

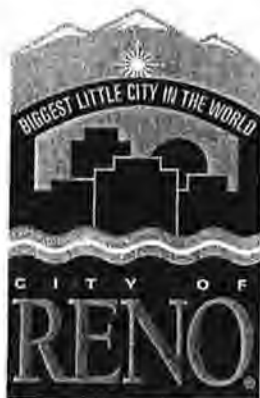
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**Appendix 1**  
**Council Decision & Certification Letter and Zoning Ordinance**

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**Ashley D. Turney**  
City Clerk  
(775) 334-2030  
TurneyA@reno.gov

**Mikki Bond**  
Acting Chief Deputy City Clerk  
(775) 334-2030  
BondM@reno.gov



**Office of the City Clerk**  
Central Cashiering (775) 334-2030  
Parking Tickets (775) 334-2293

August 24, 2018

**FILED THIS DATE**  
8 / 24 / 2018  
BY: ums  
CITY CLERK

Rancharrah Holdings, LLC  
6001 Talbot Lane  
Reno, NV 89509

RE: Case No. LDC18-00036 (Rancharrah PUD Amendment) – Certification of the Rancharrah Planned Unit Development (PUD) Handbook

Dear Applicant:

At a regular meeting held August 22, 2018, the Reno City Council upheld the staff recommendation and certified the Rancharrah Planned Unit Development (PUD) Handbook. The PUD amendments were tentatively approved by Council on July 18, 2018.

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

Sincerely,

*for Ashley D. Turney*  
Ashley D. Turney  
City Clerk

ADT:mb

Enc.

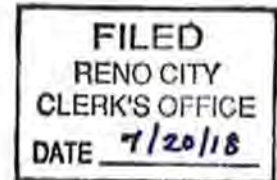
xc: Community Development  
Jeff Mann, Parks, Recreation & Community Services  
Heather Manzo, Community Development  
Wood Rodgers, Inc, c/o Andy Durling, 1361 Corporate Boulevard, Reno NV 89502



**Ashley D. Turney**  
City Clerk  
(775) 334-2030  
TurneyA@reno.gov

**Mikki Bond**  
Acting Chief Deputy City Clerk  
(775) 334-2030  
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**Office of the City Clerk**  
Central Cashiering (775) 334-2030  
Parking Tickets (775) 334-2293



cm

July 20, 2018

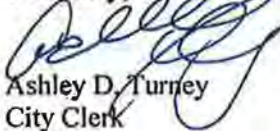
Wood Rodgers, Inc.  
ATTN: Andy Durling  
1361 Corporate Boulevard  
Reno, NV 89502

RE: Case No. LDC18-00036 (Rancharrah Planned Unit Development Amendment) – **NOTICE OF FINAL ACTION, DECISION OR ORDER**

Dear Applicant:

At a regular meeting held July 18, 2018, the Reno City Council passed and adopted Ordinance No. 6470, approving the zoning map amendment for the above referenced case.

Sincerely,

  
Ashley D. Turney  
City Clerk

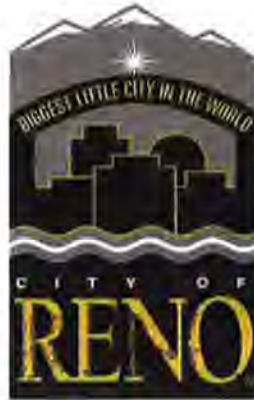
ADT:mb

Enc.

xc: Community Development  
Jeff Borchardt, Community Development  
Jeff Mann, Parks, Recreation & Community Services  
Rancharrah Holdings LLC, 6001 Talbot Lane, Reno NV 89509

**Ashley D. Turney**  
 City Clerk  
 (775) 334-2030  
 TurneyA@reno.gov

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



**Office of the City Clerk**  
 Central Cashiering (775) 334-2030  
 Parking Tickets (775) 334-2293

**FILED THIS DATE**  
6 / 11 / 18  
 BY: BBB  
 CITY CLERK

June 11, 2018

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

RE: Case No. LDC18-00036 (Rancharrah Planned Unit Development Amendment)

Dear Applicant:

At a regular meeting held June 6, 2018, the Reno City Council upheld the recommendation of the Planning Commission and approved the request for an amendment to the Rancharrah PUD to: 1) update the master developer; 2) provide clarification to the flexibility provisions; 3) modify the parking requirements for the Events Center and Equestrian Center Villages; 4) update the traffic analysis to reflect current development that has been approved; 5) clarify the recreational amenities allowed within the Events Center Village; 6) incorporate language from the prior ordinance regarding allowable residential development within the Equestrian Village; 7) allow for cluster development as an allowed use within the Estates Residential Village; 8) modify the names of the commercial land use designations; 9) modify the land use plan to: a) change Village 5 from the cottages land use designation to the single family residential land use designation; b) change Village 6 from the single family residential land use designation to the cottages land use designation; and c) modify the acreage of Villages 1 through 6 and the Equestrian Center, Events Center, Office/Medical, and Estates Residential Villages, by ordinance, subject to compliance with Condition A. The ±140 acre PUD is generally located on the northwest corner of Kietzke Lane and Del Monte Lane. The site has a Master Plan land use designation of Special Planning Area.

Wood Rodgers, Inc.

Case No. LDC18-00036 (Rancharrah Planned Unit Development Amendment)

Page 2

The City Council requested that the following modifications be made to the PUD Handbook:

1. Require a special use permit when three story buildings are proposed within the Cottages land use designation; and
2. Require the installation of sidewalk along the east side of Talbot Lane connecting the pathway within the Rancharrah PUD to the existing sidewalk along Sierra Rose Drive prior to the issuance of a certificate of occupancy for the first residence.

CONDITION A: Approval of the amendment to Rancharrah Planned Unit Development Design Guidelines is subject to the modifications to the Handbook as noted in Exhibit A, the addition of Condition No. 1 attached to this report and any modifications made by the Planning Commission and City Council at their respective public hearings. The revisions shall be incorporated into the Design Guidelines Handbook and submitted to staff in both paper and electronic versions for review within two months of the date of City Council approval; and certified by the City Council within four months of the date of City Council approval. Failure by the applicant to conform with either time deadline shall render this approval null and void.

Sincerely,

  
Ashley D. Turney  
City Clerk

ADT:bbb

xc: Community Development  
Jeff Borchardt, Community Development  
Jeff Mann, Parks, Recreation & Community Services  
Rancharrah Holdings LLC, 6001 Talbot Lane, Reno NV 89509

**Ashley D. Turney**  
City Clerk  
(775) 334-2030  
TurneyA@reno.gov



**Office of the City Clerk**  
Central Cashiering (775) 334-2032  
Parking Tickets (775) 334-2293

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

FILED THIS DATE  
8 / 28 / 15  
BY: BBB  
CITY CLERK

August 28, 2015

Reno Land Development Company  
5595 Kietzke Lane, Suite 111  
Reno, NV 89511

RE: Case No. LDC15-00047 (Rancharra PUD Amendment) – Certification of Handbook

Dear Applicant:

At a regular meeting held August 26, 2015, the City Council certified the Rancharra Planned Unit Development (PUD) Handbook. The amendment was tentatively approved by the City Council on May 13, 2015.

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

Sincerely,

*Ashley D. Turney*  
Ashley D. Turney  
City Clerk

ADT:bbb

cc: Community Development Department  
Jeff Mann, Parks, Recreation and Community Services  
Vern Kloos, Community Development  
Kietzke Corridor Investors, LLC, 4785 Caughlin Parkway, Reno NV 89519  
McKenzie Properties, P.O. Box 1209, Reno NV 89504  
Middlefork Limited Partnership, 6001 Talbot Lane, Reno NV 89511  
Andy Durling, Wood Rodgers, 5440 Reno Corporate Drive, Reno NV 89511

**Ashley D. Turney**  
City Clerk  
(775) 334-2030  
TurneyA@reno.gov



**Office of the City Clerk**  
Central Cashiering (775) 334-2032  
Parking Tickets (775) 334-2293

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

**FILED THIS DATE**  
7 / 24 / 15  
BY: BBB  
CITY CLERK

July 24, 2015

Reno Land Development Company  
5595 Kietzke Lane, Suite 111  
Reno, NV 89511

RE: Case No. LDC15-00047 (Rancharrah PUD Amendment)

Dear Applicant:

On May 27, 2015, City Council passed and adopted Ordinance No. 6368 which was to be in effect from and after its passage, adoption and publication in one issue of a newspaper printed and published in the City of Reno; upon approval of the Master Plan Amendment and a finding of conformance for the Projects of Regional Significance by the Truckee Meadows Regional Planning Agency for Case Nos. LDC15-00013 (Rancharrah) and LDC15-00047 (Rancharrah); and upon certification by City Council of the amended Planned Unit Development (PUD) Handbook for Case No. LDC15-00047 and recordation of the amended PUD Handbook for Case No. LDC15-00047.

On July 22, 2015, the Regional Planning Commission (RPC) held a public hearing and determined that this is a project of regional significance. Please see the attached letter dated July 23, 2015, from the RPC.

Sincerely,

*for Beverly Beaty-Benadom*  
Ashley D. Turney  
City Clerk

ADT:bbb

Enclosure

xc: Community Development Department  
Vern Kloos, Community Development  
Kietzke Corridor Investors, LLC, 4785 Caughlin Parkway, Reno NV 89519  
McKenzie Properties, P.O. Box 1209, Reno NV 89504  
Middlefork Limited Partnership, 6001 Talbot Lane, Reno NV 89511  
Andy Durling, Wood Rodgers, 5440 Reno Corporate Drive, Reno NV 89511



REGIONAL PLANNING COMMISSION

Doug Voelz, Chair • Kevin Weiske, Vice-Chair • James Barnes • Sarah Chvilicek • Roger Edwards • Tom Leary • Charles Reno • Art Sperber • Jason Woosley • Kimberly H. Robinson, Executive Director

July 23, 2015

Kimberly H. Robinson  
Executive Director of Regional Planning, and  
Clerk of the Regional Planning Commission  
1105 Terminal Way, Suite 316  
Reno, Nevada 89502

Received by Clerk:  7-23-15

Mailed: 7/23/15 UB

Dear Ms. Robinson:

On July 22, 2015, the Regional Planning Commission (RPC) held a public hearing and determined that the following matter conforms with the comprehensive Regional Plan:

Regional Plan Conformance Review – project of regional significance, Rancharrah (CR15-006) – a project of regional significance (PRS) for: employment greater than 938 employees; traffic in excess of 6,250 daily trips; housing in excess of 625 units; and, sewage generation greater than 187,500 gallons per day.

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

Please do not hesitate to contact me at 775/321-8397 if you have any questions on this matter.

Sincerely,



Lauren Barrera  
Regional Planner

cc:

File CR15-006  
Claudia Hanson, City of Reno  
Armando Ornelas, City of Sparks  
Bill Whitney, Washoe County

Ashley D. Turney, City of Reno  
Beverly Beaty-Benadom, City of Reno  
Debra Goodwin, RTC  
Vern Kloos, City of Reno

**Ashley D. Turney**  
City Clerk  
(775) 334-2030  
TurneyA@reno.gov



**Office of the City Clerk**  
Central Cashiering (775) 334-2032  
Parking Tickets (775) 334-2293

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

**FILED THIS DATE**

6 / 30 / 15  
BY: BBB  
CITY CLERK

**June 30, 2015**

Reno Land Development Company  
5595 Kietzke Lane, Suite 111  
Reno, NV 89511

RE: Case No. LDC15-00047 (Rancharrah PUD Amendment) – *NOTICE OF FINAL ACTION, DECISION OR ORDER – AMENDED LETTER*

Dear Applicant:

On May 27, 2015, City Council passed and adopted Ordinance No. 6368. The ordinance shall be in effect from and after its passage, adoption and publication in one issue of a newspaper printed and published in the City of Reno; upon approval of the Master Plan Amendment and a finding of conformance for the Projects of Regional Significance by the Truckee Meadows Regional Planning Agency for Case Nos. LDC15-00013 (Rancharrah) and LDC15-00047 (Rancharrah); and upon certification by City Council of the amended Planned Unit Development (PUD) Handbook for Case No. LDC15-00047 and recordation of the amended PUD Handbook for Case No. LDC15-00047.

Sincerely,

*Beverly Beaty-Benadom*  
for Ashley D. Turney  
City Clerk

ADT:bbb

xc: Community Development Department  
Vern Kloos, Community Development  
Kietzke Corridor Investors, LLC, 4785 Caughlin Parkway, Reno NV 89519  
**McKenzie Properties, P.O. Box 1209, Reno NV 89504**  
**Middlefork Limited Partnership, 6001 Talbot Lane, Reno NV 89511**  
Andy Durling, Wood Rodgers, 5440 Reno Corporate Drive, Reno NV 89511

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

**BILL NO. 6937**

**ORDINANCE NO. 6368**

**AN ORDINANCE TO (1) AMEND TITLE 18, CHAPTER 18.08 OF THE RENO MUNICIPAL CODE, ENTITLED "ZONING", SECTION 18.08.102(B).1321, TO CHANGE THE ZONING FROM ±23.52 ACRES OF LARGE LOT RESIDENTIAL-2.5 ACRE MINIMUM PARCEL SIZE (LLR2.5) TO PLANNED UNIT DEVELOPMENT (PUD); AND (2) APPROVE THE THIRD AMENDED RANCHARRAH PLANNED UNIT DEVELOPMENT (PUD) HANDBOOK TO: 1) ADD ±23.52 ACRES TO THE PUD; 2) INCREASE THE NUMBER OF RESIDENTIAL UNITS ALLOWED UP TO 691 DWELLING UNITS; 3) MODIFY THE USES, ACREAGE AND CONFIGURATION OF THE VARIOUS LAND USES ALLOWED IN THE PUD; AND 4) MODIFY THE HANDBOOK STANDARDS, TEXT AND GRAPHICS TO REFLECT THE CHANGES DISCUSSED IN 1-3 ABOVE. THIS IS A PROJECT OF REGIONAL SIGNIFICANCE FOR: (A) HOUSING (EXCEEDS 625 UNITS), (B) TRAFFIC (EXCEEDS 6,250 AVERAGE DAILY TRIPS), (C) EMPLOYMENT (MAY EXCEED 938 EMPLOYEES), AND (D) SEWAGE (EXCEEDS 187,500 GPD) AND REQUIRES REVIEW BY THE REGIONAL PLANNING COMMISSION. THE PROJECT IS LOCATED IN THE AREA BOUNDED BY SIERRA ROSE DRIVE TO THE NORTH, KIETZKE LANE TO THE EAST, DEL MONTE LANE TO THE SOUTH AND THE LAKE DITCH TO THE WEST IN A PUD (PLANNED UNIT DEVELOPMENT) ZONE; TOGETHER WITH OTHER MATTERS PROPERLY RELATING THERETO.**

**SPONSORED BY: RENO CITY PLANNING COMMISSION**

**THE CITY COUNCIL OF THE CITY OF RENO DOES ORDAIN:**

SECTION 1. Chapter 18.08 of the Reno Municipal Code is hereby amended by adding thereto a new section to be known as Section 18.08.102(b).1321 relating to a ±141 acre site located in the area bounded by Sierra Rose Drive to the north, Kietzke Lane to the east, Del Monte Lane to the south and the Lake Ditch to the west and more particularly described in the attached "Exhibit A"; to change the zoning from ±23.52 acres of Large Lot Residential-2.5 acre minimum parcel size (LLR2.5) to Planned Unit Development (PUD).

CASE NO. LDC15-00047 (Rancharrah PUD Amendment)

SECTION 2. The Third Amended Rancharrah Planned Unit Development Handbook attached hereto as Exhibit B (to be attached with adoption of the ordinance), is hereby given final approval.

SECTION 3. This Ordinance shall be in effect from and after its passage, adoption and publication in one issue of a newspaper printed and published in the City of Reno, upon approval of the Master Plan Amendment and a finding of conformance for the Projects of Regional Significance by the Truckee Meadows Regional Planning Agency for Case Nos. LDC15-00013 (Rancharrah) and LDC15-00047 (Rancharrah); upon certification by City Council of the amended PUD Handbook for Case No. LDC15-00047 and recordation of the amended PUD Handbook for Case No. LDC15-00047.

SECTION 4. The City Clerk and Clerk of the City Council of the City of Reno is hereby authorized and directed to have this Ordinance published in one issue of the Reno-Gazette Journal, a newspaper printed and published in the City of Reno.


PASSED AND ADOPTED this 27<sup>th</sup> day of May, 2015, by the following vote of the Council:

AYES:	<u>Duerr, Delgado, Bobzien, Brekhus, McKenzie, Jardon, Schieve</u>
NAYS:	<u>None</u>
ABSTAIN:	<u>None</u>
ABSENT:	<u>None</u>

APPROVED this 27<sup>th</sup> day of May, 2015.

  
HILLARY L. SCHIEVE  
MAYOR OF THE CITY OF RENO

ATTEST:

  
ASHLEY D. TURNEY  
CITY CLERK AND CLERK OF THE  
CITY COUNCIL OF THE CITY OF  
RENO, NEVADA



EFFECTIVE DATE: May 29, 2015.

## EXHIBIT "A"

### LEGAL DESCRIPTION FOR RANCHARRAH PLANNED UNIT DEVELOPMENT

All that certain real property situate within Section Thirty-Six (36), Township Nineteen (19) North, Range Nineteen (19) East, Mount Diablo Meridian, City of Reno, Washoe County, Nevada, being Assessor's Parcel Numbers 040-900-03, 040-900-08, 040-900-06, 040-900-09, 040-900-07, 040-143-17, 040-143-18, 040-900-02, 040-890-01, 040-890-02, 040-890-03, 040-890-05 & 040-151-01, and being more particularly described as follows:

**BEGINNING** at the northwest corner of Adjusted APN 040-081-63, as shown on the Record of Survey Showing A Boundary Line Adjustment for "John A. Harrah", recorded as Record of Survey Map No. 3145, on November 18, 1996 as File No. 2048420;

**THENCE** departing said northwestern corner and along the northerly line of said Adjusted parcel, South 89°32'24" East a distance of 428.88 feet;

**THENCE** continuing along said northerly line, South 89°30'47" East a distance of 628.00 feet to the northeasterly corner of said parcel, being on the westerly right-of-way line of Talbot Lane as shown on said Record of Survey Map No. 3145;

**THENCE** along said westerly right-of-way line, South 09°39'38" East a distance of 581.45 feet to the beginning of a non-tangent curve;

**THENCE** continuing along said westerly right-of-way line from a radial line which bears South 80°17'57" West, 18.46 feet along the arc of a 15.00 foot radius to the right through a central angle of 70°31'43" to the beginning of a reverse curve;

**THENCE** 196.76 feet along the arc of a 45.00 foot radius to the left through a central angle of 250°31'44" to the easterly right-of-way line of said Talbot Lane, also being the westerly line of Parcel 6A as shown on Record of Survey to Support a Boundary Line Adjustment for "Middlefork Limited Partnership, A Nevada Limited Partnership", recorded as Record of Survey Map No. 5425, on May 04, 2012, as File No. 4109624;

**THENCE** continuing along said westerly line, North 09°42'04" West a distance of 56.57 feet to the northwesterly corner of said Parcel 6A;

**THENCE** along the northerly line of said parcel, North 82°10'56" East a distance of 575.32 feet to the northeasterly corner of said Parcel 6A;

**THENCE** departing said northeasterly corner and along the easterly line of said parcel, South 00°30'56" West a distance of 10.75 feet to the northwesterly corner of Parcel 1A;

**THENCE** along the northerly line of said Parcel 1A, North 81°57'34" East a distance of 672.36 feet to the northeasterly corner of said Parcel 1A;

**THENCE** along the easterly line of said Parcel 1A, South 07°33'02" East a distance of 591.60 feet to the southeasterly corner of said parcel, also being on the northerly line of Parcel 2A as shown on said Record of Survey Map No. 5425;

**THENCE** along the northerly line of said Parcel 2A the following seven (7) courses and distances:

1. South 89°24'02" East a distance of 519.70 feet;
2. South 84°45'02" East a distance of 11.00 feet;
3. North 43°24'57" East a distance of 94.57 feet;
4. North 45°08'46" East a distance of 46.29 feet;
5. North 48°32'58" East a distance of 55.10 feet;
6. South 85°32'37" East a distance of 46.48 feet;
7. South 89°46'10" East a distance of 17.38 feet to the westerly right-of-way line of Kietzke Lane as shown on said Record of Survey Map No. 5425;

**LEGAL DESCRIPTION FOR  
RANCHARRAH PLANNED UNIT DEVELOPMENT**

**THENCE** along said westerly right-of-way line, South 10°23'05" East a distance of 782.69 feet to the southeasterly corner of said parcel;

**THENCE** departing said westerly right-of-way and along the southerly line of said Parcel 2A, North 89°37'02" West a distance of 581.24 feet to the northeasterly corner of Parcel 5A as shown on said Record of Survey Map No. 5425;

**THENCE** along the easterly line of said Parcel 5A, South 09°00'21" West a distance of 355.87 feet to the southeasterly corner of said Parcel 5A, also being on the northerly line of Parcel 3A as shown on said Record of Survey Map No. 5425;

**THENCE** along the northerly line of said Parcel 3A, South 89°37'12" East a distance of 701.51 feet to the westerly right-of-way line of Kietzke Lane as shown on said Record of Survey Map No. 5425;

**THENCE** along said westerly right-of-way line, South 10°23'05" East a distance of 484.15 feet to the southeasterly corner of said Parcel 3A, also being the beginning of a tangent curve;

**THENCE** continuing along said westerly right-of-way line, 97.43 feet along the arc of a tangent 60.00 foot radius to the right through a central angle of 93°02'23" to the southerly line of said Parcel 4A, also being the northerly right-of-way line of Del Monte Lane; the following six (6) courses, distances and curves:

**THENCE** along said northerly right-of-way line the following six (6) courses, distances and curves:

1. South 82°38'18" West a distance of 77.35 feet to the beginning of a tangent curve;
2. 51.23 feet along the arc of a 1900.00 foot radius curve to the right through a central angle of 01°32'42";
3. South 75°52'03" West a distance of 250.14 feet;
4. South 03°22'15" East a distance of 43.31 feet;
5. South 86°39'28" West a distance of 594.80;
6. South 52°36'58" West a distance of 32.79 feet to the southerly line of Parcel 2 as shown on the Parcel Map for Richard G. & Marlene B. Campbell, recorded as Parcel Map No. 2338, on March 07, 1989, as File No. 1308872;

**THENCE** departing said northerly right-of-way line and along the southerly line of said Parcel 2, South 86°40'58" West a distance of 579.50 feet, being the easterly line of Parcel 1 as shown on said Parcel Map 2338;

**THENCE** along said easterly line, South 05°27'02" East a distance of 120.00 feet;

**THENCE** continuing along said easterly line, South 33°22'58" West a distance of 77.54 feet to the southeasterly most corner of said Parcel 1;

**THENCE** South 26°47'02" East a distance of 128.61 feet to said northerly right-of-way line of Del Monte Lane, also being the beginning of a non-tangent curve;

**THENCE** along said northerly right-of-way line the following six (6) courses, distances and curves also being the beginning of a curve;

1. from a radial line which bears North 00°25'45" West, 269.05 feet along the arc of a non-tangent 382.00 foot radius to the right through a central angle of 40°21'17";
2. North 50°04'28" West a distance of 23.07 feet to the beginning of a curve;
3. 296.62 feet along the arc of a tangent 359.30 foot radius to the left through a central angle of 47°18'02";
4. South 82°37'30" West a distance of 42.70 feet to the beginning of a curve;

**LEGAL DESCRIPTION FOR  
RANCHARRAH PLANNED UNIT DEVELOPMENT**

5. 303.57 feet along the arc of a tangent 425.00 foot radius curve to the left through a central angle of 40°55'30";
6. South 41°42'00" West a distance of 163.35 feet to the southerly most corner of the parcel described in Document No. 1961602, recorded on January 25, 1996;

**THENCE** departing said northerly right-of-way line and along the southwesterly line of said Document No. 1961602, North 35°48'02" West a distance of 672.58 feet to the northwesterly line of said Document;

**THENCE** along said northwesterly line, North 30°01'58" East a distance of 351.87 feet to the southwesterly line of the Adjusted APN 040-081-73 as shown on the Record of Survey Map Showing A Boundary Line Adjustment for John A. Harrah, recorded as Record of Survey Map No. 3131, recorded on October 25, 1996, as File No. 2042532;

**THENCE** departing said southwesterly corner and along the westerly line of said parcel the following thirteen (13) courses and distances;

1. North 11°36'08" East a distance of 93.50 feet;
2. North 25°51'34" East a distance of 30.42 feet;
3. North 29°57'28" East a distance of 25.91 feet;
4. North 09°38'05" East a distance of 59.30 feet;
5. North 02°04'42" East a distance of 98.96 feet;
6. North 13°40'07" East a distance of 164.82 feet;
7. North 01°18'00" East a distance of 34.65 feet;
8. North 19°27'48" West a distance of 83.08 feet;
9. North 20°13'38" West a distance of 108.00 feet;
10. North 19°00'46" West a distance of 93.13 feet;
11. North 26°34'44" West a distance of 111.26 feet;
12. North 34°10'26" West a distance of 206.09 feet;
13. South 89°16'26" East a distance of 5.97 feet to the southwesterly corner of aforementioned Adjusted APN 040-081-63 as shown on said Record of Survey Map No. 3145;

**THENCE** departing said southwesterly corner and along the westerly line of said Adjusted APN 040-081-63 the following nine (9) courses and distances;

- 1) North 33°40'02" West a distance of 111.55 feet;
- 2) North 26°11'02" West a distance of 196.70 feet;
- 3) North 15°52'02" West a distance of 304.60 feet;
- 4) North 14°17'02" West a distance of 22.50 feet;
- 5) North 45°55'02" West a distance of 79.50 feet;
- 6) North 25°17'02" West a distance of 330.00 feet;
- 7) North 64°50'02" West a distance of 65.33 feet;
- 8) South 89°41'02" East a distance of 9.54 feet;
- 9) North 26°02'02" West a distance of 313.16 feet to the **POINT OF BEGINNING**;

Containing 140.80 acres of land, more or less.

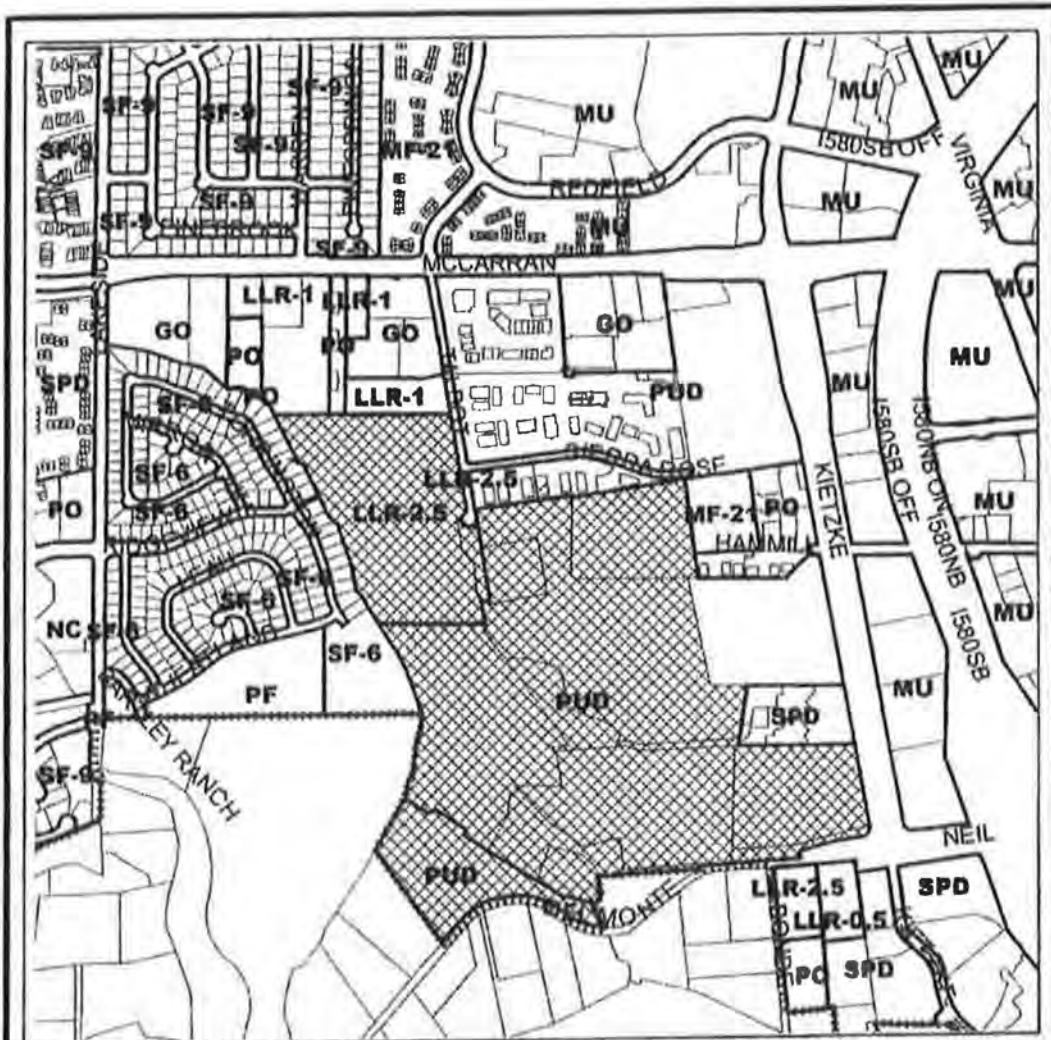
**LEGAL DESCRIPTION FOR  
RANCHARRAH PLANNED UNIT DEVELOPMENT**

The Basis of Bearings for this legal description is identical to that as shown on said Record of Survey Map No. 5425.



Prepared by:  
Wood Rodgers, Inc.  
5440 Reno Corporate Dr.  
Reno, NV 89511



Kevin M. Almeter, P.L.S.  
Nevada Certificate No. 19052




**LDC15-00047  
Rancharra PUD Amendment**

-  Subject Site
-  City Limits

0 125250 500 750 1,000 Feet

The information hereon is approximate and is intended for display purposes only. Reproduction is not permitted. For additional information please contact the City of Reno Community Development Department. Map Produced: March, 2015



**Community Development Department**

450 Baxter Street Phone: 334-2063  
 P.O. Box 1900 Fax: 334-2043  
 Reno, NV 89505 www.cityofreno.com



**Ashley D. Turney**  
City Clerk  
(775) 334-2030  
TurneyA@reno.gov



**Office of the City Clerk**  
Central Cashiering (775) 334-2032  
Parking Tickets (775) 334-2293

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

FILED THIS DATE  
5 / 19 / 15  
BY: BBB  
CITY CLERK

May 19, 2015

Reno Land Development Company  
5595 Kietzke Lane #111  
Reno, NV 89511

RE: Case No. LDC15-00047 (Rancharrah Planned Unit Development Amendment) – PUD & Zoning Map Amendments

Dear Applicant:

At a regular meeting held May 13, 2015, and following a public hearing thereon, the City Council upheld the Planning Commission recommendation and approved the request for a zoning map amendment from ±23.52 acres of Large Lot Residential - 2.5 acre minimum parcel size (LLR2.5) to Planned Unit Development (PUD); and an amendment to the Rancharrah Planned Unit Development (PUD) Handbook to: 1) add ±23.52 acres to the PUD; 2) increase the number of residential units allowed up to 691 dwelling units; 3) modify the uses, acreage and configuration of the various land uses allowed in the PUD; and 4) modify the handbook standards, text and graphics to reflect the changes discussed in 1-3 above, by ordinance, subject to compliance with Condition A, and;

- 1) The addition of the six conditions/restrictions offered by the applicant as modified by the Planning Commission and as listed on pages 2-3 of this letter;
- 2) The addition of language to the Administrative section of the PUD handbook to require: a) that a Master Developer be designated prior to certification of the PUD; and b) that language be added to require creation of a Master Association to succeed the Master Developer at such time as the Master Developer sells all of his interests in the PUD.
- 3) Incorporation of the following changes into the PUD handbook as offered to Council by the applicant to: a) increase the buffer where no outdoor events are allowed from 250 to 300 feet from the south property line; and b) add language to clarify: (1) that any temporary structures would be subject to the outdoor noise and operational standards currently contained in the handbook; and (2) that temporary structures do not meet the requirements of a permanent structure for outdoor noise and operational

limitations as shown in blue on pages 20, 21, 24 and 25 of Exhibit B attached to the May 13, 2015 Planning Commission staff report to City Council; and

- 4) Incorporation into the PUD Handbook of three conditions/stipulations as approved by the City Council on May 13, 2015 (see page 4 below).

This is a project of Regional Significance for (a) housing (exceeds 625 units), (b) traffic (exceeds 6,250 average daily trips), (c) employment (may exceed 938 employees), and (d) sewage (exceeds 187,500 GPD). The ±141 acre site is located in the area bounded by Sierra Rose Drive to the north, Kietzke Lane to the east, Del Monte Lane to the south and the Lake Ditch to the west. The site has Master Plan land use designations of Special Planning Area and Single Family Residential.

**CONDITION A:**

Approval of the amendment to the Rancharrah PUD Handbook is subject to the addition of Conditions contained in Exhibit 1 contained in this letter and any modifications made by the Planning Commission and City Council at their respective public hearings. The conditions and any revisions shall be incorporated into the Design Guidelines Handbook and submitted to staff in both paper and electronic versions for review within two (2) months of the date of Regional Planning approval of the Projects of Regional Significance.; and certified by the City Council within four (4) months of the date of Regional Planning approval of the Projects of Regional Significance. Failure by the applicant to conform to either time deadline shall render this approval null and void.

**SIX ADDITIONAL CONDITIONS/RESTRICTIONS OFFERED BY THE APPLICANT:**

1. Retail Commercial Driveway Access - If a traffic mitigation measure (i.e. traffic signal or roundabout) is proposed on Kietzke Lane at the Retail Commercial driveway, the applicant shall seek input from adjacent property owners, including NevDex Properties, and the mitigation measure shall require approval by the City Council. (Please note that this provision has been added to Condition No 6 of Exhibit 1 contained in this letter).
2. Retail Commercial Building Height - Building heights within the Retail Commercial land use category shall be 55' (with the ability to increase the height with a special use permit). Buildings located within 200' of Kietzke Lane shall not exceed 55'.
3. Office/Medical/Retail Uses - The Drive-through lane associated with the one (1) food use in the Office/Medical/Retail parcel shall not operate outside the hours of 6:00 am and 11:00 pm.
4. Lake Ditch - If excess Rancharrah water rights on the Lake Ditch are sold and subsequent shares in the Lake Ditch Company are reduced, the Home Owners Association of Rancharrah shall be assessed the remainder of the Lake Ditch Company shares.
5. Evans Creek - The portion of Evans Creek that traverses Rancharrah shall be regularly maintained and cleared of debris to assist in maintaining irrigation water flows to downstream users. Maintenance shall be the responsibility of the Equestrian Center or Home Owners Association.

6. Events Center - The 800 seat amphitheater within the Events Center will be removed from the PUD.

EXHIBIT "1"  
Engineering

1. Prior to the approval of each permit, the applicant shall have an approved Sanitary Sewer Report in accordance with the Public Works Design Manual. Adequate access shall be provided for all sanitary sewer improvements per the Public Works Design Manual. All proposed on-site sewer facilities and improvements shall be privately owned and maintained. All required on-site and off-site sanitary sewer improvements necessary to serve the project shall be complete and functional prior to the issuance of any certificate of occupancy.
2. Prior to the approval of each permit, the applicant shall have an approved Hydrology Report addressing on-site and off-site storm water flows, detention, and facility capacities for the pre-development and post-development site conditions. Additionally, the applicant shall demonstrate the proposed storm water collection and discharge facilities, including infrastructure, access, and easements, are consistent with pre-development conditions as specified in the Public Works Design Manual.
3. Site circulation design, traffic control devices, and operational characteristics of the site accesses, common use driveways, on-site drive aisles, emergency accesses, fire access lanes, pedestrian routes, sidewalks, and parking areas shall be in accordance with the Public Works Design Manual and shall meet with the approval of the City Fire and Community Development Departments.
4. The applicant shall provide sidewalks and demonstrate accessible and ADA compliant pedestrian routes from all adjacent public rights-of-way to the on-site buildings.
5. Prior to the approval of each permit, the applicant shall demonstrate adequate street lighting exists or shall propose street lighting in accordance with City standards for the project entrances. If new lighting is required, a private on-site street light shall be installed at the back of sidewalk near the project entrances.
6. Project accesses, including ingress and egress limitation controls, shall be located and designed in conformance with the Traffic Impact Study for Rancharrah - Second Amendment (prepared by TrafficWorks dated March 13, 2015) on file. At the time of permit for the commercial sites associated with the development, a traffic report update to identify entry and access requirements and recommended roadway improvements will be required. If a traffic mitigation measure is identified (i.e. traffic signal or roundabout), adjacent property owners, including NevDex Properties shall be provided an opportunity to review and comment on the mitigation measure and the mitigation measure shall require approval by the City Council. The developer will construct all roadway improvements required to serve the development and meet City of Reno and RTC level of service standards.

7. All traffic study updates shall provide analyses and review of the site plan and proposed mitigations for project generated impacts, with regards to project and the trip generation distribution estimates included in the March 13, 2015 master traffic study, on the adjacent roadway network, site accesses, pedestrian routes, and cut-through traffic concerns.

8. Prior to approval of each permit, the applicant shall provide a written response from RTC defining transit requirements for this project and shall dedicate rights-of-way or grant appropriate easements and construct transit improvement in accordance with RTC's requirements prior to the approval of any certificate of occupancy to the satisfaction of the Community Development Department staff.

9. Prior to approval of each permit or final map, the applicant shall have plans approved and shall obtain associated encroachment and excavation permits. Additionally, the applicant shall provide necessary dedications for rights-of-way and/or public use easements for the roadway, sidewalk, and pedestrian ramp improvements proposed along each project frontage.

#### School District

Prior to approval of each a final map, the applicant shall provide a copy of a disclosure statement to be provided to each home buyer with their closing documents, notifying them that students in this project may be assigned to the nearest school(s) with available capacity in the event that the zoned schools cannot accommodate additional students.

#### **THREE CONDITIONS/STIPULATIONS APPROVED AND ADDED BY THE CITY COUNCIL ON MAY 13, 2015:**

1. The master developer shall dedicate a minimum 15-foot wide public use easement to the City of Reno for a pedestrian trail along the Lake Ditch and connecting to Del Monte Lane along the southern boundary of the Rancharra PUD. The construction of the trail shall be subject to the approval of the Lake Ditch Company and other reviewing agencies, as applicable. If constructed by the master developer, the trail construction costs may be credited toward the PUD's required Residential Construction Taxes, subject to approval by the City Council.

2. The land use type "Community Center/Clubhouse, private" shall be consistent throughout the handbook to read "Community Center/Clubhouse, private (with associated outdoor recreation facilities (i.e. tennis court(s), basketball court(s), etc.)".

3. In the event that the combined +/- 31.9 acre Equestrian Center and/or the Events Center are discontinued, the aforementioned land use categories shall have an underlying allowable residential density of 1 du/acre. The potential to add 31 residential units is allowed in addition to the approved 691 dwelling units identified in the PUD (maximum of 722 residential units).

The approved zoning map amendment will become effective upon passage and adoption of the appropriate ordinance.

Reno Land Development Company

Case No. LDC15-00047 (Rancharra PUD Amendment) – PUD & Zoning Map Amendments

May 19, 2015

Page 5

Sincerely,

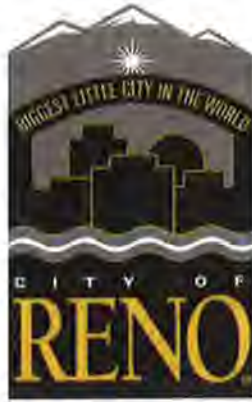
for  Ashley D. Torney  
City Clerk

ADT:bbb

xc: Community Development  
Jeff Mann, Parks, Recreation & Community Services  
Vern Kloos, Community Development  
Kietzke Corridor Investors, LLC, 4785 Caughlin Parkway, Reno NV 89519  
McKenzie Properties, P.O. Box 1209, Reno NV 89504  
Middleford Limited Partnership, 6001 Talbot Lane, Reno NV 89511  
Andy Durling, Wood Rodgers, Inc., 5440 Reno Corporate Drive, Reno NV 89511

**Lynnette R. Jones**  
City Clerk  
(775) 334-2030  
[jonesl@ci.reno.nv.us](mailto:jonesl@ci.reno.nv.us)

**Beverly Beaty-Benadom**  
Deputy City Clerk  
(775) 334-2030  
[Beaty-BenadomB@reno.gov](mailto:Beaty-BenadomB@reno.gov)



**Office of the City Clerk**  
Central Cashiering (775)334-2032  
Parking Tickets (775)334-2279

November 14, 2011

**FILED THIS DATE**  
11 / 14 / 11  
BY: BBB  
CITY CLERK

Middlefork Ltd. Partnership dba Rancharrah  
ATTN: John Harrah  
6001 Talbot Lane  
Reno, NV 89511

RE: Case No. LDC11-00027 (Rancharrah Planned Unit Development Amendment) –  
Certification of PUD Standards Handbook

Dear Applicant:

At a regular meeting held November 9, 2011, the City Council certified the Rancharrah PUD Design Standards Handbook. The amendment was tentatively approved by City Council on May 25, 2011.

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

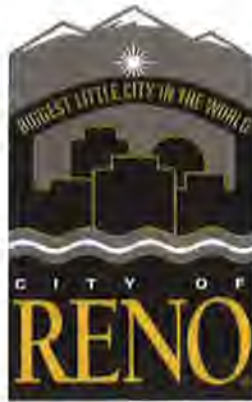
Sincerely,

*Beverly Beaty-Benadom for*  
Lynnette R. Jones  
City Clerk

LRJ:bbb

xc: Community Development  
Traffic Design Engineer  
Terry Zeller, Parks, Recreation & Community Services  
Andy Durling, Wood Rodgers, Inc.

