Appendix A
Traffic Study – Solaegui Engineers
BELLA VISTA RANCH PHASE 2
TRAFFIC ANALYSIS

MAY, 2004

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SOLAEQUI ENGINEERS, LTD.
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.

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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>
<thead>
<tr>
<th>DEVELOPMENT</th>
<th>AM PEAK HOUR</th>
<th>PM PEAK HOUR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Single Family Housing 1,700 Dwelling Units</td>
<td>300 900 1,200</td>
<td>865 508 1,373</td>
</tr>
<tr>
<td>Single Family Housing 1,700 Dwelling Units</td>
<td>300 900 1,200</td>
<td>865 508 1,373</td>
</tr>
<tr>
<td>TOTAL 2,400</td>
<td>1,730 1,016 2,746</td>
<td></td>
</tr>
</tbody>
</table>

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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

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.
Bella Vista Ranch Phase 2
Directions of Approach
Figure 2

LEGEND
- KEY INTERSECTION
- PHASE 1
(−) PHASE 2 WITH ALT. A
(−) PHASE 2 WITH ALT. C

PROJECT
SITE

BELLA VISTA RANCH PHASE 2
DIRECTIONS OF APPROACH
FIGURE 2
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
BELLA VISTA RANCH PHASE 2
EXISTING + PHASES 1 & 2 TRAFFIC VOLUMES - ALT. A
FIGURE 8
BELLA VISTA RANCH PHASE 2
EXISTING + PHASES 1 & 2 TRAFFIC VOLUMES - ALT. C
FIGURE 9
NOTE
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
BELLA VISTA RANCH PHASE 2
2030 TRAFFIC VOLUMES - EAST CONNECTOR ALTERNATE C
FIGURE 12

NOTE
WITH RIO WRANGLER AND PIONEER CONNECTIONS
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>
<thead>
<tr>
<th>LEVEL OF SERVICE</th>
<th>DELAY RANGE (SEC/VEH)</th>
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<tbody>
<tr>
<td>A</td>
<td>≤10</td>
</tr>
<tr>
<td>B</td>
<td>&gt;10 and ≤15</td>
</tr>
<tr>
<td>C</td>
<td>&gt;15 and ≤25</td>
</tr>
<tr>
<td>D</td>
<td>&gt;25 and ≤35</td>
</tr>
<tr>
<td>E</td>
<td>&gt;35 and ≤50</td>
</tr>
<tr>
<td>F</td>
<td>&gt;50</td>
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</table>

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

<table>
<thead>
<tr>
<th>LEVEL OF SERVICE</th>
<th>CONTROL DELAY PER VEHICLE (SEC)</th>
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<tr>
<td>A</td>
<td>≤10</td>
</tr>
<tr>
<td>B</td>
<td>&gt;10 and ≤20</td>
</tr>
<tr>
<td>C</td>
<td>&gt;20 and ≤35</td>
</tr>
<tr>
<td>D</td>
<td>&gt;35 and ≤55</td>
</tr>
<tr>
<td>E</td>
<td>&gt;55 and ≤80</td>
</tr>
<tr>
<td>F</td>
<td>&gt;80</td>
</tr>
</tbody>
</table>

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**

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

**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 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 ±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 C 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.

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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 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

<table>
<thead>
<tr>
<th>FACILITY</th>
<th>LANES</th>
<th>LOS C</th>
<th>AVERAGE DAILY TRAFFIC VOLUME</th>
<th>LOS D</th>
<th>LOS E</th>
<th>LOS F</th>
</tr>
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<td>2</td>
<td>$\leq 17,300$</td>
<td>17,301-19,200</td>
<td>19,201-20,300</td>
<td>$&gt;20,300$</td>
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<tr>
<td>Control Arterial</td>
<td>4</td>
<td>$\leq 36,100$</td>
<td>36,101-38,400</td>
<td>38,401-40,600</td>
<td>$&gt;40,600$</td>
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</tr>
<tr>
<td></td>
<td>6</td>
<td>$\leq 54,700$</td>
<td>54,701-57,600</td>
<td>57,601-60,900</td>
<td>$&gt;60,900$</td>
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<tr>
<td>Moderate Access</td>
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<td>$\leq 32,200$</td>
<td>32,201-35,200</td>
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<td>$\leq 49,600$</td>
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<tr>
<td>Control Arterial</td>
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<td>$\leq 15,700$</td>
<td>15,701-28,400</td>
<td>28,401-30,200</td>
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<td>Ultra-Low Access</td>
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<td>$\leq 24,100$</td>
<td>24,101-41,200</td>
<td>41,201-43,000</td>
<td>$&gt;43,000$</td>
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<tr>
<td>Control Arterial</td>
<td>8</td>
<td>$\leq 33,300$</td>
<td>33,301-55,200</td>
<td>55,201-57,400</td>
<td>$&gt;57,400$</td>
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<tr>
<td>Collector</td>
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<tr>
<td>Ramp</td>
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<td>12,801-14,400</td>
<td>14,401-16,000</td>
<td>$&gt;16,000$</td>
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<tr>
<td></td>
<td>2</td>
<td>$\leq 25,600$</td>
<td>25,601-28,800</td>
<td>28,801-32,000</td>
<td>$&gt;32,000$</td>
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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

