controlled intersections for each minor movement and approach. The intersection delay is the weighted average of the delay in each of the approaches. Table 2 below shows the unsignalized intersection level of service criteria.

TABLE 2
LOS CRITERIA FOR UNSIGNALIZED INTERSECTIONS

<u>LEVEL OF SERVICE</u>	<u>DELAY RANGE (SEC/VEH)</u>
A	≤10
B	>10 and ≤15
C	>15 and ≤25
D	>25 and ≤35
E	>35 and ≤50
F	>50

The "level of service" for signalized intersections is stated in terms of the average control delay per vehicle for a peak 15 minute analysis period. The signalized intersection level of service criteria are shown in Table 3.

TABLE 3
LOS CRITERIA FOR SIGNALIZED INTERSECTIONS

<u>LEVEL OF SERVICE</u>	<u>CONTROL DELAY PER VEHICLE (SEC)</u>
A	≤ 10
B	>10 and ≤ 20
C	>20 and ≤ 35
D	>35 and ≤ 55
E	>55 and ≤ 80
F	>80

A summary of "level of service" (L.O.S.) operation at the key intersections for the existing and existing plus project conditions is shown in Table 4. The highway capacity worksheets are included in the appendix.

TABLE 5
LEVEL OF SERVICE RESULTS

INTERSECTION	EXISTING		EXISTING + PHASE 1		EXISTING + PHASE 2 ALT. A		EXISTING + PHASE 2 ALT. C	
	AM	PM	AM	PM	AM	PM	AM	PM
So. Meadows/ I-580 SB Ramps Signalized Intersection Delay	C25.1	C22.2	C25.2	C26.5	C25.7	C27.6	C30.3	C31.1
So. Meadows/ I-580 NB Ramps Signalized Intersection Delay	B14.7	B15.7	B17.5	B16.8	C20.9	B17.2	C21.6	B18.4
So. Meadows/Double R Signalized Intersection Delay	C29.8	C30.1	C31.6	C33.3	C32.1	C34.0	C33.0	D38.8
So. Meadows/Double Diamond Unsignalized All-Way								
Eastbound	B13.3	C24.8	D31.4	F671				
Westbound	C17.9	B13.4	F799	F298				
Northbound	C15.8	B13.4	C23.5	C18.0				
Southbound	B11.7	C24.9	C16.5	F61.3				
Intersection Delay	B15.1	C21.8	F412	F358	N/A	N/A	N/A	N/A
Signalized								
Intersection Delay								
W/O Improvements	N/A	N/A	C31.2	C27.7	E58.7	D46.8	E63.0	E56.9
With Improvements	N/A	N/A	C25.2	C26.6	C31.1	C33.6	C32.4	D40.0

South Meadows Parkway/I-580 Southbound Ramps

The South Meadows Parkway/I-580 southbound ramp intersection was analyzed for capacity as a signalized intersection for all scenarios. The intersection currently operates at level of service C with a delay of 25.1 and 22.2 seconds per vehicle during the AM and PM peak hours, respectively. With the addition of phase 1 project traffic, the intersection is expected to continue to operate at level of service C with a delay of 25.2 and 26.5 seconds per vehicle during the AM and PM peak hours, respectively. For the existing plus phases 1 and 2 with East Connector alternate A, the

intersection is expected to operate at level of service C with a delay of 25.7 and 27.6 seconds per vehicle during the AM and PM peak hours, respectively. For the existing plus phases 1 and 2 with East Connector alternate C, the intersection is expected to operate at level of service C with a delay of 30.3 and 31.1 seconds per vehicle during the AM and PM peak hours, respectively. The intersection was analyzed with the existing approach lanes.

South Meadows Parkway/I-580 Northbound Ramps

The South Meadows Parkway/I-580 northbound ramp intersection was analyzed for capacity as a signalized intersection for all scenarios. The intersection currently operates at level of service B with a delay of 14.7 and 15.7 seconds per vehicle during the AM and PM peak hour, respectively. With the addition of phase 1 project traffic, the intersection continues to operate at level of service B with a delay of 17.5 and 16.8 seconds per vehicle during the AM and PM peak hours, respectively. For the existing plus phases 1 and 2 traffic volumes with East Connector alternate A, the intersection is expected to operate at level of service C with a delay of 20.9 seconds per vehicle during the AM peak hour and level of service B with a delay of 17.2 seconds per vehicle during the PM peak hour. For the existing plus phases 1 and 2 traffic volumes with East Connector alternate C, the intersection is expected to operate at level of service C with a delay of 21.6 seconds per vehicle during the AM peak hour and level of service B with a delay of 18.4 seconds per vehicle during the PM peak hour. The intersection was analyzed with the existing approach lanes.

The Nevada Department of Transportation has indicated that the east approach of the South Meadows Parkway/I-580 northbound ramp intersection may be modified to eliminate one of the right turn lanes and instead provide three through lanes and a single right turn lane. The intersection was subsequently re-analyzed for capacity with this proposed lane modification. For the existing traffic volumes, the intersection operates at level of service B with a delay of 17.3 seconds per vehicle during the AM peak hour and level of service D with a delay of 40.9 seconds per vehicle during the PM peak hour. For the existing plus phase 1 traffic volumes, the intersection operates at level of service D with a delay of 35.1 and 57.7 seconds per vehicle during the AM and PM peak hours, respectively. For the existing plus phases 1 and 2 traffic volumes with East Connector alternate A, the intersection operates at level of service D with a delay of 44.9 and 58.9 seconds per vehicle during the AM and PM peak hours, respectively. For the existing plus phases 1 and 2 traffic volumes with East Connector alternate C, the intersection operates at level of service E with a delay of 60.1 and 67.3 seconds per vehicle during the AM and PM peak hours, respectively.

Existing traffic volumes indicate a westbound right turn volume of ± 650 vehicles during the AM peak hour and $\pm 1,100$ vehicles during the PM peak hour while westbound through volumes total ± 240 vehicles during the AM peak hour and ± 520 vehicles during the PM peak hour. In addition, future peak hour traffic volumes obtained from RTC's traffic forecasting model indicate that the westbound right turn movement will serve approximately twice as much traffic as the westbound through movement for the 2012 and 2030 planning scenarios. The existing traffic volumes and future traffic projections as well as the level of service results indicate that the existing lane configuration which includes a shared through-right turn lane and one exclusive right turn lane

should remain operational.

South Meadows Parkway/Double R Boulevard

The South Meadows Parkway/Double R Boulevard intersection was analyzed for capacity as a signalized intersection for all scenarios. The intersection currently operates at level of service C with a delay of 29.8 and 30.1 seconds per vehicle during the AM and PM peak hours, respectively. With the addition of phase 1 project traffic, the intersection is expected to continue to operate at level of service C with a delay of 31.6 and 33.3 seconds per vehicle during the AM and PM peak hours, respectively. For the existing plus phases 1 and 2 traffic volumes with East Connector alternate A, the intersection is expected to operate at level of service C with a delay of 32.1 and 34.0 seconds per vehicle during the AM and PM peak hours, respectively. For the existing plus phases 1 and 2 traffic volumes with East Connector alternate C, the intersection is expected to operate at level of service C with a delay of 33.0 seconds per vehicle during the AM peak hour and level of service D with a delay of 38.8 seconds per vehicle during the PM peak hour. The intersection was analyzed with the existing approach lanes.

South Meadows Parkway/Double Diamond Parkway

The South Meadows Parkway/Double Diamond Parkway intersection was analyzed for capacity as an unsignalized intersection for all scenarios. The intersection approaches and overall intersection currently operate at level of service C or better during the AM and PM peak hours. With the addition of phase 1 traffic, the east approach is anticipated to operate at level of service F during the AM peak hour and the east, west, and north approaches are each anticipated to operate at level of service F during the PM peak hour with an overall intersection level of service F during both the AM and PM peak hours.

Traffic signal warrant #3 for peak hour traffic volumes was reviewed at the South Meadows Parkway/Double Diamond Parkway intersection based on Figure 4C-3 of the *Manual on Uniform Traffic Control Devices* (2003 Edition). The peak hour warrant is met for the existing plus phase 1 traffic volumes. It is recommended that a traffic signal be installed at the South Meadows Parkway/Double Diamond Parkway intersection when warranted. The intersection was subsequently analyzed as a signalized intersection with the existing lanes for the existing plus phase 1 and existing plus phases 1 and 2 traffic volumes with East Connector alternate A and C alignments. The intersection is expected to operate at level of service C with a delay of 31.2 and 27.7 seconds per vehicle during the AM and PM peak hours, respectively. For the existing plus phases 1 and 2 traffic volumes with East Connector alternate A, the intersection is expected to operate at level of service E with a delay of 32.1 seconds per vehicle during the AM and level of service D with a delay of 46.8 seconds per vehicle during the PM peak hours. For the existing plus phases 1 and 2 traffic volumes with East Connector alternate C, the intersection is expected to operate at level of service E with a delay of 63.0 and 56.9 seconds per vehicle during the AM and PM peak hours, respectively.

The intersection was re-analyzed with the existing approach lanes plus one exclusive right turn lane at the South Meadows Parkway east approach and dual left turn lanes at the Double Diamond Parkway north approach. The intersection is expected to operate at level of service C with a delay of 25.21 and 26.6 seconds per vehicle during the AM and PM peak hours, respectively. For the existing plus phases 1 and 2 traffic volumes with East Connector alternate A, the intersection is expected to operate at level of service C with a delay of 32.1 and 34.0 seconds per vehicle during the AM and PM peak hours, respectively. For the existing plus phases 1 and 2 traffic volumes with East Connector alternate C, the intersection is expected to operate at level of service C with a delay of 33.0 seconds per vehicle during the AM peak hour and level of service D with a delay of 38.8 seconds per vehicle during the PM peak hour. As shown in Table 5, the improvements of an exclusive right turn lane at the east approach and dual left turn lanes at the north approach of the South Meadows Parkway/Double Diamond Parkway intersection significantly improve intersection operation for existing plus project phases 1 and 2 traffic volumes.

ROADWAY CAPACITY ANALYSIS

South Meadows Parkway, Double R Boulevard, Double Diamond Parkway, Prototype Drive, Pioneer Parkway and Rio Wrangler Parkway were reviewed for capacity based on daily level of service thresholds established by the Regional Transportation Commission (RTC) in their *2030 Regional Transportation Plan* and the ramps at the I-580/South Meadows on daily level of service thresholds obtained from the RTC's *2015 Regional Transportation Plan*. Table 5 shows the daily level of service thresholds for high, moderate, low, and ultra-low access control arterials, collectors, and freeway ramps. Four scenarios, obtained from RTC's traffic forecasting model, were reviewed: 2012 base plus project phase 1 traffic volumes (2012 scenario), 2030 base plus phases 1 and 2 traffic volumes with East Connector alternate A alignment (2030 alternate A scenario), and 2030 base (2030 base C scenario) and 2030 base plus phases 1 and 2 traffic volumes with East Connector alternate C alignment (2030 alternate C scenario).

TABLE 5
LEVEL OF SERVICE CRITERIA FOR ROADWAY SEGMENTS

FACILITY	LANES	LOS C	AVERAGE DAILY TRAFFIC VOLUME			LOS F
			LOS D	LOS E		
High Access	2	≤17,300	17,301-19,200	19,201-20,300		>20,300
Control Arterial	4	≤36,100	36,101-38,400	38,401-40,600		>40,600
	6	≤54,700	54,701-57,600	57,601-60,900		>60,900
Moderate Access	2	≤14,800	14,801-17,500	17,501-18,600		>18,600
Control Arterial	4	≤32,200	32,201-35,200	35,201-36,900		>36,900
	6	≤49,600	49,601-52,900	52,901-55,400		>55,400
Low Access	2	≤ 6,900	6,901-13,400	13,401-15,100		>15,100
Control Arterial	4	≤15,700	15,701-28,400	28,401-30,200		>30,200
Ultra-Low Access	6	≤24,100	24,101-41,200	41,201-43,000		>43,000
Control Arterial	8	≤33,300	33,301-55,200	55,201-57,400		>57,400
Collector	2	≤7,300	7,301-8,500	8,501-9,100		>9,100
Ramp	1	≤12,800	12,801-14,400	14,401-16,000		>16,000
	2	≤25,600	25,601-28,800	28,801-32,000		>32,000

A summary of the "Level of Service" (LOS) operation for the key roadways in this analysis is shown in Table 6.

TABLE 6
ROADWAY SEGMENT AVERAGE DAILY TRAFFIC AND LEVEL OF SERVICE RESULTS

ROADWAY	YEAR 2012		ALTERNATE A YEAR 2030		ALTERNATE C YEAR 2030	
	BASE	+ PH. 1	BASE	+ PH. 1&2	BASE	+ PH. 1&2
SOUTH MEADOWS PARKWAY						
East of Virginia		9,600		13,500	12,800	13,200
6 Lane Ultra-Low		C		C	C	C
Between I-580 Ramps		17,100		23,900	23,000	26,200
6 Lane Ultra-Low		C		C	C	D

TABLE 6 (CONT.)
ROADWAY SEGMENT AVERAGE DAILY TRAFFIC AND LEVEL OF SERVICE RESULTS

ROADWAY	YEAR 2012	ALTERNATE A	ALTERNATE C	
	<u>BASE +PH. 1</u>	<u>YEAR 2030</u> <u>BASE +PH. 1&2</u>	<u>YEAR 2030</u> <u>BASE +PH. 1&2</u>	
SOUTH MEADOWS PARKWAY				
East of I-580 NB Ramps	32,400	37,300	36,600	42,400
6 Lane Ultra-Low	D	D	D	E
8 Lane Ultra-Low	C	C	D	D
6 Lane Moderate	C	C	C	C
West of Double R	27,300	31,900	31,000	37,100
6 Lane Ultra-Low	D	D	D	D
8 Lane Ultra-Low	C	C	C	D
6 Lane Moderate	C	C	C	C
East of Double R	22,200	30,700	29,100	34,400
4 Lane Moderate	C	C	C	D
6 Lane Moderate	C	C	C	C
West of Double Diamond	10,200	18,800	13,500	23,000
4 Lane Moderate	C	C	C	C
East of Double Diamond	12,200	27,000	8,400	25,300
4 Lane Moderate	C	C	C	C
East of Wilbur May	12,200	27,000	8,400	25,300
4 Lane Moderate	C	C	C	C
West of Pioneer (On-Site)	12,200	27,000	5,500	12,900
2 Lane Moderate	C	F	C	C
4 Lane Moderate	C	C	C	C
DOUBLE R BOULEVARD				
North of Double Diamond (No.)	39,900	34,000	38,200	43,700
6 Lane Moderate	C	C	C	C
South of Double Diamond	14,500	11,200	14,500	14,800
4 Lane Moderate	C	C	C	C
North of South Meadows	8,100	7,400	8,500	9,000
4 Lane Moderate	C	C	C	C

Table 6 is continued on the following page.

TABLE 6 (CONT.)
ROADWAY SEGMENT AVERAGE DAILY TRAFFIC AND LEVEL OF SERVICE RESULTS

ROADWAY	YEAR 2012	ALTERNATE A	ALTERNATE C	
	<u>BASE</u> <u>+PH. 1</u>	<u>BASE +PH. 1&2</u>	<u>BASE</u> <u>+PH. 1&2</u>	<u>BASE</u> <u>+PH. 1&2</u>
DOUBLE R BOULEVARD				
South of South Meadows	13,900	14,200	14,900	13,500
4 Lane Moderate	C	C	C	C
North of Double Diamond (So.)	13,900	16,600	17,600	16,200
4 Lane Moderate	C	C	C	C
North of Damonte Ranch	17,500	30,100	23,300	24,100
4 Lane Moderate	C	C	C	C
DOUBLE DIAMOND PARKWAY				
East of Double R (North)	17,400	17,900	18,200	24,600
4 Lane Moderate	C	C	C	C
North of South Meadows	17,400	17,900	18,200	24,600
4 Lane Moderate	C	C	C	C
South of South Meadows	9,900	25,400	17,600	19,500
4 Lane Moderate	C	C	C	C
East of Double R (South)	4,100	14,700	6,900	9,100
4 Lane Moderate	C	C	C	C
PIONEER PARKWAY				
North of Steamboat	5,100	29,500	11,000	16,000
2 Lane High	C	F	C	C
4 Lane High	C	C	C	C
South of South Meadows	12,200	32,500	3,100	13,500
2 Lane High	C	F	C	C
4 Lane High	C	C	C	C
North of South Meadows	0	48,300	0	4,900
2 Lane High	C	F	C	C
4 Lane High	C	F	C	C
6 Lane High	C	C	C	C

Table 6 is continued on the following page.

TABLE 6 (CONT.)
ROADWAY SEGMENT AVERAGE DAILY TRAFFIC AND LEVEL OF SERVICE RESULTS

ROADWAY	YEAR 2012	ALTERNATE A	ALTERNATE C	
	BASE + PH. 1	YEAR 2030 BASE + PH. 1&2	YEAR 2030 BASE	YEAR 2030 + PH. 1&2
PROTOTYPE DRIVE				
West of Double R	13,900	13,600	13,000	12,900
2 Lane Low	E	E	D	D
4 Lane Low	C	C	C	C
RIO WRANGLER DRIVE				
North of Steamboat	1,500	6,600	4,300	5,800
2 Lane Collector	C	C	C	C
East of Pioneer Parkway	0	15,400	5,500	12,900
2 Lane Collector	C	F	C	F
2 Lane Moderate	C	D	C	C
4 Lane Moderate	C	C	C	C
I-580/SO. MEADOWS INTERCHANGE				
Southbound Off-Ramp	10,200	11,000	11,700	13,900
2 Lane Ramp	C	C	C	C
Southbound On-Ramp	1,400	1,500	1,800	1,800
1 Lane Ramp	C	C	C	C
Northbound Off-Ramp	4,200	5,100	5,200	5,000
1 Lane Ramp	C	C	C	C
Northbound On-Ramp	10,500	10,900	10,900	13,600
1 Lane Ramp	C	C	C	D
2 Lane Ramp	C	C	C	C

South Meadows Parkway

South Meadows Parkway is classified as an ultra-low access control arterial from South Virginia Street to Double R Boulevard and a moderate access control arterial between Double R Boulevard and Pioneer Parkway. The existing six-lane section from South Virginia Street to the I-580 northbound ramp intersection will operate at level of service C for the 2012 base plus phase 1 (2012 scenario), 2030 base plus phases 1 and 2 with East Connector alternate A (2030 alternate A scenario), and 2030 base traffic volumes (2030 base scenario). The existing six-lane

section will operate at level of service C from South Virginia Street to the I-580 southbound ramp intersection and level of service D between the I-580 ramps for the 2030 base plus phases 1 and 2 traffic volumes with East Connector alternate C (2030 alternate C scenario). The existing six-lane section between the I-580 northbound ramps and Gateway Drive will operate at level of service D for all scenarios except for the 2030 alternate C scenario, which operates at level of service E. As an eight-lane section between the I-580 northbound ramps and Gateway Drive, South Meadows Parkway will operate at level of service C for the 2012 and 2030 alternate A scenarios and level of service D for the 2030 base C and 2030 alternate C scenarios. As a six-lane moderate access control arterial between the I-580 northbound ramps and Gateway Drive, South Meadows Parkway will operate at level of service C for all scenarios. The existing six-lane section between Gateway Drive and Double R Boulevard will operate at level of service D for all scenarios. As an eight-lane section between Gateway Drive and Double R Boulevard, South Meadows Parkway will operate at level of service C for all scenarios except for the 2030 alternate C scenario, which operates at level of service D. As a six-lane moderate access control arterial between Gateway Drive and Double R Boulevard, South Meadows Parkway will operate at level of service C for all scenarios. The existing four-lane moderate access control section east of Double R Boulevard will operate at level of service C for all scenarios except for the 2030 alternate C scenario, which operates at level of service D. As a six-lane section between Gateway Drive and Double R Boulevard, South Meadows Parkway will operate at level of service C for all scenarios. South Meadows Parkway from west of Double Diamond Boulevard to Pioneer Parkway will need to be a two-lane section to maintain level of service C for the 2030 alternate A scenario and a four-lane section to maintain level of service C for 2030 alternate C scenario.

Double R Boulevard

Double R Boulevard is classified as a moderate access control arterial from Damonte Ranch Parkway to Longley Lane. The existing six-lane section north of Double Diamond Parkway (north) will operate at level of service C for all scenarios. The existing four-lane section between Double Diamond Parkway (north) and Damonte Ranch Parkway will operate at level of service C or better for all scenarios.

Double Diamond Parkway

Double Diamond Parkway is classified as a moderate access control arterial between Double R Boulevard (north) and Double R Boulevard (south). The entire four-lane section will operate at level of service C or better for all scenarios.

Pioneer Parkway

Pioneer Parkway is classified as a high access control arterial from Geiger Grade to South Meadows Parkway. The section of Pioneer Parkway between South Meadows Parkway and

Steamboat Parkway will need to be constructed as a two-lane roadway in order to provide level of service C operation for the 2012, 2030 base C and 2030 alternate C scenarios. The section north of South Meadows Parkway will need to be constructed as a two-lane roadway in order to provide level of service C operation for the 2030 base C and 2030 alternate C scenarios. The section of Pioneer Parkway (East Connector alternate A alignment) between South Meadows Parkway and Steamboat Parkway will need to be constructed as a four-lane roadway in order to provide level of service C operation for the 2030 alternate A scenario. The section north of South Meadows Parkway will need to be constructed as a six-lane roadway in order to provide level of service C operation for the 2030 alternate A scenario.

Prototype Drive

Prototype Drive is classified as a low access control arterial between Double R Boulevard and Gateway Drive. The existing two-lane section west of Double R Boulevard will operate at level of service E for the 2012 and 2030 alternate A scenarios and level of service D for the 2030 base and 2030 alternate C scenarios. This section will need to be four lanes in order to maintain level of service C operation for all scenarios.

Rio Wrangler Parkway

Rio Wrangler Parkway is classified as a collector street from Damonte Ranch Parkway to South Meadows Parkway. The section north of Steamboat Parkway will operate at level of service C for all scenarios. The section east of Pioneer Parkway will operate at level of service C as a two-lane collector for the 2012 and 2030 base C scenarios and level of service F for the 2030 alternate A and 2030 alternate C scenarios. As a two-lane moderate access control arterial, the section east of Pioneer Parkway will operate at level of service D for the 2030 alternate A scenario and level of service C for the other scenarios. As a four-lane section moderate access control arterial, the section east of Pioneer Parkway will operate at level of service C for all scenarios.

South Meadows Parkway/I-580 Interchange Ramps

The existing on and off-ramps at the I-580/South Meadows Parkway interchange are anticipated to operate at level of service C or better for all scenarios except for the northbound on-ramp which operates at level of service D for the 2030 alternate C scenario. The northbound on-ramp will need to be a two-lane ramp to maintain level of service C operation for the 2030 alternate C scenario.

SITE PLAN REVIEW

Project access for phase 1 will be provided from South Meadows Parkway at the project's west boundary and Pioneer Parkway at the project's south boundary. With phase 2, additional access will be provided from Rio Wrangler at the project's south boundary. With East Connector alternate A alignment, additional access is provided from Pioneer Parkway at the project's north boundary. With East Connector alternate C alignment, access to the project site is provided via Pioneer Parkway and Rio Wrangler Parkway at the project's south boundary. South Meadows Parkway, Pioneer Parkway, and Rio Wrangler Parkway will ultimately converge to form a four-leg intersection within the project site. Lane requirements were subsequently reviewed for the South Meadows Parkway/Pioneer Parkway/Rio Wrangler Parkway intersection based on future peak hour traffic volumes projections obtained from RTC's traffic forecasting model. As previously discussed under the Roadway Capacity section, two-lane moderate access control roadways for the on-site sections of South Meadows Parkway and Rio Wrangler Parkway and two-lane high access control roadways for the on-site sections of Pioneer Parkway are required in order to provide level of service C operation for the 2012, 2030 base C and 2030 alternate C planning scenarios. The South Meadows Parkway/Pioneer Parkway/Rio Wrangler Parkway intersection needs to be constructed with a minimum of one left turn lane, one through lane and one right turn lane at the four approaches. The on-site sections of South Meadows Parkway and Rio Wrangler Parkway require four-lane moderate access control roadways and the on-site section of Pioneer Parkway (East Connector alternative A alignment) between Steamboat Parkway and South Meadows Parkway requires a four-lane high access control roadway and Pioneer Parkway north of South Meadows Parkway requires a six-lane high access control roadway to provide level of service C operation for the 2030 alternate A planning scenario. At a minimum, the South Meadows Parkway/Pioneer Parkway/Rio Wrangler Parkway intersection needs to be constructed with a minimum of one left turn lane, two through lanes and one right turn lane at the four approaches for the 2030 alternate C scenario. In addition, the RTC modeling did not provide turning movements at the intersections. Consequently, dual left turn lanes may be needed when more definitive information is available.

Access management standards established by the Regional Transportation Commission were also reviewed in regards to signalized and unsignalized intersection spacing requirements. Pioneer Parkway is classified as a high access control arterial and therefore signal spacing shall be a minimum of one-half mile and unsignalized intersections shall be spaced a minimum of 250 feet from signalized intersections and 500 feet from other unsignalized intersections. Left turn movements from Pioneer Parkway to a minor street or driveway will only be allowed if a minimum of 750 feet of spacing is provided from a signalized intersection. Left turn movements from a minor street or driveway onto Pioneer Parkway will only be allowed at signalized intersections. South Meadows Parkway is classified as moderate access control arterial and the section of Rio Wrangler Parkway east of Pioneer Parkway will also need to be a moderate access control arterial. Signal spacing on moderate access control arterials shall be a minimum of one-quarter mile and unsignalized intersections shall be spaced a minimum of 200 feet from signalized intersections and 300 feet from other unsignalized intersections. Left turn movements from moderate access control arterials to a minor street or driveway will only be allowed if a

minimum of 500 feet of spacing is provided from a signalized intersection. For low access control arterials, signal spacing shall be a minimum of 1,000 feet and unsignalized intersections shall be spaced a minimum of 150 feet from signalized intersections and 200 feet from other unsignalized intersections. Left turn movements from low access control arterials to a minor street or driveway will only be allowed if a minimum of 350 feet of spacing is provided from a signalized intersection.

The conceptual site plan does not show the lot layout or the on-site collector and local street network. It is recommended that the on-site collector streets and local streets intersecting South Meadows Parkway, Pioneer Parkway, and Rio Wrangler Parkway meet RTC spacing requirements for high, moderate and low access control arterials.

There have been discussions regarding access to developable land east of the project site. There is excellent potential access to this property with the East Connector alternate C alignment, which is to the east of the Bella Vista Ranch project site. The exact location of the alignment of the East Connector has not yet been finalized, but future access to the other property would be independent of the Bella Vista Ranch project. For the East Connector alternate A alignment, a stubbed street at the project's east boundary may be needed to provide access to the property to the east. The location of the stubbed street will depend upon a feasible alignment for both the Bella Vista Ranch Phase 2 site and the property to the east considering the topography of the area, which is hilly.

RECOMMENDATIONS

Traffic generated by Bella Vista Ranch Phase 2 will have some impact on the adjacent street network. The following recommendations are made to mitigate project traffic impacts.

It is recommended that any required signing, striping or traffic control improvements comply with Nevada Department of Transportation and City of Reno requirements.

It is recommended that a traffic signal be installed at the South Meadows Parkway/Double Diamond Parkway intersection when warranted.

It is recommended that the on-site collector streets and local streets intersecting Pioneer Parkway meet Regional Transportation Commission spacing requirements for high access control arterials.

It is recommended that the on-site collector streets and local streets intersecting South Meadows Parkway and Rio Wrangler Parkway meet Regional Transportation Commission spacing requirements for moderate access control arterials.

Appendix A-1
Update letter – Solaegui Engineering, September, 2010

SOLAEGUI
ENGINEERS

October 7, 2010

Mr. William Gall, P.E.
City of Reno
P.O. Box 1900
Reno, Nevada 89505

RE: Bella Vista Phase II

Dear Bill:-

This letter provides supplemental information for the above mentioned development located in the City of Reno, Nevada. The information includes a discussion of the number of lanes that will be required for the segment of Rio Wrangler Parkway along the project's frontage and the segment of South Meadows Parkway that crosses Steamboat Creek for the 2030 planning scenario. The number of lanes required on these segments will be based on level of service criteria established by the Regional Transportation Commission. 2030 average daily traffic volumes on these roadway segments were obtained from base model data we have in our files from 2009 which was provided by the Regional Transportation Commission's traffic forecasting model. The model outputs indicate the following roadway volumes:

- 12,300 ADT on Rio Wrangler Parkway just south of South Meadows Parkway
- 8,800 ADT on Rio Wrangler Parkway near the project's south boundary
- 60,800 ADT on South Meadows Parkway at the Steamboat Creek crossing

These 2030 model volumes were generated based on 700 single family dwelling units within the traffic analysis zone (TAZ) that Bella Vista Phase II is located. The currently proposed Bella Vista Phase II project is now designed for 575 multi-family units and 16.4 acres of non-residential land uses. The non-residential land uses were assumed to include commercial development at a 25% floor area ratio which amounts to 179,000 square feet of building area. Trip generation volumes were subsequently calculated for 700 single family homes identified in the model and the multi-family and commercial land uses now proposed in order to adjust the model volumes accordingly.

Table 1 on the following page shows the trip generation for the model land uses and currently proposed land uses based on trip generation rates obtained from the Eighth Edition of *ITE Trip Generation* (2008) for Land Use: 210 Single Family Detached Housing, Land Use 230: Residential Condominium/Townhouse and Land Use 820: Shopping Center. The trip generation worksheets are included with this letter.

TABLE 1
TRIP GENERATION

LAND USE	ADT	AM PEAK HOUR			PM PEAK HOUR		
		IN	OUT	TOTAL	IN	OUT	TOTAL
RTC MODEL							
Single Family, 700 D.U.	6,699	133	392	525	448	259	707
PROPOSED							
Multi-Family, 575 D.U.	3,341	40	213	253	201	98	299
Shopping Center, 179 K.S.F.	<u>7,686</u>	<u>109</u>	<u>70</u>	<u>179</u>	<u>328</u>	<u>340</u>	<u>668</u>
Total	11,027	149	283	432	529	438	967
Numeric Change	+4,328	+16	-109	-93	+81	+179	+260

As indicated in Table 1, the proposed Phase II land uses generate 4,328 more average daily trips, 93 less AM peak hour trips and 260 more PM peak hour trips than the 2030 projected land uses in the RTC model. The additional ADT volumes generated by the proposed land uses were manually assigned to the adjacent roadways and added to the RTC 2030 modeled roadway volumes presented above. The adjusted 2030 roadway ADT volumes are as follows:

- 15,550 ADT on Rio Wrangler Parkway just south of South Meadows Parkway
- 9,900 ADT on Rio Wrangler Parkway near the project's south boundary
- 64,050 ADT on South Meadows Parkway at the Steamboat Creek crossing

The section of South Meadows Parkway and Rio Wrangler Parkway adjacent to the site were subsequently reviewed for lane requirements for the adjusted 2030 traffic volumes based on daily level of service (LOS) thresholds established by the Regional Transportation Commission. The RTC's Regional Transportation Plan indicates that South Meadows Parkway and Rio Wrangler Parkway are both classified as arterials with moderate access control. Table 2 shows the daily level of service thresholds for arterials with moderate access control.

TABLE 2
LOS CRITERIA FOR ARTERIALS WITH MODERATE ACCESS CONTROL

FACILITY/LANES	LOS B	LOS C	AVERAGE DAILY TRAFFIC VOLUME			LOS F
			LOS D	LOS E		
2 Lanes	≤5,500	5,501-14,800	14,801-17,500	17,501-18,600		>18,600
4 Lanes	≤12,000	12,001-32,200	32,201-35,200	35,201-36,900		>36,900
6 Lanes	≤18,800	18,801-49,600	49,601-52,900	52,901-55,400		>55,400
8 Lanes	≤25,600	25,601-66,800	66,801-70,600	70,601-73,900		>73,900

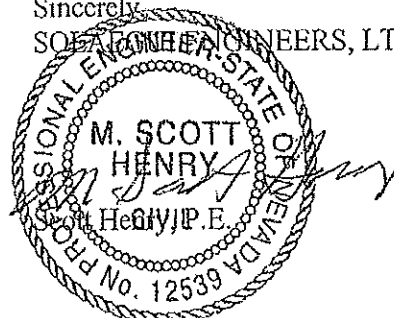
The segment of Rio Wrangler Parkway from South Meadows Parkway to the project's south boundary will need to be a two-lane roadway in order to accommodate the 2030 adjusted traffic volumes and meet RTC's policy LOS D standards for roadways serving less than 27,000 ADT. The segment of South Meadows Parkway that crosses Steamboat Creek will need to be an eight-lane roadway in order to accommodate the 2030 adjusted traffic volumes and meet RTC's policy LOS E standards for roadways serving more than 27,000 ADT.

It should be noted that the 64,050 ADT volume on South Meadows Parkway includes traffic volumes generated by a 9,000 unit development located east of Bella Vista Phase II in Storey County. The 2030 traffic volume on the segment of South Meadows Parkway east of Rio Wrangler Parkway that will serve the Storey County development amounts to 60,000 ADT which also indicates the need for an eight-lane roadway. The majority of the traffic volume on the section of South Meadows Parkway that crosses Steamboat Creek can therefore be attributed to Storey County development. The project contribution to the traffic volume on the section of South Meadows Parkway that crosses Steamboat Creek will not exceed traffic volumes on Rio Wrangler Parkway.

In summary, it is our opinion that the Bella Vista Phase II land uses can be served by constructing a two-lane moderate access control arterial for both South Meadows Parkway and Rio Wrangler Parkway.

We trust that this information will meet your requirements. Please call if you have any questions or comments.

Sincerely,
SOLAR ENGINEERS, LTD.



ENCL
cc Eric Gibbons

10-7-10
Exp. 6-30-11

Eng5/Letters/Reno/Bella Vista Phase 2

Summary of Average Vehicle Trip Generation
 For 700 Dwelling Units of Single Family Detached Housing
 October 07, 2010

	24 Hour Two-Way Volume	7-9 AM Pk Hour		4-6 PM Pk Hour	
		Enter	Exit	Enter	Exit
Average Weekday	6699	133	392	448	259
	24 hour Two-Way Volume	Peak Hour			
		Enter	Exit		
Saturday	7056	343	308		
Sunday	6139	322	280		

Note: A zero indicates no data available.
 Source: Institute of Transportation Engineers
 Trip Generation, 8th Edition, 2008.

TRIP GENERATION BY MICROTRANS

Summary of Average Vehicle Trip Generation
 For 575 Dwelling Units of Residential Condominium / Townhouse
 October 07, 2010

	24 Hour Two-Way Volume	7-9 AM Pk Hour		4-6 PM Pk Hour	
		Enter	Exit	Enter	Exit
Average Weekday	3341	40	213	201	98

	24 hour Two-Way Volume	Peak Hour	
		Enter	Exit
Saturday	3260	144	127
Sunday	2783	127	132

Note: A zero indicates no data available.
 Source: Institute of Transportation Engineers
 Trip Generation, 8th Edition, 2008.

TRIP GENERATION BY MICROTRANS

Summary of Average Vehicle Trip Generation
 For 179 Th.Sq.Ft. GLA of Shopping Center
 October 07, 2010

	24 Hour Two-Way Volume	7-9 AM Pk Hour		4-6 PM Pk Hour	
		Enter	Exit	Enter	Exit
Average Weekday	7686	109	70	328	340

	24 hour Two-Way Volume	Peak Hour	
		Enter	Exit
Saturday	8945	455	421
Sunday	4518	274	285

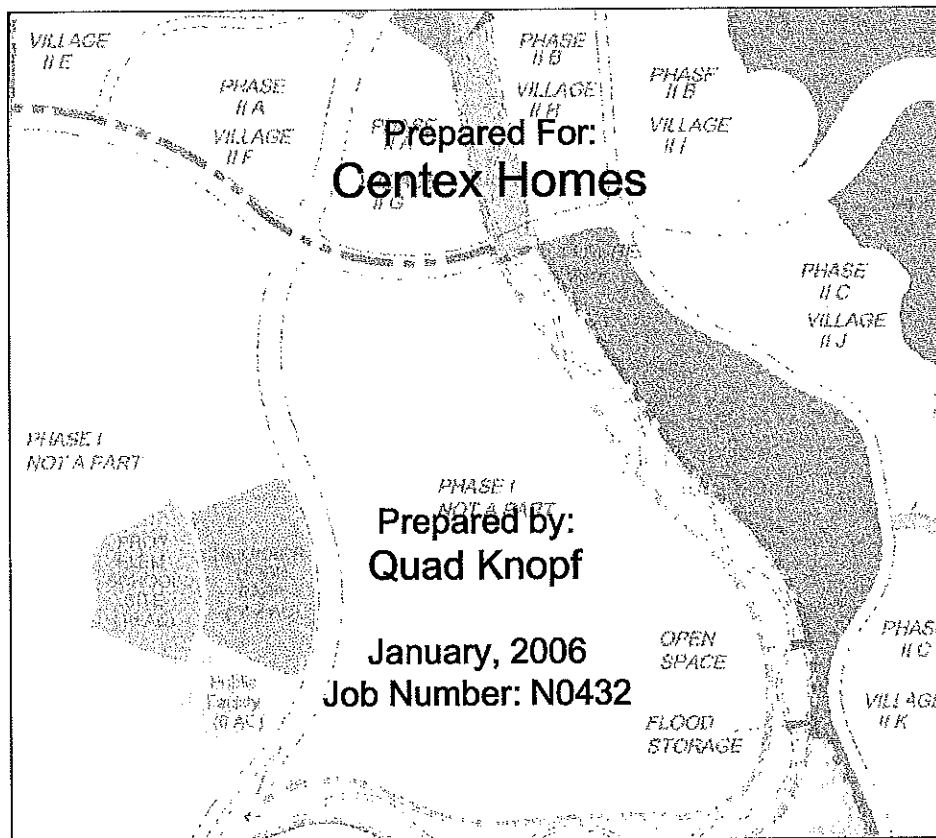
Note: A zero indicates no data available.
 Source: Institute of Transportation Engineers
 Trip Generation, 8th Edition, 2008.

TRIP GENERATION BY MICROTRANS

Appendix B
Flood Control Master Plan – Quadknopf Consulting

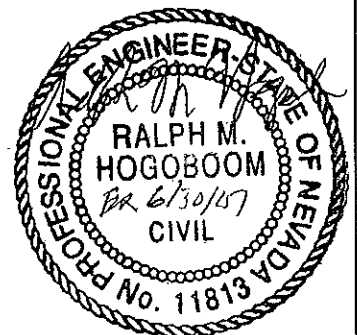
FLOOD CONTROL MASTER PLAN BELLA VISTA RANCH PHASE II

City of Reno, Nevada



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1/13/06

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PHASE 2
FLOOD CONTROL MASTER PLAN
SOUTHERN PORTION OF THE BELLA VISTA RANCH

1.0 INTRODUCTION

The original Master Plan Document was prepared for Phase 1 and Phase 2 of Bella Vista Ranch Subdivision. However the two phases were separated for submittal at different times. The original document "FLOOD CONTROL MASTER PLAN, BELLA VISTA RANCH, City of Reno, Nevada" dated June 3, 2005 prepared by Quad Knopf was submitted with Phase 1.

Phase 1 plans are currently in the review process in the City of Reno. They include the majority of the Relocated Steamboat Creek, all of the east-west channel and the westerly channel. Phase 2 includes the construction of the northerly 1500 feet of Relocated Steamboat Creek and the construction of a multi-barrel box culvert at the proposed South Meadows Parkway crossing. Existing drainage courses from the lower portions of the Virginia Range foothills have been delineated.

1.1 Background

The majority of the Bella Vista Ranch lies within a broad alluvial valley in the southern portion of the Truckee Meadows. A small portion of the property on the easterly boundary is situated on the lower portion of the Virginia Range. Properties to the south, the Damonte Ranch, and the west, the Double Diamond Ranch, are undergoing intensive master planned development. The drainage and flood control infrastructure which has been constructed with these two large developments was master planned with area wide considerations. See Figure 1.

1.2 Damonte Ranch Facilities

The facilities constructed on the Damonte Ranch have the largest impact upon the planning for drainage and flood prevention for the Bella Vista. Steamboat Creek, Whites Creek Branches 3 and 4 and the Eastside Tributaries (flows from the Virginia Range) have been (or will at ultimate build out be) collected in a series of natural and engineered channels which were designed to maintain the drainage patterns which existed prior to development.

The Steamboat Creek channel loses capacity at a point north of the Whites Creek Branch 3 channel and a diversion structure has been built to allow the lower flows to continue north in the current channel and to capture the higher flows and to direct them over a side weir and into a series of large regional detention facilities. The large detention facilities also serve as wetlands mitigation areas. Those excess flows, along with the onsite flows and flows entering from the eastern boundary are directed toward the Steamboat Creek historic channel on the eastern portion of the project. They sheet flow through regulatory wetlands areas and areas set aside for future wetlands mitigation.

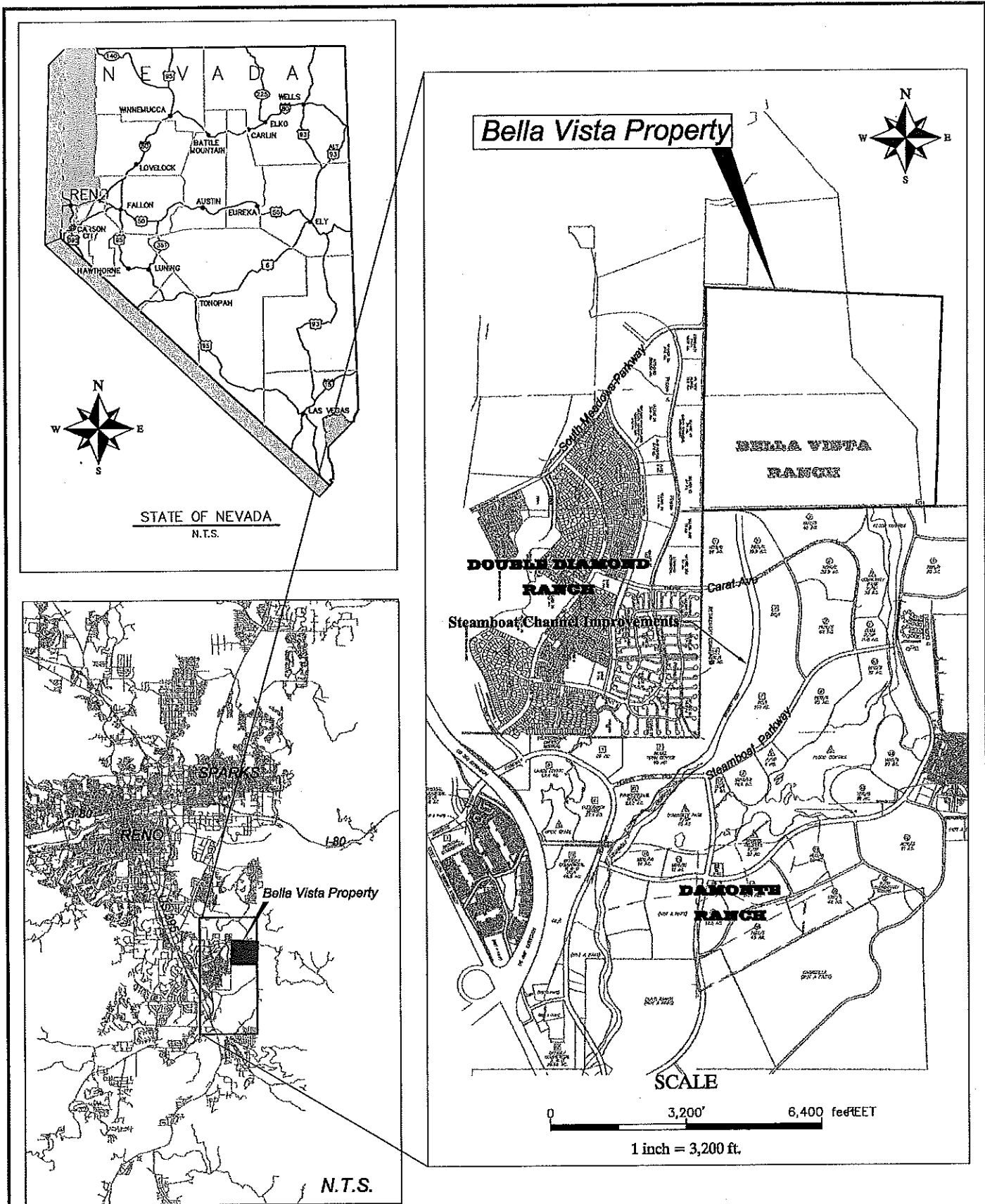


Figure 1
Vicinity Map
Bella Vista Ranch
Centex Homes

Phased construction of the Damonte Ranch has begun on the central and southern portion of the property. Construction of the Relocated Steamboat Creek is nearing completion through the northerly portion of the property. The channel has been excavated and the majority of the rockery walls have been constructed. The major construction remaining is the construction of two multi-barrel reinforced concrete box culverts. The Steamboat Creek flows are returned to sheet flow and combine near the northern boundary of the ranch. When the final phases of the project are built and agreements are reached with the Bella Vista development, the flows will be confined to the restored Steamboat Creek channel, a channel on the west side of the project and to the wetlands mitigation site on the east.

1.3 Double Diamond Ranch

Flood control facilities on the Double Diamond Ranch include the confinement of Thomas Creek to wetland areas and designed channels. These channels deliver the 100 year flows to the Double Diamond regional detention basin on the northern portion of the east boundary of the project. Whites Creek Branches 1 and 2 are also conveyed through the Double Diamond project in a series of channels and wetlands and combine with the Thomas Creek flows to be conveyed to the regional detention basin. On site flows are collected primarily in the Central Channel and in a channel on the eastern boundary of Double Diamond. The Central Channel combines with the Thomas and Whites Creek and flows into the detention basin. The flows in the channel on the eastern boundary are also conveyed to the regional detention basin. This channel was also sized for flows which were displaced by the placement of fill on the eastern edge of the Double Diamond ranch.

2.0 BELLA VISTA PROJECT SITE

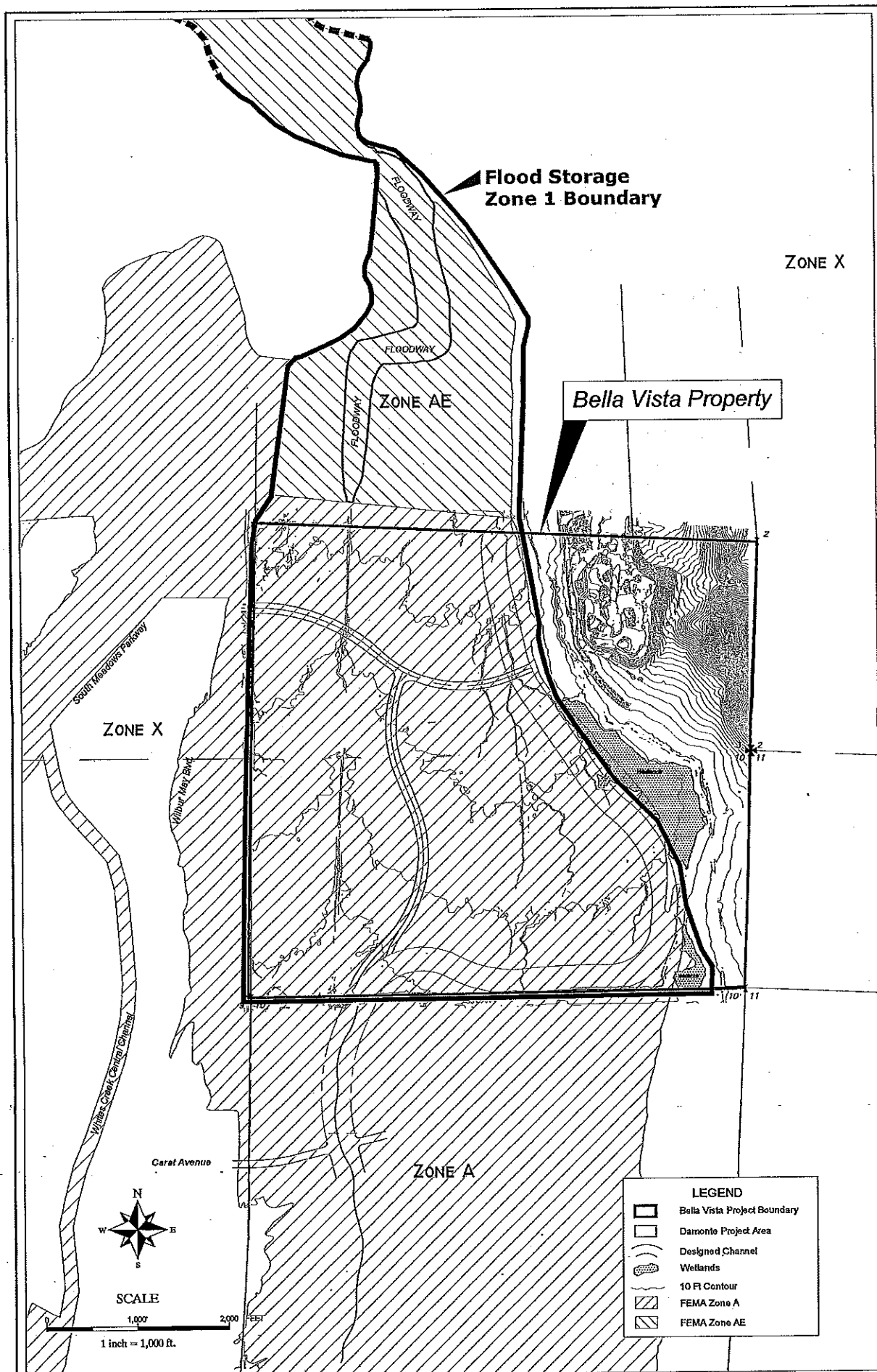
The Bella Vista Ranch has been determined to be subject to flooding in a 100 year or 1% chance flood. It is within an unnumbered Zone A and Zone AE on Panel 3178 of the Flood Insurance Rate Map for Washoe County and Incorporated Areas, effective date of September 30, 1994. It is affected by two sources of flooding as described in the following sections. The flood zones are shown on Figure 2.

2.1 Steamboat Creek

Steamboat Creek is the major source of flooding on the Bella Vista parcel. The creek was diverted from its natural channel more than a century ago with the advent of ranching and farming in the Truckee Meadows area. The low flows were diverted to a perched channel which was constructed in a north south alignment. This alteration allowed for flood irrigation of the Bella Vista. In larger events, the flows which exceed the channel capacity break out of the manmade channel and flow primarily eastward to the historic channel. Most of the ranch is covered with sheet flow during a major event, with the manmade and historic channels having the deepest flows.

2.2 East Side – Virginia Range Tributaries

No significantly large basins affect the parcel from the eastern boundary but there are three basins whose 100 year discharges range from 38 to 135 cfs. Flows from these basins are most likely to be more hazardous during localized thunderstorm events rather than during a general rain event.



Sheet 1 of 1

Quad Knopf Job #

N0432

Date: Jan 2006

Washoe County

FIGURE 2

Existing Conditions FEMA Zone Map

Centex Homes

Nevada

Scale: 1" = 1,000'

CT: detailed contours = 10 Feet

File Name: 0432_Fig2.dwg

Drawn By: GH

Designed By: PB

Revisions:



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N0432

3.0 FLOOD CONTROL MASTER PLAN GOALS AND INTENT

The Flood Control Master Plan for the Bella Vista Ranch has as one of its primary goals to provide flood protection for the proposed project and to adhere to the floodplain management ordinances of the City of Reno and the Interim Policies adopted by the Regional Water Planning Commission. Channel and storm drain design will be in accordance with the *City of Reno Design Standards* and the *Draft Hydrologic Criteria and Drainage Design Manual*.

The improved Steamboat Creek which is being restored with this project close to its historic alignment, as preferred by the *Steamboat Creek Restoration Plan*, will provide the central feature of the plan. The current channel has basically been used as an irrigation canal and does little to further the goals proposed by the restoration plan, especially the reduction of the total dissolved solids in the flow. A low flow channel as described above is incorporated into the design as recommended in the *Steamboat Creek Restoration Plan*. The main channel is proposed with a sinuous channel to avoid decreasing the time of the peak flow through the project and to prevent increasing its quantity.

The major wetlands adjacent to the channel will provide overflow capacity for extreme events and flood storage capacity for the project. The project lies within zone 1 of the critical flood storage zones for the Truckee River Watershed, however it is not within the backwater pool caused by the Huffaker Narrows and its culvert structure, nor the proposed flood pool of the conceptual detention dam proposed by the Corps of Engineers Truckee Meadows Flood Management Project.

3.1 Purpose of Master Plan

This Master Plan was developed in order to provide a framework for final design of the drainage and flood control features of the Bella Vista Ranch development. The framework will

- Quantify flows originating off site and on site
- Provide conceptual or preliminary design for channels and other hydraulic structures
- Propose mitigation for any impacts to adjacent property owners
- Provide sufficient analyses to support the facilities proposed.

Further, more detailed analyses and studies are planned during various stages of the project design. Specifically:

- Hydraulic evaluation of the proposed Steamboat Creek restoration channel and certification that the Master Grading and Major Infrastructure Plan for Phase I is in conformance with this Master Flood Control Plan. This evaluation will be submitted with the construction drawings for the channel and will present any

analyses needed for proposed variations. This report will also include the final Flood Storage Plan.

- Application for Conditional Letter of Map Revision to FEMA for confirmation that the facilities proposed are in conformance with FEMA policies and that the project will be removed from 100 year floodplain when built as designed
- Hydrology Reports for each tentative map
- Hydrologic and Hydraulic Evaluation for Phase II Grading and Drainage Plan

3.2 Flood Storage Zone 1

The Bella Vista Ranch lies within critical zone one as delineated by the Regional Water Planning Commission and adopted by the City of Reno. The purpose of the zone 1 designation was to assure that properties that are developed do not affect the proposed Truckee Meadows Flood Management Plan as developed by the Community Coalition. This plan relies upon the preservation of the volume of flood ponding currently available in the eastern Truckee Meadows. Projects must mitigate development within the ponding areas by providing storage in a hydraulically connected area or by participating in a regional project.

The southern portion of the Bella Vista does not contain ponding areas, only shallow sheet flow, so it is difficult to offer mitigation in the spirit of the current ordinance, that is, no ponding areas are proposed to be eliminated. Critical areas on the Bella Vista Ranch are those north of the project which lie within the proposed flood pool of the Huffaker Hills Detention Basin, a part of the flood management plan. The extent of this proposed detention structure's flood pool is shown on figure 3. The flood pool is based upon the current elevation of the spillway at 4428.

A second alternative to the Huffaker Hills Detention Basin is under study by the Corps of Engineers and the local project sponsors. This alternative has a spillway design of 4448 and would inundate the entire project. This concept would require levees of more than 20 feet adjacent to the South Meadows Business Park, render the Double Diamond Detention Basin useless and require large pumping stations to remove drainage and flood waters from both the Double Diamond Ranch and the South Meadows Business Park. It is highly unlikely that this alternative will be pursued due to serious objections from the City of Reno and affected residents and the extraordinary cost of such an undertaking.

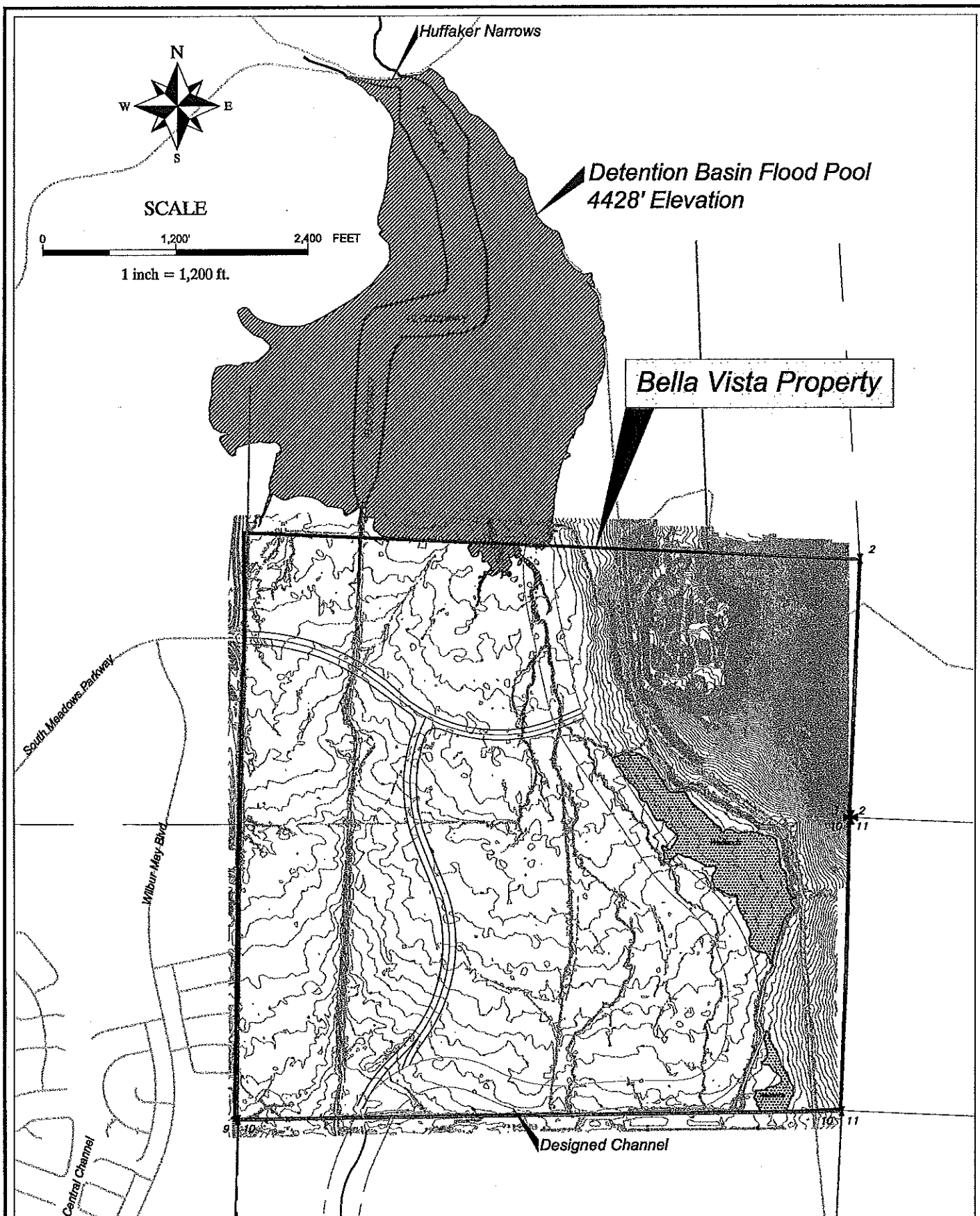


Figure 3
Detention Basin Flood Pool
Bella Vista Ranch



Care has been taken in the concept development of flood control and drainage features to avoid adverse impacts on the flood storage capacity downstream of the project. The relocated Steamboat Creek channel is designed for minimal velocities and a longer travel time in order to minimize or negate any impacts to the hydrograph (especially the timing of flows) at the Huffaker Narrows.