Lynnette R. Jones  
City Clerk  
(775) 334-2030  
[jonesl@ci.reno.nv.us](mailto:jonesl@ci.reno.nv.us)



Office of the City Clerk  
Central Cashiering (775) 334-2032  
Parking Tickets (775) 334-2293

Beverly Beaty-Benadom  
Deputy City Clerk  
(775) 334-2030  
[BeatyBenadomB@reno.gov](mailto:BeatyBenadomB@reno.gov)

July 15, 2011

FILED THIS DATE  
7 / 18 / 11  
BY: BBB  
CITY CLERK

Middlefork Limited Partnership dba Rancharrah  
ATTN: John Harrah  
6001 Talbot Lane  
Reno, NV 89509

RE: Case No. LDC11-00027 (Rancharrah Planned Unit Development Amendment) – **NOTICE OF CONFORMANCE**

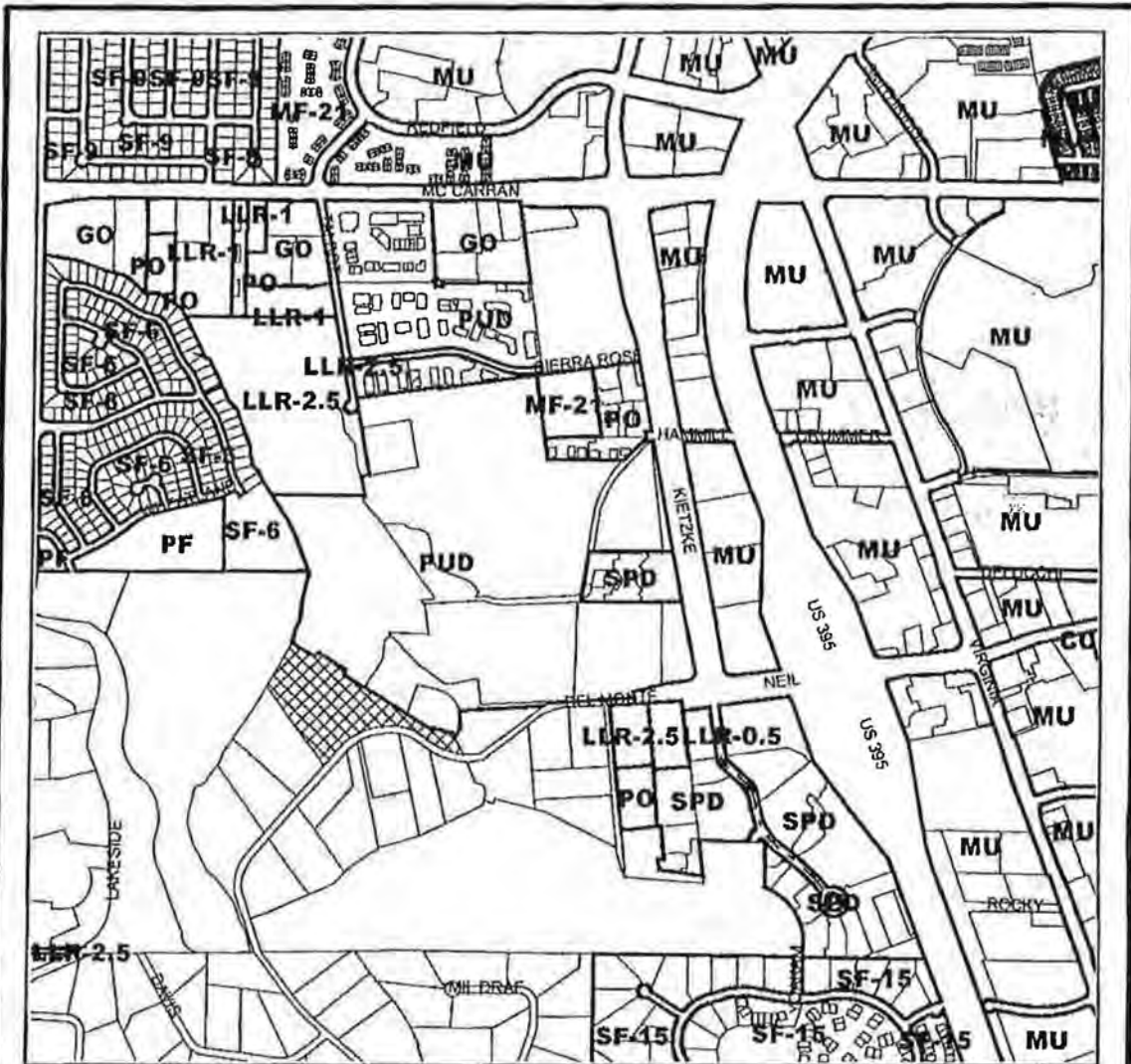
Dear Applicant:

On June 8, 2011, the City Council passed and adopted Ordinance No. 6186, approving the above referenced PUD amendment, subject to approval of this Project of Regional Significance by the Regional Planning Agency, Certification of the PUD Handbook by the City Council and recordation of same. On July 13, 2011, the Regional Planning Commission (RPC) held a public hearing and determined that the above matter conforms with the comprehensive Regional Plan. Please see the attached letter dated July 14, 2011, from the Regional Planning Commission.

Sincerely,  
  
Lynnette R. Jones


LRJ:bbb

xc: Community Development  
Traffic Design Engineer  
Terry Zeller, Parks, Recreation & Community Services  
Marchon Miller, Regional Transportation Commission  
Andy Durling, Wood Rodgers, Inc.




LDC11-00027

### Rancharrah Zoning Map Amendment

 Subject Site

From: HDR (High Density Rural)

To: PUD - Rancharrah



Scale: 0 125 250 500 750 1,000 Feet

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



**Community Development Department**

450 Siachai Street Phone: 334-2063  
 P.O. Box 1900 Fax: 334-2043  
 Reno NV 89505 www.cityofreno.com

FILE: 334-2043-00027-0001-0001

**RENO NEWSPAPERS INC**

**Publishers of**

**Reno Gazette-Journal**

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RENO NV 89505-1900

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PO# NOTICE OF CITY  
Ad# 1000755215  
Legal Ad Cost \$69.97

STATE OF NEVADA  
COUNTY OF WASHOE

Being first duly sworn, deposes and says: That as the legal clerk of the Reno Gazette-Journal, a daily newspaper of general circulation published in Reno, Washoe County, State of Nevada, that the notice referenced below has published in each regular and entire issue of said newspaper between the dates: **06/10/2011 - 06/10/2011**, for exact publication dates please see last line of Proof of Publication below.

Signed:   
JUN 10 2011

Subscribed and sworn to before me  
**PAMELA K. HEISLER**  
Notary Public - State of Nevada  
Appointment Recorded in Washoe County  
No: 04-88494-2 - Expires December 8, 2011  
  


**Proof of Publication**

NOTICE OF CITY ORDINANCES NOTICE IS HEREBY GIVEN that the ordinance, listed below by title and containing the vote of the Council, was prepared on May 25, 2011, and final action and adoption of such ordinance took place on June 8, 2011. BILL NO. 6747, ORDINANCE NO. 6186: AN ORDINANCE AMENDING TITLE 18, CHAPTER 18.08 OF THE RENO MUNICIPAL CODE, ENTITLED "ZONING," REZONING <4>9.2 ACRES LOCATED ON THE NORTH SIDE OF DEL MONTE LANE <4>1,800 FEET WEST OF ITS INTERSECTION WITH KIETZKE LANE FROM HDR (HIGH DENSITY RURAL - WASHOE COUNTY) TO PUD; TOGETHER WITH OTHER MATTERS PROPERLY RELATING THERETO. AYES: Zadra, Aiuzzi, Gustin, Sferrazza, Dortch NAYS: None ABSTAIN: None ABSENT: Cashell, Hascheff This ordinance shall be in full force and effect from and after June 10, 2011. Notice is further given that copy of the above ordinance is available for inspection by all interested parties at the office of the City Clerk, City Hall, One East First Street, Second Floor, Reno, Nevada or by accessing our website at reno.gov.  
LYNNETTE R. JONES, CITY CLERK AND CLERK OF THE CITY COUNCIL No. 755215  
June 10, 2011

EXPLANATION: *Matter in italics is new*; Matter in brackets [ ] is material to be omitted.

**BILL NO. 6747**

**ORDINANCE NO. 6186**

**AN ORDINANCE TO AMEND TITLE 18, CHAPTER 18.08 OF THE RENO MUNICIPAL CODE, ENTITLED "ZONING," REZONING ±9.2 ACRES LOCATED ON THE NORTH SIDE OF DEL MONTE LANE ±1,800 FEET WEST OF ITS INTERSECTION WITH KIETZKE LANE FROM HDR (HIGH DENSITY RURAL – WASHOE COUNTY) TO PUD; TOGETHER WITH OTHER MATTERS PROPERLY RELATING THERETO.**

SPONSORED BY: RENO CITY PLANNING COMMISSION

THE CITY COUNCIL OF THE CITY OF RENO DO ORDAIN:

SECTION 1. Chapter 18.08 of the Reno Municipal Code is hereby amended by adding thereto a new section to be known as Section 18.08.102(b).1266 relating to ±9.2 acres located on the north side of Del Monte Lane ±1,800 feet west of its intersection with Kietzke Lane and more particularly described in the attached "Exhibit A" and rezoning said property from HDR (High Density Rural – Washoe County) to PUD, the same to read as follows:

*Sec. 18.08.102(b).1266. The zoning of the City of Reno as heretofore established is hereby amended in the manner shown on the map labeled Case No. LDC11-00027, thereby changing the use of land indicated therein, relating to ±9.2 acres located north of Del Monte Lane ±1,800 feet west of its intersection with Kietzke Lane and more particularly described in the attached "Exhibit A", and rezoning said property from HDR (High Density Rural – Washoe County) to PUD.*

SECTION 2. This Ordinance shall be in effect from and its passage, adoption and publication in one issue of a newspaper printed and published in the City of Reno and after approval of the Project of Regional Significance by the Regional Planning Agency, Certification of the PUD Handbook by City Council and recordation of same.

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

PASSED AND ADOPTED this 8<sup>th</sup> day of June, 2011, by the following vote of the Council:


AYES: Zadra, Aiazzi, Gustin, Sferrazza, Dortch

NAYS: None


ABSTAIN: None ABSENT: Cashell, Hascheff

APPROVED this 8<sup>th</sup> day of June, 2011.



  
ROBERT A. CASHELL, SR.  
MAYOR OF THE CITY OF RENO

ATTEST:

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

EFFECTIVE DATE: June 10, 2011.

# EXHIBIT A

## LEGAL DESCRIPTION

All that certain real property situate within a portion of the South One-Half (S ½) of Section Thirty-Six (36), Township Nineteen (19) North, Range Nineteen (19) East, Mount Diablo Meridian, Washoe County, Nevada, being Assessor's Parcel Number 040-151-01 as depicted on Record of Survey Map No. 2860, recorded on April 5, 1995 as File No. 1883476, in the Official Records of Washoe County, Nevada, and being more particularly described as follows:

**BEGINNING** at the southwest corner of Adjusted APN 40-081-73, as shown on Record of Survey Map No. 3131, recorded on October, 1996 as File No. 2042532, in the Official Records of Washoe County, Nevada;

**THENCE** departing said corner, South 58°38'00" East a distance of 170.29 feet;

**THENCE** North 64°55'55" East a distance of 45.09 feet;

**THENCE** South 58°38'00" East a distance of 213.83 feet;

**THENCE** South 13°24'00" West a distance of 39.50 feet;

**THENCE** South 58°38'00" East a distance of 679.80 feet;

**THENCE** South 77°28'00" East a distance of 171.64 feet;

**THENCE** South 27°28'00" East a distance of 162.04 feet to the northerly right-of-way of Del Monte Lane, also being the beginning of a non-tangent curve;

**THENCE** from a radial line which bears North 01°06'35" West, 268.62 feet along the arc of a 381.97 foot radius curve to the right through a central angle of 40°17'35";

**THENCE** North 50°49'00" West a distance of 23.07 feet to the beginning of a tangent curve;

**THENCE** 296.33 feet along the arc of a 359.30 foot radius curve to the left through a central angle of 47°15'17";

**THENCE** South 81°55'43" West a distance of 42.70 feet to the beginning of a tangent curve;

**THENCE** 303.57 feet along the arc of a 425.00 foot radius curve to the left through a central angle of 40°55'30";

**THENCE** South 41°00'13" West a distance of 163.61 feet;

**THENCE** North 36°29'00" West a distance of 672.97 feet;

**THENCE** North 29°21'00" East a distance of 351.87 feet to the point of beginning;

**CONTAINING** 9.77 acres of land, more or less.

The basis of bearings for this description is identical to that as shown on Record of Survey Map No. 2860, recorded April 5, 1995 as File No. 1883476, in the Official Records of Washoe County, Nevada.

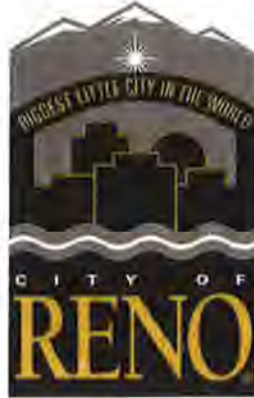
*Note: A field boundary survey was not conducted for the preparation of this legal description. It was compiled using record data only. This legal description is provided as a convenience and is not intended for the purpose of subdividing land not in conformance with Nevada Revised Statutes.*

Prepared by:  
Wood Rodgers, Inc.  
5440 Reno Corporate Dr.  
Reno, NV 89511



Kevin M. Almeter, P.L.S.  
Nevada Certificate No. 19052

Lynnette R. Jones  
City Clerk  
(775) 334-2030  
[jonesl@ci.reno.nv.us](mailto:jonesl@ci.reno.nv.us)



Office of the City Clerk  
Central Cashiering (775) 334-2032  
Parking Tickets (775) 334-2293

Beverly Beaty-Benadom  
Deputy City Clerk  
(775) 334-2030  
[BeatyBenadomB@reno.gov](mailto:BeatyBenadomB@reno.gov)

June 9, 2011

FILED THIS DATE  
6 / 09 / 11  
BY: BBB  
CITY CLERK

Middlefork Limited Partnership dba Rancharrah  
ATTN: John Harrah  
6001 Talbot Lane  
Reno, NV 89509

RE: Case No. LDC11-00027 (Rancharrah Planned Unit Development Amendment) – ***NOTICE OF FINAL ACTION, DECISION OR ORDER***

Dear Applicant:

At a regular meeting held June 8, 2011, the City Council passed and adopted Ordinance No. 6186, approving the above referenced PUD amendment, subject to approval of this Project of Regional Significance by the Regional Planning Agency, Certification of the PUD Handbook by the City Council and recordation of same.

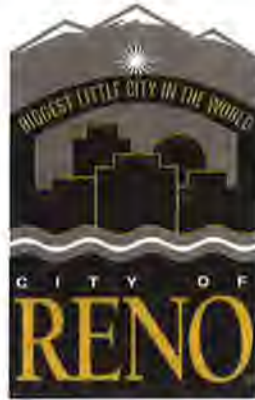
Sincerely,

*Beverly Beaty Benadom*  
Lynnette R. Jones *for*

LRJ:bbb

xc: Community Development  
Traffic Design Engineer  
Terry Zeller, Parks, Recreation & Community Services  
Marchon Miller, Regional Transportation Commission  
Andy Durling, Wood Rodgers, Inc.

Lynnette R. Jones  
City Clerk  
(775) 334-2030  
[jonesl@ci.reno.nv.us](mailto:jonesl@ci.reno.nv.us)



Office of the City Clerk  
Central Cashiering (775) 334-2032  
Parking Tickets (775) 334-2293

Beverly Beaty-Benadom  
Deputy City Clerk  
(775) 334-2030  
[BeatyBenadomB@reno.gov](mailto:BeatyBenadomB@reno.gov)

FILED THIS DATE  
5 / 26 / 11  
BY: BBB  
CITY CLERK

May 26, 2011

Middlefork Limited Partnership dba Rancharrah  
ATTN: John Harrah  
6001 Talbot Lane  
Reno, NV 89509

RE: Case No. LDC11-00027 (Rancharrah Planned Unit Development Amendment)

Dear Applicant:

At a regular meeting held May 25, 2011, and following a public hearing thereon, the City Council upheld the recommendation of the Planning Commission and approved the request for: (1) an amendment to eliminate previously planned residential subdivisions from the PUD (Planned Unit Development) and add retail commercial, office/medical office, special events and equestrian uses; and (2) a zoning map amendment from  $\pm 9.2$  acres of HDR (High Density Rural - Washoe County) to PUD, which will be incorporated into the Rancharrah PUD, by ordinance. This is a project of Regional Significance as it will generate more than 6,750 average daily trips ( $\pm 11,052$  ADT). The  $\pm 117.2$  acre site is located south of the current terminus of Talbot Lane, west of Kietzke Lane and north of Del Monte Lane (6001 Talbot Lane) in the PUD zone.

The approved PUD amendment will become effective upon passage and adoption of the appropriate ordinance, and subject to approval of this project of regional significance by the Regional Planning Agency.

Sincerely,

  
Lynnette R. Jones

LRJ:bbb

xc: Community Development  
Traffic Design Engineer  
Terry Zeller, Parks, Recreation & Community Services  
Marchon Miller, Regional Transportation Commission  
Andy Durling, Wood Rodgers, Inc.



**LEGAL DESCRIPTION FOR  
RANCHARRAH PUD AMENDMENT**

All that certain real property situate within Section Thirty-Six (36), Township Nineteen (19) North, Range Nineteen (19) East, Mount Diablo Meridian, City of Reno, Washoe County, Nevada, and being more particularly described as follows:

**BEGINNING** at the northwest corner of Adjusted APN 040-081-63, as shown on the Record of Survey Showing A Boundary Line Adjustment for "John A. Harrah", recorded as Record of Survey Map No. 3145, on November 18, 1996 as File No. 2048420;

**THENCE** departing said northwestern corner and along the northerly line of said Adjusted parcel, South 89°32'24" East a distance of 428.88 feet;

**THENCE** continuing along said northerly line, South 89°30'47" East a distance of 628.00 feet to the northeasterly corner of said parcel, being on the westerly right-of-way line of Talbot Lane as shown on said Record of Survey Map No. 3145;

**THENCE** along said westerly right-of-way line, South 09°39'38" East a distance of 581.45 feet to the beginning of a non-tangent curve;

**THENCE** continuing along said westerly right-of-way line from a radial line which bears South 80°17'57" West, 18.46 feet along the arc of a 15.00 foot radius to the right through a central angle of 70°31'43" to the beginning of a reverse curve;

**THENCE** 196.76 feet along the arc of a 45.00 foot radius to the left through a central angle of 250°31'44" to the easterly right-of-way line of said Talbot Lane, also being the westerly line of Parcel 6A as shown on Record of Survey to Support a Boundary Line Adjustment for "Middlefork Limited Partnership, A Nevada Limited Partnership", recorded as Record of Survey Map No. 5425, on May 04, 2012, as File No. 4109624;

**THENCE** continuing along said westerly line, North 09°42'04" West a distance of 56.57 feet to the northwesterly corner of said Parcel 6A;

**THENCE** along the northerly line of said parcel, North 82°10'56" East a distance of 575.32 feet to the northeasterly corner of said Parcel 6A;

**THENCE** departing said northeasterly corner and along the easterly line of said parcel, South 00°30'56" West a distance of 10.75 feet to the northwesterly corner of Parcel 1A;

**THENCE** along the northerly line of said Parcel 1A, North 81°57'34" East a distance of 672.36 feet to the northeasterly corner of said Parcel 1A;

**THENCE** along the easterly line of said Parcel 1A, South 07°33'02" East a distance of 591.60 feet to the southeasterly corner of said parcel, also being on the northerly line of Parcel 2A as shown on said Record of Survey Map No. 5425;

**THENCE** along the northerly line of said Parcel 2A the following seven (7) courses and distances:

1. South 89°24'02" East a distance of 519.70 feet;
2. South 84°45'02" East a distance of 11.00 feet;
3. North 43°24'57" East a distance of 94.57 feet;
4. North 45°08'46" East a distance of 46.29 feet;
5. North 48°32'58" East a distance of 55.10 feet;
6. South 85°32'37" East a distance of 46.48 feet;
7. South 89°46'10" East a distance of 17.38 feet to the westerly right-of-way line of Kietzke Lane as shown on said Record of Survey Map No. 5425;

**LEGAL DESCRIPTION FOR  
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**THENCE** along said westerly right-of-way line, South 10°23'05" East a distance of 782.69 feet to the southeasterly corner of said parcel;

**THENCE** departing said westerly right-of-way and along the southerly line of said Parcel 2A, North 89°37'02" West a distance of 581.24 feet to the northeasterly corner of Parcel 5A as shown on said Record of Survey Map No. 5425;

**THENCE** along the easterly line of said Parcel 5A, South 09°00'21" West a distance of 355.87 feet to the southeasterly corner of said Parcel 5A, also being on the northerly line of Parcel 3A as shown on said Record of Survey Map No. 5425;

**THENCE** along the northerly line of said Parcel 3A, South 89°37'12" East a distance of 701.51 feet to the westerly right-of-way line of Kietzke Lane as shown on said Record of Survey Map No. 5425;

**THENCE** along said westerly right-of-way line, South 10°23'05" East a distance of 484.15 feet to the southeasterly corner of said Parcel 3A, also being the beginning of a tangent curve;

**THENCE** continuing along said westerly right-of-way line, 97.43 feet along the arc of a tangent 60.00 foot radius to the right through a central angle of 93°02'23" to the southerly line of said Parcel 4A, also being the northerly right-of-way line of Del Monte Lane; the following six (6) courses, distances and curves:

**THENCE** along said northerly right-of-way line the following six (6) courses, distances and curves:

1. South 82°39'18" West a distance of 77.35 feet to the beginning of a tangent curve;
2. 51.23 feet along the arc of a 1900.00 foot radius curve to the right through a central angle of 01°32'42";
3. South 75°52'03" West a distance of 250.14 feet;
4. South 03°22'15" East a distance of 43.31 feet;
5. South 86°39'28" West a distance of 594.80;
6. South 52°36'58" West a distance of 32.79 feet to the southerly line of Parcel 2 as shown on the Parcel Map for Richard G. & Marlene B. Campbell, recorded as Parcel Map No. 2338, on March 07, 1989, as File No. 1308872;

**THENCE** departing said northerly right-of-way line and along the southerly line of said Parcel 2, South 86°40'58" West a distance of 579.50 feet, being the easterly line of Parcel 1 as shown on said Parcel Map 2338;

**THENCE** along said easterly line, South 05°27'02" East a distance of 120.00 feet;

**THENCE** continuing along said easterly line, South 33°22'58" West a distance of 77.54 feet to the southeasterly most corner of said Parcel 1;

**THENCE** South 26°47'02" East a distance of 128.61 feet to said northerly right-of-way line of Del Monte Lane, also being the beginning of a non-tangent curve;

**THENCE** along said northerly right-of-way line the following six (6) courses, distances and curves also being the beginning of a curve;

1. from a radial line which bears North 00°25'45" West, 269.05 feet along the arc of a non-tangent 382.00 foot radius to the right through a central angle of 40°21'17";
2. North 50°04'28" West a distance of 23.07 feet to the beginning of a curve;
3. 296.62 feet along the arc of a tangent 359.30 foot radius to the left through a central angle of 47°18'02";
4. South 82°37'30" West a distance of 42.70 feet to the beginning of a curve;

**LEGAL DESCRIPTION FOR  
RANCHARRAH PUD AMENDMENT**

5. 303.57 feet along the arc of a tangent 425.00 foot radius curve to the left through a central angle of 40°55'30";
6. South 41°42'00" West a distance of 163.35 feet to the southerly most corner of the parcel described in Document No. 1961602, recorded on January 25, 1996;

**THENCE** departing said northerly right-of-way line and along the southwesterly line of said Document No. 1961602, North 35°48'02" West a distance of 672.58 feet to the northwesterly line of said Document;

**THENCE** along said northwesterly line, North 30°01'58" East a distance of 351.87 feet to the southwesterly line of the Adjusted APN 040-081-73 as shown on the Record of Survey Map Showing A Boundary Line Adjustment for John A. Harrah, recorded as Record of Survey Map No. 3131, recorded on October 25, 1996, as File No. 2042532;

**THENCE** departing said southwesterly corner and along the westerly line of said parcel the following thirteen (13) courses and distances;

1. North 11°36'08" East a distance of 93.50 feet;
2. North 25°51'34" East a distance of 30.42 feet;
3. North 29°57'28" East a distance of 25.91 feet;
4. North 09°38'05" East a distance of 59.30 feet;
5. North 02°04'42" East a distance of 98.86 feet;
6. North 13°40'07" East a distance of 164.82 feet;
7. North 01°18'00" East a distance of 34.65 feet;
8. North 19°27'48" West a distance of 83.08 feet;
9. North 20°13'38" West a distance of 108.00 feet;
10. North 19°00'46" West a distance of 93.13 feet;
11. North 26°34'44" West a distance of 111.26 feet;
12. North 34°10'26" West a distance of 206.09 feet;
13. South 89°16'26" East a distance of 5.97 feet to the southwesterly corner of aforementioned Adjusted APN 040-081-63 as shown on said Record of Survey Map No. 3145;

**THENCE** departing said southwesterly corner and along the westerly line of said Adjusted APN 040-081-63 the following nine (9) courses and distances;

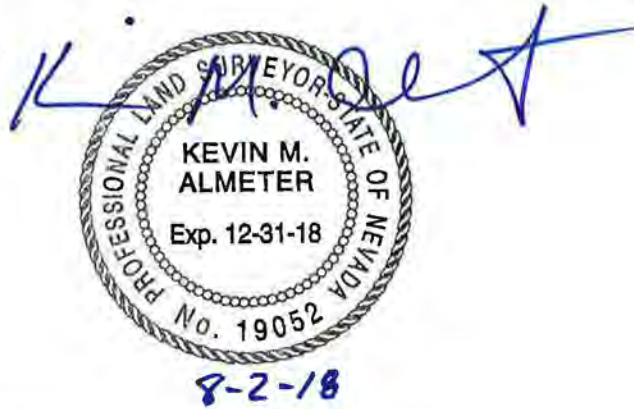
- 1) North 33°40'02" West a distance of 111.55 feet;
- 2) North 26°11'02" West a distance of 196.70 feet;
- 3) North 15°52'02" West a distance of 304.60 feet;
- 4) North 14°17'02" West a distance of 22.50 feet;
- 5) North 45°55'02" West a distance of 79.50 feet;
- 6) North 25°17'02" West a distance of 330.00 feet;
- 7) North 64°50'02" West a distance of 65.33 feet;
- 8) South 89°41'02" East a distance of 9.54 feet;
- 9) North 26°02'02" West a distance of 313.16 feet to the **POINT OF BEGINNING**;

**LEGAL DESCRIPTION FOR  
RANCHARRAH PUD AMENDMENT**

Containing 140.80 acres of land, more or less.

The Basis of Bearings for this legal description is identical to that as shown on said Record of Survey Map No. 5425.

Prepared by:  
Wood Rodgers, Inc.  
1361 Corporate Blvd.  
Reno, NV 89502



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Kevin M. Almeter, P.L.S.  
Nevada Certificate No. 19052





Traffic Engineering, Transportation Planning, & Forensic Services

April 16, 2018

Janelle Thomas, PE  
Community Development – Engineering Manager  
City of Reno  
1 East First Street  
Reno, NV 89501

### **Trip Generation / Traffic Study Update for Rancharra PUD Handbook Amendment (2018)**

Dear Ms. Thomas,

This letter serves as a trip generation/traffic study update for the Rancharra PUD Handbook amendment (2018). The revised handbook includes a slightly different specific land use and quantity mix compared to what was evaluated in the previously approved "*Traffic Impact Study for Rancharra Planned Unit Development (Second Amendment)*" dated March 13, 2015. This letter summarizes a trip generation analysis prepared for the new land use mix and demonstrates that the proposal would create fewer trips than evaluated in the traffic impact study. Therefore, the project's traffic impacts would not be expected to exceed what was contemplated and mitigated in the March 13, 2015 traffic study recommendations.

#### ***Land Use Revisions***

The Rancharra PUD amendment proposal includes the following land use mix and quantities:

- 162 Single Family residential units
- 250 Cottage residential units (ownership townhomes)
- 310 Multi-Family residential units (ownership condominiums)
- 17,000 sqft Event and Equestrian Center
- 331 beds of Assisted Living/Congregate Care
- 82,700 sqft of Office space
- 18,000 sqft of Quality Restaurant
- 12,000 sqft of High Turn-over Sit Down Restaurant (casual)
- 8,000 sqft Bank
- 26,600 sqft of Retail space

Overall, the land use mix is similar to the prior PUD Handbook from a trip generation perspective and consistent with the intended development flexibility that was outlined in the original traffic study.

**Trip Generation**

Trip generation rates for the project were obtained using the Trip Generation Manual, 9th Edition, published by the Institute of Transportation Engineers. The analytical methodologies utilized in the original traffic study were also used in the following calculations for overall consistency. **Table 1** provides the Daily, AM peak hour, and PM peak hour trip generation calculations compared to the trip generation estimates from the approved traffic impact study and PUD Handbook.

**Table 1. Trip Generation Estimates**

Time Period	Total Trips			Internal Trips			Pass-By Trips			Net New Trips		
	Total	In	Out	Total	In	Out	Total	In	Out	Total	In	Out
<b>Traffic Impact Study Trip Generation</b>												
Daily	13,077	6,539	6,538	1,358	679	679	0	0	0	11,719	5,860	5,859
AM Peak Hour	939	495	444	83	41	42	0	0	0	856	454	402
PM Peak Hour	1,301	590	711	138	70	68	107	48	59	1,055	471	584
<b>Updated Handbook Land Use Mix</b>												
Daily	12,123	6,065	6,058	1,522	761	761	0	0	0	10,601	5,304	5,297
AM Peak Hour	818	365	453	117	59	58	0	0	0	701	306	395
PM Peak Hour	1,221	669	552	243	121	122	201	109	92	777	439	338
<b>Proposed Trips Compared to Traffic Study</b>												
Daily	-954									-1,118		
AM Peak Hour	-121									-155		
PM Peak Hour	-80									-278		

As shown in **Table 1**, applying the ITE Trip Generation Manual trip rates, the proposed land use/quantity amendments are anticipated to generate fewer trips during the Daily, AM peak hour, and PM peak hour periods than were evaluated in the Traffic Impact Study (March 13, 2015). The new land use mix has a greater degree of internalization (trips between the internal project elements) having a more diverse mix of housing and commercial uses. Updated trip generation calculations are provided in **Attachment A**.

The proposed land use mix and quantities are anticipated to be equal to or less intense than what was evaluated in the approved PUD traffic study, therefore, the traffic impacts would also be equal to or less than previously stated and the mitigations outlined in the master traffic report are still valid and sufficient.

The trip generation thresholds stated in the prior handbook and traffic study (13,077 Daily, 939 AM, and 1,301 PM total project trips) should be carried forward to the new PUD handbook language. Any similar land use mix generating traffic volumes below these values would continue to be in compliance with the Traffic Impact Study (March 13, 2015).

No significant changes in external access points or internal roadway connections are proposed that would alter the prior traffic analysis or conclusions. We are not aware of any significant external factors (roadway network changes, new intersection controls, other projects, etc.) that would alter the prior traffic impact study and therefore believe it to be valid for the proposed amendment.

Please do not hesitate to contact us at (775) 322-4300 with any questions.

Sincerely,  
TRAFFIC WORKS, LLC



Loren E. Chilson, PE  
Principal

Attachments:

A - Updated Trip Generation Calculations

Rancharrah - Updated Land Uses/Quantities - April 16, 2018  
 Land Use Assumptions for Trip Generation

Parcel	Land Use Details			Closest Match to ITE Land Use Data			Daily		AM Peak			PM Peak		
	Units of Development	Variable	Code	Land Use	Independent Variable	Rate	In	Out	Rate	In	Out	Rate	In	Out
<b>Village I,II,III</b>														
Village I	Single Family Housing	74 Dwelling Units	74.0	210 Single-Family Detached Housing	Dwelling Units	9.57	50%	50%	0.75	25%	75%	1.01	60%	40%
Village II	Single Family Housing	8 Dwelling Units	8.0	210 Single-Family Detached Housing	Dwelling Units	9.57	50%	50%	0.75	25%	75%	1.01	60%	40%
Village III	Single Family Housing	31 Dwelling Units	31.0	210 Single-Family Detached Housing	Dwelling Units	9.57	50%	50%	0.75	25%	75%	1.01	60%	40%
<b>Estates, Equestrian Center, and Village IV</b>														
Equestrian Center	Equestrian Center*	29 Members	29.0	Special Trip Generation Rate*		1.00	50%	50%	0.12	50%	50%	0.12	50%	50%
Estates Residential	Estate, EC Res. Equestrian	29 Dwelling Units	29.0	210 Single-Family Detached Housing	Dwelling Units	9.57	50%	50%	0.75	25%	75%	1.01	60%	40%
Village IV	Cottages	50 Dwelling Units	50.0	230 Residential Condominium/Townhouse	Dwelling Units	5.81	50%	50%	0.44	17%	83%	0.52	67%	33%
REDUCTION	Single Family Housing	4 Dwelling Units	-4.0	210 Single-Family Detached Housing	Dwelling Units	9.57	50%	50%	0.75	25%	75%	1.01	60%	40%
REDUCTION	Limited Commercial/Office	8,300 Square Feet	-8.3	710 General Office	KSF	11.01	50%	50%	1.55	88%	12%	1.49	17%	83%
<b>Village V, VI, VII</b>														
Village V	Single Family Housing	20 Dwelling Units	20.0	210 Single-Family Detached Housing	Dwelling Units	9.57	50%	50%	0.75	25%	75%	1.01	60%	40%
Village VI	Cottages	200 Dwelling Units	200.0	230 Residential Condominium/Townhouse	Dwelling Units	5.81	50%	50%	0.44	17%	83%	0.52	67%	33%
Village VII	Townhomes/Condominiums	310 Dwelling Units	310.0	230 Residential Condominium/Townhouse	Dwelling Units	5.81	50%	50%	0.44	17%	83%	0.52	67%	33%
<b>Events Center</b>														
Event Center	Event Center	17,000 Square Feet	17.0	560 Church	KSF	9.11	50%	50%	0.56	62%	38%	0.55	48%	52%
		0	0			0.00	50%	50%	0.00	55%	45%	0.00	45%	55%
<b>South Commercial Area</b>														
	Retail	26,600 Square Feet	26.60	820 Shopping Center	KSF	42.94	50%	50%	1.00	61%	39%	3.73	49%	51%
	Bank	8,000 Square Feet	8.00	912 Drive-In Bank	KSF	148.15	50%	50%	12.35	56%	44%	25.82	50%	50%
	Office	45,200 Square Feet	45.20	710 General Office	KSF	11.01	50%	50%	1.55	88%	12%	1.49	17%	83%
	Restaurant	12,000 Square Feet	12.0	932 High-Turnover (Sit-Down) Restaurant	KSF	127.15	50%	50%	11.52	52%	48%	11.15	59%	41%
	High-End Restaurant	18,000 Square Feet	18.0	931 Quality Restaurant	KSF	89.95	50%	50%	0.81	60%	40%	7.49	67%	33%
<b>North Commercial Area</b>														
	Office	29,000 Square Feet	29.00	710 General Office	KSF	11.01	50%	50%	1.55	88%	12%	1.49	17%	83%
	Office	8,500 Square Feet	8.50	710 General Office	KSF	11.01	50%	50%	1.55	88%	12%	1.49	17%	83%
	Assisted Living	331 Beds	331.00	254 Assisted Living	Beds	2.66	50%	50%	0.14	65%	35%	0.22	44%	56%

\* No. of Members at Equestrian Center = No. of DU in Estates Residential

\*Special Trip Generation Rate: Each member is anticipated to visit once every other day. Trips spread evenly over 8 hours. Therefore: 1 member visit\*1/2 of days\*2 trips per visit = 1 trip/member/day. 1 trip per day/8 hour period = 0.12 trips in the peak hour.

\*\*Charles Schwab Office, 8,500 sqft financial consulting, not customer banking.

