



City of La Habra Heights AGENDA REPORT

To: Mayor and City Councilmembers For Meeting of: April 12, 2007

From: Majdi Ataya, P.E., City Engineer

Through: Justin R. Powers
Community Development Dir.

SUBJECT: HACIENDA ROAD TRAFFIC EVALUATION

BACKGROUND:

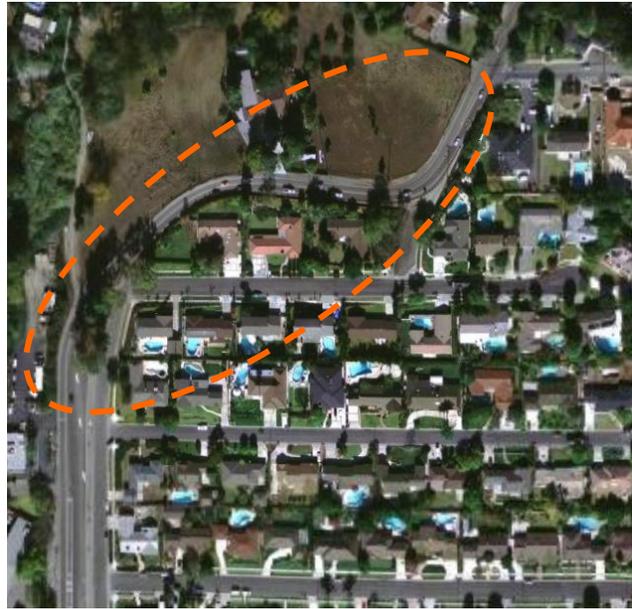
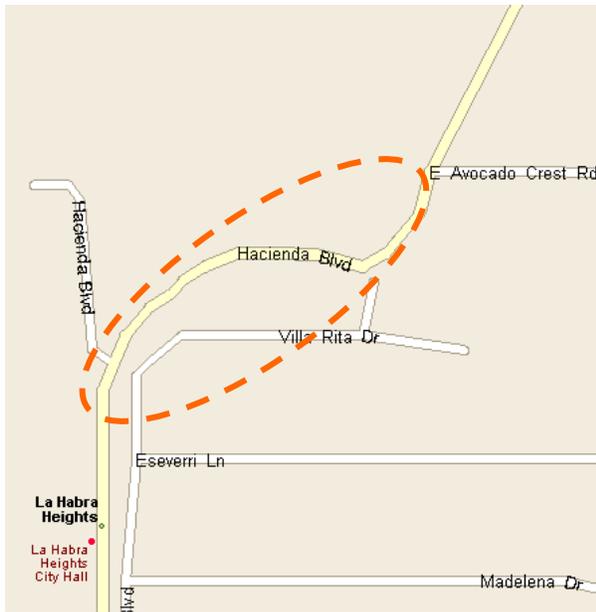
Based on comments received from the Community and Council Members at the March 8th Meeting, we have revised our previous traffic study to consider new alternatives for Hacienda Road between the City of La Habra Heights City Hall and Avocado Crest Road. The direction from Council was to consider more extensive improvements than those previously recommended. The conclusions of this study also reflect input from the Chilson family, who owns property along Hacienda Road. The main purpose of this study is to develop recommendations which achieve two ends:

- Reduce speeds along Hacienda Road
- Limit vehicles intruding onto the Chilson property from Hacienda Road

ANALYSIS:

STUDY LOCATION

Hacienda Road within the study area is considered a north-south collector street (with one lane in each direction) in the City of La Habra Heights General Plan. It becomes a four-lane arterial street when traveling to the south into the City of La Habra. Our study segment (shown on the top of the next page) is located in the City of La Habra Heights just north of the border of the two cities and its key roadway characteristics are described on the following page.



- It has two consecutive horizontal curves in a total length of approximately 1,000 feet. The posted advisory speed is 15 miles per hour (mph) and 25 mph for the northbound and southbound direction, respectively.
- It functions as the transition from a four-lane arterial street to a two-lane collector street, as well as the entrance/exit to the winding portion of Hacienda Road with significant grades.
- Two driveways are located on Hacienda Road immediately past the curves, including the driveway to the Fire Station in the southbound direction and the driveway to Avocado Crest Road in the northbound direction.
- The northbound direction provides a merge area from two to one travel lane before the first curve with roadway width decreasing from approximately 32 feet in the merge area to 12 feet in the curve.