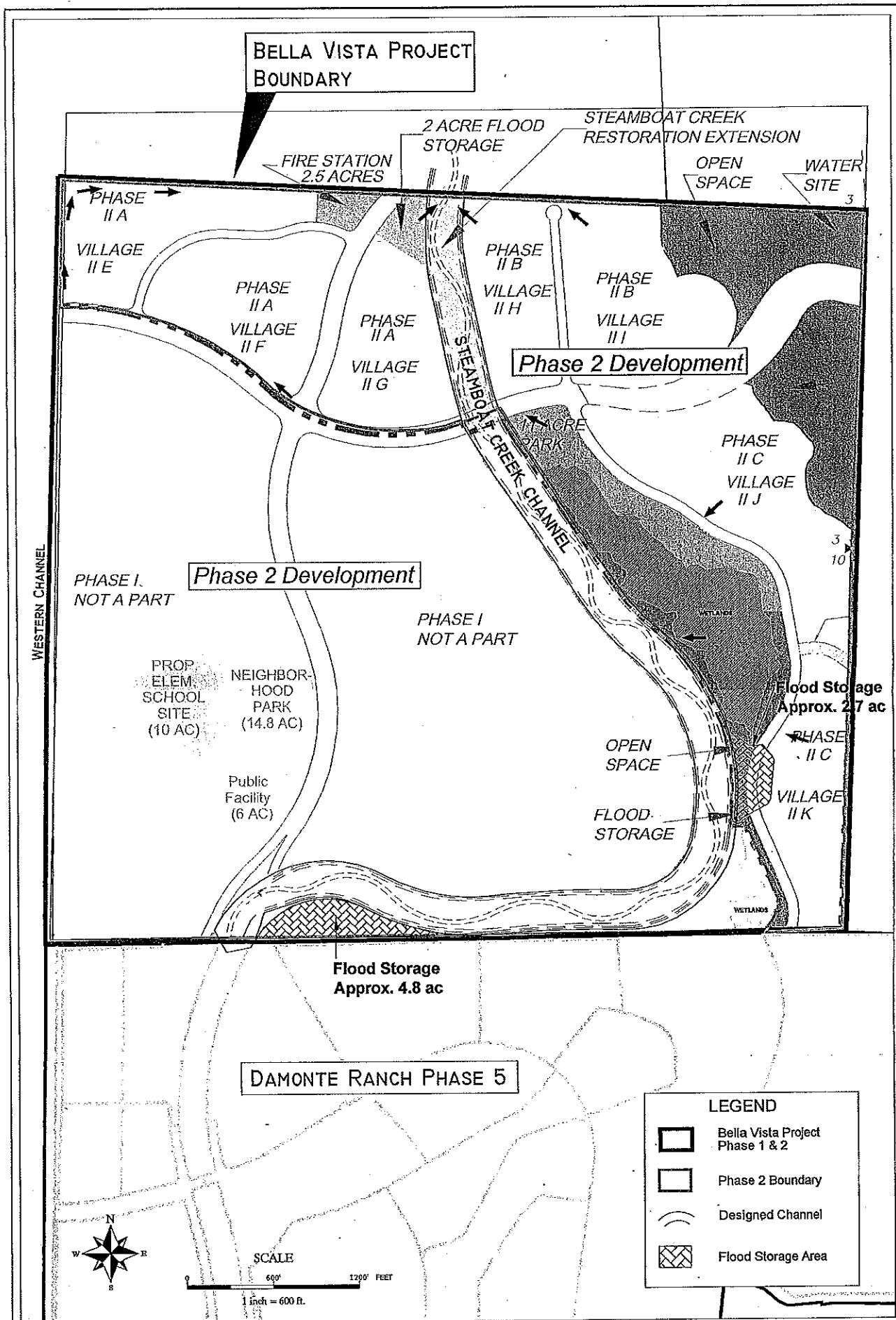
The construction of impervious surfaces within the development will increase the *volume* of runoff. The mitigation of this increase in runoff is to take place in the following way:

On site mitigation both phases can be achieved by retention in the two parcels shown on Figure 4 and the volume of stormwater which leaves the property will remain at pre-development levels during the 100 year design event (as determined by the Truckee Meadows Flood Management Project). This mitigation includes full retention until the peak volumes of flood flows have receded in the Vista area. The release from the oversized basins will be designed to retain the required volume for a 72-hour period following the peak of the storm. The suggested design of the outlet structures is included in the Plans for Phase 1 currently being reviewed by the City of Reno. Our calculations based upon the conceptual land plan show that about 20 acre-feet of storage for Phase 1 and 4 acre-feet of storage for Phase 2 will be needed for mitigation of the project at its currently proposed density. Full retention areas of the property have been set aside to contain the estimated volume and are shown on figure 3.

The drainages from the east side tributaries will be intercepted in their current configurations by the improved Steamboat Channel. Onsite flow which is generated on Phase 2 is confined to areas north of South Meadows Parkway and east of the improved Steamboat Channel. The concentrated flows from the improved Steamboat Channel will also enter the property to the north in a manner to be determined by agreement between the project developer and the land owner. These concepts are being reviewed and analyzed and will be finalized in detail in the Hydraulic Report which will be prepared for the channel design and the Master Grading and Major Infrastructure Plan discussed earlier in this report.

3.3 Development Phasing Plan

Phase 2 of the project is shown on Figure 4. The northerly 1500 feet of Steamboat Channel will be constructed and the South Meadows Parkway crossing are to be completed as part of the Phase 2. The required flood storage for Phase 2 will be near the northerly boundary line.



4.0 HYDROLOGIC ANALYSES

Hydrologic analyses for the flood control concept development for the Bella Vista Ranch Project were performed using the Army Corps of Engineers HEC 1 program and the approved master plans for the Damonte and Double Diamond Projects. The hydrologic models for these projects were developed by Nimbus Engineers using locally accepted parameters and are the basis of the flood control infrastructure which has been constructed upstream of the project and for the future improvements which are planned. These models are the current effective FEMA models, which were approved by the City of Reno and Washoe County and submitted to and approved by FEMA, with a number of CLOMRs and LOMRs for the two developments. The results of the models prepared for the preliminary designs are included on a CD in Appendix A of this report. Figure 5 is the hydrologic work map which displays the regional basin configuration used in the model.

Steamboat Creek entering the Bella Vista site from the south currently sheet flows from the south to the north contributing 5972 cfs. North of the property line, after combining with the flows from the Double Diamond Regional Detention Basin and the east side tributaries the flow is 6362 cfs. Upon the completion of the Damonte Ranch improvements at the south property line 4213cfs will enter through the channel on the western side of the property and 2836cfs will enter through the confined wetlands flow on the eastern portion of the project. For further discussion of the improvements which have been constructed to date on the Damonte Ranch the reader is referred to *Application for Letter of Map Revision for the Double Diamond and Damonte Ranch Regional Flood Control Improvements*, Nimbus Engineers, 2004. For further discussion of the future conditions the reader is referred to *Application for Conditional Letter of Map Revision Damonte/Double Diamond Ranch for Regional Flood Control Improvements*, Nimbus Engineers, 2001.

The Bella Vista Ranch on site flows will increase with the type of development planned. The impact of the increased on-site flows has been assessed using street patterns and site grading plans developed by Places Consulting. Most of those on-site flows will be directed to the restored Steamboat Channel, with lesser amounts being directed to the westerly boundary to the West Side channel. In the central portion of the project, the East West channel will collect flows and direct them to the Steamboat Creek channel. The Steamboat Channel is proposed as a restoration channel and will include features for wetland enhancement and mitigation, as well as water quality improvement, which have been designed in consultation with the Corps of Engineers.

The hydrologic analyses for the Bella Vista Ranch, as noted earlier, have been performed using the Corps of Engineers HEC 1 computer program and current effective models accepted by FEMA. The analyses enclosed are as it is on the ground today, sheetflooding from the south. Also included is an analysis which assumes that the Damonte Ranch Phase V improvements have been approved and built and that Steamboat Creek is contained when it enters the site and the Phase 1 improvements for Bella Vista have been approved and built.

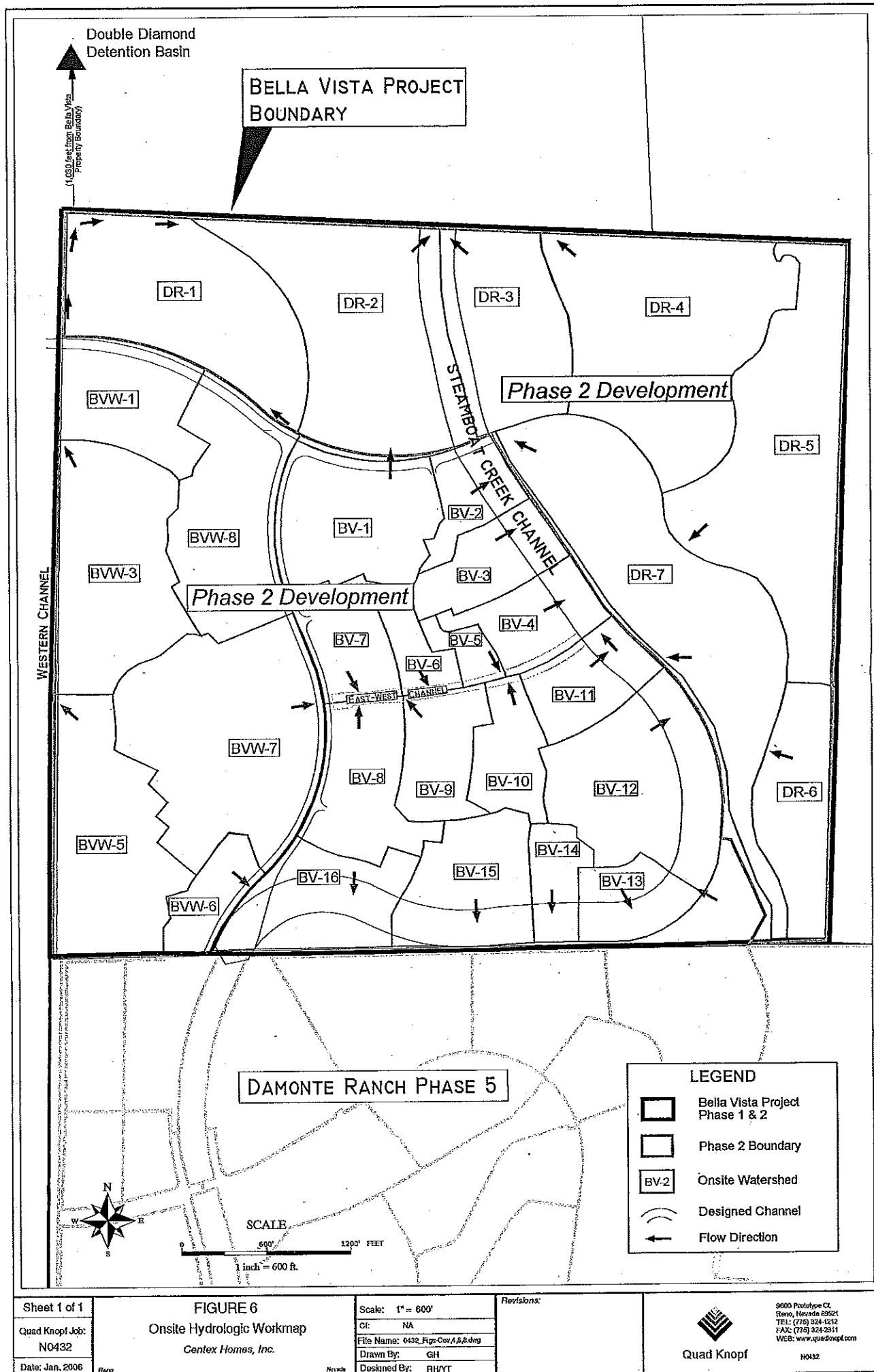
The following table includes descriptions of the models and their file names. These models are included in electronic form on a CD in Appendix A .

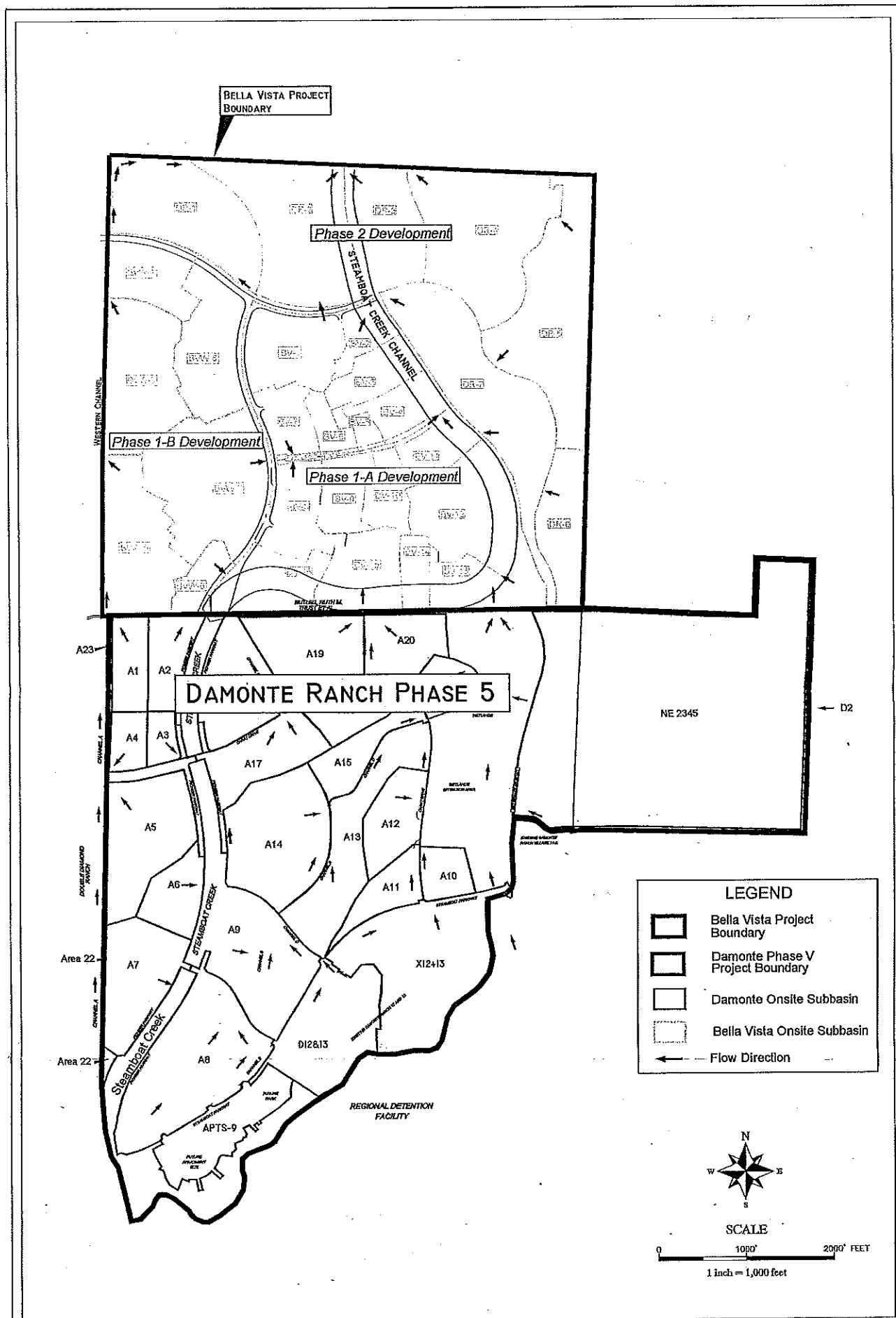
Table 1

Regional Models		Peak flow
0243AB.dat	-Existing Conditions	6362
DRph5.dat	- Existing conditions w/ Damonte V	7165
DRph5+BV1.dat	-Post-development (through Phase 1)	7022
DRph5+BV2.dat	-Post-development (through Phase 2)	7057
Onsite Volume Models:		Volume
BV72UND.dat	-Existing conditions	101 ac-ft
BV72DEV1.dat	-Post-development (through Phase1)	121 ac-ft
BV72DEV2.dat	-Post-development (through Phase 2)	125 ac-ft

4.1 On-site Hydrologic Analysis

Earlier discussion in this document focused on the overall development. Figures 6,7, and 8 show the project layout and the sub-watersheds used in the on-site analysis, the configuration of the Damonte V project used in this analysis and the soils map used to develop the curve numbers for the analysis. The on site hydrologic analysis was performed using the Corps of Engineers HEC-1 computer program. On-site basins generally drain to the relocated Steamboat channel. Table 2 sets forth the parameters which were used in the HEC-1 model; times of concentration were determined to be the minimum (10 minutes) based upon the formulas in the *Hydrologic Criteria and Drainage Design Manual*, therefore they are not listed.





Sheet 1 of 1

Quad Knopf Job:
N0432

Date: Jan. 2000

Drawn

FIGURE 7
Damonte Onsite Subbasin Map
Bella Vista Ranch
Centex Homes

Approved

Scale: 1" = 1,000'

Ck: NA

File Name: 0432_Plot_Damonte Onsite.dwg

Drawn By: GH

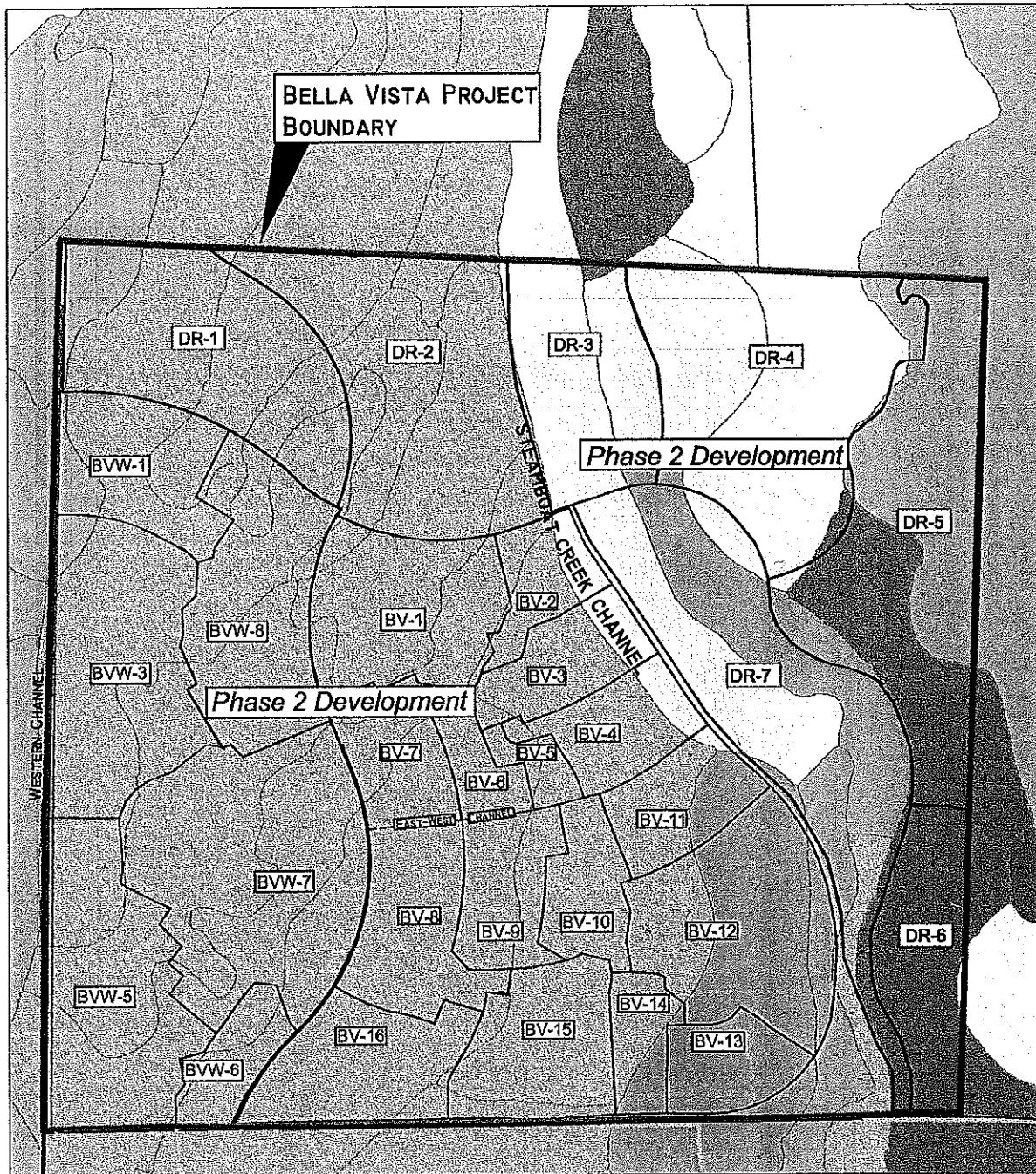
Designed By: DW

Revisions:

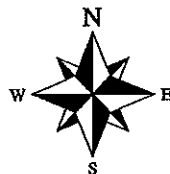


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SCALE
0 1000' 2000 FEET
1 inch = 1000 ft.



LEGEND

Project Boundary

Onsite Watershed

Soil Hydrologic Groups

Group A

Group B

Group C

Group D

Figure 8
Soils Map
Bella Vista Phase 1 & 2

Quad Knopf Job #N0432
File: 0432_Figs-Cov,4,6,8.dwg

Centex Homes

Date: Jan 2006



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N0432

Table 2 On-site Watershed Parameters

Sub-basin ID	Area (acres)	Area (mi ²)	CN Pre- Development	CN Post- Development
DR-1	33.92	0.053	74	86
DR-2	26.24	0.041	74	90
DR-3	18.56	0.029	74	90
DR-4	44.80	0.070	74	75
DR-5	65.92	0.103	74	78
DR-6	18.56	0.029	74	87
DR-7	61.44	0.096	74	49

Modeling for existing conditions, as presented in the effective FEMA models, produces a flow of 6362 cfs at the north end of the Bella Vista Ranch Project when the onsite flows are combined with the 5972 cfs sheet flow coming from the Damonte Ranch Project. Damonte Ranch V is proposed to channelize Steamboat Creek and the Westside Channel to the Bella Vista Ranch south property line. With that development the flows entering Bella Vista will be 4213cfs in the channel and 2836cfs from the confined wetland flow on the eastern side of the property.

This modeling is presented to demonstrate the impacts of the development which will need to be mitigated, either because of increase in peak flows which would require detention, or increase in the volume of runoff which will require flood storage to be developed. An area within the development have been reserved for flood storage and/or peak flow detention. The increase in peak flows from the on-site development are approximately 44 cfs, considering only Phase 1 and 2 developments. The increase in on site peak flows however does not increase the overall peak flow leaving the project. If the increase in on site peak flow is detained, it will add to the off site peak flows which enter and leave the site after the runoff from the on site basins and the peak at the Huffaker Narrows will be increased. Increase in the volume of flow will be mitigated and this volume mitigation will also serve as detention. The final design of the flood storage will be incorporated into the channel design and be submitted in conjunction with the Master Grading and Major Infrastructure Plan.

5.0 HYDRAULIC ANALYSES

A HEC RAS model has been developed of the proposed relocation of Steamboat Creek in order to demonstrate that the channel is physically feasible and that the velocities will remain low enough to achieve the goals of improved riparian vegetation and wetlands enhancement. The model will be refined and updated as final design plans are developed to incorporate freeboard requirements and to include storm drainage inlets and confluence configurations for the east side tributaries and flows entering in the southwest

corner from the Damonte wetlands flows. Figure 9 shows the channel alignment and cross section location for the RAS analysis. HEC-RAS analysis for the existing natural channels in the East side is included. Preliminary designs of these channels for developed conditions are also provided.

5.1 Hydraulic Analysis of the Steamboat Creek channel

The channel that is proposed for Steamboat Creek is compatible with the goals of the Steamboat Creek restoration plan and has been developed in consultation with the U.S. Army Corps of Engineers and the wetland scientists for the project. The channel will convey the western flows to the east to combine with the flows from the Damonte wetlands and then continue to the north in the alignment of the historic Steamboat Creek channel. The Phase 1 portion of the channel slope varies from 0.0016 to 0.0018 ft/ft. Phase 2 will continue downstream with a channel slope of .0016 ft/ft and have a water surface top width of approximately 240 ft. All velocities calculated are non-erosive.

A low flow channel is incorporated into the preliminary design. See typical section on Figure 9. The channel has a capacity of approximately 25 to 30 cfs. This low flow channel has been sized and configured as requested by the Corps of Engineers during review of the 404 Permit application for channel relocation. The final low flow design will incorporate point bars which are periodically flooded to enhance the wetland mitigation. These enhancements to the low flow channel do not affect the performance of the larger channel and are not analyzed herein. The Corps of Engineers preferred depth for the channel will make it extremely likely that the channel will be constructed in some portions of the ground water. Consultation with the Nevada Department of Environmental Protection has been done. The department has no current objection to the channel intercepting groundwater flow. It is felt that any effects to the water table will be localized and will be similar to the effect of the current Steamboat channel. Soil testing within the proposed alignment of the channel is currently underway and soil and water samples will be tested.

The restored Steamboat Channel has been designed to connect to the channel proposed for the Damonte V development. As noted earlier, the preliminary design has been developed in consultation with the project's wetlands consultant and the Corps of Engineers Reno Office. The alignment and cross sections of the channel are in conformance with the Steamboat Creek Restoration Plan which is the locally accepted and preferred standard for improvements to the Creek and its associated floodplains. The preliminary design presented here has been submitted to the Corps of Engineers as the basis of a request for a 404 Permit from the Corps which is required under the Clean Water Act.

A Corps of Engineers HEC RAS model was prepared for the channel design and is included in Appendix A. The model was developed with generally accepted parameters for an earthen channel. The designed channel will not have velocities which exceed 5 feet per second and the curvature of the channel conforms to standards set forth in the

Hydrologic Criteria and Drainage Design Manual. The final design of the channel will be developed in conjunction with the Master Grading Plan in order to assure that the channel has proper freeboard.

The preliminary design of the channel shown in this report, presumes that the Damonte V channel Bella Vista Phase 2 portion of the channel will be built prior to the Bella Vista Phase 2 portion of the channel. If the Damonte channel is not built in a timely manner, the design of the Bella Vista channel will be modified to include the capture of the sheet flow which exists in that area presently. Site specific surveying is being obtained in order to develop the spreading structure which will be needed at the channel outlet. The design for that structure will be included in the Hydraulic Analysis report for the channel.

5.2 East Side Channels

HEC-RAS analysis for the existing natural channels in the East side is included (see Appendix B). Preliminary designs of these channels for developed conditions have been developed based upon analysis of channel size and velocity using the Manning Equation (see Table 3). Loose rip-rap lined channel is used. Location and cross section of these channels are given in Figure 10.

Table 3 Preliminary Design of East Side Channels (Developed Conditions)

Channel Name	Discharge (cfs)	Manning's n	Longitudinal Slope (ft/ft)	Side slope	Bottom Width (ft)	Flow Depth (ft)
South Channel	91	0.04	0.03	2H:1V	6	1.51
Mid Channel	10	0.04	0.03	2H:1V	2	0.73
Far North Channel	138	0.04	0.05	2H:1V	10	1.29

6.0 CONCLUSIONS AND RECOMMENDATIONS

The Bella Vista Ranch project will create a project which is compatible with surrounding developments and will meet all requirements for the safe handling of drainage and flood flows as set forth in City ordinance and standards. The analyses which are provided herein have been developed to provide a framework for orderly development of the project and for the design of the needed drainage and flood control features. The submittal of an Application for a Conditional Letter of Map Revision (CLOMR) will be prepared after approval of the Master Plan. The approval of the CLOMR by FEMA will assure that the project will be removed from the 100 year floodplain

Final design of each tentative map and its associated infrastructure, ie storm drains, channels, culverts and flood storage facilities should be evaluated to determine that the projects and facilities will not alter the overall framework for the project. If it is found necessary to deviate from this Master Plan, a revised Master Plan should be developed for review and approval by the City of Reno.

The Flood Storage Ordinance is a new concept within the Truckee Meadows and prior to the final design of the Flood Mitigation features, the City and the project developer should agree upon the responsibilities for maintenance and operation of the facilities. It is our recommendation that the city give serious consideration to Alternative 2 in Section 3.2. This alternative will allow the project to proceed while providing time for the City and the other governments in the region to determine the best way to achieve their goals of maintaining the flood storage and safeguarding the flood control project.

Appendix B-1
CLOMR Letter from FEMA



Federal Emergency Management Agency

Washington, D.C. 20472

AUG 08 2007

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

IN REPLY REFER TO:
Case No.: 07-09-1007R

The Honorable Robert Cashell
Mayor, City of Reno
P.O. Box 1900
Reno, NV 89505

Community: City of Reno, NV
Community No.: 320020

104

Dear Mayor Cashell:

This responds to a request that the Department of Homeland Security's Federal Emergency Management Agency (FEMA) comment on the effects that a proposed project would have on the effective Flood Insurance Rate Map (FIRM) and Flood Insurance Study (FIS) report for Washoe County, Nevada and Incorporated Areas (the effective FIRM and FIS report for your community), in accordance with Part 65 of the National Flood Insurance Program (NFIP) regulations. In a letter dated March 13, 2007, Mr. Ralph M. Hogoboom, P.E., Senior Engineer, Quad Knopf, requested that FEMA evaluate the effects along Steamboat Creek that updated topographic information; proposed grading; a proposed channel from approximately 6,800 feet upstream of Short Lane to approximately 2,400 feet downstream of the confluence with Whites Creek Branch 3 (confluence); seven proposed 12-foot by 8-foot box culverts and one proposed 12-foot by 10-foot box culvert to be located approximately 3,200 feet downstream of the confluence; eight proposed 12-foot by 8-foot box culverts and one proposed 12-foot by 10-foot box culvert under Carat Drive, approximately 7,800 feet downstream of the confluence; and two proposed storage basins, Basin 1 and Basin 3, to be located approximately 9,500 feet downstream of the confluence and approximately 9,200 feet upstream of Short Lane, respectively, would have on the flood hazard information shown on the effective FIRM and FIS report. The proposed project reach will extend along Steamboat Creek from approximately 5,700 feet upstream of Short Lane to approximately 2,400 feet downstream of the confluence. Although the proposed area of revision is shown on the effective FIRM and FIS report as in the unincorporated areas of Washoe County, this entire area has been annexed by the City of Reno.

All data required to complete our review of this request for a Conditional Letter of Map Revision (CLOMR) were submitted with letters from Mr. Hogoboom.

We reviewed the submitted data and the data used to prepare the effective FIRM for your community and determined that the proposed project meets the minimum floodplain management criteria of the NFIP. We believe that, if the proposed project is constructed as shown on the plans entitled "Steamboat Creek Restoration Grading Plans," prepared by Odyssey Engineering, Inc., dated October 13, 2007, and "Steamboat Channel Bella Vista Ranch," prepared by Quad Knopf, dated March 12, 2007, and as described in the submitted report entitled "Application for Conditional Letter of Map Revision (CLOMR),

Damonte Ranch Phase V and Bella Vista Ranch Phase I," prepared by Quad Knopf, dated March 13, 2007, and the data listed below are received, a revision to the FIRM would be warranted.

As a result of the proposed project and updated topographic information, the width of the Special Flood Hazard Area (SFHA), the area that would be inundated by the base (1-percent-annual-chance) flood, will increase in some areas and decrease in other areas compared to the effective SFHA width along Steamboat Creek from approximately 5,700 feet upstream of Short Lane to approximately 2,400 feet downstream of the confluence. The maximum increase in SFHA width, approximately 300 feet, will occur approximately 9,400 feet upstream of Short Lane. The maximum decrease in SFHA width, approximately 4,500 feet, will occur approximately 7,700 feet upstream of Short Lane. In addition, an SFHA designated Zone A, with no Base Flood Elevations (BFEs) determined, along Steamboat Creek will be redesignated Zone AE, with BFEs determined, from approximately 6,800 feet upstream of Short Lane to approximately 2,400 feet downstream of the confluence. The entire base flood along Steamboat Creek will be contained in the proposed channel and culverts from approximately 6,800 feet upstream of Short Lane to approximately 2,400 feet downstream of the confluence..

Upon completion of the project, your community may submit the data listed below and request that we make a final determination on revising the effective FIRM and FIS report.

- Detailed application and certification forms must be used for requesting final revisions to the maps. Therefore, when the map revision request for the area covered by this letter is submitted, Form 1, entitled "Overview & Concurrence Form," must be included. (A copy of this form is enclosed.)
- The detailed application and certification forms listed below may be required if as-built conditions differ from the conceptual plans. If required, please submit new forms (copies of which are enclosed) or annotated copies of the previously submitted forms showing the revised information.

Form 2, entitled "Riverine Hydrology & Hydraulics Form"

Form 3, entitled "Riverine Structures Form"

Hydraulic analyses, for as-built conditions, of the base flood, together with a topographic work map showing the revised floodplain boundaries, must be submitted with Form 2.

- Effective October 30, 2005, FEMA revised the fee schedule for reviewing and processing requests for conditional and final modifications to published flood information and maps. In accordance with this schedule, the current fee for this map revision request is \$4,000 and must be received before we can begin processing the request. Please note, however, that the fee schedule is subject to change, and requesters are required to submit the fee in effect at the time of the submittal. Payment of this fee shall be made in the form of a check or money order, made payable in

U.S. funds to the National Flood Insurance Program, or by credit card (Visa or MasterCard only). The payment, along with the revision application, must be forwarded to the following address:

FEMA National Service Provider
3601 Eisenhower Avenue
Alexandria, VA 22304-6425

- As-built plans, certified by a registered professional engineer, of all proposed project elements
- As-built plans, certified by a registered professional engineer, and hydraulic analyses for all proposed channels located within the Damonte Ranch and Bella Vista Ranch developments
- Community acknowledgment of the map revision request
- An officially adopted maintenance and operation plan for the onsite storage Basins 1 and 3. This plan, which may be in the form of a written statement from the community Chief Executive Officer, an ordinance, or other legislation, must describe the nature of the maintenance activities, the frequency with which they will be performed, and the title of the local community official who will be responsible for ensuring that the maintenance activities are accomplished.

After receiving appropriate documentation to show that the project has been completed, FEMA will initiate a revision to the FIRM and FIS report. Because BFEs would be established as a result of the project, a 90-day appeal period would be initiated, during which community officials and interested persons may appeal the BFEs based on scientific or technical data.

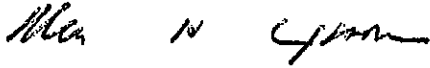
The basis of this CLOMR is, in whole or in part, a channel-modification/culvert project. NFIP regulations, as cited in Paragraph 60.3(b)(7), require that communities assure that the flood-carrying capacity within the altered or relocated portion of any watercourse is maintained. This provision is incorporated into your community's existing floodplain management regulations. Consequently, the ultimate responsibility for maintenance of the modified channel and culverts rests with your community.

This CLOMR is based on minimum floodplain management criteria established under the NFIP. Your community is responsible for approving all floodplain development and for ensuring all necessary permits required by Federal or State law have been received. State, county, and community officials, based on knowledge of local conditions and in the interest of safety, may set higher standards for construction in the SFHA. If the State, county, or community has adopted more restrictive or comprehensive floodplain management criteria, these criteria take precedence over the minimum NFIP criteria.

If you have any questions regarding floodplain management regulations for your community or the NFIP in general, please contact the Consultation Coordination Officer (CCO) for your community. Information on the CCO for your community may be obtained by calling the Director, Federal Insurance and Mitigation

Division of FEMA in Oakland, California, at (510) 627-7175. If you have any questions regarding this CLOMR, please call our Map Assistance Center, toll free, at 1-877-FEMA MAP (1-877-336-2627).

Sincerely,



Max H. Yuan, P.E., Project Engineer
Engineering Management Section
Mitigation Division

For: William R. Blanton Jr., CFM, Chief
Engineering Management Section
Mitigation Division

Enclosures

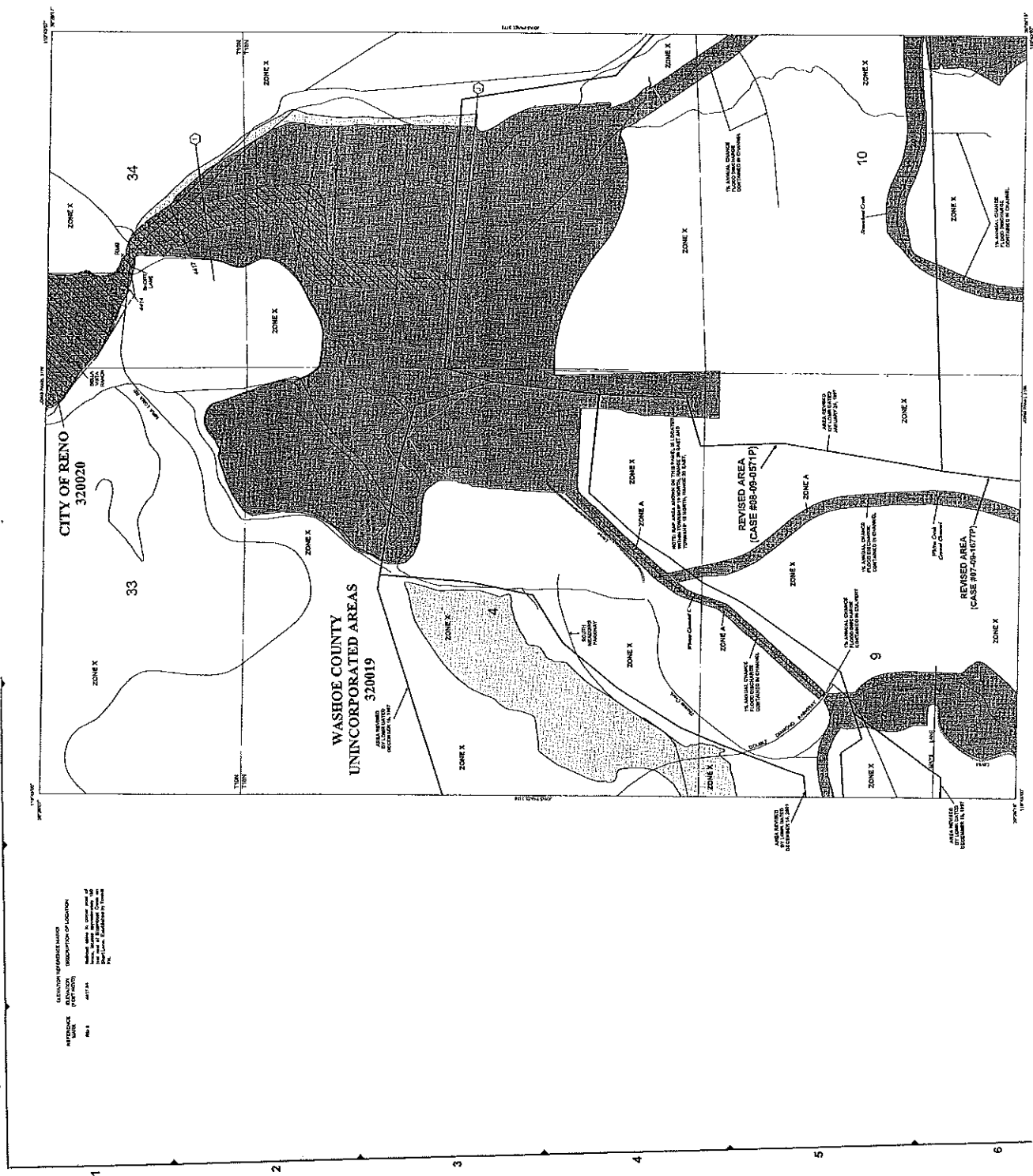
cc: Ms. Kerri Williams-Lanza, P.E., CFM
Senior Civil Engineer
City of Reno

Mr. Neil Mann
Public Works Director
City of Reno

Mr. Kimball Corbridge, P.E., CFM
Washoe County

Mr. Ralph M. Hogoboom, P.E.
Senior Engineer
Quad Knopf

Mr. Ronald C. Hoops, P.L.S.
Odyssey Engineering Inc.

[illegible][illegible][illegible]

Appendix B-2
LOMR Letter from FEMA



Federal Emergency Management Agency

Washington, D.C. 20472

APR 25 2008

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

The Honorable Robert Cashell
Mayor, City of Reno
P.O. Box 1900
Reno, NV 89505

IN REPLY REFER TO:

Case No.: 08-09-0571P
Follows Conditional
Case No.: 07-09-1007R
Community Name: City of Reno, NV
Community No.: 320020
Effective Date of
This Revision: APR 25 2008

Dear Mayor Cashell:

The Flood Insurance Rate Map for your community has been revised by this Letter of Map Revision (LOMR). Please use the enclosed annotated map panel(s) revised by this LOMR for floodplain management purposes and for all flood insurance policies and renewals issued in your community.

Additional documents are enclosed which provide information regarding this LOMR. Please see the List of Enclosures below to determine which documents are included. Other attachments specific to this request may be included as referenced in the Determination Document. If you have any questions regarding floodplain management regulations for your community or the National Flood Insurance Program (NFIP) in general, please contact the Consultation Coordination Officer for your community. If you have any technical questions regarding this LOMR, please contact the Director, Mitigation Division of the Department of Homeland Security's Federal Emergency Management Agency (FEMA) in Oakland, California, at (510) 627-7175, or the FEMA Map Assistance Center toll free at 1-877-336-2627 (1-877-FEMA MAP). Additional information about the NFIP is available on our website at <http://www.fema.gov/nfip>.

Sincerely,

Craig S. Kennedy, CFM, Program Specialist
Engineering Management Branch
Mitigation Directorate

For: William R. Blanton Jr., CFM, Chief
Engineering Management Branch
Mitigation Directorate

List of Enclosures:

Letter of Map Revision Determination Document
Annotated Flood Insurance Rate Map

cc: Ms. Kerri Williams-Lanza, P.E., CFM
Senior Civil Engineer
City of Reno

Mr. Hoss Khatami
Branch Manager
Quad Knopf

Mr. Neil Mann
Director
Public Works
City of Reno

Mr. Kimball Corbridge, P.E., CFM
Washoe County

Follows Conditional Case No.: 07-09-1007R



Federal Emergency Management Agency

Washington, D.C. 20472

APR 29 2008

CITY OF RENO
Public Works Department

LETTER OF MAP REVISION DETERMINATION DOCUMENT

COMMUNITY AND REVISION INFORMATION		PROJECT DESCRIPTION	BASIS OF REQUEST
COMMUNITY	City of Reno Washoe County Nevada	CHANNELIZATION GRADING	HYDRAULIC ANALYSIS HYDROLOGIC ANALYSIS NEW TOPOGRAPHIC DATA
	COMMUNITY NO.: 320020		
IDENTIFIER	Bella Vista Ranch Phase I	APPROXIMATE LATITUDE & LONGITUDE: 39.447, -119.719 SOURCE: USGS QUADRANGLE DATUM: NAD 83	
ANNOTATED MAPPING ENCLOSURES		ANNOTATED STUDY ENCLOSURES	
TYPE: FIRM*	NO.: 32031C3178 E DATE: September 30, 1994	NO REVISION TO THE FLOOD INSURANCE STUDY REPORT	
TYPE: FIRM*	NO.: 32031C3179 E DATE: September 30, 1994		

Enclosures reflect changes to flooding sources affected by this revision.

* FIRM - Flood Insurance Rate Map; ** FBFM - Flood Boundary and Floodway Map; *** FFBM - Flood Hazard Boundary Map

FLOODING SOURCE(S) & REVISED REACH(ES)

Steamboat Creek - from approximately 6,800 feet upstream of Short Lane to approximately 8,900 feet downstream of the confluence with Whites Creek Branch 3

SUMMARY OF REVISIONS

Flooding Source	Effective Flooding	Revised Flooding	Increases	Decreases
Steamboat Creek	Zone A	Zone A	YES	YES
	Zone A	Zone A (contained)	NONE	YES
	Zone A	Contained	NONE	YES

* BFEs - Base Flood Elevations

DETERMINATION

This document provides the determination from the Department of Homeland Security's Federal Emergency Management Agency (FEMA) regarding a request for a Letter of Map Revision (LOMR) for the area described above. Using the information submitted, we have determined that a revision to the flood hazards depicted in the Flood Insurance Study (FIS) report and/or National Flood Insurance Program (NFIP) map is warranted. This document revises the effective NFIP map, as indicated in the attached documentation. Please use the enclosed annotated map panels revised by this LOMR for floodplain management purposes and for all flood insurance policies and renewals in your community.

This determination is based on the flood data presently available. The enclosed documents provide additional information regarding this determination. If you have any questions about this document, please contact the FEMA Map Assistance Center toll free at 1-877-336-2627 (1-877-FEMA MAP) or by letter addressed to the LOMR Depot, 3601 Eisenhower Avenue, Alexandria, VA 22304. Additional information about the NFIP is available on our website at <http://www.fema.gov/nfip>.

Craig S. Kennedy

Craig S. Kennedy, CFM, Program Specialist
Engineering Management Branch
Mitigation Directorate

112553 10.3.1.08090571 102-I-C

APR 25 2008

APR 25 2008



Federal Emergency Management Agency

Washington, D.C. 20472

LETTER OF MAP REVISION DETERMINATION DOCUMENT (CONTINUED)

COMMUNITY INFORMATION

APPLICABLE NFIP REGULATIONS/COMMUNITY OBLIGATION

We have made this determination pursuant to Section 206 of the Flood Disaster Protection Act of 1973 (P.L. 93-234) and in accordance with the National Flood Insurance Act of 1968, as amended (Title XIII of the Housing and Urban Development Act of 1968, P.L. 90-448), 42 U.S.C. 4001-4128, and 44 CFR Part 65. Pursuant to Section 1361 of the National Flood Insurance Act of 1968, as amended, communities participating in the NFIP are required to adopt and enforce floodplain management regulations that meet or exceed NFIP criteria. These criteria, including adoption of the FIS report and FIRM, and the modifications made by this LOMR, are the minimum requirements for continued NFIP participation and do not supersede more stringent State/Commonwealth or local requirements to which the regulations apply.

NFIP regulations Subparagraph 60.3(b)(7) requires communities to ensure that the flood-carrying capacity within the altered or relocated portion of any watercourse is maintained. This provision is incorporated into your community's existing floodplain management ordinances; therefore, responsibility for maintenance of the altered or relocated watercourse, including any related appurtenances such as bridges, culverts, and other drainage structures, rests with your community. We may request that your community submit a description and schedule of maintenance activities necessary to ensure this requirement.

COMMUNITY REMINDERS

We based this determination on the 1-percent-annual-chance discharges computed in the submitted hydrologic model. Future development of projects upstream could cause increased discharges, which could cause increased flood hazards. A comprehensive restudy of your community's flood hazards would consider the cumulative effects of development on discharges and could, therefore, indicate that greater flood hazards exist in this area.

Your community must regulate all proposed floodplain development and ensure that permits required by Federal and/or State/Commonwealth law have been obtained. State/Commonwealth or community officials, based on knowledge of local conditions and in the interest of safety, may set higher standards for construction or may limit development in floodplain areas. If your State/Commonwealth or community has adopted more restrictive or comprehensive floodplain management criteria, those criteria take precedence over the minimum NFIP requirements.

We will not print and distribute this LOMR to primary users, such as local insurance agents or mortgage lenders; instead, the community will serve as a repository for the new data. We encourage you to disseminate the information in this LOMR by preparing a news release for publication in your community's newspaper that describes the revision and explains how your community will provide the data and help interpret the NFIP maps. In that way, interested persons, such as property owners, insurance agents, and mortgage lenders, can benefit from the information.

This determination is based on the flood data presently available. The enclosed documents provide additional information regarding this determination. If you have any questions about this document, please contact the FEMA Map Assistance Center toll free at 1-877-336-2627 (1-877-FEMA MAP) or by letter addressed to the LOMR Depot, 3601 Eisenhower Avenue, Alexandria, VA 22304. Additional information about the NFIP is available on our website at <http://www.fema.gov/nfip>.

Craig S. Kennedy, CFM, Program Specialist
Engineering Management Branch
Mitigation Directorate

112553 10.3.1.08090571 102-I-C



Federal Emergency Management Agency
Washington, D.C. 20472

**LETTER OF MAP REVISION
DETERMINATION DOCUMENT (CONTINUED)**

We have designated a Consultation Coordination Officer (CCO) to assist your community. The CCO will be the primary liaison between your community and FEMA. For information regarding your CCO, please contact:

Ms. Sally M. Ziolkowski
Director, Mitigation Division
Federal Emergency Management Agency, Region IX
1111 Broadway Street, Suite 1200
Oakland, CA 94607-4052
(510) 627-7175

STATUS OF THE COMMUNITY NFIP MAPS

We are processing a revised countywide FIRM and FIS report for Washoe County; therefore, we will not physically revise and republish the FIRM and FIS report for your community to incorporate the modifications made by this LOMR at this time. Preliminary copies of the revised countywide FIRM and FIS report were submitted to your community for review on September 28, 2007. We will incorporate the modifications made by this LOMR into the revised FIRM and FIS report before they become effective.

Although the area of revision is shown on the effective FIRM as within the unincorporated areas of Washoe County, the City of Reno has annexed the entire area of revision.

This determination is based on the flood data presently available. The enclosed documents provide additional information regarding this determination. If you have any questions about this document, please contact the FEMA Map Assistance Center toll free at 1-877-336-2627 (1-877-FEMA MAP) or by letter addressed to the LOMR Depot, 3601 Eisenhower Avenue, Alexandria, VA 22304. Additional information about the NFIP is available on our website at <http://www.fema.gov/nfip>.

Craig S. Kennedy, CFM, Program Specialist
Engineering Management Branch
Mitigation Directorate



Federal Emergency Management Agency
Washington, D.C. 20472

LETTER OF MAP REVISION
DETERMINATION DOCUMENT (CONTINUED)

PUBLIC NOTIFICATION OF REVISION

This revision is effective as of the date of this letter. Any requests to review or alter this determination should be made within 30 days and must be based on scientific or technical data.

This determination is based on the flood data presently available. The enclosed documents provide additional information regarding this determination. If you have any questions about this document, please contact the FEMA Map Assistance Center toll free at 1-877-336-2627 (1-877-FEMA MAP) or by letter addressed to the LOMR Depot, 3601 Eisenhower Avenue, Alexandria, VA 22304. Additional Information about the NFIP is available on our website at <http://www.fema.gov/nfip>.

A handwritten signature in black ink, appearing to read "Craig S. Kennedy".

Craig S. Kennedy, CFM, Program Specialist
Engineering Management Branch
Mitigation Directorate

Legend

-  1% annual chance (100-Year) Floodplain
-  1% annual chance (100-Year) Floodway
-  0.2% annual chance (500-Year) Floodplain



APPROXIMATE SCALE IN FEET

500 250 0 500

NATIONAL FLOOD INSURANCE PROGRAM

FIRM
FLOOD INSURANCE RATE MAP

WASHOE COUNTY,
NEVADA
AND INCORPORATED AREAS

PANEL 3179 OF 3350
(SEE MAP INDEX FOR PANELS NOT PRINTED)

CONTAINS:

COMMUNITY

NUMBER PANEL SUFFIX

WASHOE COUNTY
UNINCORPORATED AREAS 320019 3179 E

REVISED TO
REFLECT LOMR
EFFECTIVE APR 25 2008

MAP NUMBER
32031C3179 E

EFFECTIVE DATE:
SEPTEMBER 30, 1994



Federal Emergency Management Agency

3
REVISED AREA
(CASE #08-09-0571P)

2
ZONE X

ZONE X

ZONE A

Steamboat
Creek

1% ANNUAL CHANCE
FLOOD DISCHARGE
CONTAINED IN CHANNEL

ZONE X

MIRALOMA ROAD

ZONE X

11

REVISED AREA
(CASE #07-09-1677P)

ZONE X

ZONE A

ZONE X

WASHOE COUNTY
UNINCORPORATED AREAS
320019

JOINS PANEL 3187

JOINS PANEL 3178

Legend

-  1% annual chance (100-Year) Floodplain
-  1% annual chance (100-Year) Floodway
-  0.2% annual chance (500-Year) Floodplain



APPROXIMATE SCALE IN FEET

500 250 0 500

NATIONAL FLOOD INSURANCE PROGRAM

FIRM
FLOOD INSURANCE RATE MAP

WASHOE COUNTY,
NEVADA
AND INCORPORATED AREAS

PANEL 3187 OF 3350
(SEE MAP INDEX FOR PANELS NOT PRINTED)

CONTAINS:

COMMUNITY

NUMBER PANEL SUFFIX

WASHOE COUNTY,
UNINCORPORATED AREAS 320019 3187 E

MAP NUMBER
32031C3187 E

EFFECTIVE DATE:
SEPTEMBER 30, 1994



Federal Emergency Management Agency

REVISED TO
REFLECT LOMR
EFFECTIVE APR 25 2008

JOINS PANEL 3179

ZONE X

REVISED AREA
(CASE #07-09-1677P)

11

WASHOE COUNTY
UNINCORPORATED AREAS
320019

MIRALOMA

ROAD

ZONE X

AREA REVISED
BY LOMR DATED
SEPTEMBER 28, 2005

14

1% ANNUAL CHANCE
FLOOD DISCHARGE
CONTAINED IN CULVERT

15

ZONE X

ZONE A

ZONE A

JOINS PANEL 3186

Appendix C
Wetland Mitigation Plan – Gibson & Skordal

BELLA VISTA RANCH - CENTEX HOMES

WETLAND MITIGATION AND MONITORING PLAN

Reno, Nevada

February 2005
Revised August 2005

[Signature]
8/28/05

Prepared For:

CENTEX HOMES
10509 Professional Circle, Suite 200
Reno, Nevada 89521

Prepared By:

GIBSON & SKORDAL, LLC
Wetland Consultants
2277 Fair Oaks Blvd., Suite 105
Sacramento, California 95825

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Chapter 1

Summary

The purpose of this document is to describe the mitigation measures proposed as compensation for the potential impacts to wetlands and other waters of the United States that would result from construction of the proposed Bella Vista Ranch-Centex Homes project. This plan was prepared with the objective of complying with the Corps of Engineers' and Environmental Protection Agency's guidance on compensatory mitigation projects for aquatic resource impacts under the Corps Regulatory program pursuant to Section 404 of the Clean Water Act and Section 10 of the Rivers and Harbors Act as set forth in Regulatory Guidance letter No. 02-2. It is also intended to conform with the overall goals and recommendations set forth in Washoe-Storey Conservation District's Steamboat Creek Restoration Plan.

The overall format of this plan follows the Sacramento District Corps of Engineers' Habitat Mitigation and Monitoring Proposal Guidelines dated October 25, 1996.

The proposed project is a 364-acre mixed use residential development. The development would result in the loss of 4.623 acres of waters of the United States comprised of 3.060 acres of perennial creek channel (Steamboat Creek) and 1.562 acres of ephemeral to intermittent creek channels. To mitigate for these impacts, Steamboat Creek would be restored to its approximate original alignment. The restored stream corridor would consist of a meandering low flow channel with adjacent wetlands located on point bars occurring on the inside of meanders. The restored

Steamboat Creek natural corridor will be approximately 55.6 acres comprised of 5.3 acres of low flow channel, four acres of adjacent wetlands and 46.3 acres of uplands.

Chapter 2

Project Description

Responsible Parties

This mitigation plan is being proposed by Centex Homes as part of their Department of the Army Permit Application for a Section 404 permit to authorize fill in waters of the United States associated with the Bella Vista Ranch project described below. As the permittee, Centex Homes will be responsible for implementing the provisions of this mitigation plan.

Location of Project

The project area is approximately 364 acres in size. It is located east of the Double Diamond Ranch development and north of the Damonte Ranch development in Reno, Nevada. It is within Sections 21 and 28, Township 20 North and Range 20 East. The coordinates for the center of the property are latitude North 39°, 34', 44" and longitude West 119°, 44' 16". Sheet 1 of 9 of the project plans attached as Appendix A is a vicinity map showing major roads and surrounding developments.