Rancharrah Trip Generation - UPDATED April 16, 2018

Daily	Total Trips			Internal Trips			Pass-By Trips			Net New Trips		
	Total	In	Out	Total	In	Out	Total	In	Out	Total	In	Out
Residential	4,860	2,432	2,428	482	241	241	0	0	0	4,378	2,191	2,187
South Commercial	5,970	2,986	2,984	958	479	479	0	0	0	5,012	2,507	2,505
North Commercial	1,293	647	646	82	41	41	0	0	0	1,211	606	605
TOTAL	12,123	6,065	6,058	1,522	761	761	0	0	0	10,601	5,304	5,297

AM Peak Hour	Total Trips			Internal Trips			Pass-By Trips			Net New Trips		
	Total	In	Out	Total	In	Out	Total	In	Out	Total	In	Out
Residential	365	70	295	23	3	20	0	0	0	342	67	275
South Commercial	349	214	135	78	46	32	0	0	0	271	168	103
North Commercial	104	81	23	16	10	6	0	0	0	88	71	17
TOTAL	818	365	453	117	59	58	0	0	0	701	306	395

PM Peak Hour	Total Trips			Internal Trips			Pass-By Trips			Net New Trips		
	Total	In	Out	Total	In	Out	Total	In	Out	Total	In	Out
Residential	450	295	155	71	33	38	0	0	0	379	262	117
South Commercial	642	333	309	163	83	80	192	109	83	287	141	146
North Commercial	129	41	88	9	5	4	9	0	9	111	36	75
TOTAL	1,221	669	552	243	121	122	201	109	92	777	439	338

Weekday Average Daily Trip Generation Calculations

Land Use	Variable	ITE LU Code	Trip Rate	Trip Equation	Total Trips			Internal Trips				External Trips			Pass-By			Diverted Link			Net New						
					% In	% Out	Total	In	Out	In%	Out%	In	Out	Total	In	Out	% of Ext.	Total	In	Out	% of Ext.	Total	In	Out			
<b>Village I, II, III</b>																											
Village I	74.00 DU	210	9.57		50%	50%	708	354	354	10%	10%	35	35	638	319	319	0%	0	0	0	0%	0	0	0	638	319	319
Village II	8.00 DU	210	9.57		50%	50%	77	39	38	10%	10%	4	4	69	35	34	0%	0	0	0	0%	0	0	0	69	35	34
Village III	31.00 DU	210	9.57		50%	50%	297	148	149	10%	10%	15	15	267	133	134	0%	0	0	0	0%	0	0	0	267	133	134
<b>Sub-Total</b>							1082	541	541			54	54	974	487	487	0%	0	0	0	0%	0	0	0	974	487	487
<b>Estates, Equestrian Center, and Village IV</b>																											
Equestrian Center	29.00 Member		1.00		50%	50%	29	15	14			0	0	29	15	14	0%	0	0	0	0%	0	0	0	29	15	14
Estates Residential	29.00 DU	210	9.57		50%	50%	278	139	139	10%	10%	14	14	250	125	125	0%	0	0	0	0%	0	0	0	250	125	125
Village IV	50.00 DU	230	5.81		50%	50%	291	146	145	10%	10%	15	15	261	131	130	0%	0	0	0	0%	0	0	0	261	131	130
<i>REDUCTION FOR EXISTING FACILITIES:</i>																											
Single Family Housing	-4.00 DU	210	9.57		50%	50%	-38	-19	-19					-38	-19	-19	0%	0	0	0	0%	0	0	0	-38	-19	-19
Limited Commercial/Office	-8.30 KSF		11.01		50%	50%	-91	-46	-45					-91	-46	-45	0%	0	0	0	0%	0	0	0	-91	-46	-45
<b>Sub-Total</b>							469	235	234			29	29	411	206	205	0%	0	0	0	0%	0	0	0	411	206	205
<b>Village V, VI, VII</b>																											
Village V	20.00 DU	210	9.57		50%	50%	191	96	95	10%	10%	10	10	171	86	85	0%	0	0	0	0%	0	0	0	171	86	85
Village VI	200.00 DU	230	5.81		50%	50%	1162	581	581	10%	10%	58	58	1046	523	523	0%	0	0	0	0%	0	0	0	1046	523	523
Village VII	310.00 DU	230	5.81		50%	50%	1801	901	900	10%	10%	90	90	1621	811	810	0%	0	0	0	0%	0	0	0	1621	811	810
<b>Sub-Total</b>	0.00 x	0	0.00		50%	50%	3154	1578	1576			158	158	2838	1420	1418	0%	0	0	0	0%	0	0	0	2838	1420	1418
<b>Events Center</b>																											
Event Center	17.00 KSF	560	9.11		50%	50%	155	78	77					155	78	77	0%	0	0	0	0%	0	0	0	155	78	77
<b>Sub-Total</b>	0.00 x	0	0.00		50%	50%	155	78	77			0	0	155	78	77	0%	0	0	0	0%	0	0	0	155	78	77
<b>South Commercial Area</b>																											
Retail	26.60 KSF	820	42.94		50%	50%	1142	571	571	20%	20%	114	114	914	457	457	0%	0	0	0	0%	0	0	0	914	457	457
Bank	8.00 KSF	912	148.15		50%	50%	1185	593	592			0	0	1185	593	592	0%	0	0	0	0%	0	0	0	1185	593	592
Office	45.20 KSF	710	11.01		50%	50%	498	249	249	20%	20%	50	50	398	199	199	0%	0	0	0	0%	0	0	0	398	199	199
Restaurant	12.00 KSF	932	127.15		50%	50%	1526	763	763	20%	20%	153	153	1220	610	610	0%	0	0	0	0%	0	0	0	1220	610	610
High-End Restaurant	18.00 KSF	931	89.95		50%	50%	1619	810	809	20%	20%	162	162	1295	648	647	0%	0	0	0	0%	0	0	0	1295	648	647
<b>Sub-Total</b>							5970	2986	2984			479	479	5012	2507	2505	0%	0	0	0	0%	0	0	0	5012	2507	2505
<b>North Commercial Area</b>																											
Office	29.00 KSF	710	11.01		50%	50%	319	160	159	20%	20%	32	32	255	128	127	0%	0	0	0	0%	0	0	0	255	128	127
Office	8.50 KSF	710	11.01		50%	50%	94	47	47	20%	20%	9	9	76	38	38	0%	0	0	0	0%	0	0	0	76	38	38
Assisted Living	331.00 Beds	254	2.68		50%	50%	880	440	440			0	0	880	440	440	0%	0	0	0	0%	0	0	0	880	440	440
<b>Sub-Total</b>							1293	647	646			41	41	1211	606	605	0%	0	0	0	0%	0	0	0	1211	606	605
<b>TOTAL</b>							12,123	6,055	6,058			761	761	10,601	5,304	5,297		0	0	0		0	0	0	10,601	5,304	5,297
<b>Residential TOTAL</b>							4,860	2,432	2,428			241	241	4,378	2,191	2,187		0	0	0		0	0	0	4,378	2,191	2,187
<b>South Commercial</b>							5,970	2,986	2,984			479	479	5,012	2,507	2,505		0	0	0		0	0	0	5,012	2,507	2,505
<b>North Commercial</b>							1,293	647	646			41	41	1,211	606	605		0	0	0		0	0	0	1,211	606	605

Weekday AM Peak Hour Trip Generation Calculations

Land Use	Variable	ITE LU Code	Trip Rate	Trip Equation	Total Trips			Internal Trips				External Trips			Pass-By			Diverted Link			Net New						
					% In	% Out	Total	In	Out	In%	Out%	In	Out	Total	In	Out	% of Ext.	Total	In	Out	% of Ext.	Total	In	Out			
<b>Village I, II, III</b>																											
Village I	74.00 DU	210	0.75		25%	75%	56	14	42	6%	7%	1	3	52	13	39	0%	0	0	0	0%	0	0	0	52	13	39
Village II	8.00 DU	210	0.75		25%	75%	6	2	4	6%	7%	0	0	6	2	4	0%	0	0	0	0%	0	0	0	6	2	4
Village III	31.00 DU	210	0.75		25%	75%	23	6	17	6%	7%	0	1	22	6	16	0%	0	0	0	0%	0	0	0	22	6	16
<b>Sub-Total</b>							85	22	63			1	4	80	21	59	0%	0	0	0	0%	0	0	0	80	21	59
<b>Estates, Equestrian Center, and Village IV</b>																											
Equestrian Center	29.00 Member		0.12		50%	50%	3	2	1			0	0	3	2	1	0%	0	0	0	0%	0	0	0	3	2	1
Estates Residential	29.00 DU	210	0.75		25%	75%	22	6	16	6%	7%	0	1	21	6	15	0%	0	0	0	0%	0	0	0	21	6	15
Village IV	50.00 DU	230	0.44		17%	83%	22	4	18	6%	7%	0	1	21	4	17	0%	0	0	0	0%	0	0	0	21	4	17
<i>REDUCTION FOR EXISTING FACILITIES:</i>																											
Single Family Housing	-4.00 DU	210	0.75		25%	75%	-3	-1	-2					-3	-1	-2	0%	0	0	0	0%	0	0	0	-3	-1	-2
Limited Commercial/Office	-6.30 KSF		1.55		88%	12%	-13	-11	-2					-13	-11	-2	0%	0	0	0	0%	0	0	0	-13	-11	-2
<b>Sub-Total</b>							31	0	31			0	2	29	0	29	0%	0	0	0	0%	0	0	0	29	0	29
<b>Village V, VI, VII</b>																											
Village V	20.00 DU	210	0.75		25%	75%	15	4	11	6%	7%	0	1	14	4	10	0%	0	0	0	0%	0	0	0	14	4	10
Village VI	200.00 DU	230	0.44		17%	83%	88	15	73	6%	7%	1	5	82	14	68	0%	0	0	0	0%	0	0	0	82	14	68
Village VII	310.00 DU	230	0.44		17%	83%	136	23	113	6%	7%	1	8	127	22	105	0%	0	0	0	0%	0	0	0	127	22	105
<b>Sub-Total</b>	0.00 *	0	0.00		17%	83%	0	0	0			0	0	0	0	0	0%	0	0	0	0%	0	0	0	0	0	0
<b>Events Center</b>																											
Event Center	17.00 KSF	560	0.56		62%	38%	10	6	4	0%	0%	0	0	10	6	4	0%	0	0	0	0%	0	0	0	10	6	4
<b>Sub-Total</b>	0.00 x	0	0.00		55%	45%	0	0	0	0%	0%	0	0	0	0	0	0%	0	0	0	0%	0	0	0	0	0	0
<b>South Commercial Area</b>																											
Retail	26.60 KSF	620	1.00		61%	39%	27	16	11	50%	45%	8	5	14	8	6	0%	0	0	0	0%	0	0	0	14	8	6
Bank	8.00 KSF	912	12.35		56%	44%	99	55	44			0	0	99	55	44	0%	0	0	0	0%	0	0	0	99	55	44
Office	45.20 KSF	710	1.55		88%	12%	70	62	8	19%	87%	12	7	51	50	1	0%	0	0	0	0%	0	0	0	51	50	1
Restaurant	12.00 KSF	932	11.52		52%	48%	138	72	66	32%	28%	23	18	97	49	48	0%	0	0	0	0%	0	0	0	97	49	48
High-End Restaurant	18.00 KSF	931	0.81		60%	40%	15	9	6	32%	28%	3	2	10	6	4	0%	0	0	0	0%	0	0	0	10	6	4
<b>Sub-Total</b>							349	214	135			46	32	271	168	103	0%	0	0	0	0%	0	0	0	271	168	103
<b>North Commercial Area</b>																											
Office	29.00 KSF	710	1.55		88%	12%	45	40	5	19%	87%	8	4	33	32	1	0%	0	0	0	0%	0	0	0	33	32	1
Office	8.50 KSF	710	1.55		88%	12%	13	11	2	19%	87%	2	2	9	9	0	0%	0	0	0	0%	0	0	0	9	9	0
Assisted Living	331.00 Beds	254	0.14		65%	35%	46	30	16			0	0	46	30	16	0%	0	0	0	0%	0	0	0	46	30	16
<b>Sub-Total</b>							104	81	23			10	6	88	71	17	0%	0	0	0	0%	0	0	0	88	71	17
<b>TOTAL</b>																											
<b>Residential TOTAL</b>							818	365	453			59	58	701	306	395		0	0	0					701	306	395
<b>South Commercial</b>							349	214	135			46	32	271	168	103		0	0	0					271	168	103
<b>North Commercial</b>							104	81	23			10	6	88	71	17		0	0	0					88	71	17

Weekday PM Peak Hour Trip Generation Calculations

Land Use	Variable	ITE LU Code	Trip Rate	Trip Equation	Total Trips			Internal Trips				External Trips			Pass-By			Diverted Link			Net New						
					% In	% Out	Total	In	Out	In%	Out%	In	Out	Total	In	Out	% of Ext.	Total	In	Out	% of Ext.	Total	In	Out			
<b>Village I, II, III</b>																											
Village I	74.00 DU	210	1.01		60%	40%	75	45	30	11%	23%	5	7	63	40	23	0%	0	0	0	0%	0	0	0	63	40	23
Village II	8.00 DU	210	1.01		60%	40%	8	5	3	11%	23%	1	1	6	4	2	0%	0	0	0	0%	0	0	0	6	4	2
Village III	31.00 DU	210	1.01		60%	40%	31	19	12	11%	23%	2	3	26	17	9	0%	0	0	0	0%	0	0	0	26	17	9
<b>Sub-Total</b>							114	69	45			8	11	95	61	34		0	0	0	0%	0	0	0	95	61	34
<b>Estates, Equestrian Center, and Village IV</b>																											
Equestrian Center	29.00 Member		0.12		50%	50%	3	2	1			0	0	3	2	1	0%	0	0	0	0%	0	0	0	3	2	1
Estates Residential	29.00 DU	210	1.01		60%	40%	29	17	12	11%	23%	2	3	24	15	9	0%	0	0	0	0%	0	0	0	24	15	9
Village IV	50.00 DU	230	0.52		67%	33%	26	17	9	11%	23%	2	2	22	15	7	0%	0	0	0	0%	0	0	0	22	15	7
<i>REDUCTION FOR EXISTING FACILITIES:</i>																											
Single Family Housing	-4.00 DU	210	1.01		60%	40%	-4	-2	-2					-4	-2	-2	0%	0	0	0	0%	0	0	0	-4	-2	-2
Limited Commercial/Office	-8.30 KSF		1.49		17%	83%	-12	-2	-10					-12	-2	-10	0%	0	0	0	0%	0	0	0	-12	-2	-10
<b>Sub-Total</b>							42	32	10			4	5	33	28	5		0	0	0	0%	0	0	0	33	28	5
<b>Village V, VI, VII</b>																											
Village V	20.00 DU	210	1.01		60%	40%	20	12	8	11%	23%	1	2	17	11	6	0%	0	0	0	0%	0	0	0	17	11	6
Village VI	200.00 DU	230	0.52		67%	33%	104	70	34	11%	23%	8	8	88	62	26	0%	0	0	0	0%	0	0	0	88	62	26
Village VII	310.00 DU	230	0.52		67%	33%	161	108	53	11%	23%	12	12	137	96	41	0%	0	0	0	0%	0	0	0	137	96	41
<b>Sub-Total</b>	0.00 x	0	0.00		67%	33%	0	0	0			0	0	0	0	0	0%	0	0	0	0%	0	0	0	0	0	0
<b>Sub-Total</b>							285	190	95			21	22	242	169	73		0	0	0	0%	0	0	0	242	169	73
<b>Events Center</b>																											
Event Center	17.00 KSF	560	0.55		48%	52%	9	4	5	0%	0%	0	0	9	4	5	0%	0	0	0	0%	0	0	0	9	4	5
<b>Sub-Total</b>	0.00 x	0	0.00		45%	55%	0	0	0	0%	0%	0	0	0	0	0	0%	0	0	0	0%	0	0	0	0	0	0
<b>Sub-Total</b>							9	4	5			0	0	9	4	5		0	0	0	0%	0	0	0	9	4	5
<b>South Commercial Area</b>																											
Retail	26.60 KSF	820	3.73		49%	51%	99	49	50	69%	58%	34	29	36	15	21	34%	12	5	7	0%	0	0	0	24	10	14
Bank	8.00 KSF	912	25.82		50%	50%	207	104	103			0	0	207	104	103	47%	97	49	48	0%	0	0	0	110	55	55
Office	45.20 KSF	710	1.49		17%	83%	67	11	56	50%	9%	6	5	56	5	51	10%	6	1	5	0%	0	0	0	50	4	46
Restaurant	12.00 KSF	932	11.15		59%	41%	134	79	55	25%	46%	20	25	89	59	30	43%	38	25	13	0%	0	0	0	51	34	17
High-End Restaurant	18.00 KSF	931	7.49		67%	33%	135	90	45	25%	46%	23	21	91	67	24	43%	39	29	10	0%	0	0	0	52	38	14
<b>Sub-Total</b>							642	333	309			83	80	479	250	229		192	109	83	0%	0	0	0	287	141	146
<b>North Commercial Area</b>																											
Office	29.00 KSF	710	1.49		17%	83%	43	7	36	50%	9%	4	3	36	3	33	10%	4	0	-4	0%	0	0	0	32	3	29
Office	8.50 KSF	710	1.49		17%	83%	13	2	11	50%	9%	1	1	11	1	10	47%	5	0	5	0%	0	0	0	6	1	5
Assisted Living	331.00 Beds	254	0.22		44%	56%	73	32	41			0	0	73	32	41	0%	0	0	0	0%	0	0	0	73	32	41
<b>Sub-Total</b>							129	41	88			5	4	120	36	84		9	0	9	0%	0	0	0	111	36	75
<b>TOTAL</b>							1,221	669	552			121	122	978	548	430		201	109	92		0	0	0	777	439	338
<b>Residential TOTAL</b>							450	295	155			33	38	379	262	117		0	0	0		0	0	0	379	262	117
<b>South Commercial</b>							642	333	309			83	80	479	250	229		192	109	83		0	0	0	287	141	146
<b>North Commercial</b>							129	41	88			5	4	120	36	84		9	0	9		0	0	0	111	36	75

**TRAFFIC IMPACT STUDY**  
**FOR**  
**RANCHARRAH**  
**PLANNED UNIT DEVELOPMENT**  
**(SECOND AMENDMENT)**

March 13, 2015

PREPARED FOR:  
RENO LAND DEVELOPMENT COMPANY

PREPARED BY:



## **YOUR QUESTIONS ANSWERED QUICKLY**

### **Why did you perform this study?**

This Traffic Impact Study evaluates the potential traffic impacts associated with modifying the current Ranchharrah Planned Unit Development (PUD), approved in early 2011, to include a different land use mix, increased land use density, and a slightly revised access and circulation plan.

### **What does the project consist of?**

The existing PUD includes: a 75.83 acre special events complex, an 8.4 acre office/medical site (north edge parcel), a 12.0 acre retail/commercial site, and an 11.3 acre office/medical site. Each development site has individual access points to the adjacent roadway network.

The proposed PUD consists of: 691 residential units varying in type, a small Equestrian Center, a 14.2 acre Event Center, a 12.3 acre Retail-Commercial site, and an 11.8 acre Office-Medical-Retail site. Similar to the prior plan, each site has individual access points to the adjacent roadway network.

### **How much traffic will the project generate?**

Proposed land uses within the Ranchharrah PUD are anticipated to generate approximately 13,077 daily trips, 939 AM peak hour trips, and 1,301 PM peak hour trips.

### **Are there any traffic impacts?**

Yes, there several minor impacts, all of which can be easily mitigated. They are:

1. The project will notably increase the westbound left-turn volume and queue length at the Talbot Lane/McCarran Blvd intersection, requiring a longer left-turn storage pocket on McCarran Boulevard.
2. The project will significantly increase the volume and queue length for the northbound left-turn movement at the Talbot Lane/McCarran Blvd intersection, requiring minor striping revisions that will enable additional left-turn storage area on Talbot Lane.
3. The Retail-Commercial site approach to Kietzke Lane will not function well with only STOP control (LOS "F" is expected on the project approach). However, it should be noted that the poor level of service noted above is within the project site and will not affect Kietzke Lane. The Kietzke Lane approaches will continue to operate at acceptable level of service conditions.

**Are any traffic related improvements proposed?**

Impacts at the Talbot Lane/McCarran Blvd intersection will be mitigated by 1) lengthening the westbound left-turn pocket to provide 200 feet of striped storage space and 2) striping of additional red curb on the northbound approach (red curb will be installed from 260 feet to 510 feet, measured from the STOP bar).

Increases in traffic and the associated minor affects throughout the roadway network will be mitigated by the applicant's payment of Regional Road Impact Fees.

At the point in time in which a developer of the Retail-Commercial site desires to obtain building permits, a traffic study will be prepared for the Retail-Commercial site that addresses the access to Kietzke Lane and any needs for new intersection control on Kietzke Lane. Three intersection scenarios are foreseeable at this time, but they will have to be revisited in the future. They are: 1) STOP sign control on the project approach, which will not adversely affect Kietzke Lane, but will provide poor levels of service within the project, 2) a roundabout on Kietzke Lane, OR 3) a traffic signal on Kietzke Lane. It should be noted that a signal is less likely since the location does not meet typical signal spacing requirements. The installation of a traffic signal will also be subject to meeting MUTCD traffic signal warrants.

#### **LIST OF FIGURES**

1. Study Area
2. Land Use Plan
3. Existing Traffic Volumes
4. Project Trips
5. Existing Plus Project Traffic Volumes
6. Proposed Office-Medical-Retail Access Configuration

#### **LIST OF APPENDICES**

- A. Existing Conditions LOS Calculations
- B. Trip Generation Calculations
- C. Existing Plus Project LOS Calculations

## INTRODUCTION

This report presents the findings of a Traffic Impact Study completed to assess the potential traffic impacts on local intersections associated with the revision (second amendment) of the Ranchharrah Planned Unit Development. This traffic impact study has been prepared to document existing traffic conditions, quantify traffic volumes generated by the proposed project, identify potential impacts, document findings, and make recommendations to mitigate impacts, if any are found.

The proposed project will modify the current Ranchharrah PUD (approved in 2011) to include a different land use mix/quantity and slightly different access points. The original PUD for the site included: 4 existing single family residences, an existing 16 acre private equestrian facility, an existing 1.9 acre limited commercial/office site with buildings, and 155 single family residential units that were never constructed. Since the single family homes were not constructed and Regional Road Impact Fees were not paid for those units, no credit has been taken for them in this study. Similarly, no elements of the current PUD have been built, no Regional Road Impact Fees have been paid, and no traffic improvements specific to the project have been constructed. No trip generation or impact fee credits have been taken for the current PUD.

In short, the land uses, quantities, and access plan composing the proposed amendment do not significantly differ from the current PUD. The proposed project generates approximately 18% more daily trips, 30% more PM peak hour trips, and significantly more AM peak hour trips (but the AM trips are still a much smaller number than PM peak hour trips). Since the project is anticipated to generate more traffic than was previously evaluated, a new traffic analysis is presented here to address any additional impacts that could occur with the PUD amendment.

### *Study Area and Evaluated Scenarios*

The project is located west of Kietzke Lane and south of McCarran Boulevard in southwest Reno, NV. The study intersections were identified based on the prior Ranchharrah Traffic Impact Study and are shown in **Figure 1**. The following locations address the primary routes providing local access to the proposed project:

- McCarran Boulevard/Lakeside Drive
- McCarran Boulevard/Talbot Lane
- McCarran Boulevard/Kietzke Lane
- Kietzke Lane/Sierra Rose Drive/Meadowood Mall Way
- Kietzke Lane/Retail-Commercial Access/Nevdex middle driveway
- Kietzke Lane/Office-Medical-Retail/Nevdex south driveway

This study includes analysis of the both the weekday AM and PM peak hours as these are the periods of time in which peak traffic is anticipated to occur. While the proposed project includes a special events center which will host primarily weekend activities, traffic generated by those events combined with

weekend background traffic is expected to be considerably less than weekday plus project traffic volumes. The evaluated development scenarios are:

- Existing Conditions (no project)
- Existing Plus Project Conditions

**Analysis Methodology**

Level of service (LOS) is a term commonly used by transportation practitioners to measure and describe the operational characteristics of intersections, roadway segments, and other facilities. This term equates seconds of delay per vehicle at intersections to letter grades “A” through “F” with “A” representing optimum conditions and “F” representing breakdown or over capacity flows.

The complete methodology is established in the Highway Capacity Manual (HCM), 2010, published by the Transportation Research Board. **Table 1** presents the delay thresholds for each level of service grade at un-signalized and signalized intersections.

**Table 1: Level of Service Definition for Intersections**

Level of Service	Brief Description	Un-signalized Intersections (average delay/vehicle in seconds)	Signalized Intersections (average delay/vehicle in seconds)
A	Free flow conditions.	< 10	< 10
B	Stable conditions with some affect from other vehicles.	10 to 15	10 to 20
C	Stable conditions with significant affect from other vehicles.	15 to 25	20 to 35
D	High density traffic conditions still with stable flow.	25 to 35	35 to 55
E	At or near capacity flows.	35 to 50	55 to 80
F	Over capacity conditions.	> 50	> 80

**Source:** Highway Capacity Manual (2010), Chapters 16 and 17

Level of service calculations were performed for the study intersections using the Synchro 8 software package with analysis and results reported in accordance with the current HCM 2010 methodology.

Level of Service Policy

The 2035 Regional Transportation Plan (2035 RTP) establishes level of service criteria for regional roadway facilities in Washoe County, the City of Reno, and City of Sparks. The current Level of Service policy is:

- “All regional roadway facilities projected to carry less than 27,000 ADT at the latest RTP horizon – LOS D or better.”

- “All regional roadway facilities projected to carry 27,000 ADT or more at the latest RTP horizon – LOS E or better.”
- “All intersections shall be designed to provide a level of service consistent with maintaining the policy level of service of the intersecting roadways”.

Applying these standards to the study roadways, the level of service criteria specific for this project are:

- Intersections on McCarran Boulevard – LOS E
- Intersections on Kietzke Lane – LOS D
- Intersections on Sierra Rose Drive – LOS D
- Intersections on Talbot Lane – LOS D

## EXISTING TRANSPORTATION FACILITIES

### *Roadway Facilities*

A brief description of the key roadways in the study area is provided below.

*McCarran Boulevard* is an arterial ring road serving the cities of Reno and Sparks. Within the study area, McCarran Boulevard is a four-lane roadway to the west of Lakeside Drive and becomes a six-lane roadway to the west of Lakeside Drive. It is classified as a “High Access Control Arterial” in the 2035 RTP. The posted speed limit is 45 mph in the study area.

*Kietzke Lane* is a four-lane north-south roadway that provides primary access to the Retail-Commercial and Office-Medical sites. It is classified as a “Medium Access Control Arterial” in the 2035 RTP. The posted speed limit is 45 mph.

*Lakeside Drive* is a 2 to 4 lane north-south roadway. The posted speed limit is 35 mph. Within the study area Lakeside Drive is designated as a “Medium Access Control Arterial” in the 2035 RTP.

*Sierra Rose Drive* is a two-lane east-west roadway with the posted speed limit of 25 mph. Sierra Rose Drive extends west from Kietzke Lane opposite Meadowood Mall Way and the I-580 interchange. It is classified as a “Medium Access Control Arterial” in the 2035 RTP.

*Talbot Lane* is a two-lane north-south roadway that provides primary access to Ranchharrah. It is classified as a “Medium Access Control Arterial” in the 2035 RTP. The posted speed limit is 25 mph.

**Table 2** provides a summary of existing characteristics for the study roadways.

Table 2 Configuration of Study Area Roadways			
Street Name	2013 Average Daily Traffic	# of Lanes	Posted Speed (mph)
McCarran Boulevard	27,500	6 plus turn lanes	45
Kietzke Lane	19,000	4 plus turn lanes	45
Lakeside Drive	8,500	4	35
Sierra Rose Drive	approx. 2,500	2	25
Talbot Lane	approx. 1,900	2	25

**Alternate Travel Modes**

There are currently sidewalks along the full length of the north side of Sierra Rose Drive, discontinuous sidewalks on the south side of Sierra Rose Drive, on the east side of Talbot Lane, discontinuously on the west side of Talbot Lane, all along the east side of Kietzke Lane, discontinuously along the west side of Kietzke Lane (provided only between McCarran Boulevard and Hammill Lane), and continuously on both sides of McCarran Boulevard.

There are existing bike lanes in both the eastbound and westbound directions on McCarran Boulevard in the project vicinity. Dedicated bike lanes are present on Kietzke Lane in both the northbound and southbound directions. Bike lanes are also available on Meadowood Mall Way to the east of Kietzke Lane.



**Exhibit 1. RTC Transit Routes**

The Regional Transportation Commission (RTC) operates public transit service (RTC Ride) on McCarran Boulevard and Kietzke Lane (Route 9) and on South Virginia Street (Route R1) as shown Exhibit 1. While public transit is not operated on roadways immediately adjacent to the project site, Route 9 is within a walkable distance from the project.

**EXISTING CONDITIONS**

**Existing Traffic Volumes**

Existing traffic volumes were determined by conducting field turning movement counts at the study intersections. The counts were conducted on an average mid-week day in November 2014. The existing peak hour intersection traffic volumes and lane configurations are shown on Figure 3, attached.

**Existing Intersection Level of Service**

Level of service calculations were performed using the existing traffic volumes, lane configurations, and traffic controls. The results are presented in **Table 3** and the calculation sheets are provided in **Appendix A**, attached.

As shown in **Table 3**, all the study intersections operate at acceptable levels of service except the Kietzke Lane/Office-Medical Access/south Nevdex driveway and Kietzke Lane/Retail-Commercial/middle Nevdex driveway intersections. These two intersections operate at LOS "F", during the PM peak hour, on the existing STOP controlled westbound (Nevdex) approaches.

**Table 3: Existing Conditions Intersection Level of Service Summary**

Intersection	Intersection Control	Existing Conditions			
		AM		PM	
		LOS	Delay	LOS	Delay
Kietzke Ln/Office-Medical-Retail Access	TWSC				
<i>Eastbound Approach</i>		NA	NA	NA	NA
<i>Westbound Approach</i>		C	16.7	F	60.8
<i>Northbound Left</i>		NA	NA	NA	NA
<i>Southbound Left</i>		A	9.2	B	11.8
Kietzke Ln/Retail-Commercial Access	TWSC				
<i>Eastbound Left</i>		NA	NA	NA	NA
<i>Eastbound Right</i>		NA	NA	NA	NA
<i>Westbound Approach</i>		C	20.5	F	>100
<i>Northbound Left</i>		NA	NA	NA	NA
<i>Southbound Left</i>		A	9.2	B	12.0
Kietzke Ln/Sierra Rose Dr	Signal	B	17.7	D	35.2
Kietzke Ln/McCarran Blvd	Signal	C	25.3	D	40.6
McCarran Blvd/Talbot Ln	Signal	B	11.0	C	22.0
McCarran Blvd/Lakeside Dr	Signal	D	43.3	D	47.7

TWSC = Two-Way Stop Control

**PROJECT GENERATED TRAFFIC**

**Project Description**

The proposed project is located west of Kietzke Lane and south of McCarran Boulevard as shown in **Figure 2**. For the purposes of this study, the PUD consists of three main development areas:

- Residential – Primarily residential land uses but also includes an Event Center at the existing main house and an Equestrian Center.
- Retail-Commercial – Consists of retail, restaurant, office, and medical office land uses.

- Office-Medical-Retail – Consists of retail, office, and medical office land uses.

The proposed project consists of the following land uses:

- Residential:
  - 323 Single-Family Housing units
  - 310 Multi-Family Apartments (urban residential)
  - 58 Cottages
  - 17,000 square foot Event Center
  - Equestrian Center

This mix above is a general assumption considering a total of 691 residential type units. The mix is expected to vary by type and location over time and will not alter the study results so long as the trip generation estimates do not significantly increase.

- Retail-Commercial:
  - 15,000 square feet of Retail
  - 5,000 square feet of Restaurant
  - 120,000 square feet of Office
  - 40,000 square feet of Medical Office
- Office-Medical-Retail:
  - 20,000 square feet of Office
  - 40,000 square feet of Medical-Dental Office
  - 42,800 square feet of Retail

### ***Trip Generation***

Trip generation rates for the proposed project were obtained from the Trip Generation Manual, 8th Edition, published by the Institute of Transportation Engineers. **Tables 4, 5, and 6** provide the Daily, AM Peak Hour, and PM Peak Hour trip generation calculation details for the proposed project.

The equestrian center is anticipated to primarily operate as a horse boarding facility and meeting place for an equestrian club. Weekday peak hour activity will be primarily trips associated with owners caring for their boarded horses. We understand that owners typically visit a boarding facility once every other day throughout the week. Of course each visit equals two trips (one in, one out). We also assumed that the trips would be spread over only an 8 hour period. Since the site plan shows there are 13 single family lots in Village VI, which are "Equestrian Estates" next to the Equestrian Center, we assumed an equal number of members to use the facility. Additional members would not change the results of this study. The daily and peak hour rates for the equestrian center are calculated as follows:

1 owner \* 1/2 of days \* 2 trips/day = 1 trip per day. 1 trip/day divided by an 8 hour operation period = 0.12 trips in both the AM and PM peak hours.

Trip reduction was applied to reduce the number of trips generated by the existing land uses that physically occupy the parcels. Detailed calculations of the trip generation estimates are shown in **Appendix B**.

**Table 4: Daily Trip Generation Estimates**

Daily	Total Trips			Internal Trips			Pass-By Trips			Net New Trips		
	Total	In	Out	Total	In	Out	Total	In	Out	Total	In	Out
Ranchharrah	5,528	2,765	2,763	276	138	138	0	0	0	5,252	2,627	2,625
Retail-Commercial	4,046	2,023	2,023	486	243	243	0	0	0	3,560	1,780	1,780
Office-Medical-Retail	3,503	1,751	1,752	596	298	298	0	0	0	2,907	1,453	1,454
TOTAL	13,077	6,539	6,538	1,358	679	679	0	0	0	11,719	5,860	5,859

**Table 5: AM Peak Trip Generation Estimates**

AM Peak Hour	Total Trips			Internal Trips			Pass-By Trips			Net New Trips		
	Total	In	Out	Total	In	Out	Total	In	Out	Total	In	Out
Ranchharrah	422	93	329	8	1	7	0	0	0	414	92	322
Retail-Commercial	351	276	75	47	24	23	0	0	0	304	252	52
Office-Medical-Retail	166	126	40	28	16	12	0	0	0	138	110	28
TOTAL	939	495	444	83	41	42	0	0	0	856	454	402

**Table 6: PM Peak Trip Generation Estimates**

PM Peak Hour	Total Trips			Internal Trips			Pass-By Trips			Net New Trips		
	Total	In	Out	Total	In	Out	Total	In	Out	Total	In	Out
Ranchharrah	544	343	201	39	24	15	0	0	0	504	318	186
Retail-Commercial	429	127	302	43	22	21	50	20	30	336	85	251
Office-Medical-Retail	328	120	208	56	24	32	57	28	29	215	68	147
TOTAL	1,301	590	711	138	70	68	107	48	59	1,055	471	584

As shown in tables above, the proposed project is estimated to generate a total of 13,077 daily trips, 939 AM peak hour trips, and 1,301 PM peak hour trips. These numbers include both internal trips and pass-by trips. The daily trip generation estimates are approximately 18% higher than the trip generation estimates approved with the current Ranchharrah PUD.

Internal trip capture can be defined as a reduction of trips within a mixed-use development resulting from the proximity of complementary land uses within the development. A spreadsheet tool referenced in the *ITE Trip Generation Handbook*, 3rd Edition was used to estimate the number of internal trips for this project. The spreadsheet uses the procedures outlined in NCHRP report 684, titled "Enhancing Internal Trip Capture Estimation for Mixed-Use Developments" to calculate internal trips. These calculations are also provided in **Appendix B**.

Pass-by trips are made by drivers already using the adjacent roadway, which enter the site as an intermediate stop on the way to another destination. The trip may not necessarily be "generated" by the land use under study, and thus, is not a new trip added to the transportation system. Pass-by trip percentages specified in the *ITE Trip Generation Handbook* were used to estimate the pass-by rates for this project. The handbook does not provide guidance for pass-by trip percentages for daily trips or AM peak hour trips. Therefore pass-by trips were estimated only for the PM peak hour.

Internal trips and pass-by trips are reduced from the total new trips to obtain Net New Trips, which are then assigned to the external study intersections. Pass-by trips are assigned only at the project driveways.

### ***Project Access***

**Figure 2** shows how individual access points will be provided for each of the three major development areas – Residential, Retail-Commercial, and the Office-Medical-Retail. Access for the residential development areas will be provided via:

- Talbot lane through the McCarran Boulevard/Talbot Lane and Sierra Rose Drive/Kietzke Lane intersections.
- Office-Medical-Retail Driveway on Kietzke Lane

The Retail-Commercial and Office-Medical-Retail areas would have access points on Kietzke Lane. Note that only gated emergency access is assumed to Del Monte Lane and Sierra Rose Drive.

Access for the Retail-Commercial site is assumed to be “full access” at this time, allowing for all possible movements at Kietzke Lane. The access driveway for Retail-Commercial is proposed in direct alignment with the middle Nevdex office complex driveway. The project approach is assumed to be side-street STOP controlled. Currently this intersection is STOP-controlled on the opposing Nevdex westbound approach.

The access driveway for the Office-Medical-Retail site is proposed directly opposite the south Nevdex office complex driveway. The access for the Office-Medical-Retail will allow right-in, right-out, and left-in movements at Kietzke Lane. The left-out movement from the Office-Medical-Retail driveway is not recommended. The left out movement can be easily completed by turning right on Kietzke Lane and making a U-turn at the Neal Road/Kietzke Lane roundabout. This access is connected to the residential component of the project. The connection through the Office-Medical-Retail site will serve only residential traffic, and special events, and will be gated beyond the Office-Medical-Retail area. In addition, the south access of the First Independent Bank office complex on Kietzke Lane will be consolidated with this access.

The proposed driveways on Kietzke Lane are in line with the existing NevDex driveways. The consolidation of the south access of the First Independent Bank office complex on with the Office-Medical-Retail access improves the overall access management on Kietzke Lane.

### ***Consolidation of First Independent Bank and Office-Medical-Retail Driveways***

The First Independent Bank office complex which is located immediately north of the Office-Medical-Retail site has two access driveways on Kietzke Lane. The south driveway is currently Right-In/Right-Out only. The south access of the First Independent Bank office complex will be combined with the Office-Medical-Retail access. Hence, all the traffic that is currently using the south driveway is assumed to be diverted to the new combined Office-Medical-Retail access driveway.

In addition to the project trips, the traffic volumes from the First Independent Bank driveway were also added at the Office-Medical-Retail access to obtain “Plus Project” volumes. The traffic volumes at the First

Independent Bank driveway were determined by conducting field turning movement counts on January 7, 2015 during the AM and PM peak hours. During the PM peak hour, the south access has approximately 48 exiting vehicles and 4 entering vehicles. During the AM peak hour, it has approximately 16 exiting vehicles and 8 entering vehicles. The proposed configuration of the Office-Medical-Retail access driveway is shown in **Figure 6**.

### ***Trip Distribution and Assignment***

Traffic generated by the project was distributed to the road network based on the location of the project, major activity centers, and roadway connections. Since the three sites have different land uses and have their own access points, the trip distribution is slightly different for each of the three sites.

The following trip distribution percentages were used for distributing the Residential traffic:

- 25% to/from the west via McCarran Boulevard
- 5% to/from the north via Talbot Lane
- 20% to/from the north via Kietzke Lane
- 15% to/from the east via McCarran Boulevard and/or S Virginia Street
- 15% to/from the northeast via Sierra Rose Drive (Meadowood Mall Way/I-580)
- 20% to/from the southeast via Neil Road/I-580

The following trip distribution percentages were used for distributing the Retail-Commercial traffic:

- 25% to/from the west via McCarran Boulevard
- 20% to/from the north via Kietzke Lane
- 15% to/from the east via McCarran Boulevard and/or S Virginia Street
- 15% to/from the northeast via Sierra Rose Drive (Meadowood Mall Way/I-580)
- 25% to/from the southeast via Neil Road/I-580

The following trip distribution percentages were used for distributing the Office-Medical-Retail traffic:

- 25% to/from the west via McCarran Boulevard
- 20% to/from the north via Kietzke Lane
- 15% to/from the east via McCarran Boulevard and/or S Virginia Street
- 5% to/from the northeast via Sierra Rose Drive (Meadowood Mall Way/I-580)
- 35% to/from the southeast via Neil Road/I-580

Project generated trips were assigned to the adjacent roadway system based on the distributions outlined above. The project trip assignment is shown on **Figure 4**, attached.

## EXISTING PLUS PROJECT CONDITIONS

### Traffic Volumes

Existing plus project traffic volumes were developed by adding the project generated trips (Figure 4) to the existing traffic volumes (Figure 3) and are shown on Figure 5, attached. The “Plus Project” condition Peak Hour Factors (PHF) and travel patterns were assumed to remain the same as in existing conditions.

### Intersection Level of Service Analysis

Table 7 presents the level of service analysis summary for “Plus Project” scenario assuming the existing intersection configurations. Detailed calculation sheets are provided in Appendix C, attached.

**Table 7: Existing Plus Project Intersection Level of Service Summary**

Intersection	Intersection Control	Existing Conditions				Plus Project			
		AM		PM		AM		PM	
		LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay
Kietzke Ln/Office-Medical-Retail Access	TWSC								
<i>Eastbound Approach</i>		NA	NA	NA	NA	B	13.6	D	27.7
<i>Westbound Approach</i>		C	16.7	F	60.8	D	28.4	F	>100
<i>Northbound Left</i>		NA	NA	NA	NA	B	10.9	B	12.9
<i>Southbound Left</i>		A	9.2	B	11.8	A	9.6	B	12.9
Kietzke Ln/Retail-Commercial Access	TWSC								
<i>Eastbound Left</i>		NA	NA	NA	NA	F	>100	F	>100
<i>Eastbound Right</i>		NA	NA	NA	NA	B	13.6	C	16.0
<i>Westbound Approach</i>		C	20.5	F	>100	D	29.2	F	>100
<i>Northbound Left</i>		NA	NA	NA	NA	B	12.3	B	12.2
<i>Southbound Left</i>		A	9.2	B	12.0	A	9.3	B	12.9
Kietzke Ln/Sierra Rose Dr	Signal	B	17.7	D	35.2	C	25.3	D	45.5
Kietzke Ln/McCarran Blvd	Signal	C	25.3	D	40.6	C	29.7	D	47.5
McCarran Blvd/Talbot Ln	Signal	B	11.0	C	22.0	C	24.7	D	37.0
McCarran Blvd/Lakeside Dr	Signal	D	43.3	D	47.7	D	45.3	D	50.0

With the addition of the project traffic, all the study intersections operate at acceptable Level of Service (LOS) conditions with the exception of the side-street approaches at the Kietzke Lane/Office-Medical-Retail Access and Kietzke Lane/Retail-Commercial Access intersections.

At the Kietzke Lane/Office-Medical-Retail Access the westbound (Nevdex) approach will operate at LOS “F” during the PM peak hour. However, it is important to note that this approach operates at LOS “F” even under existing conditions (without the project). In addition, the proposed project driveway (eastbound approach) will operate at LOS “B/D” with the project traffic. The westbound approach (Nevdex side) is the

one that operates at LOS "F", due to the left turning volume out of the existing westbound driveway and conflicting through volumes on Kietzke Lane. The proposed project does not add any trips to the westbound approach and therefore does not significantly impact this intersection.

At the Kietzke Lane/Retail-Commercial Access, the eastbound left and westbound movements would operate at LOS "F" while the Kietzke Lane approaches and eastbound right movement would operate at LOS "B/C". It is important to note that the side street (Nevdex) operates at LOS "F" even under existing conditions (without the project). The eastbound left movement (Retail-Commercial Driveway) will operate at LOS "F" with the addition of the project traffic. However, the project traffic does not significantly impact Kietzke Lane as all the movements on Kietzke Lane operate at LOS "B" with the addition of the project traffic.

Since poor traffic operations would be limited to private approaches (not affecting Kietzke Lane operations), LOS "F" on the side-street approaches is not a condition that must be mitigated at this time, if at all. There are countless minor streets and driveways that function at LOS "F" during peak hours throughout the urban area. It is not feasible, nor desirable, to construct a traffic signal or roundabout at all of these locations. If a future developer wishes to improve the Retail-Commercial site access intersection, addition studies should be conducted with a specific development plan for that site.

#### ***Queue Length Analysis - McCarran Boulevard/Talbot Lane Intersection***

A queue length analysis was performed for two critical left-turn movements at the McCarran Boulevard/Talbot Lane intersection. We compared 95<sup>th</sup> percentile and 50<sup>th</sup> percentile queue lengths for the northbound left-turn and westbound left-turn movements, with and without the project trips added. The 50<sup>th</sup> percentile queue is the maximum back of queue on a typical cycle and the 95<sup>th</sup> percentile queue is the maximum back of queue at 95<sup>th</sup> percentile traffic volumes. The projected queue lengths were calculated using Synchro 8.0 software. The Synchro manual specifically states that in many cases, the 95<sup>th</sup> percentile queue will not be experienced due to upstream metering. However, at the McCarran Boulevard/ Talbot Lane intersection, there is no upstream intersection for the northbound movement and hence we evaluated both the 50<sup>th</sup> and 95<sup>th</sup> percentile queue lengths. **Table 8** and **Table 9** show the 50<sup>th</sup> percentile and 95<sup>th</sup> percentile queue lengths.

Since there is no upstream intersection to meter traffic for the northbound movement, the 95<sup>th</sup> percentile queue length is considered appropriate for calculating storage space. As shown in **Tables 8** and **9**, the 95<sup>th</sup> percentile queue length for the northbound left-turn movement currently exceeds the available storage space during the PM peak hour. With the project traffic added, the northbound left-turn 95<sup>th</sup> percentile queue length is approximately twice the available storage space. This condition has the potential to increase the overall approach queues by blocking the northbound through and right-turning vehicles when the left-turn queue spills back into the through lane. However, it should be noted that the northbound left-turn queue length exceeds the available storage even under existing conditions.

**Table 8: 95<sup>th</sup> Percentile Queue Lengths at McCarran Boulevard/Talbot Lane**

Scenario/ Movement	Available Storage (feet)	95th Percentile Queue (feet)			
		Existing AM	Plus Project AM	Existing PM	Plus Project PM
Northbound Left	200	88	175	299	364
Westbound Left	85	106	130	15	175

**Table 9: 50<sup>th</sup> Percentile Queue Lengths at McCarran Boulevard/Talbot Lane**

Scenario/ Movement	Available Storage (feet)	50th Percentile Queue (feet)			
		Existing AM	Plus Project AM	Existing PM	Plus Project PM
Northbound Left	200	45	111	233	258
Westbound Left	85	70	89	11	80

Although there is an upstream intersection (McCarran/Kietzke) to meter the westbound traffic at the McCarran Boulevard/Talbot Lane intersection, as a conservative approach, 95th percentile queue length was used to calculate the needed storage with the addition of the project trips. During our field visits, the westbound left-turn queue was observed to spill back into the westbound through lane during a few peak hour cycles. Since McCarran Boulevard is a high speed and high volume roadway, it is important for safety reasons that left-turn queues not spill back into the “fast lane”. The westbound left-turn lane at McCarran Boulevard/Talbot Lane has approximately 85 feet of storage length available. With the project traffic added, the westbound left-turn 95th percentile queue length is anticipated to reach 175 feet during the PM peak hour.

Queuing Mitigation Recommendations

The insufficient northbound left-turn storage would be best improved by removing on-street parking on the east side of Talbot Lane as shown in **Exhibit 2**. The curb would need to be striped RED in the hatched area which is from approximately 260 feet to 510 feet back from the STOP bar. This would provide additional travel lane width (effectively two northbound lanes) so that long left-turn queues would not block through and right-turn movements. A dashed white lane line could be striped south from the solid white turn lane line to delineate the presence of two lanes. No changes are proposed to the existing lane striping.



**Exhibit 2**

The insufficient westbound left-turn lane storage could be corrected by extending the left-turn lane east through the existing landscaped median. A cursory review indicates there is sufficient width available in the existing median island. 200 feet of striped storage pocket length should be constructed for the westbound left-turn lane as shown in **Exhibit 2**.