<table>
<thead>
<tr>
<th>ROADWAY</th>
<th>YEAR 2012</th>
<th>ALTERNATE A YEAR 2030</th>
<th>ALTERNATE C YEAR 2030</th>
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<td>BASE + PH. 1 &amp; 2</td>
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<tr>
<td>East of Virginia</td>
<td>9,600</td>
<td>13,500</td>
<td>12,800</td>
</tr>
<tr>
<td>6 Lane Ultra-Low</td>
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<td>C</td>
<td>C</td>
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<tr>
<td>Between I-580 Ramps</td>
<td>17,100</td>
<td>23,900</td>
<td>23,000</td>
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<tr>
<td>6 Lane Ultra-Low</td>
<td>C</td>
<td>C</td>
<td>D</td>
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### TABLE 6 (CONT.)
ROADWAY SEGMENT AVERAGE DAILY TRAFFIC AND LEVEL OF SERVICE RESULTS

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<thead>
<tr>
<th>ROADWAY</th>
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<th>ALTERNATE C</th>
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<td>BASE + PH. 1</td>
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<td>BASE + PH. 1&amp;2</td>
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<tr>
<td>East of I-580 NB Ramps</td>
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<td>37,300</td>
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<td>D</td>
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<tr>
<td>8 Lane Ultra-Low</td>
<td>C</td>
<td>C</td>
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<tr>
<td>6 Lane Moderate</td>
<td>C</td>
<td>C</td>
<td>C</td>
</tr>
<tr>
<td>West of Double R</td>
<td>27,300</td>
<td>31,900</td>
<td>31,000</td>
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<td>D</td>
<td>D</td>
<td>D</td>
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<tr>
<td>8 Lane Ultra-Low</td>
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<td>C</td>
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<tr>
<td>6 Lane Moderate</td>
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<tr>
<td>East of Double R</td>
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<td>30,700</td>
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<tr>
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</tr>
<tr>
<td>West of Double Diamond</td>
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<tr>
<td>East of Double Diamond</td>
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<td>27,000</td>
<td>8,400</td>
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<td>C</td>
<td>C</td>
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<td>F</td>
<td>C</td>
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<td>DOUBLE R BOULEVARD</td>
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<tr>
<td>North of Double Diamond (No.)</td>
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<tr>
<td>South of Double Diamond</td>
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<td>14,500</td>
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<tr>
<td>North of South Meadows</td>
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Table 6 is continued on the following page.
### TABLE 6 (CONT.)
ROADWAY SEGMENT AVERAGE DAILY TRAFFIC AND LEVEL OF SERVICE RESULTS

<table>
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<tr>
<th>ROADWAY</th>
<th>YEAR 2012</th>
<th>ALTERNATE A YEAR 2030</th>
<th>ALTERNATE C YEAR 2030</th>
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<td>BASE + PH. 1&amp;2</td>
<td>BASE + PH. 1&amp;2</td>
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</tr>
<tr>
<td>South of South Meadows</td>
<td>13,900</td>
<td>14,200</td>
<td>14,900 13,500</td>
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<td>4 Lane Moderate</td>
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<td>C</td>
<td>C C</td>
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<tr>
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<td>17,600 16,200</td>
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<td>4 Lane Moderate</td>
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<td>C</td>
<td>C C</td>
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<td>North of Damonte Ranch</td>
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<td>C C</td>
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<td>C</td>
<td>C C</td>
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<tr>
<td>North of South Meadows</td>
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<td>17,900</td>
<td>18,200 24,600</td>
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<td>C C</td>
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Table 6 is continued on the following page.
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<td>BASE + PH. 1 &amp; 2</td>
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<td>D</td>
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<tr>
<td>4 Lane Low</td>
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<td>C</td>
<td>C</td>
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<td>I-580/SO. MEADOWS INTERCHANGE</td>
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<td>Southbound On-Ramp</td>
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<td>2 Lane Ramp</td>
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</table>