In addition to the geometric characteristics described above, the operational characteristics of the study segment are also presented below based on field observations and a review of related documents provided by the City, including the *Engineering Report on Right-turn Lane on Avocado Crest Road at Hacienda Road* prepared for the City Council meeting on January 12, 2006, the *City of La Habra Heights Engineering and Traffic Survey* (March 2006), and *Hacienda Road Traffic Calming Study* (July 2002).

Traffic Volumes

- The average daily traffic on this roadway is 21,880 with a high number of commute users as of January and February of 2006 with a significant number of commuters, according to the *City of La Habra Heights Engineering and Traffic Survey* (March 2006).

Traffic Speeds

- The 85th percentile speed is approximately 40 mph on Hacienda Road between East Road and South City Limit, which includes the study segment.
- Estimates based on field observations show a majority of vehicles travel at speeds significantly higher than the posted advisory speeds in the curvature area.
- Vehicles traveling on the northbound direction make quick stops at the Avocado Crest Road driveway to make right turns.

ACCIDENT REVIEW

The accident review was conducted based on the Incident History Report provided by the City, which includes the traffic accidents on Hacienda Road between West Road and South City Limit in Year 2006. There were a total of seven accidents on this segment in 2006, five (71%) of which were hit-object or side-swipe collisions due to unsafe speed and two of them occurred right in the curvature area. The calculated collision rate for Hacienda Road between West Road and South City Limit is 1.71.

In addition, historical accident data contained in the related documents described above were also reviewed for the same segment, and the results are summarized in Table 1. As shown, from Year 2002 through 2006, the average number of collisions on Hacienda Road between East Road and South City Limit is more than three collisions per year, which is the threshold defined in the *Hacienda Road Traffic Calming Study* (July 2002).

Year	Number of Accidents
1998	5
1999	2
2000	3
2001	2
2002-2004 ¹	19 in 3 years
2006	7

Note: ¹ For Hacienda Road between East Road and South City Limit.
Source: City of La Habra Heights, 2007.

We also met with the owner of the property located on the west/north side of Hacienda Road within the study area. As indicated by the property owner, more accidents than listed in Table 1 occurred on Hacienda Road, a majority of which occurred because drivers traveled at speeds too high for the curvature area. We can therefore conclude that many of the accidents, particularly those where drivers drive off the road into the Chilson property, go unreported.

EXISTING TRAFFIC CONTROL/CALMING DEVICES

In the past five years, the City has initiated studies to improve traffic safety on Hacienda Road, which include the *Traffic Calming Study of Hacienda Road* completed in 2002 and an engineering study on *Right-turn Lane on Avocado Crest Road at Hacienda Road*. Both studies provide recommendations to improve traffic safety along Hacienda Road and/or adjacent driveways, and some of the recommended traffic control/calming devices have already been installed.

The existing traffic control/calming devices on Hacienda Road between the City Hall and Avocado Crest Road are summarized and graphically displayed below. For the traffic control devices, the MUTCD (Manual on Uniform Traffic Control Devices) codes were also identified.

Northbound Direction

The following traffic control/calming devices are currently installed on northbound Hacienda Road from the south to the north.

1. A right-turn sign (W1-1) with an advisory 15 mph speed plaque (W13-1) is placed approximately 500 feet before the first curve.
2. A winding road sign (W1-5) with a next 3-mile distance plaque (W7-3a) is placed approximately 230 feet before the first curve.
3. A slippery when wet sign (W8-5) is placed right before the first curve.
4. Multiple chevron alignment signs (W1-8) are placed along the two curves.
5. Raised reflective pavement markers are installed in the median and shoulder along the two curves.



Southbound Direction

The following traffic control/calming devices are currently installed on Southbound Hacienda Road from the north to the south.

1. A left-turn sign (W1-1) with an advisory 25 mph speed plaque (W13-1) is placed between the two curves.
2. A worn rumble strip is located near the fire station past the second curve.
3. Multiple chevron alignment signs (W1-8) are placed along the two curves.
4. Raised reflective pavement markers are installed in the median and shoulder along the two curves.
5. Multiple reflectors are installed along the two curves.