**Queue Length Analysis – Kietzke Lane/Office-Medical-Retail Access Intersection**

A queue length analysis was also performed at the Kietzke Lane/Office-Medical-Retail Access Intersection. The most critical movement at this intersection is the northbound left-turn movement on Kietzke Lane for vehicles entering the Office-Medical-Retail site from the south. The queue length analysis showed that the northbound left-turn pocket at the Kietzke Lane/Office-Medical-Retail Access intersection would operate without any queuing issues. The average northbound left-turn queue length is anticipated to be less than 15 feet during both the AM and PM peak hours with the project traffic added. The traffic signal at Kietzke Lane/Sierra Rose Drive would create enough gaps for the northbound left-turn movement to operate smoothly at the Kietzke Lane/Office-Medical-Retail Access intersection. **Table 10** shows the 95<sup>th</sup> percentile northbound left-turn movement queue length. We recommend providing 100 feet of striped northbound left-turn storage on Kietzke Lane.

**Table 10: 95<sup>th</sup> Percentile Queue Length at Kietzke Lane/Office-Medical-Retail Access Intersection**

Movement	95th Percentile Queue (feet)			
	Existing AM	Plus Project AM	Existing PM	Plus Project PM
Northbound Left	NA	6	NA	12

**CONCLUSIONS & RECOMMENDATIONS**

The following is a list of our key findings and recommendations:

**Proposed Project**

The Ranchharrah Planned Unit Development (PUD) consists of three development components:

- Residential – Primarily residential land uses with an event center and equestrian center.
- Retail-Commercial – Consists of retail, office, and medical office land uses.
- Office-Medical-Retail – Consists of retail, office, and medical office land uses.

The proposed project is estimated to generate a total of 13,077 daily trips, 939 AM peak hour trips, and 1,301 PM peak hour trips. These numbers include both internal trips and pass-by trips. The daily trip generation estimates are approximately 18% higher than the trip generation estimates approved with the current Ranchharrah PUD. PM peak hour trips would be approximately 30% higher.

**Project Access**

Access for the Residential development area will be provided via Talbot Lane and the Office-Medical-Retail driveway on Kietzke Lane. The Retail-Commercial site has an individual access point on Kietzke Lane. The Retail-Commercial driveway will have full access allowing for all possible movements at Kietzke Lane and is proposed in direct alignment with the middle Nevdex office complex driveway. The access driveway for

the Office-Medical-Retail is proposed directly across from the south Nevdex office complex driveway. The access for the Office-Medical site will be STOP controlled on the minor approach and allow right-in, right-out, and left-in movements. The left-out movement from the Office-Medical driveway would not be allowed, consistent with the recommendations in the previous Ranchharrah Traffic Study. In addition, the south access of the First Independent Bank office complex on Kietzke Lane will be consolidated with the Office-Medical-Retail access.

### ***Existing Level of Service***

All the study intersections operate at acceptable levels of service except the Kietzke Lane/Office-Medical-Retail Access and Kietzke Lane/Retail-Commercial Access intersections. The minor street (Nevdex) approaches at both locations currently operate at LOS "F" during the PM peak hour. These two intersections are un-signalized with STOP control on the westbound driveway approaches.

### ***Plus Project Level of Service***

With the addition of project generated traffic, all the study intersections operate at acceptable level of service conditions with the exception of Kietzke Lane/Retail-Commercial Access and Kietzke Lane/Office-Medical-Retail Access intersections. The side street approaches at these intersections will continue to operate at LOS "F" during the PM peak hour with addition of the project traffic. However, it is important to note that these intersections operate at LOS "F" during the existing conditions (without the project).

### ***Kietzke Lane/Office-Medical-Retail Access Intersection***

The proposed project driveway (eastbound approach) will operate at LOS "B/D" and the Kietzke Lane approaches will operate at LOS "B" with the project traffic. The westbound approach (Nevdex side) is the one that operates at LOS "F", due to the left turning volume out of the existing westbound driveway and conflicting through volumes on Kietzke Lane. The proposed project does not add any trips to the westbound approach and therefore does not significantly impact this intersection.

The queuing analysis shows that with the addition of the project traffic, the estimated 95<sup>th</sup> percentile queue length for the northbound left-turn movement is anticipated to be less than 15 feet during the peak hours with the project traffic added. We recommend providing 100 feet of striped northbound left-turn storage on Kietzke Lane.

### ***Kietzke Lane/Retail-Commercial Access Intersection***

With the addition of the project traffic, the minor street approaches are anticipated to operate at LOS "F" conditions during the peak hours. Left-turn movements from the Retail-Commercial and the Nevdex office complex driveway may be extremely difficult during peak travel periods. It is important to note that the side street (Nevdex) operates at LOS "F" under existing conditions (without the project). The eastbound approach (Retail-Commercial driveway) will also operate at LOS "F" with the addition of the project traffic.

However, the project traffic does not impact Kietzke Lane as all the movements on Kietzke Lane operate at LOS "B" or better even with the addition of the project traffic.

Since poor traffic operations would be limited to side-street approaches (not affecting Kietzke Lane operations), LOS "F" on the side-street approaches is not a condition that must be mitigated at this time, if at all. There are countless minor streets and driveways that function at LOS "F" during peak hours throughout the urban area. It is not feasible, nor desirable, to construct a traffic signal or roundabout at all of these locations.

At the point in time in which a developer of the Retail-Commercial site desires to obtain building permits, a traffic study will be prepared for the Retail-Commercial site that addresses the access to Kietzke Lane and any needs for new intersection control on Kietzke Lane. Three intersection scenarios are foreseeable at this time, but they will have to be revisited in the future. They are: 1) STOP sign control on the project approach, which will not adversely affect Kietzke Lane, but will provide poor levels of service within the project, 2) a roundabout on Kietzke Lane, OR 3) a traffic signal on Kietzke Lane. It should be noted that a signal is less likely since the location does not meet typical signal spacing requirements. The installation of a traffic signal will also be subject to meeting MUTCD traffic signal warrants.

#### ***McCarran Boulevard/Talbot Lane Intersection***

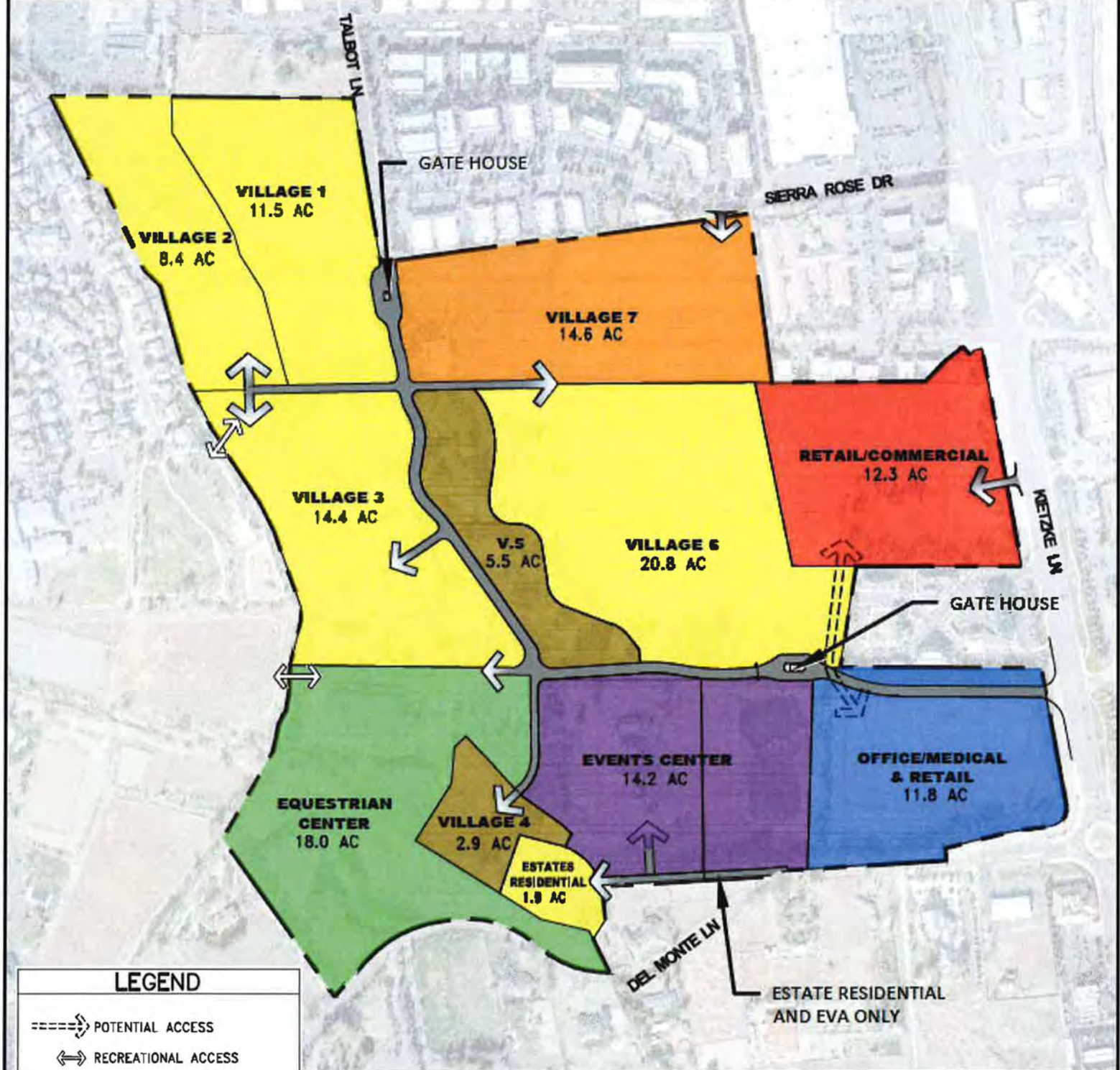
The queuing analysis shows that with the addition of the project traffic, the estimated 95<sup>th</sup> percentile queue lengths for the northbound left-turn and westbound left-turn movements will exceed the available storage. During the PM peak hour, with the project traffic added, the northbound left-turn 95<sup>th</sup> percentile queue may reach 370 feet. Similarly, the 95<sup>th</sup> percentile queue for the westbound left-turn movement during the PM peak hour will reach approximately 175 feet. We recommend extending the westbound left-turn pocket (on McCarran Boulevard) to 200 feet of striped storage length. The northbound left-turn storage space on Talbot Lane can effectively be increased by eliminating approximately 230 feet of on-street parking on the east side of Talbot Lane as shown in **Exhibit 2** on page 15. No changes are proposed to the existing lane striping on the northbound approach.

#### ***Other Off-site Mitigation Measures***

No other mitigations are proposed at any other study intersections since the analysis showed that the anticipated project traffic does not cause any other significant impacts requiring mitigation. The project's contribution of Regional Road Impact Fees will mitigate the minor project effects on the overall roadway network.

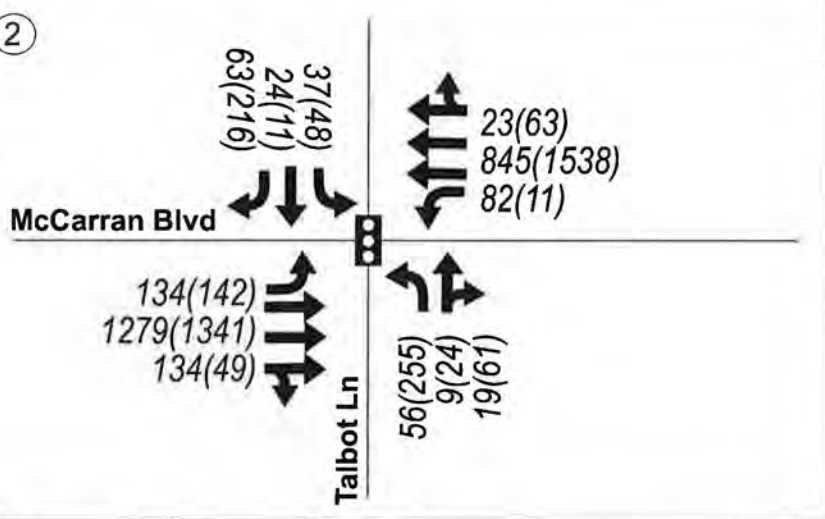
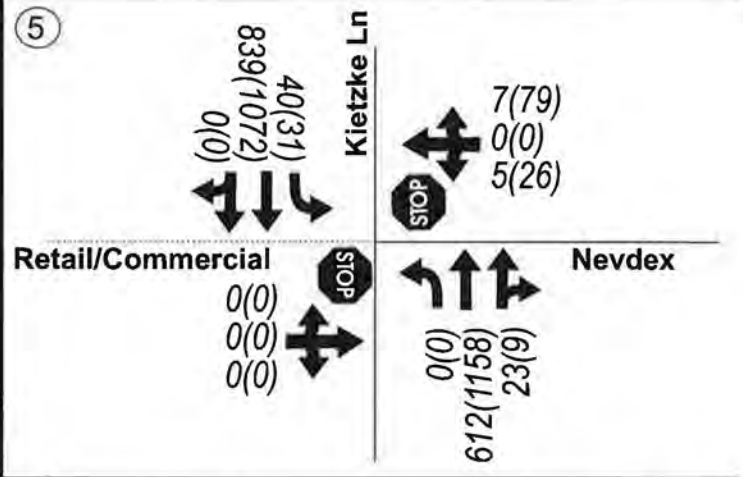
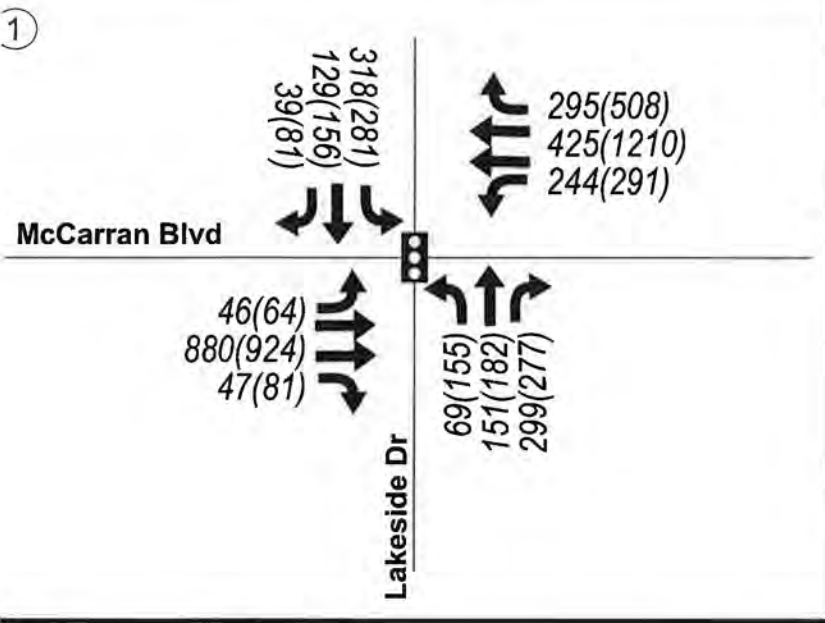
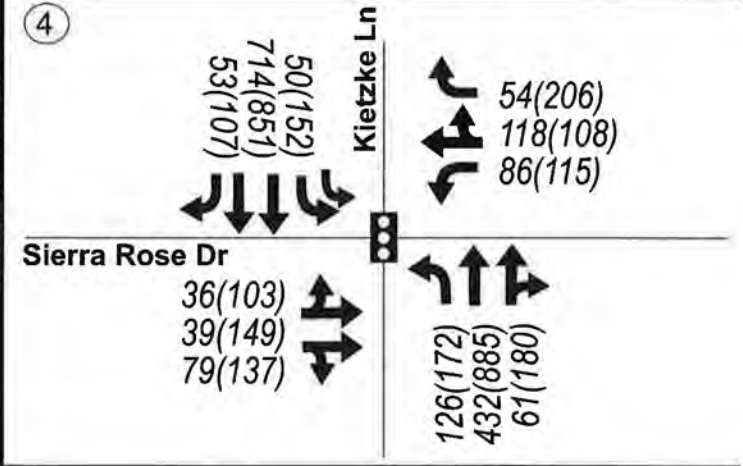
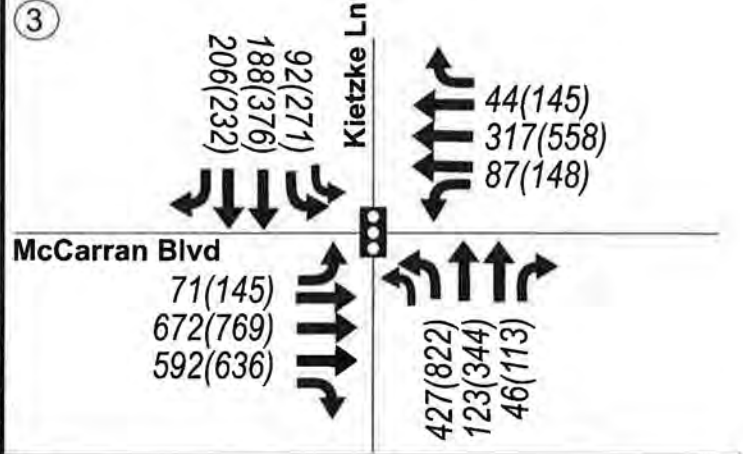


- ### Study Intersections
- ① McCarran Blvd & Lake Side Dr
  - ② McCarran Blvd & Talbot Ln
  - ③ Kietzke Ln & McCarran Blvd
  - ④ Kietzke Ln & Sierra Rose Dr
  - ⑤ Kietzke Ln & Retail/Commercial
  - ⑥ Kietzke Ln & Office/Medical/Retail



**LEGEND**

- POTENTIAL ACCESS
- RECREATIONAL ACCESS
- PLANNED ACCESS
- SINGLE FAMILY
- COTTAGES
- URBAN RESIDENTIAL
- OFFICE/MEDICAL
- RETAIL/COMMERCIAL
- EQUESTRIAN CENTER
- EVENTS CENTER

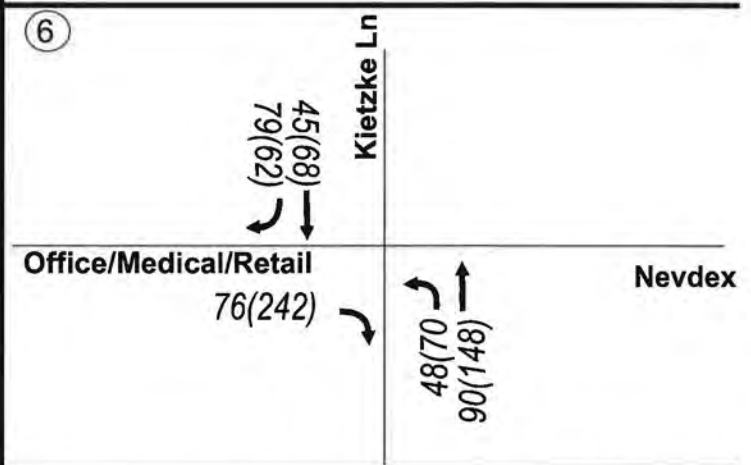
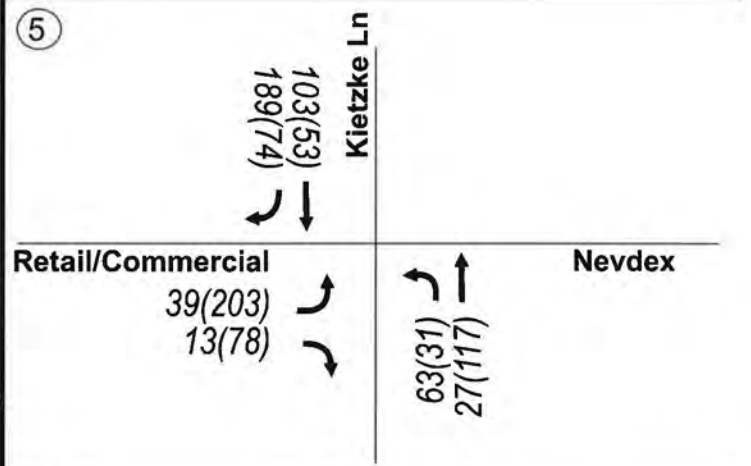
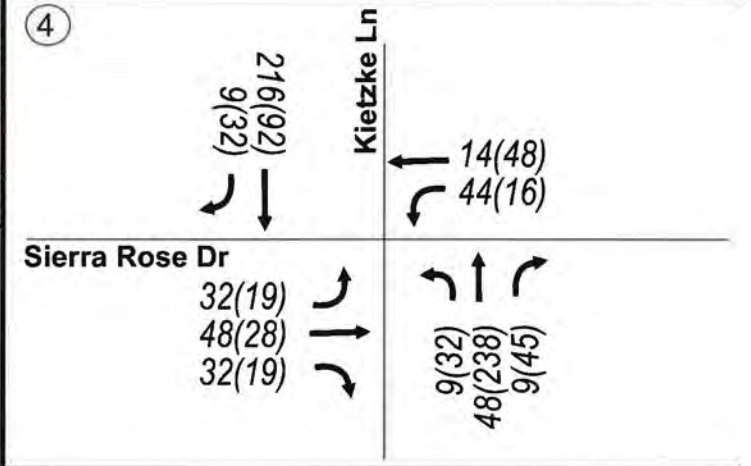
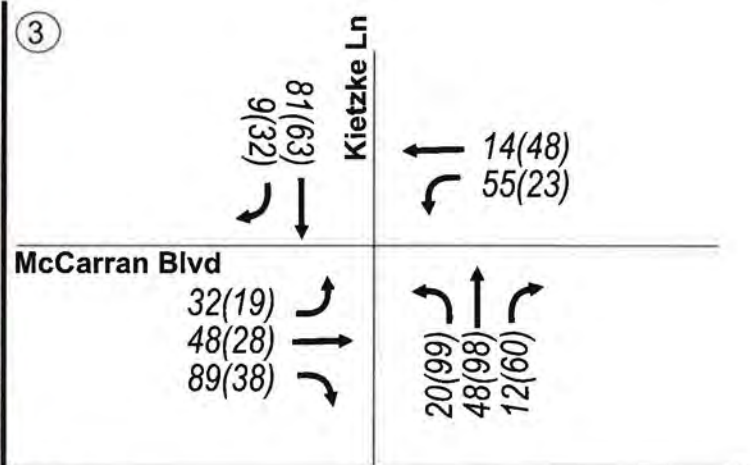
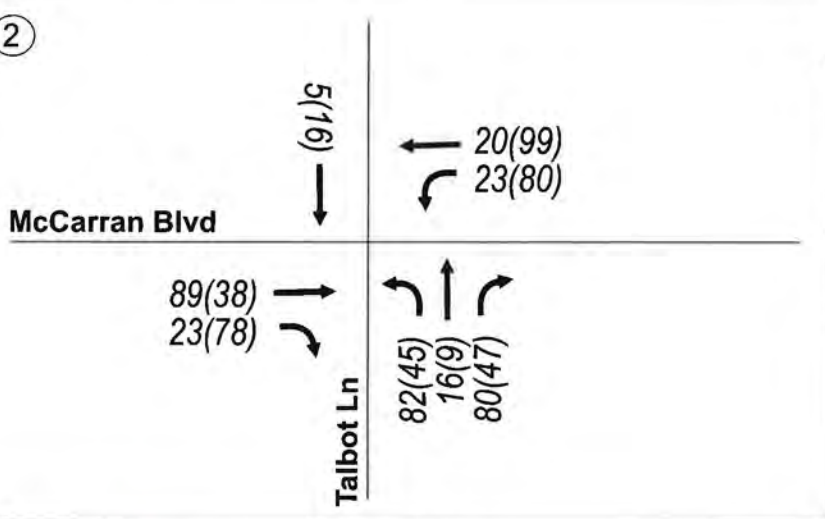
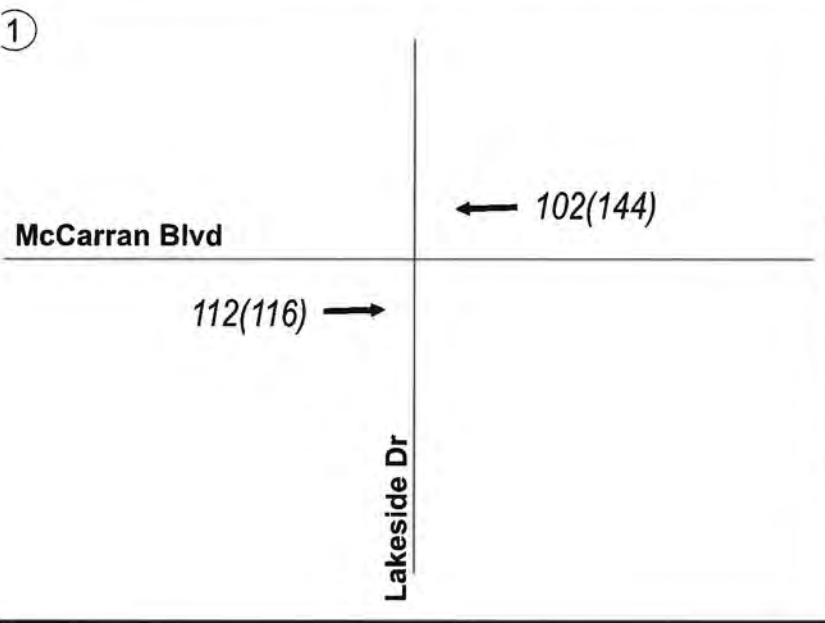


**LEGEND**

- AM(PM) - Peak Hour Traffic Volumes
- ← - Lane Configuration
- ⬢ - Traffic Signal
- STOP - Stop Sign



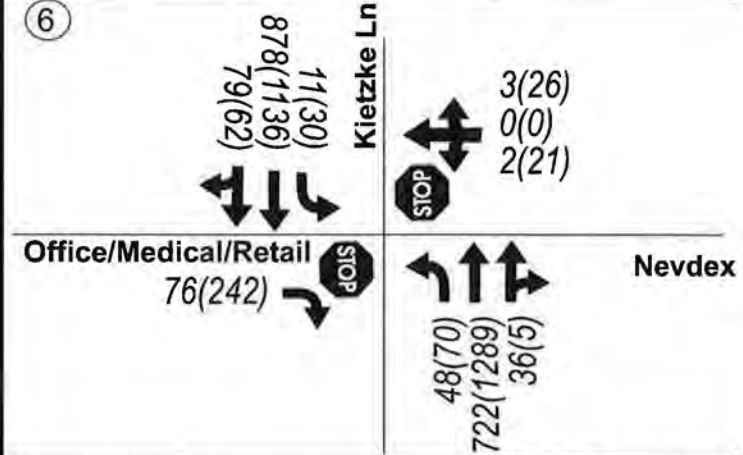
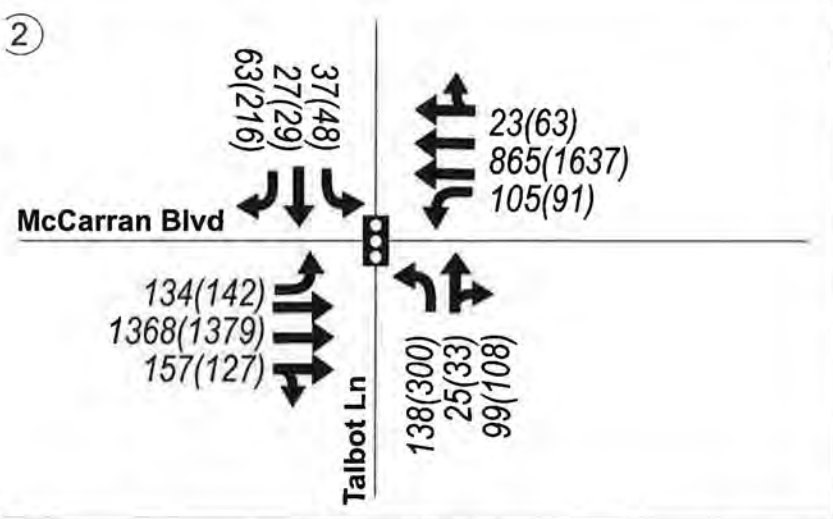
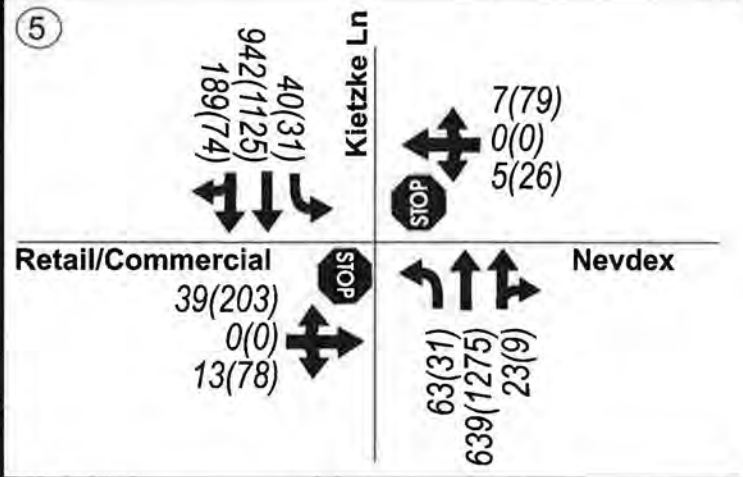
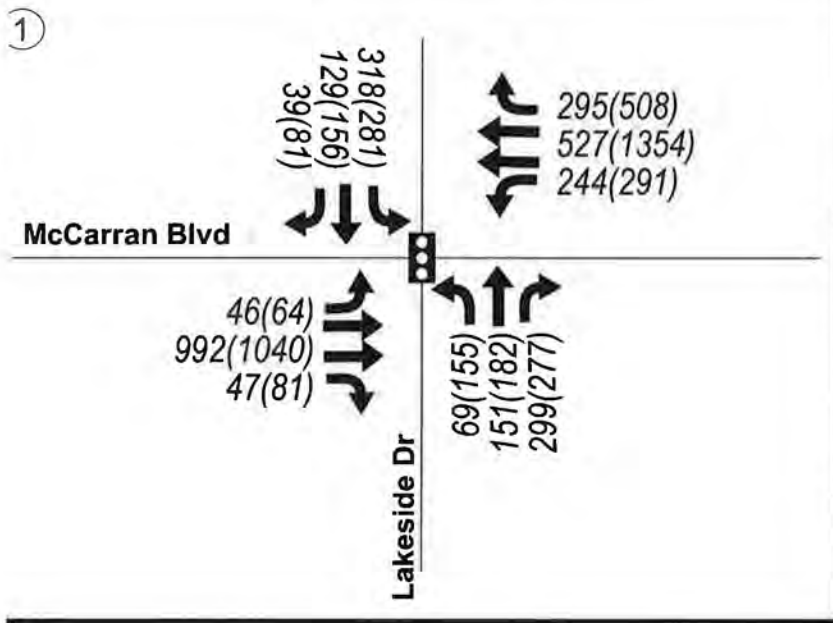
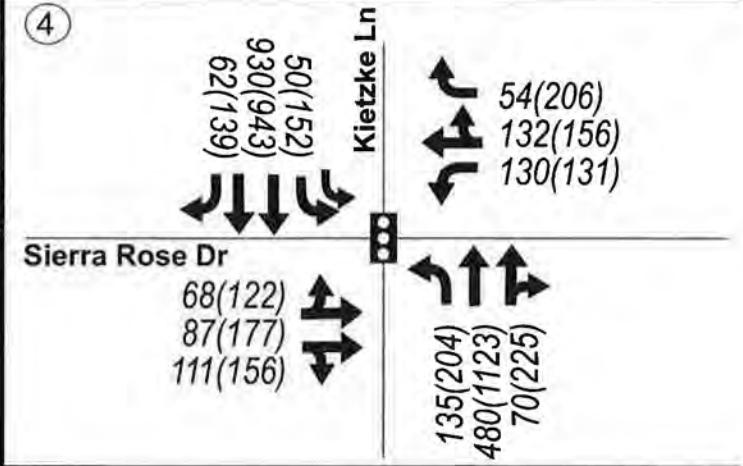
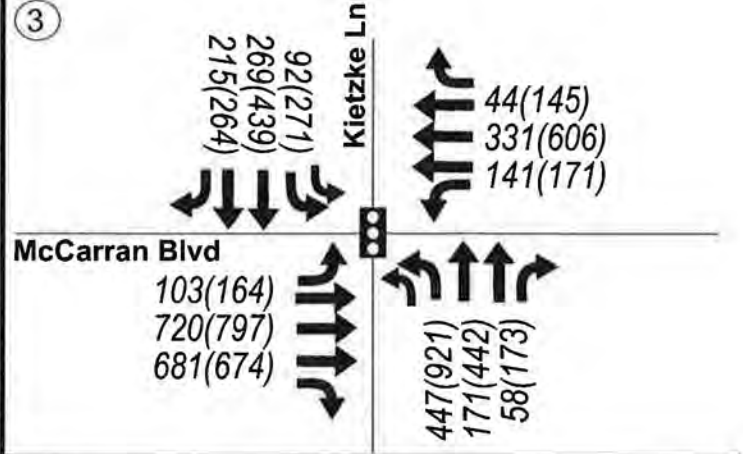
**Figure 3**  
**RANCHARRAP**  
**TRAFFIC IMPACT STUDY**  
*Existing Traffic Volumes*



**LEGEND**  
AM(PM) - Peak Hour Trip Assignment

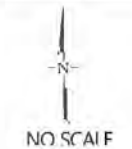


**Figure 4**  
**RANCHARRAI**  
**TRAFFIC IMPACT STUDY**  
Project Trips



**LEGEND**

- AM(PM) - Peak Hour Traffic Volumes
- ← - Lane Configuration
- ⬢ - Traffic Signal
- STOP - Stop Sign



**Figure 5**  
**RANCHARRAI**  
**TRAFFIC IMPACT STUDY**  
 Existing Plus Project Traffic Volumes

# PROPOSED ACCESS CONFIGURATION



# **APPENDIX A**

Existing Conditions LOS Calculations

Intersection	
Int Delay, s/veh	0.1

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Vol, veh/h	2	3	632	36	11	833
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	150	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	2	3	687	39	12	905

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1184	363	0	0	726	0
Stage 1	707	-	-	-	-	-
Stage 2	477	-	-	-	-	-
Critical Hdwy	6.84	6.94	-	-	4.14	-
Critical Hdwy Stg 1	5.84	-	-	-	-	-
Critical Hdwy Stg 2	5.84	-	-	-	-	-
Follow-up Hdwy	3.52	3.32	-	-	2.22	-
Pot Cap-1 Maneuver	182	634	-	-	873	-
Stage 1	450	-	-	-	-	-
Stage 2	590	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	179	634	-	-	873	-
Mov Cap-2 Maneuver	179	-	-	-	-	-
Stage 1	450	-	-	-	-	-
Stage 2	582	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	16.7	0	0.1
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	314	873	-
HCM Lane V/C Ratio	-	-	0.017	0.014	-
HCM Control Delay (s)	-	-	16.7	9.2	-
HCM Lane LOS	-	-	C	A	-
HCM 95th %tile Q(veh)	-	-	0.1	0	-

Intersection	
Int Delay, s/veh	0.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR
Vol, veh/h	0	0	0	5	0	7	0	612	23
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	130	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	0	0	5	0	8	0	665	25

Major/Minor	Minor2			Minor1			Major1		
Conflicting Flow All	1332	1689	456	1221	1677	345	912	0	0
Stage 1	999	999	-	678	678	-	-	-	-
Stage 2	333	690	-	543	999	-	-	-	-
Critical Hdwy	7.54	6.54	6.94	7.54	6.54	6.94	4.14	-	-
Critical Hdwy Stg 1	6.54	5.54	-	6.54	5.54	-	-	-	-
Critical Hdwy Stg 2	6.54	5.54	-	6.54	5.54	-	-	-	-
Follow-up Hdwy	3.52	4.02	3.32	3.52	4.02	3.32	2.22	-	-
Pot Cap-1 Maneuver	112	93	551	136	94	651	743	-	-
Stage 1	261	319	-	408	450	-	-	-	-
Stage 2	654	444	-	492	319	-	-	-	-
Platoon blocked, %									
Mov Cap-1 Maneuver	107	89	551	131	90	651	743	-	-
Mov Cap-2 Maneuver	107	89	-	131	90	-	-	-	-
Stage 1	261	304	-	408	450	-	-	-	-
Stage 2	646	444	-	468	304	-	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s	0	20.5	0
HCM LOS	A	C	

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	743	-	-	-	245	900	-	-
HCM Lane V/C Ratio	-	-	-	-	0.053	0.048	-	-
HCM Control Delay (s)	0	-	-	0	20.5	9.2	-	-
HCM Lane LOS	A	-	-	A	C	A	-	-
HCM 95th %tile Q(veh)	0	-	-	-	0.2	0.2	-	-

**Intersection**

Int Delay, s/veh

Movement	SBL	SBT	SBR
Vol, veh/h	40	839	0
Conflicting Peds, #/hr	0	0	0
Sign Control	Free	Free	Free
RT Channelized	-	-	None
Storage Length	100	-	-
Veh in Median Storage, #	-	0	-
Grade, %	-	0	-
Peak Hour Factor	92	92	92
Heavy Vehicles, %	2	2	2
Mvmt Flow	43	912	0

Major/Minor	Major2		
Conflicting Flow All	690	0	0
Stage 1	-	-	-
Stage 2	-	-	-
Critical Hdwy	4.14	-	-
Critical Hdwy Stg 1	-	-	-
Critical Hdwy Stg 2	-	-	-
Follow-up Hdwy	2.22	-	-
Pot Cap-1 Maneuver	900	-	-
Stage 1	-	-	-
Stage 2	-	-	-
Platoon blocked, %		-	-
Mov Cap-1 Maneuver	900	-	-
Mov Cap-2 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-

Approach	SB
HCM Control Delay, s	0.4
HCM LOS	

**Minor Lane/Major Mvmt**

HCM 2010 Signalized Intersection Summary  
 3: Kietzke & Sierra Rose/Meadowood

























12/3/2014

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	36	39	79	86	118	54	126	432	61	50	714	53
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1900	1900	1863	1863	1863	1863	1900	1863	1863	1863
Adj Flow Rate, veh/h	39	42	86	93	128	59	137	470	66	54	776	58
Adj No. of Lanes	1	1	0	0	1	2	1	2	0	2	2	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	183	129	264	178	209	658	173	1793	251	122	1814	811
Arrive On Green	0.24	0.24	0.24	0.24	0.24	0.24	0.10	0.57	0.57	0.04	0.51	0.51
Sat Flow, veh/h	1192	546	1119	476	886	2787	1774	3119	436	3442	3539	1583
Grp Volume(v), veh/h	39	0	128	221	0	59	137	266	270	54	776	58
Grp Sat Flow(s),veh/h/ln	1192	0	1665	1363	0	1393	1774	1770	1786	1721	1770	1583
Q Serve(g_s), s	2.4	0.0	5.0	7.5	0.0	1.3	5.9	5.9	5.9	1.2	10.7	1.4
Cycle Q Clear(g_c), s	14.9	0.0	5.0	12.5	0.0	1.3	5.9	5.9	5.9	1.2	10.7	1.4
Prop In Lane	1.00		0.67	0.42		1.00	1.00		0.24	1.00		1.00
Lane Grp Cap(c), veh/h	183	0	393	387	0	658	173	1017	1027	122	1814	811
V/C Ratio(X)	0.21	0.00	0.33	0.57	0.00	0.09	0.79	0.26	0.26	0.44	0.43	0.07
Avail Cap(c_a), veh/h	268	0	512	498	0	857	318	1017	1027	661	1814	811
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	34.5	0.0	24.7	28.0	0.0	23.3	34.4	8.3	8.3	36.9	11.9	9.6
Incr Delay (d2), s/veh	0.6	0.0	0.5	1.3	0.0	0.1	7.8	0.6	0.6	2.5	0.7	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.8	0.0	2.3	4.5	0.0	0.5	3.3	3.0	3.0	0.6	5.4	0.7
LnGrp Delay(d),s/veh	35.0	0.0	25.2	29.3	0.0	23.3	42.2	8.9	8.9	39.4	12.6	9.8
LnGrp LOS	D		C	C		C	D	A	A	D	B	A
Approach Vol, veh/h		167			280			673			888	
Approach Delay, s/veh		27.5			28.0			15.7			14.1	
Approach LOS		C			C			B			B	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	6.8	48.9		22.4	11.6	44.0		22.4				
Change Period (Y+Rc), s	4.0	4.0		4.0	4.0	4.0		4.0				
Max Green Setting (Gmax), s	15.0	39.0		24.0	14.0	40.0		24.0				
Max Q Clear Time (g_c+I1), s	3.2	7.9		16.9	7.9	12.7		14.5				
Green Ext Time (p_c), s	0.1	9.7		1.5	0.2	9.3		1.8				
<b>Intersection Summary</b>												
HCM 2010 Ctrl Delay			17.7									
HCM 2010 LOS			B									