Description of the Proposed Project

The proposed project is a 364-acre mixed use residential development. Approximately 275.5 acres will consist of four residential neighborhoods with attendant, roads, sidewalks,

landscaping and other attendant features. Five acres are proposed for commercial uses. Eleven acres are proposed for public facilities including neighborhood parks, smaller parks and a police sub-station. A total of 17.2 acres are proposed for major roadways (Pioneer Parkway). The remainder (55.6 acres) would be the proposed Steamboat Creek Natural Corridor. Table 1 is a summary of the various proposed uses and their respective areas.

Table 1. Proposed Land Use

<i>Proposed Use</i>		<i>Area (acres)</i>	<i>Density (du/acre)</i>	<i>% of Total</i>
Residential	Neighborhood A	60.9	4.1 - 4.9	-
	Neighborhood B	77.0	7.8 - 8.4	-
	Neighborhood C	55.7	3.6 - 5.0	-
	Neighborhood D	81.9	4.9 - 6.1	-
	Subtotal Residential	275.5	-	75.8
Commercial		5.0	-	1.4
Public Facilities	Neighborhood Parks	5.0	-	-
	Small Parks	5.0	-	-
	Police Station	1.0	-	-
	Subtotal Public Facilities	11.0	-	3.0
Major Roadways	Pioneer Parkway	17.2	-	4.6
Steamboat Creek Natural Corridor		55.6	-	15.2
Grand Total		± 364.3	-	100

Chapter 3

Description of Impacts to Aquatic Resources

Existing Resources

General Site Characteristics

The project area consists of the southern 364 acres of the 1,700-acre Bella Vista Ranch. The topography of the project area is primarily flat to gently sloping terrain except the extreme eastern portion which is steeper terrain. The elevations within the study area range from 4,420' to 4,595' feet and 4,420' to 4,445' on the valley floor.

Historically, the hydrology of the project has been extensively modified to facilitate flood irrigation for grazing. Many years ago, Steamboat Creek was channelized and relocated to the west. Based on topography and soils, it appears that Steamboat Creek originally flowed south to north along the eastern one-third of the valley. The current alignment of Steamboat Creek is along a low topographic ridge that forms an east-west drainage divide. The ground elevation along the current alignment of Steamboat is four to five feet higher than its original alignment.

A second irrigation canal was constructed along the eastern side of the valley. This ditch was constructed to transport irrigation water north from Damonte Ranch. This ditch was also connected to Steamboat by a ditch aligned along the southern boundary of Bella Vista Ranch. The irrigation ditch along the eastern side of the

valley was historically constructed at an elevation several feet above the toe of the eastern slope. This irrigation ditch may have intercepted groundwater flow contributing to saline seep wetlands that occur along the eastern edge of the valley. Countering this effect somewhat, are several small breaches in this ditch that allow irrigation waters to escape from the ditch.

A total of 15 soil mapping units occur within the study area for the jurisdictional delineation. Table 2 provides a list of these soil mapping units along with their status as hydric soils. Figure 1 is a map showing the location of soil mapping units. Two of the soils (Cradlebaugh loam and Voltaire loam, strongly alkaline) are listed as hydric soils. Six of the soil mapping units that are not listed as hydric commonly have inclusions of hydric soils within the mapping unit.

Table 2. Soil Mapping Units Within the Study Area *

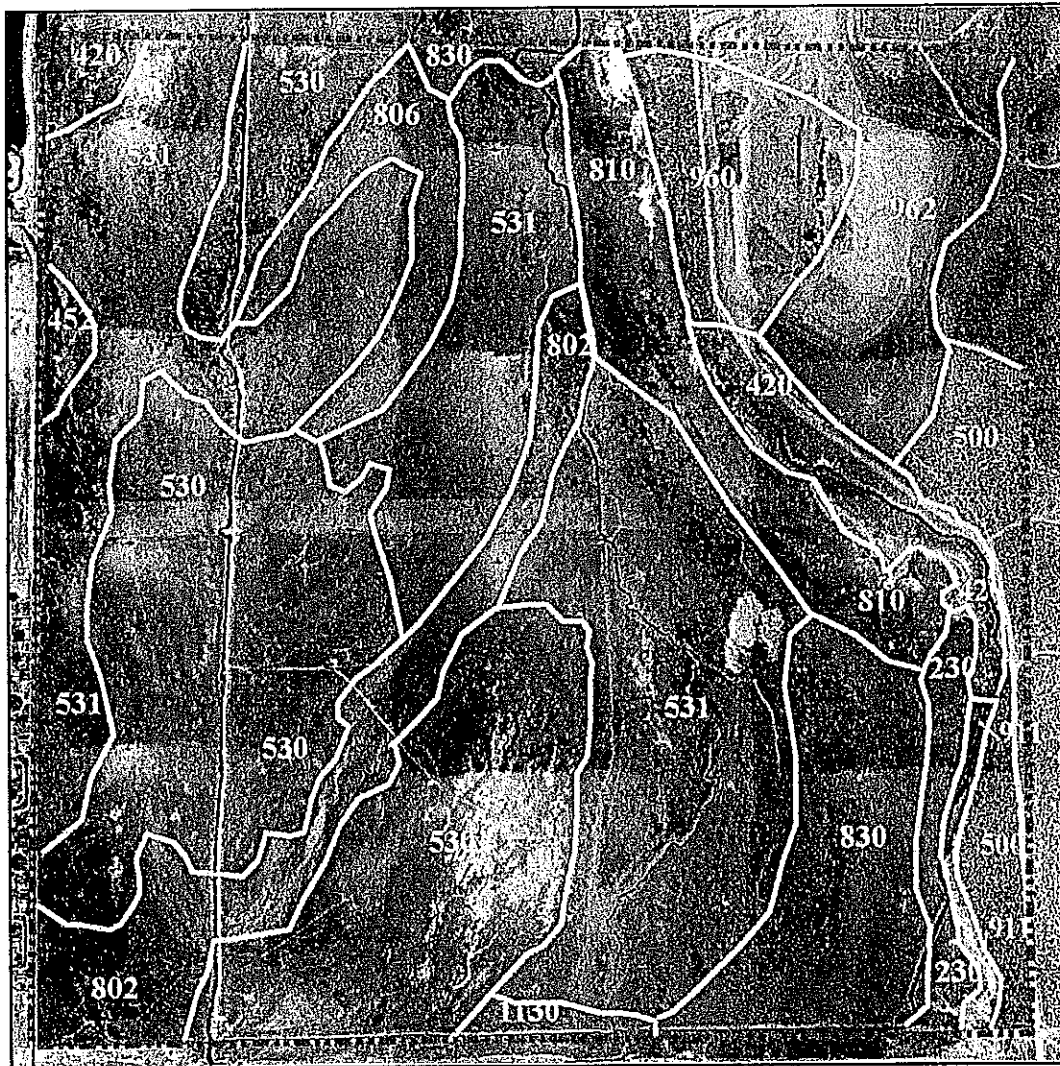
<i>Map Ref. No.</i>	<i>Soil Name</i>	<i>Hydric? **</i>	<i>Hydric Inclusions?</i>
230	Cradlebaugh loam	Yes	Yes
420	Godecke loamy sand	No	Yes
430	Sagouspe variant loamy very fine sand	No	Yes
452	Voltaire loam, strongly saline	Yes	Yes
500	Mottsville sand	No	No
530	Sagouspe sand	No	Yes
531	Sagouspe fine sandy loam	No	No
802	Truckee silt loam, strongly saline	No	Yes
806	Truckee sandy loam, sandy substratum	No	No
810	Rose Creek fine sandy loam, drained	No	No
830	Fettic silty clay loam	No	Yes
911	Vamp silt loam, strongly alkaline	No	Yes
960	Kayo stony sandy loam	No	No
962	Kayo very stony sandy loam	No	No
1130	Dithod sandy loam	No	No

* Soil Conservation Service 1983

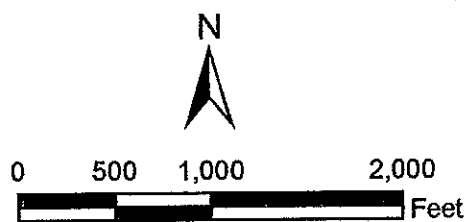
** Soil Conservation Service 1991.

A preliminary geotechnical investigation of the study area for the jurisdictional delineation was completed by Black Eagle

FIGURE 1
SOIL MAPPING UNITS



SOURCE: Adapted from Soil Survey of Washoe County, Nevada, South Part



Legend

- Study Area Boundary
- Soil Unit Mapping Boundary

Consulting, Inc. The report for this investigation provides detailed descriptions of soil profiles, depth to groundwater and soil chemistry for selected locations (Black Eagle Consulting, Inc. 2004).

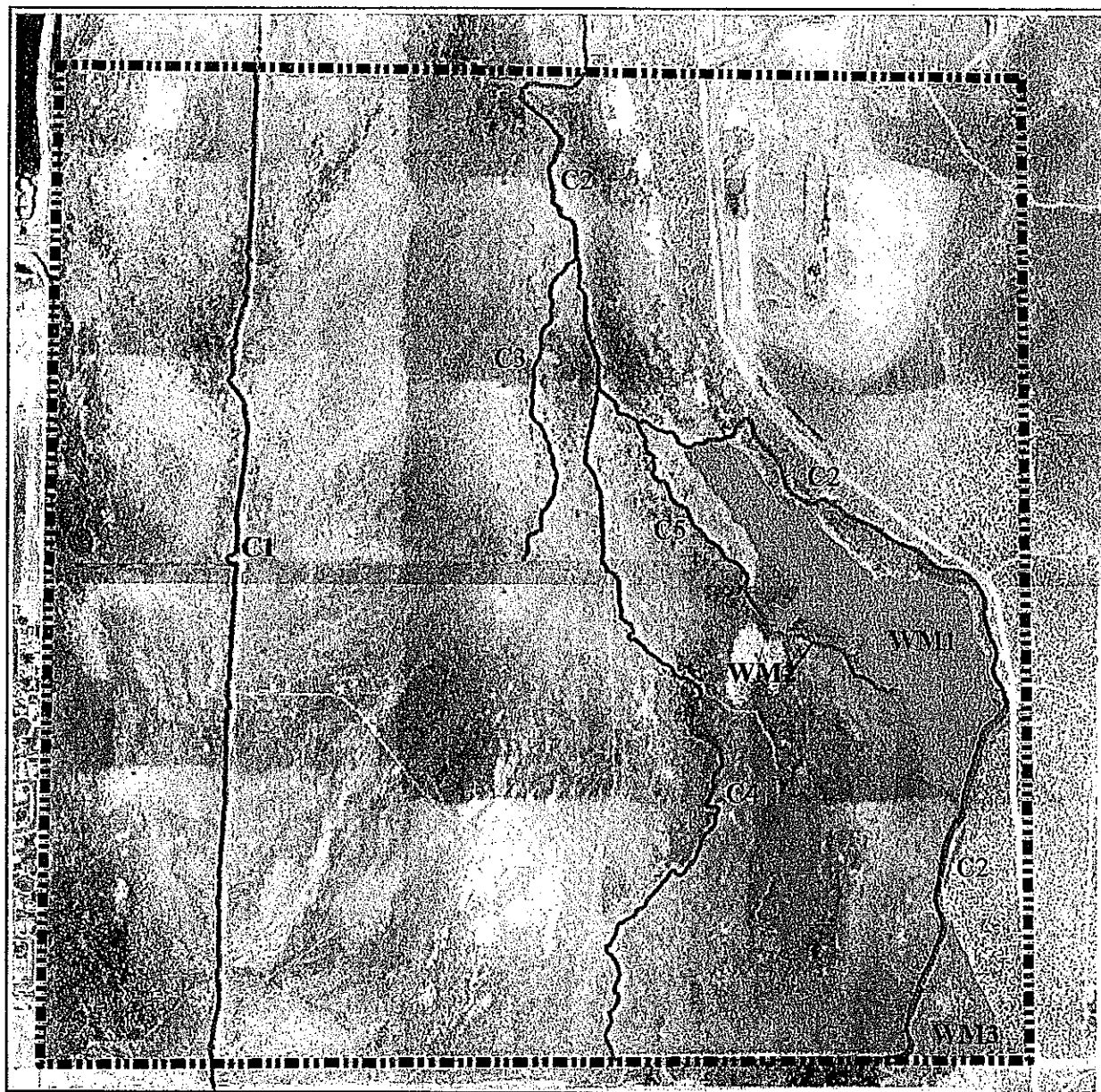
The dominant plant community occurring within the project area is characteristic of upland rangeland. Since cessation of irrigation, whitetop (*Lepidium latifolium*) has established itself as the dominant species. Other common plants within the study area include rabbitbrush (*Chrysothamnus nauseosus*), big sagebrush (*Artemisia tridentata*), greasewood (*Sarcobatus vermiculatus*), cheatgrass (*Bromus tectorum*), saltgrass (*Distichlis spicata*), and flaxweed (*Descurainia sophia*).

Aquatic Resources

A delineation of jurisdictional waters of the United States was completed by Gibson & Skordal, LLC in 2004. This delineation encompassed a larger area than what is now the project area. The delineation encompassed a 642-acre area whereas the project area is approximately 364 acres. Figure 2 is a delineation map depicting the location and extent of waters of the United States within the original study area as delineated by Gibson & Skordal, LLC. Table 3 lists each of the delineated waters/wetlands, by type, and their areas for the original delineation and Table 4 lists the areas of delineated waters and wetlands within the project area.

FIGURE 2

EXISTING WATERS OF THE UNITED STATES



Legend

-  Wet Meadow (WM)
-  Channel (C)
-  Delineation Study Area Boundary



GIBSON & SKORDAL, LLC
WETLANDS CONSULTANTS
2277 Fair Oaks Blvd., Suite 395
Sacramento, CA 95825
(916) 569-1830

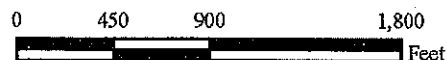


Table 3. Summary of Delineated Areas

<i>Reference Number</i>	<i>Wetland/Waters Type</i>	<i>Area (Acres)</i>
WM1	Wet Meadow	20.274
WM2	Wet Meadow	0.273
WM3	Wet Meadow	2.387
C1	Channel, Steamboat Creek	3.061
C2	Channel	1.082
C3	Channel	0.334
C4	Channel	0.816
C5	Channel	0.412
Total		28.639

Table 4. Summary of Waters/Wetlands within the Project Area

<i>Reference Number</i>	<i>Wetland/Waters Type</i>	<i>Area (Acres)</i>
C1	Channel, Steamboat Creek	3.061
C2	Channel	0.541
C3	Channel	0.334
C4	Channel	0.816
C5	Channel	0.412
Total		5.164

The following is a description of the wetlands and other waters of the United States existing within the project area as well as those within the study area of the wetland delineation.

The waters of the United States within the project area consist of perennial and intermittent to ephemeral channels. Wetlands within the project area are limited to relatively small areas within these channels. Steamboat Creek (C1) and C2 are perennial creeks while C3, C4 and C5 are intermittent to ephemeral drainage courses. Both Steamboat Creek and C2 are channelized watercourses that were constructed to act as conduits for irrigation water. Both lack meanders and are deeply incised with steep banks. Because of these steep banks, wetland vegetation is sparse and limited in extent. There is no woody riparian vegetation associated with either of these water courses.

Both Steamboat Creek and C2 are located at elevated topographic positions to facilitate the distribution of irrigation water. While both of these water courses carry water from naturally occurring sources including runoff and groundwater in the spring and early summer, their hydrology is dominated by irrigation water during the summer and early fall.

C3, C4, and C5 are intermittent to ephemeral channels that experience flows only in the spring during periods of precipitation and/or groundwater levels are high. Wetland vegetation is generally lacking in these channels. No woody riparian vegetation is associated with these channels. Prior to the cessation of flood irrigation practices, these channels transported irrigation return flows and would have experienced intermittent flow through much of the irrigation season ($\pm$ March – October). The jurisdictional width of C3, C4 and C5 average approximately eight feet.

WM1, WM2 and WM3 are alkaline wet meadows. These wetlands occur on convex sloping topography along the eastern edge of the valley bottom immediately east of the eastern project area boundary. The hydrology of these wetlands is dependent on naturally occurring groundwater seepage supplemented by

infiltration and some minor overland flow from irrigation water derived from C2. The naturally occurring groundwater is alkaline. This alkaline groundwater is diluted somewhat by the infiltration and overland flow from C2.

There are two distinct plant communities comprising these wet meadows. The predominant plant community in the eastern portions of WM1 and WM3 is dominated by halophytes. The dominant species is saltgrass. Other common species include pickleweed (*Salicornia* sp.), saltmarsh bird's-beak (*Cordylanthus maritimus*) and seaside arrow-grass (*Triglochin maritima*). The plant community in the western portions of WM1, WM2, and all of WM3 is more typical of fresh to slightly brackish environments with Baltic rush (*Juncus balticus*) being the dominant species. Cattails (*Typha* sp.) are common in those areas directly influenced by overland flow escaping from C2.

Impacts

The proposed project will result in the elimination of all existing waters of the United States within the project boundaries (except for C2 and restoration of Steamboat Creek to its approximate original alignment. The restored Steamboat Creek will include both a low-water channel as well as adjacent wetlands. The restored Steamboat Creek Natural Corridor will also include an upland floodplain and buffer.

The proposed project will result in the loss of approximately 4.623⁶²³ acres of waters of the United States. This total is entirely comprised of channels. No wetlands will be directly impacted by the proposed project. Approximately 3.061 acres of perennial creek channel and 1.562 acres of intermittent to ephemeral drainages channels will be relocated. The restored Steamboat Creek will have six acres of low water channel habitat and three acres of adjacent wetlands.

A detailed description of the restored Steamboat Creek Corridor is provided in Chapter 4 – Proposed Mitigation Measures.

Chapter 4

Proposed Mitigation Measures

Goals and Objectives

Given the highly modified and degraded nature of the waterways and wetlands within the project area, several opportunities to restore functions and values to wetlands and other waters of the United States were identified during project planning. Based on these opportunities, the following planning objectives and mitigation objectives were established.

- Restore Steamboat Creek consistent with the Steamboat Creek Restoration Plan. To the extent possible, the alignment of the restored channel of Steamboat Creek should approximate its approximate original alignment.
- To the maximum extent possible, all preserved and restored wetlands and other waters of the United States should be located within contiguous open space corridors with upland buffers of at least 50 feet in width. The restored channel of Steamboat Creek should be aligned adjacent to existing wetlands along the eastern side of the valley.
- The number of road crossings over the preserved and restored wetlands and other waters of the United States should be minimized to the maximum extent practicable.

- To the extent practicable, locate public use areas such as schools and parks adjacent to the preserved and restored wetlands and other waters of the United States.

There are several logistical constraints that limit the extent to which the above design objectives can be satisfied. The following is a discussion of these constraints

- The transportation system for the project must tie into existing transportation infrastructure. There are two regional arterials that the project will need to be designed to connect with. They are Pioneer Parkway and South Meadows Parkway. Pioneer Parkway is a north-south arterial that currently is planned to connect from Damonte on the south at the approximate point where the current alignment of Steamboat Creek enters the project area. South Meadows Parkway connects with the project area in its northwest corner.
- The project design must accommodate all flows entering from the south (Damonte Ranch). Currently, flows enter the property in the southwest in Steamboat Creek and in the southeast from a wetland mitigation area located in the northeast corner of Damonte Ranch, flowing into C2. The design will need to accommodate both low and flood flows. At the current time, irrigation water from C2 is released through several small breaches into WM1 and subsurface seepage from C2 contributes groundwater to WM1. The current areal extent of WM1 is maintained, at least in part, by this water. The project should be designed to maintain this hydrologic input to maintain the existing hydrology of WM1.

Steamboat Creek Restoration Plan

The Steamboat Creek Restoration Plan (SCRCP) is a community-wide, cooperative plan prepared for the Washoe-Storey Conservation District to restore, enhance and preserve the

Steamboat Creek Watershed (Codega 2000). The stated goals of this plan are as follows.

- Improve the water quality of Steamboat Creek.
- Restore Steamboat Creek to a sustainable condition.
- Re-establish wildlife habitat appropriate for individual reaches.
- Re-establish vegetation appropriate for individual stream reaches.
- Combine stream restoration with recreation in areas designated for public access.

The SCRP provides specific design recommendations for the restoration of various reaches of Steamboat Creek. It also prioritizes the need for restoring these various reaches. The project area lies within the middle of the Bella Vista reach. This reach is assigned a moderate to high restoration priority based on particulate pollution and chemical constituents.

The SCRP classifies the existing channels according to the Rosgen Classification System (RCS) and makes recommendations for restored channels within various reaches. The RCS classifies channels according to their channel morphology and by bed material types. Based on morphology, the channel is assigned a letter designation A through G. The channel is then assigned a number 1 through 6 based on the bed material type (e.g. bedrock, sand, gravel, etc.).

Within the Bella Vista reach, F and G type channels are predominant. F and G type channels are deeply incised, low gradient channels with steep banks located in highly weathered, alluvial or colluvial soils. They are unstable and subject to bank and/or bed erosion. The SCRP acknowledges that these channel types have little meaning since the entire reach is artificial. The

recommended restored channel is a C5 type. C type channels are slightly entrenched within broad valleys associated with floodplains. The bed material is sand. C type channels have well defined meanders and are considerably more stable than F and G type channels.

The SCRP recommends two alternatives for restoring this reach of Steamboat Creek. The first alternative would involve attempting to restore the creek within its current alignment. The second alternative would involve relocating Steamboat east to approximate its original alignment.

Since the first alternative would use the current alignment of Steamboat Creek, it would not result in true restoration. This alignment will always be perched above the valley floor and will require more intensive long-term maintenance.

Because of the above and following coordination with the Corps of Engineers, the second alternative (restore Steamboat Creek to its approximate original alignment) was selected as the preferred restoration alternative.

Description of Proposed Mitigation Measures

Design

For the reasons stated above, the SCRP restoration alternative selected for this project is to relocate Steamboat Creek to approximately its original alignment using a C5 type channel as the model for the restored channel.

In order to return Steamboat Creek to its approximate original alignment, the channel will have to connect the current alignment of Steamboat Creek with the original alignment. Based on the topography of the project area as well as the soils, it appears that the original channel was located approximately 2,000 to 3,000 feet east of its current alignment. The point at which Steamboat Creek

enters the property from the south cannot be moved more than about 350 feet to the east because the alignment south of the project area is dictated by the Damonte Ranch project which is currently under construction. Therefore, in order to relocate the channel to its original alignment at the southern border of the project area, the channel must first be aligned parallel to the southern border of the property boundary to a point where it approximates the original alignment, whereupon it can then turn north.

The project plans in Appendix A include drawings showing the proposed restored channel of Steamboat Creek in plan and cross-section views.

The Steamboat Creek Natural Corridor (SCNC) will begin at a point approximately 313 feet east of the point where Steamboat Creek currently enters the project area. The SCNC will follow the southern boundary of the project area to a point due west of WM1. The SCNC will then turn north and parallel the eastern project boundary to the northern boundary of the project area. The SCNC will average 240 feet in width. The total area of the SCNC will be 55.6 acres. The SCNC has been designed to accommodate the estimated post-project 100-year storm event.

The restored channel of Steamboat Creek will be a C5 type channel that will meander within the SCNC. The low water channel has been designed to carry the estimated average summer flow of Steamboat Creek. This is the estimated amount of water that normally flows in Steamboat Creek during the summer irrigation season. The total length of the low flow channel will be approximately 7,700 feet. It will have an average bottom width of 9 feet, an average top width of 21 feet and an average depth of 2 feet. The total area of low flow channel will be approximately 5.3 acres.

Significant portions of the low flow channel are expected to be open water but emergent marsh vegetation is also expected to establish along its edges and in backwater areas. Plant species

expected to establish within the low flow channel include hardstem bulrush (*Scirpus acutus*) and cattails.

The restored channel of Steamboat Creek has been designed so that there will be wetlands located on the point bars occurring at the inside of meanders. The wetlands will be located on low terraces that are slightly higher than the bed of the low flow channel. The point bar wetlands are designed so that they are at or above the summer low flow elevation but below the estimated average annual high water elevation. Approximately four acres of wetlands will be constructed.

The point bar wetlands have been designed to have the hydrologic characteristics of herbaceous and/or woody riparian wetlands existing at other locations along Steamboat Creek. They have been designed so that they will flood only during higher spring flows. While they will be inundated for a month or less under normal conditions, their elevation is such that they should experience saturated soils within the upper root zone for a significant portion of the growing season during normal runoff years.

This hydrology regime is more conducive to the establishment of vegetation typically found in wet meadows and riparian meadows as opposed to the emergent marsh vegetation that is expected to establish within the low flow channel. Plant species expected to establish within this zone include Baltic rush, fox-tail barley, (*Hordeum jubatum*), meadow barley (*Hordeum brachyantherum*), tufted hairgrass (*Deschampsia cespitosa*) and various bluegrasses (*Poa juncifolia*, *P. palustris*).

In addition to hydrology, the plant communities that establish within the low water channel and point bar wetlands will be significantly influenced by soil and groundwater chemistry. The soils and associated groundwater of the Truckee meadows are high in certain naturally occurring salts. Both boron and arsenic are present in concentrations that can influence the type of plant communities that can be successfully established. Chemical testing within the project area revealed soil boron concentrations ranging from 5.3 to 81 mg/l (ppm) in groundwater and 25 to 140

mg/l (ppm) in the soil (Black Eagle Consulting, Inc. 2004). These levels of boron are similar to levels that have been observed on adjacent developments (Double Diamond and Damonte Ranches).

The effect of high salt levels has been and will continue to be moderated by irrigation waters which dilute and/or reduce the concentrations near the surface. Where concentrations are relatively high, the plant communities that establish will be more typical of alkaline wetlands. Species such as salt grass, Mediterranean barley (*Hordeum hystrix*), pickleweed, salt marsh birds-beak and seaside arrow-grass are likely to become dominant in these areas over time. Also, the high boron levels are expected to preclude successful establishment of woody riparian vegetation.

Implementation

The SCNC will be constructed "in the dry" to minimize temporary degradation of water quality from construction activities.

Construction of the entire SCNC including the restored stream channel with its adjacent wetlands will be completed prior to routing the water of Steamboat Creek into the restored channel.

All of the topsoil within the alignment of the SCNC will be excavated to an approximate depth of 0.75 foot. The salvaged topsoil will be stockpiled separately from other excavated material. The corridor will then be excavated to its approximate finish contours minus ± 0.75 foot. The salvaged topsoil will then be applied evenly across the corridor and finish graded.

The salvaged and reapplied topsoil will be the primary source of inoculum for revegetation of the creek, adjacent wetlands and floodplain. The area from which the soil is being salvaged was flood irrigated for many years and contains the seeds, roots and rhizomes of many hydrophytes. Normally use of this topsoil would be the most efficient method of revegetating the restored channel and disturbed uplands. However, a combination of seeding and plugging will also be used to promote a more rapid establishment of desired species and discourage the establishment

of undesirable species such as tall whitetop (see Appendix B – Revegetation Plan).

Construction of the SCNC will take place during the fall and winter low flow period. Prior to rerouting water from the existing channel of Steamboat Creek into the restored channel, a series of temporary sediment traps will be constructed within the restored channel. The sediment traps will be constructed of 3/4-inch drain rock spaced 750 feet apart in the low flow channel of relocated Steamboat Creek. The drain rock plug will allow the flow to pass through at slower velocities than the first flow channel by itself thereby creating a pool upstream of the plug in which the sediments will drop out.

The plugs will remain in place after stabilization has taken place. The first major flow will remove them and redistribute the rock downstream. The flowline of the realigned channel varies from 0.0016 ft/ft to 0.0018 ft/ft. The first flow channel meanders from side to side across the 200 wide main channel bottom, therefore its slope will be less than the main channel. Drawings of the sediment filters and placement are shown schematically in Appendix C. As stated previously, the construction of the restored channel will be conducted "in the dry". An earth plug will be maintained between the upstream beginning of the restored channel and the existing channel of Steamboat Creek until construction of the restored channel is completed. Prior to releasing water into the restored channel, a sandbag plug will be constructed in the earth plug. The sandbag plug will have V-shaped opening in the center for the diverted flow to pass through (see Appendix C).

After completion of the sandbag plug the earthen plug will be incrementally removed allowing gradually increased flow into the restored channel. At the point when removing sandbags does not increase the flow, a sandbag plug will be placed in the existing channel Steamboat Creek immediately downstream of the diversion. The construction of the plug will continue by adding sandbags until the entire flow is diverted to the new channel. After the entire flow has been diverted, the existing channel will be filled in downstream of the diversion.

Once the relocated channel has been completed on the Damonte Development to the south and the flow diverted to the realigned channel, the plugs in the existing and temporary channel on Bella Vista Development will be removed and the old channel filled. A noxious weed control program will be implemented during the mitigation monitoring period. The purpose of this program will be to limit the establishment of noxious weeds within the SCNC. Appendix B contains a copy of the Revegetation Plan which outlines measures to control noxious weeds. The intent of this program will be to reduce the presence of certain non-native weed species that can retard the development of desired plant communities and reduce wetland function or value. It is not intended to limit all non-native species. Examples of species of concern are white-top pepper-grass (*Lepidium latifolium*), purple loosestrife (*Lythrum salicaria*), several species of nightshade (*Solanum* sp.) and salt cedar (*Tamarix ramosissima*). Weed control measures will include hand removal and application of herbicides. Where herbicides are used, they will be limited to those that have been approved for use in or near water (see Appendix B).

Implementation Schedule

The construction of the SCNC will be initiated prior to or concurrent with initiation of construction activities for the project. It will be completed no later than December 31 of that same year.

Responsibilities for Implementing Plan

The permittee (Centex Homes) will be responsible for constructing the proposed mitigation.

Chapter 5

Monitoring

Performance Standards

The following performance standards will be used to assess the relative success of the constructed wetlands.

The restored Steamboat Creek shall be approximately 7,700 feet in length. It shall contain approximately 5.3 acres of summer low flow channel, four acres of wetlands, and 46.3 acres of upland floodplain buffer.

A minimum of 3.2 acres of the total four acres of wetlands constructed must meet or exceed the following criteria for three consecutive years without human intervention.

- The constructed wetlands will exhibit a minimum of one primary or two secondary indicators of wetland hydrology (Environmental Laboratory 1987).
- The plant communities in the constructed wetlands will be dominated by species with a wetland indicator status of facultative, facultative wetland or obligate (Reed 1988).
- The plant communities in the constructed wetlands (other than areas of open water) will be dominated by species commonly found in wetlands adjacent to Steamboat Creek both upstream and downstream of the mitigation area.

- The total vegetative cover in the constructed wetlands (other than areas of open water) will be equal to or greater than 70 percent.

Restrictions and Conditions

In addition to the above performance standards, the Corps of Engineers has required that the following restrictions be complied with as conditions of the permit. Where there are perceived conflicts between the restrictions listed below and other provisions of this plan, these conditions will be overriding.

1. The permittee must obtain written approval from this office prior to making any change or modification to any general or special permit condition.
2. The permittee shall take the actions required to record this permit with the Registrar of Deeds or other appropriate official charged with the responsibility for maintaining records of title to or interest in real property. Proof of this recordation shall be submitted to this office before February 28, 2006. The deed restriction must include a condition that the deed restriction may not be removed without prior written approval from the Corps.
3. The permittee must protect the constructed Steamboat Creek natural corridor (and mitigation site) from human encroachment and disturbance that would environmentally degrade the corridor for at least 30 years from the date of this permit.
4. The permittee must treat all water from stormwater outfalls draining to the Steamboat Creek natural corridor using appropriate Best Management Practices (BMPs) prior to discharging to the low flow channel of Steamboat Creek. Appropriate BMPs include oil and grease separators, trash racks, grassy swales and/or detention basins.

5. The permittee must establish staging areas in an upland area at least 150 feet from the newly constructed Steamboat Creek corridor after corridor construction is completed.
6. The permittee must complete all land clearing and other surface disturbances associated with this permitted activity outside the avian breeding season (from 15 April to 31 July) to avoid destruction of active bird nests (nests with eggs or fledglings) that breed in the area unless a qualified biologist surveys the area prior to construction and verifies that no active nests would be impacted. If the biologist locates active nests at or immediately adjacent to the project site, or if other evidence of nesting is observed, a protective buffer shall be marked with flagging so the nesting area will be avoided to prevent the destruction or disturbance to nests until they are no longer active.
7. The permittee must allow unimpeded passage of a 100-year storm event for all bridge and culverted tributary crossings. Energy dissipaters and / or rip rap aprons must be installed at the downstream end of culverts to prevent increased velocities from causing erosion.
8. This permit authorizes filling approximately 3928 feet of creek segment C2; 1819 feet of creek segment C3; 4445 feet of creek segment C4; and 2243 feet of creek segment C5; it is noted that impacts to C2 and C5 are considered temporary because they line in the constructed creek corridor. The permittee must mitigate for these creek impacts by constructing a new creek corridor as shown on the attached drawings. The corridor must include side slopes (from the top of bank / original ground level to the base of the corridor that do not slope less than 1 horizontal to 3 vertical. The base of the corridor (flood storage area) shall be slightly sloped toward the low flow channel. The low flow channel must be 9-21 feet wide and 2-3 feet deep, sufficient to be near bank-full during normal low flows. The permittee must construct point-bar wetlands adjacent to the low flow channel; the total wetland acreage shall be at least 3.5

acres.

9. The permittee must complete all Steamboat Creek natural corridor construction and initial revegetation within the constructed Steamboat Creek corridor by February 28, 2006.
10. The permittee must assure compliance with the commitments made in mitigation goals. The mitigation goals are described and referenced in Chapter 4 of Mitigation and Monitoring Plan.
11. The permittee must revegetate all disturbed areas within the newly constructed Steamboat Creek corridor per the Wetland Mitigation Design Report prepared by Western Botanical Services, Inc., located in Appendix B of the referenced Mitigation and Monitoring Report.
12. The permittee must assure that low flow channel head cutting does not exceed more than 6 inches deeper than the design grade and that the base of the corridor the bank side slopes are sufficiently stabilized to preclude erosion and sediment deposition in the low flow channel.
13. The permittee must maintain a minimum 50 foot buffer between the wetland adjacent to the newly constructed Steamboat Creek corridor and any development. This buffer zone must be at least 50 feet wide measured from the outer edge of the wetland. The permittee must not construct any permanent structure within this buffer, except pedestrian walkways, bike paths, or fencing. The preferred design is a vegetated buffer zone. A vegetated buffer zone shall be established and maintained.
14. The permittee must stockpile topsoil from within the new Steamboat Creek alignment, particularly from creek segments C2 and C5. At least 6-8 inches of this material must be the top grade at the base of the corridor, excluding the low flow channel, to provide the finished grade.
15. The permittee must monitor the mitigation site for success for

at least five years to begin after the first growing season after fully implementing the mitigation plan. One measure of mitigation success shall be desirable vegetation survival and percent cover for herbaceous plants and at least three consecutive years of growth without artificial manipulation such as irrigation. Desirable plants are native, hydrophytic plants, listed in Appendix B of the referenced Mitigation and Monitoring Plan. In general, the cover of herbaceous species should be at least 40% for the first growing season and shall be at least 60% after the second growing season in all areas within the Steamboat Creek natural corridor, disturbed by construction or planted with native plantings. For herbaceous species, the cover rate shall be more than 70% for three consecutive growing seasons after the second growing season in all disturbed areas to be considered successful. If necessary, additional plantings or on-site modifications may be needed to attain a successful survival rate and plant cover.

16. The permittee must pursue all reasonable efforts for at least ten years (from the date of mitigation planting or project completion or a date) to control non-native invasive species within the newly constructed Steamboat Creek corridor below one plant per any square yard (averaged), except for purple loosestrife (*Lythrum salicaria*), saltcedar/tamarisk (*Tamarix ramosissima*), and Canada thistle (*Cirsium arvense*); there is zero tolerance for these four species. Reasonable efforts include physically pulling the plant, including the complete root mass; cutting of the flowering parts before seeds are produced; applying herbicides to early spring rosettes (young plants); and drying and, if possible, burning plants.
17. The permittee must implement the perennial pepperweed/tall white top (*Lepidium latifolium*), control plan, located in Appendix B of the referenced Mitigation and Monitoring Plan.
18. The annual mitigation monitoring report shall include information on mitigation successes and actions needed to correct deficiencies; compliance with mitigation goals; photographs of representative areas along the newly

constructed Steamboat Creek corridor; a map showing all photo locations and directions the camera was pointing; and vegetative sampling data, including species composition and density within the corridor.

19. The permittee must submit a mitigation monitoring report annually until the mitigation efforts are successful, or annually, thereafter, if mitigation is not successful after five years, until mitigation is certified as successful.
20. The first report must be submitted after the end of the first growing season and contain baseline data and as-built drawings if the project was constructed differently from the drawings included with the authorization. Submit the report and other required documents by December 31 of each year to:

US Army Corps of Engineers
Reno Regulatory Office
300 Booth Street, Room 2103
Reno, Nevada 89509-1361

21. Unless extended by non-compliance, the term for submitting monitoring reports is at least five years after completion of mitigation construction to ensure these areas revegetate as described. The Reno Regulatory Office, Corps of Engineers, Sacramento District, will determine if the mitigation effort was successful; if further actions are needed to bring the project in compliance; and the need for a monitoring report if the reporting term exceeds five years. Monitoring is no longer required when mitigation is certified by this office as successful.
22. Once the compensatory mitigation has been approved as complete and successful, you must not allow further development or human encroachment in the mitigation or buffer area for at least 30 years, except for Corps of Engineers mandated or maintenance activities or low density recreation use or seasonal restrictions if approved by this office. The permittee or a subsequent owner may maintain the site, if

consistent with the (compensatory) mitigation goals, by such activities as control of nuisance mammals, removal of exotic (non-native) or pest plant species, and controlled burning if consistent with the compensatory mitigation goals. The permittee or subsequent owner may not engage in activities in the mitigation area or buffer zone that are considered inconsistent with compensatory mitigation goals, such as removal of vegetation (although minor cosmetic manipulation, such as minor pruning, is acceptable) or alteration of hydrology, or any filling with debris or fill material, except as provided in the referenced Mitigation and Monitoring Plan. Exceptions may be obtained by written approval from the Reno Regulatory Office, Corps of Engineers, Sacramento District.

Monitoring Protocol

The constructed wetlands will be monitored for a period of five years or until all performance criteria have been met for three successive years without human intervention, whichever is longer. The purpose of the monitoring is to assess the relative success of the mitigation as compared to performance criteria and to determine whether remedial actions are necessary to assure the performance criteria are met.

Monitoring of Steamboat Creek and the constructed wetlands will include obtaining quantitative data on their hydrology and plant communities. Photo points will be established to qualitatively monitor trends in the developing plant communities. The areal extent of constructed wetlands will be surveyed annually using GPS technology and/or GIS technology with georeferenced aerial photography.

The monitoring of the hydrology of Steamboat Creek and the constructed wetlands will be emphasized primarily in the first growing season following construction. Staff gages will be installed at selected locations in the restored channel of Steamboat Creek and the constructed wetlands. Sampling will be conducted at a frequency sufficient to document the depth and duration of

inundation within the constructed wetlands. Once the hydrology of the constructed wetlands has been adequately characterized, additional detailed hydrology monitoring will not be conducted over subsequent growing seasons unless specific problems are identified that warrant further monitoring.

Vegetation monitoring will be conducted during each growing season throughout the monitoring period. The plant community in the constructed wetlands will be characterized. Each plant observed will be identified and its relative cover will be recorded. The total cover of all species will also be estimated.

Reporting

The results of each year's monitoring will be compiled into an annual monitoring report. The annual monitoring reports will present all monitoring data, assess the implications of that data, and make recommendations for remedial actions, where warranted. The annual reports will be submitted to the Corps of Engineers not later than December 31st each year.

Responsibilities

The permittee (Centex Homes) will be responsible for implementing all aspects of the monitoring of the constructed mitigation.

Chapter 6

Long-term Maintenance and Management

The mitigation area will be owned and managed by a Home Owners Association (HOA). Prior to deeding the land to the HOA, deed restrictions will be established over the restored Steamboat Creek, the constructed wetlands and their upland buffer. These deed restrictions will limit activities within the mitigation area to those activities beneficial to the restoration, creation and preservation of Steamboat Creek, the constructed wetlands and their adjacent upland buffer.

Once the restored Steamboat Creek and the constructed wetlands have been monitored for the required period and they have met or exceeded all performance criteria for a period of three consecutive years without human intervention, these responsibilities will have been satisfied and the HOA will be responsible for the long-term maintenance of the mitigation area. Long-term maintenance includes those activities necessary to protect the mitigation area from incidental damage and, if such damage does occur, undertake appropriate remedial measures. Normal long-term maintenance activities include maintenance of the trail system and garbage removal. The HOA will fund any and all efforts required under this plan.

Appendix C-1
404 Individual Permit # 200400683

24015-00

DEPARTMENT OF THE ARMY PERMIT

Permittee: Centex Homes

Permit Number: 200400683

Issuing Office: US Army Engineer District, Sacramento

NOTE: The term "you" and its derivatives, as used in this permit, means the permittee or any future transferee. The term "this office" refers to the appropriate district or division office of the Corps of Engineers having jurisdiction over the permitted activity or the appropriate official of that office acting under the authority of the commanding officer.

You are authorized to perform work in accordance with the terms and conditions specified below.

Project Description:

TO place fill material in Steamboat Creek to divert all of its flows into a newly constructed, restored Steamboat Creek corridor. All work is to be completed in accordance with the attached plan, entitled, "Wetland Mitigation and Monitoring Plan."

Project Location:

The project is located in southeast Reno in Sections 3 and 10, Township 18 North, Range 20 East, Washoe County, Nevada on the Steamboat USGS topographic quadrangle.

Permit Conditions:

General Conditions:

1. The time limit for completing the work authorized ends on September 30, 2008. If you find that you need more time to complete the authorized activity, submit your request for a time extension to this office for consideration at least one month before the above date is reached.
2. You must maintain the activity authorized by this permit in good condition and in conformance with the terms and conditions of this permit. You are not relieved of this requirement if you abandon the permitted activity, although you may make a good faith transfer to a third party in compliance with General Condition 4 below. Should you wish to cease to maintain the authorized activity or should you desire to abandon it without a good faith transfer, you must obtain a modification of this permit from this office, which may require restoration of the area.
3. If you discover any previously unknown historic or archeological remains while accomplishing the activity authorized by this permit, you must immediately notify this office of what you have found. We will initiate the Federal and state coordination required to determine if the remains warrant a recovery effort or if the site is eligible for listing in the National Register of Historic Places.
4. If you sell the property associated with this permit, you must obtain the signature of the new owner in the space provided and forward a copy of the permit to this office to validate the transfer of this authorization.

5. If a conditioned water quality certification has been issued for your project, you must comply with the conditions specified in the certification as special conditions to this permit. For your convenience, a copy of the certification is attached if it contains such conditions.

6. You must allow representatives from this office to inspect the authorized activity at any time deemed necessary to ensure that it is being or has been accomplished in accordance with the terms and conditions of your permit.

Special Conditions:

The document entitled "Wetland Mitigation and Monitoring Plan," dated Revised August 2005, is incorporated by reference as a condition of this authorization. This plan includes mitigation location and design drawings, vegetation plans, including target species to be planted, and final success criteria, presented in the format of the Sacramento District's Habitat Mitigation and Monitoring Proposal Guidelines, dated December 30, 2004. You must comply with the overall goals and designs of the referenced mitigation plan.

You must comply with the restrictions and conditions section listed in the referenced mitigation plan that start on page 21.

You must implement the cultural resources treatment plan, entitled "An Historic Preservation Treatment Plan for Three Prehistoric Sites (26Wa2054, 26Wa6651, and 26Wa7478), Located in the Truckee Meadows, Washoe County, Nevada" by December 31, 2006.

Further Information:

1. Congressional Authorities: You have been authorized to undertake the activity described above pursuant to:

- ☐ Section 10 of the Rivers and Harbors Act of 1899 (33 U.S.C. 403).
- ☒ Section 404 of the Clean Water Act (33 U.S.C. 1344).
- ☐ Section 103 of the Marine Protection, Research and Sanctuaries Act of 1972 (33 U.S.C. 1413).

2. Limits of this authorization.

- a. This permit does not obviate the need to obtain other Federal, state, or local authorizations required by law.
- b. This permit does not grant any property rights or exclusive privileges.
- c. This permit does not authorize any injury to the property or rights of others.
- d. This permit does not authorize interference with any existing or proposed Federal projects.

3. Limits of Federal Liability. In issuing this permit, the Federal Government does not assume any liability for the following:

- a. Damages to the permitted project or uses thereof as a result of other permitted or unpermitted activities or from natural causes.
- b. Damages to the permitted project or uses thereof as a result of current or future activities undertaken by or on behalf of the United States in the public interest.
- c. Damages to persons, property, or to other permitted or unpermitted activities or structures caused by the activity authorized by this permit.
- d. Design or construction deficiencies associated with the permitted work.
- e. Damage claims associated with any future modification, suspension, or revocation of this permit.

4. Reliance on Applicant's Data. The determination of this office that issuance of this permit is not contrary to the public interest was made in reliance on the information you provided.

5. Reevaluation of Permit Decision. This office may reevaluate its decision on this permit at any time the circumstances warrant.

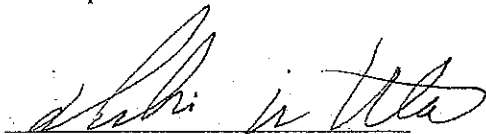
Circumstances that could require a reevaluation include, but are not limited to, the following:

- a. You fail to comply with the terms and conditions of this permit.
- b. The information provided by you in support of your permit application proves to have been false, incomplete, or inaccurate (see 4 above).
- c. Significant new information surfaces which this office did not consider in reaching the original public interest decision.

Such a reevaluation may result in a determination that it is appropriate to use the suspension, modification, and revocation procedures contained in 33 CFR 325.7 or enforcement procedures such as those contained in 33 CFR 326.4 and 326.5. The referenced enforcement procedures provide for the issuance of an administrative order requiring you comply with the terms and conditions of your permit and for the initiation of legal action where appropriate. You will be required to pay for any corrective measures ordered by this office, and if you fail to comply with such directive, this office may in certain situations (such as those specified in 33 CFR 209.170) accomplish the corrective measures by contract or otherwise and bill you for the cost.

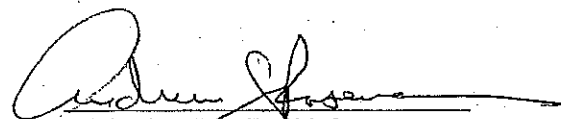
6. Extensions. General Condition 1 establishes a time limit for the completion of the activity authorized by this permit. Unless there are circumstances requiring either a prompt completion of the authorized activity or a reevaluation of the public interest decision, the Corps will normally give favorable consideration to a request for an extension of this time limit.

Your signature below, as permittee, indicates that you accept and agree to comply with the terms and conditions of this permit.


Permittee

10/7/05
Date

This permit becomes effective when the Federal official, designated to act for the Secretary of the Army, has signed below.


for Michael S. Jewell, Chief,
Central California/Nevada Section
(For the District Engineer)

7 OCT 05
Date

When the structures or work authorized by this permit are still in existence at the time the property is transferred, the terms and conditions of this permit will continue to be binding on the new owner(s) of the property. To validate the transfer of this permit and the associated liabilities associated with compliance with its terms and conditions, have the transferee sign and date below.

Transferee

Date

LEO DROZDOFF, Administrator

(775) 687-4670
Administration
Facsimile 687-5856

Water Quality Planning
Water Pollution Control
Facsimile 687-4684

Mining Regulation & Reclamation
Facsimile 684-5259

State of Nevada
KENNY C. GUINN
Governor



ALLEN BIAGGI, Director

Air Pollution Control
Air Quality Planning
Facsimile 687-6396

Waste Management
Federal Facilities

Corrective Actions
Facsimile 687-8335

email ndep.nv.gov

DEPARTMENT OF CONSERVATION AND NATURAL RESOURCES

DIVISION OF ENVIRONMENTAL PROTECTION

901 South Stewart Street, Suite 4001

Carson City, Nevada 89701-5249

March 30, 2005

Mr. Richard Gebhart
U.S. Army Corps of Engineers
Nevada/Sierra Regulatory Office
300 Booth Street Rm 2103
Reno, NV 89509

Nevada Division of Environmental Protection (NDEP) grants 401 Certification for the Centex Homes Project (PN 200400683) in south Reno, Washoe County, Nevada. BMPs must be properly installed and maintained throughout the project construction period until all disturbed areas are stabilized. Photographs of BMPs must be submitted to this office within two weeks of their installation. If straw bales are selected as BMPs they should be certified as weed free.

Any modifications to original project submittal must be reviewed and approved by this office prior to implementation.

All conditions of NDEPs Temporary Authorization To Discharge Permit (Construction / Dewatering Permit) or any other permit issued by NDEP for the project must be followed.

This Section 401 Water Quality Certification is subject to the acquisition of all necessary local, regional, state and federal permits and approvals as required by law. Failure to meet any conditions of this 401 Water Quality Certification or the Temporary Authorization Permit (Construction/Dewatering Permit) or any other permit issued by NDEP for this project or any violation of NAC 445A may result in the revocation of this 401 Water Quality Certification.

If you have any question please give me a call.

Sincerely yours,

A handwritten signature in cursive script that reads "Glen Gentry".

Glen Gentry
Monitoring Branch Supervisor
Bureau Water Quality Planning

cc: Kyle Collinworth, Centex Homes
Icyl Mulligan, NDEP

Appendix D
Geotechnical Report – Black Eagle Consulting

PRELIMINARY GEOTECHNICAL INVESTIGATION

**THE SOUTHERN PORTION OF THE
BELLA VISTA RANCH**

**A Portion of Sections 3 and 10,
Township 18N, Range 20E, M.D.M.**

WASHOE COUNTY, NEVADA

AUGUST 2004

Prepared for:

Centex Homes



Black Eagle Consulting, Inc. - Geotechnical & Construction Services



Black Eagle Consulting, Inc. 1345 Capital Boulevard, Suite A Telephone: 775/359-6600 Email: mail@blackeagleconsulting.com
Geotechnical & Construction Services Reno, Nevada 89502-7140 Facsimile: 775/359-7766

Mr. Merlin Waite
Centex Homes
9600 Prototype Drive
Reno, NV 89511

August 23, 2004
Project No.: 0199-08-1

**Re: Preliminary Geotechnical Investigation
The Southern Portion of Bella Vista Ranch**

Dear Mr. Waite:

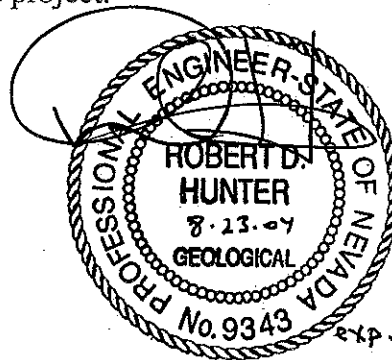
Black Eagle Consulting, Inc. is transmitting herewith our preliminary geotechnical investigation of the southern portion of the Bella Vista Ranch in Washoe County, Nevada. A wide variety of materials are present, ranging from bedrock to coarse granular alluvial fan deposits, and complexly interbedded fine sand, silt, and clay flood plain deposits. Bedrock is present in limited areas in the higher elevations along the northeastern boundary. Coarse granular alluvial fan deposits are present east of Mira Loma Road. The remainder of the site west of Mira Loma Road in low-lying flood plain deposits is typified by complexly gradational and interbedded layers of fine sands, silts, and clays. The ground water table lies at shallow depths in several areas throughout the low-lying flood plain.

The enclosed report presents conclusions and recommendations for the planning and preliminary design of the project. If you require any clarification of our findings, please contact us. We look forward to being of continued service to Centex Homes on this project.

Sincerely,

Black Eagle Consulting, Inc.

Larry J. Johnson
President



Dal Hunter, Ph.D., P.E.
Vice President

Copies to: Addressee (5 copies)

cc: Mr. Randy Walters, MacKay & Somp
Ms. Peggy Bowker, P.E., Nimbus Engineers

LJJ:DH:mk

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APPENDIX

A - Liquefaction Analyses

PRELIMINARY GEOTECHNICAL INVESTIGATION

THE SOUTHERN PORTION OF THE BELLA VISTA RANCH

**(A Portion of Sections 3 and 10,
Township 18N, Range 20E, M.D.M.)**

WASHOE COUNTY, NEVADA

INTRODUCTION

Presented herein are the results of the Black Eagle Consulting, Inc. preliminary geotechnical investigation and associated geotechnical recommendations for the southern portion of the Bella Vista Ranch, Washoe County, Nevada. These conclusions and recommendations are based on surface and subsurface conditions encountered in our research and exploration of the property. The objectives of this study were to:

1. Determine general soil, bedrock, and ground water conditions pertaining to planning, design, and construction of the proposed residential development.
2. Provide recommendations for due diligence, planning and preliminary design of the project, as related to these geotechnical conditions.

The area covered by this report is shown on Plate 1 - Plot Plan. Our investigation included field exploration, laboratory testing, and engineering analysis to determine the physical and mechanical properties of the various on-site materials. Results of our field exploration and testing programs are included in this report and form the basis for all conclusions and recommendations.

The services described above were conducted in accordance with the Black Eagle Consulting, Inc. proposal dated June 4, and revised July 6, 2004.

PROJECT DESCRIPTION

Project details are not available at this time, but planning studies are in progress. We anticipate that the site will be developed as residential housing projects with associated streets, utilities, and neighborhood parks.

SITE CONDITIONS

Access

This initial geotechnical investigation of the Bella Vista Ranch site covers approximately 585 acres in Sections 3 and 10, Township 18 North, 20 East, M.D.M. and includes most of the area south of the A & K conveyor belt, east of Alexander Lake and Steamboat Creek, and west of the Power substation and Mira Loma Road (refer to Plate 1a). The Bella Vista Ranch site is accessed by turning south along Alexander Lane, locally known as the Mira Loma Access Road, off of South McCarran Boulevard. A locked gate on the south side of Alexander Lane that accesses the north-central part of the site is present approximately 3.2 miles from McCarran Boulevard.

Topography and Vegetation

Topography ranges from a low of 4,425 feet in elevation near the valley floor to a maximum of 4,960 feet in the northwestern corner and 4,820 feet in elevation in the southeastern corner of the site. The majority of the site lies at or near valley floor elevations. Gradients across the valley floor are typically in the range of 0.5 to 1.0 percent.

Vegetation in the valley floor is dominated by green and brown grass that ranges from 6 inches to 5 feet in height. The hills and alluvial fans show sparse to moderate amounts of small sagebrush up to 3 feet tall. Wetland areas consist of abundant native green plants and weeds. Vegetation is larger and more abundant in areas adjacent to Steamboat Creek, Alexander Lake, and the other local irrigation ditches.

Lakes, Wetlands, and Irrigation Ditches

The majority of the property is flat and undeveloped and has been used previously for cattle ranching. Steamboat Creek crosses the western part of the site and is oriented in a north-south direction. Limited access across the area is provided by a small number of unimproved roads that traverse the ranch, with the primary road running north-south and directly east of Steamboat Creek. Areas of the eastern side of the ranch are inaccessible without a 2- to 3-foot deep water crossing. A number of east-west barbed-wire fences also cross the site. Alexander Lake covers approximately 41 acres and lies just outside of the area of study, near the northwestern corner of the property. Several wetlands are present on the southern part of the site. The largest wetland is located in the southeastern corner of the parcel and covers approximately 20 acres.

Throughout the ranch are several irrigation ditches that connect to Steamboat Creek, Alexander Lake, or several of the wetland areas. These ditches also serve as the local drainage features on the site. Sheet flow is also an important drainage pattern that is related to the topographic variation due to localized rises and depressions.

Gravel Operations

The most prominent activity on the Bella Vista Ranch site is the active mining of aggregate and gravel along the northeastern margin by A&K Earthmovers. Several other previously mined quarries are present outside the boundaries. The Alexander Lane roadway is heavily used by trucks hauling aggregate and gravel from the main Bella Vista Pit located on the northeast corner of the site and from Pit #2, located on the northwest corner of the site (see Plate 1). A conveyor belt crosses the northern boundary of the Bella Vista Ranch site (see Plate 1) connecting the mining operations between the two pits. The northeastern quarry has been partially backfilled with considerable depths of construction debris and uncontrolled fill.

Utilities and Other Development

An overhead power line is present on the northern and eastern boundaries of the Bella Vista Ranch site. The power line approaches a large power substation that lies just outside the eastern-central boundary of the site (see Plate 1).

Sewage treatment ponds lie approximately 1.4 miles to the south of the southern boundary of the Bella Vista Ranch site. The Sage Hills Gun Club and Shooting Range lies near the southeast corner of the site.

Sewer lines are currently being constructed directly south of the wetlands at the southern border of the parcel in the developing Damonte Ranch area.

EXPLORATION

Exploration of the Bella Vista site was conducted from June 11 to 16, 2004, and included both test pits and borings. Twenty-one test pits were excavated with Case 580 Super L and Case 580K rubber-tired backhoes. The maximum depth of excavation was 14.3 feet in Test Pit # 6. Test pit locations are shown on Plate 1a.

Deeper soils were explored on June 15 and 16, 2004, with three test borings. Two borings were advanced using 6-inch-outside-diameter (O.D.), 3-1/4-inch-inside-diameter (I.D.), hollow stem augers and a truck-mounted CME 55 soils sampling drill rig. All three borings were for liquefaction analysis and utilized rotary mud drilling techniques. The maximum depth of exploration was 41-1/2 feet below the existing ground surface in B-1. Several attempts were made to advance borings B-2 and B3 below 36.3 feet and 33.0 feet, respectively, but caving conditions prevented further progress. The locations of the test borings are shown on Plate 1a.

