

JH Ranch Application #Z-11-01

Siskiyou County Planning Staff General Plan Traffic Analysis

May 7, 2012

French Creek Road Level of Service Discussion

Vehicular access to JH Ranch is provided by French Creek Road. The Siskiyou County Circulation Element projects that the Level of Service (LOS) of "A" for French Creek Road is 200 trips a day. This LOS is categorized by free flow traffic, low traffic density, and speeds controlled by a driver's comfort level. An important aspect of French Creek Road, like many other rural roads in the County, is that it was constructed without any particular design standard and the primary consideration was simply to provide access for the surrounding properties. Because of this, the driver's comfort level is based on low traffic volumes rather than adequate roadway geometrics. Controlled speed, low volume, adequate vision and spacing are important factors that relate directly to the driver's ability to compensate for the deficiencies in the roadway geometrics of French Creek Road.

The traffic analysis (the 8/10/2011 traffic report revision and the 3/30/12 discussion memorandum) submitted with the PDPA provides an analysis of French Creek Road's LOS. The traffic analysis states that the Highway Capacity Manual indicates that the ideal capacity of any rural arterial road segment is approximately 1,800 vehicles per hour. (The Highway Capacity Manual is also used in the County's Circulation Element to estimate roadway capacity.) In addition, the traffic analysis acknowledges that this level is based on free-flow, ideal conditions and will be reduced by variable that are applied to compensate for roadway deficiencies.

In contrast to the above stated General Plan LOS "A" of 200 ADT, the PDPA traffic analysis states that the General Plan calculates that the LOS "A" capacity of French Creek Road at 1,408 ADT or 169 vehicles per hour based. The March 30, 2012 discussion memorandum then calculates the LOS "C" for French Creek Road at between 2,500 to 3,300 ADT or 504 vehicles per hour.

Because of the conflicting LOS "A" statements for French Creek Road, it is important to review exactly how each of these calculations were made. The Siskiyou County Circulation Element identifies the following equation and variables (the variables are obtained from the Highway Capacity Manual) that are to be used and considered in calculating the capacity of any given roadway.

$$SV = 2000 * VC * WL * TL$$

Where:

SV = peak hour service volume (total for both directions/hour);

V/C = volume to capacity ratio including percent of passing sight distance adjustment;

WL = adjustment for land width and lateral clearance; and

TL = truck factor at a given level of service

NOTE: Peak hour service (vehicles at peak hour - VPH) is assumed to be 12 percent of Average Daily Traffic (ADT).

Using this equation, the Circulation Element contains several examples of different roadway configurations and how the different LOS's would be calculated for these example roadways. One example is a rural road with 10 foot lanes, 4 foot shoulders, rolling terrain, 50% passing sight distance, and 5 percent trucks. The example calculates LOS "A" and LOS "C" as follows:

For LOS "A", the equation would then equate to $SV = 2000 * .135 * .70 * .87$, or 169 VPH or 1,408 ADT.

For LOS "C", the equation would then equate to $SV = 2000 * .450 * .72 * .83$, or 538 VPH or 4,482 ADT.

The traffic analysis submitted with the PDPA states that the above LOS "A" example equation defines the LOS capacity of French Creek Road at 1,408 ADT. This conclusion was based on the above reference example due to it

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being somewhat similar to French Creek Road. However, the existing configuration of French Creek Road in comparison to the above example is only similar and not the actual configuration. French Creek Road was originally constructed with the primary objective of going from Point "A" to Point "B" as simply as possible without regard to design speed parameters. As such, its roadway geometrics are significantly below standards and the above example does not take into account all of French Creek Road's deviations from the ideal assumptions.

The March 30, 2012 discussion memorandum submitted with the proposed PDPA provides an updated calculation from the Highway Capacity Manual on estimating the LOS "C" for French Creek Road. In this calculation, the ideal capacity for an arterial rural roadway (1,800 vehicles per hour) is multiplied by a correction factor for rolling roads with no passing lanes. Note that the 1,800 VPH figure is a refinement of the 2,000 VPH contained in the General Plan's example equation which was based on the 1965 Highway Capacity Manual. As mentioned earlier, based on this calculation, the March memorandum calculates the LOS "C" at 504 vehicles per hour and between 2,500 to 3,300 ADT.