# HCM 2010 Signalized Intersection Summary






















## 4: Kietzke & McCarran Blvd

12/3/2014

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	71	672	592	87	317	44	427	123	46	92	188	206
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	0.60	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	74	700	0	91	330	0	445	128	0	96	196	0
Adj No. of Lanes	1	3	1	1	3	1	2	2	1	2	2	1
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	96	2481	772	118	2545	475	554	246	110	622	317	142
Arrive On Green	0.05	0.49	0.00	0.07	0.50	0.00	0.16	0.07	0.00	0.18	0.09	0.00
Sat Flow, veh/h	1774	5085	1583	1774	5085	950	3442	3539	1583	3442	3539	1583
Grp Volume(v), veh/h	74	700	0	91	330	0	445	128	0	96	196	0
Grp Sat Flow(s),veh/h/ln	1774	1695	1583	1774	1695	950	1721	1770	1583	1721	1770	1583
Q Serve(g_s), s	3.4	6.7	0.0	4.1	2.8	0.0	10.2	2.9	0.0	1.9	4.4	0.0
Cycle Q Clear(g_c), s	3.4	6.7	0.0	4.1	2.8	0.0	10.2	2.9	0.0	1.9	4.4	0.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	96	2481	772	118	2545	475	554	246	110	622	317	142
V/C Ratio(X)	0.77	0.28	0.00	0.77	0.13	0.00	0.80	0.52	0.00	0.15	0.62	0.00
Avail Cap(c_a), veh/h	217	2481	772	325	2545	475	798	1987	889	622	1469	657
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	0.00	0.98	0.98	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	38.3	12.5	0.0	37.6	10.9	0.0	33.1	36.8	0.0	28.3	35.9	0.0
Incr Delay (d2), s/veh	12.4	0.3	0.0	10.1	0.1	0.0	3.8	1.7	0.0	0.1	2.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.0	3.2	0.0	2.4	1.3	0.0	5.1	1.5	0.0	0.9	2.2	0.0
LnGrp Delay(d),s/veh	50.7	12.7	0.0	47.7	11.0	0.0	37.0	38.5	0.0	28.4	37.9	0.0
LnGrp LOS	D	B		D	B		D	D		C	D	
Approach Vol, veh/h		774			421			573			292	
Approach Delay, s/veh		16.4			19.0			37.3			34.8	
Approach LOS		B			B			D			C	
<b>Timer</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>	<b>8</b>				
Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	18.8	9.7	9.5	82.0	17.2	11.3	8.4	83.1				
Change Period (Y+Rc), s	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0				
Max Green Setting (Gmax), s	7.0	46.0	15.0	36.0	19.0	34.0	10.0	41.0				
Max Q Clear Time (g_c+I1), s	3.9	4.9	6.1	8.7	12.2	6.4	5.4	4.8				
Green Ext Time (p_c), s	0.4	0.8	0.1	7.2	1.0	1.0	0.0	7.6				
<b>Intersection Summary</b>												
HCM 2010 Ctrl Delay			25.3									
HCM 2010 LOS			C									

HCM 2010 Signalized Intersection Summary  
 6: Talbot & McCarran Blvd

12/3/2014

												
Movement	EBL	EBT	E3R	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	134	1279	134	82	845	23	56	9	19	37	24	63
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1900	1863	1863	1900	1863	1863	1863
Adj Flow Rate, veh/h	144	1375	144	88	909	25	60	10	20	40	26	0
Adj No. of Lanes	1	3	0	1	3	0	1	1	0	1	1	1
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	181	3376	354	114	3483	96	175	46	92	169	154	131
Arrive On Green	0.10	0.72	0.72	0.06	0.68	0.68	0.08	0.08	0.08	0.08	0.08	0.00
Sat Flow, veh/h	1774	4677	490	1774	5088	140	1379	556	1111	1374	1863	1583
Grp Volume(v), veh/h	144	997	522	88	605	329	60	0	30	40	26	0
Grp Sat Flow(s),veh/h/ln	1774	1695	1776	1774	1695	1838	1379	0	1667	1374	1863	1583
Q Serve(g_s), s	7.3	10.6	10.6	4.5	6.3	6.3	3.9	0.0	1.5	2.6	1.2	0.0
Cycle Q Clear(g_c), s	7.3	10.6	10.6	4.5	6.3	6.3	5.1	0.0	1.5	4.1	1.2	0.0
Prop In Lane	1.00		0.28	1.00		0.08	1.00		0.67	1.00		1.00
Lane Grp Cap(c), veh/h	181	2447	1282	114	2320	1258	175	0	138	169	154	131
V/C Ratio(X)	0.80	0.41	0.41	0.77	0.26	0.26	0.34	0.00	0.22	0.24	0.17	0.00
Avail Cap(c_a), veh/h	504	2447	1282	349	2320	1258	423	0	437	416	489	416
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.54	0.54	0.54	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	40.1	5.0	5.0	42.1	5.5	5.5	41.4	0.0	39.2	41.1	39.0	0.0
Incr Delay (d2), s/veh	4.4	0.3	0.5	10.4	0.3	0.5	1.2	0.0	0.8	0.7	0.5	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.8	4.9	5.3	2.5	2.9	3.3	1.5	0.0	0.7	1.0	0.6	0.0
LnGrp Delay(d),s/veh	44.5	5.3	5.5	52.5	5.8	6.1	42.5	0.0	40.0	41.8	39.5	0.0
LnGrp LOS	D	A	A	D	A	A	D		D	D	D	
Approach Vol, veh/h		1663			1022			90				66
Approach Delay, s/veh		8.8			9.9			41.7				40.9
Approach LOS		A			A			D				D
<b>Timer</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>	<b>8</b>				
Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	9.9	98.6		11.5	13.3	95.1		11.5				
Change Period (Y+Rc), s	4.0	4.0		4.0	4.0	4.0		4.0				
Max Green Setting (Gmax), s	18.0	66.0		24.0	26.0	58.0		24.0				
Max Q Clear Time (g_c+I1), s	6.5	12.6		6.1	9.3	8.3		7.1				
Green Ext Time (p_c), s	0.1	27.9		0.5	0.3	26.9		0.5				
<b>Intersection Summary</b>												
HCM 2010 Ctrl Delay			11.0									
HCM 2010 LOS			B									

HCM 2010 Signalized Intersection Summary  
7: Lakeside Dr & McCarran Blvd

12/3/2014

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	46	880	47	244	425	295	69	151	299	318	129	39
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1863	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	50	957	0	265	462	0	75	164	325	346	140	42
Adj No. of Lanes	1	2	0	1	2	1	1	1	1	1	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	64	1201	0	298	1667	746	407	435	370	415	585	497
Arrive On Green	0.04	0.34	0.00	0.06	0.16	0.00	0.04	0.23	0.23	0.12	0.31	0.31
Sat Flow, veh/h	1774	3632	0	1774	3539	1583	1774	1863	1583	1774	1863	1583
Grp Volume(v), veh/h	50	957	0	265	462	0	75	164	325	346	140	42
Grp Sat Flow(s),veh/h/ln	1774	1770	0	1774	1770	1583	1774	1863	1583	1774	1863	1583
Q Serve(g_s), s	3.1	27.4	0.0	16.6	12.9	0.0	3.6	8.3	22.2	13.0	6.2	2.1
Cycle Q Clear(g_c), s	3.1	27.4	0.0	16.6	12.9	0.0	3.6	8.3	22.2	13.0	6.2	2.1
Prop In Lane	1.00		0.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	64	1201	0	298	1667	746	407	435	370	415	585	497
V/C Ratio(X)	0.78	0.80	0.00	0.89	0.28	0.00	0.18	0.38	0.88	0.83	0.24	0.08
Avail Cap(c_a), veh/h	127	1201	0	333	1667	746	407	533	453	415	682	580
HCM Platoon Ratio	1.00	1.00	1.00	0.33	0.33	0.33	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	0.97	0.97	0.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	53.5	33.5	0.0	51.8	30.4	0.0	31.2	36.1	41.4	31.6	28.5	27.1
Incr Delay (d2), s/veh	17.9	5.5	0.0	22.2	0.4	0.0	0.2	0.5	15.4	13.7	0.2	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.9	14.3	0.0	10.0	6.4	0.0	1.8	4.3	11.2	5.7	3.2	0.9
LnGrp Delay(d),s/veh	71.4	39.0	0.0	74.1	30.8	0.0	31.4	36.6	56.7	45.3	28.7	27.1
LnGrp LOS	E	D		E	C		C	D	E	D	C	C
Approach Vol, veh/h		1007			727			564			528	
Approach Delay, s/veh		40.6			46.6			47.5			39.5	
Approach LOS		D			D			D			D	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	22.8	50.1	8.0	39.1	8.1	64.8	17.0	30.1				
Change Period (Y+Rc), s	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0				
Max Green Setting (Gmax), s	21.0	38.0	4.0	41.0	8.0	51.0	13.0	32.0				
Max Q Clear Time (g_c+1), s	18.6	29.4	5.6	8.2	5.1	14.9	15.0	24.2				
Green Ext Time (p_c), s	0.2	5.3	0.0	3.2	0.0	11.6	0.0	2.0				
<b>Intersection Summary</b>												
HCM 2010 Ctrl Delay			43.3									
HCM 2010 LOS			D									

**Intersection**

Int Delay, s/veh 1.4

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Vol, veh/h	21	26	1141	5	30	1068
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	150	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	1	1	1	1	1	1
Mvmt Flow	23	28	1240	5	33	1161

**Major/Minor**

	Minor1		Major1		Major2	
Conflicting Flow All	1889	623	0	0	1246	0
Stage 1	1243	-	-	-	-	-
Stage 2	646	-	-	-	-	-
Critical Hdwy	6.82	6.92	-	-	4.12	-
Critical Hdwy Stg 1	5.82	-	-	-	-	-
Critical Hdwy Stg 2	5.82	-	-	-	-	-
Follow-up Hdwy	3.51	3.31	-	-	2.21	-
Pot Cap-1 Maneuver	63	431	-	-	560	-
Stage 1	237	-	-	-	-	-
Stage 2	486	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	59	431	-	-	560	-
Mov Cap-2 Maneuver	59	-	-	-	-	-
Stage 1	237	-	-	-	-	-
Stage 2	457	-	-	-	-	-

**Approach**

	WB		NB		SB
HCM Control Delay, s	60.8		0		0.3
HCM LOS	F				

**Minor Lane/Major Mvmt**

	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	113	560	-
HCM Lane V/C Ratio	-	-	0.452	0.058	-
HCM Control Delay (s)	-	-	60.8	11.8	-
HCM Lane LOS	-	-	F	B	-
HCM 95th %tile Q(veh)	-	-	2	0.2	-

Intersection									
Int Delay, s/veh	5.6								
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR
Vol, veh/h	0	0	0	26	0	79	0	1158	9
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	130	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	1	1	1	1	1	1	1	1	1
Mvmt Flow	0	0	0	28	0	86	0	1259	10

Major/Minor	Minor2			Minor1			Major1		
Conflicting Flow All	1862	2501	583	1914	2497	634	1165	0	0
Stage 1	1233	1233	-	1264	1264	-	-	-	-
Stage 2	629	1268	-	650	1233	-	-	-	-
Critical Hdwy	7.52	6.52	6.92	7.52	6.52	6.92	4.12	-	-
Critical Hdwy Stg 1	6.52	5.52	-	6.52	5.52	-	-	-	-
Critical Hdwy Stg 2	6.52	5.52	-	6.52	5.52	-	-	-	-
Follow-up Hdwy	3.51	4.01	3.31	3.51	4.01	3.31	2.21	-	-
Pot Cap-1 Maneuver	45	29	458	42	29	424	601	-	-
Stage 1	189	249	-	181	241	-	-	-	-
Stage 2	439	240	-	427	249	-	-	-	-
Platoon blocked, %									
Mov Cap-1 Maneuver	34	27	458	40	27	424	601	-	-
Mov Cap-2 Maneuver	34	27	-	40	27	-	-	-	-
Stage 1	189	234	-	181	241	-	-	-	-
Stage 2	350	240	-	401	234	-	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s	0	122.4	0
HCM LOS	A	F	

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	601	-	-	-	126	549	-	-
HCM Lane V/C Ratio	-	-	-	-	0.906	0.061	-	-
HCM Control Delay (s)	0	-	-	0	122.4	12	-	-
HCM Lane LOS	A	-	-	A	F	B	-	-
HCM 95th %tile Q(veh)	0	-	-	-	5.8	0.2	-	-

**Intersection**

Int Delay, s/veh

Movement	SBL	SBT	SBR
Vol, veh/h	31	1072	0
Conflicting Peds, #/hr	0	0	0
Sign Control	Free	Free	Free
RT Channelized	-	-	None
Storage Length	100	-	-
Veh in Median Storage, #	-	0	-
Grade, %	-	0	-
Peak Hour Factor	92	92	92
Heavy Vehicles, %	1	1	1
Mvmt Flow	34	1165	0

Major/Minor	Major2		
Conflicting Flow All	1268	0	0
Stage 1	-	-	-
Stage 2	-	-	-
Critical Hdwy	4.12	-	-
Critical Hdwy Stg 1	-	-	-
Critical Hdwy Stg 2	-	-	-
Follow-up Hdwy	2.21	-	-
Pot Cap-1 Maneuver	549	-	-
Stage 1	-	-	-
Stage 2	-	-	-
Platoon blocked, %		-	-
Mov Cap-1 Maneuver	549	-	-
Mov Cap-2 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-

Approach	SB
HCM Control Delay, s	0.3
HCM LOS	

**Minor Lane/Major Mvmt**

























HCM 2010 Signalized Intersection Summary  
 3: Kietzke & Sierra Rose/Meadowood

12/3/2014

Movement	EBL	EBT	ESR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	103	149	137	115	108	206	172	885	180	152	851	107
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1881	1881	1900	1900	1881	1881	1881	1881	1900	1881	1881	1881
Adj Flow Rate, veh/h	112	162	149	125	117	224	187	962	196	165	925	116
Adj No. of Lanes	1	1	0	0	1	2	1	2	0	2	2	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	1	1	1	1	1	1	1	1	1	1	1	1
Cap, veh/h	178	346	318	220	192	1077	217	1334	272	223	1408	630
Arrive On Green	0.38	0.38	0.38	0.38	0.38	0.38	0.12	0.45	0.45	0.06	0.39	0.39
Sat Flow, veh/h	1046	904	831	454	503	2814	1792	2960	602	3476	3574	1599
Grp Volume(v), veh/h	112	0	311	242	0	224	187	580	578	165	925	116
Grp Sat Flow(s),veh/h/ln	1046	0	1735	956	0	1407	1792	1787	1775	1738	1787	1599
Q Serve(g_s), s	12.5	0.0	15.9	16.0	0.0	6.3	12.0	31.1	31.1	5.5	24.9	5.6
Cycle Q Clear(g_c), s	44.4	0.0	15.9	31.9	0.0	6.3	12.0	31.1	31.1	5.5	24.9	5.6
Prop In Lane	1.00		0.48	0.52		1.00	1.00		0.34	1.00		1.00
Lane Grp Cap(c), veh/h	178	0	664	413	0	1077	217	806	800	223	1408	630
V/C Ratio(X)	0.63	0.00	0.47	0.59	0.00	0.21	0.86	0.72	0.72	0.74	0.66	0.18
Avail Cap(c_a), veh/h	178	0	664	413	0	1077	320	806	800	296	1408	630
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	52.0	0.0	27.3	36.4	0.0	24.3	50.7	26.3	26.3	54.0	29.1	23.3
Incr Delay (d2), s/veh	7.0	0.0	0.5	2.2	0.0	0.1	14.4	5.5	5.6	6.6	2.4	0.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	4.0	0.0	7.7	7.2	0.0	2.5	6.8	16.5	16.5	2.8	12.7	2.6
LnGrp Delay(d),s/veh	58.9	0.0	27.8	38.6	0.0	24.4	65.1	31.8	31.9	60.6	31.6	23.9
LnGrp LOS	E		C	D		C	E	C	C	E	C	C
Approach Vol, veh/h		423			466			1345			1206	
Approach Delay, s/veh		36.0			31.8			36.4			34.8	
Approach LOS		D			C			D			C	
<b>Timer</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>	<b>8</b>				
Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	11.6	57.0		49.0	18.3	50.3		49.0				
Change Period (Y+Rc), s	4.0	4.0		4.0	4.0	4.0		4.0				
Max Green Setting (Gmax), s	10.0	53.0		45.0	21.0	42.0		45.0				
Max Q Clear Time (g_c+I1), s	7.5	33.1		46.4	14.0	26.9		33.9				
Green Ext Time (p_c), s	0.1	13.4		0.0	0.3	11.0		4.0				
<b>Intersection Summary</b>												
HCM 2010 Ctrl Delay			35.2									
HCM 2010 LOS			D									






















HCM 2010 Signalized Intersection Summary  
4: Kietzke & McCarran Blvd

12/3/2014

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	145	769	636	148	558	145	822	344	113	271	376	232
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1881	1881	1881	1881	1881	1881	1881	1881	1881	1881	1881	1881
Adj Flow Rate, veh/h	158	836	0	161	607	0	893	374	0	295	409	0
Adj No. of Lanes	1	3	1	1	3	1	2	2	1	2	2	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	1	1	1	1	1	1	1	1	1	1	1	1
Cap, veh/h	189	1619	504	190	1623	505	985	514	230	996	525	235
Arrive On Green	0.11	0.32	0.00	0.11	0.32	0.00	0.28	0.14	0.00	0.29	0.15	0.00
Sat Flow, veh/h	1792	5136	1599	1792	5136	1599	3476	3574	1599	3476	3574	1599
Grp Volume(v), veh/h	158	836	0	161	607	0	893	374	0	295	409	0
Grp Sat Flow(s),veh/h/ln	1792	1712	1599	1792	1712	1599	1738	1787	1599	1738	1787	1599
Q Serve(g_s), s	9.3	14.4	0.0	9.5	9.9	0.0	26.7	10.8	0.0	7.1	11.9	0.0
Cycle Q Clear(g_c), s	9.3	14.4	0.0	9.5	9.9	0.0	26.7	10.8	0.0	7.1	11.9	0.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	189	1619	504	190	1623	505	985	514	230	996	525	235
V/C Ratio(X)	0.84	0.52	0.00	0.85	0.37	0.00	0.91	0.73	0.00	0.30	0.78	0.00
Avail Cap(c_a), veh/h	249	1619	504	199	1623	505	1096	1690	756	996	1127	504
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	0.00	0.80	0.80	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	47.3	30.2	0.0	47.3	28.6	0.0	37.3	44.2	0.0	30.0	44.3	0.0
Incr Delay (d2), s/veh	17.0	1.2	0.0	26.4	0.1	0.0	8.4	1.6	0.0	0.2	2.5	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	5.5	7.0	0.0	6.1	4.7	0.0	13.9	5.5	0.0	3.5	6.0	0.0
LnGrp Delay(d),s/veh	64.4	31.4	0.0	73.8	28.7	0.0	45.7	45.8	0.0	30.2	46.9	0.0
LnGrp LOS	E	C		E	C		D	D		C	D	
Approach Vol, veh/h		994			768			1267			704	
Approach Delay, s/veh		36.6			38.2			45.7			39.9	
Approach LOS		D			D			D			D	
<b>Timer</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>	<b>8</b>				
Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	34.9	19.5	15.4	60.2	34.6	19.8	37.5	38.1				
Change Period (Y+Rc), s	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0				
Max Green Setting (Gmax), s	17.0	51.0	12.0	34.0	34.0	34.0	15.0	31.0				
Max Q Clear Time (g_c+I1), s	9.1	12.8	11.5	16.4	28.7	13.9	11.3	11.9				
Green Ext Time (p_c), s	2.2	2.7	0.0	8.7	1.8	2.0	0.1	9.1				
<b>Intersection Summary</b>												
HCM 2010 Ctrl Delay			40.6									
HCM 2010 LOS			D									

HCM 2010 Signalized Intersection Summary  
6: Talbot & McCarran Blvd

12/3/2014

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	142	1341	49	11	1538	63	255	24	61	48	11	216
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1881	1881	1900	1881	1881	1900	1881	1881	1900	1881	1881	1881
Adj Flow Rate, veh/h	154	1458	53	12	1672	68	277	26	66	52	12	0
Adj No. of Lanes	1	3	0	1	3	0	1	1	0	1	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	1	1	1	1	1	1	1	1	1	1	1	1
Cap, veh/h	186	3330	121	20	2844	116	377	107	272	303	426	362
Arrive On Green	0.07	0.44	0.44	0.01	0.56	0.56	0.23	0.23	0.23	0.23	0.23	0.00
Sat Flow, veh/h	1792	5087	185	1792	5063	206	1410	472	1198	1312	1881	1599
Grp Volume(v), veh/h	154	981	530	12	1130	610	277	0	92	52	12	0
Grp Sat Flow(s),veh/h/ln	1792	1712	1849	1792	1712	1845	1410	0	1670	1312	1881	1599
Q Serve(g_s), s	9.5	22.2	22.2	0.7	24.1	24.1	21.2	0.0	5.0	3.8	0.6	0.0
Cycle Q Clear(g_c), s	9.5	22.2	22.2	0.7	24.1	24.1	21.8	0.0	5.0	8.8	0.6	0.0
Prop In Lane	1.00		0.10	1.00		0.11	1.00		0.72	1.00		1.00
Lane Grp Cap(c), veh/h	186	2241	1210	20	1923	1036	377	0	379	303	426	362
V/C Ratio(X)	0.83	0.44	0.44	0.60	0.59	0.59	0.73	0.00	0.24	0.17	0.03	0.00
Avail Cap(c_a), veh/h	321	2241	1210	64	1923	1036	576	0	614	488	692	588
HCM Platoon Ratio	0.67	0.67	0.67	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.51	0.51	0.51	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	50.9	17.0	17.0	54.9	16.0	16.0	42.0	0.0	35.3	38.9	33.6	0.0
Incr Delay (d2), s/veh	4.8	0.3	0.6	25.7	1.3	2.4	2.8	0.0	0.3	0.3	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	4.9	10.6	11.5	0.5	11.7	12.9	8.5	0.0	2.4	1.4	0.3	0.0
LnGrp Delay(d),s/veh	55.7	17.4	17.6	80.6	17.3	18.4	44.8	0.0	35.6	39.2	33.6	0.0
LnGrp LOS	E	B	B	F	B	B	D		D	D	C	
Approach Vol, veh/h		1665			1752			369				64
Approach Delay, s/veh		21.0			18.1			42.5				38.1
Approach LOS		C			B			D				D
<b>Timer</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>	<b>8</b>				
Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	5.2	95.5		29.3	15.6	85.1		29.3				
Change Period (Y+Rc), s	4.0	4.0		4.0	4.0	4.0		4.0				
Max Green Setting (Gmax), s	4.0	73.0		41.0	20.0	57.0		41.0				
Max Q Clear Time (g_c+I1), s	2.7	24.2		10.8	11.5	26.1		23.8				
Green Ext Time (p_c), s	0.0	37.7		1.7	0.2	26.0		1.5				
<b>Intersection Summary</b>												
HCM 2010 Ctrl Delay			22.0									
HCM 2010 LOS			C									

HCM 2010 Signalized Intersection Summary  
7: Lakeside Dr & McCarran Blvd

12/3/2014

Movement	EBL	EBT	EBR	WBL	WBT	WER	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	64	924	81	291	1210	508	155	182	277	281	156	81
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1881	1881	1900	1881	1881	1881	1881	1881	1881	1881	1881	1881
Adj Flow Rate, veh/h	70	1004	0	316	1315	0	168	198	301	305	170	88
Adj No. of Lanes	1	2	0	1	2	1	1	1	1	1	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	1	1	1	1	1	1	1	1	1	1	1	1
Cap, veh/h	90	1279	0	348	1796	803	380	408	347	349	455	386
Arrive On Green	0.05	0.36	0.00	0.06	0.17	0.00	0.07	0.22	0.22	0.10	0.24	0.24
Sat Flow, veh/h	1792	3668	0	1792	3574	1599	1792	1881	1599	1792	1881	1599
Grp Volume(v), veh/h	70	1004	0	316	1315	0	168	198	301	305	170	88
Grp Sat Flow(s),veh/h/ln	1792	1787	0	1792	1787	1599	1792	1881	1599	1792	1881	1599
Q Serve(g_s), s	4.7	30.5	0.0	21.3	42.4	0.0	8.9	11.2	22.0	12.0	9.1	5.4
Cycle Q Clear(g_c), s	4.7	30.5	0.0	21.3	42.4	0.0	8.9	11.2	22.0	12.0	9.1	5.4
Prop In Lane	1.00		0.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	90	1279	0	349	1796	803	380	408	347	349	455	386
V/C Ratio(X)	0.78	0.78	0.00	0.91	0.73	0.00	0.44	0.49	0.87	0.87	0.37	0.23
Avail Cap(c_a), veh/h	133	1279	0	398	1796	803	380	496	421	349	542	461
HCM Platoon Ratio	1.00	1.00	1.00	0.33	0.33	0.33	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	0.74	0.74	0.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	57.0	34.8	0.0	55.7	42.9	0.0	33.9	41.6	45.9	38.5	38.4	36.9
Incr Delay (d2), s/veh	15.9	4.9	0.0	17.7	2.0	0.0	0.8	0.9	15.0	20.8	0.5	0.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.7	15.9	0.0	12.3	21.5	0.0	4.4	5.9	11.2	6.3	4.8	2.4
LnGrp Delay(d),s/veh	72.9	39.7	0.0	73.4	44.9	0.0	34.7	42.5	60.8	59.4	38.9	37.2
LnGrp LOS	E	D		E	D		C	D	E	E	D	D
Approach Vol, veh/h		1074			1631			667			563	
Approach Delay, s/veh		41.9			50.4			48.8			49.7	
Approach LOS		D			D			D			D	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	27.6	56.0	13.0	33.3	10.1	73.6	16.0	30.3				
Change Period (Y+Rc), s	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0				
Max Green Setting (Gmax), s	27.0	43.0	9.0	35.0	9.0	61.0	12.0	32.0				
Max Q Clear Time (g_c+I1), s	23.3	32.5	10.9	11.1	6.7	44.4	14.0	24.0				
Green Ext Time (p_c), s	0.3	8.8	0.0	3.6	0.0	12.9	0.0	2.3				
<b>Intersection Summary</b>												
HCM 2010 Ctrl Delay			47.7									
HCM 2010 LOS			D									

# **APPENDIX B**

Trip Generation Calculations

Land Use Assumptions for Trip Generation

Parcel	Land Use Details			Closest Match to ITE Land Use Data			Daily			AM Peak			PM Peak		
	Units of Development	Variable	Code	Land Use	Independent Variable	Rate	In	Out	Rate	In	Out	Rate	In	Out	
<b>Village I,II,III</b>															
Village I	Single Family Housing	99 Dwelling Units	99.0	210	Single-Family Detached Housing	Dwelling Units	9.57	50%	50%	0.75	25%	75%	1.01	60%	40%
Village II	Single Family Housing	62 Dwelling Units	62.0	210	Single-Family Detached Housing	Dwelling Units	9.57	50%	50%	0.75	25%	75%	1.01	60%	40%
Village III	Single Family Housing	50 Dwelling Units	50.0	210	Single-Family Detached Housing	Dwelling Units	9.57	50%	50%	0.75	25%	75%	1.01	60%	40%
<b>Equistrian Center and Village IV</b>															
Equistrian Center	Equistrian Center*	13 Members	13.0	Special Trip Generation Rate*			1.00	50%	50%	0.12	50%	50%	0.12	50%	50%
Estates Residential	Equistrian Estates	13 Dwelling Units	13.0	210	Single-Family Detached Housing	Dwelling Units	9.57	50%	50%	0.75	25%	75%	1.01	60%	40%
Village IV	Cottages	23 Dwelling Units	23.0	230	Residential Condominium/Townhouse	Dwelling Units	5.81	50%	50%	0.44	17%	83%	0.52	67%	33%
REDUCTION	Single Family Housing	4 Dwelling Units	-4.0	210	Single-Family Detached Housing	Dwelling Units	9.57	50%	50%	0.75	25%	75%	1.01	60%	40%
REDUCTION	Limited Commercial/Office	8,300 Square Feet	-8.3	710	General Office	KSF	11.01	50%	50%	1.55	88%	12%	1.49	17%	83%
<b>Village V, VI, VII</b>															
Village V	Cottages	35 Dwelling Units	35.0	230	Residential Condominium/Townhouse	Dwelling Units	5.81	50%	50%	0.44	17%	83%	0.52	67%	33%
Village VI	Single Family Housing	99 Dwelling Units	99.0	210	Single-Family Detached Housing	Dwelling Units	9.57	50%	50%	0.75	25%	75%	1.01	60%	40%
Village VII	Multi Family Apartments	310 Dwelling Units	310.0	220	Apartment	Dwelling Units	6.65	50%	50%	0.51	20%	80%	0.62	65%	35%
<b>Events Center</b>															
Event Center	Event Center	17,000 Square Feet	17.0	550	Church	KSF	9.11	50%	50%	0.56	62%	38%	0.55	48%	52%
Rental Cottages	Rental Cottages	0 Dwelling Units	0	311	All Suites Hotel	Rooms	4.90	50%	50%	0.38	55%	45%	0.40	45%	55%
<b>Retail-Commercial</b>															
Retail	Retail	15,000 Square Feet	15.00	820	Shopping Center	KSF	42.94	50%	50%	1.00	61%	39%	3.73	49%	51%
Restaurant	Sit-Down Restaurant	5,000 Square Feet	5.0	932	High-Turnover (Sit-Down) Restaurant	KSF	127.15	50%	50%	11.52	52%	48%	11.15	59%	41%
Office	Office	120,000 Square Feet	120.00	710	General Office	KSF	11.01	50%	50%	1.55	88%	12%	1.49	17%	83%
Medical Office	Medical Office	40,000 Square Feet	40	720	Medical-Dental Office Building	KSF	36.13	50%	50%	2.30	79%	21%	3.46	27%	73%
<b>Office-Medical-Retail</b>															
	General Office	20,000 Square Feet	20.00	710	General Office	KSF	11.01	50%	50%	1.55	88%	12%	1.49	17%	83%
	Medical Dental Office	40,000 Square Feet	40.00	720	Medical-Dental Office Building	KSF	36.13	50%	50%	2.30	79%	21%	3.46	27%	73%
	Retail	42,800 Square Feet	42.8	820	Shopping Center	KSF	42.94	50%	50%	1.00	61%	39%	3.73	49%	51%

\* No. of Members at Equistrian Center = No. of DU in Village IV.

\*Special Trip Generation Rate: Each member is anticipated to visit once every other day. Trips spread evenly over 8 hours. Therefore: 1 member visit\*1/2 of days\*2 trips per visit = 1 trip/member/day. 1 trip per day/8 hour period = 0.12 trips in the peak hour.

Weekday Average Daily Trip Generation Calculations

Land Use	Variable	ITE LU Code	Trip Rate	Trip Equation	Total Trips						Internal Trips				External Trips			Pass-By				Diverted Link				Net New		
					% In	% Out	Total	In	Out	In%	Out%	In	Out	Total	In	Out	% of Ext.	Total	In	Out	% of Ext.	Total	In	Out	Total	In	Out	
<b>Village I, II, III</b>																												
Village I	99.00 DU	210	9.57		50%	50%	947	474	473	5%	5%	24	24	899	450	449	0%	0	0	0	0%	0	0	0	0	889	450	449
Village II	62.00 DU	210	9.57		50%	50%	593	297	296	5%	5%	15	15	563	282	281	0%	0	0	0	0%	0	0	0	0	563	282	281
Village III	50.00 DU	210	9.57		50%	50%	479	239	240	5%	5%	12	12	455	227	228	0%	0	0	0	0%	0	0	0	0	455	227	228
<b>Sub-Total</b>							2019	1010	1009			51	51	1917	959	958	0%	0	0	0	0%	0	0	0	0	1917	959	958
<b>Equestrian Center and Village IV</b>																												
Equestrian Center	13.00 Member		1.00		50%	50%	13	7	6	5%	5%	0	0	13	7	6	0%	0	0	0	0%	0	0	0	0	13	7	6
Estates Residential	13.00 DU	210	9.57		50%	50%	124	62	62	5%	5%	3	3	118	59	59	0%	0	0	0	0%	0	0	0	0	118	59	59
Cottages	23.00 DU	230	5.81		50%	50%	134	67	67	5%	5%	3	3	128	64	64	0%	0	0	0	0%	0	0	0	0	128	64	64
<i>REDUCTION FOR EXISTING FACILITIES:</i>																												
Single Family Housing	-4.00 KSF	210	9.57		50%	50%	-38	-19	-19					-38	-19	-19	0%	0	0	0	0%	0	0	0	0	-38	-19	-19
Limited Commercial/Office	-8.30 Member		11.01		50%	50%	-81	-46	-45					-91	-46	-45	0%	0	0	0	0%	0	0	0	0	-91	-46	-45
<b>Sub-Total</b>							142	71	71			6	6	130	65	65	0%	0	0	0	0%	0	0	0	0	130	65	65
<b>Village V, VI, VII</b>																												
Village V	55.00 DU	230	5.81		50%	50%	203	102	101	5%	5%	5	5	193	97	96	0%	0	0	0	0%	0	0	0	0	193	97	96
Village VI	99.00 DU	210	9.57		50%	50%	947	473	474	5%	5%	24	24	899	449	450	0%	0	0	0	0%	0	0	0	0	889	449	450
Village VII	310.00 DU	220	6.65		50%	50%	2062	1031	1031	5%	5%	52	52	1958	979	979	0%	0	0	0	0%	0	0	0	0	1958	979	979
Village IX	0.00 DU	230	5.81		50%	50%	0	0	0	5%	5%	0	0	0	0	0	0%	0	0	0	0%	0	0	0	0	0	0	0
<b>Sub-Total</b>							3212	1606	1606			81	81	3050	1525	1525	0%	0	0	0	0%	0	0	0	0	3050	1525	1525
<b>Events Center</b>																												
Event Center	17.00 KSF	560	9.11		50%	50%	155	78	77					155	78	77	0%	0	0	0	0%	0	0	0	0	155	78	77
Rental Cottages	0.00 Rooms	311	4.90		50%	50%	0	0	0					0	0	0	0%	0	0	0	0%	0	0	0	0	0	0	0
<b>Sub-Total</b>							155	78	77			0	0	155	78	77	0%	0	0	0	0%	0	0	0	0	155	78	77
<b>Retail-Commercial</b>																												
Retail	15.00 KSF	820	42.94		50%	50%	644	322	322	12%	12%	39	39	566	283	283	0%	0	0	0	0%	0	0	0	0	566	283	283
Restaurant	5.00 KSF	932	127.15		50%	50%	636	318	318	12%	12%	38	38	560	280	280	0%	0	0	0	0%	0	0	0	0	560	280	280
Office	120.00 KSF	710	11.01		50%	50%	1321	660	661	12%	12%	79	79	1163	581	582	0%	0	0	0	0%	0	0	0	0	1163	581	582
Medical Office	40.00 KSF	720	36.13		50%	50%	1445	723	722	12%	12%	87	87	1271	636	635	0%	0	0	0	0%	0	0	0	0	1271	636	635
<b>Sub-Total</b>							4046	2023	2023			243	243	3560	1780	1780	0%	0	0	0	0%	0	0	0	0	3560	1780	1780
<b>Office-Medical-Retail</b>																												
General Office	20.00 KSF	710	11.01		50%	50%	220	110	110	17%	17%	19	19	182	91	91	0%	0	0	0	0%	0	0	0	0	182	91	91
Medical Dental Office	40.00 KSF	720	36.13		50%	50%	1445	722	723	17%	17%	123	123	1199	599	600	0%	0	0	0	0%	0	0	0	0	1199	599	600
Retail	42.80 KSF	820	42.94		50%	50%	1838	919	919	17%	17%	156	156	1526	763	763	0%	0	0	0	0%	0	0	0	0	1526	763	763
<b>Sub-Total</b>							3503	1751	1752			298	298	2907	1453	1454	0%	0	0	0	0%	0	0	0	0	2907	1453	1454
<b>TOTAL</b>							13,077	6,539	6,538			679	679	11,719	5,860	5,859	0%	0	0	0	0%	0	0	0	0	11,719	5,860	5,859
<b>Ranch Harrah TOTAL</b>							5,526	2,765	2,763			138	138	5,252	2,627	2,625	0%	0	0	0	0%	0	0	0	0	5,252	2,627	2,625
<b>Town Center TOTAL</b>							4,046	2,023	2,023			243	243	3,560	1,780	1,780	0%	0	0	0	0%	0	0	0	0	3,560	1,780	1,780
<b>Office/Medical TOTAL</b>							3,503	1,751	1,752			298	298	2,907	1,453	1,454	0%	0	0	0	0%	0	0	0	0	2,907	1,453	1,454

Weekday AM Peak Hour Trip Generation Calculations

Land Use	Variable	ITE LU Code	Trip Rate	Total Trips						Internal Trips				External Trips			Pass-By			Diverted Link			Net New				
				Trip Equation	% In	% Out	Total	In	Out	In	Out	In	Out	Total	In	Out	% of Ext.	Total	In	Out	% of Ext.	Total	In	Out			
<b>Village I, II, III</b>																											
Village I	99.00 DU	210	0.75		25%	75%	74	19	55	2%	2%	0	1	73	19	54	0%	0	0	0	0%	0	0	0	73	19	54
Village II	62.00 DU	210	0.75		25%	75%	47	12	35	2%	2%	0	1	46	12	34	0%	0	0	0	0%	0	0	0	46	12	34
Village III	50.00 DU	210	0.75		25%	75%	38	9	29	2%	2%	0	1	37	9	28	0%	0	0	0	0%	0	0	0	37	9	28
<b>Sub-Total</b>							159	40	119			0	3	156	40	116	0%	0	0	0	0%	0	0	0	156	40	116
<b>Equestrian Center and Village IV</b>																											
Equestrian Center	13.00 Member		0.12		50%	50%	2	1	1	0%	0%	0	0	2	1	1	0%	0	0	0	0%	0	0	0	2	1	1
Estates Residential	13.00 DU	210	0.75		25%	75%	10	3	7	2%	2%	0	0	10	3	7	0%	0	0	0	0%	0	0	0	10	3	7
Cottages	23.00 DU	230	0.44		17%	50%	10	2	8	2%	2%	0	0	10	2	8	0%	0	0	0	0%	0	0	0	10	2	8
<i>REDUCTION FOR EXISTING FACILITIES:</i>																											
Single Family Housing	-4.00 KSF	210	0.75		25%	50%	-3	-1	-2					-3	-1	-2	0%	0	0	0	0%	0	0	0	-3	-1	-2
Limited Commercial/Office	-8.30 Member		1.55		88%	50%	-13	-11	-2					-13	-11	-2	0%	0	0	0	0%	0	0	0	-13	-11	-2
<b>Sub-Total</b>							6	-6	12			0	0	6	-6	12	0%	0	0	0	0%	0	0	0	6	-6	12
<b>Village V, VI, VII</b>																											
Village V	35.00 DU	230	0.44		17%	83%	15	3	12	2%	2%	0	0	15	3	12	0%	0	0	0	0%	0	0	0	15	3	12
Village VI	99.00 DU	210	0.75		25%	75%	74	18	56	2%	2%	0	1	73	18	55	0%	0	0	0	0%	0	0	0	73	18	55
Village VII	310.00 DU	220	0.51		20%	80%	158	32	126	2%	2%	1	3	154	31	123	0%	0	0	0	0%	0	0	0	154	31	123
Village IX	0.00 DU	230	0.44		17%	83%	0	0	0	2%	2%	0	0	0	0	0	0%	0	0	0	0%	0	0	0	0	0	0
<b>Sub-Total</b>							247	53	194			1	4	242	52	190	0%	0	0	0	0%	0	0	0	242	52	190
<b>Events Center</b>																											
Event Center	17.00 KSF	560	0.56		62%	38%	10	6	4	0%	0%	0	0	10	6	4	0%	0	0	0	0%	0	0	0	10	6	4
Rental Cottages	0.00 Rooms	311	0.38		55%	45%	0	0	0	0%	0%	0	0	0	0	0	0%	0	0	0	0%	0	0	0	0	0	0
<b>Sub-Total</b>							10	6	4			0	0	10	6	4	0%	0	0	0	0%	0	0	0	10	6	4
<b>Retail-Commercial</b>																											
Retail	15.00 KSF	820	1.00		61%	39%	15	9	6	44%	50%	4	3	8	5	3	0%	0	0	0	0%	0	0	0	8	5	3
Restaurant	5.00 KSF	932	11.52		52%	48%	58	30	28	27%	36%	8	10	40	22	18	0%	0	0	0	0%	0	0	0	40	22	18
Office	120.00 KSF	710	1.55		88%	12%	186	164	22	5%	24%	8	5	173	156	17	0%	0	0	0	0%	0	0	0	173	156	17
Medical Office	40.00 KSF	720	2.30		79%	21%	92	73	19	5%	24%	4	5	83	69	14	0%	0	0	0	0%	0	0	0	83	69	14
<b>Sub-Total</b>							351	276	75			24	23	304	252	52	0%	0	0	0	0%	0	0	0	304	252	52
<b>Office-Medical-Retail</b>																											
General Office	20.00 KSF	710	1.55		88%	12%	31	27	4	7%	26%	2	1	28	25	3	0%	0	0	0	0%	0	0	0	28	25	3
Medical Dental Office	40.00 KSF	720	2.30		79%	21%	92	73	19	7%	26%	5	5	82	68	14	0%	0	0	0	0%	0	0	0	82	68	14
Retail	42.60 KSF	820	1.00		61%	39%	43	26	17	35%	35%	9	6	28	17	11	0%	0	0	0	0%	0	0	0	28	17	11
<b>Sub-Total</b>							166	126	40			16	12	138	110	28	0%	0	0	0	0%	0	0	0	138	110	28
<b>TOTAL</b>							939	495	444			41	42	856	454	402		0	0	0		0	0	0	856	454	402
<b>Ranch Harrah TOTAL</b>							422	93	329			1	7	414	92	322		0	0	0		0	0	0	414	92	322
<b>Town Center TOTAL</b>							351	276	75			24	23	304	252	52		0	0	0		0	0	0	304	252	52
<b>Office/Medical TOTAL</b>							166	126	40			16	12	138	110	28		0	0	0		0	0	0	138	110	28