**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

SOLAEGUI ENGINEERS, LTD.
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
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.
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>
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<th>FACILITY/LANES</th>
<th>LOS B</th>
<th>LOS C</th>
<th>LOS D</th>
<th>LOS E</th>
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<td>2 Lanes</td>
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<td>66,801-70,600</td>
<td>70,601-73,900</td>
<td>&gt;73,900</td>
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</table>
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.
Summary of Average Vehicle Trip Generation
For 700 Dwelling Units of Single Family Detached Housing
October 07, 2010

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<th>24 Hour Two-Way Volume</th>
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<th>4-6 PM Pk Hour</th>
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<td>24 hour Peak Hour</td>
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Note: A zero indicates no data available.
Source: Institute of Transportation Engineers

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

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<th>4-6 PM Pk Hour</th>
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<tbody>
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Note: A zero indicates no data available.
Source: Institute of Transportation Engineers

TRIP GENERATION BY MICROTRANS
## Summary of Average Vehicle Trip Generation
For 179 Th.Sq.Ft. GLA of Shopping Center
October 07, 2010

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<th>24 Hour Two-Way Volume</th>
<th>7-9 AM Pk Hour</th>
<th>4-6 PM Pk Hour</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Enter</td>
<td>Exit</td>
</tr>
<tr>
<td>Average Weekday</td>
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<td>70</td>
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<td>24 hour Two-Way Volume</td>
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<tr>
<td>Sunday</td>
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</table>

Note: A zero indicates no data available.

Source: Institute of Transportation Engineers

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

Prepared For:
Centex Homes

Prepared by:
Quad Knopf

January, 2006
Job Number: N0432

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RALPH M. HOGOBOOM
No. 11819
CIVIL

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.
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.
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

Quadrant: 1
File: 0432_Figs2,3,9.dwg

Date: January 2008
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.
BELLA VISTA PROJECT
BOUNDARY

2 ACRE FLOOD
STORAGE

FIRE STATION
2.5 ACRES

STEAMBOAT CREEK
RESTORATION EXTENSION

OPEN
SPACE
WATER
SITE

PHASE II A
VILLAGE II E

PHASE II A
VILLAGE II F

PHASE II A
VILLAGE II G

PHASE II B
VILLAGE II H

PHASE II B
VILLAGE II I

PHASE II C
VILLAGE II J

PHASE II C
VILLAGE II K

Phase 2 Development

Phase 2 Development

Prop
Elem
School
Site
(10 AC)

Neighborhood
Park
(14.8 AC)

Public
Facility
(6 AC)

Flood Storage
Approx. 4.8 ac

Flood Storage
Approx. 27 ac

Damonte Ranch Phase 5

Legend

Bella Vista Project
Phase 1 & 2
Phase 2 Boundary
Designed Channel
Flood Storage Area

Figure 4
Phasing and Flood Storage Areas
Centex Homes, Inc.

Scale: 1" = 600 ft

Date: May, 2005

Rev: A

File Name: QK_048428

Designed By: DW

Quad Knopf
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 4213 cfs will enter through the channel on the western side of the property and 2836 cfs 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, sheetfloodng 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

<table>
<thead>
<tr>
<th>Regional Models</th>
<th>Peak flow</th>
<th>Volume</th>
</tr>
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<tbody>
<tr>
<td>0243AB.dat</td>
<td>Existing Conditions</td>
<td>6362</td>
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<tr>
<td>DRph5.dat</td>
<td>Existing conditions w/ Damonte V</td>
<td>7165</td>
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<td>DRph5+BV1.dat</td>
<td>Post-development (through Phase 1)</td>
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<tr>
<td>DRph5+BV2.dat</td>
<td>Post-development (through Phase 2)</td>
<td>7057</td>
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<table>
<thead>
<tr>
<th>Onsite Volume Models:</th>
<th>Volume</th>
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<tbody>
<tr>
<td>BV72UND.dat</td>
<td>Existing conditions</td>
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<tr>
<td>BV72DEV1.dat</td>
<td>Post-development (through Phase 1)</td>
</tr>
<tr>
<td>BV72DEV2.dat</td>
<td>Post-development (through Phase 2)</td>
</tr>
</tbody>
</table>