The 1985 version of the Highway Capacity Manual contained significant refinements over the 1965 version discussed in the General Plan of how to calculate roadway service volumes. The refinements include the following factors: (1) Minimum Design speed; (2) Lane widths greater than or equal to 12 feet; (3) Clear shoulders wider than or equal to 6 feet; (4) No "no passing zones"; (5) All passenger cars in the traffic stream; (6) A 50/50 directional split of traffic; (7) No impediments to through traffic due to traffic control or turning vehicles; and (8) Level terrain.

The equation which defines the general relationship of traffic operations from the 1985 Highway Capacity Manual is:

$$SF = X,XXX * (V/C) * F_d * F_w * F_{hv}$$

Where:

SF = service flow rate for the defined level-of-service;

X,XXX is the per hour capacity of the roadway under ideal geometry and conditions;

V/C = ratio of service flow rate to ideal capacity of defined level-of-service;

F_d = adjustment factor for directional distribution of traffic;

F_w = adjustment factor for narrow lanes and restricted shoulder widths; and

F_{hv} = adjustment factor for the presence of heavy vehicles.

In calculating the roadway capacity of French Creek Road, the March 30, 2012 discussion memorandum used 1,800 vehicles per hour (the ideal capacity of a rural arterial roadway) and applied a V/C adjustment for the lack of passing lanes under "rolling" conditions. Upon review of this calculation, staff believes that a more appropriate correction should have been applied as French Creek Road is situated under more "mountainous" conditions. The "mountainous" correction factor also accounts for reduced visibility due to the presence of trees and other horizontal visual obstructions. The application of this more limiting factor would reduce the LOS "C" to 288 vehicles per hour, or between 1,425 and 1,881 ADT. The ADT estimation is based on the same ratio of vehicles per hour to ADT provided in the March 30, 2012 discussion memorandum.

As noted above, the Highway Capacity Manual also provides for other corrections in addition to the V/C factor. The actual design of French Creek Road deviates from ideal lane and shoulder widths. In addition, there are heavy vehicles which utilize French Creek Road. Based on these factors, staff believes that the correct calculations to estimate the LOS for French Creek Road are actually:

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For LOS "A", the equation would then equate to $SF = 1,800 * .04 * 1 * .49 * .625$, or 22 VPH or 183 ADT.
 For LOS "C", the equation would then equate to $SF = 1,800 * .4 * 1 * .49 * .526$, or 106 VPH or 889 ADT.

The variables used in the above equations were obtained from the Highway Capacity Manual. It is important to note that in applying these variables, it is assumed that there are "no passing" limitations on only 60 percent of the road (not the more restrictive 100 percent assumption in the PDPA traffic information), that there is no directional distribution correction, the .49 represents the correction for lane and shoulder width deficiencies, and that there are 10 percent heavy trucks on the road. In addition, in staff's calculation the number of vehicles per hour are assumed to be 12 percent of the ADT. The PDPA ADT calculation uses a more restrictive range of between 15 to 20 percent. If staff had utilized the PDPA traffic assumptions (rolling conditions, no passing lanes, more restrictive peak volume to ADT ratio) the ADT calculation estimates would be lowered to between 644 and 851 vehicles per day under LOS "C" conditions.

As previously noted, the General Plan previously defined the LOS "A" for French Creek Road as 200 ADT. The exact assumptions that were used in this calculation are not known; however, using the equation and staff's variable assumptions discussed above produced a capacity that was within 17 trips for LOS "A". Staff believes that the closeness of this correlation confirms the variable assumptions. Using these confirmed assumptions, the LOS "C" capacity of French Creek Road is approximately 889 ADT. Using the PDPA assumptions, LOS "A" would be between 100 and 133 trips a day on average and would not correlate with the General Plan's LOS "A" stated capacity for French Creek Road.

