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MEMORANDUM

Date: April 16, 2013

Project #: 13278

To: Rob Hayes-St. Clair
JH Ranch

From: Chirag Safi, (916) 822-5356

Project: French Creek Road

Subject: Micro-Simulation Analysis Framework & Assumptions

This memorandum summarizes the technical parameters and assumptions for performing micro-simulation analysis of the French Creek Road. The memorandum was prepared based on the initial conversation with the Omni-Means, the Traffic Analysis Peer Review Consultant for the JR Ranch Planned Amendment #Z-11-01.

- **Vehicle Volumes:** The traffic data provided by the SHN Consulting Engineers and Geologists in the *French Creek Road Traffic Analysis* report dated August 8, 2012 will be used. Directional split will be applied to the traffic counts performed during the peak hour. Only one peak hour (so the hour of the highest traffic) will be modeled and evaluated.

- **Vehicle Classification:** Based on the site observations conducted by Omni-Means, two passenger cars can cautiously pass-by each other; however, a passenger car and a pick-up is not able at the point of Section 4 of French Creek Road that is inhibited by a rock outcrop and power pole where the pavement measures 13.5'. These classes of vehicles will be modeled in VISSIM, each assigned with the average/typical geometry. Vehicle classification will be assigned to traffic generated by JH Ranch programs and general vehicular traffic along French Creek Road. Per SHN French Creek Traffic Analysis dated August 12, 2012, 38% of peak hour vehicles are generated by JH Ranch programs.

  Therefore, for JH Ranch generated traffic the following classification will be used:

  - Small passenger cars (assume as 80% of all vehicles)
  - Pick-up trucks (assume as 14% of all vehicles)
  - Heavy vehicles, i.e. lumber trucks (assume as 6% of all vehicles)

  For general vehicular traffic the following classification will be used:

- Small passenger cars (assume as 47% of all vehicles)
- Pick-up trucks (assume as 47% of all vehicles)
- Heavy vehicles, i.e. lumber trucks (assume as 6% of all vehicles)

- **Desired Speed:** Maximum speeds will be set equal to the speed limit, i.e. 40 mph. The minimum value would be 25 mph.

- **Reduced Speed Areas:** Approximately 488 feet along Section 4 of French Creek Road will be coded as reduced area. This will include from Location B through Location E of Section 4 as described in the French Creek Road Section 4 Measurements Memo by SHN dated November 12, 2012. The speed in the reduced speed areas will range from 15 to 25 mph.

- **Stop Rules:** As noted in "Vehicle Classification" there is one point at Section 4 of French Creek Road where sight distance is reduced by a rock outcrop and power pole and the subsequent pavement width at this point is measured as 13.5'. The reduction in sight distance is experienced approximately from between 30'-100' approaching this location from both the north and southbound due to the rock outcrop, power pole and horizontal curve. Sight distance is not obstructed within 30' of either side of this location in both a northbound and southbound travel.

  The location and type of stop rules will be based on the prevailing restriction to the sight distance and horizontal curve. The stop (priority) rules will be coded at the following two locations for all vehicle classification:

  1. Northbound - within 30' of the southern power pole (roadway width 13.5'-15')
  2. Southbound - within 30' of the southern power pole (roadway width 13.5'-15')

  The directional stop rule will be coded within 30' of the southern power pole. The priority (stop) rules in this case will be applied in the event of northbound and southbound traffic arrives within the predetermined 30' vicinity of the southern power pole. In this event the following rules apply:

  - Pick-up trucks or heavy vehicles would stop and provide right-of-way to the opposing passenger car
  - Heavy vehicles would stop and provide right-of-way to the opposing vehicle of other classification.
  - When two heavy vehicles or two pick-up trucks encounter each other from the opposite directions, whichever vehicle got second to the section of roadway (say, 100 feet) will yield right of way to opposing vehicle.

  All stop (priority rules) would have the following features:

- Minimum headway may range from 25 to 50 feet depending on location along the study segment.
- Minimum gap time may range from 1 to 3 seconds depending on classification and location along the study segment.

- **Functions & Distributions:** Each vehicle class mentioned above will be given a different range/distribution of behavior rules, especially in the face of opposing traffic at the narrow stretch. Driving behavior will be iteratively adjusted to meet the desired visualization. The model will be start with two driver behavior for each vehicle classification – aggressive (who can pass-by opposing vehicles without stopping) and conservative (stop and yield to opposing traffic). Please note that VISSIM can't model backing up movement. The following values will be changed:

    - Maximum acceleration
    - Maximum deceleration

- **Global Driving Behavior:** Wiedemann 99 will be used for car following model. The parameters contained within this model will be tweaked in order to get desired visualization within the study segment. The values that could be changes include, but not limited to, CCO, CC1, CC4, CC5, CC7, CC8, etc.

- **Model Calibration:** In absence of any other data, calibration will be purely based on traffic volumes. Simulation volumes will be checked against the input counts.

- Ten VISSIM runs will be made with random seed number. The simulation resolution would be 5 time steps/second.

- **Delays and Level of Service:** The simulated travel time will be compared with the free flow travel time of vehicles going through this simulated stretch of French Creek. In absence of any ground conditions, the existing travel time will be estimated using the prevailing speed and length of the segment. The difference between simulated travel time and free flow travel time can be attributed to the narrow width, sight distance obstructions and road curvature. In other words, the difference would be the delay; then use signal-controlled-delay ranges defined in the 2010 HCM to determine LOS.

- **Sensitivity:** Use VISSIM micro-simulation to determine existing level of delay and LOS. Use VISSIM micro-simulation to determine the maximum throughput before vehicles start experiencing average delays corresponding to LOS D for signal control as defined in the 2010 HCM.