The native soils were sampled in-place every 2 to 5 feet by use of a standard, 2-inch O.D., split-spoon sampler driven by a standard 140-pound drive hammer with a 30-inch stroke. The number of blows to drive the sampler the final 12 inches of an 18-inch penetration (Standard Penetration Test - ASTM D 1586) into undisturbed soil is an indication of the density and consistency of the material. Pocket penetrometer testing was performed on various samples of fine-grained soils in order to evaluate unconfined compressive strength.

Due to the relatively small diameter of the samplers, the maximum particle size that could be obtained was approximately 1-1/4 inches. The final logs may not, therefore, adequately represent the actual quantity or presence of cobbles or boulders.

Test pit numbers TP-1, TP-2, TP-3, TP-5, and TP-6, along with Boring #B-01, are located north of the site boundary for this initial geotechnical investigation. Geotechnical information from these test pits and one boring are included in this report.

Ground-water observation wells were installed in ten of the test pits (TP-2, 6, 9, 10, 14, 16, 17, 18, 19, and 20) and in two borings (B-2 and B-3). The observation wells consist either of 10-foot long and 3-inch-diameter or 2-3/8-inch-diameter polyvinyl chloride (PVC) pipe with slotted intervals or drilled holes throughout the length of the pipe. A 20-foot long PVC pipe was installed in boring

B-3. The ground water observation wells at boring sites B-2 and B-3 were installed in hollow-stem auger borings that were drilled 5 feet away from the respective mud-rotary boring. The depth to the ground water table from the existing surface was measured in all 12 monitoring wells on June 17, 2004 and varied from a low of 2.7 feet at TP-2 and TP-16, to a high of 9.2 feet in TP-6 and greater than 10 feet in TP-10 (Table 1). A map showing ground water depth zones is included as Plate 1c.

One trench (TP-7) was excavated 60 linear feet across the trace of a mapped earthquake fault (Bonham and Bell, 1993) in order to verify the precise location of the fault trace on the surface. The fault was not observed in the trench; however, previous disturbance from the active mining operations may have covered exposures of this fault. The maximum depth of the fault trench at TP-7 was 4.1 feet. A prominent northwest-trending fault zone was previously mapped by the Nevada Bureau of Mines and Geology (Bonham and Bell, 1993) in the northeastern corner of the site directly within the main operating Bella Vista open pit. However, this prominent fault zone was not trenched during this phase of exploration due to previous mining operations that have disturbed the native surface, including over 20 feet of mine fill cover.

TABLE 1. DEPTH TO THE GROUND WATER TABLE FROM THE EXISTING SURFACE WITHIN TEST PITS AND BORINGS AS MEASURED FROM INSTALLED SLOTTED PVC PIPES ON JUNE 17, 2004.	
TEST PIT NUMBER	Depth to GWT from surface (ft.)
TP-02	2.7
TP-06	9.2
TP-09	4.0
TP-10	Greater than 10.0
TP-14	6.5
TP-16	2.7
TP-17	5.1
TP-18	4.2
TP-19	3.0
TP-20	6.2
B-02	6.9
B-03	4.6
GWT = Ground Water Table	

Material Classification

Two members of the geotechnical staff examined and classified all soils in the field in accordance with ASTM D 2488. During test pitting, representative bulk samples were placed in sealed plastic

bags and returned to our Reno, Nevada, laboratory for testing. Additional soil classification was subsequently performed in accordance with ASTM 2487 (Unified Soil Classification System [USCS]) upon completion of laboratory testing as described below in the **Laboratory Testing** section. Logs of the test pits are presented as Plate 2 – Boring/Test Pit Logs, and a USCS chart has been included as Plate 3 - Graphic Soils Classification Chart.

LABORATORY TESTING

All soils testing performed in the Black Eagle Consulting, Inc. soils laboratory is conducted in accordance with the standards and methodologies described in Volume 4.08 of the ASTM Standards.

Index Testing

Samples of significant soil types were analyzed to determine their in situ moisture content (ASTM D 2216), grain size distribution (ASTM D 422), and plasticity index (ASTM D 4318), and the results of these tests are shown on Plate 4 - Index Test Results. Results of these tests were used to classify the soils according to ASTM D 2487 and to verify the field logs, which were then updated as appropriate. Classification in this manner provides an indication of the soil's mechanical properties and can be correlated with published charts (Bowles, 1996; NAVFAC, 1982a and b) to evaluate bearing capacity, lateral earth pressures, and settlement potential.

Chemical Tests

Chemical testing was performed on five ground water samples obtained from the ground water observation wells installed at the site (TP-2, TP-16, TP-19, TP-20, and B-02). The samples were tested for total boron content in order to evaluate the potential to discharge site ground water into the nearby Steamboat Creek. Total boron in the five water samples range from 5.3 to 81 mg/l (ppm) with the highest boron present in TP-16 (81 ppm) located in the southeast corner of the site near an existing wet lands area.

Chemical testing was also performed on five soil samples from 0 to 5 feet below the surface (in test pits 3, 5, 9, 14, and 17). The soil samples were tested for soluble sulfate, soluble chloride, pH, resistivity, and total boron which will help for future planning of landscape constraints. Total boron in the five soil samples range from 25 to 140 mg/kg (ppm) with the highest boron present in TP-5 located near the northwest corner of the site.

All chemical testing was performed by Western Environmental Testing Laboratory (WET Lab) of Sparks, Nevada. The results of the chemical tests are shown on Plate 5.

GENERAL GEOLOGY AND SOIL CONDITIONS

The Bella Vista Ranch lies immediately west of the Virginia Range, which has been previously mapped by the Nevada Bureau of Mines and Geology (Bonham and Bell, 1993) as consisting of three main rock and soil units: (1) volcanic rocks of the Kate Peak Formation, (2) alluvial fan deposits of the Virginia Range, and (3) flood plain deposits of the Truckee River and Steamboat Creek.

The western part of the Virginia Range is dominated by volcanic and volcanoclastic rocks from the Kate Peak Formation which consists of *flows, domes, lahars, pyroclastic flows, plugs and dikes with ages ranging from 12.4 to 16.9 Ma* (Bonham and Bell, 1993). Exposures of the Kate Peak Formation are locally present on the northwest and eastern boundaries of the Bella Vista Ranch site. No test pits or borings were completed in this bedrock unit.

Alluvial fan deposits of the Virginia Range lie on the western flank of the Virginia Range in the Bella Vista Ranch site and consist of *subangular to subrounded clasts of gray to dark gray andesite with varying proportions of white to red altered andesite clasts; poorly to moderately stratified; poorly to very poorly sorted*. Subunits of the alluvial fan deposits include: (1) *light brown to brown, muddy, sandy, pebble gravel; locally with cobble to boulder gravel; pebbly sand derived from reworking of older eolian sand deposits*; (2) *light brown to brown, muddy, sandy, cobble to boulder gravel; maximum boulder diameter > 1m; soils contain a well-developed argillic (Bt) horizon ranging from 1/2 to 1 m thick, locally underlain by a carbonate-silica-cemented duripan as much as 1 m thick; this unit forms a prominent terrace east of Steamboat Creek*. The alluvial fan deposits at the Bella Vista Ranch site are generally exposed east of the Mira Loma Access road but locally cross over the road in the south-central part of the site. Three test pits tested the alluvial fan deposits: TP-7, TP-12, and TP-21.

The flood plain deposits of the Truckee River and Steamboat Creek generally lie west of the Mira Loma Access road. The floodplain deposits consist of *gray, dark gray-brown, and light brown sand, and sandy mud; locally may contain interbeds of pebble-cobble fluvial gravel and peat*. A C^{14} date of 2130 ± 165 years was obtained on a peat bed directly north of the Steamboat quadrangle (Bell and Bonham, 1987). The majority of the test pits and all three of the borings were located in the floodplain deposits.

Soils encountered during our exploration generally agree with the previous mapping by the Nevada Bureau of Mines and Geology. All of the test pits and borings completed by Black Eagle Consulting except for TP-07, TP-12, and TP-21 were located in the flood plain. The flood plain deposits in the valley floor or the main ranching area consist of a thinly interbedded sequence of silty sand, lean clay, and lean clay with sand with lesser fat clay, silty clay, poorly graded sand, and poorly graded sand with clay. The fine-grained soils are described as slightly moist to wet, brown to dark brown to dark brownish black, soft to very hard, and have 50 to 84 percent low to high plastic fines. Granular soils are dominated by silty sand, clayey sand, and silt, clayey sand with lesser poorly graded sand, poorly graded sand with clay, and poorly graded sand with silt. These soils are described as light brown to brown to dark grayish green, slightly moist to wet, and loose to medium dense. The plasticity indices of granular and fine-grained soils, verified in our laboratory, range from non-plastic to 36.

Coarse-grained granular soils are also encountered within the flood plain deposits at depths greater than 28.0 feet in B-1, 23.5 feet in B-2, and 27.5 feet in B-3. These soils consist of poorly graded gravel with sand, poorly graded gravel, poorly graded sand with silt and gravel, and poorly graded gravel with silt and sand. The coarse-grained granular soils in the deeper parts of borings B-1, B-2, and B-3 are described as dark gray to dark greenish gray, wet, dense to very dense, locally unconsolidated, with less than 5 to 15 percent non-plastic fines. Subrounded to subangular gravel makes up 15 to 80 percent of the total soil mass.

Test pits TP-7, TP-12, and TP-21 encountered alluvial fan granular soil deposits located to the east of the flood plain deposits. These granular soil deposits consist of a near-surface unit one foot thick of dry to slightly moist silty sand with estimated 15-20 percent non-plastic fines. Gravel-bearing material is common at depth within test pits TP-7 and TP-12 which consists of poorly graded gravel with clay, poorly graded gravel with sand, poorly graded gravel with silt and sand, poorly graded sand with gravel, and poorly graded gravel (duripan). Gravel content varies from 15 to 85 percent of the total soil mass. This material is typically a very dense duripan with slight to strong calcium carbonate cement. The back hoe was unable to excavate the gravel-bearing material at depths greater than 4.1 feet in test-pit TP-7 and at depths greater than 6.5 feet in test pit TP-12.

The alluvial fan deposits encountered in Test Pit TP-21 were all granular with trace to minor gravel. Soils encountered in TP-21 consist of an interbedded sequence of silty sand, poorly graded sand with silt and gravel, poorly graded sand with silt, poorly graded sand, and poorly graded sand with gravel. This material is described as grayish brown to brown, dry to very moist, and loose to very dense with a non-plastic fines content ranging from less than 5 percent to 20 percent.

Flood Plains

The majority of the Bella Vista Ranch site that is located to the west of the Mira Loma Road has been identified by the Federal Emergency Management Agency (FEMA) as lying in a shaded Zone A, or within the limits of a 100-year flood with no associated base flood elevation determinations (FEMA, 1994). The northern part of Steamboat Creek, within the northern half of Section 3 T18N, R 20E, has been identified by FEMA as lying in a shaded Zone AE, or within the limits of a 100-year flood also with no associated base flood elevation determinations (FEMA, 1994).

The area lying primarily to the east of the Mira Loma Road has been identified by FEMA as lying in unshaded Zone X, which is outside the 500-year flood plain. A small sliver zone near the northern part of Mira Loma Road in the northeast part of Section 3, T18N, R20E has been identified by FEMA as lying within shaded Zone X, or within the area of a 500-year flood and within an area of 100-year flood with average depths of less than 1 foot or with drainage areas less than 1 square mile, and areas protected by levees from 100-year flood (FEMA, 1994).

GEOLOGIC HAZARDS

Seismicity

Much of the Western United States is a region of moderate to intense seismicity related to movement of the crustal masses (plate tectonics). By far, the most active regions, outside of Alaska, center around the San Andreas fault system of western California. Other seismically active areas include the Wasatch Front in Salt Lake City, Utah, which forms the eastern boundary of the Basin and Range physiographic province, and the eastern front of the Sierra Nevada Mountains, which is the western margin of the province. The Reno-Sparks area lies along the eastern base of the Sierra Nevada, within the western extreme of the Basin and Range. It must be recognized that there are probably few regions in the United States not underlain at some depth by older bedrock faults. Even areas within the interior of North America have a history of strong seismic activity.

The Truckee Meadows lies within Seismic Zone 3, an area with a potential for earthquake damage. Seismicity within the Reno-Sparks area is considered about average for the western Basin and Range Province (Ryall and Douglas, 1976). It is generally accepted that the maximum credible earthquake in this area would be in the range of magnitude 7 to 7.5 along the frontal fault system of the Eastern Sierra Nevada. The most active segment of this fault system in the Reno

area is located at the base of the mountains near Thomas Creek, Whites Creek, and Mt. Rose Highway, some 5 miles west of the project.

Faults

No earthquake hazards map is available for the project area. The published geologic map (Bonham and Bell, 1993) shows several faults in the northeastern portion of the site in areas of the aggregate quarry. These faults are also shown on the Quaternary Fault Map of Nevada (Bell, 1984) as being Pleistocene in age. The criteria for evaluation of Quaternary earthquake faults have been developed and adopted by the State of Nevada Seismic Safety Council. These standards define active faults as those with evidence of displacement within the past 11,000 years (Holocene time). Those faults with evidence of displacement during Pleistocene time (11,000 to 2,000,000 years before present) are generally considered potentially active. Based on the geologic map, the faults on the project are considered potentially active. Potentially active is a rather alarming and unfortunate term in that it suggests a higher degree of risk than is justified in most cases. Recurrence intervals for Nevada earthquakes along faults that have been studied are estimated to be in the range of 6,000 to 18,000 years in western Nevada (Bell, 1984). The very active eastern boundary faults of the Sierra Nevada Mountains may have a shorter recurrence interval of 1,000 to 2,000 years. Many of the smaller faults may be the result of one-time events in response to movement along a better developed and more active fault system a considerable distance away.

One trench TP-7 was excavated 60 linear feet across a fault mapped by the Nevada Bureau of Mines and Geology (NMBG; Bonham and Bell, 1993). The trench was examined for evidence of faulting; however, no fault was observed. Soil profiles are included as Plate 2. Most of the surface expression of fault traces mapped by the NBMG has been destroyed by aggregate mining operations. Additional fault trenching should be performed during design-level investigations.

Ground Motion and Liquefaction

Because the eastern portion of site area is underlain by dense granular soils and bedrock, liquefaction potential is minimal due to the types of materials present. Only localized amplification of ground motion would be expected during an earthquake in these areas. Mapping by the U. S. Geological Survey (1996) indicates that there is a 10 percent probability that a *bedrock* ground acceleration of 0.3 to 0.4 will be exceeded in 50 years. Including the effects of any potential soil amplification, the peak ground acceleration expected for the design earthquake will be approximately 0.384g using methods recommended in the 2003 *International Building Code* (International Codes Council, 2003).

Liquefaction is a nearly complete loss of soil shear strength that can occur during a seismic event in saturated, loose to medium dense, poorly graded sands, cohesionless silts, and gravels. Liquefaction results from cyclic shear strains causing partial collapse of the soil matrix and development of excessive pore water pressure between the soil grains. Liquefaction will result in settlements shortly after the earthquake. Water and sand may be expelled to the surface, referred to as sand boils; these may cause minimal damage, except if building footings are located directly over a major sand boil. For sites with gentle or minimal slopes or with an adjacent slope, significant damage may potentially result from ground oscillation or lateral spreading. These horizontal deformations occur due to either the earthquake motions imparted to the surface soils or the driving force of the existing ground surface slope, which cause the surface soils to move with relatively little resistance from the underlying liquefied soils.

The area has some limited areas of liquefiable soils, based on the presence of relatively young, loose to medium dense, sandy soils with a very high water table. Field exploration performed as a part of this investigation involved two rotary mud borings to a depth of 40 feet (Borings B-02 and B-03). Exploration, laboratory testing, and analysis were performed in accordance with the *Guidelines for Evaluating Liquefaction Hazards in Nevada* (Truckee Meadows Geohazards Committee, 2003), ASTM D 6066, and Youd et al. (2001). The variation of soil consistency, penetration resistance, and liquefaction threshold with depth are shown on Plate 6 - Liquefaction Potential Versus Depth. The figure shows the corrected penetration resistance in blows per foot versus depth, versus the predicted liquefaction threshold for the design earthquake. The threshold shown on the figure is the penetration resistance below which liquefaction will occur; penetration values plotting to the left of the threshold lines indicate liquefaction. The results of the liquefaction analyses indicate that the majority of the site soils are too cohesive or sufficiently dense to be considered liquefiable; however, there are two layers (one between 15 feet and 17½ feet in Boring B-02, and the other between 25 and 27½ feet in Boring B-03) that could liquefy during the design ground motion. The calculated total settlement for each of these layers is only about ½ inch. It is unlikely that this minimal amount of settlement would ever reflect to the surface. Supporting calculations are contained in Appendix A - Liquefaction Analyses.

In Nevada, there is no specific policy which requires structures to be designed to resist liquefaction. Such designs tend to be very costly and are usually limited to those structures with a public safety function, such as fire and police facilities and hospitals or buildings with high occupancy, such as large commercial, retail, office and manufacturing facilities, schools, municipal or major governmental buildings. These types of structures present a significant potential for loss of life and/or are important enough, from a public safety standpoint, such that a design to minimize liquefaction may be warranted. The decision to mitigate or accept liquefaction

risk is a business decision that can only be made by the owner/developer. The decision requires analysis of up-front mitigation costs as compared to the potential for longer range repair costs and liability.

We recommend that, as the area is developed and uses of the area with specific structures are formulated, a geotechnical investigation be completed for each of these specific projects. These specific geotechnical investigations can then address the potential for liquefaction at that location and the need, if necessary, for a liquefaction analysis and design for liquefaction effects.

Flood Plains

The majority of the Bella Vista Ranch site that is located to the west of the Mira Loma Road has been identified by the Federal Emergency Management Agency (FEMA) as lying in a shaded Zone A, or within the limits of a 100-year flood with no associated base flood elevation determinations (FEMA, 1994). The northern part of Steamboat Creek within the northern half of Section 3, T18N, R 20E, has been identified by FEMA as lying in a shaded Zone AE, or within the limits of a 100-year flood also with no associated base flood elevation determinations (FEMA, 1994).

The area lying primarily to the east of the Mira Loma Road has been identified by FEMA as lying in unshaded Zone X, which is outside the 500-year flood plain. A small sliver zone near the northern part of Mira Loma Road in the northeast part of Section 3, T18N, R20E has been identified by FEMA as lying within shaded Zone X, or within the area of a 500-year flood and within an area of 100-year flood with average depths of less than 1 foot or with drainage areas less than 1 square mile, and areas protected by levees from 100-year flood (FEMA, 1994).

Other Geologic Hazards

A high potential for dust generation is present if grading is performed in dry weather. No other geologic hazards were identified.

DISCUSSION AND RECOMMENDATIONS

General Information

A wide variety of materials are present, ranging from:

- Volcanic bedrock along the eastern margin
- Coarse granular alluvial fan deposits lying predominately east of Mira Loma Road
- Complexly interbedded fine grain silts, clays, and sands in the lowlands west of Mira Loma Road.

The area east of Mira Loma road will serve as a good source of structural fill throughout the project. The existing borrow pit in the northeast corner contains significant quantities of construction debris and uncontrolled fill. Structural improvements should be separated from the fine grain and clay soils by structural fill. Ground water is shallow in portions of the low-lying areas, as shown on Plate 1c.

The recommendations provided herein, and particularly under **Site Preparation, Grading and Filling, Foundation Design, Site Drainage and Quality Control**, are intended to minimize risks of structural distress related to consolidation or expansion of native soils and/or structural fills. These recommendations, along with proper design and construction of the structure and associated improvements, work together as a system to improve overall performance. If any aspect of this system is ignored or poorly implemented, the performance of the project will suffer. Sufficient quality control should be performed to verify that the recommendations presented in this report are followed.

Structural areas referred to in this report include all areas of buildings, concrete slabs, asphalt pavements, as well as pads for any minor structures. All compaction requirements presented in this report are relative to ASTM D 1557. For the purposes of this project:

- Fine-grained soils are defined as those with more than 40 percent by weight passing the number 200 sieve, and a plastic index lower than 15.
- Clay soils are defined as those with more than 30 percent passing the number 200 sieve, and a plastic index greater than 15.
- Granular soils are those not defined by the above criteria.

Any evaluation of the site for the presence of surface or subsurface hazardous substances is beyond the scope of this investigation. When suspected hazardous substances are encountered during routine geotechnical investigations, they are noted in the exploration logs and immediately reported to the client. No such substances were revealed during our exploration. A Phase I

Environmental Assessment was performed on this site by Black Eagle Consulting, Inc. in August 2004.

The test pits were excavated by backhoe at the approximate locations shown on the site plan. Locations were determined in the field by approximate means. All test pits were backfilled upon completion of the field portion of our study. The backfill was compacted to the extent possible with the equipment on hand. However, the backfill was not compacted to the requirements presented herein under **Grading and Filling**. If structures, concrete flatwork, pavement, utilities or other improvements are to be located in the vicinity of any of the test pits, the backfill should be removed and recompact in accordance with the requirements contained in the soils report. Failure to properly compact backfill could result in excessive settlement of improvements located over test pits.

It is common practice in Northern Nevada to place unsuitable soils, including expansive clays and oversize rock, in back, front, and side yard areas. If the developer elects this alternate, as opposed to exporting such materials and importing/placing structural fills in yard areas, we recommend disclosure be included in the sales agreement. The buyer should be made aware that homeowner-added improvements, such as patios or swimming pools, will require geotechnical analysis.

Seismic Design Criteria

All structures at Bella Vista should be designed for Seismic Zone 3. The City of Reno has adopted the 1997 *Uniform Building Code* (ICBO), but is planning to change to the 2003 *International Building Code* (ICC, 2003) in late 2004. The ICC requires a detailed soils evaluation to a depth of 100 feet to develop the appropriate soils criteria. However, the code states that a Type S_D soil profile may be used as a default value when the soil properties are not known in sufficient detail to determine the soil profile type. The Type S_D soil profile is for stiff soils with a shear velocity between 600 and 1,200 feet per second, or with an N (SPT) value between 15 and 50 or an undrained shear strength between 1,000 and 2,000 pounds per square foot (psf). Based on our experience and the geology at the area, it is our opinion that the default soils profile Type S_D is appropriate for alluvial fan materials and S_e for flood plain areas. With that assumption, the recommended seismic design criteria are as follow:

TABLE 2 -- IBC 2003 SEISMIC DESIGN CRITERIA	
Spectral Response at Short Periods, S_s , percent of gravity (IBC Figure 1615)	144
Spectral Response at 1-Second Period, S_1 , percent of gravity (IBC Figure 1615)	49
Site Class (IBC Table 1615.1.1)	S_D
Site Coefficient F_a , decimal	1.0
Site Coefficient F_v , decimal	1.51
Site Adjusted Spectral Response at Short Periods, S_{MS} (IBC Eqn 16-16)	144
Site Adjusted Spectral Response at Short Periods, S_{M1} (IBC Eqn 16-17)	74

These parameters were derived for an earthquake with a magnitude of 7 to 7.5 occurring on the eastern Sierra frontal fault system, 8 kilometers west of the site.

Site Preparation

All vegetation should be stripped and grubbed from structural areas and removed from the site. A stripping depth of 0.2 to 0.3 feet is anticipated.

Clay and fine grain soils were found to exist in various locations in various depths and thicknesses in the low-lying portions of the site. Laboratory testing performed on these materials indicates the clay soils exhibit plasticity indices on the order of 16 to 26, indicative of moderately expansive soils (Nelson and Miller, 1992).

Surficial clay soils on this site will exhibit considerable shrink-swell with changes in moisture content. Such soils are common, but sporadically distributed and must be identified during grading. Failure to recognize and properly mitigate expansive clays will result in damage to improvements. Clay soils should be separated from improvements by structural fill in order to decrease potential shrink-swell movements. The minimum separation is presented in Table 3.

TABLE 3 - REQUIRED THICKNESS OF STRUCTURAL FILL BETWEEN CLAY SOILS AND IMPROVEMENTS	
Improvement	Minimum Separation
Footings	2 feet
Floor Slabs, Living Space	2 feet
Floor Slab, Garage	2 feet
Exterior Concrete Slabs, including curbs, gutters, sidewalk*	1.5 feet
Asphalt Pavements	1.5 feet
* Includes aggregate base section.	

The required separation may be achieved by any combination of site filling or overexcavation and replacement. Depending on final design elevations, considerable overexcavation could be required.

Clays to be left in place and covered with fill should be moisture conditioned to 2 to 4 percent over optimum for a minimum depth of 12 inches. This moisture level will significantly decrease the magnitude of shrink-swell movements in the upper foot of clay. The high moisture content must be maintained by periodic surface wetting, or other methods, until the surface is covered by at least one lift of fill.

All areas to receive structural fill or structural loading should be densified to, at least, 90 percent relative compaction. Where less than 70 percent passes the $\frac{3}{4}$ -inch sieve, as in alluvial fan areas, soils are too coarse for standard density testing techniques. In this case, as will occasionally occur here, a proof rolling of a minimum five single passes with a minimum 10-ton roller in mass grading, or five complete passes with hand compactors in footing trenches is recommended. This alternate has proved to provide adequate project performance, as long as all other geotechnical recommendations are closely followed. In all cases, the final surface should be smooth, firm, and exhibit no signs of deflection.

Existing ditches which are to be abandoned and are located in structural areas will require overexcavation to remove organic material and soft, wet, fine-grained soils. The overexcavation should extend to a depth of at least one to three feet below the ditch bottom, unless granular soils are encountered at shallower depth. The width of overexcavation will be dependent upon the extent of soft, wet soils that cannot be compacted. Ditch bottoms may require stabilization in accordance with later recommendations. Where irrigation ditches are to be perpetuated, it will be necessary to either re-route them around structural areas or replace the ditches with gasketed pipes. No piped ditches should underlie a house or its garage.

In areas of shallow ground water, or if wet weather construction is anticipated, soils may be well above optimum moisture and impossible to compact. In some situations, moisture conditioning may be possible by scarifying the top 12 inches of subgrade and allowing it to air dry to near-optimum moisture, prior to compaction. Where this procedure is ineffective or where construction schedules preclude delays, mechanical stabilization will be necessary. Mechanical stabilization may be achieved by overexcavations and/or placement of an initial 12- to 18-inch-thick lift of 12-inch-minus, 3-inch-plus, well graded, angular rock fill. The more angular and well graded the rock is, the more effective it will be. This fill should be densified with large equipment, such as a self-propelled sheeps-foot or a large loader, until no further deflection is noted. Additional lifts of rock may be necessary to achieve adequate stability. The use of a geotextile (Table 4) will prevent

mud from "pumping" up between the rocks, thereby increasing rock-to-rock contact and decreasing the thickness of stabilizing fill.

As an alternate, overexcavation and a geotextile/gravel system may be used for stabilization. The geotextile should meet or exceed the following minimum properties:

TABLE 4 - MINIMUM AVERAGE ROLL STRENGTH PROPERTIES FOR GEOTEXTILE	
Trapezoid Strength (ASTM D 4533)	80 lbs.
Puncture Strength (ASTM D 4833)	120 lbs.
Grab Tensile/Elongation (ASTM D 4632)	245 @ 50 %

A minimum of 18 inches of imported, coarse, stabilizing fill should be placed above the geotextile. Additional lifts of stabilizing fill may be necessary. The stabilizing can be obtained from the eastern alluvial fan deposits.

Regardless of which alternate is selected, a test section is recommended to determine the required thickness of stabilization.

Trenching and Excavation

Temporary trenches with near-vertical sidewalls should be stable to a depth of approximately 5 feet. Temporary trenches are defined as those that will be open for less than 24 hours. Excavations to greater depths will require shoring or laying back of sidewalls to maintain adequate stability. Regulations amended in Part 1926, Volume 54, Number 209 of the Federal Register (Table B-1, October 31, 1989) require that the temporary sidewall slopes be no greater than those presented in Table 5.

TABLE 5 - MAXIMUM ALLOWABLE TEMPORARY SLOPES	
Soil or Rock Type	Maximum Allowable Slopes¹ for Deep Excavations less than 20 Feet Deep²
Stable Rock	Vertical (90 degrees)
Type A ³	3H:4V (53 degrees)
Type B	1H:1V (45 degrees)
Type C	3H:2V (34 degrees)
<i>Notes:</i>	
1. Numbers shown in parentheses next to maximum allowable slopes are angles expressed in degrees from the horizontal. Angles have been rounded off.	
2. Sloping or benching for excavations greater than 20 feet deep shall be designed by a registered professional engineer.	
3. A short-term (open 24 hours or less) maximum allowable slope of 1H:2V (63 degrees) is allowed in excavation in Type A soils that are 12 feet or less in depth. Short-term maximum allowable slopes for excavations greater than 12 feet in depth shall be 3H:4V (53 degrees).	

These regulations, including the classification system and the maximum slopes, have been adopted and are strictly enforced by the State of Nevada, Department of Industrial Relations, Division of Occupational Safety and Health. In general, Type A soils are cohesive, non-fissured soils, with an unconfined compressive strength of 1.5 tons per square foot (tsf) or greater. Type B are cohesive soils with an unconfined compressive strength between 0.5 and 1.5 tsf, while those designated as Type C have an unconfined compressive strength below 0.5 tsf. Numerous additional factors and exclusions are included in the formal definitions. The client, owner, design engineer, and contractor shall refer to Appendix A and B of Subpart P of the previously referenced Federal Register for complete definitions and requirements on sloping and benching of trench sidewalls. Appendices C through F of Subpart P apply to requirements and methodologies for shoring.

On the basis of our exploration, the flood plain soils are predominately Type B, and the alluvial fan soils are Type C. Any area in question should be considered Type C, unless specifically examined by the geological engineer during construction. All trenching should be performed and stabilized in accordance with local, state, and OSHA standards.

Maximum particle size in the backfill should be 4 inches. In general, bedding and initial backfill 12 inches over the pipe will require import, but native granular soil will provide adequate final backfill as long as oversized particles from alluvial fan soils are excluded. Drain rock and backfill can be manufactured from the eastern alluvial fan soils. Bedding and initial backfill should conform to the requirements of the utility having jurisdiction, but should be densified to at least 90 percent relative compaction. Excavations below the ground water table will likely require dewatering. Below the waterline, bedding and backfill should consist of compacted drain rock graded in accordance with the requirements for Class C drain backfill presented in the City of Reno *Standard Specifications for Public Works Construction*. Above the waterline, trenches should be backfilled in maximum eight-inch-thick (loose) lifts in all structural areas. Each lift should be densified to a minimum of 90 percent relative compaction (ASTM D 1557). When drain rock is used as trench backfill, it shall be considered a rock backfill (greater than 30 percent retained on the 3/4-inch sieve) and should be placed in maximum 12-inch-thick loose lifts, with each lift densified by at least five complete passes with approved compaction equipment and until no deflection is observed. A separator geotextile such as Synthetic Industries Geotex 401 should be placed between the drain rock and any native soil backfill.

Grading and Filling

Native clay and fine-grained soils should be placed as fill only in nonstructural areas. Native granular soils will be suitable for structural fill provided particles larger than 8 inches are

removed. The minimum R-value for street subgrade will need to be 30. High-strength structural fill (subbase, $R \geq 45$) will be required in areas of weak, native soil in order to provide a weighted average R-value of 30. Oversized rock can be stockpiled for later use as erosion protection or placed in the bottom of deep nonstructural fills. In deep fills, oversized rocks must be scattered in such a manner as to preclude development of voids between the particles (nesting).

All fill and utility trench backfill in structural areas should be densified to a minimum 90 percent relative compaction. Nonstructural fill should be densified to, at least, 85 percent relative compaction to minimize consolidation and erosion. If the native granular soils have greater than 30 percent retained on the $\frac{3}{4}$ -inch sieve, standard density testing is not valid. A proof rolling program of at least five single passes of a minimum 10-ton roller in mass grading or at least five complete passes with hand compactors in footing trenches is recommended. Compaction must continue to the satisfaction of the geotechnical engineer. Acceptance of this rock fill is based upon observation of maximum particle size, lift thickness, moisture content, and applied compactive effort. In all cases, the finished surface should be smooth, firm, and show no signs of deflection. Grading should not be performed with or on frozen soils.

Subsidence and Shrinkage

In low-lying flood plain areas, subsidence of about 0.1 to 0.2 feet should be anticipated from construction traffic. Subsidence of granular alluvial fan soils exposed in cut should be negligible. Granular alluvial soils excavated and recompacted in structural fills should experience quantity shrinkage of approximately 10 to 15 percent, including removal of oversize particles. In other words, one cubic yard of excavated granular alluvium will generate about 0.85 to 0.90 cubic yards of structural fill at 90 percent relative compaction.

Foundation Design

The near-surface clays are poor foundation soils such that footings should not bear directly in these materials. The most economical method of foundation support lies in spread footings bearing on structural fill.

Individual column footings and continuous wall footings underlain by a minimum of 2 feet of structural fill or granular native soil fill can be designed for a net maximum allowable bearing pressure of 2,000 psf, and should have minimum footings widths of 16 and 12 inches, respectively. The net allowable bearing pressure is that pressure at the base of the footing in excess of the adjacent overburden pressure. This allowable bearing value should be used for dead plus ordinary live loads. Ordinary live loads are defined as being that portion of the design live

load which will be present during the majority of the life of the structure. Design live loads are those loads which are produced by the use and occupancy of the building, such as by moveable objects, including people or equipment, as well as snow loads. This bearing value may be increased by one-third for total loads. Total loads are defined as the maximum load imposed by the required combinations of dead load, design live loads, snow loads, and wind or seismic loads.

With this allowable bearing pressure, total settlements of approximately $\frac{3}{4}$ -inch should be anticipated. Differential settlements between footings with similar loads, dimensions, and base elevations should not exceed two-thirds of the values provided above for total settlements. The majority of the anticipated settlement will occur during the construction period as the loads are applied.

Lateral loads, such as wind or seismic, may be resisted by passive soil pressure and friction on the bottom of the footing. The recommended coefficient of base friction is 0.4 and has been reduced by a factor of 1.5 on the ultimate soil strength. Design values for active and passive equivalent fluid pressures are 37 and 370 pounds per square foot per foot of depth, respectively. These design values are based on spread footings bearing on and backfilled with structural fill. All exterior footings should be placed a minimum two feet below adjacent finish grade for frost protection.

If loose, soft, wet, or disturbed soils are encountered at the foundation subgrade, these soils should be removed to expose undisturbed competent bearing soils, and the resulting overexcavation backfilled with compacted structural fill. The base of all excavations should be dry and free of loose soils at the time of concrete placement.

Slope Stability and Erosion Control

Stability of cut and filled surfaces involves two separate aspects. The first concerns true slope stability related to mass wasting, landslides or the en masse downward movement of soil or rock. Stability of cut and fill slopes is dependent upon shear strength, unit weight, moisture content, and slope angle. The *Uniform Building Code* (ICBO, 1997), currently adopted by the City of Reno, allows cut and fill slopes up to 2H:1V in the type of soils present at this site. The exploration and testing program conducted during this investigation confirms 2H:1V slopes will be stable.

The second aspect of stability involves erosion potential and is dependent on numerous factors involving grain size distribution, cohesion, moisture content, slope angle, and the velocity of the water or wind on the ground surface. The City of Reno municipal code requires erosion control of cut and fill slopes 5H:1V or steeper. Slopes between 3H:1V and 5H:1V can be stabilized by

hydroseeding. Slopes steeper than 3H:1V require mechanical stabilization. The City of Reno may accept other methods of stabilization on slopes steeper than 3H:1V if it can be demonstrated to be as effective as mechanical stabilization. Details of the required erosion control are presented in the City of Reno *Public Works Design Manual* (2004). Protection could be provided by a variety of methods such as rip-rap or "geo-cell" systems. Rock rip rap can be obtained by screening the eastern alluvial fan deposits.

Dust potential at this site will be moderate during dry periods. Temporary (during construction) and permanent (after construction) erosion control will be required for all disturbed areas. The contractor shall prevent dust from being generated during construction in compliance with all applicable city, county, state, and federal regulations and shall submit an acceptable dust control plan to the Washoe County District Health Department prior to starting site preparation or earthwork. The project specifications should include an indemnification by the contractor of the owner and engineer for any dust generation during the construction period. The owner will be responsible for mitigation of dust after his acceptance of the project.

In order to minimize erosion and downstream impacts to sedimentation from this site, best management practices with respect to storm water discharge should be implemented at this site.

Site Drainage

Adequate surface drainage should be provided away from the structure. A system of roof gutters and downspouts is recommended to collect roof drainage and direct it away from the foundations unless pavement extends to the walls. Stemwall backfill should be thoroughly compacted to decrease permeability and reduce the potential for irrigation and storm water to enter the crawlspace or seep beneath the floor slab. A perimeter foundation drain should be included on each house, particularly if raised floor construction is used. Positive crawlspace drainage should also be provided by grading the crawlspace to drain to one or more localized areas and providing 3-inch diameter pipes to daylight beneath the footings. Often, design grades preclude adequate drainage by daylighting a direct drain. A less preferable alternate is to grade the crawlspace to drain to the sewer lateral and gravel packing the lateral from the crawlspace to the sewer main in the street. Ponding of water on finish grade or at the edge of pavements should be prevented by proper grading.

Concrete Slabs

All concrete slabs should be directly underlain by imported, granular material with a minimum R-value of 60. Type 2, Class B, aggregate base is the preferred alternate, although other materials

may be acceptable. The thickness of base material shall be 6 inches beneath curb and gutters, 4 inches beneath sidewalks and 4 inches beneath private flatwork. Aggregate base courses should be densified to at least 95 percent relative compaction. Base materials can be manufactured from the eastern alluvial fan deposits.

The soils in the low-lying flood plain area are low-energy deposits, and, as such, include localized areas with high levels of sodium and calcium sulfate. Deposits of the white alkali salts can be seen in the area as they begin to dry out, and visible gypsum was seen in some of the test pits. Soluble sulfate minerals, particularly sodium sulfate, aggressively attack the surface of low strength porous concrete. Standard 4,000 pounds per square inch (psi) concrete with Type II cement, such as required for dedicated improvements, is normally adequately resistant to sulfate attack, especially when separated from native soil by several feet of imported fill. Footing and stemwall concrete is often of much lower strength and is poured very wet so that it becomes relatively porous. If native clay soils are used as stemwall backfill in yard areas, the sulfate will attack and severely spall the concrete, just above the ground line. This spalling occurs as the very soluble salts "wick" up the surface of the porous stemwall concrete and then precipitate as the moisture evaporates. This problem can be prevented in three ways, listed in order of preference:

- Use 4,000 psi ("City Mix") concrete for stemwalls, garage floors, and driveways.
- Use imported backfill within 3 feet of the stemwall and private flatwork.
- Coat the stemwalls with a suitable concrete sealer.

Each phase of the development should be checked for sulfate levels to determine the need for these measures.

Type II cement should be used for all concrete work. The Reno area is a region with exceptionally low relative humidity. As a consequence, concrete flatwork is prone to excessive shrinking and curling. Concrete mix proportions and construction techniques, including the addition of water and improper curing, can adversely affect the finished quality of the concrete and result in cracking, curling, and spalling of slabs. We recommend that all placement and curing be performed in accordance with procedures outlined by the American Concrete Institute (1999). Special considerations should be given to concrete placed and cured during hot or cold weather conditions. Proper control joints and reinforcing should be provided to minimize any damage resulting from shrinkage. Concrete should not be placed on frozen in-place soils.

Any interior concrete slab floors with moisture-sensitive flooring will require a moisture barrier system. Installation should conform to the specifications provided for a Class B vapor restraint (ASTM E 1745-97). A 4-inch-thick layer of clean sand or aggregate base should be placed over

the vapor barrier and be compacted with a vibratory plate. The base layer should remain compacted and a uniform thickness maintained during the concrete pour, as its intended purpose is to facilitate even curing of the concrete and minimize curling of the slab. Care should be taken during construction to ensure that rebar reinforcement, forming stakes, and equipment do not damage the integrity of the vapor barrier.

Asphalt Concrete

The project is in preliminary stages so that street layout and traffic volumes are unavailable at this time. Structural section design of pavement is therefore preliminary as well. The City of Reno requires that all roadway subgrade exhibit an R-value of at least 30 (City of Reno, 2004). The City does not specify how that requirement will be achieved, but it typically involves removal of low-strength soil and replacement with imported fill (subbase) with an R-value of at least 45 to provide a weighted average 30.

The subgrade strength in eastern alluvial fan areas is high, so that City of Reno minimum structural sections (4 inches of asphalt concrete and 6 inches of Type 2, Class B aggregate base) are appropriate for residential streets. The low-lying flood plain soils often have weak subgrade strengths that will require the addition of 12-inch granular subbase with a minimum R-value of 45 beneath these minimum structural sections to meet City standards. Collector streets would typically have the sections increased to 5 inches of asphalt concrete over 8 inches of base. Arterials will require special analysis and design.

Pavement Drainage

Pavement design is mostly a function of heavy truck traffic and subgrade strength. Inherent in the selection of design subgrade strength is the assumption that the subgrade will not become saturated. Subgrade strength drops dramatically with even a slight moisture increase above that selected for the design value. This is essentially true for any material other than clean sands and gravels and is more critical in fine-grained and clay soils than in granular soils. Soils in the low-lying flood plain area are considered to be of high moisture sensitivity. Where irrigated landscaping is to be placed adjacent to the pavement section, we recommend that edge drains be constructed directly behind the curb, or along the edge of the asphalt where curbs and gutters are not used. This recommendation includes both center median and edge or back face of curb/sidewalk areas with irrigated landscaping and is particularly important where irrigated landscape mounds slope toward the street section. If proper drainage is not provided, increased maintenance costs and premature pavement (subgrade) failure will result.

The edge drain should extend at least 12 inches below the street subgrade and can consist of either a narrow trench backfilled with Class B or C drain rock or a synthetic edge drain product. Drain rock should be separated from native soil backfill by a geotextile such as Geotex 311 or equal. In cohesionless soils the fabric should also be placed on the upslope side, between the native soils and the drain rock/backfill. The edge drain should be tied into the storm drain or drain rock backfill around the storm drain. In some cases utility trenches located behind the street could be utilized as edge drains, if designed and constructed with that intent.

Pavement Maintenance

Asphalt concrete pavements have been designed for a standard 20-year life expectancy with the design assumptions presented under **Pavement Design**. Due to the local climate and available construction aggregates, a full 20 years of performance life are seldom achieved. Between 15 and 20 years from initial construction (average 17 years), major rehabilitation (structural overlay or reconstruction) is generally required. To achieve even this performance life, periodic maintenance is required. Such maintenance includes regular crack sealing, seal coats, and patching as necessary. Failure to provide the required maintenance will significantly reduce pavement design life and performance.

Corrosion Potential

Soluble sulfate content has been determined for representative samples of the site foundation soils, and the results of the testing indicate that concrete in contact with the site foundation soils should experience moderate degradation due to reaction with soil sulfate. Therefore, Type II cement should be used for all concrete work.

Laboratory testing on representative samples of site foundation soils was also performed to evaluate the corrosion potential of the soils with respect to buried steel structures. The results of the laboratory testing indicate that the site foundation soils exhibit a high degree of corrosivity.

ANTICIPATED CONSTRUCTION PROBLEMS

Soft, wet, surface soils may make for difficult travel by construction equipment. Trenching below the water table will require dewatering. Some difficulty will also be encountered in trenching due to the presence of boulders in areas of granular alluvial fan soil.

QUALITY CONTROL

All plans and specifications should be reviewed for conformance with this geotechnical report and approved by the geotechnical engineer prior to submitting to the building department for review.

The recommendations presented in this report are based on the assumption that sufficient field testing and construction review will be provided during all phases of construction. We should review the final plans and specifications for conformance with the intent of our recommendations. Prior to construction, a pre-job conference should be scheduled to include, but not be limited to, the owner, architect, civil engineer, the general contractor, earthwork and materials subcontractors, building official, and geotechnical engineer. The conference will allow parties to review the project plans, specifications, and recommendations presented in this report and discuss applicable material quality and mix design requirements. All quality control reports should be submitted to and reviewed by the geotechnical engineer.

During construction, we should have the opportunity to provide sufficient on-site observation of preparation and grading, overexcavation, fill placement, foundation installation, and paving. These observations would allow us to verify that the geotechnical conditions are as anticipated and that the contractor's work is in conformance with the approved plans and specifications.

STANDARD LIMITATIONS CLAUSE

This report has been prepared in accordance with generally accepted geotechnical practices. The analyses and recommendations submitted are based on field exploration performed at the locations shown on Plate 1 - Plot Plan of this report. This report does not reflect soils variations that may become evident during the construction period, at which time re-evaluation of the recommendations may be necessary. We recommend our firm be retained to perform construction observation in all phases of the project related to geotechnical factors to ensure compliance with our recommendations. The owner shall be responsible for distribution of this geotechnical investigation to all designers and contractors whose work is related to geotechnical factors.

Equilibrium water level readings were made on the date shown on Plate 2 - Boring/Test Pit Logs of this report. Fluctuations in the water table may occur due to rainfall, temperature, seasonal runoff or adjacent irrigation practices. Construction planning should be based on assumptions of possible variations.

This report has been prepared to provide information allowing the architect or engineer to design the project. The owner is responsible for distribution of this report to all designers and contractors whose work is affected by geotechnical aspects. In the event of changes in the design, location, or ownership of the project from the time of this report, recommendations should be reviewed and possibly modified by the geotechnical engineer. If the geotechnical engineer is not accorded the privilege of making this recommended review, he can assume no responsibility for misinterpretation or misapplication of his recommendations or their validity in the event changes have been made in the original design concept without his prior review. The geotechnical engineer makes no other warranties, either expressed or implied, as to the professional advice provided under the terms of this agreement and included in this report.

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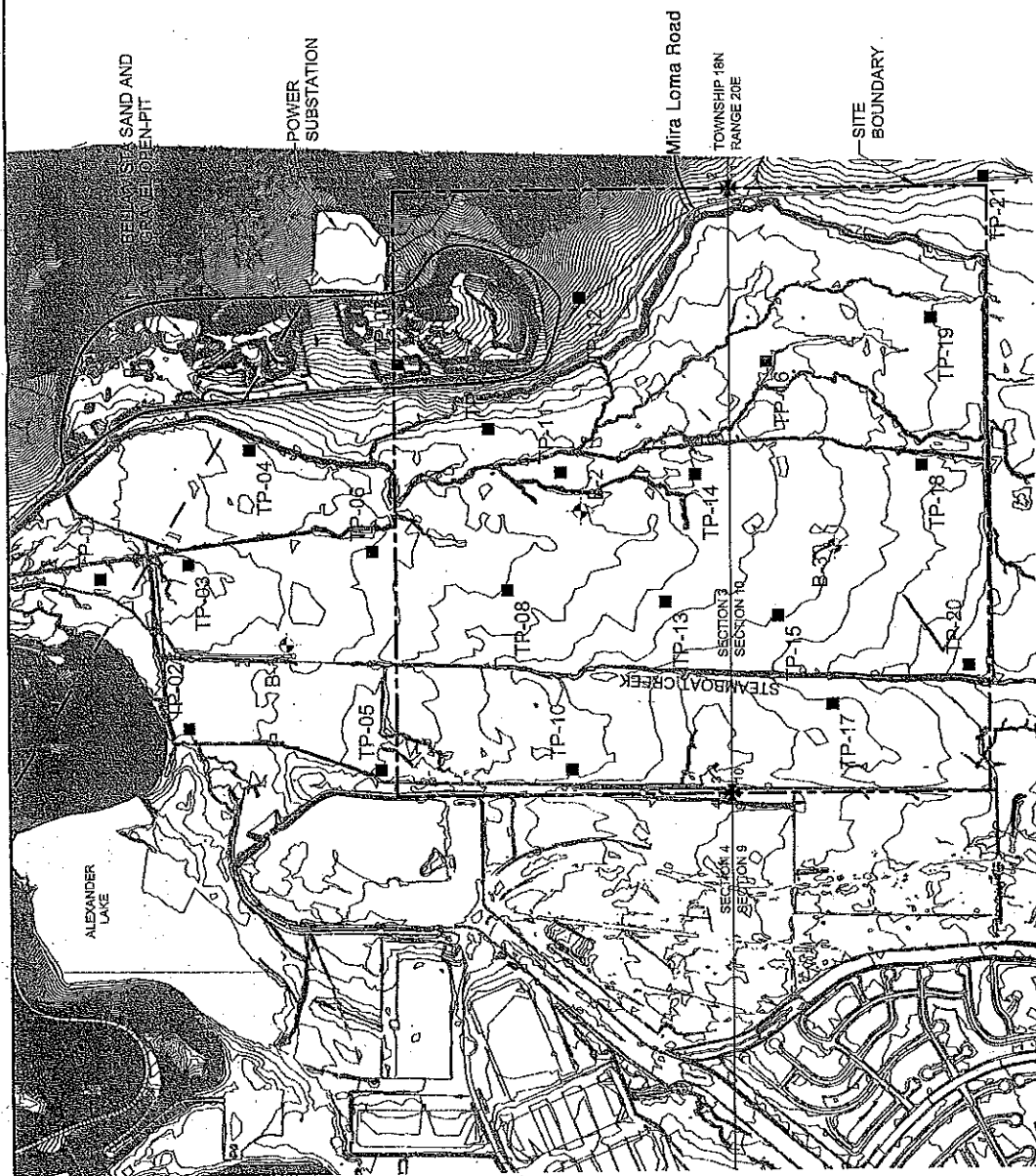
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PLATES



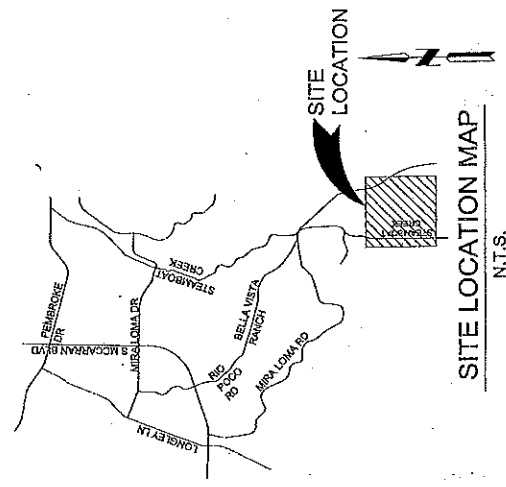
SCALE: 1" = 1000'

LEGEND

- TP-01 ■ APPROXIMATE TEST PIT LOCATION
- B-01 ● APPROXIMATE BORING LOCATION
- SITE BOUNDARY
- OPERATING CONVEYOR BELT FOR GRAVEL PIT

NOTES

1. BASE MAP PROVIDED BY CENTEX HOMES

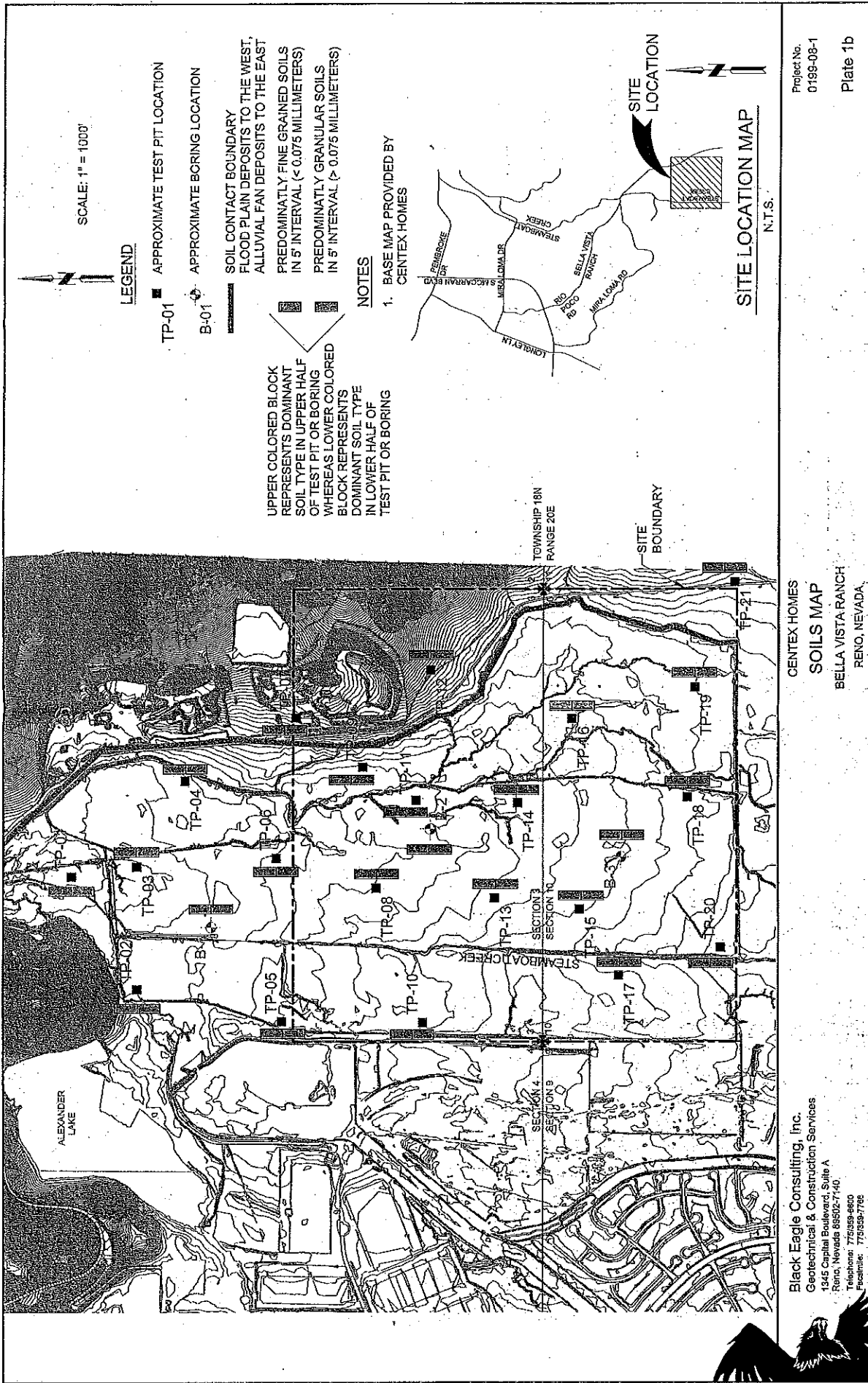


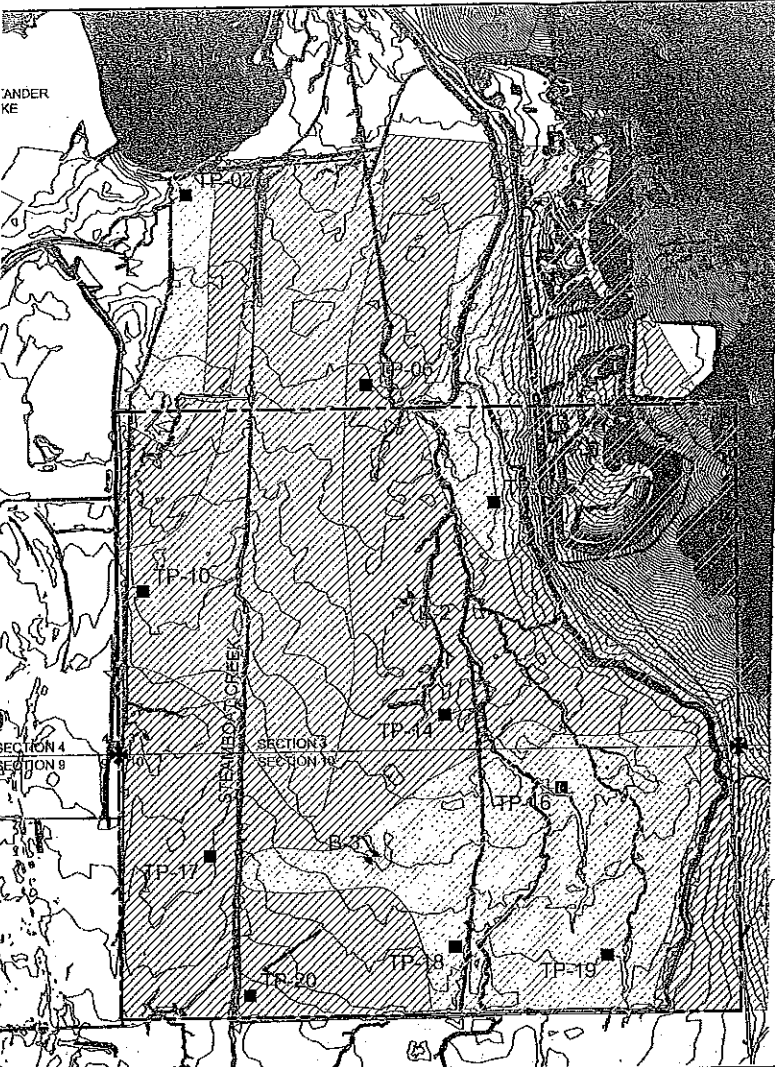
Project No.
0199-08-1
Plate 1a

CENTEX HOMES
PLOT PLAN
BELLA VISTA RANCH
RENO, NEVADA

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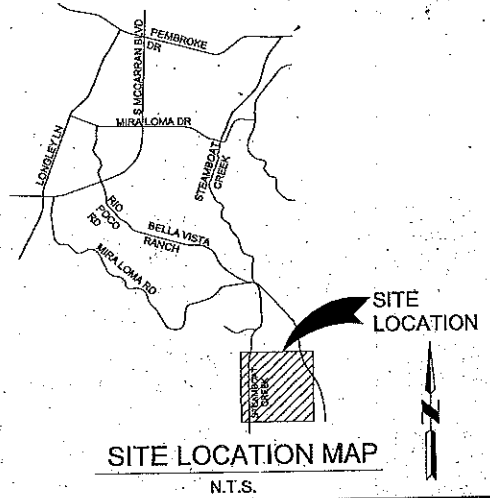
SCALE: 1" = 1000'

LEGEND

- TP-02 ■ TEST PIT WITH OBSERVATION WELL INSTALLED
- B-03 ● BORE HOLE WITH MONITORING WELL INSTALLED
- 0 - 5' DEPTH TO GROUNDWATER TABLE
- 5' - 10' DEPTH TO GROUNDWATER TABLE
- > 10' DEPTH TO GROUNDWATER TABLE

NOTES

1. BASE MAP PROVIDED BY CENTEX HOMES



CENTEX HOMES
GROUND WATER TABLE
 BELLA VISTA RANCH
 RENO, NEVADA

Project No.
 0199-08-1
 Plate 1c

C.
 /ices

BORING LOG

BORING NO.: B-01

DATE: 6/15/2004

TYPE OF BORING: CME 55

DEPTH TO GROUND WATER (ft): 21.0

LOGGED BY: TWJ

GROUND ELEVATION (ft): 4437 (Topo)

SAMPLE NO.	SAMPLE TYPE	BLOWS/12 inches	MOISTURE (%)	PLASTICITY INDEX	DEPTH (ft)	USCS SYMBOL	LITHOLOGY	DESCRIPTION
A	SPT	13				SM		0.0' - 2.0': Silty Sand light brown, slightly moist, loose from 0-0.1' and medium dense from 0.1-1.5', with estimated 20% non-plastic fines and 80% fine to coarse sand. With moderate roots to 1/4" in diameter.
B/B1	SPT	8				SM		2.0' - 3.4': Silty Sand brown, slightly moist, loose, with estimated <5% non-plastic fines and 95% fine to coarse sand. Fines have low plasticity in last 2" of the interval.
						CL		3.4' - 4.5': Lean Clay dark brownish black, moist, firm, with estimated 100% medium plastic fines.
C	SPT	13	24.7	26	5	CL		4.5' - 7.0': Lean Clay with Sand dark brown, moist, stiff, with 76% medium plastic fines, 23% fine to coarse sand, and 1% fine gravel. Material breaks at 4.0 tsf using the pocket penetrometer. Switch to mud rotary drilling after 6.5 feet.
D/D1	SPT	25				CH		7.0' - 8.5': Fat Clay dark brown, moist, very stiff, with estimated 95% high plastic fines and 5% fine to medium sand.
						SM		8.5' - 9.5': Silty Sand brown, moist, medium dense, with estimated 15% non-plastic fines, 80% fine to coarse sand, and 5% subrounded gravel to 1/4".
E	SPT	8			10	CH		9.5' - 12.0': Fat Clay dark grayish brown, moist, firm, with estimated 95% high plastic fines and 5% fine sand.
F/F1	SPT	5				SM		12.0' - 12.9': Silty Sand brown, moist, loose, with estimated 15% non-plastic fines and 85% fine to medium sand. Pocket penetrometer = 0 tsf.
						CL-ML		12.9' - 14.5': Silty Clay with Sand mottled from brown to dark green, very moist, firm, with estimated 85% low plastic fines and 15% fine to medium sand,
								14.5' - 18.0': Interbedded Lean Clay and Silty Sand dark

Located 130 feet east of ranch road.