PDPA Traffic Data Collection

The revised traffic study of August 10, 2011 included monitored traffic volumes during the spring and summer of 2010. Between May 19, 2010 and May 25, 2010, traffic counts were recorded to capture non-summer traffic counts and between July 27, 2010 and August 9, 2010 traffic counts were recorded to capture peak summer traffic counts. The peak summer counts were taken during the Parent/Child and Husband/Wife program because the participants provide their own transportation (typically rental cars) to and from JH Ranch during these sessions and this would generate the most amount of traffic (as compared to the student leadership programs where guests are brought to and from JH Ranch by bus). During the peak summer monitoring period, French Creek Road was open to the public and provided unimpeded access to National Forest lands and wilderness areas, as well as to other residential, agriculture and timber lands. During this time at JH Ranch, there were approximately 125 seasonal staff, 40 full-time staff, and 175 guests from the Parent/Child and Husband/Wife programs. Guests arrived and left (program transition periods) on Saturdays which were July 31 and August 7, 2010. To capture this data, three traffic counters were used and were placed at the JH Ranch bridge, JH Ranch main entrance, and at French Creek Road near Highway 3.

The traffic report states that during the non-summer period, the ADT along French Creek Road was 225 vehicles. In calculating this average, the traffic report used all 7 days that the counter was in place, even if the counter had only collected data for part of day. For example, the traffic counter only began collecting data on May 19th at 5:00 pm and stopped collecting data on May 25th at 8:00 am. Including the days with only a partial count as a whole day in the average calculation reduces the ADT estimate. If the average calculation only includes complete days, the ADT estimate increases to 286. The other issue with the ADT calculation is that there is a marked difference between weekday and weekend traffic. For example, the weekend ADT is 216 trips and the weekday 333 trips.

With regards to the summer peak period, the traffic report states that during the summer peak period the ADT along French Creek Road was 439 trips a day. Like the non-summer ADT calculation, incomplete days were included in this average calculation. The traffic report used 8 days that the French Creek Road counter was collecting data and for 2 of those days data was only partially collected. The traffic counter began collecting data on July 27th at 9:00 am and stopped collecting data on August 3rd at 8:00 am. Including the partial days in this average calculation reduced the ADT estimate to the stated 439 vehicles from the correct average calculation of 479 vehicles. In addition, like the non-summer calculation, there is a marked difference between weekday and weekend traffic. For example, the weekend ADT is 409 trips and the weekday 514 trips. It is also noted that during the summer

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monitoring period, the French Creek Road traffic counter stopped collecting traffic counts on August 3rd whereas the other two traffic counters collected data until August 9th.

Project Related Traffic Increase

As stated in the PDPA, the traffic capacity of French Creek Road is one of the performance measures that limits the ability of JH Ranch to expand in the future. Based on the analysis of the March 2012 discussion memorandum, a conclusion is reached that "It is conceivable that several thousand people could occupy and use JH Ranch without significant increases in traffic on French Creek Road".

In order to evaluate this statement, a review of the actual collected data is necessary. It is noted that this evaluation is limited due to the limited data that is available. For example, while non-summer traffic counts were collected in May 2010, the data that was collected was limited to only total French Creek Road traffic near the Highway 3 intersection. As such, it is not possible to actually determine the non-summer JH Ranch traffic volumes and compare it against summer traffic to develop an accurate estimate of the level of traffic generated by the increased occupancy in the summer.