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.
Figure 8
Soils Map
Bella Vista Phase 1 & 2

LEGEND
- Project Boundary
- BV-2
- Onsite Watershed
- Soil Hydrologic Groups

Group A
Group B
Group C
Group D

Scale
1 inch = 1000 ft.

0 1000 2000 FEET

Quad Knopf
Bella Vista Phase 1 & 2
Cantex Homes
Date: Jan 2006
Table 2 On-site Watershed Parameters

<table>
<thead>
<tr>
<th>Sub-basin ID</th>
<th>Area (acres)</th>
<th>Area (m²)</th>
<th>CN Pre-Development</th>
<th>CN Post-Development</th>
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<tbody>
<tr>
<td>DR-1</td>
<td>33.92</td>
<td>0.053</td>
<td>74</td>
<td>86</td>
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<td>DR-2</td>
<td>26.24</td>
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<td>DR-3</td>
<td>18.56</td>
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</tr>
<tr>
<td>DR-4</td>
<td>44.80</td>
<td>0.070</td>
<td>74</td>
<td>75</td>
</tr>
<tr>
<td>DR-5</td>
<td>65.92</td>
<td>0.103</td>
<td>74</td>
<td>78</td>
</tr>
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<td>DR-6</td>
<td>18.56</td>
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<td>61.44</td>
<td>0.096</td>
<td>74</td>
<td>49</td>
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</table>

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 4213 cfs in the channel and 2836 cfs 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 0.0016 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)

<table>
<thead>
<tr>
<th>Channel Name</th>
<th>Discharge (cfs)</th>
<th>Manning's n</th>
<th>Longitudinal Side slope (ft/ft)</th>
<th>Bottom Width (ft)</th>
<th>Flow Depth (ft)</th>
</tr>
</thead>
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<tr>
<td>South Channel</td>
<td>91</td>
<td>0.04</td>
<td>0.03</td>
<td>2H:1V</td>
<td>6</td>
</tr>
<tr>
<td>Mid Channel</td>
<td>10</td>
<td>0.04</td>
<td>0.03</td>
<td>2H:1V</td>
<td>2</td>
</tr>
<tr>
<td>Far North Channel</td>
<td>138</td>
<td>0.04</td>
<td>0.05</td>
<td>2H:1V</td>
<td>10</td>
</tr>
</tbody>
</table>
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
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 3,700 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

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.
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

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. Neil Mann
Director
Public Works
City of Reno

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

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

Mr. Hoss Khatami
Branch Manager
Quad Knopf
LETTER OF MAP REVISION DETERMINATION DOCUMENT

COMMUNITY AND REVISION INFORMATION

COMMUNITY: City of Reno
Washoe County
Nevada

COMMUNITY NO.: 320020

IDENTIFIER: Bella Vista Ranch Phase I

PROJECT DESCRIPTION

CHANNELIZATION
GRADING

HYDRAULIC ANALYSIS
HYDROLOGIC ANALYSIS
NEW TOPOGRAPHIC DATA

BASIS OF REQUEST

APPROXIMATE LATITUDE & LONGITUDE: 39.447,-119.718
SOURCE: USGS QUAD (NO.:

ANOTATED MAPPING ENCLOSURES

TYPE: FIRM* NO.: 32031C3178 E DATE: September 30, 1994
TYPE: FIRM* NO.: 32031C3179 E DATE: September 30, 1994

NO REVISION TO THE FLOOD INSURANCE STUDY REPORT

ANOTATED STUDY ENCLOSURES

Enclosures reflect changes to flooding sources affected by this revision.
* FIRM - Flood Insurance Rate Map; ** FBPM - Flood Boundary and Floodway Map; *** FEMA - Flood Hazard Boundary Map