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Reno, Nevada

PROJECT NO.:

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PLATE:

2a

SHEET 1 OF 3



BORING LOG

BORING NO.: B-01

DATE: 6/15/2004

TYPE OF BORING: CME 55

DEPTH TO GROUND WATER (ft): 21.0

LOGGED BY: TWJ

GROUND ELEVATION (ft): 4437 (Topo)

SAMPLE NO.	SAMPLE TYPE	BLOWS/12 inches	MOISTURE (%)	PLASTICITY INDEX	DEPTH (ft)	USCS SYMBOL	LITHOLOGY	DESCRIPTION
G	SPT	5				CL		greenish black, very moist silty sand with estimated 20% non-plastic fines and 80% fine to medium sand. Interbedded with dark black lean clay with estimated 90% medium plastic fines and 20% fine sand. Pocket penetrometer = 0.5-0.65 tsf.
H	SPT	2			20	CL		18.0' - 23.0': Lean Clay dark greenish black, very moist to wet, soft, with estimated 90% medium plastic fines and 10% fine sand.
I	SPT	10			25	SC		23.0' - 28.0': Interbedded Silty Sand, Clayey Sand, and Sandy Lean Clay dark greenish black, wet, loose. Material from 25.0-25.25' consists of Silty Sand with estimated 15% non-plastic fines and 85% fine to medium sand. The remaining material from 25.25-26.5' consists of interbedded Clayey Sand with estimated 20% low plastic fines and 80% fine to medium sand, and Sandy Lean Clay with estimated 65% low plastic fines and 35% fine to medium sand. Pocket penetrometer = 1.75-2.25 tsf.
								28.0' - 33.0': Poorly Graded Gravel with Sand dark gray, wet, dense, with estimated <5% non-plastic fines, 40% fine to coarse sand, and 55% rounded to subrounded gravel to 1/2". Pocket penetrometer = 1.5-2.0 (material breaks).

Located 130 feet east of ranch road.

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PLATE:

2b

SHEET 2 OF 3



BORING LOG

BORING NO.: B-01

DATE: 6/15/2004

TYPE OF BORING: CME 55

DEPTH TO GROUND WATER (ft): 21.0

LOGGED BY: TWJ

GROUND ELEVATION (ft): 4437 (Topo)

SAMPLE NO.	SAMPLE TYPE	BLOWS/12 inches	MOISTURE (%)	PLASTICITY INDEX	DEPTH (ft)	USCS SYMBOL	LITHOLOGY	DESCRIPTION
J	SPT	37				GP		
					35	SP-SM		33.0' - 38.0': Poorly Graded Sand with Silt and Gravel dark gray, wet, medium dense, with estimated 5% non-plastic to low plastic fines, 80% fine to coarse sand, and 15% rounded to subrounded gravel to 3/8". Very low recovery from 35.0-36.5 feet.
K	SPT	17						
						GP		38.0' - 41.0': Poorly Graded Gravel gray, wet, dense, with estimated <5% non-plastic fines, <5% fine to coarse sand, and 90% subrounded gravel to 1/2".
					40			
L/L1	SPT	37				GPS SM		41.0' - 41.4': Poorly Graded Gravel with Sand gray, wet, dense, with estimated <5% non-plastic fines, 35% fine to coarse sand, and 60% subrounded gravel to 1/2". 41.4' - 41.5': Silty Sand olive gray, wet, dense, with estimated 15% non-plastic fines and 85% fine to coarse sand.
								-- back fill mud-rotary hole with bentonite. Drill twin auger hole 10 feet east of mud-rotary hole in order to measure ground water table elevation at 21.0 feet below the surface.

Located 130 feet east of ranch road.

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PLATE:

2c

SHEET 3 OF 3



BORING LOG

BORING NO.: B-02

DATE: 6/16/2004

TYPE OF BORING: CME 55

DEPTH TO GROUND WATER (ft): 6.9

LOGGED BY: TWJ

GROUND ELEVATION (ft): 4431 (Topo)

SAMPLE NO.	SAMPLE TYPE	BLOWS/12 inches	MOISTURE (%)	PLASTICITY INDEX	DEPTH (ft)	USCS SYMBOL	LITHOLOGY	DESCRIPTION
A	SPT	4				CH		0.0' - 0.2': Fat Clay dark brown, moist, soft, with estimated 90% high plastic fines and 10% fine sand. With strong roots.
						SM		0.2' - 0.8': Silty Sand brown, slightly moist, very loose, with estimated 15% non-plastic fines and 85% fine to coarse sand.
						CL		0.8' - 2.0': Lean Clay dark brownish black, moist, very hard, with estimated 95% medium plastic fines and 5% fine sand. Pocket penetrometer = 4.0 tsf (material breaks).
B/B1	SPT	11				CL		2.0' - 3.0': Lean Clay brown, moist, stiff, with estimated 80% low plastic fines and 20% fine to medium sand. Pocket penetrometer = 2.75 tsf.
						SP-SM		3.0' - 4.5': Poorly Graded Sand with Silt brown, moist, medium dense, with estimated 10% non-plastic fines and 90% fine to coarse sand. Fines in last 1.5" of interval are low plastic. With trace roots.
C/C1	SPT	13			5	CL		4.5' - 5.5': Lean Clay with Sand brown, moist, stiff, with estimated 80% low plastic fines and 20% fine to medium sand.
						SP		5.5' - 7.0': Sandy Lean Clay brown, very moist to wet, stiff, with estimated <5% non-plastic fines and 95% fine to coarse sand. Last 1" of interval consists of dark brown and slightly moist Sandy Lean Clay (not sampled). With trace rootlets. Switch to mud-rotary drilling greater than 6.5 feet. Water sample collected on 6/17/04 and submitted for chemical analysis.
D/D1	SPT	15				CL		7.0' - 8.0': Lean Clay with Sand dark greenish gray, wet, stiff, with estimated 75% medium plastic fines and 25% fine to medium sand. Pocket penetrometer = 2.25 tsf.
						SM		8.0' - 9.5': Silty Sand dark greenish gray, wet, medium dense, with estimated 20% non-plastic fines and 80% fine to medium sand.
E	SPT	8			10	CL		9.5' - 12.0': Lean Clay with Sand from 10.0-10.1' is dark greenish gray, wet Clayey Sand (not sampled) with estimated 15% medium plastic fines and 85% fine to medium sand and trace gravel to 1/4". Most material from 10.1-11.5' consists of dark gray and wet Lean Clay with Sand with estimated 85% medium plastic fines and 15% fine sand. Pocket penetrometer = 1.5 tsf.
F	SPT	15				CL		12.0' - 14.5': Lean Clay dark greenish gray, wet, stiff, with estimated 95% medium plastic fines and 5% fine sand. Pocket penetrometer = 3.0-3.5 tsf from 12.5-13.5' and 2.75 tsf from 13.5-14.0'.
								14.5' - 16.0': Silty Sand dark greenish gray, wet, loose, with

Located 540 feet north of fence line and 880 feet southeast of TP-8.

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PROJECT NO.:

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PLATE:

2b

SHEET 1 OF 3



BORING LOG

BORING NO.: B-02

DATE: 6/16/2004

TYPE OF BORING: CME 55

DEPTH TO GROUND WATER (ft): 6.9

LOGGED BY: TWJ

GROUND ELEVATION (ft): 4431 (Topo)

SAMPLE NO.	SAMPLE TYPE	BLOWS/12 inches	MOISTURE (%)	PLASTICITY INDEX	DEPTH (ft)	USCS SYMBOL	LITHOLOGY	DESCRIPTION
G/G1	SPT	10				SM		estimated 15% non-plastic fines, 73% fine to coarse sand, and 12% subrounded gravel to 3/8". Pocket penetrometer = 2.5 tsf (material breaks).
						SC-SM		16.0' - 18.0': Silty, Clayey Sand dark grayish green, wet, loose, with estimated 25% non-plastic to low plastic fines and 75% fine to coarse sand. Pocket penetrometer = 0.5 tsf.
					20	SC		18.0' - 23.5': Clayey Sand dark grayish green, wet, loose, with estimated 40% low plastic fines and 60% fine to medium sand. More fines in upper half of interval. Pocket penetrometer = 1.0-1.5 tsf.
H	SPT	7						
					25			
I	SPT	50 in 5"				GP-GM		23.5' - 28.0': Poorly Graded Gravel with Silt and Sand dark greenish black, wet, very dense, with estimated 5% non-plastic fines, 25% fine to coarse sand, and 70% subrounded gravel to 1-1/2".
								28.0' - 33.0': Poorly Graded Gravel dark greenish gray, wet, very dense. Only trace recovery due to two pieces of subrounded gravel to 1-1/2" in diameter jammed in shoe. Very difficult drilling with tricone bit.

Located 540 feet north of fence line and 880 feet southeast of TP-8.

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PROJECT NO.:

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PLATE:

2c

SHEET 2 OF 3



BORING LOG

BORING NO.: B-02

DATE: 6/16/2004

TYPE OF BORING: CME 55

DEPTH TO GROUND WATER (ft): 6.9

LOGGED BY: TWJ

GROUND ELEVATION (ft): 4431 (Topo)

SAMPLE NO.	SAMPLE TYPE	BLOWS/12 inches	MOISTURE (%)	PLASTICITY INDEX	DEPTH (ft)	USCS SYMBOL	LITHOLOGY	DESCRIPTION
J	X SPT	50 in 6"				GP		
K/K1	X SPT	82			35	GP		33.0' - 35.7': Poorly Graded Gravel dark gray, wet, very dense, unconsolidated material, with estimated <5% non-plastic fines, 20% fine to coarse sand, and 75% subrounded to subangular gravel to 3/4".
						GP-GM		35.7' - 36.3': Poorly Graded Gravel with Silt and Sand dark greenish gray, wet, very dense, with estimated 7% non-plastic fines, 73% fine to coarse sand, and 20% subrounded to subangular gravel to 3/4". -- used tricone bit to 40'; hole keeps caving in after reaming hole out twice. Stop hole at 40' at 10:35 a.m. -- Drill a twin hollow-stem auger boring 5 feet east of mud-rotary hole and set 2-6/16" (O.D) PVC pipe in hole to observe ground water table elevation. Ground water table measured at 6.9 feet below surface on 6-17-04 at 12:10 p.m.

Located 540 feet north of fence line and 880 feet southeast of TP-8.



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PROJECT NO.:

0199-08-1

PLATE:

2d

SHEET 3 OF 3

BORING LOG

BORING NO.: B-03

DATE: 6/16/2004

TYPE OF BORING: CME 55

DEPTH TO GROUND WATER (ft): 4.6

LOGGED BY: TWJ

GROUND ELEVATION (ft): 4441 (Topo)

SAMPLE NO.	SAMPLE TYPE	BLOWS/12 inches	MOISTURE (%)	PLASTICITY INDEX	DEPTH (ft)	USCS SYMBOL	LITHOLOGY	DESCRIPTION
A/A1	SPT	6				SP-SM		0.0' - 0.4': Poorly Graded Sand with Silt brown, dry, loose, with estimated 5% non-plastic fines and 95% fine to coarse sand. With moderate roots.
						CL		
						SP		
						ML		0.4' - 0.7': Lean Clay brown, moist, firm, with estimated 95% low plastic fines and 5% fine sand.
B	SPT	8						0.7' - 1.0': Poorly Graded Sand brown, slightly moist, loose, with estimated <5% non-plastic fines and 95% fine to coarse sand.
						SC-SM		1.0' - 2.0': Silt with Sand brown, moist, firm, with estimated 85% non-plastic fines and 15% fine sand.
								2.0' - 4.5': Silty, Clayey Sand brown, moist, loose, interbedded Silty Sand and Clayey Sand, with estimated 20% non-plastic to low plastic fines, 80% fine to medium sand, and trace subangular gravel to 3/4" in last 2-1/2". With trace rootlets. Pocket penetrometer = 2.0 tsf (material breaks) from 2.5-3.0'; 0 tsf from 3.0-4.0'.
C/C1	SPT	5			5	SM		
						SC		4.5' - 5.3': Silty Sand brown, moist to wet, loose, with estimated 25% non-plastic fines and 75% fine to medium sand. With trace rootlets. Pocket penetrometer = 0 tsf.
						CH		5.3' - 5.5': Clayey Sand brown, wet, loose, with estimated 30% low plastic fines and 70% fine to medium sand.
						SM		5.5' - 7.0': Fat Clay dark brownish black, wet, firm, with estimated 95% medium to high plastic fines and 5% fine sand. Pocket penetrometer = 1.0-1.25 tsf. Switch to mud-rotary drilling greater than 6.5 feet.
D	SPT	11				CL		7.0' - 7.9': Silty Sand dark greenish black, wet, medium dense, with estimated 20% non-plastic fines, 70% fine to coarse sand, and 10% subrounded gravel to 1/4". Pocket penetrometer = 0 tsf.
					10	CL		7.9' - 9.5': Sandy Lean Clay dark greenish black, wet, stiff, with estimated 60% medium plastic fines and 40% fine to medium sand. Pocket penetrometer = 2.25 tsf.
E/E1	SPT	18				SP-SM		9.5' - 10.7': Lean Clay dark greenish gray, wet, very stiff, with estimated 90% medium plastic fines and 10% fine sand. Pocket penetrometer = 1.0-1.75 tsf.
								10.7' - 12.0': Poorly Graded Sand with Silt dark gray, wet, medium dense, with estimated 5% non-plastic fines and 95% fine to coarse sand.
F	SPT	28				SM		12.0' - 14.5': Silty Sand dark greenish black, wet, medium dense, with estimated 30% non-plastic fines and 70% fine to coarse sand. Pocket penetrometer = 0-0.5 tsf (material breaks).
								14.5' - 15.5': Silty, Clayey Sand dark gray, wet, medium dense,

Located in middle of meadow.

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PLATE:

2c

SHEET 1 OF 3

BORING LOG

BORING NO.: B-03

DATE: 6/16/2004

TYPE OF BORING: CME 55

DEPTH TO GROUND WATER (ft): 4.6

LOGGED BY: TWJ

GROUND ELEVATION (ft): 4441 (Topo)

SAMPLE NO.	SAMPLE TYPE	BLOWS/12 inches	MOISTURE (%)	PLASTICITY INDEX	DEPTH (ft)	USCS SYMBOL	LITHOLOGY	DESCRIPTION
G/G1	SPT	13				SC-SM		with estimated 20% medium plastic fines and 80% fine sand. Pocket penetrometer = 1.25 tsf.
						CL		15.5' - 18.0': Lean Clay dark gray, wet, stiff, with estimated 90% medium plastic fines and 10% fine sand. Pocket penetrometer = 2.5-2.75 tsf.
						SC		18.0' - 20.6': Clayey Sand dark greenish gray, wet, medium dense, with estimated 30% low plastic fines and 70% fine to medium sand. Pocket penetrometer = 0.5-1.25 tsf.
H	SPT	22			20	SP-SM		20.6' - 21.3': Poorly Graded Sand with Silt dark gray, wet, medium dense, with estimated 10% non-plastic fines and 90% fine to coarse sand. Pocket penetrometer = 0 tsf.
						CL		21.3' - 23.0': Lean Clay with Sand dark greenish black, wet, very stiff, with estimated 80% medium plastic fines and 20% fine to medium sand. Material not sampled.
						SC-SM		23.0' - 26.3': Silty, Clayey Sand dark greenish gray, wet, medium dense, with estimated 25% low plastic fines and 75% fine to medium sand. Pocket penetrometer = 0.5 tsf.
I/I1	SPT	18			25	SM		26.3' - 27.5': Silty Sand dark greenish gray, wet, medium dense, with estimated 20% non-plastic fines and 80% fine to medium sand. Pocket penetrometer = 2.25 tsf.
								27.5' - 33.0': Poorly Graded Gravel dark gray, wet, dense, unconsolidated, with estimated <5% non-plastic fines, 13% fine to coarse sand, and 82% subrounded to subangular gravel to 1-1/2". Difficult auger drilling from 27.5 to 33.0 feet. Hole keeps caving at 33.0 feet. Stop hole at 33.0 feet at 1:55 p.m.

Located in middle of meadow.

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PLATE:

2d

SHEET 2 OF 3

BORING LOG

BORING NO.: B-03

DATE: 6/16/2004

TYPE OF BORING: CME 55

DEPTH TO GROUND WATER (ft): 4.6

LOGGED BY: TWJ

GROUND ELEVATION (ft): 4441 (Topo)

SAMPLE NO.	SAMPLE TYPE	BLOWS/12 inches	MOISTURE (%)	PLASTICITY INDEX	DEPTH (ft)	USCS SYMBOL	LITHOLOGY	DESCRIPTION
1	SPT	32				GP		
					35			
					40			
								-- Drill hollow-stem auger hole 7 feet north of mud-rotary hole and install 2-6/16" (O.D.) PVC pipe 20 feet long to observe the ground water table elevation. Measured ground water table on 6-17-04 is 4.6 feet below the surface.

Located in middle of meadow.

BORING LOG 0199081.GPJ BLKEAGLE.GDT 9/17/2004



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PLATE:

2e

SHEET 3 OF 3

TEST PIT LOG

TEST PIT NO.: TP-01

DATE: 6/16/2004

TYPE OF HOE: Case 580 Super L Rubber tire back hoe

DEPTH TO GROUND WATER (ft): 11

LOGGED BY: DPM

GROUND ELEVATION (ft): 4444 (Topo)

SAMPLE NO.	SAMPLE TYPE	PENETROMETER (tsf)	MOISTURE (%)	PLASTICITY INDEX	DEPTH (ft)	USCS SYMBOL	LITHOLOGY	DESCRIPTION
A	GRAB					SC		0.0' - 0.5': CLAYEY SAND brown, dry, loose, with estimated 35-40% medium plasticity fines and 60-65% fine to coarse sand.
						SP		Very abundant organic material and roots present.
B	GRAB					CL		0.5' - 1.0': POORLY GRADED SAND brown, slightly moist, loose, with estimated trace non-plastic fines and 100% fine to medium sand.
C	GRAB					SM		1.0' - 1.9': SANDY LEAN CLAY brown, slightly moist, medium dense, with estimated 45-50% medium plasticity fines and 50-55% fine sand. Roots and oxidation encountered.
D	GRAB					SM		1.9' - 2.5': SILTY SAND white and light grey, slightly moist, medium dense, with estimated 40-45% low plasticity fines and 55-60% fine sand. Roots and oxidation encountered.
E	GRAB					SC		2.5' - 3.5': SILTY SAND grey, slightly moist, medium dense, with estimated 15-20% low plasticity fines and 80-85% fine sand. Roots and oxidation encountered.
F	GRAB					CL		3.5' - 4.0': CLAYEY SAND dark brown, slightly moist, medium dense, with estimated 45% medium plasticity fines and 55% fine to coarse sand. Abundant roots encountered.
								4.0' - 8.0': LEAN CLAY with SAND black and dark brown, slightly moist, firm to stiff, with estimated 80-90% medium plasticity fines and 10-20% fine sand. Grades to higher percentage sand, estimated from tailings. Hole caving occurs at 7 feet below grade.
								8.0' - 13.0': LEAN CLAY with SAND black and dark grey, moist to wet, firm, with estimated 80-90% medium plasticity fines and 10-20% fine sand.

Located south of Alexander Lake access road.

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PLATE:

2d

SHEET 1 OF 1

TEST PIT LOG

TEST PIT NO.: TP-02

DATE: 6/10/2004

TYPE OF HOE: Case 580 Super L Rubber tire back hoe

DEPTH TO GROUND WATER (ft): 2.7

LOGGED BY: DPM

GROUND ELEVATION (ft): 4438 (Topo)

SAMPLE NO.	SAMPLE TYPE	PENETROMETER (tsf)	MOISTURE (%)	PLASTICITY INDEX	DEPTH (ft)	USCS SYMBOL	LITHOLOGY	DESCRIPTION
								0.0' - 0.4': TOPSOIL
						SM		0.4' - 1.0': SILTY SAND grey and brown, moist, medium dense, with estimated 20% low plasticity fines and 80% fine to coarse sand with roots.
						SM		
						SP-SM		1.0' - 1.5': SILTY SAND grey, wet, loose to medium dense, with estimated 35% low plasticity fines and 65% fine sand.
								1.5' - 2.0': POORLY GRADED SAND with SILT grayish-brown, wet, loose, with estimated 5-10% non-plastic fines and 90-95% fine to coarse sand.
A	GRAB	<.5				CL		2.0' - 5.0': LEAN CLAY black, wet, soft, with estimated 85-90% low to medium plasticity fines and 10-15% fine sand. Water Sample collected on 6/17/04 and submitted for chemical analysis. Hole caving and water pumping at 2.7 feet below grade.
					5			
B	GRAB					SM		5.0' - 8.0': SILTY SAND dark grey, wet, loose, with estimated 30% low plasticity fines, 60% fine to coarse sand, and 10% fine subrounded gravel. Estimated from tailings.
						ML		8.0' - 9.5': SANDY SILT blue-green and grey, wet, soft, with estimated 55% low plasticity fines and 45% fine to coarse sand. Estimated from tailings.
					10			-- Install slotted PVC pipe to observe ground water table elevation. Measured ground water table on 6/17/04 is 2.7 feet below the ground surface.

Located 50 feet southeast of Steamboat Creek. PVC pipe installed to monitor ground water.

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PLATE:

2e

SHEET 1 OF 1

TEST PIT LOG

TEST PIT NO.: TP-03

DATE: 6/10/2004

TYPE OF HOE: Case 580 Super L Rubber tire back hoe

DEPTH TO GROUND WATER (ft): NE

LOGGED BY: DPM

GROUND ELEVATION (ft): 4440 (Topo)

SAMPLE NO.	SAMPLE TYPE	PENETROMETER (sf)	MOISTURE (%)	PLASTICITY INDEX	DEPTH (ft)	USCS SYMBOL	LITHOLOGY	DESCRIPTION
								0.0' - 0.5': TOPSOIL brown, slightly moist, medium dense, with abundant organic material.
A	GRAB	4.5				SP		0.5' - 1.5': POORLY GRADED SAND brown, slightly moist, medium dense, with estimated trace non-plastic fines, 100% fine to coarse sand, and trace fine subrounded gravel.
B	GRAB					ML		1.5' - 2.0': SILT with SAND light grey to black, dry, very stiff, with estimated 75-85% non-plastic to low plasticity fines and 15-25% fine sand. Thin black sandy silt seam at bottom.
						SP		2.0' - 5.0': POORLY GRADED SAND brown, slightly moist, loose to medium dense, with estimated trace non-plastic fines, 90% fine to coarse sand, and 10% fine subrounded gravel. Soil sample submitted for chemical analysis.
					5	SM		5.0' - 5.5': SILTY SAND black and brown, slightly moist, medium dense, with estimated 35% low plasticity fines and 65% fine sand.
						ML		SANDY SILT black and brown, slightly moist, stiff, with estimated 60-70% low plasticity fines and 30-40% fine to medium sand. Interbedded layers with weak to moderate cementation encountered. Estimated from tailings.
C	GRAB	2.5 - >5.0				CL		8.0' - 10.0': LEAN CLAY with SAND black, slightly moist to moist, stiff, with estimated 80% medium plasticity fines and 20% fine sand. Estimated from tailings.
					10			

Located in abandoned pasture approximately 30 feet west of dry irrigation ditch and 188 feet south of fence line.

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PLATE:

2f

SHEET 1 OF 1

TEST PIT LOG

TEST PIT NO.: TP-04

DATE: 6/16/2004

TYPE OF HOE: Case 580 Super L Rubber tire back hoe

DEPTH TO GROUND WATER (ft): 5

LOGGED BY: DPM

GROUND ELEVATION (ft): 4420 (Topo)

SAMPLE NO.	SAMPLE TYPE	PENETROMETER (tsf)	MOISTURE (%)	PLASTICITY INDEX	DEPTH (ft)	USCS SYMBOL	LITHOLOGY	DESCRIPTION
A	GRAB					SC		0.0' - 0.5': CLAYEY SAND reddish-brown, slightly moist, loose, with estimated 35% medium plasticity fines and 65% fine sand. Soil consists of predominantly organic material.
B	GRAB					CL		0.5' - 1.2': SANDY LEAN CLAY dark brown, slightly moist, firm, with estimated 55-60% medium plasticity fines and 40-45% fine sand. Abundant roots encountered.
C	GRAB					CL		1.2' - 2.5': SANDY LEAN CLAY light brown and grayish-brown, slightly moist, stiff, with estimated 60-65% medium plasticity fines and 35-40% fine to medium sand. Color darkens with depth from grade.
D	GRAB					CL		2.5' - 3.0': GRAVELLY LEAN CLAY with SAND grey, moist, very stiff, with estimated 55% medium plasticity fines, 15% fine to medium sand, and 30% fine to coarse subangular gravel. Rare small subangular cobbles up to 4-inches encountered.
					5	SC		3.0' - 5.5': SANDY LEAN CLAY grey, moist to wet, soft, with, estimated 65% medium plasticity fines, 35% fine sand, and trace fine subangular gravel.
						SC		5.5' - 7.0': CLAYEY SAND grey, wet, dense, with estimated 35-40% medium plasticity fines and 60-65% fine to coarse sand. Hole caving at 6.5 feet below grade.

10

BORING LOG 0199081.GPJ ELKEAGLE.GDT 8/17/2004



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PLATE:

2g

SHEET 1 OF 1

TEST PIT LOG

TEST PIT NO.: TP-05

DATE:

6/10/2004

TYPE OF HOE: Case 580 Super L Rubber tire back hoe

DEPTH TO GROUND WATER (ft): 4.5

LOGGED BY: DPM

GROUND ELEVATION (ft):

4429 (Topo)

SAMPLE NO.	SAMPLE TYPE	PENETROMETER (tsf)	MOISTURE (%)	PLASTICITY INDEX	DEPTH (ft)	USCS SYMBOL	LITHOLOGY	DESCRIPTION
A	GRAB	>5.0				SM		0.0' - 1.0': SILTY SAND brown, slightly moist, medium dense, with estimated 15% non-plastic fines and 85% fine to coarse sand with abundant roots.
						SC-SM		1.0' - 2.5': SILTY, CLAYEY SAND brown, slightly moist, medium dense, with estimated 30-35% medium plasticity fines and 65-70% fine to coarse sand. Soil sample submitted for chemical analysis.
						SM		2.5' - 3.5': SILTY SAND brown, moist, medium dense, with estimated 15% non-plastic fines and 85% fine to coarse sand.
						ML		3.5' - 3.9': SANDY SILT light brown, moist, hard, with estimated 65% low plasticity fines and 35% fine to coarse sand.
						SP		Strong cementation.
						SP-SM		3.9' - 4.5': POORLY GRADED SAND brown, very moist, loose, with estimated trace non-plastic fines, 100% fine to coarse sand, and trace fine subrounded gravel.
						ML		4.5' - 6.5': POORLY GRADED SAND with SILT grey-green, wet, loose, with estimated 10% non-plastic fines and 90% fine to coarse sand.
						SP		6.5' - 7.5': SANDY SILT grey, wet, hard, with estimated 60% low plasticity fines and 40% fine sand. Layer is strongly cemented and estimated from tailings.
								7.5' - 9.0': POORLY GRADED SAND grey, wet, loose, with estimated trace non-plastic fines and 100% fine to coarse sand. Estimated from tailings.

5

10

Located in abandoned pasture.

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PLATE:

2h

SHEET 1 OF 1

TEST PIT LOG

TEST PIT NO.: TP-06

DATE: 6/15/2004

TYPE OF HOE: Case 580 Super L Rubber tire back hoe

DEPTH TO GROUND WATER (ft): 9.2

LOGGED BY: DPM

GROUND ELEVATION (ft): 4430 (Topo)

SAMPLE NO.	SAMPLE TYPE	PENETROMETER (tsf)	MOISTURE (%)	PLASTICITY INDEX	DEPTH (ft)	USCS SYMBOL	LITHOLOGY	DESCRIPTION
						SP-SM		0.0' - 0.7': POORLY GRADED SAND with SILT brown, dry, loose, with estimated 10-12% non-plastic fines, 88-90% fine to coarse sand, and trace fine subrounded gravel. Abundant roots encountered.
A	GRAB					SP		0.7' - 2.3': POORLY GRADED SAND brown, slightly moist, loose, with estimated trace non-plastic fines, 100% fine to coarse sand, and trace fine subrounded gravel.
B	GRAB					CL		2.3' - 3.7': SANDY LEAN CLAY black and dark brown, slightly moist, medium stiff, with estimated 70% medium plasticity fines and 30% fine sand. Interbedded thin seams of silty soils near 3.5 feet below grade.
C	GRAB					ML		3.7' - 4.0': SANDY SILT reddish-brown, slightly moist, stiff, with estimated 50% low plasticity fines and 50% fine sand. Weakly cemented, with friable texture.
D	GRAB					SM		4.0' - 4.7': SILTY SAND light brown, slightly moist, medium dense, with estimated 30-40% low plasticity fines and 60-70% fine to medium sand. Fines decrease with depth from grade.
E	GRAB				5	SP-SM		4.7' - 6.0': POORLY GRADED SAND with SILT light brown, slightly moist, medium dense, with estimated 10% non-plastic to low plasticity fines, 90% fine to coarse sand, and trace fine sub-rounded gravel.
						CL		6.0' - 7.0': SANDY LEAN CLAY dark brown and grey, slightly moist, medium stiff, with estimated 50% low to medium plasticity fines and 50% fine sand. Estimated from tailings.
					10	SM		7.0' - 14.6': SILTY SAND brown and grey-green, moist to wet, medium dense, with 20-40% low plasticity fines and 60-80% fine to coarse sand. Layer is interbedded and estimated from tailings.

Located 146 feet north of fence line.

BORING LOG 0199081.GPJ BLKEAGLE.GDT 8/17/2004



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PLATE:

2i

SHEET 1 OF 2

TEST PIT LOG

TEST PIT NO.: TP-06

DATE: 6/15/2004

TYPE OF HOE: Case 580 Super L Rubber tire back hoe

DEPTH TO GROUND WATER (ft): 9.2

LOGGED BY: DPM

GROUND ELEVATION (ft): 4430 (Topo)

SAMPLE NO.	SAMPLE TYPE	PENETROMETER (tsf)	MOISTURE (%)	PLASTICITY INDEX	DEPTH (ft)	USCS SYMBOL	LITHOLOGY	DESCRIPTION
					20			-- Install slotted PVC pipe to observe the ground water table elevation. Measured ground water table on 6/17/04 is 9.2 feet below the ground surface.
					25			

Located 146 feet north of fence line.

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PLATE:

2j

SHEET 2 OF 2



TEST PIT LOG

TEST PIT NO.: TP-07

DATE: 6/14/2004

TYPE OF HOE: Case 580 Super L Rubber tire back hoe

DEPTH TO GROUND WATER (ft): NE

LOGGED BY: TWJ

GROUND ELEVATION (ft): 4448 (Topo)

SAMPLE NO.	SAMPLE TYPE	PENETROMETER (tsf)	MOISTURE (%)	PLASTICITY INDEX	DEPTH (ft)	USCS SYMBOL	LITHOLOGY	DESCRIPTION
A	GRAB					SM		0.0' - 1.0': SILTY SAND grayish brown, dry to slightly moist, loose from 0-0.15' and dense from 0.15-1.0', with estimated 15% non-plastic fines and 85% fine to medium sand. With trace roots to 0.3" in diameter.
B	GRAB					GP-GC		1.0' - 3.0': POORLY GRADED GRAVEL WITH CLAY AND SAND dark brown, moist, very dense, with estimated 10% low to medium plastic fines, 30% fine to coarse sand, and 60% subrounded to subangular gravel to 2-1/2". With subrounded to subangular cobbles to 1' that make up to 40% of the total soil mass. With subrounded boulders to 3' that make up to 10% of the total soil mass. With trace rootlets. Moderately difficult to excavate.
C	GRAB					GP		
D	GRAB					GP		
					5			POORLY GRADED GRAVEL WITH SAND brown, slightly moist, dense, with estimated 5% non-plastic fines, 15% fine to coarse sand, and 80% subrounded gravel to 2-1/2".
					10			3.4' - 4.1': POORLY GRADED GRAVEL-Hardpan light whitish gray, slightly moist, dry, with estimated <5% non-plastic fines, 10% fine to coarse sand, and 85% angular to subangular gravel to 3". With angular cobbles to 6" that make up to 5% of the total soil mass. With strong calcium carbonate cement. Material is very difficult to excavate. Refusal at 4.1 feet. Trench excavation is 60 feet long. No fault observed.

Located on native soil window within Bella Vista Pit at 50 feet north of mine road.

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PLATE:

2j

SHEET 1 OF 1

TEST PIT LOG

TEST PIT NO.: TP-08

DATE: 6/10/2004

TYPE OF HOE: Case 580 Super L Rubber tire back hoe

DEPTH TO GROUND WATER (ft): NE

LOGGED BY: DPM

GROUND ELEVATION (ft): 4432 (Topo)

SAMPLE NO.	SAMPLE TYPE	PENETROMETER (tsf)	MOISTURE (%)	PLASTICITY INDEX	DEPTH (ft)	USCS SYMBOL	LITHOLOGY	DESCRIPTION
A	GRAB					SC		0.0' - 0.5': TOPSOIL brown, dry, loose, with abundant organic material.
						SP-SM		0.5' - 1.0': CLAYEY SAND black, slightly moist, coarse, with estimated 20% medium plasticity fines and 80% fine to coarse sand.
						SP-SM		1.0' - 3.0': POORLY GRADED SAND with SILT brown, slightly moist, loose, with estimated trace non-plastic fines, 95% fine to coarse sand, and 5% fine rounded gravel.
B	GRAB	3.5				SP-SM		3.0' - 5.0': POORLY GRADED SAND with SILT light brown and brown, slightly moist, medium dense, with estimated 5% non-plastic fines, 95% fine to coarse sand, and trace fine rounded gravel. Thin seam of silty sand encountered at top of layer.
					5	SC		5.0' - 6.5': CLAYEY SAND black, moist, medium dense, with estimated 45% medium plasticity fines and 55% fine sand.
						SC		6.5' - 11.0': CLAYEY SAND black and brown, moist, medium dense, with estimated 25-35% low to medium plasticity fines and 65-75% fine to coarse sand. Alternating interbedded layers of silty sand and clayey sand estimated from tailings.

Abandoned pasture with brush to 1 foot in height.

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PLATE:

2k

SHEET 1 OF 1



TEST PIT LOG

TEST PIT NO.: TP-09

DATE: 6/15/2004

TYPE OF HOE: Case 580 Super L Rubber tire back hoe

DEPTH TO GROUND WATER (ft): 4.0

LOGGED BY: DPM

GROUND ELEVATION (ft): 4430.9 (Topo)

SAMPLE NO.	SAMPLE TYPE	PENETROMETER (tsf)	MOISTURE (%)	PLASTICITY INDEX	DEPTH (ft)	USCS SYMBOL	LITHOLOGY	DESCRIPTION
A	GRAB					SC		0.0' - 0.7': CLAYEY SAND brown, dry to slightly moist, loose to medium dense, with estimated 40% medium plasticity fines and 60% fine sand. Very abundant organic material and roots present in soil.
B	GRAB		19.1	7		CL		0.7' - 1.2': SANDY LEAN CLAY light brown, slightly moist, firm, with estimated 55-60% medium plasticity fines and 40-45% fine sand. Very abundant organic material in soil. Soil sample submitted for chemical analysis.
C	GRAB					SC-SM		1.2' - 2.2': SILTY, CLAYEY SAND brown, moist, loose, with 21% low to medium plasticity fines and 80% fine to coarse sand.
D	GRAB					SP-SM		2.2' - 3.0': POORLY GRADED SAND with SILT brown, moist, loose, with estimated 5% non-plastic fines and
E	GRAB					SC		3.0' - 4.0': CLAYEY SAND brown, very moist, loose to medium dense, with estimated 20% medium plasticity fines, 75% fine to coarse sand, and 5% fine subrounded gravel.
					5	SC		4.0' - 5.5': CLAYEY SAND light brown, wet, medium dense, with estimated 45% medium plasticity fines and 55% fine sand.
F	GRAB					SM		5.5' - 10.0': SILTY SAND grey, wet, loose, with estimated 15% low plasticity fines, 85% fine to coarse sand, and trace fine subrounded gravel.
					10			-- Install slotted PVC pipe to observe the ground water table elevation. Measured ground water table on 6/17/04 is 4.0 feet below the ground surface.

Located 165 feet east of active irrigation ditch.

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TEST PIT LOG

TEST PIT NO.: TP-10

DATE: 6/14/2004

TYPE OF HOE: Case 580 Super L Rubber tire back hoe

DEPTH TO GROUND WATER (ft): >10

LOGGED BY: TWJ

GROUND ELEVATION (ft): 4433.5 (Topo)

SAMPLE NO.	SAMPLE TYPE	PENETROMETER (tsf)	MOISTURE (%)	PLASTICITY INDEX	DEPTH (ft)	USCS SYMBOL	LITHOLOGY	DESCRIPTION
A	GRAB					CL-ML		0.0' - 0.6': SILTY CLAY grayish brown, dry to slightly moist, firm, with estimated 90% low plastic fines and 10% fine sand. With strong roots.
B	GRAB	>4.5				CL		0.6' - 2.2': SANDY LEAN CLAY dark brown, moist, very hard, with estimated 70% low plastic fines and 30% fine to medium sand. With trace rootlets. Pocket penetrometer is >4.5 tsf.
C	GRAB	4.0-4.5				CL		2.2' - 3.7': LEAN CLAY WITH SAND light brown, moist, hard, with estimated 85% low plastic fines and 15% fine to medium sand. With trace rootlets.
D	GRAB				5	SP		3.7' - 7.1': POORLY GRADED SAND brown, very moist, dense, with estimated <5% non-plastic fines and 95% fine to coarse sand. Interbedded with Clayey Sand with estimated 15% low plastic fines and 85% fine to coarse sand. With trace rootlets.
E	GRAB	>4.5				CL		7.1' - 9.5': LEAN CLAY dark brown to brown, very moist, very hard, with estimated 90% medium plastic fines and 10% fine sand. Pocket penetrometer = >4.5 tsf.
F	GRAB				10	SP		9.5' - 10.0': POORLY GRADED SAND brown, very moist, medium dense, with estimated <5% non-plastic fines and 95% fine to coarse sand. No seeping water.
G	GRAB					CL		10.0' - 11.5': LEAN CLAY dark grayish green, very moist, very hard, with estimated 95% medium plastic fines and 5% fine sand.
-- Install 3" diameter PVC pipe to observe the ground water table elevation. Ground water table measured at deeper than 10.0 feet below the ground surface on 6/17/04.								

Located 65 feet east of fence line.

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TEST PIT LOG

TEST PIT NO.: TP-11

DATE: 6/10/2004

TYPE OF HOE: Case 580 Super L Rubber tire back hoe

DEPTH TO GROUND WATER (ft): 9.5

LOGGED BY: DPM

GROUND ELEVATION (ft): 4431.5 (Topo)

SAMPLE NO.	SAMPLE TYPE	PENETROMETER (tsf)	MOISTURE (%)	PLASTICITY INDEX	DEPTH (ft)	USCS SYMBOL	LITHOLOGY	DESCRIPTION
						SC		0.0' - 1.5': CLAYEY SAND black and dark brown, slightly moist, loose, with estimated 40-45% medium plasticity fines and 55-60% fine sand. Dense rootlets encountered.
A	GRAB					SM		1.5' - 2.7': SILTY SAND brown, moist, medium dense, with estimated 12-15% low plasticity fines and 85-88% fine to coarse sand with roots.
						SC SP		2.7' - 3.0': CLAYEY SAND dark brown, moist, medium dense, with estimated 35% medium plasticity fines and 65% fine to coarse sand.
B	GRAB					SC-SM		3.0' - 3.5': POORLY GRADED SAND brown, moist, medium dense, with estimated trace non-plastic fines and 100% fine to coarse sand.
C	GRAB	3.0			5	CL		3.5' - 4.5': SILTY, CLAYEY SAND brown, moist, medium dense, with estimated 35-45% low to medium plasticity fines and 55-65% fine to coarse sand.
								4.5' - 6.5': SANDY LEAN CLAY dark brown, moist, firm to stiff, with estimated 50% medium plasticity fines and 50% fine sand.
								6.5' - 10.0': CLAYEY SAND brown and dark brown, moist to wet, medium dense, with estimated 20-35% medium plasticity fines and 65-80% fine to coarse sands in interbedded layers. Estimated from tailings.
					10	SC		

Abandoned pasture with sage to 3 foot in height.

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TEST PIT LOG

TEST PIT NO.: TP-12

DATE: 6/10/2004

TYPE OF HOE: Case 580 Super L Rubber tire back hoe

DEPTH TO GROUND WATER (ft): >6.5

LOGGED BY: TWJ

GROUND ELEVATION (ft): 4455 (Topo)

SAMPLE NO.	SAMPLE TYPE	PENETROMETER (tsf)	MOISTURE (%)	PLASTICITY INDEX	DEPTH (ft)	USCS SYMBOL	LITHOLOGY	DESCRIPTION
A	GRAB					SM		0.0' - 0.9': SILTY SAND grayish brown, dry from 0-0.1' and slightly moist from 0.1-0.9', dense, with estimated 20% non-plastic fines, 68% fine to medium sand, and 12% subrounded gravel to 2". With trace roots to 1/2".
B	GRAB					GP-GC		0.9' - 1.7': POORLY GRADED GRAVEL WITH CLAY AND SAND dark brown, moist, very dense, with estimated 5% medium plastic fines, 40% fine to coarse sand, and 55% subangular gravel to 3". With subangular cobbles to 1". With trace roots to 1/2".
C	GRAB					GP		1.7' - 2.7': POORLY GRADED GRAVEL light whitish gray, dry to slightly moist, very dense, with estimated <5% non-plastic fines, 10% fine to coarse sand, and 85% subangular to subrounded gravel to 3". With trace subangular cobbles to 7". With strong calcium carbonate cement. Gravel and cobbles consist of black basalt porphyry.
D	GRAB					GP-GM		2.7' - 4.6': POORLY GRADED GRAVEL WITH SILT AND SAND light brown, slightly moist, very dense, with estimated 5% non-plastic fines, 30% fine to coarse sand, and 65% subangular to subrounded gravel to 3". With subrounded to subangular cobbles to 8" that make up to 15% of the total soil mass. With trace calcium carbonate filaments and coatings to gravel and sand.
E	GRAB					SP		4.6' - 6.5': POORLY GRADED SAND WITH GRAVEL light brown, slightly moist, very dense, with estimated <5% non-plastic fines, 80% fine to coarse sand, and 15% subrounded to subangular gravel to 3". With subrounded cobbles to 6" that make up to 5% of the total soil mass. Refusal at 6.5 feet.

Located 150 feet south of open pit boundary and 280 feet northeast of dirt road.

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TEST PIT LOG

TEST PIT NO.: TP-13

DATE: 6/10/2004

TYPE OF HOE: Case 580 Super L Rubber tire back hoe

DEPTH TO GROUND WATER (ft): NE

LOGGED BY: DPM

GROUND ELEVATION (ft): 4441.5 (Topo)

SAMPLE NO.	SAMPLE TYPE	PENETROMETER (tsf)	MOISTURE (%)	PLASTICITY INDEX	DEPTH (ft)	USCS SYMBOL	LITHOLOGY	DESCRIPTION
								0.0' - 0.4': TOPSOIL
						SP		0.4' - 1.0': POORLY GRADED SAND light brown, dry, dense, with estimated trace non-plastic fines and 100% fine to coarse sand with abundant roots.
A	GRAB	>5.0 tsf				SM		1.0' - 1.5': SILTY SAND light brown, dry, dense, with estimated 30% non-plastic fines and 70% fine sand with roots.
						SP		1.5' - 2.3': POORLY GRADED SAND reddish-brown and brown, dry, loose, with estimated trace non-plastic fines and 100% fine to coarse sand with abundant roots.
						ML		2.3' - 3.0': SANDY SILT light brown and black, dry, very stiff, with estimated 55-60% low plasticity fines and 40-45% fine sand.
						SP		3.0' - 3.5': POORLY GRADED SAND brown, dry, dense, with estimated 5% non-plastic fines and 95% fine to coarse sand with mica.
B	GRAB		10.9	11	5	CL		3.5' - 5.0': SANDY LEAN CLAY light brown, dry, very stiff with 59% low plastic fines and 41% fine to medium sand.
						SP		5.0' - 6.0': POORLY GRADED SAND brown, dry to slightly moist, loose, with estimated trace non-plastic fines and 100% fine to coarse sand with mica.
						ML		6.0' - 7.0': SANDY SILT brown, moist, stiff, with estimated 55% low plasticity fines and 45% fine sand.
								7.0' - 12.0': CLAYEY SAND brown and grey, moist, medium dense, with estimated 35-45% medium plasticity fines and 55-65% fine to coarse sand. Estimated from tailings.
					10	SC		

Abandoned pasture with dense brush to 3 foot in height.

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TEST PIT LOG

TEST PIT NO.: TP-14

DATE: 6/15/2004

TYPE OF HOE: Case 580 Super L Rubber tire back hoe

DEPTH TO GROUND WATER (ft): 6.5

LOGGED BY: DPM

GROUND ELEVATION (ft): 4432 (Topo)

SAMPLE NO.	SAMPLE TYPE	PENETROMETER (tsf)	MOISTURE (%)	PLASTICITY INDEX	DEPTH (ft)	USCS SYMBOL	LITHOLOGY	DESCRIPTION
						CL		0.0' - 1.0': SANDY LEAN CLAY
A	GRAB					SC		1.0' - 2.0': CLAYEY SAND black and brown, slightly moist, medium dense, with estimated 40% medium plasticity fines and 60% fine sand. Abundant organics and interbedded clean sand and silty sand seams encountered.
B	GRAB		6.1	NP		SM		2.0' - 2.7': SILTY SAND brown, slightly moist, medium dense, with 13% non-plastic fines and 87% fine to medium sand with mica. Fines percentage decreases with depth from grade. Soil sample submitted for chemical analysis.
C	GRAB					SC		2.7' - 3.0': CLAYEY SAND black, slightly moist, medium dense, with estimated 45% medium plasticity fines and 55% fine sand.
						SC		3.0' - 3.5': CLAYEY SAND light brown, slightly moist, medium dense, with estimated 35% medium plasticity fines and 65% fine to coarse sand.
D	GRAB				5	CL		3.5' - 3.7': CLAYEY SAND light brown, slightly moist, medium dense, with estimated 25% medium plasticity fines and 75% fine to coarse sand.
						SM		3.7' - 6.0': SANDY LEAN CLAY dark brown, moist, stiff, with estimated 65% low to medium plasticity fines and 35% fine sand.
						CL		6.0' - 6.7': SILTY SAND brown, moist, medium dense, with estimated 15% low plasticity fines and 85% fine to coarse sand.
								6.7' - 8.0': SANDY LEAN CLAY brown, moist, firm, with estimated 75% medium plasticity fines and 25% fine sand.
					10	SC-SM		8.0' - 13.0': SILTY, CLAYEY SAND brown, grey, and bluish-green, moist, medium dense, with estimated 25-40% low to medium plasticity fines and 60-75% fine to coarse sand. Interbedded layers of silty sands and clayey sands estimated from tailings.
-- Install slotted PVC pipe to observe the ground water table elevation. Measured ground water table on 6/17/04 is 6.5 feet below the ground surface.								

Located 50 feet south of fence line.

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TEST PIT LOG

TEST PIT NO.: TP-15

DATE: 6/10/2004

TYPE OF HOE: Case 580 Super L Rubber tire back hoe

DEPTH TO GROUND WATER (ft): 11

LOGGED BY: DPM

GROUND ELEVATION (ft): 4441 (Topo)

SAMPLE NO.	SAMPLE TYPE	PENETROMETER (tsf)	MOISTURE (%)	PLASTICITY INDEX	DEPTH (ft)	USCS SYMBOL	LITHOLOGY	DESCRIPTION
						SC		0.0' - 0.5': CLAYEY SAND brown, dry, dense, with estimated 35-40% medium plasticity fines and 60-65% fine to coarse sand.
						SP		Very abundant roots and organics encountered.
A	GRAB					SC-SM		0.5' - 1.5': POORLY GRADED SAND brown, slightly moist, loose, with estimated trace non-plastic fines and 100% fine to coarse sand.
B	GRAB	4.5				ML		1.5' - 3.0': SILTY, CLAYEY SAND dark brown, slightly moist, medium dense, with estimated 35-40% low to medium plasticity fines and 60-65% fine to coarse sand.
						SP		3.0' - 3.5': SANDY SILT brown, moist, stiff, with estimated 55% low plasticity fines and 45% fine sand.
						ML		3.5' - 4.0': POORLY GRADED SAND brown, moist, medium dense, with estimated trace non-plastic fines and 100% fine to coarse sand.
					5	SP		
						SP-SM		4.0' - 4.5': SANDY SILT brown, moist, stiff, with estimated 55% low plasticity fines and 45% fine sand.
						CH		4.5' - 5.0': POORLY GRADED SAND brown, moist, medium dense, with estimated trace non-plastic fines and 100% fine to coarse sand.
						SC		5.0' - 6.0': POORLY GRADED SAND with SILT brown, moist, medium dense, with estimated 5-10% non-plastic fines and 90-95% fine to coarse sand.
						CH		6.0' - 7.0': SANDY FAT CLAY black, moist, stiff, with estimated 70% medium to high plasticity fines and 30% fine sand. Estimated from tailings.
					10	CH		
						SP-SM		7.0' - 9.0': CLAYEY SAND brown, moist, medium dense, with estimated 30% medium plasticity fines and 70% fine to coarse sand. Estimated from tailings.
								9.0' - 9.5': SANDY FAT CLAY black, moist, stiff, with estimated 70% medium to high plasticity fines and 30% fine sand. Estimated from tailings.
								9.5' - 12.0': POORLY GRADED SAND with SILT brown, moist to wet, medium dense, with estimated 5-10% low plasticity fines and 90-95% fine to coarse sand. Estimated from tailings.

Located 500 feet east of Steamboat ditch with 1 foot high dense brush.

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TEST PIT LOG

TEST PIT NO.: TP-16

DATE: 6/10/2004

TYPE OF HOE: Case 580 Super L Rubber tire back hoe

DEPTH TO GROUND WATER (ft): 2.7

LOGGED BY: DPM

GROUND ELEVATION (ft): 4434 (Topo)

SAMPLE NO.	SAMPLE TYPE	PENETROMETER (sf)	MOISTURE (%)	PLASTICITY INDEX	DEPTH (ft)	USCS SYMBOL	LITHOLOGY	DESCRIPTION
								0.0' - 0.5': TOPSOIL
A	GRAB					CL		0.5' - 1.0': SANDY LEAN CLAY light brown, moist, firm, with estimated 60-70% medium plasticity fines and 30-40% fine sand.
B	GRAB					CL		1.0' - 2.2': SANDY LEAN CLAY light brown, moist, soft, with estimated 60% low to medium plasticity fines and 40% fine sand.
C	GRAB					CL		2.2' - 2.8': SANDY LEAN CLAY brown, moist to wet, soft, with estimated 50% medium plasticity fines and 50% fine sand.
D	GRAB					CL		2.8' - 4.0': SANDY LEAN CLAY light brown and brown, wet, soft, with estimated 50% medium plasticity fines, 40% fine to coarse sand, and 10% fine to coarse round gravel. With trace rounded cobbles to 8". Water sample collected on 6/17/04 and submitted for chemical analysis.
						SC		
					5			4.0' - 4.5': CLAYEY SAND brown, wet, soft, with estimated 35-45% medium plasticity fines, 55-65% fine to coarse sand, and trace fine to coarse rounded gravel. Estimated from tailings.
E	GRAB					SM		4.5' - 7.0': SILTY SAND grey-brown, wet, loose to very loose, with estimated 25% low plasticity fines, 70% fine to coarse sand, and 5% rounded fine to coarse gravel. Occasional rounded cobbles up to 8-inches in diameter comprise 5% total soil mass.
								-- Install slotted PVC pipe to observe the ground water table elevation. The measured ground water table on 6/17/04 is 2.7 feet below the ground surface.
					10			

Located west of Mira Loma Road and gun club.

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TEST PIT LOG

TEST PIT NO.: TP-17

DATE: 6/14/2004

TYPE OF HOE: Case 580 Super L Rubber tire back hoe

DEPTH TO GROUND WATER (ft): 5.1

LOGGED BY: TWJ

GROUND ELEVATION (ft): 4444 (Topo)

SAMPLE NO.	SAMPLE TYPE	PENETROMETER (tsf)	MOISTURE (%)	PLASTICITY INDEX	DEPTH (ft)	USCS SYMBOL	LITHOLOGY	DESCRIPTION
A/B	GRAB					CL		0.0' - 0.6': LEAN CLAY brown, slightly moist, firm, with estimated 90% low plastic fines and 10% fine sand. With strong roots and grass.
						CL		0.6' - 1.3': LEAN CLAY WITH SAND brown, slightly moist, very stiff, with estimated 85% low plastic fines and 15% fine sand. With weak roots. Pocket penetrometer = 3.0-3.5 tsf.
						SM		1.3' - 3.1': SILTY SAND grayish brown to brown, moist, dense, with estimated 20% non-plastic fines and 80% fine to medium sand. With trace rootlets. A one-inch thick layer of dark brown Clayey Sand occurs at 2.0 feet with 15% medium plastic fines and 85% fine to medium sand.
						SP		3.1' - 4.7': POORLY GRADED SAND brown, moist, dense, with estimated <5% non-plastic fines and 95% fine to coarse sand. With trace rootlets. One 0.5" thick Clayey Sand layer at 3.4 feet with 15% medium plastic fines and 85% fine to medium sand.
					5	SM		4.7' - 5.9': SILTY SAND dark brown, very moist to wet, dense, with estimated 15% non-plastic fines and 85% fine to medium sand. With trace rootlets.
						SC-SM		5.9' - 7.8': SILTY, CLAYEY SAND mottled from dark brown to dark green, wet, dense, with estimated 25% non-plastic to low plastic fines and 75% fine to medium sand. Water is minorly seeping at 7.8 feet at approximately 1 gallon per minute.
						SP		7.8' - 10.4': POORLY GRADED SAND grayish brown, wet, dense, with estimated <5% non-plastic fines, 85% fine to coarse sand, and 10% rounded gravel to 1-1/2".
					10			
								-- Soil sample from 0-1.3 feet submitted for chemical analysis.
								-- Install 3" diameter PVC pipe to observe the ground water table elevation. Ground water table measured at 5.1 feet below the ground surface on 6/17/04.