Weekday PM Peak Hour Trip Generation Calculations

Land Use	Variable	ITE LU Code	Trip Rate	Total Trips						Internal Trips				External Trips			Pass-By			Diverted Link			Net New					
				Trip Equation	% In	% Out	Total	In	Out	In%	Out%	In	Out	Total	In	Out	% of Ext.	Total	In	Out	% of Ext.	Total	In	Out				
<b>Village I, II, III</b>																												
Village I	99.00	DU	210	1.01		60%	40%	100	60	40	7%	8%	4	3	93	56	37	0%	0	0	0	0%	0	0	0	93	56	37
Village II	62.00	DU	210	1.01		60%	40%	63	38	25	7%	8%	3	2	58	35	23	0%	0	0	0	0%	0	0	0	58	35	23
Village III	50.00	DU	210	1.01		60%	40%	51	31	20	7%	8%	2	2	47	29	18	0%	0	0	0	0%	0	0	0	47	29	18
<b>Sub-Total</b>								214	129	85			9	7	198	120	78	0%	0	0	0	0%	0	0	0	198	120	78
<b>Equisrian Center and Village IV</b>																												
Equisrian Center	13.00	Member		0.12		50%	50%	2	1	1	0%	0%	0	0	2	1	1	0%	0	0	0	0%	0	0	0	2	1	1
Estates Residential	13.00	DU	210	1.01		60%	40%	13	8	5	7%	8%	1	0	12	7	5	0%	0	0	0	0%	0	0	0	12	7	5
Cottages	23.00	DU	230	0.52		67%	50%	12	8	4	7%	8%	1	0	11	7	4	0%	0	0	0	0%	0	0	0	11	7	4
REDUCTION FOR EXISTING FACILITIES:																												
Single Family Housing	-4.00	KSF	210	1.01		60%	50%	-4	-2	-2					-4	-2	-2	0%	0	0	0	0%	0	0	0	-4	-2	-2
Limited Commercial/Office	-8.30	Member		1.49		17%	50%	-12	-2	-10					-12	-2	-10	0%	0	0	0	0%	0	0	0	-12	-2	-10
<b>Sub-Total</b>								11	13	-2			1	0	9	11	-2	0%	0	0	0	0%	0	0	0	9	11	-2
<b>Village V, VI, VII</b>																												
Village V	35.00	DU	230	0.52		67%	33%	18	12	6	7%	8%	1	0	17	11	6	0%	0	0	0	0%	0	0	0	17	11	6
Village VI	99.00	DU	210	1.01		60%	40%	100	60	40	7%	8%	4	3	93	56	37	0%	0	0	0	0%	0	0	0	93	56	37
Village VII	310.00	DU	220	0.62		65%	35%	192	125	67	7%	8%	9	5	178	116	62	0%	0	0	0	0%	0	0	0	178	116	62
Village IX	0.00	DU	230	0.52		67%	33%	0	0	0	7%	8%	0	0	0	0	0	0%	0	0	0	0%	0	0	0	0	0	0
<b>Sub-Total</b>								310	197	113			14	8	288	183	105	0%	0	0	0	0%	0	0	0	288	183	105
<b>Events Center</b>																												
Event Center	17.00	KSF	560	0.55		48%	52%	9	4	5	0%	0%	0	0	9	4	5	0%	0	0	0	0%	0	0	0	9	4	5
Rental Cottages	0.00	Rooms	311	0.40		45%	55%	0	0	0	0%	0%	0	0	0	0	0	0%	0	0	0	0%	0	0	0	0	0	0
<b>Sub-Total</b>								9	4	5			0	0	9	4	5	0%	0	0	0	0%	0	0	0	9	4	5
<b>Retail-Commercial</b>																												
Retail	15.00	KSF	820	3.73		49%	51%	56	27	29	41%	31%	11	9	36	16	20	44%	16	7	9	0%	0	0	0	20	9	11
Restaurant	5.00	KSF	932	11.15		59%	41%	56	33	23	27%	43%	9	10	37	24	13	43%	16	10	6	0%	0	0	0	21	14	7
Office	120.00	KSF	710	1.49		17%	83%	179	30	149	3%	1%	1	1	177	29	148	10%	18	3	15	0%	0	0	0	159	26	133
Medical Office	40.00	KSF	720	3.46		27%	73%	138	37	101	3%	1%	1	1	136	36	100	0%	0	0	0	0%	0	0	0	136	36	100
<b>Sub-Total</b>								429	127	302			22	21	386	105	281	0%	50	20	30	0%	0	0	0	336	85	251
<b>Office-Medical-Retail</b>																												
General Office	20.00	KSF	710	1.49		17%	83%	30	5	25	24%	7%	1	2	27	4	23	10%	3	0	3	0%	0	0	0	24	4	20
Medical Dental Office	40.00	KSF	720	3.46		27%	73%	138	37	101	24%	7%	9	7	122	28	94	0%	0	0	0	0%	0	0	0	122	28	94
Retail	42.80	KSF	820	3.73		49%	51%	160	78	82	18%	28%	14	23	123	64	59	44%	54	28	26	0%	0	0	0	69	36	33
<b>Sub-Total</b>								328	120	208			24	32	272	96	176	0%	57	28	29	0%	0	0	0	215	68	147
<b>TOTAL</b>																												
								1,301	590	711			70	68	1,162	519	643		107	48	59		0	0	0	1,055	471	584
<b>Ranch Harrah TOTAL</b>								544	343	201			24	15	504	318	186		0	0	0		0	0	0	504	318	186
<b>Town Center TOTAL</b>								429	127	302			22	21	386	105	281		50	20	30		0	0	0	336	85	251
<b>Office/Medical TOTAL</b>								328	120	208			24	32	272	96	176		57	28	29		0	0	0	215	68	147

NCHRP 684 Internal Trip Capture Estimation Tool			
Project Name:	Rancharrah	Organization:	Traffic Works
Project Location:	Reno	Performed By:	Uday Maripalli
Scenario Description:	DD	Date:	11/10/2014
Analysis Year:	2014	Checked By:	
Analysis Period:	AM Street Peak Hour	Date:	

Table 1-A: Base Vehicle-Trip Generation Estimates (Single-Use Site Estimate)						
Land Use	Development Data (For Information Only)			Estimated Vehicle-Trips <sup>3</sup>		
	ITE LUCs <sup>1</sup>	Quantity	Units	Total	Entering	Exiting
Office	710/720	60	KSF	123	100	23
Retail	820	43	KSF	43	26	17
Restaurant				0		
Cinema/Entertainment				0		
Residential	210/230	691	Units	426	98	328
Hotel				0		
All Other Land Uses <sup>2</sup>				0		
				592	224	368

Table 2-A: Mode Split and Vehicle Occupancy Estimates						
Land Use	Entering Trips			Exiting Trips		
	Veh. Occ. <sup>4</sup>	% Transit	% Non-Motorized	Veh. Occ. <sup>4</sup>	% Transit	% Non-Motorized
Office		0%	0%		0%	0%
Retail		0%	0%		0%	0%
Restaurant		0%	0%		0%	0%
Cinema/Entertainment		0%	0%		0%	0%
Residential		0%	0%		0%	0%
Hotel		0%	0%		0%	0%
All Other Land Uses <sup>2</sup>		0%	0%		0%	0%

Table 3-A: Average Land Use Interchange Distances (Feet Walking Distance)						
Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office						
Retail						
Restaurant						
Cinema/Entertainment						
Residential						
Hotel						

Table 4-A: Internal Person-Trip Origin-Destination Matrix*						
Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		6	0	0	0	0
Retail	4		0	0	2	0
Restaurant	0	0		0	0	0
Cinema/Entertainment	0	0	0		0	0
Residential	3	3	0	0		0
Hotel	0	0	0	0	0	

Table 5-A: Computations Summary			
	Total	Entering	Exiting
All Person-Trips	592	224	368
Internal Capture Percentage	6%	8%	5%
External Vehicle-Trips <sup>5</sup>	556	206	350
External Transit-Trips <sup>6</sup>	0	0	0
External Non-Motorized Trips <sup>6</sup>	0	0	0

Table 6-A: Internal Trip Capture Percentages by Land Use		
Land Use	Entering Trips	Exiting Trips
Office	7%	26%
Retail	35%	35%
Restaurant	N/A	N/A
Cinema/Entertainment	N/A	N/A
Residential	2%	2%
Hotel	N/A	N/A

<sup>1</sup>Land Use Codes (LUCs) from *Trip Generation Manual*, published by the Institute of Transportation Engineers.

<sup>2</sup>Total estimate for all other land uses at mixed-use development site is not subject to internal trip capture computations in this estimator.

<sup>3</sup>Enter trips assuming no transit or non-motorized trips (as assumed in ITE *Trip Generation Manual*).

<sup>4</sup>Enter vehicle occupancy assumed in Table 1-A vehicle trips. If vehicle occupancy changes for proposed mixed-use project, manual adjustments must be made to Tables 5-A, 9-A (O and D). Enter transit, non-motorized percentages that will result with proposed mixed-use project complete.

<sup>5</sup>Vehicle-trips computed using the mode split and vehicle occupancy values provided in Table 2-A.

<sup>6</sup>Person-Trips

\*Indicates computation that has been rounded to the nearest whole number.

<b>Project Name:</b>	Rancharrah
<b>Analysis Period:</b>	AM Street Peak Hour

Land Use	Table 7-A (D): Entering Trips			Table 7-A (O): Exiting Trips		
	Veh. Occ.	Vehicle-Trips	Person-Trips*	Veh. Occ.	Vehicle-Trips	Person-Trips*
Office	1.00	100	100	1.00	23	23
Retail	1.00	26	26	1.00	17	17
Restaurant	1.00	0	0	1.00	0	0
Cinema/Entertainment	1.00	0	0	1.00	0	0
Residential	1.00	98	98	1.00	328	328
Hotel	1.00	0	0	1.00	0	0

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		6	14	0	0	0
Retail	5		2	0	2	0
Restaurant	0	0		0	0	0
Cinema/Entertainment	0	0	0		0	0
Residential	7	3	66	0		0
Hotel	0	0	0	0	0	

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		8	0	0	0	0
Retail	4		0	0	2	0
Restaurant	14	2		0	5	0
Cinema/Entertainment	0	0	0		0	0
Residential	3	4	0	0		0
Hotel	3	1	0	0	0	

Destination Land Use	Person-Trip Estimates			External Trips by Mode*		
	Internal	External	Total	Vehicles <sup>1</sup>	Transit <sup>2</sup>	Non-Motorized <sup>2</sup>
Office	7	93	100	93	0	0
Retail	9	17	26	17	0	0
Restaurant	0	0	0	0	0	0
Cinema/Entertainment	0	0	0	0	0	0
Residential	2	96	98	96	0	0
Hotel	0	0	0	0	0	0
All Other Land Uses <sup>3</sup>	0	0	0	0	0	0

Origin Land Use	Person-Trip Estimates			External Trips by Mode*		
	Internal	External	Total	Vehicles <sup>1</sup>	Transit <sup>2</sup>	Non-Motorized <sup>2</sup>
Office	6	17	23	17	0	0
Retail	6	11	17	11	0	0
Restaurant	0	0	0	0	0	0
Cinema/Entertainment	0	0	0	0	0	0
Residential	6	322	328	322	0	0
Hotel	0	0	0	0	0	0
All Other Land Uses <sup>3</sup>	0	0	0	0	0	0

<sup>1</sup>Vehicle-trips computed using the mode split and vehicle occupancy values provided in Table 2-A

<sup>2</sup>Person-Trips

<sup>3</sup>Total estimate for all other land uses at mixed-use development site is not subject to internal trip capture computations in this estimator

\*Indicates computation that has been rounded to the nearest whole number.

NCHRP 684 Internal Trip Capture Estimation Tool			
Project Name:	Rancharrah	Organization:	Traffic Works
Project Location:	Reno	Performed By:	Uday Maripalli
Scenario Description:	DD	Date:	11/10/2014
Analysis Year:	2014	Checked By:	
Analysis Period:	PM Street Peak Hour	Date:	

Table 1-P: Base Vehicle-Trip Generation Estimates (Single-Use Site Estimate)						
Land Use	Development Data (For Information Only)			Estimated Vehicle-Trips <sup>3</sup>		
	ITE LUCs <sup>1</sup>	Quantity	Units	Total	Entering	Exiting
Office	710/720	60	KSF	168	42	126
Retail	820	43	KSF	160	78	82
Restaurant				0		
Cinema/Entertainment				0		
Residential	210/230	691	Units	549	342	207
Hotel				0		
All Other Land Uses <sup>2</sup>				0		
				877	462	415

Table 2-P: Mode Split and Vehicle Occupancy Estimates						
Land Use	Entering Trips			Exiting Trips		
	Veh. Occ. <sup>4</sup>	% Transit	% Non-Motorized	Veh. Occ. <sup>4</sup>	% Transit	% Non-Motorized
Office		0%	0%		0%	0%
Retail		0%	0%		0%	0%
Restaurant		0%	0%		0%	0%
Cinema/Entertainment		0%	0%		0%	0%
Residential		0%	0%		0%	0%
Hotel		0%	0%		0%	0%
All Other Land Uses <sup>2</sup>		0%	0%		0%	0%

Table 3-P: Average Land Use Interchange Distances (Feet Walking Distance)						
Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office						
Retail						
Restaurant						
Cinema/Entertainment						
Residential						
Hotel						

Table 4-P: Internal Person-Trip Origin-Destination Matrix*						
Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		6	0	0	3	0
Retail	2		0	0	21	0
Restaurant	0	0		0	0	0
Cinema/Entertainment	0	0	0		0	0
Residential	8	8	0	0		0
Hotel	0	0	0	0	0	

Table 5-P: Computations Summary			
	Total	Entering	Exiting
All Person-Trips	877	462	415
Internal Capture Percentage	11%	10%	12%
External Vehicle-Trips <sup>5</sup>	781	414	367
External Transit-Trips <sup>6</sup>	0	0	0
External Non-Motorized Trips <sup>6</sup>	0	0	0

Table 6-P: Internal Trip Capture Percentages by Land Use		
Land Use	Entering Trips	Exiting Trips
Office	24%	7%
Retail	18%	28%
Restaurant	N/A	N/A
Cinema/Entertainment	N/A	N/A
Residential	7%	8%
Hotel	N/A	N/A

<sup>1</sup>Land Use Codes (LUCs) from *Trip Generation Manual*, published by the Institute of Transportation Engineers.

<sup>2</sup>Total estimate for all other land uses at mixed-use development site is not subject to internal trip capture computations in this estimator.

<sup>3</sup>Enter trips assuming no transit or non-motorized trips (as assumed in ITE *Trip Generation Manual*).

<sup>4</sup>Enter vehicle occupancy assumed in Table 1-P vehicle trips. If vehicle occupancy changes for proposed mixed-use project, manual adjustments must be made.

<sup>5</sup>Vehicle-trips computed using the mode split and vehicle occupancy values provided in Table 2-P.

<sup>6</sup>Person-Trips

\*Indicates computation that has been rounded to the nearest whole number.

Estimation Tool Developed by the Texas A&M Transportation Institute - Version 2013.1

<b>Project Name:</b>	Rancharrah
<b>Analysis Period:</b>	PM Street Peak Hour

Land Use	Table 7-P (D): Entering Trips			Table 7-P (O): Exiting Trips		
	Veh. Occ.	Vehicle-Trips	Person-Trips*	Veh. Occ.	Vehicle-Trips	Person-Trips*
Office	1.00	42	42	1.00	126	126
Retail	1.00	78	78	1.00	82	82
Restaurant	1.00	0	0	1.00	0	0
Cinema/Entertainment	1.00	0	0	1.00	0	0
Residential	1.00	342	342	1.00	207	207
Hotel	1.00	0	0	1.00	0	0

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		25	5	0	3	0
Retail	2		24	3	21	4
Restaurant	0	0		0	0	0
Cinema/Entertainment	0	0	0		0	0
Residential	8	87	43	0		6
Hotel	0	0	0	0	0	

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		6	0	0	14	0
Retail	13		0	0	157	0
Restaurant	13	39		0	55	0
Cinema/Entertainment	3	3	0		14	0
Residential	24	8	0	0		0
Hotel	0	2	0	0	0	

Destination Land Use	Person-Trip Estimates			External Trips by Mode*		
	Internal	External	Total	Vehicles <sup>1</sup>	Transit <sup>2</sup>	Non-Motorized <sup>2</sup>
Office	10	32	42	32	0	0
Retail	14	64	78	64	0	0
Restaurant	0	0	0	0	0	0
Cinema/Entertainment	0	0	0	0	0	0
Residential	24	318	342	318	0	0
Hotel	0	0	0	0	0	0
All Other Land Uses <sup>3</sup>	0	0	0	0	0	0

Origin Land Use	Person-Trip Estimates			External Trips by Mode*		
	Internal	External	Total	Vehicles <sup>1</sup>	Transit <sup>2</sup>	Non-Motorized <sup>2</sup>
Office	9	117	126	117	0	0
Retail	23	59	82	59	0	0
Restaurant	0	0	0	0	0	0
Cinema/Entertainment	0	0	0	0	0	0
Residential	16	191	207	191	0	0
Hotel	0	0	0	0	0	0
All Other Land Uses <sup>3</sup>	0	0	0	0	0	0

<sup>1</sup>Vehicle-trips computed using the mode split and vehicle occupancy values provided in Table 2-P

<sup>2</sup>Person-Trips

<sup>3</sup>Total estimate for all other land uses at mixed-use development site is not subject to internal trip capture computations in this estimator

\*Indicates computation that has been rounded to the nearest whole number.

# **APPENDIX C**

Existing Plus Project Conditions LOS Calculations

Intersection	
Int Delay, s/veh	0.9

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR
Vol, veh/h	0	0	76	2	0	3	48	722	36
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None
Storage Length	-	-	0	0	-	-	50	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	0	83	2	0	3	52	785	39

Major/Minor	Minor2			Minor1			Major1		
Conflicting Flow All	1518	1949	520	1410	1973	412	1040	0	0
Stage 1	1021	1021	-	909	909	-	-	-	-
Stage 2	497	928	-	501	1064	-	-	-	-
Critical Hdwy	7.54	6.54	6.94	7.54	6.54	6.94	4.14	-	-
Critical Hdwy Stg 1	6.54	5.54	-	6.54	5.54	-	-	-	-
Critical Hdwy Stg 2	6.54	5.54	-	6.54	5.54	-	-	-	-
Follow-up Hdwy	3.52	4.02	3.32	3.52	4.02	3.32	2.22	-	-
Pot Cap-1 Maneuver	82	64	501	98	62	589	664	-	-
Stage 1	253	312	-	296	352	-	-	-	-
Stage 2	523	345	-	521	298	-	-	-	-
Platoon blocked, %									
Mov Cap-1 Maneuver	76	58	501	76	56	589	664	-	-
Mov Cap-2 Maneuver	76	58	-	76	56	-	-	-	-
Stage 1	233	307	-	273	324	-	-	-	-
Stage 2	479	318	-	429	294	-	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s	13.6	28.4	0.6
HCM LOS	B	D	

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	664	-	-	501	159	802	-	-
HCM Lane V/C Ratio	0.079	-	-	0.165	0.034	0.015	-	-
HCM Control Delay (s)	10.9	-	-	13.6	28.4	9.6	-	-
HCM Lane LOS	B	-	-	B	D	A	-	-
HCM 95th %tile Q(veh)	0.3	-	-	0.6	0.1	0	-	-

**Intersection**

Int Delay, s/veh

Movement	SBL	SBT	SBR
Vol, veh/h	11	878	79
Conflicting Peds, #/hr	0	0	0
Sign Control	Free	Free	Free
RT Channelized	-	-	None
Storage Length	150	-	-
Veh in Median Storage, #	-	0	-
Grade, %	-	0	-
Peak Hour Factor	92	92	92
Heavy Vehicles, %	2	2	2
Mvmt Flow	12	954	86

**Major/Minor Major2**

Conflicting Flow All	824	0	0
Stage 1	-	-	-
Stage 2	-	-	-
Critical Hdwy	4.14	-	-
Critical Hdwy Stg 1	-	-	-
Critical Hdwy Stg 2	-	-	-
Follow-up Hdwy	2.22	-	-
Pot Cap-1 Maneuver	802	-	-
Stage 1	-	-	-
Stage 2	-	-	-
Platoon blocked, %		-	-
Mov Cap-1 Maneuver	802	-	-
Mov Cap-2 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-

**Approach SB**

HCM Control Delay, s	0.1
HCM LOS	

**Minor Lane/Major Mvmt**

Intersection	
Int Delay, s/veh	5.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR
Vol, veh/h	39	0	13	5	0	7	63	639	23
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	130	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2
Mvmt Flow	42	0	14	5	0	8	68	695	25

Major/Minor	Minor2			Minor1			Major1		
Conflicting Flow All	1698	2071	615	1443	2160	360	1229	0	0
Stage 1	1214	1214	-	844	844	-	-	-	-
Stage 2	484	857	-	599	1316	-	-	-	-
Critical Hdwy	7.54	6.54	6.94	7.54	6.54	6.94	4.14	-	-
Critical Hdwy Stg 1	6.54	5.54	-	6.54	5.54	-	-	-	-
Critical Hdwy Stg 2	6.54	5.54	-	6.54	5.54	-	-	-	-
Follow-up Hdwy	3.52	4.02	3.32	3.52	4.02	3.32	2.22	-	-
Pot Cap-1 Maneuver	60	53	434	93	47	637	563	-	-
Stage 1	193	253	-	324	377	-	-	-	-
Stage 2	533	372	-	455	226	-	-	-	-
Platoon blocked, %									
Mov Cap-1 Maneuver	52	44	434	79	39	637	563	-	-
Mov Cap-2 Maneuver	52	44	-	79	39	-	-	-	-
Stage 1	170	241	-	285	331	-	-	-	-
Stage 2	463	327	-	419	215	-	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s	170.6	29.2	1.1
HCM LOS	F	D	

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	563	-	-	67	162	877	-	-
HCM Lane V/C Ratio	0.122	-	-	0.844	0.081	0.05	-	-
HCM Control Delay (s)	12.3	-	-	170.6	29.2	9.3	-	-
HCM Lane LOS	B	-	-	F	D	A	-	-
HCM 95th %tile Q(veh)	0.4	-	-	4	0.3	0.2	-	-

**Intersection**

Int Delay, s/veh

Movement	SBL	SBT	SBR
Vol, veh/h	40	942	189
Conflicting Peds, #/hr	0	0	0
Sign Control	Free	Free	Free
RT Channelized	-	-	None
Storage Length	100	-	-
Veh in Median Storage, #	-	0	-
Grade, %	-	0	-
Peak Hour Factor	92	92	92
Heavy Vehicles, %	2	2	2
Mvmt Flow	43	1024	205

**Major/Minor**

Major2

Conflicting Flow All	720	0	0
Stage 1	-	-	-
Stage 2	-	-	-
Critical Hdwy	4.14	-	-
Critical Hdwy Stg 1	-	-	-
Critical Hdwy Stg 2	-	-	-
Follow-up Hdwy	2.22	-	-
Pot Cap-1 Maneuver	877	-	-
Stage 1	-	-	-
Stage 2	-	-	-
Platoon blocked, %		-	-
Mov Cap-1 Maneuver	877	-	-
Mov Cap-2 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-

**Approach**






















SB

HCM Control Delay, s	0.3
HCM LOS	

**Minor Lane/Major Mvmt**

HCM 2010 Signalized Intersection Summary  
 3: Kietzke & Sierra Rose/Meadowood

2/20/2015

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	68	87	111	130	132	54	135	480	70	50	930	62
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1900	1900	1863	1863	1863	1863	1900	1863	1863	1863
Adj Flow Rate, veh/h	74	95	121	141	143	59	147	522	76	54	1011	67
Adj No. of Lanes	1	1	0	0	1	2	1	2	0	2	2	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	85	211	269	191	150	789	183	1679	244	117	1671	747
Arrive On Green	0.28	0.28	0.28	0.28	0.28	0.28	0.10	0.54	0.54	0.03	0.47	0.47
Sat Flow, veh/h	1175	746	950	448	531	2787	1774	3103	450	3442	3539	1583
Grp Volume(v), veh/h	74	0	216	284	0	59	147	297	301	54	1011	67
Grp Sat Flow(s),veh/h/ln	1175	0	1695	980	0	1393	1774	1770	1783	1721	1770	1583
Q Serve(g_s), s	0.0	0.0	8.9	15.1	0.0	1.3	6.9	7.8	7.9	1.3	17.9	2.0
Cycle Q Clear(g_c), s	24.0	0.0	8.9	24.0	0.0	1.3	6.9	7.8	7.9	1.3	17.9	2.0
Prop In Lane	1.00		0.56	0.50		1.00	1.00		0.25	1.00		1.00
Lane Grp Cap(c), veh/h	85	0	480	341	0	789	183	958	965	117	1671	747
V/C Ratio(X)	0.87	0.00	0.45	0.83	0.00	0.07	0.80	0.31	0.31	0.46	0.61	0.09
Avail Cap(c_a), veh/h	85	0	480	341	0	789	293	958	965	609	1671	747
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	42.4	0.0	24.9	33.8	0.0	22.2	37.2	10.7	10.7	40.2	16.5	12.3
Incr Delay (d2), s/veh	57.3	0.0	0.7	16.0	0.0	0.0	8.1	0.8	0.8	2.8	1.6	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.1	0.0	4.2	8.1	0.0	0.5	3.8	4.0	4.1	0.7	9.1	0.9
LnGrp Delay(d),s/veh	99.7	0.0	25.6	49.7	0.0	22.3	45.3	11.6	11.6	43.0	18.2	12.6
LnGrp LOS	F		C	D		C	D	B	B	D	B	B
Approach Vol, veh/h		290			343			745			1132	
Approach Delay, s/veh		44.5			45.0			18.2			19.0	
Approach LOS		D			D			B			B	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	6.9	49.9		28.0	12.7	44.0		28.0				
Change Period (Y+Rc), s	4.0	4.0		4.0	4.0	4.0		4.0				
Max Green Setting (Gmax), s	15.0	39.0		24.0	14.0	40.0		24.0				
Max Q Clear Time (g_c+1), s	3.3	9.9		26.0	8.9	19.9		26.0				
Green Ext Time (p_c), s	0.1	12.5		0.0	0.1	10.4		0.0				
<b>Intersection Summary</b>												
HCM 2010 Ctrl Delay			25.3									
HCM 2010 LOS			C									

# HCM 2010 Signalized Intersection Summary

## 4: Kietzke & McCarran Blvd

2/20/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	103	720	681	142	331	44	447	171	58	92	269	215
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	0.60	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	107	750	0	148	345	0	466	178	0	96	280	0
Adj No. of Lanes	1	3	1	1	3	1	2	2	1	2	2	1
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	136	2223	692	183	2359	441	563	300	134	667	407	182
Arrive On Green	0.08	0.44	0.00	0.10	0.46	0.00	0.16	0.08	0.00	0.19	0.11	0.00
Sat Flow, veh/h	1774	5085	1583	1774	5085	950	3442	3539	1583	3442	3539	1583
Grp Volume(v), veh/h	107	750	0	148	345	0	466	178	0	96	280	0
Grp Sat Flow(s),veh/h/ln	1774	1695	1583	1774	1695	950	1721	1770	1583	1721	1770	1583
Q Serve(g_s), s	5.2	8.6	0.0	7.2	3.4	0.0	11.6	4.3	0.0	2.0	6.7	0.0
Cycle Q Clear(g_c), s	5.2	8.6	0.0	7.2	3.4	0.0	11.6	4.3	0.0	2.0	6.7	0.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	136	2223	692	183	2359	441	563	300	134	667	407	182
V/C Ratio(X)	0.79	0.34	0.00	0.81	0.15	0.00	0.83	0.59	0.00	0.14	0.69	0.00
Avail Cap(c_a), veh/h	201	2223	692	301	2359	441	740	1842	824	667	1362	609
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	0.00	0.97	0.97	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	40.1	16.4	0.0	38.8	13.6	0.0	35.8	39.0	0.0	29.5	37.6	0.0
Incr Delay (d2), s/veh	11.8	0.4	0.0	8.2	0.1	0.0	5.8	1.8	0.0	0.1	2.1	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.0	4.1	0.0	4.0	1.6	0.0	6.0	2.2	0.0	1.0	3.4	0.0
LnGrp Delay(d),s/veh	51.9	16.8	0.0	46.9	13.8	0.0	41.5	40.8	0.0	29.6	39.7	0.0
LnGrp LOS	D	B		D	B		D	D		C	D	
Approach Vol, veh/h		857			493			644			376	
Approach Delay, s/veh		21.2			23.7			41.3			37.1	
Approach LOS		C			C			D			D	
<b>Timer</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>	<b>8</b>				
Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	21.1	11.5	13.1	74.3	18.5	14.2	10.8	76.6				
Change Period (Y+Rc), s	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0				
Max Green Setting (Gmax), s	7.0	46.0	15.0	36.0	19.0	34.0	10.0	41.0				
Max Q Clear Time (g_c+I1), s	4.0	6.3	9.2	10.6	13.6	8.7	7.2	5.4				
Green Ext Time (p_c), s	0.5	1.2	0.2	7.5	0.9	1.4	0.1	8.2				
<b>Intersection Summary</b>												
HCM 2010 Ctrl Delay			29.7									
HCM 2010 LOS			C									

HCM 2010 Signalized Intersection Summary  
6: Talbot & McCarran Blvd

2/20/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	134	1368	157	105	865	23	138	25	99	37	29	63
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1900	1863	1863	1900	1863	1863	1863
Adj Flow Rate, veh/h	144	1471	169	113	930	25	148	27	106	40	31	0
Adj No. of Lanes	1	3	0	1	3	0	1	1	0	1	1	1
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	180	3015	346	143	3210	86	257	50	195	164	279	237
Arrive On Green	0.03	0.21	0.21	0.08	0.63	0.63	0.15	0.15	0.15	0.15	0.15	0.00
Sat Flow, veh/h	1774	4628	531	1774	5092	137	1373	332	1302	1252	1863	1583
Grp Volume(v), veh/h	144	1077	563	113	619	336	148	0	133	40	31	0
Grp Sat Flow(s), veh/h/ln	1774	1695	1769	1774	1695	1839	1373	0	1633	1252	1863	1583
Q Serve(g_s), s	8.2	28.2	28.3	6.3	8.4	8.4	10.6	0.0	7.6	3.1	1.5	0.0
Cycle Q Clear(g_c), s	8.2	28.2	28.3	6.3	8.4	8.4	12.0	0.0	7.6	10.7	1.5	0.0
Prop In Lane	1.00		0.30	1.00		0.07	1.00		0.80	1.00		1.00
Lane Grp Cap(c), veh/h	180	2208	1152	143	2137	1159	257	0	245	164	279	237
V/C Ratio(X)	0.80	0.49	0.49	0.79	0.29	0.29	0.58	0.00	0.54	0.24	0.11	0.00
Avail Cap(c_a), veh/h	455	2208	1152	315	2137	1159	376	0	387	273	441	375
HCM Platoon Ratio	0.33	0.33	0.33	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.46	0.46	0.46	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	47.9	24.9	25.0	45.8	8.5	8.5	42.4	0.0	39.9	44.8	37.2	0.0
Incr Delay (d2), s/veh	3.8	0.4	0.7	9.5	0.3	0.6	2.0	0.0	1.9	0.8	0.2	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	4.2	13.4	14.1	3.5	4.0	4.4	4.2	0.0	3.6	1.1	0.8	0.0
LnGrp Delay(d),s/veh	51.8	25.3	25.6	55.2	8.8	9.1	44.5	0.0	41.7	45.6	37.4	0.0
LnGrp LOS	D	C	C	E	A	A	D		D	D	D	
Approach Vol, veh/h		1784			1068			281			71	
Approach Delay, s/veh		27.6			13.8			43.2			42.0	
Approach LOS		C			B			D			D	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	12.1	88.7		19.2	14.3	86.5		19.2				
Change Period (Y+Rc), s	4.0	4.0		4.0	4.0	4.0		4.0				
Max Green Setting (Gmax), s	18.0	66.0		24.0	26.0	58.0		24.0				
Max Q Clear Time (g_c+l1), s	8.3	30.3		12.7	10.2	10.4		14.0				
Green Ext Time (p_c), s	0.2	23.9		1.2	0.3	28.6		1.1				
<b>Intersection Summary</b>												
HCM 2010 Ctrl Delay			24.7									
HCM 2010 LOS			C									

HCM 2010 Signalized Intersection Summary  
7: Lakeside Dr & McCarran Blvd

2/20/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	46	992	47	244	527	295	69	151	299	318	129	39
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1863	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	50	1078	0	265	573	0	75	164	325	346	140	42
Adj No. of Lanes	1	2	0	1	2	1	1	1	1	1	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	64	1201	0	298	1667	746	407	435	370	415	585	497
Arrive On Green	0.04	0.34	0.00	0.06	0.16	0.00	0.04	0.23	0.23	0.12	0.31	0.31
Sat Flow, veh/h	1774	3632	0	1774	3539	1583	1774	1863	1583	1774	1863	1583
Grp Volume(v), veh/h	50	1078	0	265	573	0	75	164	325	346	140	42
Grp Sat Flow(s),veh/h/ln	1774	1770	0	1774	1770	1583	1774	1863	1583	1774	1863	1583
Q Serve(g_s), s	3.1	32.4	0.0	16.6	16.2	0.0	3.6	8.3	22.2	13.0	6.2	2.1
Cycle Q Clear(g_c), s	3.1	32.4	0.0	16.6	16.2	0.0	3.6	8.3	22.2	13.0	6.2	2.1
Prop In Lane	1.00		0.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	64	1201	0	298	1667	746	407	435	370	415	585	497
V/C Ratio(X)	0.78	0.90	0.00	0.89	0.34	0.00	0.18	0.38	0.88	0.83	0.24	0.08
Avail Cap(c_a), veh/h	127	1201	0	333	1667	746	407	533	453	415	682	580
HCM Platoon Ratio	1.00	1.00	1.00	0.33	0.33	0.33	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	0.95	0.95	0.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	53.5	35.1	0.0	51.8	31.8	0.0	31.2	36.1	41.4	31.6	28.5	27.1
Incr Delay (d2), s/veh	17.9	10.6	0.0	21.8	0.5	0.0	0.2	0.5	15.4	13.7	0.2	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.9	17.5	0.0	10.0	8.1	0.0	1.8	4.3	11.2	5.7	3.2	0.9
LnGrp Delay(d),s/veh	71.4	45.7	0.0	73.6	32.4	0.0	31.4	36.6	56.7	45.3	28.7	27.1
LnGrp LOS	E	D		E	C		C	D	E	D	C	C
Approach Vol, veh/h		1128			838			564			528	
Approach Delay, s/veh		46.9			45.4			47.5			39.5	
Approach LOS		D			D			D			D	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	22.8	50.1	8.0	39.1	8.1	64.8	17.0	30.1				
Change Period (Y+Rc), s	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0				
Max Green Setting (Gmax), s	21.0	38.0	4.0	41.0	8.0	51.0	13.0	32.0				
Max Q Clear Time (g_c+l1), s	18.6	34.4	5.6	8.2	5.1	18.2	15.0	24.2				
Green Ext Time (p_c), s	0.2	2.8	0.0	3.2	0.0	13.8	0.0	2.0				
<b>Intersection Summary</b>												
HCM 2010 Ctrl Delay			45.3									
HCM 2010 LOS			D									

Intersection									
Int Delay, s/veh	28.9								

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR
Vol, veh/h	0	0	242	21	0	26	70	1289	5
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None
Storage Length	-	-	0	0	-	-	50	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	1	1	1	1	1	1	1	1	1
Mvmt Flow	0	0	263	23	0	28	76	1401	5

Major/Minor	Minor2			Minor1			Major1		
Conflicting Flow All	2187	2893	651	2239	2923	703	1302	0	0
Stage 1	1334	1334	-	1556	1556	-	-	-	-
Stage 2	853	1559	-	683	1367	-	-	-	-
Critical Hdwy	7.52	6.52	6.92	7.52	6.52	6.92	4.12	-	-
Critical Hdwy Stg 1	6.52	5.52	-	6.52	5.52	-	-	-	-
Critical Hdwy Stg 2	6.52	5.52	-	6.52	5.52	-	-	-	-
Follow-up Hdwy	3.51	4.01	3.31	3.51	4.01	3.31	2.21	-	-
Pot Cap-1 Maneuver	26	16	414	23	15	382	533	-	-
Stage 1	164	223	-	119	174	-	-	-	-
Stage 2	322	173	-	408	215	-	-	-	-
Platoon blocked, %									
Mov Cap-1 Maneuver	20	13	414	~ 7	12	382	533	-	-
Mov Cap-2 Maneuver	20	13	-	~ 7	12	-	-	-	-
Stage 1	141	208	-	102	149	-	-	-	-
Stage 2	256	148	-	139	200	-	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s	27.7	\$ 1599.2	0.7
HCM LOS	D	F	

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	533	-	-	414	15	486	-	-
HCM Lane V/C Ratio	0.143	-	-	0.635	3.406	0.067	-	-
HCM Control Delay (s)	12.9	-	-	27.7	\$ 1599.2	12.9	-	-
HCM Lane LOS	B	-	-	D	F	B	-	-
HCM 95th %tile Q(veh)	0.5	-	-	4.3	7.2	0.2	-	-

**Notes**

~: Volume exceeds capacity    \$: Delay exceeds 300s    +: Computation Not Defined    \*: All major volume in platoon

**Intersection**

Int Delay, s/veh

Movement	SBL	SBT	SBR
Vol, veh/h	30	1136	62
Conflicting Peds, #/hr	0	0	0
Sign Control	Free	Free	Free
RT Channelized	-	-	None
Storage Length	150	-	-
Veh in Median Storage, #	-	0	-
Grade, %	-	0	-
Peak Hour Factor	92	92	92
Heavy Vehicles, %	1	1	1
Mvmt Flow	33	1235	67

Major/Minor	Major2		
Conflicting Flow All	1407	0	0
Stage 1	-	-	-
Stage 2	-	-	-
Critical Hdwy	4.12	-	-
Critical Hdwy Stg 1	-	-	-
Critical Hdwy Stg 2	-	-	-
Follow-up Hdwy	2.21	-	-
Pot Cap-1 Maneuver	486	-	-
Stage 1	-	-	-
Stage 2	-	-	-
Platoon blocked, %		-	-
Mov Cap-1 Maneuver	486	-	-
Mov Cap-2 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-

Approach	SB
HCM Control Delay, s	0.3
HCM LOS	

**Minor Lane/Major Mvmt**

Intersection									
Int Delay, s/veh	436.4								
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR
Vol, veh/h	203	0	78	26	0	79	31	1275	9
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	130	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	1	1	1	1	1	1	1	1	1
Mvmt Flow	221	0	85	28	0	86	34	1386	10

Major/Minor	Minor2			Minor1			Major1		
Conflicting Flow All	2090	2793	652	2137	2829	698	1303	0	0
Stage 1	1330	1330	-	1458	1458	-	-	-	-
Stage 2	760	1463	-	679	1371	-	-	-	-
Critical Hdwy	7.52	6.52	6.92	7.52	6.52	6.92	4.12	-	-
Critical Hdwy Stg 1	6.52	5.52	-	6.52	5.52	-	-	-	-
Critical Hdwy Stg 2	6.52	5.52	-	6.52	5.52	-	-	-	-
Follow-up Hdwy	3.51	4.01	3.31	3.51	4.01	3.31	2.21	-	-
Pot Cap-1 Maneuver	~ 31	19	413	~ 28	18	385	533	-	-
Stage 1	~ 165	224	-	137	194	-	-	-	-
Stage 2	367	193	-	410	214	-	-	-	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	~ 22	17	413	~ 20	16	385	533	-	-
Mov Cap-2 Maneuver	~ 22	17	-	~ 20	16	-	-	-	-
Stage 1	~ 154	208	-	128	182	-	-	-	-
Stage 2	267	181	-	303	199	-	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s	\$ 4385.6	\$ 438.8	0.3
HCM LOS	F	F	

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	533	-	-	30	70	491	-	-
HCM Lane V/C Ratio	0.063	-	-	10.181	1.63	0.069	-	-
HCM Control Delay (s)	12.2	-	-	\$ 4385.6	\$ 438.8	12.9	-	-
HCM Lane LOS	B	-	-	F	F	B	-	-
HCM 95th %tile Q(veh)	0.2	-	-	37.5	9.9	0.2	-	-

**Notes**  
 ~: Volume exceeds capacity    \$: Delay exceeds 300s    +: Computation Not Defined    \*: All major volume in platoon

**Intersection**

Int Delay, s/veh

Movement	SBL	SBT	SBR
Vol, veh/h	31	1125	74
Conflicting Peds, #/hr	0	0	0
Sign Control	Free	Free	Free
RT Channelized	-	-	None
Storage Length	100	-	-
Veh in Median Storage, #	-	0	-
Grade, %	-	0	-
Peak Hour Factor	92	92	92
Heavy Vehicles, %	1	1	1
Mvmt Flow	34	1223	80






















Major/Minor	Major2		
Conflicting Flow All	1396	0	0
Stage 1	-	-	-
Stage 2	-	-	-
Critical Hdwy	4.12	-	-
Critical Hdwy Stg 1	-	-	-
Critical Hdwy Stg 2	-	-	-
Follow-up Hdwy	2.21	-	-
Pot Cap-1 Maneuver	491	-	-
Stage 1	-	-	-
Stage 2	-	-	-
Platoon blocked, %		-	-
Mov Cap-1 Maneuver	491	-	-
Mov Cap-2 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-

Approach	SB
HCM Control Delay, s	0.3
HCM LOS	

**Minor Lane/Major Mvmt**

HCM 2010 Signalized Intersection Summary  
 3: Kietzke & Sierra Rose/Meadowood

2/20/2015

												
Movement	EBL	EBT	E9R	WBL	WBT	W9R	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	122	177	156	131	156	206	204	1123	225	152	943	139
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1881	1881	1900	1900	1881	1881	1881	1881	1900	1881	1881	1881
Adj Flow Rate, veh/h	133	192	170	142	170	224	222	1221	245	165	1025	151
Adj No. of Lanes	1	1	0	0	1	2	1	2	0	2	2	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	1	1	1	1	1	1	1	1	1	1	1	1
Cap, veh/h	96	332	294	189	191	1013	263	1268	252	185	1191	533
Arrive On Green	0.36	0.36	0.36	0.36	0.36	0.36	0.15	0.43	0.43	0.05	0.33	0.33
Sat Flow, veh/h	996	921	816	330	532	2814	1792	2973	591	3476	3574	1599
Grp Volume(v), veh/h	133	0	362	312	0	224	222	730	736	165	1025	151
Grp Sat Flow(s), veh/h/ln	996	0	1737	862	0	1407	1792	1787	1777	1738	1787	1599
Q Serve(g_s), s	0.0	0.0	12.6	14.4	0.0	4.2	9.1	29.7	30.4	3.5	20.1	5.2
Cycle Q Clear(g_c), s	27.0	0.0	12.6	27.0	0.0	4.2	9.1	29.7	30.4	3.5	20.1	5.2
Prop In Lane	1.00		0.47	0.46		1.00	1.00		0.33	1.00		1.00
Lane Grp Cap(c), veh/h	96	0	625	380	0	1013	263	763	758	185	1191	533
V/C Ratio(X)	1.39	0.00	0.58	0.82	0.00	0.22	0.84	0.96	0.97	0.89	0.86	0.28
Avail Cap(c_a), veh/h	96	0	625	380	0	1013	287	763	758	185	1191	533
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	37.5	0.0	19.4	27.4	0.0	16.7	31.2	20.8	21.0	35.3	23.4	18.4
Incr Delay (d2), s/veh	225.3	0.0	1.3	13.4	0.0	0.1	18.9	23.7	26.3	37.2	8.2	1.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	8.0	0.0	6.3	7.8	0.0	1.6	5.8	19.4	20.3	2.7	11.2	2.5
LnGrp Delay(d),s/veh	262.8	0.0	20.7	40.8	0.0	16.8	50.1	44.5	47.4	72.4	31.6	19.7
LnGrp LOS	F		C	D		B	D	D	D	E	C	B
Approach Vol, veh/h		495			536			1688			1341	
Approach Delay, s/veh		85.8			30.7			46.5			35.3	
Approach LOS		F			C			D			D	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	8.0	36.0		31.0	15.0	29.0		31.0				
Change Period (Y+Rc), s	4.0	4.0		4.0	4.0	4.0		4.0				
Max Green Setting (Gmax), s	4.0	32.0		27.0	12.0	24.0		27.0				
Max Q Clear Time (g_c+I1), s	5.5	32.4		29.0	11.1	22.1		29.0				
Green Ext Time (p_c), s	0.0	0.0		0.0	0.1	1.8		0.0				
<b>Intersection Summary</b>												
HCM 2010 Ctrl Delay			45.5									
HCM 2010 LOS			D									



