During the 2010 summer monitoring period, additional counters were placed at JH Ranch's main entrance and bridge to gain additional data about JH Ranch's peak summer traffic volumes. However, JH Ranch's traffic is comingled with: (1) through traffic using French Creek Road for summer activities and access to the wilderness area trailheads; (2) other increases due to seasonal fluctuations in traffic patterns; (3) new home construction (below JH Ranch); (4) road and utility maintenance activities; (5) through traffic at the main entrance from residences not associated with JH Ranch who do not use the new bridge across French Creek at Homestead Lane; and (6) through traffic from residences not associated with JH Ranch at the new bridge across French Creek at Homestead Lane. Because only two additional counters were installed at the main entrance and bridge, the traffic from JH Ranch can not be separated from the above described co-mingled traffic. Another limiting factor is the relatively small data set available where traffic on French Creek Road and at the main entrance and bridge can be compared; as previously mentioned the French Creek Road traffic counter stopped recording data prematurely.

Because of these factors, the ability to develop a trip generation ratio per guest is not directly possible. However, it is possible to develop some general information from the collected data. The August 10, 2011 revised traffic study assigns an estimate of 75% of the summer volume increase on French Creek Road being attributed to JH Ranch activities. The below table compares the non-summer and summer traffic volumes and estimates the resulting increase in traffic from JH Ranch activities using this 75% assumption:

	2010 Traffic Data Comparison			
	Non-Summer vs. Summer Traffic Volumes			
	French Creek Road			
	Non-Summer	Summer	ADT Increase	
			Total	JH Ranch
Total Average ADT	286	479	193	144
Weekend ADT	216	409	193	145
Weekday ADT	333	514	181	136

During the 2010 peak summer period, there was approximately 125 seasonal staff, 40 full-time staff, and 175 guests from the Parent/Child and Husband/Wife programs at JH Ranch for a total occupancy level of 340. Dividing the assumed 144 ADT increase by the 175 guests at JH Ranch during this period means that each guest contributed approximately .82 trips per day during the summer period. As previously mentioned, an additional 375 trips per day

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could be accommodated on French Creek Road and remain under the LOS "C" ADT of 889 trips. Accordingly, 455 additional occupants could be accommodated for a total of 795 guest and staff based on the 2010 occupancy level and 2010 French Creek traffic volumes. This of course does not consider traffic growth from any other source.

Actual traffic volumes on French Creek Road will vary not only depending on activities at JH Ranch but also from the surrounding properties. For example, on July 28, 2010, the French Creek Road traffic monitor recorded a traffic volume of 735 trips and the traffic counters at JH Ranch main entrance and bridge recorded a total of 269 trips or approximately 37 percent of French Creek Road traffic. The difference of 466 trips appears to be generated from properties outside of JH Ranch. In another example on August 1, 2010, the French Creek Road traffic monitor recorded a traffic volume of 406 trips and the traffic counters at JH Ranch main entrance and bridge recorded a total of 392 trips, or approximately 97 percent of French Creek Road traffic. Given the previously mentioned limitations on the traffic data collection and the inability to accurately separate JH Ranch traffic from other French Creek Road traffic, a conservative approximation can only be made.

Cumulative Traffic Projection

As shown above, properties outside JH Ranch property can influence the French Creek Road traffic volumes. The above discussion did not consider the addition of any traffic from future growth from properties outside of JH Ranch. This is not realistic and any traffic projections must consider the growth potential of the surrounding area. The traffic analysis submitted with the PDPA did not consider traffic from other land use growth.

Planning staff has identified some 145 properties that can take access from French Creek Road. Of this amount, staff believes that there are approximately 66 parcels where additional development is likely to occur and add additional traffic to French Creek Road. This number does not include government owned parcels, land devoted to timber production, or other property that have structures on them. Assuming an average of 7 trips a day from each parcel (the traffic generation rate for a single-family home) this means that there is the potential for an additional 462 trips which could be added to French Creek Road at build-out traffic volumes. While this is the possible build-out, it is not necessarily the probable build-out in the future. However, staff does anticipate that at least half of the properties could be developed in the future resulting in an additional 231 trips. Adding these 231 trips to the 2010 ADT of 514 produces an ADT of 745. Accordingly, without any occupancy increase at the Ranch over the 2010 level there would be 145 trips below LOS "C". Based on the .82 trips per guest at the Ranch described above, there would be capacity for 176 additional occupants at JH Ranch for a total permanent capacity of 516 individuals during the Parent/Child and Husband/Wife program session.