Located 200 feet west of Steamboat Creek, dense grass to 3 feet tall.

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TEST PIT LOG

TEST PIT NO.: TP-18

DATE: 6/15/2004

TYPE OF HOE: Case 580 Super L Rubber tire back hoe

DEPTH TO GROUND WATER (ft): 4.2

LOGGED BY: DPM

GROUND ELEVATION (ft): 4441 (Topo)

SAMPLE NO.	SAMPLE TYPE	PENETROMETER (tsf)	MOISTURE (%)	PLASTICITY INDEX	DEPTH (ft)	USCS SYMBOL	LITHOLOGY	DESCRIPTION
								0.0' - 0.5': TOPSOIL
A	GRAB					SP		0.5' - 1.0': POORLY GRADED SAND brown, slightly moist, loose, with estimated trace non-plastic fines and 100% medium to coarse sand with roots.
B	GRAB		30.1	16		CL		1.0' - 3.0': SANDY LEAN CLAY brown, moist, medium dense, with 59% medium plasticity fines and 41% fine sand.
C	GRAB					CL		3.0' - 4.0': SANDY LEAN CLAY light brown, moist, stiff, with estimated 65% low to medium plasticity fines and 35% fine sand.
					5	SC-SM		4.0' - 7.0': SILTY, CLAYEY SAND brown, very moist to wet, loose, with estimated 35% low to medium plasticity fines and 65% fine to medium sand.
					10	SM		7.0' - 10.0': SILTY SAND grey-green-blue, wet, loose to medium dense, with estimated 30% low plasticity fines and 70% fine to coarse sand.
-- Install slotted PVC pipe to observe the ground water table elevation. The measured ground water table on 6/17/04 is 4.2 feet below the ground surface.								

Located 150 feet east of flowing creek in southeast corner of parcel.

BORING LOG 0199081.GPJ BLK EAGLE.GDT 8/17/2004



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TEST PIT LOG

TEST PIT NO.: TP-19

DATE: 6/15/2004

TYPE OF HOE: Case 580 Super L Rubber tire back hoe

DEPTH TO GROUND WATER (ft): 3.0

LOGGED BY: DPM

GROUND ELEVATION (ft): 4441.5 (Topo)

SAMPLE NO.	SAMPLE TYPE	PENETROMETER (tsf)	MOISTURE (%)	PLASTICITY INDEX	DEPTH (ft)	USCS SYMBOL	LITHOLOGY	DESCRIPTION
						SC		0.0' - 0.7': CLAYEY SAND dark brown, slightly moist, loose, with estimated 45% low to medium plasticity fines and 55% fine sand.
A	GRAB					CL		0.7' - 1.1': SANDY LEAN CLAY grey and black, moist, soft, with estimated 60-70% medium plasticity fines and 30-40% fine sand. Layer is interbedded with alternating colors.
B	GRAB		42.2	12		ML		1.1' - 3.5': SANDY SILT light brown, moist to wet, soft, with 66% low plasticity fines, 30% fine to coarse sand, and 4% fine gravel.
C	GRAB					SC		3.5' - 4.0': CLAYEY SAND with GRAVEL brown, wet, loose, with estimated 40% low to medium plasticity fines, 45% fine to coarse sand, and 15% fine to coarse angular gravel. Subangular fine to coarse cobbles up to 8" comprise 5% of the total soil mass.
D	GRAB					SM		A water sample was collected on 6/17/04 and submitted for chemical analysis.
					5	SM		4.0' - 5.0': SANDY SILT brown, wet, soft, with estimated 60% low plasticity fines, 40% fine sand, and trace fine subangular gravel. Hole caving at 5 feet below grade.
						SM		5.0' - 7.0': SILTY SAND grey, wet, loose, with estimated 15-20% low plasticity fines, 70-75% fine to coarse sand, and 10% fine subrounded gravel.
					10			-- Install a slotted PVC pipe to observe the ground water table elevation. The measured ground water table on 6/17/04 is 3.0 feet below the ground surface.

BORING LOG 0199081.GPJ BLKEAGLE.GDT 8/17/2004



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TEST PIT LOG

TEST PIT NO.: TP-20

DATE: 6/14/2004

TYPE OF HOE: Case 580 Super L Rubber tire back hoe

DEPTH TO GROUND WATER (ft): 6.2

LOGGED BY: TWJ

GROUND ELEVATION (ft): 4442.5 (Topo)

SAMPLE NO.	SAMPLE TYPE	PENETROMETER (tsf)	MOISTURE (%)	PLASTICITY INDEX	DEPTH (ft)	USCS SYMBOL	LITHOLOGY	DESCRIPTION
						SM		0.0' - 1.2': Silty Sand grayish brown, dry to slightly moist, loose, with estimated 15% non-plastic fines and 85% fine to medium sand. With strong roots to 1/2" in diameter.
						GP		1.2' - 2.1': Poorly Graded Gravel with Sand grayish brown, slightly moist, dense, with estimated <5% non-plastic fines, 25% fine to coarse sand, and 70% rounded to subangular gravel to 2-1/2". With some rootlets in upper 5" of interval.
						SP-SM		2.1' - 3.4': Poorly Graded Sand with Silt light brown to brown, moist, dense, with estimated 10% non-plastic fines and 90% fine to coarse sand. A Silt layer 5" thick (not sampled) occurs from 2.1-2.45 feet with estimated 90% non-plastic fines and 10% fine-grained sand. Pocket penetrometer = 2.5 tsf. With some rootlets.
					5	SC		
						CL		3.4' - 4.7': Clayey Sand grayish brown, moist, dense, with estimated 25% low to medium plastic fines and 75% fine to coarse sand. With trace rootlets.
						SP-SM		
						SC		4.7' - 5.0': Lean Clay with Sand dark grayish brown, moist, hard, with estimated 85% low to medium plastic fines and 15% fine sand.
						SP		Poorly Graded Sand with Silt brown, very moist, dense, with estimated 10% non-plastic fines and 90% fine to coarse sand. With trace iron-oxide staining.
								6.1' - 6.4': Clayey Sand dark brown, very moist, dense, with estimated 15% low plastic fines and 85% fine to coarse sand. Water sample collected on 6/17/04 and submitted for chemical analysis.
					10	CL		6.4' - 8.0': Poorly Graded Sand grayish brown, very moist to wet, medium dense, with estimated <5% non-plastic fines and 95% fine to coarse sand. Moderate water seeping at approximately 1 gallon per minute.
								8.0' - 11.0': Sandy Lean Clay mottled from dark brown to dark green, wet, firm, with estimated 70% medium plastic fines and 30% fine to medium sand. Pocket penetrometer = 1.25-1.5 tsf.

- Install 3" diameter PVC pipe to observe the ground water table elevation. Ground water table elevation measured at 6.2 feet below the surface on 6/17/04.

BORING LOG 0199081.GPJ BLKEAGLE.GDT 8/17/2004



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(775) 359-6600

Centex Homes
Bella Vista Ranch
Reno, Nevada

PROJECT NO.:

0199-08-1

PLATE:

2W

SHEET 1 OF 1

TEST PIT LOG

TEST PIT NO.: TP-21

DATE: 6/14/2004

TYPE OF HOE: Case 580 Super L Rubber tire back hoe

DEPTH TO GROUND WATER (ft): NE

LOGGED BY: TWJ

GROUND ELEVATION (ft): 4450 (Topo)

SAMPLE NO.	SAMPLE TYPE	PENETROMETER (tsf)	MOISTURE (%)	PLASTICITY INDEX	DEPTH (ft)	USCS SYMBOL	LITHOLOGY	DESCRIPTION
A	GRAB					SM		0.0' - 1.0': Silty Sand grayish brown, dry, loose, with estimated 20% non-plastic fines, 75% fine to coarse sand, and 5% subangular to subrounded gravel to 1/4". With moderate rootlets.
B	GRAB					SP-SM		1.0' - 3.7': Poorly Graded Sand with Silt and Gravel brown, slightly moist, dense, with estimated 10% non-plastic fines, 65% fine to coarse sand, and 25% subrounded gravel to 1-1/4". With trace white clay filaments.
C	GRAB				5	SP-SM		3.7' - 5.3': Poorly Graded Sand with Silt brown, moist, very dense, with estimated 8% non-plastic fines and 92% fine to medium sand.
D	GRAB					SP-SM		5.3' - 7.0': Poorly Graded Sand with Silt and Gravel brown, moist, dense, with estimated 10% non-plastic fines, 65% fine to coarse sand, and 25% subrounded gravel to 1-1/2".
E	GRAB					SP		7.0' - 9.5': Poorly Graded Sand grayish brown, moist, dense, with estimated <5% non-plastic fines, 90% fine to coarse sand, and 5% subrounded gravel to 1".
F	GRAB				10	SP		9.5' - 11.0': Poorly Graded Sand with Gravel brownish gray, very moist, very dense, with estimated <5% non-plastic fines, 65% fine to coarse sand, and 30% subrounded gravel to 2".

Located 50 feet north of SE parcel corner. Test pit excavated on eastern side of barbed-wire fence.

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Centex Homes
Bella Vista Ranch
Reno, Nevada

PROJECT NO.:

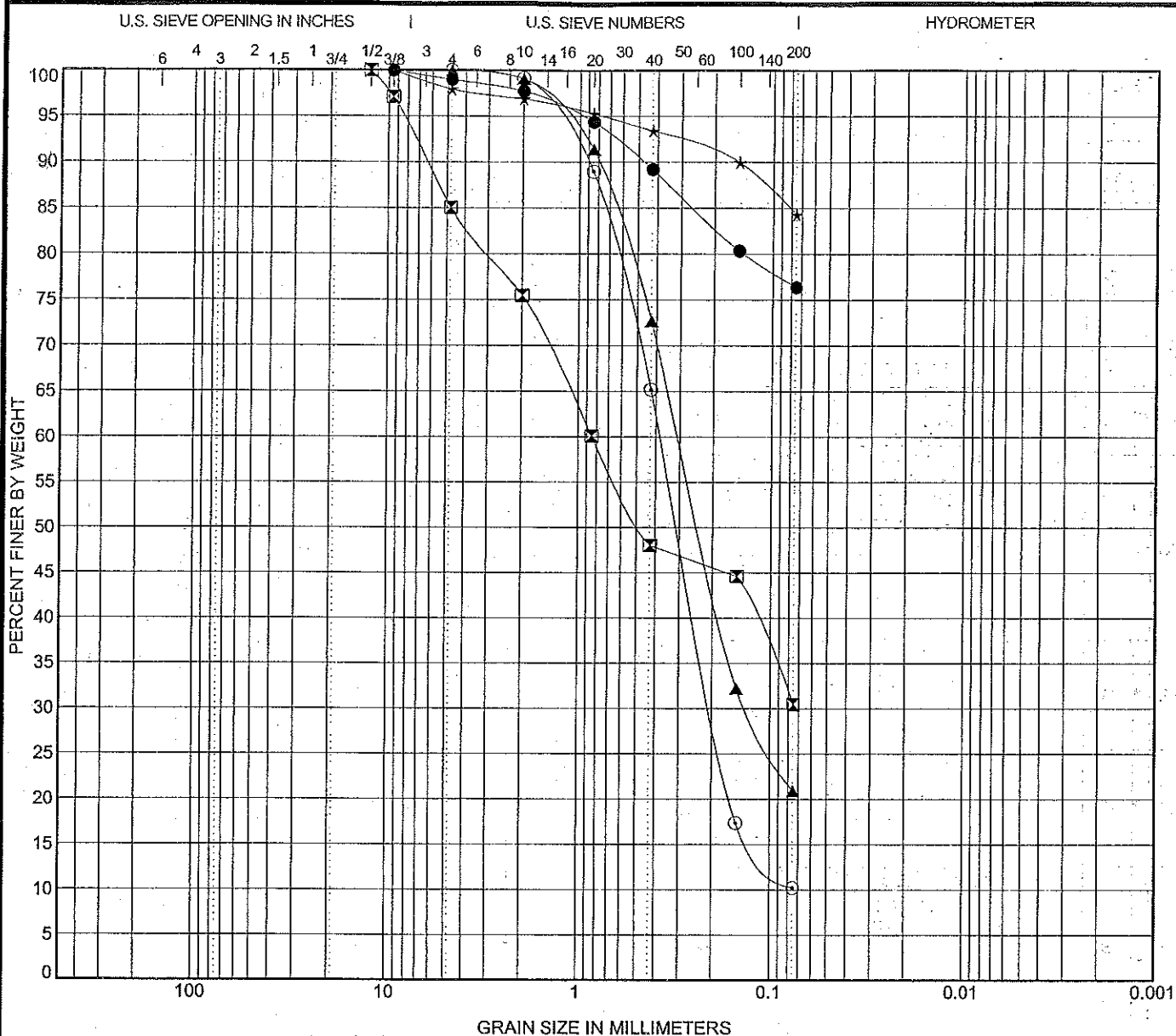
0199-08-1

PLATE:

2x

SHEET 1 OF 1





COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Specimen Identification			USCS Classification					LL	PL	PI	Cc	Cu
●	B-01	5.0'	LEAN CLAY with SAND (CL)					48	22	26		
☒	TP-02	2.0'	SILTY SAND (SM)					77	41	36		
▲	TP-09	1.2'	SILTY, CLAYEY SAND (SC-SM)					29	22	7		
★	TP-10	2.2'	LEAN CLAY with SAND (CL)					49	23	26		
⊙	TP-11	1.5'	POORLY GRADED SAND with SILT (SP-SM)					NP	NP	NP	1.40	5.17
Specimen Identification		D100	D60	D30	D10	MC %	%Gravel	%Sand	%Silt	%Clay		
●	B-01	5.0'	9.5			24.7	1.0	22.6	76.4			
☒	TP-02	2.0'	12.5	0.846		81.6	15.0	54.6	30.5			
▲	TP-09	1.2'	4.75	0.307	0.131	19.1	0.0	79.1	20.9			
★	TP-10	2.2'	9.5			33.3	2.1	13.6	84.3			
⊙	TP-11	1.5'	4.75	0.38	0.197	15.0	0.0	89.8	10.2			

US GRAIN SIZE 0199081.GPJ US LAB.GDT 8/2/2004



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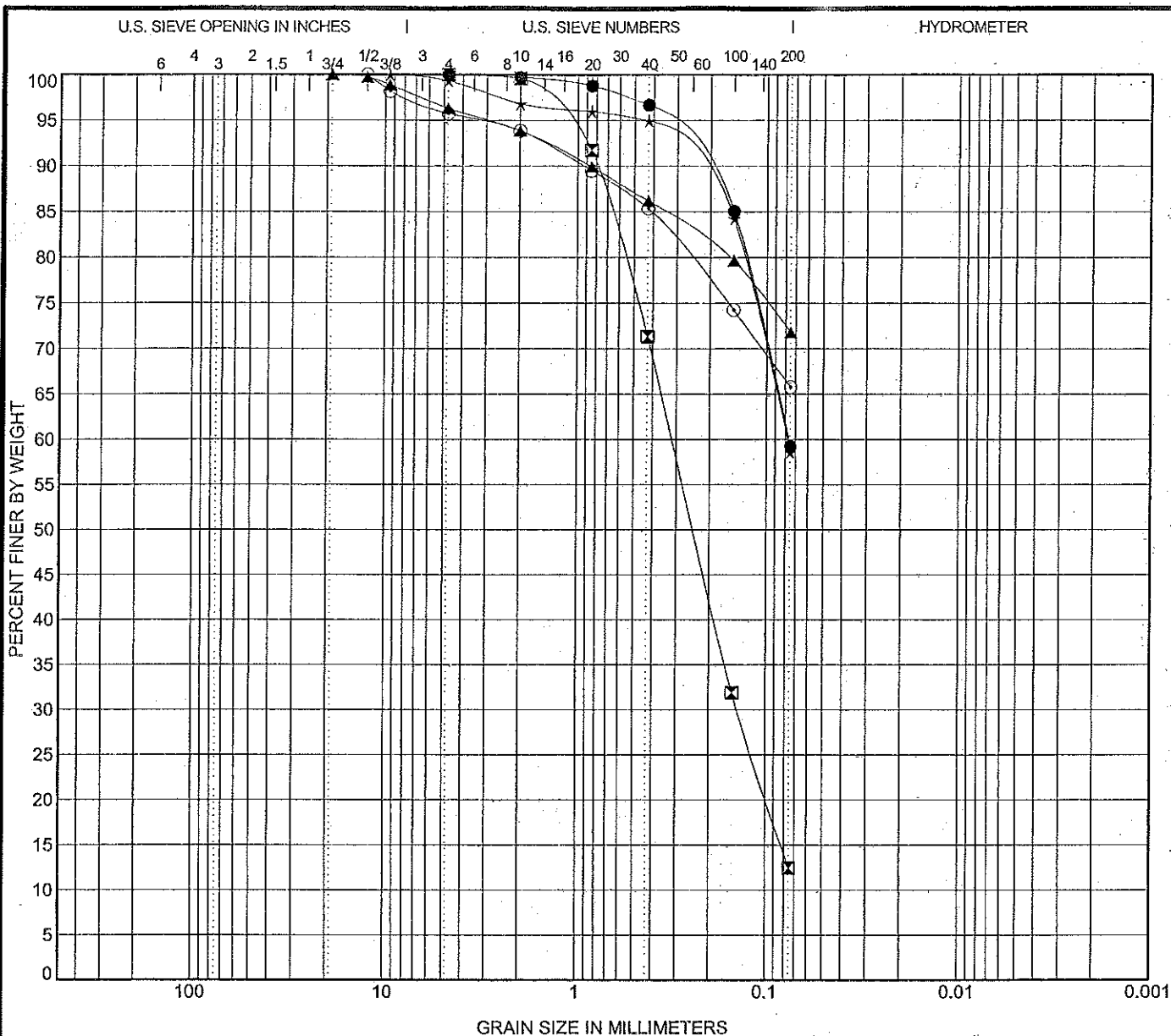
GRAIN SIZE DISTRIBUTION

Project: Bella Vista Ranch

Location: Reno, Nevada

Project Number: 0199-08-1

Plate Number: 4a



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Specimen Identification			USCS Classification					LL	PL	PI	Cc	Cu
●	TP-13	3.5'	SANDY LEAN CLAY (CL)					35	24	11		
☒	TP-14	2.0'	SILTY SAND (SM)					NP	NP	NP	0.91	4.59
▲	TP-17	0.0'	SILT with SAND (ML)					48	28	20		
★	TP-18	1.0'	SANDY LEAN CLAY (CL)					35	19	16		
◎	TP-19	1.1'	SANDY SILT (ML)					41	29	12		
Specimen Identification			D100	D60	D30	D10	MC %	%Gravel	%Sand	%Silt	%Clay	
●	TP-13	3.5'	4.75	0.077			10.9	0.0	40.7	59.3		
☒	TP-14	2.0'	4.75	0.315	0.14		6.1	0.0	87.5	12.5		
▲	TP-17	0.0'	19				22.0	3.7	24.5	71.8		
★	TP-18	1.0'	9.5	0.078			30.1	0.7	40.8	58.6		
◎	TP-19	1.1'	12.5				42.2	4.2	30.0	65.8		

US GRAIN SIZE 0199081.GPJ US LAB.GDT 9/2/2004



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Fax: (775) 359-7766

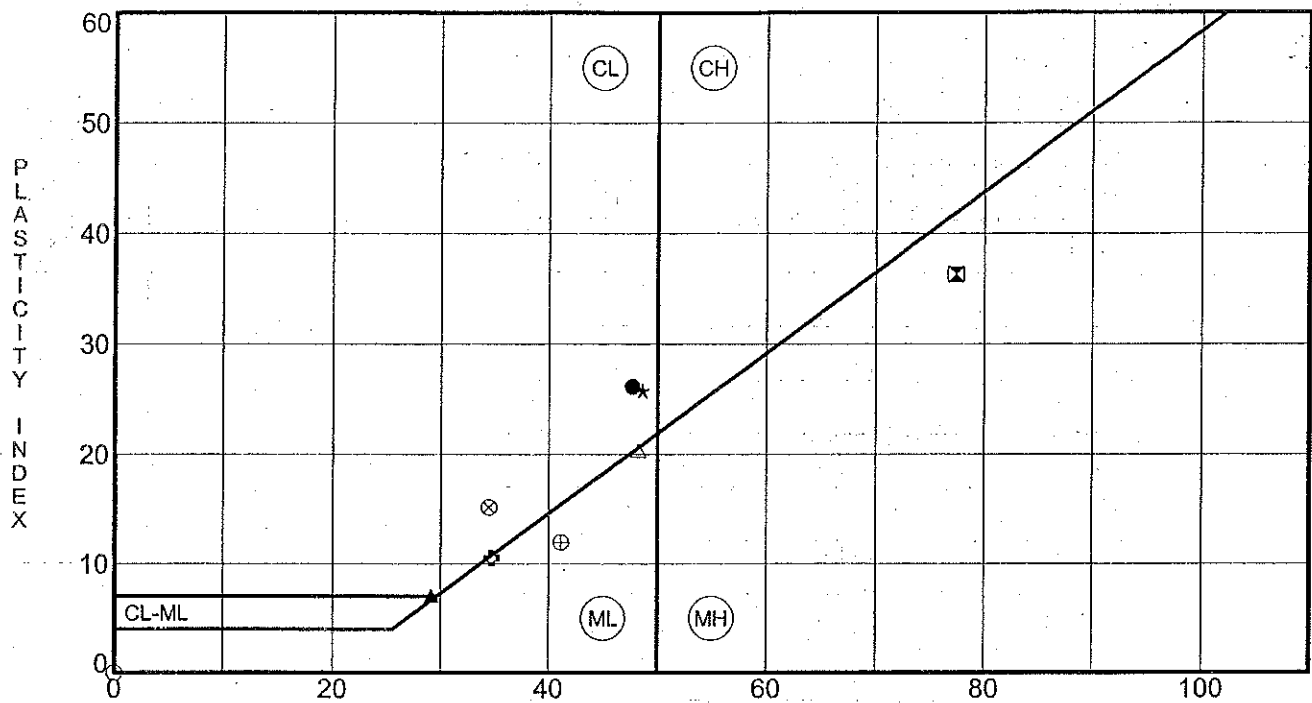
GRAIN SIZE DISTRIBUTION

Project: Bella Vista Ranch

Location: Reno, Nevada

Project Number: 0199-08-1

Plate Number: 4b

[illegible]

Black Eagle Consulting, Inc.
1345 Capital Blvd., Suite A
Reno, Nevada 89502-7140
Telephone: (775) 359-6600
Fax: (775) 359-7766

ATTERBERG LIMITS RESULTS

Project: Bella Vista Ranch

Location: Reno, Nevada

Project Number: 0199-08-1

Plate Number: 4c

Western Environmental Testing Laboratory Analytical Report

Black Eagle Consulting, Inc.
1345 Capital Blvd, Suite A
Reno, NV 89502
Attn: Ron Weber

EPA Lab ID: NV004
Received: 06/17/04
Lab Sample ID: 406-120-1/3
Reported: 06/25/04

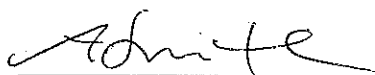
Phone: 359-6600 Fax: 359-7766

Project Name/Number: Bella Vista Ranch / 199-08-1
Sample ID: See Below
Date/Time Collected: See Below
Sampled By: Client

Parameter	Method	Results	Units	Analyzed
TP 17 A+B 0-1.3 6/15/04 @ 0400				
Chloride	300.0	310	mg/kg	06/24/04
pH	9045B	8.44	SU	06/21/04
Resistivity	2510B	530	Ω .cm	06/21/04
Sulfate	300.0	76	mg/kg	06/24/04
Boron	200.7	92	mg/kg	06/22/04
TP 14 B 2-2.7' 6/16/04 @ 0400				
Chloride	300.0	520	mg/kg	06/24/04
pH	9045B	7.64	SU	06/21/04
Resistivity	2510B	540	Ω .cm	06/21/04
Sulfate	300.0	51	mg/kg	06/24/04
Boron	200.7	29	mg/kg	06/22/04
TP 9 B 1.2-2.2 6/16/04 @ 0400				
Chloride	300.0	950	mg/kg	06/24/04
pH	9045B	8.24	SU	06/21/04
Resistivity	2510B	270	Ω .cm	06/21/04
Sulfate	300.0	200	mg/kg	06/24/04
Boron	200.7	94	mg/kg	06/22/04

Comments: The pH and Resistivity analyses were performed on a paste extract.

Plate 5a
Project No.: 0199-08-1


Andy Smith, Lab Manager

Western Environmental Testing Laboratory Analytical Report

Black Eagle Consulting, Inc.
1345 Capital Blvd, Suite A
Reno, NV 89502
Attn: Ron Weber

EPA Lab ID: NV004
Received: 06/17/04
Lab Sample ID: 406-120-4/5
Reported: 06/25/04

Phone: 359-6600 Fax: 359-7766

Project Name/Number: Bella Vista Ranch / 199-08-1
Sample ID: See Below
Date/Time Collected: See Below
Sampled By: Client

Parameter	Method	Results	Units	Analyzed
TP-3 B 2-5 6/17/04 @ 0400				
Chloride	300.0	49	mg/kg	06/24/04
pH	9045B	9.04	SU	06/21/04
Resistivity	2510B	1400	Ω .cm	06/21/04
Sulfate	300.0	25	mg/kg	06/24/04
Boron	200.7	25	mg/kg	06/22/04
TP-5 A 1-2.5 6/17/04 @ 0400				
Chloride	300.0	900	mg/kg	06/25/04
pH	9045B	9.02	SU	06/21/04
Resistivity	2510B	160	Ω .cm	06/21/04
Sulfate	300.0	490	mg/kg	06/24/04
Boron	200.7	140	mg/kg	06/22/04

Comments: The pH and Resistivity analyses were performed on a paste extract.

Plate 5b
Project No.: 0199-08-1


Andy Smith, Lab Manager

Western Environmental Testing Laboratory

Analytical Report

Black Eagle Consulting, Inc.
1345 Capital Blvd, Suite A
Reno, NV 89502
Attn: Ron Weber

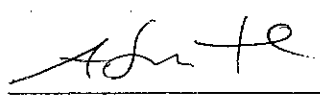
EPA Lab ID: NV004
Received: 06/17/04
Lab Sample ID: 406-121-1/5
Reported: 07/01/04

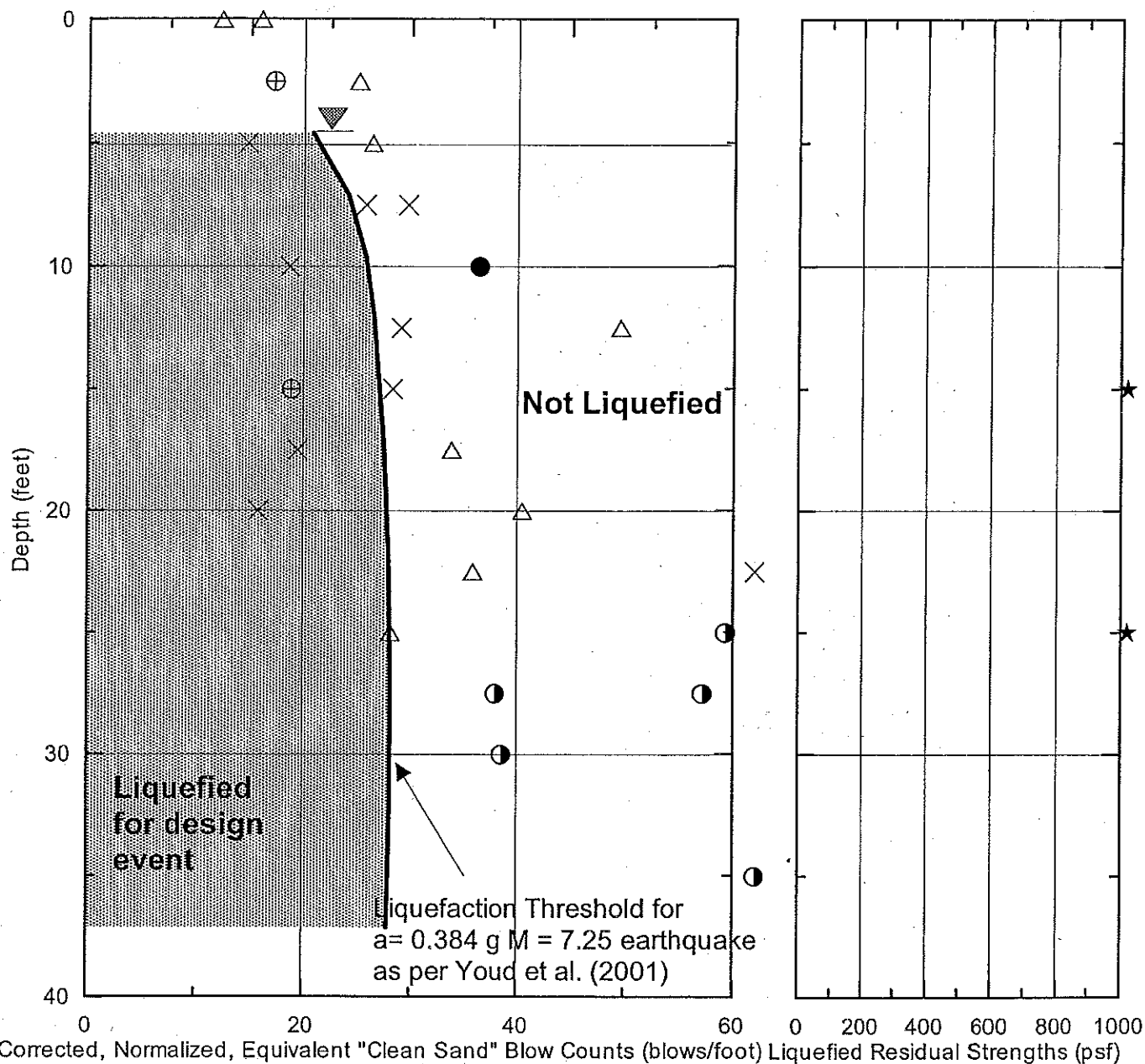
Phone: 359-6600 Fax: 359-7766

Project Name/Number: Bella Vista Ranch / 0199-08-1
Sample ID: See Below
Date/Time Collected: See Below
Sampled By: Client

Parameter	Method	Results	Units	Analyzed
B-2 6.9'				
Boron	200.7	30	ppm	06/23/04
TP-2 2.7'				
Boron	200.7	5.3	ppm	06/23/04
TP-16 4.0'				
Boron	200.7	81	ppm	06/30/04
TP-19 4.0'				
Boron	200.7	32	ppm	06/23/04
TP-20 6.2'				
Boron	201	11	ppm	06/23/04

Plate 5c
Project No.: 0199-08-1


Andy Smith, Lab Manager



- | | | | |
|---|---|---|-------------------------------------|
| ● | ● | ● | Clean sands or gravels (SP,GP) |
| ◐ | ◐ | ◐ | Sand with Silt (SP-SM) |
| ⊕ | ⊕ | ⊕ | Silty Sand (SM) |
| △ | △ | △ | Clayey Sand (SC) |
| △ | △ | △ | questionable liquefaction potential |
| × | × | × | Cohesive Soils - Non-liquefiable |
| — | | | Liquefaction Threshold |

SPT data from Borings B-02 and B-03.
Liquefied strength estimated using Seed and Harder (1991);
points to right of graph indicate values
above correlated range.

Black Eagle Consulting, Inc.

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Reno, Nevada, 89502-7140
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Fax: (775) 359-7766

CENTEX HOMES
BELLAVISTA RANCH
RENO, NEVADA

Project No:
0185-07-2

Plate 6

APPENDIX A

Liquefaction Analyses

Project Name: Eagle View Ranch
Project Number: 0-9503-1

Date: 8/19/2004
Revision No: 00511
Developed by: JWP
Calculated by: JWP
Checked by:

COMPUTE LIQUEFACTION CYCLIC STRESS AND REDUCTION RATIOS

Only cells with live green fluorescent

Sortag 27

where N_{180cs} is greater than 33.5, max value of CRR of 2.24 is used

[illegible]

Depth compared to MapCAD evaluation: Are results comparable?

[illegible]

Copy row:	200
Check:	200
Comparison OK?	

Rd Linear fit of average moment of stress reduction curves with depth
If(Depth<30 ft, Rd = 1.0, 0.0233*Depth
If(Depth<75 ft, Rd = 1.174-0.0082*Depth;
otherwise Rd is 0.58

Seed and Harder Strength Lookup		
0	0	6
6	0	10
10	100	13
		270

BLACK EAGLE CONSULTING INC.
Geotechnical and Construction Services

Project Name:
Project Number:

Bella Vista Ranch
0199-08-1

Date:
Revision No:
Developed by:
Calculated by:
Checked by:

7/15/2004
v0311

JWP
TJJ

NCRR CURVE FOR LIQUEFACTION GRAPHICS FOR BORINGS BASED UPON 1996 AND 1998 NCEER WORKSHOP RECOMMENDATIONS

Only cells with blue background and blue text should be modified

Location:

Boring ID: B-03

Surf Elev ft:

4441 Depth to Groundwater (ft): 4.6

Soil Unit Weight Above Groundwater (pcf): 120

Moment Magnitude of EQ (Mw):

Horizontal Peak Ground Accel (g):

Depth to Groundwater (ft):

Magnitude Scaling Factor:

Curve1
7.25
0.384
4.6
1.09

Boring ID	Top Depth ft	Soil Total Unit Wt (pcf)	σ'_{vo} at Mid-Depth of Sample pcf	σ'_{vo} at Mid-Depth of Sample pcf	Stress Reduction Rd	CSR with depth for M and clean sand	Ncr corresponding to CSR
B-03	4.6	120	552	552	0.99	0.226	20.832
B-03	7.1	120	852	696	0.98	0.276	24.112
B-03	9.6	120	1152	840	0.98	0.307	25.689
B-03	12.1	120	1452	984	0.97	0.328	26.538
B-03	17.1	120	2052	1272	0.96	0.355	27.470
B-03	22.1	120	2652	1560	0.95	0.369	27.986
B-03	27.1	120	3252	1848	0.94	0.377	28.161
B-03	32.1	120	3852	2136	0.91	0.376	28.127
B-03	37.1	120	4452	2424	0.87	0.365	27.853
B-03	42.1	120	5052	2712	0.83	0.363	27.416
B-03	47.1	120	5652	3000	0.79	0.339	26.930
B-03	52.1	120	6252	3288	0.75	0.325	26.408
B-03	57.1	120	6852	3576	0.70	0.309	25.797

Boring ID:

Location:

Depth to Groundwater (ft):

Moment Magnitude of EQ (Mw):

Horizontal Peak Ground Accel (g):

Depth to Groundwater (ft):

Summary of Resul Elevation:

B-03
0
4.6
7.25
0.384
4.6
4441

Top Depth ft	Elevation	Ncr NP CS corresponding to CSR value
4.6	4436.4	20.832
7.1	4433.9	24.112
9.6	4431.4	25.689
12.1	4428.9	26.538
17.1	4423.9	27.470
22.1	4418.9	27.986
27.1	4413.9	28.161
32.1	4408.9	28.127
37.1	4403.9	27.853
42.1	4398.9	27.416
47.1	4393.9	26.930
52.1	4388.9	26.408
57.1	4383.9	25.797

This analysis assumes there are no significant adjustments to CSR for plasticity or gravel content. These adjustments should modify the CSR value of the data, not the CSR for the clean sand, no fines, no gravel curve. Because magnitude factors are made to adjust the N160 values, curve is made for M= 7.5 CRR vs N curve (from Raush Formula) for interpolation **Resulting curve:**

BLACK EAGLE CONSULTING INC.
Geotechnical and Construction Services

Project Name: Belita Vista Ranch
Project Number: 0199-08-1
other comments

Date: 7/14/2004
Revision No: jwp0311 el
Developed by: JWP
Calculated by: JPTJ
Checked by:

STANDARD PENETRATION TEST (SPT) CORRECTION FOR LIQUEFACTION ANALYSIS FOR BORINGS BASED UPON 1996 AND 1998 NCEER WORKSHOP RECOMMENDATIONS This version (030905) conforms more closely with MathCAD sheet (version jwp0309)

Location: 880 ft. SE
Elevation: 4431 ft.
Depth to groundwater during Earthquake (R): 6.9 ft.
Depth to groundwater during Earthquake (R): 6.9 ft.
Sampler Type (standard 1-3/8" ID=1, Sampler without Liners 1-1/2" ID=2, Trip Hammer=2, Correction Data=3): 1
Hammer Type (Calhead=1, Trip Hammer=2, Correction Data=3): 1
Corrected Hammer Efficiency as % of Theoretical Energy (if 3 above): 68%
Soil Unit Weight Above WT (pcf): 120 pcf

Elimination Codes:
MC Modified Cal or other sampler
SA clean sand (or blank)
SS Sand with 5 - 15% silt
SM Sand with >15% silt
SC Sand with >15% clay

Layer elimination
non-liquefiable consistency
Clean sand correction: if FC > 35%, computed as for FC = 35%
Normalize to 1 atm
Clean Sand Correction

Boring ID	Top Depth ft	Description	Field Blowcount	Sample Plasticity %	Fines Content %	Gravel Content %	Soil Unit Weight Above WT (pcf)	Elimination Code	Soil Total Unit Weight (pcf)	Design EQ				Normalization to 65% energy				Correction	
										σ'_{vo} at Mid-Depth of Sample	σ'_{vo} at Mid-Depth of Sample	σ'_{vo} at Mid-Depth of Sample	σ'_{vo} at Mid-Depth of Sample	Normalized to 1 atm	Hammer Cer	Sam- pier ID	Rod Length	α	β
B-02	6.9	Depth to Water Table								948	948	948	948	1.70	1.13	1.05	1	NA	1.20
B-02	0	SM: CL, PP=4.0	4	20% est	60% est	0% est	120	A	120	120	120	120	120	1.70	1.13	1.05	1	NA	1.20
B-02	2.5	CL, SP, SM: PP=0.2-8	11	10% est	50% est	0% est	120	SC	120	420	420	420	420	1.70	1.13	1.05	1	0.85	1.08
B-02	5	CL, SP, PP=0.8-1.8	13	10% est	20% est	0% est	120	SC	120	720	720	720	720	1.70	1.13	1.05	1	0.85	1.08
B-02	7.5	CL(S); SM: PP=1.5-2.3	15	12% est	30% est	1% est	120	X	120	1020	1020	1020	1020	1.52	1.13	1.05	1	0.85	1.15
B-02	10	CL, PP=1.5	8	17% est	75% est	1% est	120	X	120	1320	1320	1320	1320	1.41	1.13	1.05	1	0.85	1.15
B-02	12.5	CL, SM: PP=2.8-3.5	15	15% est	75% est	5% est	120	X	120	1620	1620	1620	1620	1.32	1.13	1.05	1	0.85	1.15
B-02	15	SM, SC, SM: PP=0.5-2.5	10	0% est	20% est	6% est	120	SM	120	1920	1920	1920	1920	1.25	1.13	1.05	1	0.85	1.15
B-02	17.5	SC, SC, SM: PP=1-1.5	9	5% est	35% est	0% est	120	X	120	2220	2220	2220	2220	1.19	1.13	1.05	1	0.85	1.15
B-02	20	SC, PP=1-1.5	7	5% est	40% est	0% est	120	X	120	2520	2520	2520	2520	1.14	1.13	1.05	1	0.85	1.15
B-02	22.5	SC, GP, GM: PP=1-1.5	50	2% est	10% est	35% est	120	X	120	2820	2820	2820	2820	1.09	1.13	1.05	1	0.85	1.15
B-02	25	GP, GM	50	0% est	5% est	70% est	120	SS	120	3120	3120	3120	3120	1.05	1.13	1.05	1	0.85	1.15
B-02	27.5	GP	80	0% est	5% est	75% est	120	SS	120	3420	3420	3420	3420	1.01	1.13	1.05	1	0.85	1.15
B-02	35	GP	82.00	0% est	7% est	30% est	120	SS	120	4320	4320	4320	4320	0.92	1.13	1.05	1	0.85	1.15
B-02	40	NO RETURN	0.0	0% est	0% est	0% est	120		120	4920	4920	4920	4920	0.87	1.13	1.05	1	0.85	1.15
Averages	17.1		23.1	7%	31%	16%				4920	4920	4920	4920	0.86	1.13	1.05	1	0.85	1.15
St Devs	12.0		24.5	7%	26%	27%				4920	4920	4920	4920	0.66	1.13	1.05	1	0.85	1.15

NL indicates sample is outside of range of liquefiable soil types

Depth compared to MathCAD evaluation: Are results comparable?

Copy row:	GP	0	est	0.05	est	0.75	est	SS	120	3420	2072.16	3420	2072.16	1.01	1.13	1.05	1	0.95	57.12	0	1	57.1901
Check:	27.5																					
Comparison OK?																						

All SPT locations are driven 1.5 feet

Energy Ratio
Cer = correction relative to 60% theoretical hammer energy.
90% if safety hammer
75% if donut hammer
130% if automatic hammer
This means that actual hammer energy for safety hammer is 90% x 65% = 58%
if hammer calibration value is available, it will be used in same manner

Sampling Method
Cs =
1 1-3/8" ID sampler (with liner or no liner space)
1.2 1-1/2" ID sampler (space for liners, liners not used)
Rod Length - assume rod is probably at least 5 feet longer than the hole is deep
Cr =
1 if > 30 feet
0.95 if 20 to 30 feet
0.85 if 13 to 20 feet
0.75 if 10 to 13 feet

Borehole Diameter
Cb = 1 if 2.5 to 4.5 inches
1.05 if 6 inches
1.15 if 8 inches

Calculated by:
Checked by:

value of CBB at 234 is used.

x value of CBB of 2.24 is used.

Seed and Harder Strength Lookup			
0	0	8	0
8	0	10	100
10	100	13	270

BLACK EAGLE CONSULTING INC.
Geotechnical and Construction Services

Project Name:

Bella Vista Ranch

Project Number:

0199-08-1

Date: 7/15/2004
Revision No: v0311
Developed by: JWP
Calculated by: TJ
Checked by:

NCCR CURVE FOR LIQUEFACTION GRAPHICS FOR BORINGS BASED UPON 1996 AND 1998 NCEER WORKSHOP RECOMMENDATIONS

Only cells with blue background and blue text should be modified

Location:

Boring ID: B-02

Surf Elev ft:

4431

Soil Unit Weight Above Groundwater (pcf):

120

Moment Magnitude of EQ (Mw):

6.9

Horizontal Peak Ground Accel (g):

0.384

Depth to Groundwater (ft):

6.9

Magnitude Scaling Factor:

1.09

Curve1
7.25
0.384
6.9
1.09

Boring ID: B-02
Location: 0
Depth to Groundwater (ft): 6.9
Moment Magnitude of EQ (Mw): 7.25
Horizontal Peak Ground Accel (g): 0.384
Depth to Groundwater (ft): 6.9
Summary of Result Elevation: 4431

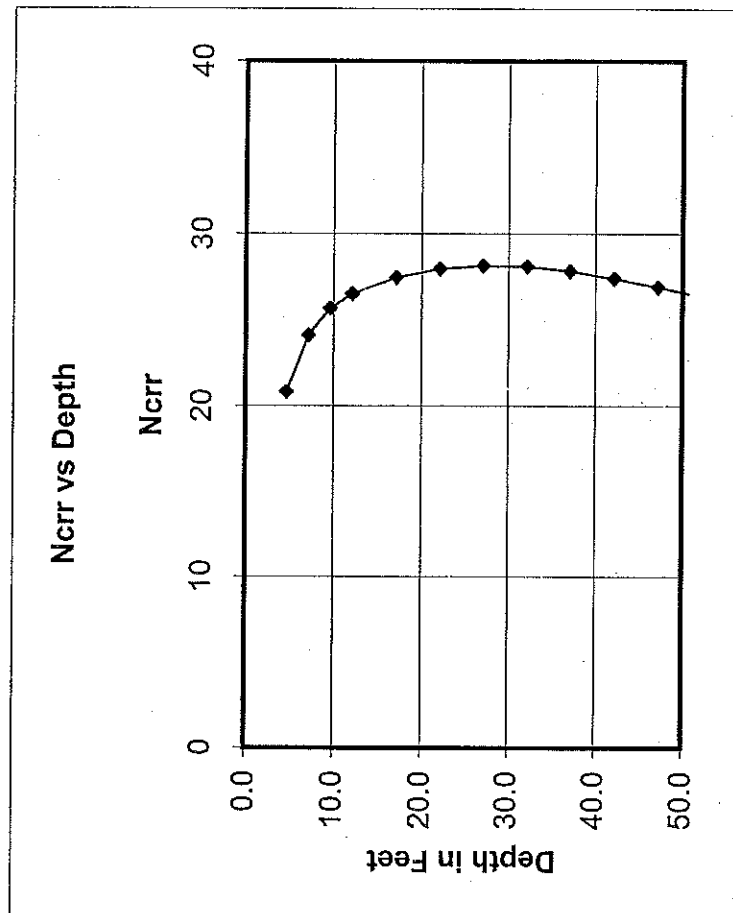
Boring ID	Top Depth ft	Soil Total Unit Wt (pcf)	σ'_{v0} at Mid-Depth of Sample psf	σ'_{v0} at Mid-Depth of Sample psf	Stress Reduction in Rd	CSR with depth for M and clean sand	Ncr corresponding to CSR
B-02	6.9	120	828	828	0.98	0.225	20.740
B-02	9.4	120	1128	972	0.98	0.260	23.137
B-02	11.9	120	1428	1116	0.97	0.285	24.575
B-02	14.4	120	1728	1260	0.97	0.303	25.512
B-02	19.4	120	2328	1548	0.95	0.329	26.553
B-02	24.4	120	2928	1836	0.94	0.344	27.106
B-02	29.4	120	3528	2124	0.93	0.354	27.456
B-02	34.4	120	4128	2412	0.89	0.349	27.278
B-02	39.4	120	4728	2700	0.85	0.341	26.981
B-02	44.4	120	5328	2988	0.81	0.330	26.607
B-02	49.4	120	5928	3276	0.77	0.318	26.177
B-02	54.4	120	6528	3564	0.73	0.305	25.580
B-02	59.4	120	7128	3852	0.69	0.290	24.861

Top Depth ft	Elevation	Ncr NP CS corresponding to CSR value
6.9	4424.1	20.740
9.4	4421.6	23.137
11.9	4419.1	24.575
14.4	4416.6	25.512
19.4	4411.6	26.553
24.4	4406.6	27.106
29.4	4401.6	27.456
34.4	4396.6	27.278
39.4	4391.6	26.981
44.4	4386.6	26.607
49.4	4381.6	26.177
54.4	4376.6	25.580
59.4	4371.6	24.861

This analysis assumes there are no significant adjustments to CSR for plasticity or gravel content. These adjustments should modify the CSR value of the data, not the CSR for the clean sand, no fines, no gravel curve. Because magnitude factors are made to adjust the N160 values, curve is made for M= 7.5

CRR vs N curve (from Rausch Formula) for interpolation Resulting curve:

CRR_i	N_{160_i}	$(CRR)_{i+1}$	$(N_{160})_{i+1}$
0.049	0	0.05	2
0.053	2	0.06	4
0.065	4	0.08	6
0.080	6	0.10	8
0.096	8	0.11	10
0.113	10	0.13	12
0.131	12	0.15	14
0.150	14	0.17	16
0.170	16	0.19	18
0.192	18	0.22	20
0.215	20	0.24	22
0.242	22	0.27	24
0.273	24	0.31	26
0.313	26	0.37	28
0.370	28	0.47	30
0.468	30	0.73	32
0.732	32	1.24	33
1.240	33	2.24	33.5
2.243	33.5		



LEVEL-GROUND LIQUEFACTION ANALYSIS USING STANDARD PENETRATION TESTING (SPT) AND BASED UPON 1996 AND 1998 NCEER WORKSHOP RECOMMENDATIONS

Location: Bella Vista Ranch Boring B-02
Analyzed Zone: 15-17.5 feet depth

This version of the liquefaction analysis procedure supports the spreadsheet analysis of multiple points

References

1. T. L. Youd, Chair, Member, ASCE, I. M. Idriss, Co-Chair, Fellow, ASCE, Ronald D. Andrus, Ignacio Arango, Gonzalo Castro, John T. Christian, Richardo Dobry, W. D. Liam Finn, Leslie F. Harder Jr., Mary Ellen Hynes, Kenji Ishihara, Joseph P. Koester, Sam S. C. Liao, William F. Marcuson III, Geoffrey R. Martin, James K. Mitchell, Yoshiharu Moriawaki, Maurice S. Power, Peter K. Robertson, Raymond B. Seed, and Kenneth H. Stokoe II, 2001, Liquefaction Resistance of Soils: Summary Report from the 1996 NCEER and 1998 NCEER/NSF Workshops on Evaluation of Liquefaction Resistance of Soils, Journal of Geotechnical and Geoenvironmental Engineering, October, 2001, p. 817-833.
2. Federal Highway Administration (FHWA), 1998, Geotechnical Earthquake Engineering Reference Manual, Report No. FHWA-HI-99-012, 392 p.
3. U. S. Water Conservation Laboratory, 2003, Agricultural Research Service, Relative Humidity Equations (www.uswcl.ars.ag.gov/exper/relhumeq.htm).
4. Ishihara, Personal communication.
5. Tokimatsu, K. and Seed, H. B., 1987, Evaluation of Settlements in Sands due to Earthquake Shaking, Journal of Geotechnical Engineering, American Society of Civil Engineers (ASCE), v. 113, n. 8, p. 861-878.
6. Seed, R. B. and L.F. Harder, 1990, SPT-based Analyses of Cyclic Pore Pressure Generation and Undrained Residual Strength, *Proc., H. Bolton Seed Memorial Symp.*, BiTech Publishers Ltd., Vancouver, 351-376.
7. Olsen, S. M. and T.D. Stark, 2003, Yield Strength Ratop and Liquefaction Analysis of Slopes and Embankments, Journal of Geotechnical Engineering, Vol 129 No. 8, p. 727 -737.

Unit Conversions

$$\text{psf} := \frac{\text{lb}_f}{\text{ft}^2} \quad \text{pcf} := \frac{\text{lb}_f}{\text{ft}^3} \quad \text{kPa} := 1000\text{Pa}$$

Checked By:

Input Data

Checked By:

Sample Top Depth:

$$d := 15\text{ft}$$

Depth to Mid-Sample (typically 0.5' waste barrel +1' sampler length/2 = 1'):

$$l := 1.0\text{ft}$$

Soil Total Unit Weight above Water Table:

$$\gamma_{\text{above}} := 110\text{pcf}$$

Soil Total Unit Weight below Water Table:

$$\gamma := 120\text{pcf}$$

SPT N-Value at Sample Depth:

$$N_m := 10$$

Soil Sample Plasticity Index (PI):

$$PI := 0$$

Percentage of Fines or Fines Content [%]:

$$FC := 20$$

Percentage of Gravel or Gravel Content [%]:

$$GC := 6$$

Thickness of Potentially Liquefiable Zone:

$$T_w := 2.5\text{ft}$$

Depth to Ground Water during Exploration:

$$d_{gw} := 6.9 \text{ ft}$$

during Liquefaction Event:

$$d_{gwatEQ} := 5 \text{ ft}$$

Borehole Diameter:

$$d_b := 6 \text{ in}$$

Length of Drill Rod above the Ground Surface to Hammer:

$$l_{rgs} := 5 \text{ ft}$$

Sampler Type (Standard = 1, Sampler without Liners = 2):

$$\text{Sampler} := 1$$

Hammer Type (Cathead = 1, Auto Hammer [Uncorrected = 2, Corrected = 3]):

$$\text{Hammer} := 3$$

Corrected Hammer Efficiency (Must enter 3 for Hammer Type above)(% not decimal:
this is relative to theoretical 100%.

$$ER := 68$$

Horizontal Peak Ground Acceleration (PGA) [%g]:

$$a_{max} := 0.384g$$

Moment Magnitude of Earthquake:

$$M_w := 7.5$$

Calculations, Section 1: Vertical Soil Stresses

Checked By:

Calculate Depth at Midpoint of Sample:

$$z := d + l$$

$$z = 16 \text{ ft}$$

Calculate Soil Vertical Total Stress at Midpoint of Sample:

$$\sigma_v := \gamma_{above} \cdot d_{gw} + \gamma \cdot (z - d_{gw})$$

$$\sigma_v = 1851 \text{ psf}$$

Calculate Soil Effective Unit Weight at Sample Depth (Since sample is below the ground water surface):

$$\gamma_{eff} := \gamma - 62.4 \text{ pcf}$$

$$\gamma_{eff} = 57.6 \text{ pcf}$$

Calculate Effective Stress at Midpoint of Sample for SPT Correction:

$$\sigma_{veff} := \sigma_v + [62.4 \text{ pcf} \cdot (z - d_{gw})]$$

$$\sigma_{veff} = 1.283 \times 10^3 \text{ psf}$$

Calculate Soil Vertical Total Stress at Midpoint of Sample for EQ event:

$$\sigma_{vatEQ} := \gamma_{above} \cdot d_{gwatEQ} + \gamma \cdot (z - d_{gwatEQ})$$

$$\sigma_{vatEQ} = 1870 \text{ psf}$$

Calculate Effective Stress at Midpoint of Sample for EQ event:

$$\sigma_{veffatEQ} := \sigma_{vatEQ} + [62.4 \text{ pcf} \cdot (z - d_{gwatEQ})]$$

$$\sigma_{veffatEQ} = 1.184 \times 10^3 \text{ psf}$$

Calculations, Section 2: SPT N-Value Correction

Checked By:

Calculate Overburden Pressure Correction Factor:

As noted by Reference 6, the Overburden correction is to have N values representative of the equivalent penetration resistance at a hypothetical overburden stress of 100 kPa, 1 ton/ft², or roughly 1 atmosphere. The use of "atmospheres" is merely a convenience for conversion between unit systems, and is not related to local atmospheric pressure.

$$P_a := 100 \text{ kPa}$$

$$P_a = 2.089 \times 10^3 \text{ psf}$$

$$C_n := \begin{cases} \left(\frac{P_a}{\sigma_{veff}} \right)^{0.5} & \text{if } \left(\frac{P_a}{\sigma_{veff}} \right)^{0.5} \leq 1.7 \\ 1.7 & \text{otherwise} \end{cases}$$

$$C_n = 1.276$$

Determine Hammer Energy Correction Factor:

$$C_e := \begin{cases} 1.0 & \text{if (Hammer = 1)} \\ 1.3 & \text{if (Hammer = 2)} \\ \left(\frac{ER}{60}\right) & \text{if (Hammer = 3)} \\ 0 & \text{otherwise} \end{cases}$$

Determine Borehole Diameter Correction Factor:

$$C_b := \begin{cases} 1.00 & \text{if } (65\text{mm} < d_b < 115\text{mm}) \\ 1.05 & \text{if } (150\text{mm} < d_b < 154\text{mm}) \\ 1.15 & \text{if } (200\text{mm} < d_b < 204\text{mm}) \\ 0 & \text{otherwise} \end{cases}$$

Calculate Drill Rod Length:

$$L_r := d + L_{rgs}$$

Determine Rod Length Correction Factor:

$$C_r := \begin{cases} 0.75 & \text{if } (L_r < 3\text{m}) \\ 0.80 & \text{if } (3\text{m} \leq L_r < 4\text{m}) \\ 0.85 & \text{if } (4\text{m} \leq L_r < 6\text{m}) \\ 0.95 & \text{if } (6\text{m} \leq L_r < 10\text{m}) \\ 1.00 & \text{if } (10\text{m} \leq L_r < 30\text{m}) \\ 0 & \text{otherwise} \end{cases}$$

Determine Sampler Correction Factor (with or without liners):

$$C_s := \begin{cases} 1.0 & \text{if (Sampler = 1)} \\ 1.2 & \text{if (Sampler = 2)} \\ 0 & \text{otherwise} \end{cases}$$

Calculate Corrected SPT (N_{160}) Value:

$$N_{160} := (N_m \cdot C_n \cdot C_e \cdot C_b \cdot C_r \cdot C_s)$$

Calculations, Section 3: (N_{160}) Equivalent Clean Sand Correction

Calculate Clean Sand Correction Coefficients:

$$\alpha := \begin{cases} 0 & \text{if } (FC \leq 5) \\ \exp \left[1.76 - \left(\frac{FC^2}{190} \right) \right] & \text{if } (5 < FC < 35) \\ 5.0 & \text{if } (FC \geq 35) \\ 0 & \text{otherwise} \end{cases}$$

Checked By:

$$N_{160} = 14.4$$

$$\alpha = 3.615$$

If $\alpha = 0$, then input error.

$$C_e = 1.133$$

If $C_e = 0$, then input error.

$$C_b = 1.05$$

If $C_b = 0$, then input error.

$$C_r = 0.95$$

If $C_r = 0$, then input error.

$$L_r = 20 \text{ ft}$$

$$L_r = 6.096 \text{ m}$$

$$\beta := \begin{cases} 1.0 & \text{if } (FC \leq 5) \\ \left[0.99 + \left(\frac{FC^{1.5}}{1000} \right) \right] & \text{if } (5 < FC < 35) \\ 1.2 & \text{if } (FC \geq 35) \\ 0 & \text{otherwise} \end{cases}$$

$$\beta = 1.079$$

If $\beta = 0$, then input error.