FLOODING SOURCE(S) & REvised REACHES

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

Floodling Source: Steamboat Creek

<table>
<thead>
<tr>
<th>Effective Flooding</th>
<th>Revised Flooding</th>
<th>Increases</th>
<th>Decreases</th>
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<td>YES</td>
<td>NONE</td>
</tr>
<tr>
<td>Zone A</td>
<td>Contained</td>
<td>NONE</td>
<td>YES</td>
</tr>
</tbody>
</table>

* 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 Dept, 5501 Blanchflower 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 10.3.1.09090571 1024-C
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 1-877-336-3627 (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, CPM, Program Specialist
Engineering Management Branch
Mitigation Directorate

112553 10.3.1.08090571 102-I-C
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.

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

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

ZONE X

WASHOE COUNTY
UNINCORPORATED AREAS
320019

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

11

REVISED TO
REFLECT LOMR
EFFECTIVE
APR 25 2008

FIRM
FLOOD INSURANCE RATE MAP

WASHOE COUNTY,
NEVADA
AND INCORPORATED AREAS

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

AREA REVISED
BY LOMR DATED
SEPTEMBER 28, 2005

1\% ANNUAL CHANCE
FLOOD DISCHARGE
CONTAINED IN CULVERT

ZONE X

ZONE X

ZONE A

ZONE A

ZONE A

MAP NUMBER
32031C3187 E

EFFECTIVE DATE:
SEPTEMBER 30, 1994

Federal Emergency Management Agency
Appendix C

Wetland Mitigation Plan – Gibson & Skordal
BELLA VISTA RANCH - CENTEX HOMES

WETLAND MITIGATION AND MONITORING PLAN

Reno, Nevada

February 2005
Revised August 2005

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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<th>Page</th>
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<td>Water Diversion Plan</td>
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</table>
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

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

Bella Vista Ranch – Centex Homes
Mitigation and Monitoring Plan
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*

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

*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 Bella Vista Ranch – Centex Homes
Mitigation and Monitoring Plan
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 (Artemesia tridentata), greasewood (Sarcobatus vermiculatus) cheatgrass (Bromus tectorum), saltgrass (Distichlis spicata), and flixweed (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) 589-1830

0 450 900 1,800
Foot
Table 3. Summary of Delineated Areas

<table>
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<tr>
<th>Reference Number</th>
<th>Wetland/Waters Type</th>
<th>Area (Acres)</th>
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<tr>
<td>WM1</td>
<td>Wet Meadow</td>
<td>20.274</td>
</tr>
<tr>
<td>WM2</td>
<td>Wet Meadow</td>
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</tr>
<tr>
<td>WM3</td>
<td>Wet Meadow</td>
<td>2.387</td>
</tr>
<tr>
<td>C1</td>
<td>Channel, Steamboat Creek</td>
<td>3.061</td>
</tr>
<tr>
<td>C2</td>
<td>Channel</td>
<td>1.082</td>
</tr>
<tr>
<td>C3</td>
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<td>0.334</td>
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<tr>
<td>C4</td>
<td>Channel</td>
<td>0.816</td>
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<tr>
<td>C5</td>
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<td><strong>Total</strong></td>
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<td><strong>28.639</strong></td>
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Table 4. Summary of Waters/Wetlands within the Project Area

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<td>Channel, Steamboat Creek</td>
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<td>C2</td>
<td>Channel</td>
<td>0.541</td>
</tr>
<tr>
<td>C3</td>
<td>Channel</td>
<td>0.334</td>
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<td>0.816</td>
</tr>
<tr>
<td>C5</td>
<td>Channel</td>
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</tr>
<tr>
<td><strong>Total</strong></td>
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<td><strong>5.164</strong></td>
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</table>
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 (+ 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 4.623 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 (SCRP) 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.
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 CS 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 junecifolia, 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 that 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 that 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 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.

*Bella Vista Ranch – Centex Homes Mitigation and Monitoring Plan*
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
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).

   (x) Section 404 of the Clean Water Act (33 U.S.C. 1344).


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.

[Signature]

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.

[Signature]

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.

[Signature]

Transferee

[Date]
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 NDEP's 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,

Glen Gentry  
Monitoring Branch Supervisor  
Bureau Water Quality Planning

cc: Kyle Collinsworth, Centex Homes  
Icyl Mulligan, NDEP