HCM 2010 Signalized Intersection Summary  
4: Kietzke & McCarran Blvd

2/20/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	164	797	674	171	606	145	921	442	173	271	439	264
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1881	1881	1881	1881	1881	1881	1881	1881	1881	1881	1881	1881
Adj Flow Rate, veh/h	178	866	0	186	659	0	1001	480	0	295	477	0
Adj No. of Lanes	1	3	1	1	3	1	2	2	1	2	2	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	1	1	1	1	1	1	1	1	1	1	1	1
Cap, veh/h	207	1518	473	187	1462	455	1027	629	281	991	591	265
Arrive On Green	0.12	0.30	0.00	0.10	0.28	0.00	0.30	0.18	0.00	0.29	0.17	0.00
Sat Flow, veh/h	1792	5136	1599	1792	5136	1599	3476	3574	1599	3476	3574	1599
Grp Volume(v), veh/h	178	866	0	186	659	0	1001	480	0	295	477	0
Grp Sat Flow(s), veh/h/ln	1792	1712	1599	1792	1712	1599	1738	1787	1599	1738	1787	1599
Q Serve(g_s), s	11.2	16.4	0.0	11.9	12.1	0.0	32.8	14.7	0.0	7.6	14.8	0.0
Cycle Q Clear(g_c), s	11.2	16.4	0.0	11.9	12.1	0.0	32.8	14.7	0.0	7.6	14.8	0.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	207	1518	473	187	1462	455	1027	629	281	991	591	265
V/C Ratio(X)	0.86	0.57	0.00	1.00	0.45	0.00	0.97	0.76	0.00	0.30	0.81	0.00
Avail Cap(c_a), veh/h	234	1518	473	187	1462	455	1027	1585	709	991	1056	473
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	0.00	0.46	0.46	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	50.0	34.3	0.0	51.5	33.8	0.0	40.1	45.1	0.0	32.1	46.2	0.0
Incr Delay (d2), s/veh	24.5	1.6	0.0	64.4	0.2	0.0	13.5	0.9	0.0	0.2	2.7	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	6.9	8.0	0.0	9.2	5.8	0.0	17.6	7.3	0.0	3.7	7.5	0.0
LnGrp Delay(d),s/veh	74.5	35.9	0.0	115.8	34.0	0.0	53.6	46.0	0.0	32.3	48.9	0.0
LnGrp LOS	E	D		F	C		D	D		C	D	
Approach Vol, veh/h		1044			845			1481			772	
Approach Delay, s/veh		42.5			52.0			51.1			42.5	
Approach LOS		D			D			D			D	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	36.8	24.2	16.0	53.0	38.0	23.0	32.2	36.7				
Change Period (Y+Rc), s	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0				
Max Green Setting (Gmax), s	17.0	51.0	12.0	34.0	34.0	34.0	15.0	31.0				
Max Q Clear Time (g_c+l1), s	9.6	16.7	13.9	18.4	34.8	16.8	13.2	14.1				
Green Ext Time (p_c), s	2.4	3.5	0.0	8.5	0.0	2.2	0.1	8.9				
<b>Intersection Summary</b>												
HCM 2010 Ctrl Delay			47.5									
HCM 2010 LOS			D									

HCM 2010 Signalized Intersection Summary  
6: Talbot & McCarran Blvd

2/20/2015

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		  			  						 	
Volume (veh/h)	142	1379	127	91	1637	63	300	33	108	48	27	216
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1881	1881	1900	1881	1881	1900	1881	1881	1900	1881	1881	1881
Adj Flow Rate, veh/h	154	1499	138	99	1779	68	326	36	117	52	29	0
Adj No. of Lanes	1	3	0	1	3	0	1	1	0	1	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	1	1	1	1	1	1	1	1	1	1	1	1
Cap, veh/h	184	2867	264	59	2687	103	418	105	342	302	507	431
Arrive On Green	0.07	0.40	0.40	0.03	0.53	0.53	0.27	0.27	0.27	0.27	0.27	0.00
Sat Flow, veh/h	1792	4787	440	1792	5077	194	1389	390	1268	1241	1881	1599
Grp Volume(v), veh/h	154	1072	565	99	1199	648	326	0	153	52	29	0
Grp Sat Flow(s),veh/h/ln	1792	1712	1803	1792	1712	1847	1389	0	1658	1241	1881	1599
Q Serve(g_s), s	10.4	28.9	28.9	4.0	30.9	31.0	27.7	0.0	9.1	4.3	1.4	0.0
Cycle Q Clear(g_c), s	10.4	28.9	28.9	4.0	30.9	31.0	29.1	0.0	9.1	13.3	1.4	0.0
Prop In Lane	1.00		0.24	1.00		0.10	1.00		0.76	1.00		1.00
Lane Grp Cap(c), veh/h	184	2051	1080	59	1812	978	418	0	447	302	507	431
V/C Ratio(X)	0.84	0.52	0.52	1.68	0.66	0.66	0.78	0.00	0.34	0.17	0.06	0.00
Avail Cap(c_a), veh/h	294	2051	1080	59	1812	978	510	0	558	384	633	538
HCM Platoon Ratio	0.67	0.67	0.67	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.42	0.42	0.42	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	55.8	23.3	23.3	58.9	20.8	20.8	43.8	0.0	35.8	41.2	33.0	0.0
Incr Delay (d2), s/veh	5.0	0.4	0.8	370.3	1.9	3.5	6.2	0.0	0.5	0.3	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	5.4	13.8	14.6	8.0	15.0	16.6	11.3	0.0	4.2	1.5	0.7	0.0
LnGrp Delay(d),s/veh	60.8	23.7	24.0	429.2	22.7	24.3	50.0	0.0	36.3	41.4	33.1	0.0
LnGrp LOS	E	C	C	F	C	C	D		D	D	C	
Approach Vol, veh/h		1791			1946			479			81	
Approach Delay, s/veh		27.0			43.9			45.6			38.4	
Approach LOS		C			D			D			D	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	8.0	85.1		36.9	16.5	76.6		36.9				
Change Period (Y+Rc), s	4.0	4.0		4.0	4.0	4.0		4.0				
Max Green Setting (Gmax), s	4.0	73.0		41.0	20.0	57.0		41.0				
Max Q Clear Time (g_c+1), s	6.0	30.9		15.3	12.4	33.0		31.1				
Green Ext Time (p_c), s	0.0	35.6		2.4	0.2	21.7		1.8				
<b>Intersection Summary</b>												
HCM 2010 Ctrl Delay				37.0								
HCM 2010 LOS				D								

HCM 2010 Signalized Intersection Summary  
 7: Lakeside Dr & McCarran Blvd

2/20/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NER	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	64	1040	81	291	1354	508	155	182	277	281	156	81
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1881	1881	1900	1881	1881	1881	1881	1881	1881	1881	1881	1881
Adj Flow Rate, veh/h	70	1130	0	316	1472	0	168	198	301	305	170	88
Adj No. of Lanes	1	2	0	1	2	1	1	1	1	1	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	1	1	1	1	1	1	1	1	1	1	1	1
Cap, veh/h	90	1279	0	348	1796	803	380	408	347	349	455	386
Arrive On Green	0.05	0.36	0.00	0.06	0.17	0.00	0.07	0.22	0.22	0.10	0.24	0.24
Sat Flow, veh/h	1792	3668	0	1792	3574	1599	1792	1881	1599	1792	1881	1599
Grp Volume(v), veh/h	70	1130	0	316	1472	0	168	198	301	305	170	88
Grp Sat Flow(s),veh/h/ln	1792	1787	0	1792	1787	1599	1792	1881	1599	1792	1881	1599
Q Serve(g_s), s	4.7	36.0	0.0	21.3	48.3	0.0	8.9	11.2	22.0	12.0	9.1	5.4
Cycle Q Clear(g_c), s	4.7	36.0	0.0	21.3	48.3	0.0	8.9	11.2	22.0	12.0	9.1	5.4
Prop In Lane	1.00		0.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	90	1279	0	349	1796	803	380	408	347	349	455	386
V/C Ratio(X)	0.78	0.88	0.00	0.91	0.82	0.00	0.44	0.49	0.87	0.87	0.37	0.23
Avail Cap(c_a), veh/h	133	1279	0	398	1796	803	380	496	421	349	542	461
HCM Platoon Ratio	1.00	1.00	1.00	0.33	0.33	0.33	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	0.66	0.66	0.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	57.0	36.6	0.0	55.7	45.3	0.0	33.9	41.6	45.9	38.5	38.4	36.9
Incr Delay (d2), s/veh	15.9	9.1	0.0	16.1	2.9	0.0	0.8	0.9	15.0	20.8	0.5	0.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.7	19.3	0.0	12.2	24.7	0.0	4.4	5.9	11.2	6.3	4.8	2.4
LnGrp Delay(d),s/veh	72.9	45.7	0.0	71.9	48.2	0.0	34.7	42.5	60.8	59.4	38.9	37.2
LnGrp LOS	E	D		E	D		C	D	E	E	D	D
Approach Vol, veh/h		1200			1788			667			563	
Approach Delay, s/veh		47.3			52.4			48.8			49.7	
Approach LOS		D			D			D			D	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	27.6	56.0	13.0	33.3	10.1	73.6	16.0	30.3				
Change Period (Y+Rc), s	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0				
Max Green Setting (Gmax), s	27.0	43.0	9.0	35.0	9.0	61.0	12.0	32.0				
Max Q Clear Time (g_c+I1), s	23.3	38.0	10.9	11.1	6.7	50.3	14.0	24.0				
Green Ext Time (p_c), s	0.3	4.6	0.0	3.6	0.0	9.4	0.0	2.3				
<b>Intersection Summary</b>												
HCM 2010 Ctrl Delay			50.0									
HCM 2010 LOS			D									



**PRELIMINARY DRAINAGE REPORT**  
**FOR**  
**RANCHARRAH PLANNED UNIT DEVELOPMENT**

*Prepared for:*

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December 8, 2014

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**WOOD RODGERS**  
DEVELOPING INNOVATIVE DESIGN SOLUTIONS

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## APPENDIX

NOAA Intensity Tables

FIRM Panels 3231 and 3233

Hydrologic Basin Map

Existing Rational Method Results (5-Year and 100-Year)

Proposed Rational Method Results (5-Year and 100-Year)



# 1 INTRODUCTION

This report represents the Preliminary Drainage Report for the development of the proposed Rancharrah Planned Unit Development. The purpose of this report is to address the drainage issues that result from development of the proposed project site in accordance with Truckee Meadows Regional Drainage Manual (TMRDM) and City of Reno development standards. This report includes the overall hydrologic analyses for existing and proposed conditions associated with this development. The analysis and conclusions contained herein are based off of site reconnaissance, construction documents for existing infrastructure and analysis of the overall area, and land use proposed within the Planned Unit Development document, which could potentially be subject to change. It should be noted that the assumptions and calculations in this report are preliminary, and that a Technical Drainage Study will be required prior to permit and final construction.

## 1.1 PROJECT LOCATION

The site is located within the Section 36 in T19N, R19E, MDM, Washoe County, Nevada. The project site is located in Southwest Reno, west of Kietzke Lane, north of Del Monte Lane and south of Sierra Rose Drive (reference to the vicinity map below).



## **1.2 HISTORIC DRAINAGE**

The site generally drains from west to east at slopes of approximately 2%. Much of the site is existing pasture land, with buildings interspersed. Offsite drainage does not impact the site except in storms greater the 100-year recurrence interval as indicated by the Federal Emergency Management Agency (FEMA) Rate maps for the site area. This is due to the Lake Ditch, an irrigation facility, which runs north to south along the western boundary of the site and its possibility of breach. Generally, areas west of the site drain to ditches and storm drain facilities and 100-year flood flows travel south along the western edge of the Rancharra site to Evans Creek southwest of the project site. From this point, Evans Creek travels southeast across Del Monte Lane west of Kietzke Lane and south of the project site. A small existing pasture area northwest of the Maintenance facility drains to the west edge of the terminus of Talbot Lane and runs along the north edge of the Equestrian/Livestock Pasture area and outfalls into storm drain within Sierra Rose Drive without impact to the site.

Storm flows generated onsite in the existing condition generally sheet flow to the east toward Kietzke Lane or Sierra Rose Drive (northeast corner of Office/Medical area and are captured by existing ditches and storm drain along Kietzke Lane or Sierra Rose Drive. The ditches flow to storm drain systems that flow east under US 395 for eventual outfall to the Truckee River. With development of the site, increased storm flows and volumes due to increased imperviousness of the developments will require detention basins to attenuate the increase in flows and volumes to assure that flow rates are not increased in the 100-year storm from existing conditions. It is anticipated that, as individual parcels outlet to different areas along Kietzke Lane and Sierra Rose Drive, detention basins will be placed at the outlets of each parcel to attenuate flows. Where final grading and drainage patterns for parcels allow, shared detention basins are a possibility. As the Rancharra PUD allows for flexibility within zoning areas, and final site layouts are not known at this time, a Technical Drainage Study will be required as site plans/zoning develops further on the site to assure that existing facilities can service the site.

As is depicted in the FEMA FIRM Panels 3231 and 3233, located in the Appendix of this report, the project site is located in FEMA Zone "X".

## **1.3 REGULATORY PERSPECTIVE**

The Project site is located within the City of Reno jurisdiction. The drainage utilities will be operated and maintained by the City of Reno.

## **2 HYDROLOGIC ANALYSIS**

The hydrologic analysis included in this report consists of preliminary peak runoff flow computations for the existing and proposed conditions storm drain design. The 5-year and 100-year storm events were modeled per City of Reno code and the TMRDM, and the results are shown in the Appendix of this report.



## 2.1 DESIGN RAINFALL

Precipitation intensity estimates were taken from the National Oceanic and Atmospheric Administration (NOAA) Atlas 14, Volume 1, Version 5 which provides rainfall information for latitude and longitude. It was determined that the site latitude and longitude are 39.4701 West and -119.7959 North, and intensity was used appropriately for the 5-year and 100-year storm events. Intensity numbers are included in the Appendix of this report.

## 2.2 METHODS

The rational method was used to compute the peak runoff flow rates for basins for the existing and proposed project site conditions for both the 5-year and 100-year storm events. This method requires an area, intensity, and runoff coefficient, and indirectly the method also requires a time of concentration to determine the flow at each inlet location. The intensity for each sub-basin was determined using the time of concentration and the Precipitation Intensity Table. Runoff coefficients were derived from the Rational Formula Method Runoff Coefficients table in the Truckee Meadows Regional Drainage Manual (adjusted appropriately for the proposed conditions).

## 2.3 RESULTS

The hydrologic basin map is provided in the Appendix of this report. A summary of the 5-year and 100-year recurrence storm flow rates for the existing and proposed conditions using Rational Method calculations are included in Table 1 (see the Appendix for the complete calculations).

**Table 1**  
**Peak Flow Rates**

Basin Name	Acreage (AC)	Existing 5-Yr Runoff (cfs)	Proposed 5-Yr Runoff (cfs)	Existing 100-Yr Runoff (cfs)	Proposed 100-Yr Runoff (cfs)
Village 1 & 2	20.20	6.4	21.3	43.8	68.4
Village 3	15.32	3.2	8.4	20.6	27.8
Village 4	2.94	0.7	2.4	4.7	8.6
Village 5	6.63	0.4	4.8	5.5	16.7
Village 6	8.23	2.1	5.9	14.7	20.5
Village 7	12.60	2.7	9.0	17.8	31.1
Village 8	14.55	3.1	10.0	19.7	34.7
Estates Residential	1.91	0.8	0.8	3.2	3.2
Equestrian Center	17.74	4.4	4.4	31.0	31.0
Events Center	17.18	7.0	7.0	26.5	26.5
Office/Medical	11.34	2.6	9.3	16.6	29.9
Retail/Commercial	12.23	0.7	10.1	10.3	32.3



### **3 CONCLUSIONS**

The Rancharrah site can be developed without adversely affecting downstream properties above the existing condition, and can be developed so that building, utility pads, etc. are protected from 100-year storm flows. Additionally, detention basins will be provided to assure that increases in peak storm flow rates and volume due to increased impermeability of developed areas will be attenuated. This study is preliminary in nature, and as design is finalized, a Technical Drainage Study will be completed to assure that drainage facilities in final design meet the requirements of the TMRDM and the City of Reno Development code.

All exhibits and supporting calculations are included in the Appendix of this report.

### **4 REFERENCES**

Truckee Meadows Regional Drainage Manual, April 30, 2009.

City of Reno Design Manual, Latest Edition.



## Appendix



**POINT PRECIPITATION FREQUENCY ESTIMATES**

Sanja Perica, Sarah Dietz, Sarah Heim, Lillian Hiner, Kazungu Maitaria, Deborah Marlin, Sandra Pavlovic, Ishani Roy, Carl Trypaluk, Dale Unruh, Fenglin Yan, Michael Yekla, Tan Zhao, Geoffrey Bonnin, Daniel Brewer, Li-Chuan Chen, Tye Parzybok, John Yarchoan

NOAA, National Weather Service, Silver Spring, Maryland

[PF tabular](#) | [PF graphical](#) | [Maps & aerals](#)

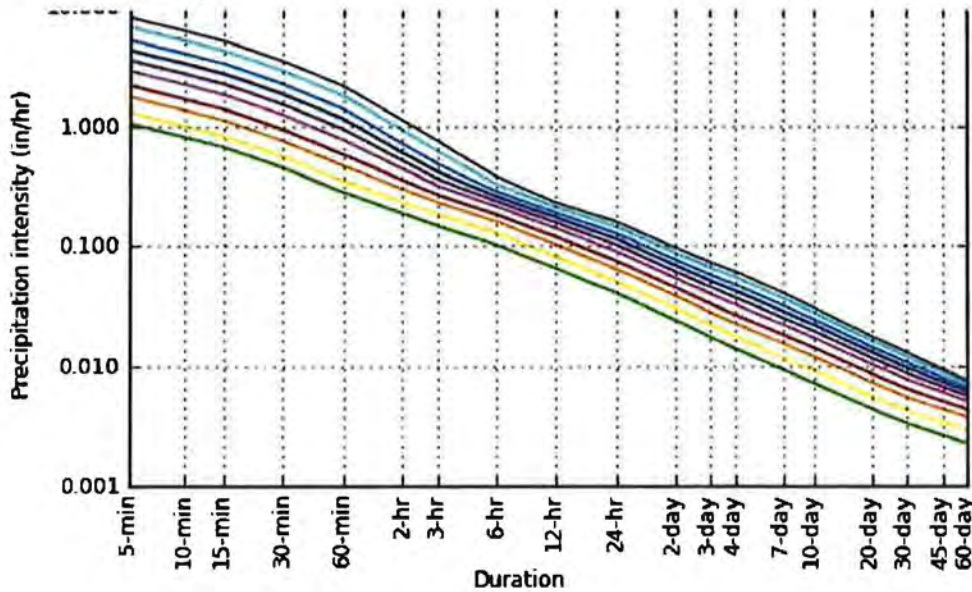
**PF tabular**

<b>PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches/hour)<sup>1</sup></b>										
Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	1.06 (0.912-1.22)	1.31 (1.12-1.55)	1.76 (1.50-2.09)	2.20 (1.85-2.59)	2.90 (2.39-3.49)	3.56 (2.82-4.33)	4.34 (3.34-5.36)	5.29 (3.90-6.70)	6.83 (4.72-8.96)	8.21 (5.42-11.1)
10-min	0.804 (0.696-0.930)	0.996 (0.852-1.18)	1.34 (1.14-1.58)	1.67 (1.40-1.97)	2.21 (1.82-2.66)	2.72 (2.15-3.30)	3.31 (2.54-4.09)	4.03 (2.96-5.09)	5.20 (3.58-6.82)	6.25 (4.13-8.41)
15-min	0.668 (0.572-0.772)	0.824 (0.704-0.972)	1.11 (0.944-1.31)	1.38 (1.16-1.63)	1.83 (1.50-2.20)	2.24 (1.78-2.73)	2.74 (2.10-3.38)	3.33 (2.45-4.21)	4.29 (2.96-5.64)	5.16 (3.41-6.95)
30-min	0.448 (0.396-0.520)	0.556 (0.474-0.656)	0.748 (0.638-0.884)	0.928 (0.784-1.10)	1.23 (1.01-1.48)	1.51 (1.20-1.84)	1.84 (1.41-2.27)	2.24 (1.65-2.84)	2.89 (2.00-3.80)	3.48 (2.30-4.68)
60-min	0.278 (0.239-0.322)	0.344 (0.293-0.406)	0.463 (0.394-0.547)	0.575 (0.485-0.680)	0.762 (0.627-0.915)	0.936 (0.740-1.14)	1.14 (0.875-1.41)	1.39 (1.02-1.76)	1.79 (1.24-2.35)	2.15 (1.42-2.90)
2-hr	0.186 (0.164-0.213)	0.230 (0.205-0.265)	0.296 (0.258-0.340)	0.350 (0.302-0.404)	0.436 (0.365-0.508)	0.512 (0.418-0.606)	0.598 (0.474-0.720)	0.710 (0.538-0.886)	0.922 (0.682-1.19)	1.11 (0.768-1.46)
3-hr	0.147 (0.132-0.166)	0.183 (0.166-0.207)	0.229 (0.205-0.259)	0.265 (0.235-0.301)	0.316 (0.275-0.362)	0.360 (0.307-0.418)	0.414 (0.346-0.488)	0.484 (0.394-0.596)	0.620 (0.484-0.798)	0.748 (0.562-0.984)
6-hr	0.102 (0.092-0.114)	0.128 (0.115-0.143)	0.158 (0.142-0.177)	0.181 (0.162-0.204)	0.212 (0.186-0.239)	0.234 (0.202-0.267)	0.256 (0.218-0.296)	0.282 (0.235-0.330)	0.325 (0.263-0.404)	0.377 (0.299-0.498)
12-hr	0.065 (0.059-0.073)	0.082 (0.074-0.091)	0.103 (0.093-0.115)	0.119 (0.107-0.133)	0.141 (0.124-0.159)	0.157 (0.136-0.179)	0.173 (0.148-0.200)	0.189 (0.158-0.222)	0.211 (0.171-0.254)	0.229 (0.181-0.280)
24-hr	0.041 (0.037-0.045)	0.051 (0.046-0.057)	0.064 (0.058-0.071)	0.075 (0.068-0.083)	0.090 (0.081-0.100)	0.102 (0.091-0.114)	0.114 (0.101-0.128)	0.127 (0.111-0.144)	0.145 (0.125-0.165)	0.159 (0.135-0.183)
2-day	0.024 (0.022-0.027)	0.030 (0.027-0.034)	0.038 (0.034-0.043)	0.045 (0.040-0.050)	0.054 (0.048-0.061)	0.061 (0.054-0.069)	0.069 (0.060-0.078)	0.077 (0.066-0.088)	0.087 (0.074-0.102)	0.096 (0.080-0.113)
3-day	0.017 (0.016-0.019)	0.022 (0.020-0.024)	0.028 (0.025-0.031)	0.033 (0.029-0.037)	0.040 (0.035-0.044)	0.045 (0.040-0.051)	0.051 (0.044-0.058)	0.057 (0.049-0.065)	0.066 (0.055-0.076)	0.073 (0.060-0.085)
4-day	0.014 (0.013-0.016)	0.018 (0.016-0.020)	0.023 (0.020-0.025)	0.027 (0.024-0.030)	0.032 (0.029-0.036)	0.037 (0.033-0.042)	0.042 (0.037-0.048)	0.047 (0.041-0.054)	0.055 (0.046-0.063)	0.061 (0.050-0.071)
7-day	0.009 (0.008-0.011)	0.012 (0.011-0.013)	0.015 (0.014-0.017)	0.018 (0.016-0.020)	0.022 (0.019-0.025)	0.025 (0.022-0.029)	0.028 (0.025-0.033)	0.032 (0.027-0.037)	0.037 (0.031-0.043)	0.041 (0.034-0.048)
10-day	0.007 (0.006-0.008)	0.009 (0.008-0.010)	0.012 (0.011-0.014)	0.014 (0.013-0.016)	0.017 (0.015-0.019)	0.020 (0.017-0.022)	0.022 (0.019-0.025)	0.025 (0.021-0.028)	0.028 (0.024-0.032)	0.031 (0.026-0.036)
20-day	0.004 (0.004-0.005)	0.006 (0.005-0.006)	0.007 (0.006-0.008)	0.009 (0.008-0.010)	0.010 (0.009-0.011)	0.012 (0.010-0.013)	0.013 (0.011-0.015)	0.014 (0.012-0.016)	0.016 (0.014-0.019)	0.017 (0.015-0.020)
30-day	0.003 (0.003-0.004)	0.004 (0.004-0.005)	0.005 (0.005-0.006)	0.006 (0.006-0.007)	0.008 (0.007-0.009)	0.009 (0.008-0.010)	0.010 (0.008-0.011)	0.011 (0.009-0.012)	0.012 (0.010-0.014)	0.013 (0.011-0.015)
45-day	0.003 (0.002-0.003)	0.003 (0.003-0.004)	0.004 (0.004-0.005)	0.005 (0.005-0.006)	0.006 (0.005-0.007)	0.007 (0.006-0.007)	0.007 (0.007-0.008)	0.008 (0.007-0.009)	0.009 (0.008-0.010)	0.009 (0.008-0.011)
60-day	0.002 (0.002-0.003)	0.003 (0.003-0.003)	0.004 (0.003-0.004)	0.004 (0.004-0.005)	0.005 (0.005-0.006)	0.006 (0.005-0.006)	0.006 (0.005-0.007)	0.007 (0.006-0.007)	0.007 (0.006-0.008)	0.008 (0.007-0.009)

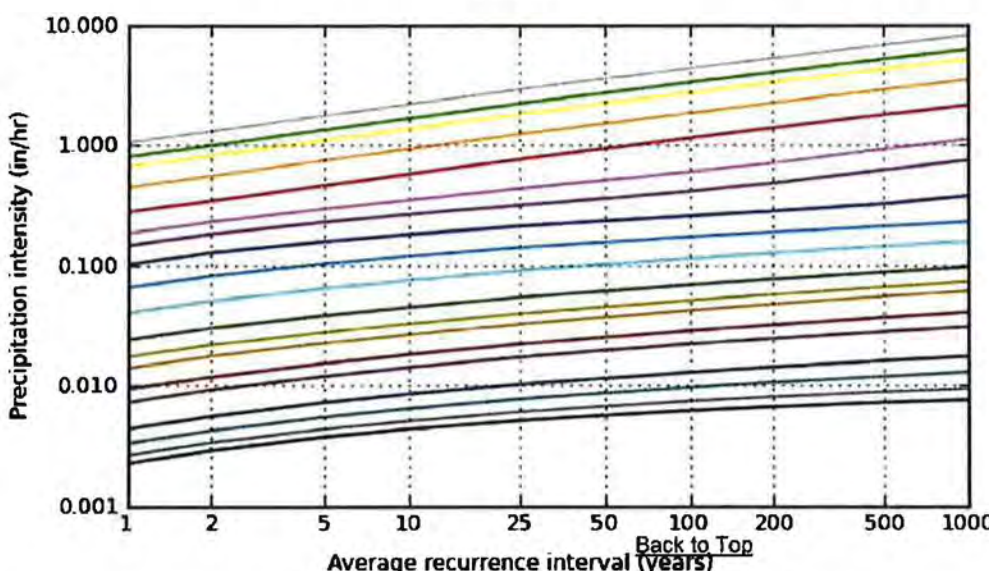
<sup>1</sup> Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS). Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values. Please refer to NOAA Atlas 14 document for more information.

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**PF graphical**



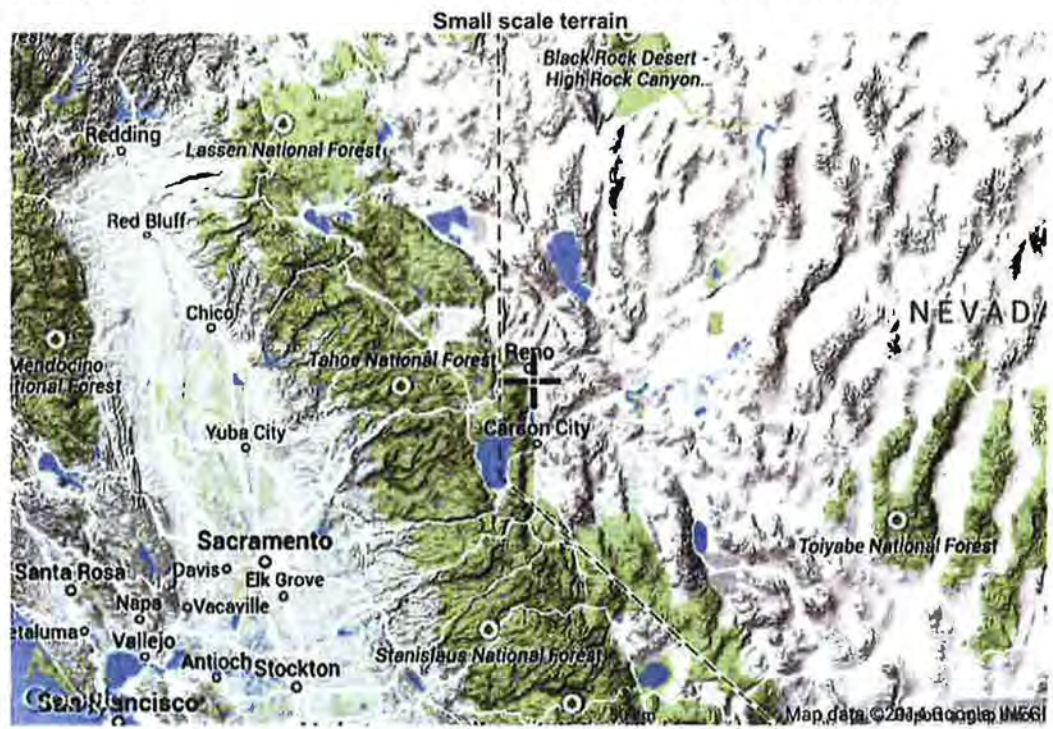
Average recurrence interval (years)
1
2
5
10
25
50
100
200
500
1000



Duration	
5-min	2-day
10-min	3-day
15-min	4-day
30-min	7-day
60-min	10-day
2-hr	20-day
3-hr	30-day
6-hr	45-day
12-hr	60-day
24-hr	

NOAA Atlas 14, Volume 1, Version 5

Maps & aeriels  
Created (GMT): Sat Dec 6 00:39:02 2014



Large scale terrain



Large scale map



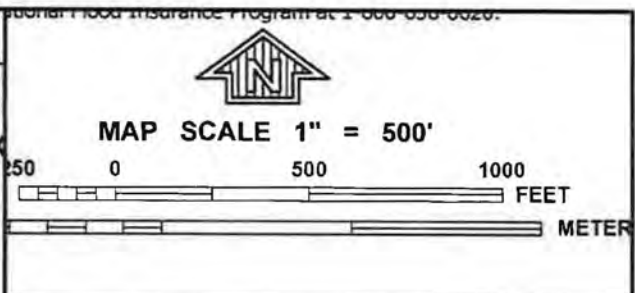
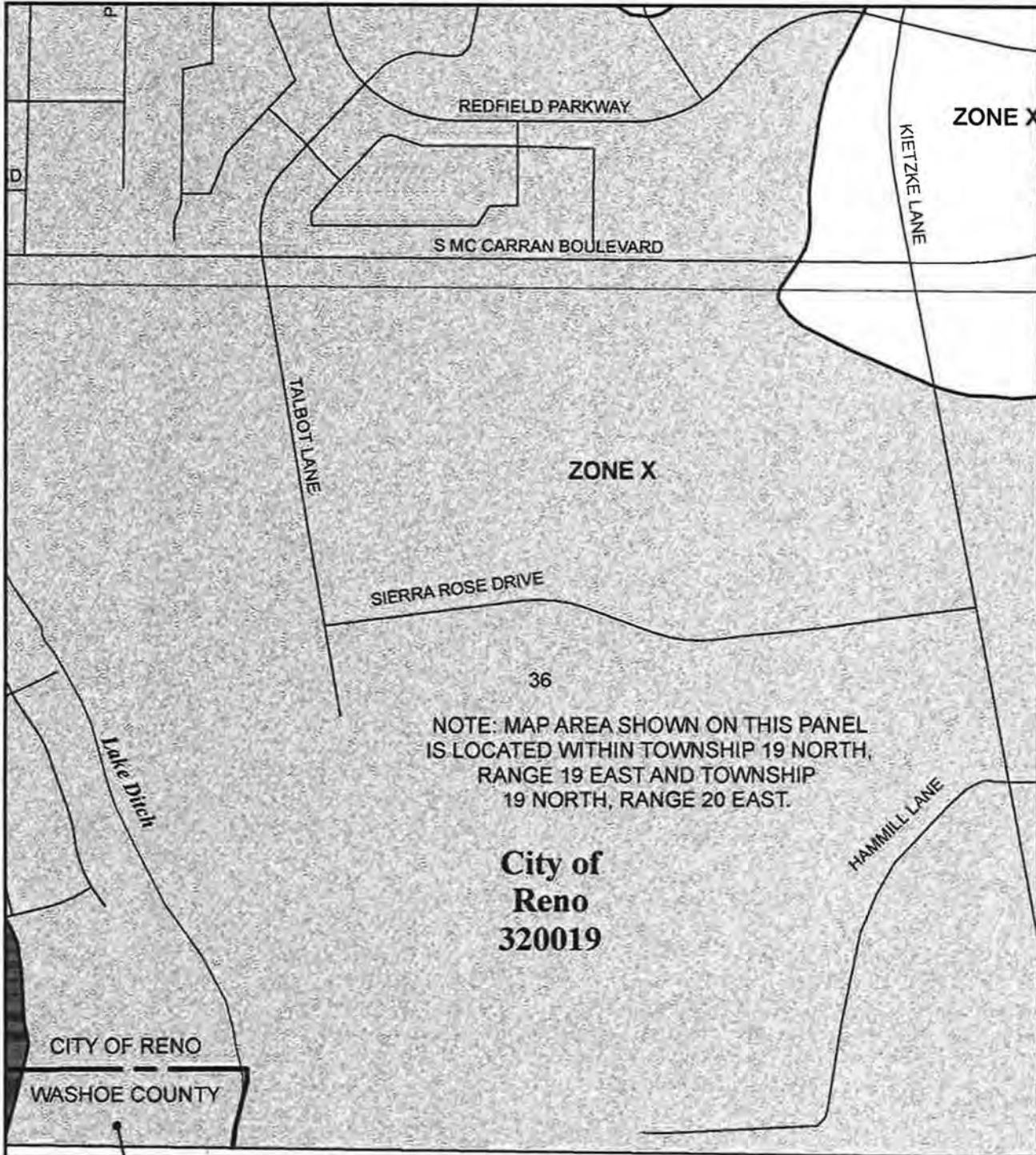
Large scale aerial



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**NATIONAL FLOOD INSURANCE PROGRAM**

PANEL 3231G

**FIRM**  
FLOOD INSURANCE RATE MAP

WASHOE COUNTY,  
NEVADA  
AND INCORPORATED AREAS

PANEL 3231 OF 3475

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

<u>COMMUNITY</u>	<u>NUMBER</u>	<u>PANEL</u>	<u>SUFFIX</u>
RENO, CITY OF	320020	3231	G
WASHOE COUNTY	320019	3231	G

Notice to User: The Map Number shown below should be used when placing map orders; the Community Number shown above should be used on insurance applications for the subject community.

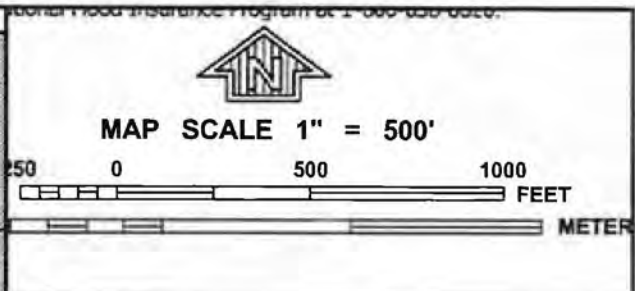
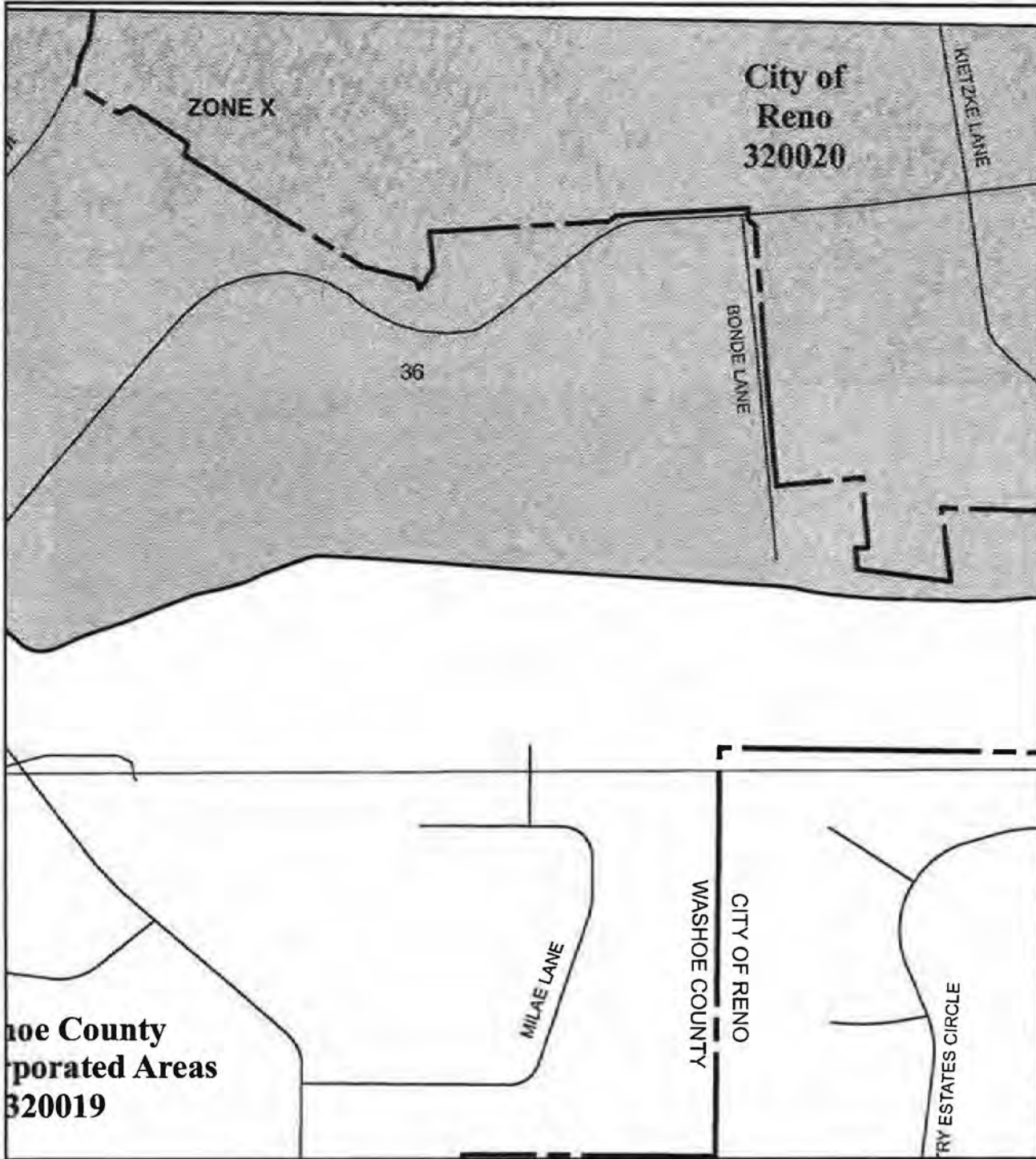


**MAP NUMBER**  
32031C3231G

**MAP REVISED**  
MARCH 16, 2009

Federal Emergency Management Agency

This is an official copy of a portion of the above referenced flood map. It was extracted using F-MIT On-Line. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For the latest product information about National Flood Insurance Program flood maps check the FEMA Flood Map Store at [www.msc.fema.gov](http://www.msc.fema.gov)



**NATIONAL FLOOD INSURANCE PROGRAM**

**PANEL 3233G**

**FIRM**  
**FLOOD INSURANCE RATE MAP**


**WASHOE COUNTY,  
 NEVADA  
 AND INCORPORATED AREAS**

**PANEL 3233 OF 3475**  
 (SEE MAP INDEX FOR FIRM PANEL LAYOUT)

**CONTAINS:**

COMMUNITY	NUMBER	PANEL	SUFFIX
RENO, CITY OF	320020	3233	G
WASHOE COUNTY	320019	3233	G

Notice to User: The Map Number shown below should be used when placing map orders; the Community Number shown above should be used on insurance applications for the subject community.