Calculate Corrected (N_{160}) Equivalent Clean Sand Value:

$$N_{160cs} := \alpha + \beta \cdot (N_{160})$$

$$N_{160cs} = 19.2$$

Calculations, Section 4: Cyclic Stress Ratio and Cyclic Resistance Ratio (CSR) Checked By:

Calculate Cyclic Resistance Ratio (CRR) for Moment Magnitude $M_w = 7.5$ Earthquake (This is the boomerang curve on the SPT ver CSR lplot - function of clean sand resistance only):

$$CRR_{7.5} := \begin{cases} \left[\frac{1}{34 - N_{160cs}} + \frac{N_{160cs}}{135} + \frac{50}{(10 \cdot N_{160cs} + 45)^2} - \frac{1}{200} \right] & \text{if } N_{160cs} < 34 \\ 100 & \text{otherwise} \end{cases}$$

$$CRR_{7.5} = 0.205$$

Calculate Stress Reduction Coefficient to Account for Flexibility in Soil Profile:

$$r_d := \begin{cases} (1.0m - 0.00765 \cdot z) & \text{if } (z \leq 9.15m) \\ (1.174m - 0.0267 \cdot z) & \text{if } (9.15m < z \leq 23m) \\ 0 & \text{otherwise} \end{cases}$$

$$r_d = 3.158 \text{ ft}$$

$$r_d = 0.963 \text{ m}$$

If $r_d = 0$, then input error.

Redefine Stress Reduction Coefficient for Calculations:

$$r_d := \frac{r_d}{m}$$

Calculate Cyclic Stress Ratio (CSR) using water level and effective stress during the earthquake, not exploration levels:

$$CSR := 0.65 \cdot \left(\frac{a_{max}}{g} \right) \cdot \left(\frac{\sigma_{vatEQ}}{\sigma_{veffatEQ}} \right) r_d$$

$$CSR = 0.38$$

Calculations, Section 5: CSR Scaling Factors

Checked By:

Note : Cyclic stress ratio (CSR) is divided by the magnitude scaling factor, gravel content, and plasticity factor to compare to the cyclic resistance ratio curve. All the modifications are put on the CSR side of the equation, because (a) the 1998 NCEER method does not specify whether to apply scaling factors to CSR (division) or Cyclic Resistance Ratio (multiplication), and (b) graphically, we can compare a wide variety of data with and without modifications to a single CRR curve and put all modifications in CSR.

Calculate Magnitude Scaling Factor (MSF) to Scale CSR Data:

$$MSF := \frac{10^{2.24}}{M_w^{2.56}}$$

$$MSF = 1$$

Reproduce Figure 8-7, Reference 2 (Effect of Gravel Content on Liquefaction Resistance of Gravelly Soils):

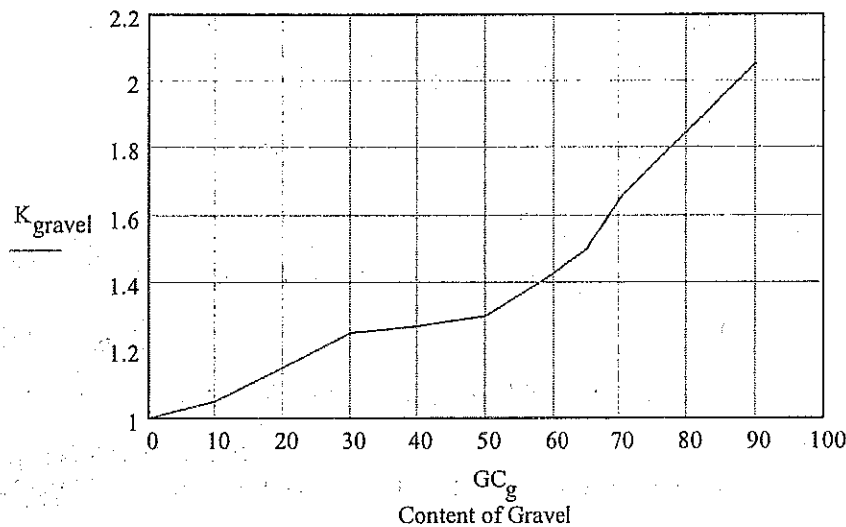
Data for Gravel Content:

Data for Plasticity Modification

$GC_g :=$	$K_{gravel} :=$
0	1.00
10	1.05
20	1.15
25	1.20
30	1.25
40	1.27
50	1.30
58	1.40
65	1.50
70	1.65
90	2.05

$$PI_g := \begin{pmatrix} 0 \\ 10 \\ 55 \end{pmatrix}$$

$$SR_g := \begin{pmatrix} 1.0 \\ 1.0 \\ 2.0 \end{pmatrix}$$



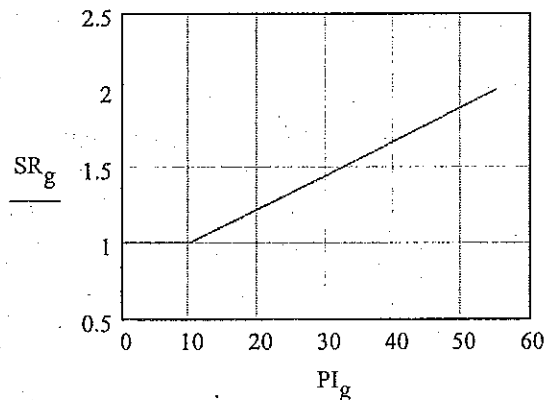
Note - gravel scaling factor is to account for unrepresentatively high blows for gravel layers - should decrease overall factor of safety.

Calculate Gravel Content Scaling Factor (GCSF):

$$GCSF := \text{interp}(GC_g, K_{gravel}, GC)$$

$$GCSF = 1$$

Reproduce Chart for Modification of Cyclic Strength Allowing for Effects of Plasticity (From Ishihara):



Calculate Plasticity Index Scaling Factor (PISF):

$$PISF := \text{interp}(PI_g, SR_g, PI)$$

$$PISF = 1$$

Calculations, Section 6: Factor of Safety (FS) Against Liquefaction

Checked By:

Calculate Modified and Scaled CSR:

$$CSR_{mod} = 0.391$$

$$FS = 0.525$$

$$FS = \left(\frac{CRR_{7.5}}{CSR} \right) \cdot MSF \cdot \frac{PISF}{GCSF}$$

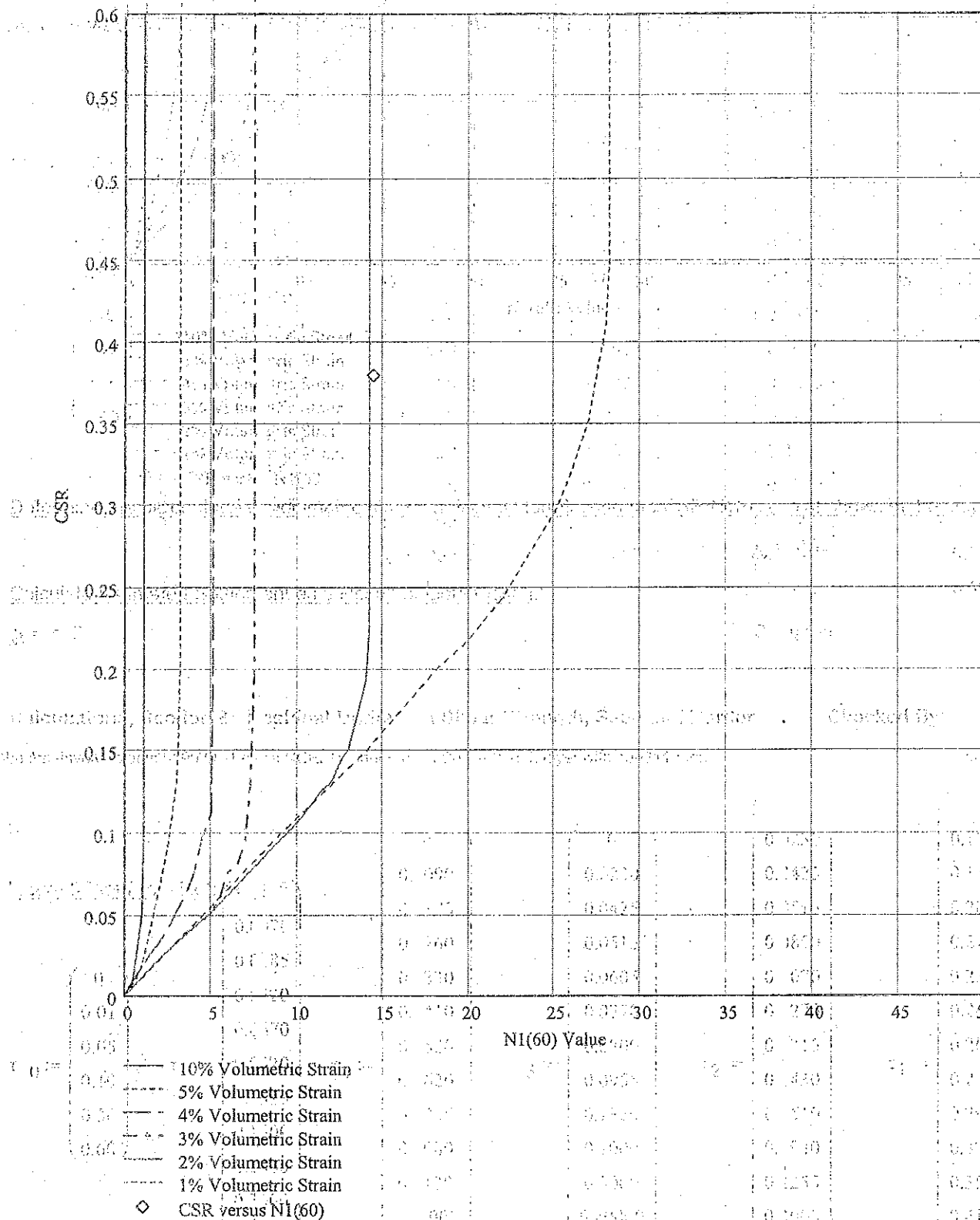
	<u>Hazard Levels</u>
Hazard = 2	Negligible = 0
	Possible = 1
	Likely = 2

Hazard :=	0 if ($FS \geq 1.1$)
	1 if ($1.0 < FS < 1.1$)
	2 otherwise

Checked By:

$$k_1 := 0..5 \quad k_2 := 0..10 \quad k_3 := 0..13 \quad k_4 := 0..15$$

\\bec\mainvol\projects\0199\08-1\calcs\NCEER Liquefaction Bg B-02 15 ft layer with su0311.mcd



Determine the percentage of Volumetric strain [in decimal form] using the CSR/N1(60) point shown in the plot above:

$$e_v = 0.02$$

Calculate Estimated Settlement as a Result of Liquefaction:

$$S_m = e_v \cdot T$$

$$S = 0.6 \text{ in}$$

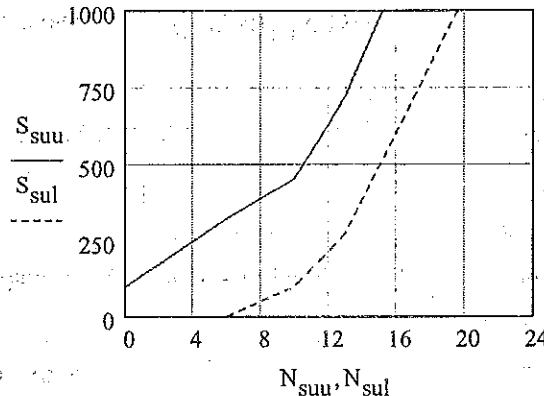
Calculations, Section 8: Residual Undrained Shear Strength, Seed and Harder

Checked By:

Please use with caution - based on limited case studies of large-strain liquefaction failures, may not be appropriate at all for small-strain liquefaction failures.

Reproduce Chart for Residual Undrained Shear Strength from Reference 6

$$N_{sul} := \begin{pmatrix} 0 \\ 6 \\ 10 \\ 13 \\ 20 \end{pmatrix} \quad S_{sul} := \begin{pmatrix} 0 \\ 0 \\ 100 \\ 270 \\ 1040 \end{pmatrix} \quad N_{suu} := \begin{pmatrix} 0 \\ 6 \\ 10 \\ 13 \\ 16 \end{pmatrix} \quad S_{suu} := \begin{pmatrix} 100 \\ 320 \\ 450 \\ 720 \\ 1100 \end{pmatrix}$$



Note: Chart is extrapolated above N = 15 and below N=3

Calculate Upper and Lower Bound Undrained Strength from Seed and Harder:

$$S_{ul} := \begin{cases} \text{round}(\text{interp}(N_{sul}, S_{sul}, N_{160cs}), -1) & \text{if } N_{160cs} \leq 20 \\ 0 & \text{otherwise} \end{cases}$$

$$N_{160cs} = 19.2$$

$$S_{ul} = 950 \text{ psf}$$

$$S_{uu} := \begin{cases} \text{round}(\text{interp}(N_{suu}, S_{suu}, N_{160cs}), -1) & \text{if } N_{160cs} \leq 20 \\ 0 & \text{otherwise} \end{cases}$$

$$S_{uu} = 1500 \text{ psf}$$

As noted by Reference 6, "it is recommended that the lower bound, or near-lower-bound relationship between N_{160cs} and [residual undrained shear strength] be used...at this time, owing to scatter and uncertainty, and the limited number of case studies back-analyzed to date."

Calculations, Section 9: Residual Undrained Shear Strength from Reference 7

Checked By:

$$S_{yield} := \begin{cases} \sigma_{veffatEQ}(0.205 + 0.0075 \cdot N_{160}) & \text{if } N_{160} \leq 12 \\ 0 & \text{otherwise} \end{cases}$$

If values are zero, indicates not valid range of N_{160} for relationship

$$S_{yield} = 0 \frac{\text{ms}^2}{\text{kg}} \text{ psf}$$

This value is primarily relevant for "static" rather than seismic liquefaction

$$S_{triggered} := \begin{cases} \sigma_{veffatEQ}(0.03 + 0.0075 \cdot N_{160}) & \text{if } N_{160} \leq 12 \\ 0 & \text{otherwise} \end{cases}$$

$$S_{triggered} = 0 \frac{\text{ms}^2}{\text{kg}} \text{ psf}$$

Calculations, Section 10: Summary of Results

Checked By:

Layer Depth, d:

$$z = 16 \text{ ft}$$

Blowcounts:

$$N_m = 10 \quad N_{160} = 14.42 \quad N_{160cs} = 19.2$$

Liquefied? Hazard Levels: Negligible = 0 Marginal = 1 Liquefies = 2

$$FS = 0.525 \quad \text{Hazard} = 2$$

Settlement Strain:

$$\epsilon = 0.02 \quad \text{Manually picked}$$

Undrained Strength: Seed and Harder

$$S_{ul} = 950$$

Yield undrained strength for static failures (Olsen and Stark 2003)

$$S_{yield} = 0 \frac{\text{ms}^2}{\text{kg}} \text{ psf}$$

Liquefied residual strength (Olsen and Stark 2003)

$$S_{triggered} = 0 \frac{\text{ms}^2}{\text{kg}} \text{ psf}$$

These values will be zero if N_{160} is outside of the correlated range.

LEVEL-GROUND LIQUEFACTION ANALYSIS USING STANDARD PENETRATION TESTING (SPT) AND BASED UPON 1996 AND 1998 NCEER WORKSHOP RECOMMENDATIONS

Location: Bella Vista Ranch Boring B-03
Analyzed Zone: 25-27.5 feet depth

This version of the liquefaction analysis procedure supports the spreadsheet analysis of multiple points

References

1. T. L. Youd, Chair, Member, ASCE, I. M. Idriss, Co-Chair, Fellow, ASCE, Ronald D. Andrus, Ignacio Arango, Gonzalo Castro, John T. Christian, Richardo Dobry, W. D. Liam Finn, Leslie F. Harder Jr., Mary Ellen Hynes, Kenji Ishihara, Joseph P. Koester, Sam S. C. Liao, William F. Marcuson III, Geoffrey R. Martin, James K. Mitchell, Yoshiharu Moriawaki, Maurice S. Power, Peter K. Robertson, Raymond B. Seed, and Kenneth H. Stokoe II, 2001, Liquefaction Resistance of Soils: Summary Report from the 1996 NCEER and 1998 NCEER/NSF Workshops on Evaluation of Liquefaction Resistance of Soils, Journal of Geotechnical and Geoenvironmental Engineering, October, 2001, p. 817-833.
2. Federal Highway Administration (FHWA), 1998, Geotechnical Earthquake Engineering Reference Manual, Report No. FHWA-HI-99-012, 392 p.
3. U. S. Water Conservation Laboratory, 2003, Agricultural Research Service, Relative Humidity Equations (www.uswcl.ars.ag.gov/exper/relhumeq.htm).
4. Ishihara, Personal communication.
5. Tokimatsu, K. and Seed, H. B., 1987, Evaluation of Settlements in Sands due to Earthquake Shaking, Journal of Geotechnical Engineering, American Society of Civil Engineers (ASCE), v. 113, n. 8, p. 861-878.
6. Seed, R. B. and L.F. Harder, 1990, SPT-based Analyses of Cyclic Pore Pressure Generation and Undrained Residual Strength, *Proc., H. Bolton Seed Memorial Symp.*, BiTech Publishers Ltd., Vancouver, 351-376.
7. Olsen, S. M. and T.D. Stark, 2003, Yield Strength Ratop and Liquefaction Analysis of Slopes and Embankments, Journal of Geotechnical Engineering, Vol 129 No. 8, p. 727 -737.

Unit Conversions

$$\text{psf} := \frac{\text{lbf}}{\text{ft}^2} \quad \text{pcf} := \frac{\text{lbf}}{\text{ft}^3} \quad \text{kPa} := 1000\text{Pa}$$

Checked By:

Input Data

Sample Top Depth:

d := 25ft

Depth to Mid-Sample (typically 0.5' waste barrel +1' sampler length/2 = 1'):

l := 1.0ft

Soil Total Unit Weight above Water Table:

$\gamma_{\text{above}} := 110\text{pcf}$

Soil Total Unit Weight below Water Table:

$\gamma := 120\text{pcf}$

SPT N-Value at Sample Depth:

$N_m := 18$

Soil Sample Plasticity Index (PI):

PI := 5

Percentage of Fines or Fines Content [%]:

FC := 22

Percentage of Gravel or Gravel Content [%]:

GC := 0

Thickness of Potentially Liquefiable Zone:

$T_w := 2.5\text{ft}$

$$d_{gw} := 4.6 \text{ ft}$$

$$d_{\text{gwatEQ}} := 4\text{ft}$$

$$d_b := 6 \text{ in}$$

1 rgs $\approx$ 5 ft

Sampler := 1

Hammer := 3

ER := 68

$$a_{\max} := 0.384g$$

$$M_w := 7.5$$

Calculations, Section 1: Vertical Soil Stresses

Calculate Depth at Midpoint of Sample:

$$Z := \Omega + i\infty$$

$$z = 26 \text{ ft}$$

Calculate Soil-Vertical Total Stress at Midpoint of Sample:

$$\sigma_v = \gamma_{\text{above}} \cdot d_{\text{gw}} + \gamma \cdot (z - d_{\text{gw}})$$

$$\sigma_v = 3074 \text{ psf}$$

Calculate Soil Effective Unit Weight at Sample Depth (Since sample is below the ground water surface):

$$\gamma_{\text{eff}} := \gamma - 62.4 \text{ pcf}$$

$$\gamma_{\text{eff}} = 57.6 \text{ pcf}$$

Calculate Effective Stress at Midpoint of Sample for SPT Correction:

$$\sigma_{veff} := \sigma_v + \left[62.4 \text{ pcf} \cdot (z - d_{gw}) \right]$$

$$\sigma_{veff} = 1.739 \times 10^3 \text{ psf}$$

Calculate Soil Vertical Total Stress at Midpoint of Sample for EQ event:

$$\sigma_{\text{vatEQ}} := \gamma_{\text{above}} \cdot d_{\text{gwatEQ}} + \gamma \cdot (z - d_{\text{gwatEQ}})$$

$$\sigma_{\text{vatEO}} = 3080 \text{ psf}$$

Calculate Effective Stress at Midpoint of Sample for EQ event:

$$\sigma_{veffatEQ} := \sigma_{vatEQ} + \left[62.4 \text{pcf} \cdot (z - d_{gWatEQ}) \right]$$

$$\sigma_{veffatEO} = 1.707 \times 10^3 \text{ psf}$$

Calculations, Section 2: SPT N-Value Correction

Checked By:

Calculate Overburden Pressure Correction Factor:

As noted by Reference 6, the Overburden correction is to have N values representative of the equivalent penetration resistance at a hypothetical overburden stress of 100 kpa, 1 ton/ft², or roughly 1 atmosphere. The use of "atmospheres" is merely a convenience for conversion between unit systems, and is not related to local atmospheric pressure.

$$P_a := 100 \text{ kPa}$$

$$P_a = 2.089 \times 10^3 \text{ psf}$$

$$C_n = \begin{cases} \left(\frac{P_a}{\sigma_{veff}} \right)^{0.5} & \text{if } \left[\left(\frac{P_a}{\sigma_{veff}} \right)^{0.5} \leq 1.7 \right] \\ 1.7 & \text{otherwise} \end{cases}$$

$$C_n \approx 1.096$$

Determine Hammer Energy Correction Factor:

$$C_e = \begin{cases} 1.0 & \text{if (Hammer = 1)} \\ 1.3 & \text{if (Hammer = 2)} \end{cases}$$

$$C_e = 1.133$$

If $C_e = 0$, then input error.

$$C_b = \begin{cases} \left(\frac{ER}{50} \right) & \text{if (Hammer = 3)} \\ 0 & \text{otherwise} \end{cases}$$

$$C_b = 0.0$$

If $C_b = 0$, then input error.

Determine Sorehole Diameter Correction Factor:

$$C_b = \begin{cases} 1.00 & \text{if } (65\text{mm} < d_b < 115\text{mm}) \\ 1.05 & \text{if } (150\text{mm} < d_b < 154\text{mm}) \end{cases}$$

$$C_b = 1.05$$

If $C_b = 0$, then input error.

$$C_b = 1.15 \text{ if } (200\text{mm} < d_b < 204\text{mm})$$

$$C_b = 1.15$$

$$C_b = 0 \text{ otherwise}$$

Calculate Drill Rod Length:

$$l_r = d + l_{ags}$$

$$l_r = 30\text{ft}$$

Determine Rod Length Correction Factor:

$$C_r = \begin{cases} 0.75 & \text{if } (l_r < 3\text{m}) \\ 0.50 & \text{if } (3\text{m} \leq l_r < 4\text{m}) \\ 0.85 & \text{if } (4\text{m} \leq l_r < 6\text{m}) \\ 0.95 & \text{if } (6\text{m} \leq l_r < 10\text{m}) \\ 1.00 & \text{if } (10\text{m} \leq l_r < 30\text{m}) \end{cases}$$

$$C_r = 0.95$$

If $C_r = 0$, then input error.

$$C_r = 0 \text{ otherwise}$$

Determine Sampler Correction Factor (with or without liners):

$$C_s = \begin{cases} 1.0 & \text{if (Sampler = 1)} \\ 1.2 & \text{if (Sampler = 2)} \\ 0 & \text{otherwise} \end{cases}$$

$$C_s = 1.0$$

If $C_s = 0$, then input error.

Calculate Corrected SPT (N_{160}) Value:

$$N_{160} = (N_m \cdot C_n \cdot C_e \cdot C_b \cdot C_r \cdot C_s)$$

$$N_{160} = 22.3$$

Calculations, Section 3: (N_{160}) Equivalent Clean Sand Correction

Checked By:

Calculate Clean Sand Correction Coefficients:

$$\alpha = \begin{cases} 0 & \text{if } (FC \leq 5) \\ \exp \left[1.76 - \left(\frac{190}{FC} \right) \right] & \text{if } (5 < FC < 35) \\ 5.0 & \text{if } (FC \geq 35) \\ 0 & \text{otherwise} \end{cases}$$

$$\alpha = 3.925$$

If $\alpha = 0$, then input error.

$$\alpha = 0 \text{ otherwise}$$

$$\beta := \begin{cases} 1.0 & \text{if } (FC \leq 5) \\ 0.99 + \left(\frac{FC - 5}{1000} \right) & \text{if } (5 < FC < 35) \\ 1.2 & \text{if } (FC \geq 35) \\ 0 & \text{otherwise} \end{cases}$$

$$\beta = 1.093$$

If $\beta = 0$, then input error.

Calculate Corrected (N_{160}) Equivalent Clean Sand Value:

$$N_{160cs} := \alpha + \beta (N_{160})$$

$$N_{160cs} = 28.3$$

Calculations, Section 4: Cyclic Stress Ratio and Cyclic Resistance Ratio (CSR) Checked By:

Calculate Cyclic Resistance Ratio (CRR) for Moment Magnitude $M_w = 7.5$ Earthquake (This is the boomerang curve on the SPT ver CSR plot - function of clean sand resistance only):

$$CRR_{7.5} := \begin{cases} \left[\frac{1}{54 - N_{160cs}} + \frac{N_{160cs}}{135} + \frac{50}{(10 \cdot N_{160cs} + 45)^2} + \frac{1}{200} \right] & \text{if } N_{160cs} < 34 \\ 100 & \text{otherwise} \end{cases}$$

$$CRR_{7.5} = 0.381$$

Calculate Stress Reduction Coefficient to Account for Flexibility in Soil Profile:

$$r_d := \begin{cases} (1.0m - 0.00765 \cdot z) & \text{if } (z \leq 9.15m) \\ (1.174m - 0.0267 \cdot z) & \text{if } (9.15m < z \leq 23m) \\ 0 & \text{otherwise} \end{cases}$$

$$r_d = 3.082 \text{ ft}$$

$$r_d = 0.939 \text{ m}$$

If $r_d = 0$, then input error.

Redefine Stress Reduction Coefficient for Calculations:

$$r_d := \frac{r_d}{m}$$

Calculate Cyclic Stress Ratio (CSR) using water level and effective stress during the earthquake, not exploration levels:

$$CSR = 0.65 \left(\frac{\sigma_{max}}{s} \right) \left(\frac{\sigma_{vatBQ}}{\sigma_{veffatEQ}} \right) \left(\frac{A_d}{m} \right)$$

$$C_b = 1.35$$

$$CSR = 0.423$$

Calculations, Section 5: CSR Scaling Factors

Checked By:

Note: Cyclic stress ratio (CSR) is divided by the magnitude scaling factor, gravel content, and plasticity factor to compare to the cyclic resistance ratio curve. All the modifications are put on the CSR side of the equation, because (a) the 1998 NCEER method does not specify whether to apply scaling factors to CSR (division) or Cyclic Resistance Ratio (multiplication), and (b) graphically, we can compare a wide variety of data with and without modifications to a single CRR curve and put all modifications in CSR.

Calculate Magnitude Scaling Factor (MSF) to Scale CSR Data:

$$MSF = \frac{10^{2.24 \left(\frac{M_w - 6.0}{2.56} \right)}}{M_w}$$

$$MSF = 1$$

Reproduce Figure 8-7, Reference 2 (Effect of Gravel Content on Liquefaction Resistance of Gravelly Soils):

Data for Gravel Content:

Data for Plasticity Modification

$$C_u = 1.35$$

If $C_u = 0$, then input error.

0	1.00
10	1.05
20	1.15
25	1.20
30	1.25
40	1.27
50	1.30
58	1.40
65	1.50
70	1.65
90	2.05

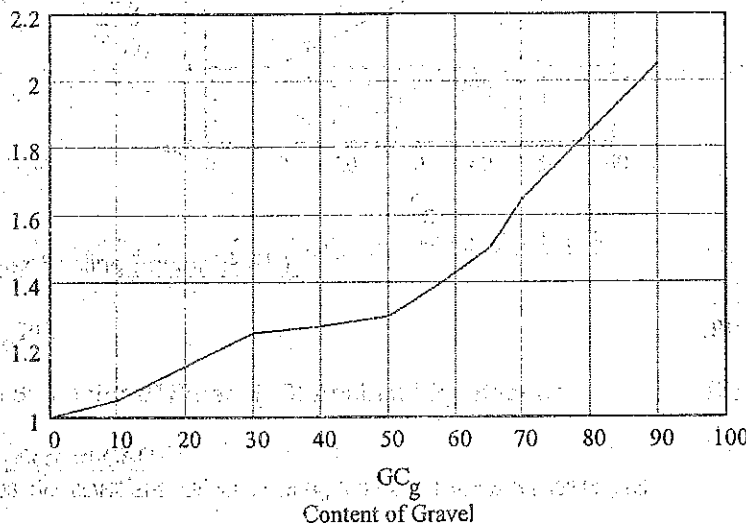
$$PI_g = \begin{pmatrix} 0 \\ 10 \\ 55 \end{pmatrix}$$

$$SR_g = \begin{pmatrix} 1.0 \\ 1.0 \\ 2.0 \end{pmatrix}$$

$$GC_g := 40$$

$$K_{gravel} :=$$

$$1.27$$



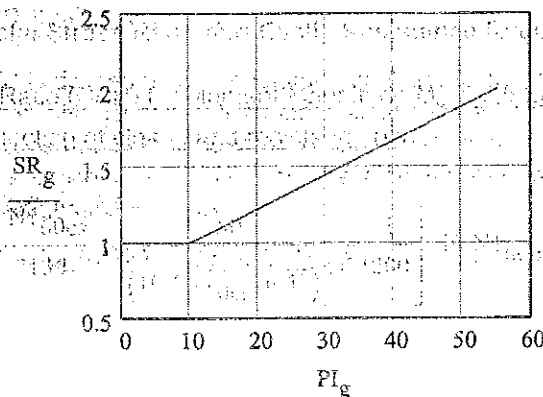
Note - gravel-scaling factor is to account for unrepresentatively high blows for gravel layers - should decrease overall factor of safety.

Calculate Gravel Content Scaling Factor (GCSF):

$$GCSF := \text{interp}(GC_g, K_{gravel}, GC)$$

$$GCSF = 1$$

Reproduce Chart for Modification of Cyclic Strength Allowing for Effects of Plasticity (From Ishihara):



Calculate Plasticity Index Scaling Factor (PISF):

$$PISF := \text{interp}(PI_g, SR_g, PI)$$

$$PISF = 1$$

Calculations, Section 6: Factor of Safety (FS) Against Liquefaction

Checked By:

Calculate Modified and Scaled CSR:

$$CSR_{mod} := \frac{CSR \cdot GCSF}{MSF \cdot PISF}$$

$$CSR_{mod} = 0.423$$

Calculate Factor of Safety Against Liquefaction:

$$FS := \left(\frac{CRR_{7.5}}{CSR} \right) \cdot MSF \cdot \frac{PISF}{GCSF}$$

$$FS = 0.9$$

Determine Liquefaction Hazard based upon Calculated Factor of Safety:

$$\text{Hazard} := \begin{cases} 0 & \text{if } (FS \geq 1.1) \\ 1 & \text{if } (1.0 < FS < 1.1) \\ 2 & \text{otherwise} \end{cases}$$

$$\text{Hazard} = 2$$

Hazard Levels

Negligible = 0

Possible = 1

Likely = 2

Calculations, Section 7: Potential Settlement due to Liquefaction

Checked By:

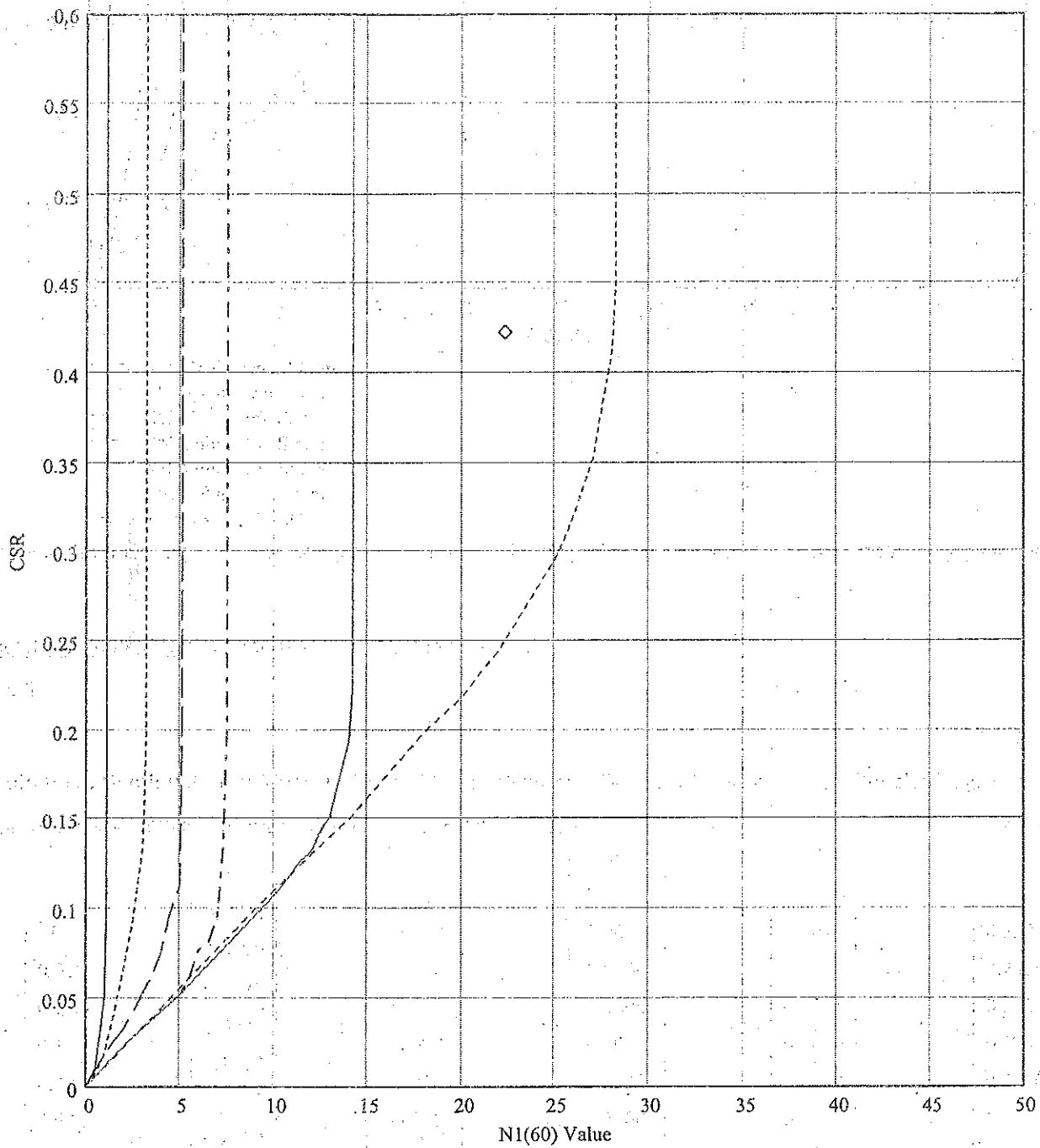
Data to Reproduce Figure 5 from Reference 5:

$$k_1 := 0..5 \quad k_2 := 0..10 \quad k_3 := 0..13 \quad k_4 := 0..15$$

$N_{10} :=$	$N_5 :=$	$N_4 :=$	$N_3 :=$	$N_2 :=$	$N_1 :=$
0	0	0	0	0	0
0.5	0.5	0.5	2.0	2.0	9.05
1.0	1.0	1.0	4.0	4.0	14.0
1.1	1.5	1.5	5.0	5.0	18.1
1.1	2.0	2.0	5.5	8.0	20.0
1.1	2.5	2.5	6.0	10.0	21.0
	3.0	3.0	6.5	11.5	22.0
	3.1	3.5	7.0	12.0	23.0
	3.2	4.0	7.3	12.5	24.0
	3.2	4.5	7.5	13.0	25.0
	3.2	5.0	7.5	14.0	26.0
		5.1	7.5	14.2	27.0
		5.1	7.5	14.2	28.0
		5.1	7.5	14.2	28.2
		5.1	7.5	14.2	28.2
			7.5	14.2	28.2

		0	0	0	0	0	0
		0.0070	0.0090	0.0230	0.0230	0.0230	0.1000
		0.0185	0.0175	0.0425	0.0425	0.0425	0.1500
		0.0420	0.0260	0.0515	0.0515	0.0515	0.2000
		0.0670	0.0330	0.0605	0.0605	0.0850	0.2180
		0.0920	0.0410	0.0770	0.0770	0.1070	0.2320
		0.1310	0.0520	0.0800	0.0800	0.1270	0.2450
		0.1500	0.0620	0.0955	0.0955	0.1315	0.2620
		0.2000	0.0755	0.1320	0.1320	0.1430	0.2790
		0.3000	0.0980	0.2000	0.2000	0.1510	0.2960
		0.6000	0.1130	0.3000	0.3000	0.1940	0.3210
			0.20000	0.40000	0.40000	0.2255	0.3525
			0.4000	0.5000	0.5000	0.3000	0.4120
			0.6000	0.6000	0.6000	0.4000	0.4500
						0.5000	0.5000
						0.6000	0.6000

Figure 5 Plot From Reference 5:



- 10% Volumetric Strain
- - - 5% Volumetric Strain
- . - 4% Volumetric Strain
- . . . 3% Volumetric Strain
- - - 2% Volumetric Strain
- - - 1% Volumetric Strain
- ◇ CSR versus N1(60)

Determine the percentage of volumetric strain [in decimal form] using the CSR/N1(60) point shown in the plot above:

$$\varepsilon_v := 0.0145$$

Calculate Estimated Settlement as a Result of Liquefaction:

$$S_v := \varepsilon_v \cdot T$$

$$S = 0.4 \text{ in}$$

Calculations, Section 8: Residual Undrained Shear Strength, Seed and Harder

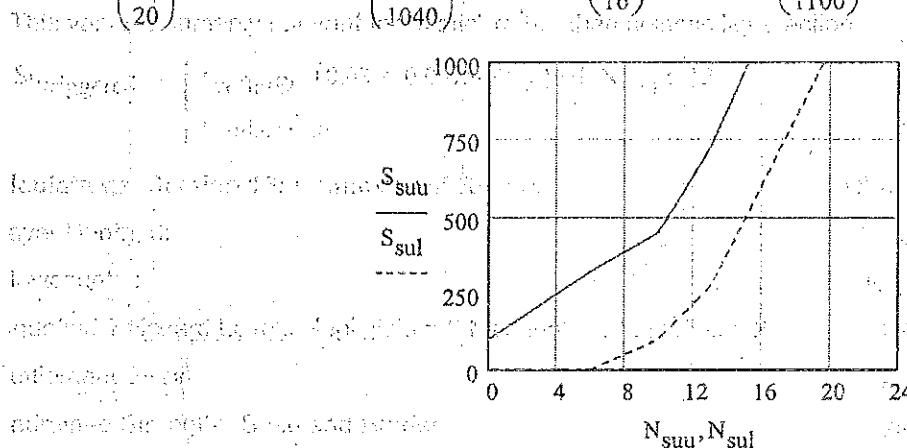
Checked By:

Please use with caution - based on limited case studies of large-strain liquefaction failures, may not be appropriate at all for small-strain liquefaction failures.

Reproduce Chart for Residual Undrained Shear Strength from Reference 6

For a given blowcount and associated blowcount standard deviation, the chart provides the upper and lower bound undrained shear strength values.

N_{sul}	S_{sul}	N_{suu}	S_{suu}
0	0	0	320
6	0	6	450
10	100	10	720
13	270	13	1100
20	1040	16	



Note: Chart is extrapolated above $N = 15$ and below $N = 3$

Calculate Upper and Lower Bound Undrained Strength from Seed and Harder

$$S_{ul} := \begin{cases} \text{round}(\text{interp}(N_{sul}, S_{sul}, N_{160cs}), -1) & \text{if } N_{160cs} \leq 20 \\ 0 & \text{otherwise} \end{cases} \quad N_{160cs} = 28.3$$

$$S_{ul} = 0 \text{ psf}$$

$$S_{uu} := \begin{cases} \text{round}(\text{interp}(N_{suu}, S_{suu}, N_{160cs}), -1) & \text{if } N_{160cs} \leq 20 \\ 0 & \text{otherwise} \end{cases} \quad S_{uu} = 0 \text{ psf}$$

As noted by Reference 6, "it is recommended that the lower bound, or near-lower-bound relationship between N_{160cs} and [residual undrained shear strength] be used...at this time, owing to scatter and uncertainty, and the limited number of case studies back-analyzed to date."

Calculations, Section 9: Residual Undrained Shear Strength from Reference 7

Checked By:

$$S_{u,yield} := \begin{cases} \sigma_{veffatEQ} (0.205 + 0.0075 \cdot N_{160}) & \text{if } N_{160} \leq 12 \\ 0 & \text{otherwise} \end{cases}$$

If values are zero, indicates not valid range of N_{160} for relationship

$$S_{u,yield} = 0 \frac{ms^2}{kg} \text{ psf}$$

This value is primarily relevant for "static" rather than seismic liquefaction

$$S_{u,trigged} := \begin{cases} \sigma_{veffatEQ} (0.03 + 0.0075 \cdot N_{160}) & \text{if } N_{160} \leq 12 \\ 0 & \text{otherwise} \end{cases}$$

$$S_{u,trigged} = 0 \frac{ms^2}{kg} \text{ psf}$$

Calculations, Section 10: Summary of Results

Checked By:

Layer Depth, d :

$$z = 26 \text{ ft}$$

Blowcounts:

$$N_m = 18 \quad N_{160} = 22.3 \quad N_{160cs} = 28.3$$

Liquefied? Hazard Levels: Negligible = 0 Marginal = 1 Liquefies = 2

$$FS = 0.9 \quad \text{Hazard} = 2$$

Settlement Strain:

$$\epsilon = 0.015 \quad \text{Manually picked}$$

Undrained Strength: Seed and Harder

$$S_{ul} = 0$$

Yield undrained strength for static failures (Olsen and Stark 2003)

$$S_{u,yield} = 0 \frac{ms^2}{kg} \text{ psf}$$

Liquefied residual strength (Olsen and Stark 2003)

$$S_{u,trigged} = 0 \frac{ms^2}{kg} \text{ psf}$$

These values will be zero if N_{160} is outside of the correlated range.

Appendix G
First Amended Public Facility Site Agreement

**FIRST AMENDED AND RESTATED PUBLIC FACILITY SITE
AGREEMENT**

BETWEEN

**CITY OF RENO,
A municipal corporation**

AND

**CORONA CYAN LLC,
A Delaware Limited Liability Corporation**

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**FIRST AMENDED AND RESTATED
PUBLIC FACILITY SITE AGREEMENT**

THIS FIRST AMENDED AND RESTATED PUBLIC FACILITY SITE AGREEMENT ("Agreement") is entered into by and between the CITY OF RENO, a municipal corporation ("City"); and CORONA CYAN LLC, a Delaware limited liability company and its successors and assigns ("Developer"). In consideration of the mutual covenants and agreements hereinafter set forth, the parties agree as follows:

1 GENERAL

1.1 On February 14, 2007, the City and Centex Homes, a Nevada general partnership ("Centex"), entered into a Fire Station Development Agreement ("Prior Agreement") which was executed by the City on March 14, 2007. On March 29, 2008, Centex and Developer, executed a General Assignment, Bill of Sale and Assignment and Assumption Agreement (the "General Assignment") whereby Centex granted, sold, assigned, transferred, conveyed and delivered to Developer any and all rights and obligations previously held by Centex in and under the Prior Agreement, all in connection with Developer's acquisition from Centex of the Bella Vista Ranch real estate development project located in Reno, Nevada. Pursuant to the General Assignment, Developer succeeded to the rights and obligations of Centex under the Prior Agreement and is now the "Developer" (as that term is defined in the Prior Agreement).

1.2 Pursuant to Sections 1.2 and 3.4 of the Prior Agreement, Centex voluntarily agreed and offered to dedicate to the City a fire station site and construct a turnkey fire station as indicated in the Prior Agreement. Pursuant to Section 5.3 of the Prior Agreement, if the fire station has not been constructed, Centex may assign its obligation to construct the fire station subject to approval by the City. The City desires to approve an assignment of the Prior Agreement to Developer, as is amended herein.

1.3 The City and Developer desire to amend the Prior Agreement to modify their respective obligations thereunder, and to provide for, among other modifications, the application of the Prior Agreement, as amended, to the 637+- acres of real property located in the City of Reno and more particularly described in Exhibit "A" attached hereto and incorporated herein by this reference. This Agreement covers the following two (2) planned unit developments (PUD's): 1) City of Reno Case No. LDC05-00127, the planned unit development handbook which was approved by the City in August, 2005 (the "Phase 1 Handbook") as may be amended; and 2) City of Reno Case No. LDC10-00051, the planned unit development handbook (the "Phase 2 Handbook") as may be amended, which is currently being processed by the City. Both projects, for ease of reference are referred to collectively as the PUD's and all terms herein apply to both projects. This Agreement is subject to all other provisions contained in the applicable PUD's.

1.4 Pursuant to the provisions of this Agreement, Developer will transfer to the City by a Grant, Bargain and Sale Deed that certain Public Facility Site defined in Section 2 below, and make certain contributions from the PUD's toward the City's construction of a fire station that will serve the PUD's.

1.5 The Public Facility Site defined in Section 2 below, and all improvements thereon shall not be part of any homeowners' associations, landscape maintenance districts, drainage districts, or any other association or district established as a part of the PUD.

1.6 Upon full execution hereof and payment of the Initial Contribution (as defined below), this Agreement fully amends, restates, and supersedes the Prior Agreement.

2 TRANSFER OF PUBLIC FACILITY SITE TO THE CITY

The Public Facility Site is more particularly described in Exhibit "B" (the "Public Facility Site"). Promptly following full execution of this Agreement, Developer shall execute and cause to be recorded at Developer's sole cost and expense a Grant Bargain and Sale Deed in the form attached hereto as Exhibit "C", and all related transfer documents approved by the City Attorney's Office which will transfer ownership of the Public Facility Site to the City. The Public Facility Site shall be transferred to the City free and clear of all encumbrances and liens except for permitted exceptions agreed to by the City in its reasonable discretion. When ownership of the Public Facility Site is transferred to the City, it shall be in good condition, free of any hazardous waste, weeds and/or debris, and shall include all water rights, if any, owned by the Developer. The Developer shall bring all utilities up to the Public Facility Site prior to transfer of ownership to the Public Facility Site to the City. The Developer shall also execute a Developers Release and Affidavit in the form attached as Exhibit "D". With this transfer, the Developer hereby waives any reversionary rights to the Public Facility Site, including any rights under NRS 268.050. Once the City receives the Initial Contribution (defined below) and the City has received a fully executed Grant Bargain and Sale Deed and related documents that has been recorded by the Developer in the official records of Washoe County, the Developer shall have no further responsibility, liability, or obligation for the Public Facility Site and the City agrees to take ownership and maintain the Public Facility Site in accordance with City codes.

3 CONTRIBUTIONS

3.1 Initial Contribution. Within thirty (30) days of execution of this Agreement, Developer shall pay to the City the sum of One Million and No/100ths Dollars (\$1,000,000.00) (the "Initial Contribution"), which funds shall be placed in a restricted City account and shall

only be used by the City toward the construction of a fire station which will serve the PUD's consistent with the City's response times utilized to provide fire service. The location of this fire station shall be in the sole discretion of the City but the location shall be adequate to provide fire services to the PUD's as noted above. The Initial Contribution shall be comprised of the following and shall be paid as follows: (1) Developer shall cause to be transferred to the City all right, title, and interest in and to that certain deposit account with Wells Fargo Bank, which account is identified as account number #1763113667 (the "Account") which balance shall be no less than Two Hundred Twenty Seven Thousand and No/100ths (\$227,000.00). This Account is currently owned by Centex Homes, a Nevada general partnership (Centex). Centex shall be a party and signatory to this Agreement for the sole purpose of transferring ownership of this Account to the City. Once Centex has caused this Account to be transferred to the City, Centex shall have no further obligations under this Agreement. (2) The Developer shall also authorize the transfer and release to the City of all funds the City has collected and currently holds for the issuance of building permits for the PUD's pursuant to the Prior Agreement (Building Permit Funds). This amount is estimated to be One Hundred Twenty Thousand and No/100ths (\$120,000.00). Developer shall pay to the City, via wire transfer, an amount equal to the difference between the Initial Contribution and the actual balances in the Account and Building Permit Funds at the time the Account and Building Permit Funds are transferred from or released by Developer to the City.

If the Initial Contribution is not paid to City within this thirty (30) day period, interest shall accrue at the rate of one (1) percent, compounded monthly, until the Initial Contribution has been paid to the City. In addition to the above, if the Initial Contribution is not paid by the Developer to the City within thirty (30) days, this shall be a material breach of this Agreement

and Developer shall have the full obligation to construct a turn-key fire station at the Public Facility Site by December 31, 2025 but shall have no further obligations hereunder. The City shall also withhold all building permits if the Initial Contribution is not paid within (30) days.

3.2 Contributions. In addition to the Initial Contribution, Developer shall provide contributions for the construction of the fire station in connection with the development of each of the PUD's which obtain building permits after the execution of this Agreement. The contribution due (the "Contribution" or "Contributions") for each Unit under this Section 3.2 shall be as follows: (1) the sum of Three Hundred and No/100ths Dollars (\$300.00) for each Residential Unit constituting a single family dwelling; (2) the sum of Two Hundred and No/100ths Dollars (\$200.00) for each Residential Unit constituting an individual multi-family dwelling; and (3) thirty five cents (\$0.35) per gross building square foot for Non-Residential Units. As used herein, "Residential Unit" means any single family dwelling or individual multi-family dwelling in the Project, and "Non-Residential Unit" means any stand-alone building in the Project located upon property holding a commercial land use designation which is not a "Residential Unit". (Residential Units and Non-Residential Units may be referred to herein individually as a "Unit" and collectively as "Units"). Units shall not include civic uses, such as parks, schools, recreational amenities (e.g. golf course, fitness center, community center, or homeowner association facilities), open space, wetlands, common area, government-owned facilities, streets, flood control improvements, etc (collectively, the "Civic Uses"). It is noted that certain Units that have already obtained building permits paid at a different rate, which is deemed to be adequate and no further capital contributions shall be required for those units. Once a Contribution is made for a Unit, that Unit shall be completely released from all further obligations to contribute under this Section 3 without the need to record a release of the lien and

charge of this Agreement as to said Unit, and said Unit owner shall have no liability if Contributions are not timely made for other Units or any Developer obligations of this Agreement are not performed. If requested, the City agrees to sign and deliver to Developer, which Developer may cause to be recorded at its sole cost and expense, a release of lien required by a title company with respect to the sale of a Unit, provided that the form of the release of lien is acceptable to the City, in the City's reasonable discretion.

3.3. Payment of Contributions. Each and every Contribution required by Section 3.2 above shall be paid to the City prior to the issuance of a building permit for that Unit. The City shall have the right to delay or deny the issuance of any and all building permits for a material default of this Agreement or deny or delay a building permit for any Unit for which the Contribution has not been paid until such time as the Contribution has been paid. For purposes of clarification, the approval of parcel maps, tentative maps, special use permits, records of survey, final subdivision maps, or approval of certificates of occupancy for Civic Uses within the Project shall not trigger the obligation to make Contributions hereunder.

3.4 Sale Proceeds. City shall receive full ownership of the Public Facility Site. If City determines it no longer has a municipal or government use for the site, it may sell all or a portion of the property. After January 1, 2028, City shall receive all proceeds from the sale. If such sale occurs prior to the January 1, 2028, Developer and the City shall equally share the net sales proceeds of the sale. As used herein, "net sales proceeds" means the gross sales price of the sale of the Public Facility Site, less reasonable brokerage commission and other reasonable closing costs which costs shall be split evenly between the City and the Developer. Notwithstanding the foregoing, Developer may, in its sole and absolute discretion, apply its portion of the proceeds from a sale occurring before January 1, 2028 to any remaining amounts

due under of this Agreement. If the Developer applies its portion of the net sales proceeds during this time, such amount shall be credited toward either the applicable amount of One Million Five Hundred Thousand and No/100ths Dollars (\$1,500,000.00) the Developer must pay to the City by January 1, 2023 (See Section 3.6) or the One Million Eight Hundred Thousand and No/100ths Dollars (\$1,800,000.00) the Developer must pay to the City after January 1, 2023 but before January 1, 2028 (See Section 3.6 below).

3.5 Pre-paid Contributions. In its sole and absolute discretion and without any obligation whatsoever to do so, at any time Developer may pre-pay a Contribution to the City under this Agreement ("Pre-paid Contribution"). The Developer shall indicate to what obligation or to which Units the Pre-paid Contribution applies.

3.6 Increased Contributions. If, by January 1, 2023, the City has not collected One Million Five Hundred Thousand and No/100ths Dollars (\$1,500,000.00) under the terms of this Agreement, the Developer shall process, at its sole cost and expense, an amendment to the PUD's which shall increase the Contributions required of Units within the PUD's to ensure the City receives an increase in total compensation to be the sum of One Million Eight Hundred Thousand and No/100ths Dollars (\$1,800,000.00). If the City has not received this increased amount of One Million Eight Hundred Thousand and No/100ths Dollars (\$1,800,000.00) by January 1, 2028 the Developer shall make a lump sum payment to the City for the difference between what the City has received and the One Million Eight Hundred Thousand and No/100ths Dollars (\$1,800,000.00). If the Developer does not make this payment within thirty (30) days from this date, the City shall cease to issue all building permits within the PUD's. The City also reserves the right to pursue all other legal remedies.

3.7 Certificate of Compliance. Within thirty (30) working days after receiving a specific request from Developer and if all amounts due and payable under this Agreement have been paid and all other conditions have been satisfied, the City shall execute in recordable form, a Certificate of Compliance with the Agreement, which, when recorded in the official records of Washoe County shall indicate satisfaction of the obligations of the parties under this Agreement. A Release of Lien is different than a Certificate of Compliance and no recorded Release of Lien terminating the lien and charge upon a portion of Units shall operate to terminate any outstanding obligations of the Developer or the City, including any unperformed obligation of Developer to contribute for all other Units not subject to the recorded Release of Lien or to pay Contributions which have not been paid.

4 COVENANTS RUNNING WITH THE LAND / ASSIGNMENT

4.1 Recordation. In order to provide notice to bind all future owners of the property within the PUD's regarding obligations for Contributions specified in this Agreement, and to provide them with the benefits hereof, this Agreement shall be recorded, at Developers sole cost and expense, in the official records of Washoe County. The terms and provisions of this Agreement regarding Contributions shall constitute covenants running with the land for the Units, and no successor in interest to all or part of the Units shall assume Developer's obligations under Sections 2 or 3.1, unless the successor to Developer is assigned the obligation and expressly assumes the obligation, subject to City approval, as provided in Section 4.2 of this Agreement.

4.2 Assignment of Agreement. Developer may assign this Agreement, subject to the City's written approval of the assignee, which approval shall not be unreasonably withheld, provided that the approved assignee assumes the applicable obligations and duties of Developer

and is capable of performing such outstanding obligations and duties. In determining whether an assignee is capable of performing the outstanding obligations and duties of the Agreement, the City may consider, among other things, the assignee's financial resources, past business and/or development history and/or any other matters which may impact the assignee's ability to perform the outstanding obligations and duties contained in the Agreement.

4.3 Subordination. The parties agree that this Agreement, and all terms and conditions hereof, shall be junior to and subordinated to the recorded priority of all deeds of trust encumbering all or any portion of the Units which are recorded subsequent in time to this Agreement, provided any such deed of trust secures the payment of loan proceeds used to purchase or construct improvements which benefit the Units subject to subordination. Nothing contained in this Agreement grants any right nor imposes any obligation on a trustee or a beneficiary of a deed of trust encumbering all or any portion of the Units. Upon request, the City shall execute recordable subordination agreements consistent with the provisions of this Section.

5 TERM

Except as otherwise expressly provided herein, this Agreement shall terminate fifty (50) years from the date hereof or earlier upon the recordation of a Certificate of Compliance.

6 MISCELLANEOUS

The parties further agree as follows:

6.1 Governing Law; Venue. This Agreement is being executed and delivered in Washoe County, Nevada, and is intended to be performed in the State of Nevada, and the laws of Nevada shall govern the validity, construction, enforcement and interpretation of the Agreement. Venue for any legal action arising out of this Agreement shall be in a court of competent jurisdiction located in Washoe County, Nevada.

6.2 Entirety and Amendments. This Agreement embodies the entire agreement between the parties and supersedes all prior agreements and understandings relating to the subject matter hereof and may be amended or supplemented only by an instrument in writing executed by the party against whom enforcement is sought, provided that nothing contained in this Agreement shall be interpreted to change, amend or modify the conditions of the PUD's, as approved by the City. No oral statements or representations made before or after the execution of this Agreement regarding the subject matter of this Agreement are binding on a party, nor may any such oral statements or representations be relied on by a party.

6.3 Invalid Provisions. If any provision of this Agreement is held to be illegal, invalid or unenforceable under present or future laws, such provision shall be fully severable. The Agreement shall be construed and enforced as if such illegal, invalid or unenforceable provision had never comprised a part of the Agreement. The remaining provisions of the Agreement shall remain in full force and effect and shall not be affected by the illegal, invalid or unenforceable provision or by its severance from this Agreement.

6.4 Parties Bound and Assignment. Except as otherwise provided herein, this Agreement shall be binding upon and inure to the benefit of the parties, and their respective heirs, personal representatives, successors and assigns.

6.5 Further Acts. In addition to the acts recited in the Agreement to be performed, the parties agree to perform, or cause to be performed, any and all further acts as may be reasonably necessary to consummate the obligations contemplated hereby.