Summary

As detailed in this section, the traffic analysis prepared for the PDPA application contains a number of mathematical errors in calculating the applicable ADT and LOS levels. In calculating the average ADT, partial days were included in the average which lowered the correct ADT calculation. In addition, by combining weekend and weekday traffic, the significant variations between the weekday ADT and weekend ADT were missed which need to be considered in developing future traffic volumes. With regards to the LOS calculation, as previously noted, the Highway Capacity Manual contains a number of variables that are used to correct for deviations from ideal roadway geometrics and the traffic analysis only utilized one. Staff believes that the applications of the other variables to account for lane and shoulder width deviations, the presence of heavy vehicles, and the mountainous condition of French Creek Road drastically reduces the number of cars that can be accommodated on French Creek Road while maintaining a LOS of "C".

Another issue with the traffic report is that the actual traffic data collected was limited in duration and locations. For example, while non-summer traffic counts were collected in May 2010, the data that was collected was limited to only French Creek Road traffic near the Highway 3 intersection. As such, it is not possible to compare summer traffic volumes at the bridge and main entrance of JH Ranch to the non-summer traffic volumes. In addition, because of the limited number of counters that were actually installed, it is not possible to separate JH Ranch's traffic that is comingled with the previously detailed non-JH Ranch traffic. This in turn prevents the development of a

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data driven trip generation rate for summer occupancy during the Parent/Child and Husband/Wife program session; the session where the most amount of traffic is generated. The limited number of counters also prevents an analysis of trip distribution which is needed to assess impacts of traffic from day trips on other constrained roads in the area.

Notwithstanding the data collection limitations, the data does show that summer traffic volumes on French Creek Road are higher than non-summer traffic volumes. This is in part because of increased JH Ranch traffic, but it also because other uses in the area are generating higher traffic volumes as well. The traffic report assigns an estimate of 75 percent of this traffic increase to JH Ranch and notes that this level is believed to be a conservative estimate. Under this assumption, staff was able to develop an approximate trip generation rate. However, upon review of the data that was collected, it indicates that the level of additional traffic from JH Ranch is highly variable. Comparing changes in traffic from the bridge and main entrance monitors to the French Creek monitor shows significant variations ranging from approximately 37 to approximately 97 percent. Thus, the 75 percent estimate is likely to be conservative most of the time; it is also likely to under estimate JH Ranch's contribution to French Creek Road's traffic volumes some of the time. Because of this, staff's trip generation rate can only be considered a generalized estimate.

The limited data that was collected targeted the traffic from one of the 2010 Parent/Child and Husband/Wife sessions because, as previously discussed, it is this time where the highest traffic volumes from JH Ranch are being generated. In 2010, the PDPA traffic analysis states that there were 175 guests in this program. As discussed in the PDPA, up to 250 guests in this program can be accommodated. Thus, at current capacity, additional traffic will be added to French Creek Road. In staff's build-out analysis, the additional traffic from these 75 guests are accounted for in the estimated permanent capacity of 516 individuals during the Parent/Child and Husband/Wife program session. This capacity was developed from a trip generation rate that was developed with the available data from this session. At issue is that this capacity will change with the different program sessions because the mode of transportation varies. The issue here is that occupancy levels can be considerably different while maintaining a LOS "C" and this issue and how it relates to the performance standard has not been analyzed.

Based on the above identified issues, staff is unable to make a finding that traffic from the proposed project does not have the possibility of creating a significant environmental impact. Staff believes that the analysis conducted herein does show that traffic volumes from JH Ranch's summer operations do meet the General Plan's LOS "C" criteria under current operations and even with some limited growth as discussed above. However, in making this conclusion, a significant number of assumptions have to be made. While staff believes that these assumptions are reasonable, staff can not draw a conclusion on their level of accuracy. Because of this, staff can not make the finding that traffic from the proposed project does not have the possibility of creating a significant environmental impact