**MAP NUMBER**  
**32031C3233G**

**MAP REVISED**  
**MARCH 16, 2009**

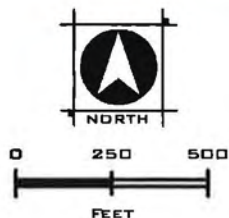
Federal Emergency Management Agency

**Washoe County  
 Incorporated Areas  
 320019**

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**DRAINAGE BASINS**  
**RANCHARRAH**  
**RENO, NV**  
**DECEMBER, 2014**  
 NOTES



**PRELIMINARY**

**WOOD RODGERS**

Basin Name	Drainage Area (AC)	Weighted Average C-Factor <sub>5-Year</sub>	TIME OF CONCENTRATION								5-YEAR STORM EVENT				
			Initial Flow Time, T <sub>i</sub>			Travel Time, T <sub>t</sub>					Total (T <sub>i</sub> +T <sub>t</sub> )	Urbanized Basins Check	Final	NOAA ATLAS 14 Rainfall Intensity	Rational Flow
			Overland Flow			Channelized Flow									
			L <sub>1</sub> (ft)	S (ft/ft)	T <sub>i</sub> (min)	L <sub>2</sub> (ft)	S (ft/ft)	V (ft/s)	T <sub>t1</sub> (min)	T <sub>c</sub> (min)	T <sub>c</sub> *(min)	T <sub>c</sub> (min)	I <sub>5-year</sub> (in/hour)	Q <sub>5-year</sub> (cfs)	
Village 1 & 2	20.20	0.20	50	0.0415	7.2	724	0.0247	2.5	4.8	7.2	14.3	7.2	1.58	6.4	
Village 3	15.32	0.20	50	0.0340	7.6	1254	0.0146	1.9	10.7	18.4	17.2	17.2	1.06	3.2	
Village 4	2.94	0.20	50	0.0189	9.3	410	0.0086	1.5	4.6	13.9	12.6	12.6	1.22	0.7	
Village 5	6.63	0.05	50	0.0118	12.7	842	0.0164	2.1	6.8	19.4	15.0	15.0	1.11	0.4	
Village 6	8.23	0.20	50	0.0312	7.9	540	0.0249	2.5	3.5	11.4	13.3	11.4	1.28	2.1	
Village 7	12.60	0.20	50	0.0182	9.4	1104	0.0207	2.3	7.9	17.3	16.4	16.4	1.08	2.7	
Village 8	14.55	0.20	50	0.0131	10.5	1061	0.0166	2.1	8.5	19.0	16.2	16.2	1.08	3.1	
Estates Residential	1.91	0.35	50	0.0103	9.5	280	0.0148	2.0	2.4	11.8	11.8	11.8	1.26	0.8	
Equestrian Center	17.74	0.20	50	0.0187	9.3	1298	0.2190	7.6	2.9	12.2	17.5	12.2	1.24	4.4	
Events Center	17.18	0.35	50	0.0140	8.5	817	0.0270	2.7	5.1	13.7	14.8	13.7	1.17	7.0	
Office/Medical	11.34	0.20	50	0.0172	9.6	677	0.0102	1.6	6.9	16.5	14.0	14.0	1.15	2.6	
Retail/Commercial	12.23	0.05	50	0.0260	9.7	735	0.0107	1.7	7.3	17.1	14.4	14.4	1.14	0.7	

Basin Name	Drainage Area (AC)	Weighted Average C-Factor <sub>100-Year</sub>	TIME OF CONCENTRATION										100-YEAR STORM EVENT	
			Initial Flow Time, T <sub>i</sub>			Travel Time, T <sub>t</sub>				Total (T <sub>i</sub> +T <sub>t</sub> )	Urbanized Basins Check	Final	NOAA ATLAS 14 Rainfall Intensity	Rational Flow
			Overland Flow			Channelized Flow								
			L <sub>i</sub> (ft)	S (ft/ft)	T <sub>i</sub> (min)	L <sub>c</sub> (ft)	S (ft/ft)	V(ft/s)	T <sub>tt</sub> (min)	T <sub>c</sub> (min)	T <sub>c</sub> *(min)	T <sub>c</sub> (min)	I <sub>100-year</sub> (in/hour)	Q <sub>100-year</sub> (cfs)
Village 1 & 2	20.20	0.50	50	0.0415	4.8	724	0.0247	2.5	4.8	5.0	14.3	5.0	4.34	43.8
Village 3	15.32	0.50	50	0.0340	5.1	1254	0.0146	1.9	10.7	15.8	17.2	15.8	2.69	20.6
Village 4	2.94	0.50	50	0.0189	6.2	410	0.0086	1.5	4.6	10.8	12.6	10.8	3.22	4.7
Village 5	6.63	0.30	50	0.0118	9.6	842	0.0164	2.1	6.8	16.4	15.0	15.0	2.75	5.5
Village 6	8.23	0.50	50	0.0312	5.2	540	0.0249	2.5	3.5	8.8	13.3	8.8	3.56	14.7
Village 7	12.60	0.50	50	0.0182	6.3	1104	0.0207	2.3	7.9	14.2	16.4	14.2	2.83	17.8
Village 8	14.55	0.50	50	0.0131	7.0	1061	0.0166	2.1	8.5	15.5	16.2	15.5	2.71	19.7
Estates Residential	1.91	0.50	50	0.0103	7.6	280	0.0148	2.0	2.4	9.9	11.8	9.9	3.32	3.2
Equestrian Center	17.74	0.50	50	0.0187	6.2	1298	0.2190	7.6	2.9	9.1	17.5	9.1	3.50	31.0
Events Center	17.18	0.50	50	0.0140	6.8	817	0.0270	2.7	5.1	12.0	14.8	12.0	3.09	26.5
Office/Medical	11.34	0.50	50	0.0172	6.4	677	0.0102	1.6	6.9	13.3	14.0	13.3	2.93	16.6
Retail/Commercial	12.23	0.30	50	0.0260	7.4	735	0.0107	1.7	7.3	14.8	14.4	14.4	2.81	10.3

Basin Name	Drainage Area (AC)	Weighted Average C-Factor <sub>5-year</sub>	TIME OF CONCENTRATION										5-YEAR STORM EVENT	
			Initial Flow Time, T <sub>i</sub>			Travel Time, T <sub>t</sub>				Total (T <sub>i</sub> +T <sub>t</sub> )	Urbanized Basins Check	Final	NOAA ATLAS 14 Rainfall Intensity	Rational Flow
			Overland Flow			Channelized Flow								
			L <sub>i</sub> (ft)	S (ft/ft)	T <sub>i</sub> (min)	L <sub>c</sub> (ft)	S (ft/ft)	V(ft/s)	T <sub>tt</sub> (min)	T <sub>c</sub> (min)	T <sub>c</sub> ' (min)	T <sub>c</sub> (min)	I <sub>5-year</sub> (in/hour)	Q <sub>5-year</sub> (cfs)
Village 1 & 2	20.20	0.60	50	0.0415	4.0	724	0.0247	2.5	4.8	5.0	14.3	5.0	1.76	21.3
Village 3	15.32	0.50	50	0.0340	5.1	1254	0.0146	1.9	10.7	15.8	17.2	15.8	1.09	8.4
Village 4	2.94	0.60	50	0.0189	5.2	410	0.0086	1.5	4.6	9.7	12.6	9.7	1.36	2.4
Village 5	6.63	0.60	50	0.0118	6.0	842	0.0164	2.1	6.8	12.8	15.0	12.8	1.21	4.8
Village 6	8.23	0.50	50	0.0312	5.2	540	0.0249	2.5	3.5	8.8	13.3	8.8	1.44	5.9
Village 7	12.60	0.60	50	0.0182	5.2	1104	0.0207	2.3	7.9	13.2	16.4	13.2	1.20	9.0
Village 8	14.55	0.60	50	0.0131	5.8	1061	0.0166	2.1	8.5	14.3	16.2	14.3	1.14	10.0
Estates Residential	1.91	0.35	50	0.0103	9.5	280	0.0148	2.0	2.4	11.8	11.8	11.8	1.26	0.8
Equestrian Center	17.74	0.20	50	0.0187	9.3	1298	0.2190	7.6	2.9	12.2	17.5	12.2	1.24	4.4
Events Center	17.18	0.35	50	0.0140	8.5	817	0.0270	2.7	5.1	13.7	14.8	13.7	1.17	7.0
Office/Medical	11.34	0.65	50	0.0172	4.8	677	0.0102	1.6	6.9	11.7	14.0	11.7	1.26	9.3
Retail/Commercial	12.23	0.65	50	0.0260	4.2	735	0.0107	1.7	7.3	11.5	14.4	11.5	1.27	10.1

Basin Name	Drainage Area (AC)	Weighted Average C-Factor <sub>100-Year</sub>	TIME OF CONCENTRATION										100-YEAR STORM EVENT	
			Initial Flow Time, T <sub>i</sub>			Travel Time, T <sub>t</sub>				Total (T <sub>i</sub> +T <sub>t</sub> )	Urbanized Basins Check	Final	NOAA ATLAS 14 Rainfall Intensity	Rational Flow
			Overland Flow			Channelized Flow								
			L <sub>i</sub> (ft)	S (ft/ft)	T <sub>i</sub> (min)	L <sub>c</sub> (ft)	S (ft/ft)	V(ft/s)	T <sub>tt</sub> (min)	T <sub>c</sub> (min)	T <sub>c</sub> *(min)	T <sub>c</sub> (min)	I <sub>100-year</sub> (in/hour)	Q <sub>100-year</sub> (cfs)
Village 1 & 2	20.20	0.78	50	0.0415	2.5	724	0.0247	2.5	4.8	5.0	14.3	5.0	4.34	68.4
Village 3	15.32	0.65	50	0.0340	3.8	1254	0.0146	1.9	10.7	14.5	17.2	14.5	2.79	27.8
Village 4	2.94	0.78	50	0.0189	3.3	410	0.0086	1.5	4.6	7.9	12.6	7.9	3.75	8.6
Village 5	6.63	0.78	50	0.0118	3.9	842	0.0164	2.1	6.8	10.6	15.0	10.6	3.24	16.7
Village 6	8.23	0.65	50	0.0312	3.9	540	0.0249	2.5	3.5	7.5	13.3	7.5	3.83	20.5
Village 7	12.60	0.78	50	0.0182	3.3	1104	0.0207	2.3	7.9	11.3	16.4	11.3	3.17	31.1
Village 8	14.55	0.78	50	0.0131	3.7	1061	0.0166	2.1	8.5	12.2	16.2	12.2	3.05	34.7
Estates Residential	1.91	0.50	50	0.0103	7.6	280	0.0148	2.0	2.4	9.9	11.8	9.9	3.32	3.2
Equestrian Center	17.74	0.50	50	0.0187	6.2	1298	0.2190	7.6	2.9	9.1	17.5	9.1	3.50	31.0
Events Center	17.18	0.50	50	0.0140	6.8	817	0.0270	2.7	5.1	12.0	14.8	12.0	3.09	26.5
Office/Medical	11.34	0.80	50	0.0172	3.2	677	0.0102	1.6	6.9	10.1	14.0	10.1	3.30	29.9
Retail/Commercial	12.23	0.80	50	0.0260	2.8	735	0.0107	1.7	7.3	10.1	14.4	10.1	3.30	32.3



**PRELIMINARY SANITARY SEWER REPORT**  
**FOR**  
**RANCHARRAH PLANNED UNIT DEVELOPMENT**

*Prepared for:*

**Reno Land Development Company**  
**5595 Keitzke Lane, Suite 111**  
**Reno, NV 89511**

December 8, 2014

*Prepared by:*

**Wood Rodgers Inc.**  
**Cary Chisum, PE – Principal**  
**5440 Reno Corporate Drive**  
**Reno, Nevada 89511**  
**(775) 823-4068**



**WOOD RODGERS**  
DEVELOPING INNOVATIVE DESIGN SOLUTIONS

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### **Appendix**

Existing Sewer Facilities Map  
Sanitary Sewer Basins



## 1.0 INTRODUCTION

The purpose of this report is to investigate preliminary potential sanitary sewer issues generated by the Rancharrah Planned Unit Development located in Southwest Reno, west of Kietzke Lane, north of Del Monte Lane and south of Sierra Rose Drive. The analysis and conclusions contained herein are based off of site reconnaissance, construction documents for existing infrastructure and analysis of the overall area, and land use proposed within the Planned Unit Development document, which could potentially be subject to change. It should be noted that the assumptions and calculations in this report are preliminary, and that a Master Sanitary Sewer Study will be required prior to permit and final construction.

### 1.1 Site Location

The Rancharrah site is located within the N 3/4 of Section 36, Township 19 North, Range 19 East, in Washoe County, Nevada. The site's location relative to the surrounding area is shown on Figure 1 below.



Figure 1: Vicinity Map

## 2.0 EXISTING CONDITIONS

The site will be serviced by the City of Reno with regard to Sanitary Sewer. There is a City of Reno sewer main within Kietzke Lane which runs north from Del Monte Lane to Hammill Lane and east under US 395. The section of Sewer main in Hammill Lane turns into and interceptor at the 395 crossing, Sewer from this system eventually outflows into the Truckee Meadows Water Reclamation Facility (TMWRF). There are existing sanitary sewer stubs within Talbot Drive stubbed into the project west of Sierra Rose Drive, Sierra Rose Drive at the northeast corner of Village 7, at the east end of Village 7 adjacent to the existing assisted care facility, to the Office/Medical/Retail parcel in Kietzke Lane and the Retail Commercial parcel in Kietzke Lane. Additionally, an 8" sanitary sewer line was constructed within the site in 1992 which can be used to service portions of the site. The line runs northwest to southeast from the existing Maintenance facility along the east boundary of the Special Events Lodging area, through the east side of the Special Events Center area and east through the southern Retail/Commercial area and connects to the Interceptor sewer main in Kietzke Lane. An Existing Sewer Facilities Map is included in the appendix of this report.

## 2.1 Proposed Conditions

As the Rancharrah PUD allows for flexibility within zoning areas, and final site layouts are not known at this time, a Master Sanitary Sewer Study will be required as site plans/zoning develops further on the site to assure that existing facilities can service the site. A sanitary sewer basins map is included in the appendix of this report. Reference to Table 1 below for sanitary sewer information as it relates to the Rancharrah site:

<u>Development Area</u>	<u>Area (acres-AC)</u>	<u>Unit*</u>	<u>GPD/Unit</u>	<u>GPD</u>	<u>MGD (million GPD)</u>
Events Center	16.3	0 dwelling	0	0	0
Equestrian Center	17.6	AC	1,067	18,780	0.0188
Retail/Commercial	12.2	AC	3,334	40,675	0.0407
Office Medical	11.3	AC	1,067	12057	0.0121
Estates Residential	1.9	1 dwelling	350	350	0.00035
Urban Residential	14.6	310 dwelling	350	108,500	0.109
Cottages	8.8	58 dwelling	350	20,300	0.0203
Single Family	54.5	322 dwelling	350	112,700	0.1127
<b>TOTAL TO SANITARY SEWER FLOWS</b>				<b>313,011</b>	<b>0.313011</b>

\* Dwelling units are estimates given probable layouts from PUD.



### **3.0 CONCLUSION**

The Rancharrah property has multiple sanitary sewer mains stubbed to the property and is directly adjacent to existing public sanitary sewer facilities which can be utilized to accommodate the sanitary sewer needs of the project. All the existing facilities stubbed to the property and adjacent to the property connect to the existing sanitary sewer main in Keitzke Lane which ties to the existing interceptor in Hammill Lane as it crosses 395. This study is preliminary in nature, and as design is finalized, a Master Sanitary Sewer Study will be submitted per the City of Reno Public Works Design Manual requirements to assure that sanitary sewer facilities have been sized to accommodate the Development of the Rancharrah Project.

### **4.0 REFERENCES**

*City of Reno (Revised January 2009). Public Works Design Manual.*



**APPENDIX**  
EXISTING SEWER FACILITIES MAP  
SANITARY SEWER BASINS



**EXISTING SEWER FACILITIES MAP**  
**NOT TO SCALE**

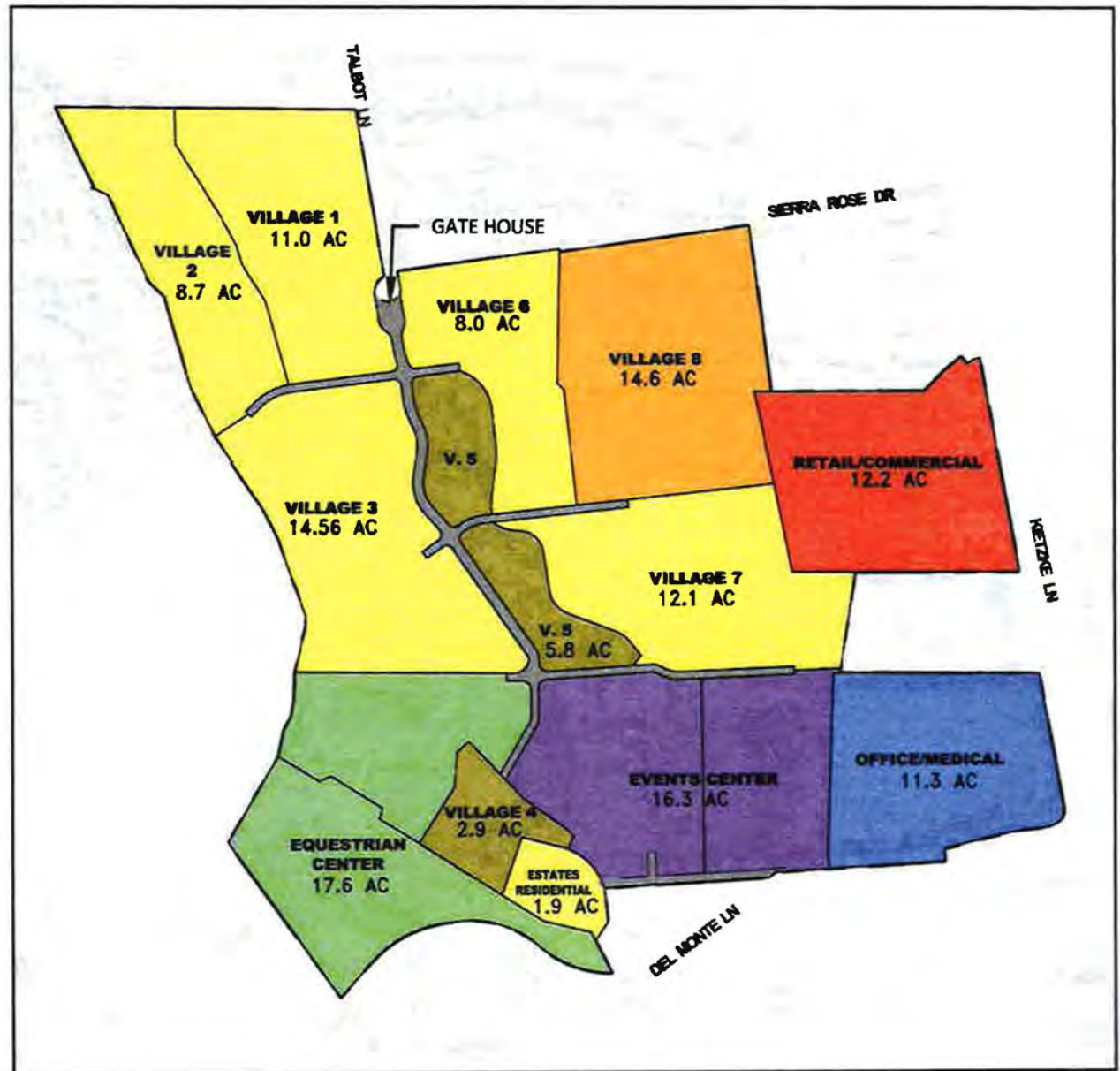


## SITE STATISTICS

COTTAGES	8.8 AC
SINGLE FAMILY RESIDENTIAL	54.4 AC
URBAN RESIDENTIAL	14.6 AC
ESTATES RESIDENTIAL	1.9 AC
EQUESTRIAN CENTER	17.6 AC
EVENTS CENTER	16.3 AC
OFFICE/MEDICAL	11.3 AC
RETAIL/COMMERCIAL	12.2 AC
TOTAL	140.7 AC

## LEGEND

	SINGLE FAMILY
	COTTAGES
	URBAN RESIDENTIAL
	RETAIL/COMMERCIAL
	OFFICE/MEDICAL
	EVENTS CENTER
	EQUESTRIAN CENTER



# RANCHARRAH

## Sewer Basins

December, 2014

600' 300' 0 600'



SCALE: 1" = 600'



NORTH



### Special Events Checklist

Special Events that occur within the Events Center and Equestrian Center land use categories have specific restrictions and requirements that must be followed prior to and during operations of specific events. All events are subject to the standards below:

- Hours of Operation: Outdoor events (with or without amplified music and/or speech) shall operate between the hours of 8:00 a.m. to 10:00 p.m. (Friday and Saturday) and 8:00 a.m. to 9:00 p.m. (Sunday through Thursday). **All outdoor amplified sound shall end at 9:00 p.m. (Sunday through Thursday) and 10:00 p.m. (Friday and Saturday).** Any events operating outside of these hours must be fully contained within a structure. Setup and removal of events may occur outside of the operational hours above – no music or other amplified sound shall be allowed during setup or removal of events.
- Outdoor events shall not exceed 55 dB maximum as measured at the nearest adjacent residential property line.
- Outdoor sound systems shall be designed to limit the maximum noise levels at the adjacent residential property line to the south and northwest of the Ranch. Speakers must point in a northerly direction away from adjacent residential properties.
- Rancharra staff shall monitor amplified sound levels at the nearest adjacent residential property line to the south on an hourly basis during events to ensure compliance with the above standards.
- No amplified sound, lighting or temporary events structures shall be allowed within the area that is 250-foot

in width as measured from the southern Rancharra PUD boundary.

- Directional signage or parking attendants shall be provided to guide events guests to available parking.
- No events traffic shall be allowed to ingress/egress to the south to Del Monte Lane.

### Specialty Functions Checklist

Special functions within the Events Center or Equestrian Center that exceed 800 attendees shall be subject to all of the above standards, as well as the following:

- Comply with the seven requirements in Special Events Checklist above.
- Events for more than 800 attendees shall obtain a Special Activity Permit from the City of Reno Business License Department.
- Specialty functions shall not exceed seven (7) consecutive days in duration, with no more than two 7-day events in any one calendar month
- Maximum of 12 combined outdoor specialty functions in the Events Center and Equestrian Center are allowed per year.
- Rancharra staff shall notify adjoining property owners to the Events Center and Equestrian Center of upcoming events. The notice shall include the schedule of events, dates, times, and a contact name and number to resolve questions or issues.
- A parking plan shall be submitted demonstrating anticipated parking needs, location of parking, and parking management/staffing for the specialty function.

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

**BILL NO. 7042**

**ORDINANCE NO. 6470**

**ORDINANCE TO AMEND TITLE 18, CHAPTER 18.08 OF THE RENO MUNICIPAL CODE, ENTITLED "ZONING", SECTION 18.08.102(b).1361, TO CHANGE THE TEXT IN THE PLANNED UNIT DEVELOPMENT (PUD) DESIGN STANDARDS TO: 1) UPDATE THE MASTER DEVELOPER; 2) PROVIDE CLARIFICATION TO THE FLEXIBILITY PROVISIONS; 3) MODIFY THE PARKING REQUIREMENTS FOR THE EVENTS CENTER AND EQUESTRIAN CENTER VILLAGES; 4) UPDATE THE TRAFFIC ANALYSIS TO REFLECT CURRENT DEVELOPMENT THAT HAS BEEN APPROVED; 5) CLARIFY THE RECREATIONAL AMENITIES ALLOWED WITHIN THE EVENTS CENTER VILLAGE; 6) INCORPORATE LANGUAGE FROM THE PRIOR ORDINANCE REGARDING ALLOWABLE RESIDENTIAL DEVELOPMENT WITHIN THE EQUESTRIAN VILLAGE; 7) ALLOW FOR CLUSTER DEVELOPMENT AS AN ALLOWED USE WITHIN THE ESTATES RESIDENTIAL VILLAGE; 8) MODIFY THE NAMES OF THE COMMERCIAL LAND USE DESIGNATIONS; 9) MODIFY THE LAND USE PLAN TO: A) CHANGE VILLAGE 5 FROM THE COTTAGES LAND USE DESIGNATION TO THE SINGLE FAMILY RESIDENTIAL LAND USE DESIGNATION; B) CHANGE VILLAGE 6 FROM THE SINGLE FAMILY RESIDENTIAL LAND USE DESIGNATION TO THE COTTAGES LAND USE DESIGNATION; AND C) MODIFY THE ACREAGE OF VILLAGES 1 THROUGH 6 AND THE EQUESTRIAN CENTER, EVENTS CENTER, OFFICE/MEDICAL, AND ESTATES RESIDENTIAL VILLAGES LOCATED ON THE NORTHWEST CORNER OF KIETZKE LANE AND DEL MONTE LANE IN A PUD ZONE; TOGETHER WITH OTHER MATTERS PROPERLY RELATING THERETO.**

**SPONSORED BY: RENO CITY PLANNING COMMISSION**

**THE CITY COUNCIL OF THE CITY OF RENO DO ORDAIN:**

SECTION 1. Chapter 18.08 of the Reno Municipal Code is hereby amended by adding thereto a new section to be known as Section 18.08.102(b).1361 relating to a ±140 acre site located on the northwest corner of Kietzke Lane and Del Monte Lane and more particularly described in the attached "Exhibit A"; to change the text in the PUD Design Standards Handbook to: 1) update the master developer; 2) provide clarification to the flexibility provisions; 3) modify the parking requirements for the Events Center and Equestrian Center Villages;

CASE NO. LDC18-00036 (Rancharra PUD Amendment)

4) update the traffic analysis to reflect current development that has been approved; 5) clarify the recreational amenities allowed within the Events Center Village; 6) incorporate language from the prior ordinance regarding allowable residential development within the Equestrian Village; 7) allow for cluster development as an allowed use within the Estates Residential Village; 8) modify the names of the commercial land use designations; 9) modify the land use plan to: a) change Village 5 from the cottages land use designation to the single family residential land use designation; b) change Village 6 from the single family residential land use designation to the cottages land use designation; and c) modify the acreage of Villages 1 through 6 and the Equestrian Center, Events Center, Office/Medical, and Estates Residential Villages, the same to read as follows:

Sec. 18.08.102(b).1361. The zoning of the City of Reno as heretofore established is hereby amended in the manner shown on the map labeled Case No. LDC18-00036, thereby changing the use of land indicated therein, relating to a ±140 acre site located on the northwest corner of Kietzke Lane and Del Monte Lane, and more particularly described in the attached "Exhibit A": to change the text in the PUD Design Standards Handbook to: 1) update the master developer; 2) provide clarification to the flexibility provisions; 3) modify the parking requirements for the Events Center and Equestrian Center Villages; 4) update the traffic analysis to reflect current development that has been approved; 5) clarify the recreational amenities allowed within the Events Center Village; 6) incorporate language from the prior ordinance regarding allowable residential development within the Equestrian Village; 7) allow for cluster development as an allowed use within the Estates Residential Village; 8) modify the names of the commercial land use designations; 9) modify the land use plan to: a) change Village 5 from the cottages land use designation to the single family residential land use designation; b) change Village 6 from the single family residential land use designation to the cottages land use designation; and c) modify the acreage of Villages 1 through 6 and the Equestrian Center, Events Center, Office/Medical, and Estates Residential Villages.

SECTION 2. This Ordinance shall be in effect from and after its passage, adoption and publication in one issue of a newspaper printed and published in the City of Reno; and upon certification by City Council of the amended PUD Design Standards Handbook for Case No. LDC18-00036 and recordation of the amended PUD Design Standards Handbook for Case No. LDC18-00036.

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

PASSED AND ADOPTED this 18<sup>th</sup> day of July, 2018, by the following vote of the Council:

AYES:	<u>Duerr, Delgado, Schieve, Brekhus, Jardon, McKenzie, Bobzien</u>
NAYS:	<u>None</u>
ABSTAIN:	<u>None</u>
ABSENT:	<u>None</u>

APPROVED this 18<sup>th</sup> day of July, 2018.

  
HILLARY E. SCHIEVE  
MAYOR OF THE CITY OF RENO

ATTEST:

  
ASHLEY D. TURNEY  
CITY CLERK AND CLERK OF THE CITY  
COUNCIL OF THE CITY OF RENO, NEVADA

EFFECTIVE DATE: July 20, 2018.



**LEGAL DESCRIPTION FOR  
RANCHARRAH PUD AMENDMENT**

All that certain real property situate within Section Thirty-Six (36), Township Nineteen (19) North, Range Nineteen (19) East, Mount Diablo Meridian, City of Reno, Washoe County, Nevada, and being more particularly described as follows:

**BEGINNING** at the northwest corner of Adjusted APN 040-081-63, as shown on the Record of Survey Showing A Boundary Line Adjustment for "John A. Harrah", recorded as Record of Survey Map No. 3145, on November 18, 1996 as File No. 2048420;

**THENCE** departing said northwestern corner and along the northerly line of said Adjusted parcel, South 89°32'24" East a distance of 428.88 feet;

**THENCE** continuing along said northerly line, South 89°30'47" East a distance of 628.00 feet to the northeasterly corner of said parcel, being on the westerly right-of-way line of Talbot Lane as shown on said Record of Survey Map No. 3145;

**THENCE** along said westerly right-of-way line, South 09°39'38" East a distance of 581.45 feet to the beginning of a non-tangent curve;

**THENCE** continuing along said westerly right-of-way line from a radial line which bears South 80°17'57" West, 18.46 feet along the arc of a 15.00 foot radius to the right through a central angle of 70°31'43" to the beginning of a reverse curve;

**THENCE** 196.76 feet along the arc of a 45.00 foot radius to the left through a central angle of 250°31'44" to the easterly right-of-way line of said Talbot Lane, also being the westerly line of Parcel 6A as shown on Record of Survey to Support a Boundary Line Adjustment for "Middlefork Limited Partnership, A Nevada Limited Partnership", recorded as Record of Survey Map No. 5425, on May 04, 2012, as File No. 4109624;

**THENCE** continuing along said westerly line, North 09°42'04" West a distance of 56.57 feet to the northwesterly corner of said Parcel 6A;

**THENCE** along the northerly line of said parcel, North 82°10'56" East a distance of 575.32 feet to the northeasterly corner of said Parcel 6A;

**THENCE** departing said northeasterly corner and along the easterly line of said parcel, South 00°30'56" West a distance of 10.75 feet to the northwesterly corner of Parcel 1A;

**THENCE** along the northerly line of said Parcel 1A, North 81°57'34" East a distance of 672.36 feet to the northeasterly corner of said Parcel 1A;

**THENCE** along the easterly line of said Parcel 1A, South 07°33'02" East a distance of 591.60 feet to the southeasterly corner of said parcel, also being on the northerly line of Parcel 2A as shown on said Record of Survey Map No. 5425;

**THENCE** along the northerly line of said Parcel 2A the following seven (7) courses and distances:

1. South 89°24'02" East a distance of 519.70 feet;
2. South 84°45'02" East a distance of 11.00 feet;
3. North 43°24'57" East a distance of 94.57 feet;
4. North 45°08'46" East a distance of 46.29 feet;
5. North 48°32'58" East a distance of 55.10 feet;
6. South 85°32'37" East a distance of 46.48 feet;
7. South 89°46'10" East a distance of 17.38 feet to the westerly right-of-way line of Kietzke Lane as shown on said Record of Survey Map No. 5425;

**LEGAL DESCRIPTION FOR  
RANCHARRAH PUD AMENDMENT**

**THENCE** along said westerly right-of-way line, South 10°23'05" East a distance of 782.69 feet to the southeasterly corner of said parcel;

**THENCE** departing said westerly right-of-way and along the southerly line of said Parcel 2A, North 89°37'02" West a distance of 581.24 feet to the northeasterly corner of Parcel 5A as shown on said Record of Survey Map No. 5425;

**THENCE** along the easterly line of said Parcel 5A, South 09°00'21" West a distance of 355.87 feet to the southeasterly corner of said Parcel 5A, also being on the northerly line of Parcel 3A as shown on said Record of Survey Map No. 5425;

**THENCE** along the northerly line of said Parcel 3A, South 89°37'12" East a distance of 701.51 feet to the westerly right-of-way line of Kletzke Lane as shown on said Record of Survey Map No. 5425;

**THENCE** along said westerly right-of-way line, South 10°23'05" East a distance of 484.15 feet to the southeasterly corner of said Parcel 3A, also being the beginning of a tangent curve;

**THENCE** continuing along said westerly right-of-way line, 97.43 feet along the arc of a tangent 60.00 foot radius to the right through a central angle of 93°02'23" to the southerly line of said Parcel 4A, also being the northerly right-of-way line of Del Monte Lane; the following six (6) courses, distances and curves:

**THENCE** along said northerly right-of-way line the following six (6) courses, distances and curves:

1. South 82°39'18" West a distance of 77.35 feet to the beginning of a tangent curve;
2. 51.23 feet along the arc of a 1900.00 foot radius curve to the right through a central angle of 01°32'42";
3. South 75°52'03" West a distance of 250.14 feet;
4. South 03°22'15" East a distance of 43.31 feet;
5. South 86°39'28" West a distance of 594.80;
6. South 52°36'58" West a distance of 32.79 feet to the southerly line of Parcel 2 as shown on the Parcel Map for Richard G. & Marlene B. Campbell, recorded as Parcel Map No. 2338, on March 07, 1989, as File No. 1308872;

**THENCE** departing said northerly right-of-way line and along the southerly line of said Parcel 2, South 86°40'58" West a distance of 579.50 feet, being the easterly line of Parcel 1 as shown on said Parcel Map 2338;

**THENCE** along said easterly line, South 05°27'02" East a distance of 120.00 feet;

**THENCE** continuing along said easterly line, South 33°22'58" West a distance of 77.54 feet to the southeasterly most corner of said Parcel 1;

**THENCE** South 26°47'02" East a distance of 128.61 feet to said northerly right-of-way line of Del Monte Lane, also being the beginning of a non-tangent curve;

**THENCE** along said northerly right-of-way line the following six (6) courses, distances and curves also being the beginning of a curve;

1. from a radial line which bears North 00°25'45" West, 269.05 feet along the arc of a non-tangent 382.00 foot radius to the right through a central angle of 40°21'17";
2. North 50°04'28" West a distance of 23.07 feet to the beginning of a curve;
3. 296.62 feet along the arc of a tangent 359.30 foot radius to the left through a central angle of 47°18'02";
4. South 82°37'30" West a distance of 42.70 feet to the beginning of a curve;

**LEGAL DESCRIPTION FOR  
RANCHARRAH PUD AMENDMENT**

5. 303.57 feet along the arc of a tangent 425.00 foot radius curve to the left through a central angle of 40°55'30";
6. South 41°42'00" West a distance of 163.35 feet to the southerly most corner of the parcel described in Document No. 1961602, recorded on January 25, 1996;

**THENCE** departing said northerly right-of-way line and along the southwesterly line of said Document No. 1961602, North 35°48'02" West a distance of 672.58 feet to the northwesterly line of said Document;

**THENCE** along said northwesterly line, North 30°01'58" East a distance of 351.87 feet to the southwesterly line of the Adjusted APN 040-081-73 as shown on the Record of Survey Map Showing A Boundary Line Adjustment for John A. Harrah, recorded as Record of Survey Map No. 3131, recorded on October 25, 1996, as File No. 2042532;

**THENCE** departing said southwesterly corner and along the westerly line of said parcel the following thirteen (13) courses and distances;

1. North 11°36'08" East a distance of 93.50 feet;
2. North 25°51'34" East a distance of 30.42 feet;
3. North 29°57'28" East a distance of 25.91 feet;
4. North 09°38'05" East a distance of 59.30 feet;
5. North 02°04'42" East a distance of 98.86 feet;
6. North 13°40'07" East a distance of 164.82 feet;
7. North 01°18'00" East a distance of 34.65 feet;
8. North 19°27'48" West a distance of 83.08 feet;
9. North 20°13'38" West a distance of 108.00 feet;
10. North 19°00'46" West a distance of 93.13 feet;
11. North 26°34'44" West a distance of 111.26 feet;
12. North 34°10'26" West a distance of 206.09 feet;
13. South 89°16'26" East a distance of 5.97 feet to the southwesterly corner of aforementioned Adjusted APN 040-081-63 as shown on said Record of Survey Map No. 3145;

**THENCE** departing said southwesterly corner and along the westerly line of said Adjusted APN 040-081-63 the following nine (9) courses and distances;

- 1) North 33°40'02" West a distance of 111.55 feet;
- 2) North 26°11'02" West a distance of 196.70 feet;
- 3) North 15°52'02" West a distance of 304.60 feet;
- 4) North 14°17'02" West a distance of 22.50 feet;
- 5) North 45°55'02" West a distance of 79.50 feet;
- 6) North 25°17'02" West a distance of 330.00 feet;
- 7) North 64°50'02" West a distance of 65.33 feet;
- 8) South 89°41'02" East a distance of 9.54 feet;
- 9) North 26°02'02" West a distance of 313.16 feet to the **POINT OF BEGINNING**;

**LEGAL DESCRIPTION FOR  
RANCHARRAH PUD AMENDMENT**

Containing 140.80 acres of land, more or less.

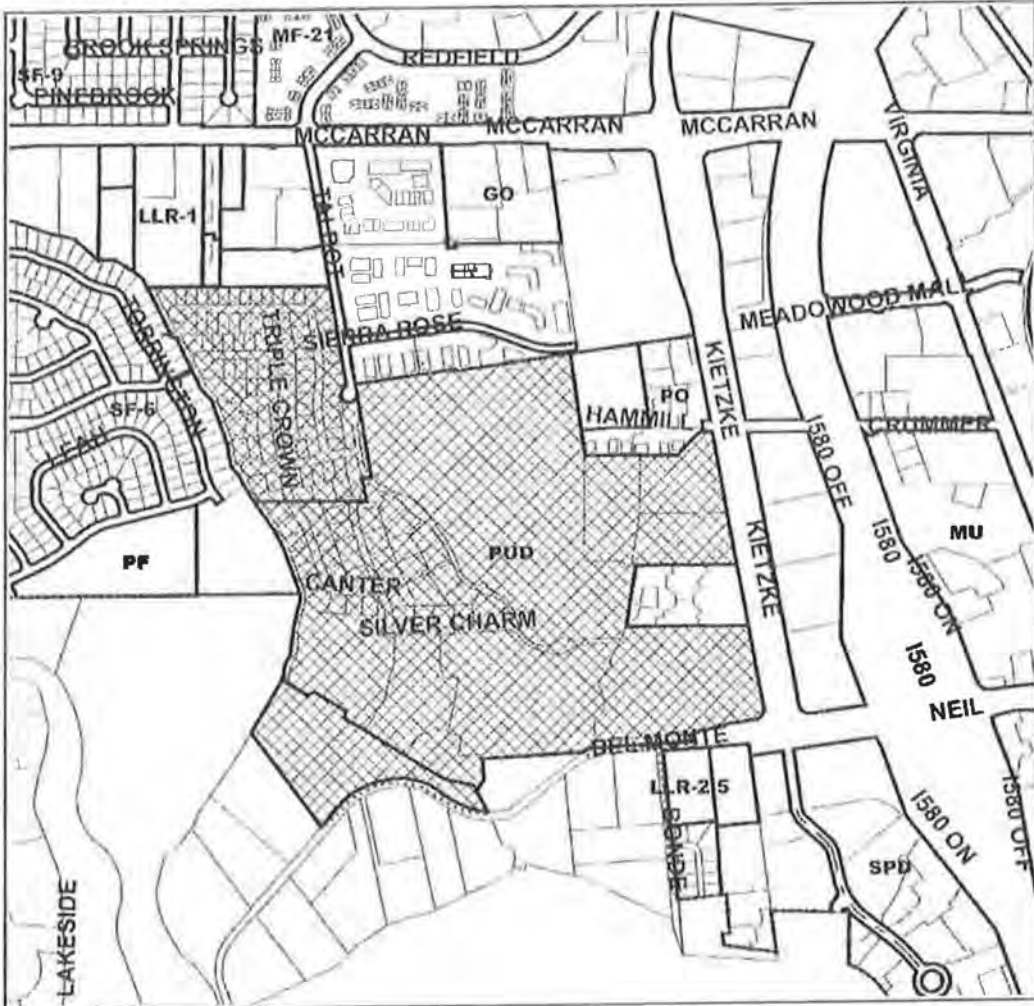
The Basis of Bearings for this legal description is identical to that as shown on said Record of Survey Map No. 5425.

Prepared by:  
Wood Rodgers, Inc.  
1361 Corporate Blvd.  
Reno, NV 89502





11-10-17

Kevin M. Almeter, P.L.S.  
Nevada Certificate No. 19052



**LDC18-00036  
(Rancharra PUD Amendment)**

-  Subject Site
-  City Limits



The information herein is approximate and is intended for display purposes only. Reproduction is not permitted. For additional information please contact the City of Reno Community Development Department. Map Produced December, 2017.



**Community Development  
Department**

1 East 1st Street Phone: 321-8309  
P.O. Box 1000 Fax: 334-2043  
Reno, NV 89505 www.reno.gov



## WASHOE COUNTY RECORDER

OFFICE OF THE COUNTY RECORDER  
LAWRENCE R. BURTNES, RECORDER

1001 E. NINTH STREET  
POST OFFICE BOX 11130  
RENO, NEVADA 89520-0027  
PHONE (775) 328-3661  
FAX (775) 325-8010

### LEGIBILITY NOTICE

The Washoe County Recorder's Office has determined that the attached document may not be suitable for recording by the method used by the Recorder to preserve the Recorder's records. The customer was advised that copies reproduced from the recorded document would not be legible. However, the customer demanded that the document be recorded without delay as the parties rights may be adversely affected because of a delay in recording. Therefore, pursuant to NRS 247.120 (3), the County Recorder accepted the document conditionally, based on the undersigned's representation (1) that a suitable copy will be submitted at a later date (2) it is impossible or impracticable to submit a more suitable copy.

By my signing below, I acknowledge that I have been advised that once the document has been microfilmed it may not reproduce a legible copy.

  
\_\_\_\_\_  
Signature

8/28/18  
\_\_\_\_\_  
Date

Heather Manzo  
\_\_\_\_\_  
Printed Name