6.6 Headings. Headings used in this Agreement are used for reference purposes only and do not constitute substantive matter to be considered in construing the terms of this Agreement.

6.7 Attorneys' Fees. In the event that any action is necessary to enforce the rights of any party hereto, the prevailing party in any such action shall be entitled to reasonable costs and attorneys' fees.

6.8 Notice. All notices given pursuant to this Agreement shall be in writing and shall be given by personal delivery, by facsimile transmission, by United States mail or by United States express mail or other established express delivery service (such as Federal Express), postage or delivery charge prepaid, addressed to the appropriate party at the address set forth below:

City: City of Reno
City Manager's Office
P.O. Box 1900
Reno, NV 89505
Telephone: (775) 334-2400
Facsimile: (775) 334-2097

Copy to: City of Reno
City Attorney's Office
P.O. Box 1900
Reno, NV 89505
Telephone: (775) 334-2050
Facsimile: (775) 334-2420

Developer: Corona Cyan LLC
Attn: Tony Koeijmans
RSF Partners
3232 McKinney, Suite 890, Dallas, TX 75204
Telephone: (214) 849-9819
Facsimile: (214) 855-9407

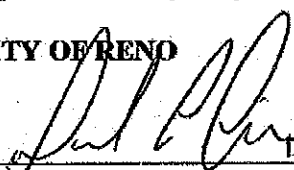
The persons and addresses to which notices are to be given may be changed at any time by any party upon written notice to the other party. All notices given pursuant to this Agreement shall be deemed given upon receipt.

6.9 Receipt Defined. For the purpose of this Agreement, the term "receipt" shall mean any of the following: (a) the date of delivery of the notice or other document as

6.12 Counterparts. This Agreement may be executed in one or more counterparts, each of which shall be deemed an original but all of which together will constitute one and the same instrument.

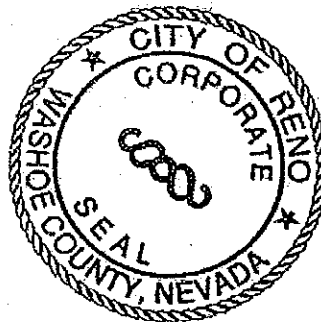
IN WITNESS WHEREOF, each Party hereto has executed this Agreement as of the date opposite that Party's signature.

CITY OF RENO

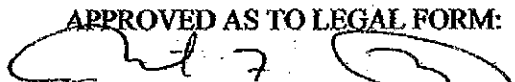
for  DAVID L. AIAZZI Date: 11-14-12, 2012
By: ROBERT A. CASHELL, SR.
Its: Mayor

ATTEST:


CITY CLERK



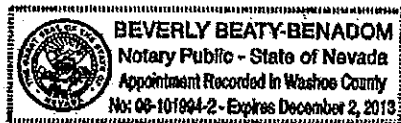
APPROVED AS TO LEGAL FORM:

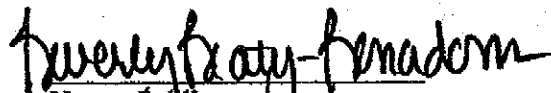

CITY ATTORNEY ROB BONY
DEPUTY

ACKNOWLEDGEMENT - NRS 240.1665

STATE OF NEVADA)
 : SS.
COUNTY OF WASHOE)

This instrument was acknowledged before me on this 14th day of November, 2012, by DAVID L. AIAZZI as VICE MAYOR of the City of Reno, a municipal corporation.




Notary Public

Corona Cyan LLC,
A Delaware limited liability company

By:

Name: Tony Koo / JAMES

Title: Authorized Signatory

Date:

11/8

2012

ACKNOWLEDGEMENT - NRS 240.1665

STATE OF TEXAS)

: SS

COUNTY OF Dallas)

This instrument was acknowledged before me on this 8th day of

Now

2012

by

Tony Koelymans

as

Authorized Signature of Corona Cyan LLC, a Delaware limited liability company.



12858197-4

Edward H. Reed

Notary Public, State of TEXAS

A Nevada General Partnership

By:

Date: November 1st, 2012

Name: Chris Winter

Title: Division VP, Finance

STATE OF _____)
) ss
COUNTY OF _____)

~~This instrument was acknowledged before me on this _____ day of _____, 20____, by _____ as _____ of Centex Homes, a Nevada General Partnership~~

Notary Public, State of _____

STATE OF CALIFORNIA

COUNTY OF ALAMEDA

)
) ss.
)

On November 1, 2012, before me, Lesley A. Rosselli, Notary Public, personally appeared **CHRISTOPHER WINTER**, who proved to me on the basis of satisfactory evidence to be the person whose name is subscribed to the within instrument and acknowledged to me that he executed the same in his authorized capacity, and that by his signature on the instrument the person, or the entity upon behalf of which the person acted, executed the instrument. I certify under PENALTY OF PERJURY under the laws of the State of California that the foregoing paragraph is true and correct.

WITNESS my hand and official seal.

Signature

Print Name: Lesley A. Rosselli

Notary Public, State of California

My commission expires: March 28, 2013

(Seal)

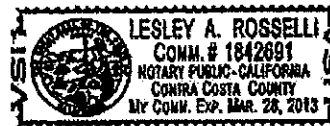


EXHIBIT "A"

LEGAL DESCRIPTION OF THE PROJECT

EXHIBIT "A"

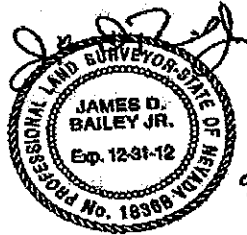
**PARCEL B OF P.M. 4528
ORIGINAL (PHASE I OF) BELLA VISTA RANCH**

All that certain real property situated within the a portion of the South One-half (1/2) of Section Three (3) and the north one-half (1/2) of Section Ten (10), Township 18 North, Range 20 East, Mount Diablo Meridian, City of Reno, County of Washoe, State of Nevada, more particularly described as follows:

Parcel B as shown on that "Parcel Map For Bella Vista Ranch", recorded in the office of the Washoe County Recorder, March 10, 2006, as Parcel Map No. 4528, Document No. 3359967, Official Records of Washoe County, Nevada.

CONTAINING: 367.11 acres of land, more or less.

See Exhibit "A-1" attached hereto, and made a part hereof.



PREPARED BY THE FIRM OF
PLACES CONSULTING SERVICES INCORPORATED
6250 FIELDSTONE PLACE
RENO, NEVADA 89523
(775) 355-7721

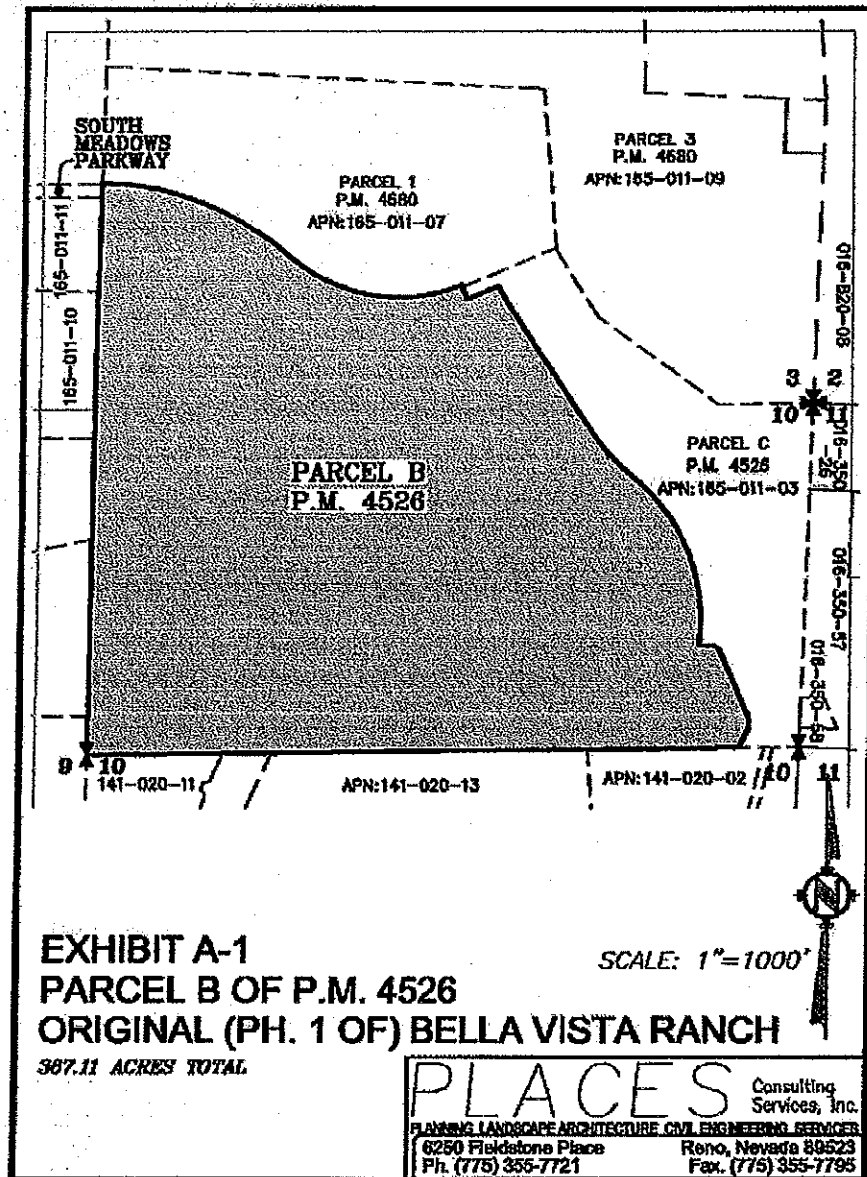


EXHIBIT "A"

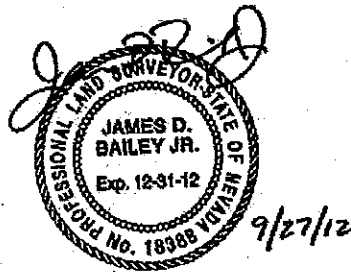
**PARCEL C OF P.M. 4526
PHASE II - BELLA VISTA RANCH
(APN: 165-011-03)**

All that certain real property situated within the a portion of the South One-half (1/2) of Section Three (3) and the northeast one-quarter (1/4) of Section Ten (10), Township 18 North, Range 20 East, Mount Diablo Meridian, City of Reno, County of Washoe, State of Nevada, more particularly described as follows:

Parcel C as shown on that "Parcel Map For Bella Vista Ranch", recorded in the office of the Washoe County Recorder, March 10, 2006, as Parcel Map No. 4526, Document No. 3359987, Official Records of Washoe County, Nevada.

CONTAINING: 77.37 acres of land, more or less.

See Exhibit "A-1" attached hereto, and made a part hereof.



PREPARED BY THE FIRM OF
PLACES CONSULTING SERVICES INCORPORATED
6250 FIELDSTONE PLACE
RENO, NEVADA 89523
(775) 355-7721

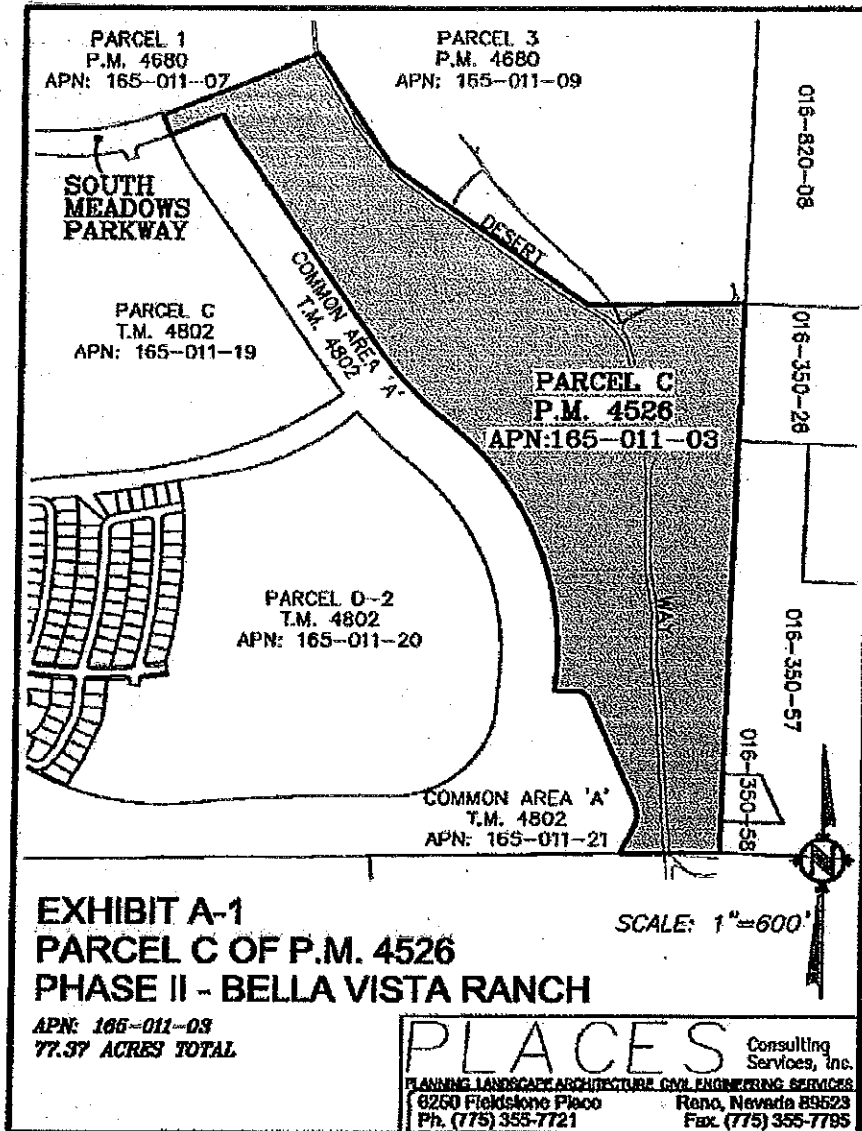


EXHIBIT "B"

LEGAL DESCRIPTION OF PROJECT PUBLIC FACILITY SITE

EXHIBIT "A"

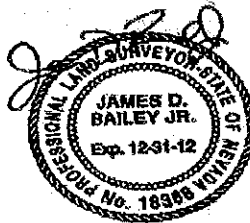
**PARCEL B OF T.M. 4792
PUBLIC FACILITY PARCEL
(APN: 165-060-01)**

All that certain real property situated within the a portion of the northwest one-quarter (1/4) of Section Ten (10), Township 18 North, Range 20 East, Mount Diablo Meridian, City of Reno, County of Washoe, State of Nevada, more particularly described as follows:

Parcel B as shown on that "Official Plat Of Bella Vista Ranch Village B - Unit 1", recorded in the office of the Washoe County Recorder, June 20, 2007, as Tract Map No. 4792, Document No. 3546189, Official Records of Washoe County, Nevada.

CONTAINING: 6.50 acres of land, more or less.

See Exhibit "A-1" attached hereto, and made a part hereof.



PREPARED BY THE FIRM OF
PLACES CONSULTING SERVICES INCORPORATED
6250 FIELDSTONE PLACE
RENO, NEVADA 89523
(775) 355-7721

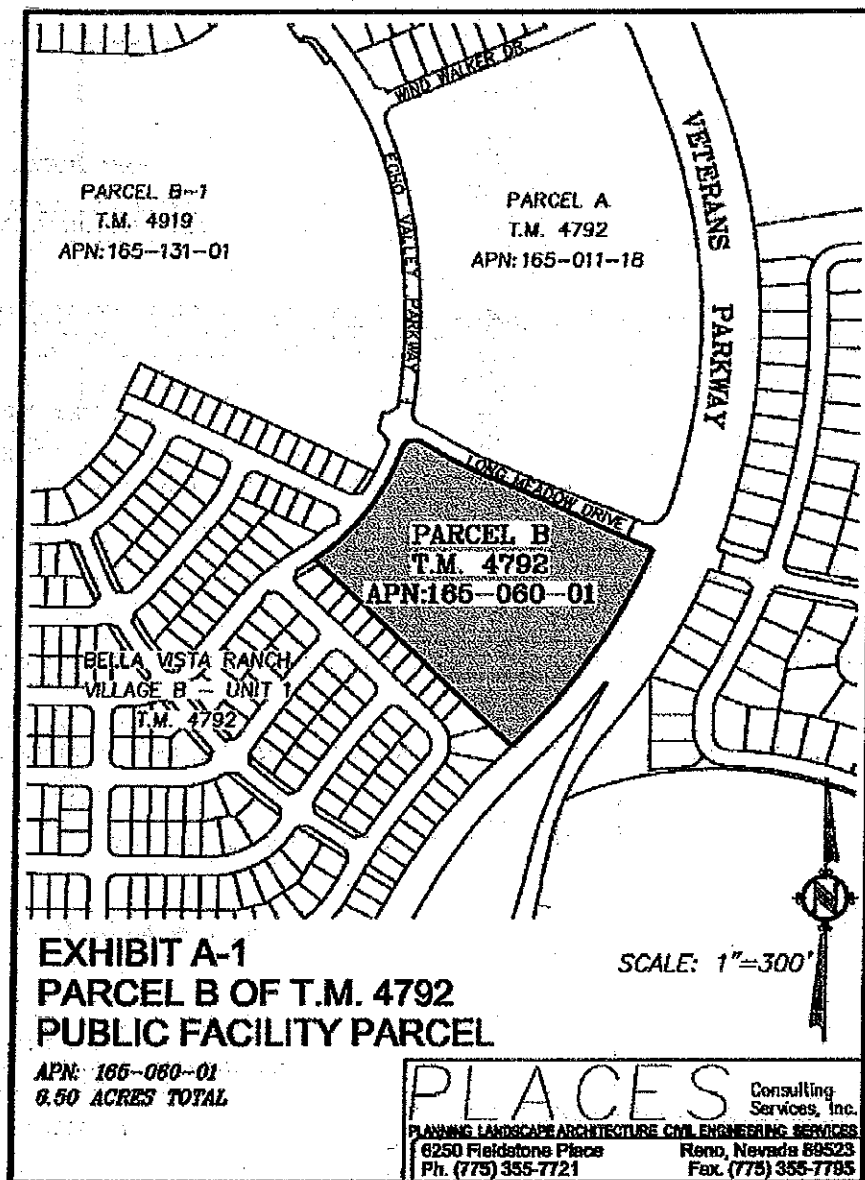


EXHIBIT C

GRANT, BARGAIN AND SALE DEED

A.P.N. # [to be provided by Developer]

After recording, mail original and
Tax Statements to:
City of Reno
C/O Property Manager
P.O. Box 1900
Reno, Nevada 89505

With a Conformed Copy to:
[Developer]

GRANT, BARGAIN and SALE DEED

THIS INDENTURE WITNESSETH: That [Developer], "Grantor", in consideration of \$10.00, the receipt of which is hereby acknowledged, does hereby Grant, Bargain, Sell and Convey to the City of Reno, a municipal corporation, "Grantee", all that real property situate in the City of Reno, County of Washoe, State of Nevada, bounded as described as follows:

See Exhibit "A" attached hereto and made a part hereof.

TO HAVE AND TO HOLD said premises, together with all and singular the rights and appurtenances thereof to Grantee in fee simple. Developer has no reserved rights in the Park Facility or the Park Site and Developer waives any first refusal rights it has under NRS 268.050, or successor statutes.

Together with all and singular the tenements, hereditaments and appurtenances thereto belonging or in anywise appertaining including any mineral and water rights. Witness my hand this _____ day of _____, 20__;

Grantor:

[Developer]

By: _____
[Insert Name, Title]

STATE OF TEXAS)

: ss

COUNTY OF _____)

On _____, 20__, personally appeared before me, a Notary Public, _____, personally known (or proved) to me the person(s) whose name is/are subscribed to the above instrument who acknowledged that he/they executed the within instrument.

Notary Public

**Exhibit 1
to Grant, Bargain and Sale Deed
Legal Description**

**THE LAND REFERRED TO HEREIN IS SITUATED IN THE COUNTY OF WASHOE,
STATE OF NEVADA, AND IS DESCRIBED AS FOLLOWS:**

EXHIBIT "A"

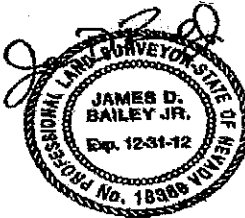
**PARCEL B OF T.M. 4792
PUBLIC FACILITY PARCEL
(APN: 165-080-01)**

All that certain real property situated within the a portion of the northwest one-quarter (1/4) of Section Ten (10), Township 18 North, Range 20 East, Mount Diablo Meridian, City of Reno, County of Washoe, State of Nevada, more particularly described as follows:

Parcel B as shown on that "Official Plat Of Bella Vista Ranch Village B - Unit 1", recorded in the office of the Washoe County Recorder, June 20, 2007, as Tract Map No. 4792, Document No. 3546189, Official Records of Washoe County, Nevada.

CONTAINING: 6.50 acres of land, more or less.

See Exhibit "A-1" attached hereto, and made a part hereof.



PREPARED BY THE FIRM OF
PLACES CONSULTING SERVICES INCORPORATED
6250 FIELDSTONE PLACE
RENO, NEVADA 89523
(775) 355-7721

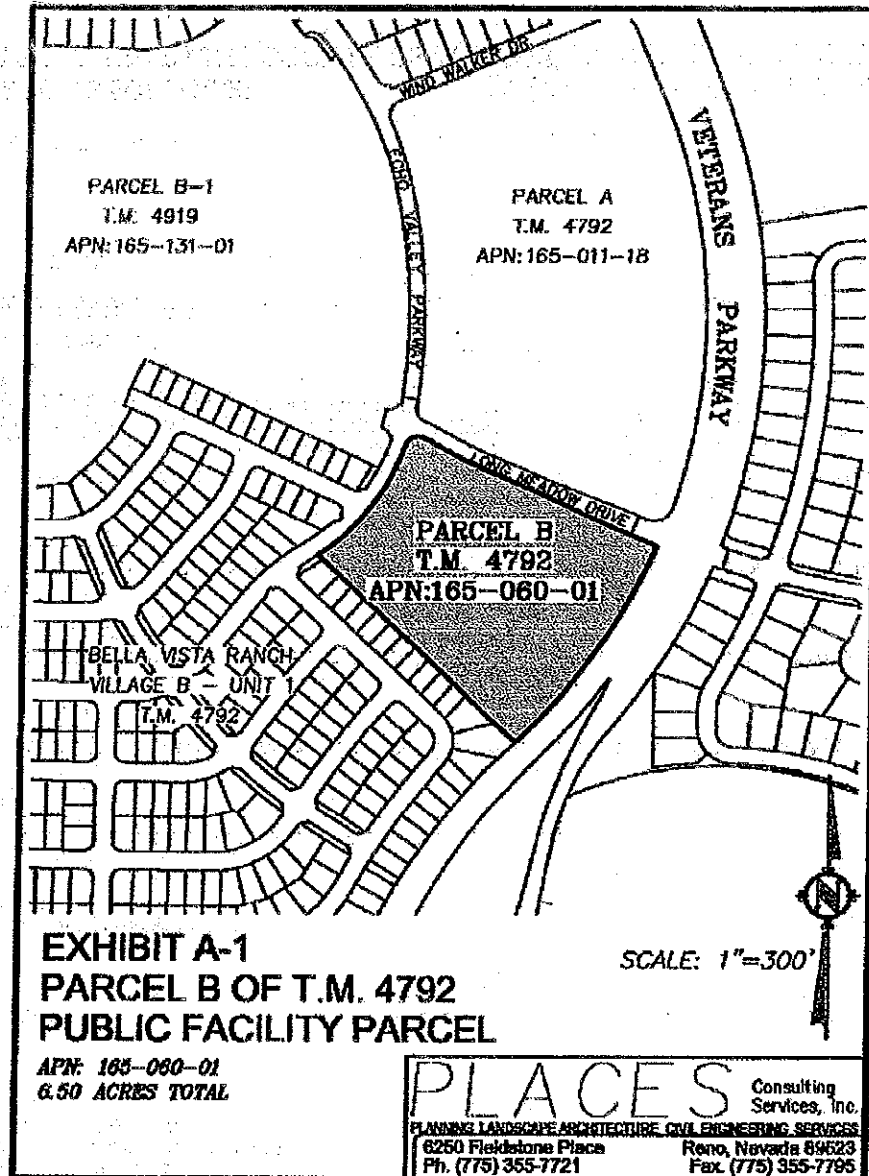


EXHIBIT D

DEVELOPER'S RELEASE AND AFFIDAVIT

- I, _____, being first duly sworn, depose and say under penalty of perjury:
1. This Developer's Release and Affidavit is made pursuant to that certain Public Facility Site Agreement by and between the City of Reno ("City") and _____ ("Developer"), dated _____ (hereafter the "Agreement").
 2. I am the _____ of _____, the Developer. I am making this Affidavit individually and I am authorized to make this Affidavit and Release on behalf of _____, the Developer. This Affidavit and the representations made herein are intended to be relied upon by the City in conjunction with the Closing of the Agreement, and shall survive the Closing.
 3. I certify and warrant on behalf of myself and Developer that to the best of our information and belief after diligent inquiry, as of the date hereof, there are no actual or threatened legal claims, including but not limited to lawsuits, material man's claims, mechanics liens, wage claims, property claims, or claims by resident's of the PUD, against the City or the Public Facility Site arising out of the Agreement, or which may affect the City's interest in the Agreement or the Public Facility Site, except those expressly set forth below:
 - a. [Describe any exceptions].
 4. I certify and warrant on behalf of myself and Developer that Developer will indemnify, defend and hold City harmless from any claims against the City arising out of developer's obligations under the Agreement.
 5. I certify and warrant on behalf of myself and Developer that Developer has no claims against the City arising out of the Agreement.
 6. I certify and warrant on behalf of myself and Developer that Developer has not become aware of any Contamination or Hazardous Substances on or under the Public Facility Site, or on or under the surrounding lands which might possibly affect the Public Facility Site, which have not been previously disclosed or disclosed in writing to City.
 - 7.
 8. I certify and warrant on behalf of myself and Developer that any applicable property taxes and utilities attributable to the Public Facility Site are fully paid and will be fully paid as of Closing.

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DEVELOPER

STATE OF TEXAS)
COUNTY OF _____) ss.

Notary Public



Appendix H
Residential Construction Tax Agreement

**ASSIGNMENT AND ASSUMPTION OF
PARK DEVELOPMENT AGREEMENT
&
FIRST AMENDMENT AND RESTATEMENT OF
PARK DEVELOPMENT AGREEMENT**

THIS ASSIGNMENT AND ASSUMPTION OF PARK DEVELOPMENT AGREEMENT & FIRST AMENDMENT AND RESTATEMENT OF PARK DEVELOPMENT AGREEMENT (this "Assignment"), is entered into by and among the CITY OF RENO, a municipal corporation ("City"), CORONA CYAN, LLC, a Delaware limited liability company ("Corona"), and CENTEX HOMES, a Nevada general partnership ("Centex"). The City, Corona, and Centex are each individually referred to herein as a "Party" and collectively as the "Parties."

RECITALS:

A. On June 28, 2006, the City and Centex entered into a Park Development Agreement (the "Park Agreement"), which Park Agreement provides for the construction of a park in relation to that planned unit development ("PUD") in Reno, Nevada, commonly known as Bella Vista Ranch (City of Reno Case No. LDC05-00127) (hereafter "BVR").

B. Centex has sold, assigned, transferred, and conveyed unto Corona all of Centex's right, title and interest in and to BVR, the Park Agreement and other interests, including Centex's rights relating to the project described in Recital D below;

C. In connection with Corona's acquisition of BVR and the Park Agreement from Centex, the Parties desire that Centex further assign to Corona, and that Corona assume from Centex, all rights, obligations, and interests of Centex in and under the Park Agreement;

D. Corona, as the developer, is in the process of obtaining approval of that proposed PUD, adjacent to BVR, commonly known as Bella Vista Ranch Phase II (City of Reno Case No. LDC10-00051) (hereafter "BVR Phase II");

E. Corona and City desire to amend the Park Agreement by providing for the City to construct some or all of the park. To clarify their relationship, Corona and City desire to amend and restate the Park Agreement between them as set forth hereafter in this Assignment;

NOW, THEREFORE, in consideration of the mutual covenants contained herein and other valuable consideration, the receipt and adequacy of which are expressly acknowledged, the parties agree as follows:

1. Assignment and Assumption.

(a) Centex hereby assigns, transfers and sets over unto Corona all of Centex's right, title and interest in, under and to the Park Agreement.

(b) Corona hereby accepts the foregoing assignment and assumes all of the liabilities and obligations of Centex under the Park Agreement.

2. Consent to Assignment. The City, in accordance with Section 9.8 of the Park Agreement, hereby (a) consents to the assignment effected hereby; and (b) agrees to recognize Corona as "Owner" under the Park Agreement and thereby establishes direct privity of estate and privity of contract with Corona.

3. Restatement of Park Agreement. The Park Agreement is hereby restated and superseded in its entirety, except to the extent specific portions of the Park Agreement are referenced herein in this Assignment.

4. Definitions. The following definitions shall apply to this Assignment.

a. Director: shall mean the Director of the City's Parks Recreation and Community Services Department ("PRCS"), or the Director's designee.

b. Improvements: shall mean the improvements described in section 8, entitled Park Site Improvements, below.

c. Park Site: shall mean that certain park site parcel of land described in the next subsection entitled Park Site Parcel, together with the related Improvements thereon.

d. Park Site Parcel: shall mean that certain parcel of land containing approximately 14 acres, plus or minus, as set forth in Exhibit "A" to this Assignment.

e. PUD: shall mean Planned Unit Development.

f. RCT: shall mean Residential Construction Tax which is that certain tax created pursuant to Nevada Revised Statutes ("NRS") 278.497 through 278.4987, as subsequently amended and Reno Municipal Code ("RMC") 18.14.401 - 18.14.406, as subsequently amended (collectively "Enabling Statutes"). RMC imposes a tax upon the construction of apartment houses, residential dwelling units and mobile home lots (collectively "Units"), and establishes a method for collection of the RCT to enable City to provide neighborhood parks and facilities for parks. RCT imposes one percent (1%) of the valuation of each building permit issued, or One Thousand Dollars (\$1,000.00) per residential dwelling unit or mobile home, whichever is less.

5. **Transfer of Land.** Corona agrees to donate the Park Site Parcel to the City at no cost to the City by grant, bargain and sale deed in a form attached hereto as Exhibit "C" within 45 days following a request in writing from the City's Director, which transfer shall occur prior to commencement of any construction by the City or within 30 days after the issuance of the 850th certificate of occupancy in BVR, whichever first occurs.

The Park Site Parcel shall be subject to a use restriction that for a period of 50 years the property shall be used solely as a city park, for related recreational purposes, and for telecommunications facilities that do not interfere with the park and recreation use and are camouflaged to minimize visual impact; and that after such time, the City, in its sole discretion, may sell or modify the use of the property provided the City Council finds at a hearing noticing all neighbors within 750 feet of the property that the proposed modification in use or sale of the property best serves the public interest. In the event of a transfer by the City, Corona hereby represents that it is reserving no right or claim in or to the Park Site Parcel and Corona, on behalf of itself and its successors and assigns, hereby waives any first refusal rights it has under NRS 268.050, or successor or similar statutes.

6. **Preliminary Title Commitment.** Thirty (30) days prior to transfer of the Parks Site Parcel to the City, Corona shall provide a preliminary commitment for an owner's standard coverage ALTA policy of title insurance for the final Park Site Parcel from a reputable title company. Prior to acceptance of the Park Site Parcel by the City, Corona shall remove all title exceptions, monetary encumbrances, encroachments, and all exceptions to coverage which could have a material and negative impact on the City's intended use of the Park Site (collectively "Encumbrances"), unless City accepts the Encumbrance in writing or unless the Encumbrance existed of record when the Park Agreement initially became effective. The cost of the preliminary report and title insurance, and any charges or fees related to escrow or transfer of the Park Site Parcel, shall be paid by Corona.

7. **Developer's Affidavit.** At the time of transfer of the Park Site Parcel to the City, Corona shall provide City with an Affidavit substantially in the form of the Developer's Affidavit attached hereto as Exhibit "B".

8. **Park Site Improvements.** City agrees to construct the improvements to the Park Site generally as described in Exhibits "B" and "C" to the Park Agreement and generally as described in the BVR PUD Handbook description of park facilities; however, City may make reasonable modifications to the improvements, facilities, amenities and to their locations within the Park Site Parcel which are in the public interest and, if it is a major change, following review by the Recreation and Parks Commission (hereafter collectively, the "Improvements").

Construction the Improvements shall take place in two phases, as provided in this section and section 9, hereafter. The first phase, to the extent it is constructed by the City, shall be designed and constructed consistent with both the City's ability to provide maintenance for the first phase and with the City's ability to fund construction with RCT

collected at that time from the BVR and the BVR Phase II PUD's. Construction of the Improvements in the first phase, whether by the City or by Corona, will begin prior to or upon issuance of the 850th Certificate of Occupancy.

Construction of the second phase will begin when the City determines that it has the ability to provide maintenance for the completed park and that it has sufficient RCT from the BVR PUD and the BVR Phase II PUD to complete construction of the Improvements. Once construction by either City or Corona is commenced, construction shall be pursued diligently until completion of that phase.

9. Accelerated Park Site Improvements.

a. The City recognizes that Corona may desire to construct park improvements prior to the City's park construction schedule. If Corona chooses to exercise this option, Corona's construction of a portion of the Improvements shall relieve the City of any requirement to build park improvements in phase one referenced in the preceding section, but shall not relieve the City of the obligation to complete the overall contemplated park Improvements in the second construction phase described in section 8.

b. Corona shall initiate the process by forwarding a written proposal to the City which shall include its intention to exercise its option. A preliminary park plan design for the entire site shall be developed and approved by the City, prior to the City's approval of Corona's accelerated improvements proposal in order to coordinate Corona's improvements into the overall Park Site planning. The proposal shall include a description of Corona's desired site amenities, total estimated construction costs, and timing of construction.

c. Corona will be eligible to utilize RCT funds collected from the BVR and BVR Phase II PUD's for reimbursement following construction of the accelerated improvements. If sufficient RCT funds are not available from the BVR and BVR Phase II PUD's, when construction commences, Corona may choose to advance its own funds to complete the project. If it does so, City will agree to reimburse Corona from future collections of RCT funds from the BVR and BVR Phase II PUD's in the fund amount advanced by Corona to complete the accelerated park improvements. City shall have the right to inspect all relevant documents to verify cost claims. The maintenance and operation of the park parcel, including the accelerated improvements, shall be the sole responsibility of Corona until the Park Site Parcel is transferred to City ownership.

d. Prevailing Wage Laws shall be applicable to construction by Corona, as follows:

(1) **Indemnity.** Corona and all Corona's contractors and subcontractors shall comply with NRS 338.010 to 338.090, inclusive, and regulations adopted pursuant thereto ("Prevailing Wage Laws"), and be responsible for carrying out the requirements of such provisions. Corona shall, and hereby agrees to, unconditionally indemnify, reimburse, defend, protect and hold harmless City and its elective and appointive boards, commissions, officers, agents, attorneys,

consultants and employees, and all of their respective successors and assigns, from and against any and all claims, demands, suits and actions at law or in equity, and losses, liabilities, expenses, penalties, fines, orders, judgments, injunctive or other relief, and costs and damages of every kind, nature and description (including but not limited to attorneys' fees and court costs; with counsel reasonably acceptable to City), and administrative, enforcement or judicial proceedings, whether known or unknown, and which directly or indirectly, in whole or in part, are caused by, arise from, or relate to, or are alleged to be caused by, arise from, or relate to the failure to comply with any state or federal labor laws, regulations or standards in connection with this agreement, including but not limited to Prevailing Wage Laws.

(2) **Wages.** As provided in NRS 338.020, the hourly and daily rate of wages to be paid each of the classes of mechanics and workmen employed in connection with construction of the Improvements shall not be less than the rate of such wages then prevailing in Washoe County.

(3) **Penalty.** Pursuant to NRS 338.060, Corona agrees to and shall forfeit as a penalty to the City, the sums established and applicable pursuant to the NRS 338.080 for each calendar day or portion thereof that each workman employed in connection with the project is paid less than the rates designated in the above in Subsection (2) for any work performed under this Agreement by Corona or any subcontractors or agents of Corona; or is not reported to the labor commissioner and City as required pursuant to NRS 338.070.

(4) **Withholding Payments.** Notwithstanding any other provisions of the Assignment, the City may withhold payments of RCT sufficient to pay any reasonably threatened or likely expenses or fines relating to Prevailing Wage Law violations or claims resolution of the issue. If any prevailing wage expenses or fines are actually incurred or imposed, City may offset otherwise required payments from RCT, or pursue such amounts by any lawful means.

(5) **Reporting, Recordkeeping and Investigations.** Prior to commencement of construction, and thereafter as often as reasonably necessary, Corona and the Director shall meet and agree upon reasonable reporting and record-keeping procedures to enable the parties to comply with Prevailing Wage Law requirements.

10. Right of Access. Prior to transfer of the Park Site Parcel, the City shall have the reasonable right of access to the Park Site Parcel, upon reasonable notice to Corona, for the purpose of conducting surveys, soils tests, staking, inspections or any other activities reasonably related to planning, engineering or construction of the Improvements. City shall have this right even if Corona accelerates construction, as provided in the preceding section entitled Accelerated Park Site Improvements.

11. Residential Construction Tax. City shall be entitled to collect and retain all RCT from the BVR PUD and the BVR Phase II PUD, including amounts already collected; and Corona waives any rights to RCT under the Park Agreement or otherwise, except as set forth in paragraph 9 herein. Any RCT not used to construct the Park Site Improvements shall be available to the City to use within the City's Park District 4 for

any purpose authorized by the RCT Enabling Statutes, regardless of whether the RCT was collected from the BVR or BVR Phase II PUD's.

12. Water. Corona shall ensure that at the time of conveyance of the Park Site Parcel to City, that City has sufficient water service to meet the needs of both phases of the completed park, including but not necessarily limited to irrigation, restroom and drinking needs. Corona shall secure "will serve" letters or other rights to water and ensure that water lines run to the boundary of Park Site Parcel. Effluent or nonpotable water may be provided for irrigation where the City deems such water to be consistent with public health.

13. Utilities: Corona shall ensure that infrastructure is in place to provide utility services to the boundary of the Park Site Parcel, including but not necessarily limited to, electricity, gas, cable, sewer and water.

14. Maintenance Prior to Transfer. Corona shall maintain the Park Site Parcel in good condition free and clear of hazards, dangerous conditions or substances, debris, dumping, digging, litter, garbage, weeds over 6 inches in height and noxious weeds until title is transferred to the City.

15. Maintenance After Transfer. Following the acceptance of the transfer of the Park Site Parcel to the City, the City shall be responsible for maintenance of the Park Site Parcel. Maintenance of improved portions of the park, whether by Corona or by the City shall be subject to the maintenance provisions contained in Exhibit "D" ("Scope of City Maintenance") to the Park Agreement, as amended from time to time. Without limiting the preceding sentence, maintenance shall be to standards required by all applicable laws and ordinances and shall be at least equal to actual maintenance performed by City for similar parks. Following construction of any phase of Improvements, the improved portion of the Park Site shall be open to the public.

16. Owner's Reservation of Rights. Notwithstanding the transfer of the Park Site Parcel, Corona reserves all mineral rights, but without right of entry on the surface of the Park Site, nor the right to drill, mine, store, explore or operate through the surface of the Park Site or within five hundred feet (500') from the surface of the Park Site. Corona further reserves unto itself all rights and benefits of wetlands wherever located, and any and all rights to change or modify the Wetlands Permit and/or mitigation program, including but not limited to the right to sell excess mitigation area from time to time. Additionally, Corona reserves all mineral rights, oil, gas and/or hydrocarbon rights, geothermal rights, and storm water runoff located or produced within the Park Site.

17. Corona's Access and Use of Park Site. After transfer of the Park Site Parcel to the City, and conditioned upon the City's written approval, Corona shall be granted the right to limited access to the Park Site for installation and maintenance of utilities and related facilities, for installation and maintenance of drainage and other facilities and equipment, for compliance with the Wetlands Permit, to adjust or relocate walls and/or fencing or otherwise to correct boundary discrepancies, to comply with drainage needs, to

fulfill any jurisdictional agency requirements, to extend, construct, connect to, and maintain utilities and drainage lines, and to accomplish any other tasks required of Corona. City's approval for such access may be further conditioned upon, including but not limited to, requiring Corona to repair or replace any portions of the Park Site or Improvements that are altered or damaged as a result of Corona's access and use of the Park Site. Corona shall not cause or allow utility vaults or pump stations to be placed on the Park Site without the City's prior written approval.

18. Default. In the event Corona defaults in the performance of its obligations under this Assignment, City shall (subject to the provisions of the following section entitled Notice of Default) without limitation have any or all of the following nonexclusive remedies:

- a. Stop issuing building permits in either the BVR PUD or the BVR Phase II PUD, or both;
- b. Demand and receive transfer of the Park Site Parcel;
- c. Avail itself of any other remedy allowed by law or equity.

19. Notice of Default. Prior to utilizing a remedy specified above, City shall deliver written notice of default to Corona specifying in detail the circumstances of Corona's default, and Corona shall have thirty (30) days from the date of delivery of the notice to cure the default.

20. Recording. Corona, at its expense, shall record this Assignment, or a Memorandum of this Assignment approved in form by the Director, against all owners within the BVR PUD within thirty (30) days of execution by all Parties, and shall provide City with a conformed recorded copy.

21. Indemnification of Owner. Subject to the limitations of applicable law, and without waiving its statutory protections, City shall indemnify, protect, defend and hold harmless Corona and its successors, assigns, shareholders, officers, directors, employees, authorized agents, contractors and subcontractors from and against any and all liability, costs and expenses (including defense costs and legal fees), and claims, losses, liabilities, suits, or actions of any kind (collectively "Claims and Expenses"), for damages for bodily injury, death, personal injury or property damage, arising out of, relating to or as a result of any negligent acts or omissions of City or its officers, directors, employees, authorized agents, contractors or subcontractors in carrying out City's obligations hereunder, except to the extent such Claims and Expenses are proximately caused by the negligence or willful misconduct of the parties indemnified or their agents, servants or independent contractors who are directly responsible to such indemnified parties.

22. Indemnification of City. Owner shall indemnify, protect, defend and hold harmless City and its governing board, employees, authorized agents, contractors and subcontractors, and their respective successors and assigns from and against any and all Claims and Expenses, for damages for bodily injury, death, personal injury or property damage, arising out of, relating to or as a result of any negligent acts or omissions of

Corona or its officers, directors, employees, authorized agents, contractors, or subcontractors in carrying out Corona's obligations hereunder, except to the extent such Claims and Expenses are proximately caused by the negligence or willful misconduct of the parties indemnified, or their agents, servants or independent contractors who are directly responsible to such indemnified parties.

23. Insurance. Prior to commencement of construction on the Park Site Parcel by Corona pursuant to paragraph 9 herein, Corona shall maintain liability insurance in an occurrence amount of at least one million dollars covering its indemnification, defense and hold harmless obligations under this Assignment, and naming the City as an additional insured, with the certificate of insurance providing that coverage for the City shall not be cancelled without 30 days prior notice to the City.

24. Defenses not Waived. The City does not waive, and intends to assert, any common law or statutory defenses available to it, including those in NRS Chapter 41.

25. Exigency. Time is of the essence of this Assignment.

26. Notice – Delivery. Any notices, requests or instructions by a party to be given to another party shall be given in writing, by personal delivery or are to be mailed by certified mail with return receipt requested, to the following addresses or by facsimile copy to the respective number set forth.

If to Corona:

Corona Cyan, LLC
c/o RSF Partners
3232 McKinney
Dallas, Texas 75204
Attention: Tony Koeijmans
FAX: 214-855-9407

If to City:

CITY OF RENO
c/o Director, Parks, Recreation and Community Services Dept.
P.O. Box 1900
Reno, Nevada 89505
Fax Number: (775) 334-2449

WITH COPY TO:

Reno City Attorney's Office
P.O. Box 1900
Reno, Nevada 89505
Fax Number: (775) 334-2420

A notice shall be effective on the date of personal delivery if personally delivered before 5:00 p.m. (local time), otherwise on the day following personal delivery, or two (2)

business days following the date the notice is postmarked, if mailed as set forth above or, if by facsimile, on the date of actual notice if received before 5:00 p.m. (local time) otherwise on the next business day. Any party may change the address to which notice is to be given to it by giving notice of such change of address in the manner set forth above for giving notice.

27. Entire Agreement. This Assignment contains the entire agreement between the parties hereto and supersedes any and all prior agreement, arrangements or understandings regarding the same subject matter as this Agreement, which are null and void.

28. Survival. The representations, covenants and agreements contained herein shall not be discharged or dissolved upon transfer of the Park Site Parcel, but shall survive the same.

29. Governing Law. This Assignment shall be constructed and enforced in accordance with the laws of the State of Nevada and venue for any such action shall be in Washoe County, Nevada.

30. Modification and Amendments. This Assignment may not be modified, amended, altered or changed in any respect whatsoever except by further agreement in writing, duly executed by the parties.

31. Successors and Assigns. This Assignment shall be binding upon and inure to the benefit of the parties hereto and their respective successors, subcontractors, personal representatives, and assigns; provided that no assignment of the rights or obligations of Corona shall take place by the mere transfer or title of all or any portion of BVR or BVR Phase II. Only an express, written assignment approved by City shall operate to assign any rights or obligations of Corona to a third party.

32. Consultation with Legal Counsel. The parties hereto acknowledge and agree that each has been given the opportunity to review this Assignment with legal counsel independently, and has the requisite experience and sophistication to understand, interpret, and agree to the particular language of the provisions hereof. The parties have equal bargaining power and intend the plain meaning of the provisions herein. In the event of an ambiguity in or dispute regarding interpretation of terms, the interpretation of this Assignment shall not be resolved by any rule of interpretation providing for interpretation against the party who causes the uncertainty to exist or against the draftsman.

33. Headings. The headings and captions used in this Assignment are for convenience and ease of reference only and shall not be used to construe, interpret, expand or limit the terms of this Assignment. All exhibits attached to this Assignment, all exhibits to the Park Agreement referenced herein, and the recitals at the front of this Assignment are incorporated fully herein by this reference.

34. **Counterparts and Signatures.** This Assignment may be executed in a number of counterparts, the conglomeration of which shall constitute a complete agreement if signed by all parties hereto. The parties hereby warrant that the persons executing this Assignment are authorized to execute this Assignment and are authorized to obligate the respective parties to perform this Assignment. A facsimile or electronic signature on this Assignment shall be treated for all purposes as an original signature.

IN WITNESS WHEREOF, each Party hereto has executed this Assignment as of the date opposite that Party's signature.

CENTEX:

CENTEX HOMES, a

Nevada general partnership

By: Centex Real Estate Corporation
a Nevada corporation, Managing Partner

By: Chris Winter

Date: November 1st, 2012

Its: Division VP, Finance

CORONA:

Corona Cyan, LLC,

a Delaware limited liability company

By: Tony Bosignans

Date: 11/8, 2012

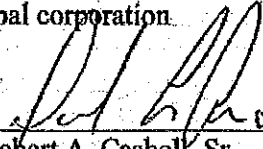
Print: Tony Bosignans

Its: Authorized Signatory

Signatures continued on next page.

THE CITY:

City of Reno,
a municipal corporation.

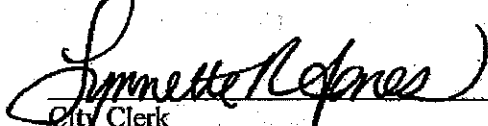
By: 

Robert A. Cashell, Sr.

Date: 11-14-12, 2012

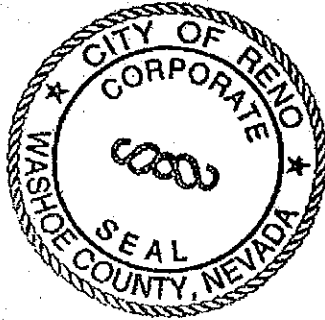
Its: Mayor

ATTEST:


City Clerk

APPROVED AS TO FORM:


Deputy City Attorney



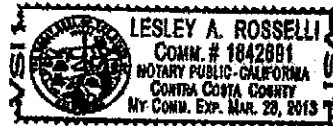
STATE OF CALIFORNIA
COUNTY OF ALAMEDA

)
) ss.
)

On November 1, 2012, before me, Lesley A. Rosselli, Notary Public, personally appeared **CHRISTOPHER WINTER**, who proved to me on the basis of satisfactory evidence to be the person whose name is subscribed to the within instrument and acknowledged to me that he executed the same in his authorized capacity, and that by his signature on the instrument the person, or the entity upon behalf of which the person acted, executed the instrument. I certify under PENALTY OF PERJURY under the laws of the State of California that the foregoing paragraph is true and correct.

WITNESS my hand and official seal.

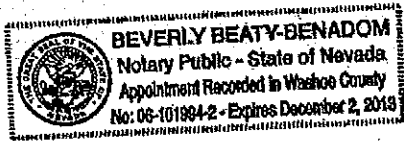
Signature [Handwritten Signature] (Seal)
Print Name: Lesley A. Rosselli
Notary Public, State of California
My commission expires: March 28, 2013



ACKNOWLEDGMENTS -- NRS 240.1665

STATE OF NEVADA)
COUNTY OF WASHOE)

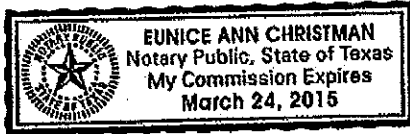
This instrument was acknowledged before me on this 14th ^{NOVEMBER} of ~~October~~ 2012, by
~~Robert A. Cashell, Sr., as Mayor, of the CITY OF RENO, a municipal corporation.~~
DAVID L. AIAZZI, VICE MAYOR



Beverly Beaty-Benadom
(Signature of notarial officer)

STATE OF TEXAS)
) ss.
COUNTY OF DALLAS)

This instrument was acknowledged before me on this 8th ^{November} day of ~~October~~, 2012
by Tony Koeijmans, as Authorized Signatory of CORONA
CYAN, LLC, a Delaware limited liability company.



12856197-4

Eunice Ann Christman
(Signature of notarial officer)

STATE OF _____)
) ss.
COUNTY OF _____)

This instrument was acknowledged before me on this _____ day of _____
, 20____, by _____ as
_____ of CENTEX HOMES, a Nevada General Partnership.

Notary Public, State of _____

Exhibit "A"

Bella Vista Ranch PUD Park Site Legal Description
[to be attached]

EXHIBIT "A"

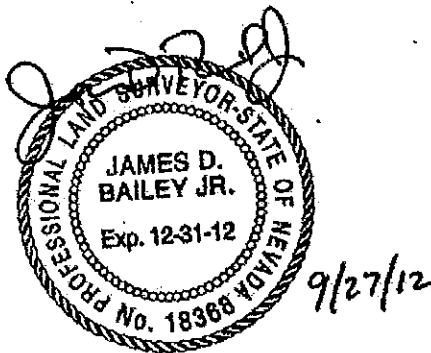
**PARCEL A OF T.M. 4792
NEIGHBORHOOD PARK
(APN: 165-011-18)**

All that certain real property situated within the a portion of the northwest one-quarter (1/4) of Section Ten (10), Township 18 North, Range 20 East, Mount Diablo Meridian, City of Reno, County of Washoe, State of Nevada, more particularly described as follows:

Parcel A as shown on that "Official Plat Of Bella Vista Ranch Village B -- Unit 1", recorded in the office of the Washoe County Recorder, June 20, 2007, as Tract Map No. 4792, Document No. 3546189, Official Records of Washoe County, Nevada.

CONTAINING: 14.24 acres of land, more or less.

See Exhibit "A-1" attached hereto, and made a part hereof.



PREPARED BY THE FIRM OF
PLACES CONSULTING SERVICES INCORPORATED
6250 FIELDSTONE PLACE
RENO, NEVADA 89523
(775) 355-7721

EXHIBIT "B"

DEVELOPER'S AFFIDAVIT FORM

I, _____, being first duly sworn, depose and say under penalty of perjury:

1. This Affidavit is made pursuant to that certain **ASSIGNMENT AND ASSUMPTION OF PARK DEVELOPMENT AGREEMENT & FIRST AMENDMENT AND RESTATEMENT OF PARK DEVELOPMENT AGREEMENT** by and between the City of Reno ("City"), CORONA CYAN, LLC, a Delaware limited liability company ("Developer") and CENTEX HOMES, a Nevada general partnership, dated _____ (hereafter the "Agreement").

2. I am the _____ of _____, the Developer. I am making this Affidavit individually and I am authorized to make this Affidavit on behalf of _____, the Developer. This Affidavit and the representations made herein are intended to be relied upon by the City in conjunction with the transfer of the Bella Vista Ranch Planned Unit Development ("PUD") Park Site Parcel, and shall survive the transfer.

3. I certify and warrant on behalf of myself and Developer that to the best of our information and belief after diligent inquiry as of the date hereof, there are no actual or threatened legal claims, including but not limited to lawsuits, material man's claims, mechanics liens, wage claims, property claims, or claims by resident's of the Bella Vista Ranch PUD or the Bella Vista Ranch, Phase II PUD, against the City or the Park Site Parcel arising out of the Agreement, or which may affect the City's interest in the Agreement or the Park Site Parcel, except those expressly set forth below:

a. *[Describe any exceptions].*

4. I certify and warrant on behalf of myself and Developer that Developer will indemnify, defend and hold City harmless from any claims against the City which are known as of the date hereof, but not disclosed and approved by the City, affecting the City's title to the Park Site Parcel.

5. I certify and warrant on behalf of myself and Developer that Developer has no claims against the City arising out of the Agreement except those expressly set forth below:

6. I certify and warrant on behalf of myself and Developer that to the best of our information and belief after diligent inquiry there are no Hazardous Substances on or affecting or likely to affect the Park Site except those expressly set forth below:

7. I certify and warrant on behalf of myself and Developer that any applicable property taxes and utilities attributable to the Park Site are fully paid as of the date hereof. t

8. I certify and warrant on behalf of myself and Developer that all public utilities required for the operation of the Park have been provided and that they either abutt the Park Site Parcel through adjoining public streets or, if they pass through adjoining private lands, do so in accordance with valid public easements that will inure to the benefit of City upon Closing.

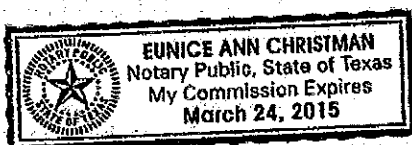
DEVELOPER

Tony Kozigman
By: Tony Kozigman
Its: Authorized Signatory

STATE OF TEXAS)
):ss.
COUNTY OF DALLAS)

This instrument was acknowledged before me on the 8th day of Nov., 2012, by Tony Kozigman, as Authorized Signatory of Corona Cyan, LLC.

Eunice Ann Christman
NOTARY PUBLIC



12858197-4

EXHIBIT "C"
FORM OF GRANT DEED

A.P. # _____

After recording, mail to:

City of Reno

% Property Manager

P.O. Box 1900

Reno, Nevada 89505

Grant, Bargain, Sale Deed

THIS INDENTURE WITNESSETH: That CORONA CYAN, LLC, a Delaware limited liability company, Grantor, in consideration of good and valuable consideration, the receipt of which is hereby acknowledged, does hereby Grant, Bargain, Sell and Convey to the City of Reno, a Nevada municipal corporation, Grantee, all that real property situate in the City of Reno, County of Washoe, State of Nevada, bounded and described as follows:

See Exhibit A attached hereto and made a part hereof.

TO HAVE AND TO HOLD said premises, together with all singular the rights and appurtenances thereof to Grantee, in fee simple, together with all and singular the tenements, hereditaments and appurtenances thereto belonging or in anywise appertaining, excepting any mineral and water rights;

And subject to a use restriction that for a period of 50 years from recording, the property shall used solely as a city park, for related recreational purposes, and for telecommunications facilities that do not interfere with the park and recreation use and are camouflaged to minimize visual impact; and that after such time, the City, in its sole discretion, may sell or modify the use of the property provided the City Council finds at a hearing noticing all neighbors within 750 feet of the property that the proposed modification in use or sale of the property best serves the public interest.

CORONA CYAN, LLC waives any first refusal rights it has under NRS 268.050, or successor or similar statutes.

Witness my hand this ____ day of _____, 20__;

Signatures of Seller

State of Nevada)
)ss
County of Washoe)

On _____, 20____, personally appeared before me, a Notary Public,
_____, personally known (or proved) to me to be the person(s)
whose name is/are subscribed to the above instrument who acknowledged that he/they
executed the within instrument.



WASHOE COUNTY RECORDER

OFFICE OF THE RECORDER
KALIE M. WORK, RECORDER

1001 E. NINTH STREET
RENO, NV 89512
PHONE (775) 328-3661
FAX (775) 325-8010

LEGIBILITY NOTICE

The Washoe County Recorder's Office has determined that the attached document may not be suitable for recording by the method used by the Recorder to preserve the Recorder's records. The customer was advised that copies reproduced from the recorded document would not be legible. However, the customer demanded that the document be recorded without delay as the parties rights may be adversely affected because of a delay in recording. Therefore, pursuant to NRS 247.120 (3), the County Recorder accepted the document conditionally based on the undersigned's representation that: (1) a suitable copy will be submitted at a later date; or (2) it is impossible or impracticable to submit a more suitable copy.

By my signing below, I acknowledge that I have been advised that once the document has been recorded it may not reproduce a legible copy.



Signature

3/5/2025

Date

Eric Hasty

Printed Name