POTENTIAL TRAFFIC SAFETY IMPROVEMENTS

Improvement 1 – Installation of Guard Rails

Existing guard rails are located along Hacienda Road from the end of the first curve through the second curve in the northbound direction, and from the middle to the end of the second curve in the southbound direction.

Given that vehicles traveling on southbound Hacienda Road often cross the shoulder line in front of the Chilson's property, and vehicles involved in several accidents in this curvature area ran off the road into the Chilson's property, we suggest installing the metal beam guard rails (MBGR) along the shoulder of southbound Hacienda Road in front of the Chilson's property. The primary purpose of this guard rail is to prevent southbound vehicles from crossing over onto the Chilson's property.

The advantages and disadvantages of this improvement are presented below:

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|----------------|--|
| Advantages: | <ul style="list-style-type: none">• Reduce traffic speeds by narrowing the roadway• Improve traffic safety for the roadside property |
| Disadvantages: | <ul style="list-style-type: none">• Installation cost is high and require high maintenance• Some potential for head-on collisions when vehicles hit guardrails and then affect upcoming traffic |

The cost estimated for the implementation of Improvement 1 is approximately \$35,000. This cost reflects the construction of a guard rail 400 feet long and is based on average construction costs of recent improvements as summarized by Los Angeles County. This guard rail would extend from Avocado Crest nearly to the driveway of the Chilson property. No guard rail would be constructed south of the driveway of the Chilson property.

As an alternate measure, the construction of the guard rail would be limited to a short section near the Chilson home along Hacienda Drive. We estimate that some level of protection would be provided by a much shorter guard rail of 100 feet in length, which would reduce the cost to approximately \$8,500.

Improvement 2 – Installation of Speed Tables

Speed tables are flat-topped speed humps used to slow down traffic, and they are often constructed with brick or other textured materials on the flat section. Speed tables are typically long enough for the entire wheelbase of a passenger car to rest on the flat section. Their long flat fields give speed tables higher design speeds than Speed Humps.



The brick or other textured materials improve the appearance of speed tables, draw attention to them, and may enhance safety and speed-reduction.

On an average, a 22-foot speed table can reduce the 85th percentile vehicle speeds by 18 percent, as well as reduce the number of accidents by 45%.

In order to slow down traffic before entering the curvature area, we recommend considering the installation of speed tables (20-22 feet long and 3 inches high) at the two locations on Hacienda Road as shown in the figure below:



There is some flexibility in the placement of the northernmost speed table. This facility could be installed either south of the Hacienda Road/Avocado Crest Road intersection, north of the intersection or at the intersection itself. If desired, the City could place a second speed table north of the Hacienda Road/Avocado Road intersection. Placing two tables in proximity could pose a problem for larger vehicles, such as fire trucks, and they would need to be spaced sufficiently far apart.

The two speed tables would cover the whole cross section of the roadway. A speed hump sign with an advisory speed sign of 24 mph should be installed 25 feet before the speed tables at each travel direction.

The advantages and disadvantages of this improvement are presented below:

- Advantages:
- Effective in reducing speeds, though not to the extent of speed humps
 - Improve traffic safety by reducing accidents

- Disadvantages:
- Increase noise
 - Could affect response times for emergency vehicles
 - Additional signage required

The cost estimated for the implementation of Improvement 2 is approximately \$10,000, which assumes the construction of two speed tables.

Improvement 3 – Installation of Centerline Delineators

Delineators are light reflecting devices mounted along the side or centerline of a roadway in series and they are primarily used to guide traffic through alignment changes. These devices can be used to supplement other signs and devices where additional guidance for traffic is desirable.

Delineators include the upright delineator post, delineator bases, epoxy resin and applicator. They are made from high impact material, and hinged at the delineator base. They can be bright yellow with several bands of high visibility reflective tape to improve nighttime visibility. They can be repeatedly run over by a vehicle without damage.

Centerline delineators can be considered on Hacienda Road to guide traffic through the curvature area and provide better visibility when the weather is undesirable and/or the roadway is wet. Centerline delineators can be installed through the entire curvature area except for the entrance to the Chilson's property for approximately 1,000 feet.

The advantages and disadvantages of this improvement are presented below:

- Advantages:
- Guide traffic and prevent cross-median behaviors
 - Provide high visibility to drivers
 - Cost is low
- Disadvantages:
- Restrict turn by large vehicles
 - Not visually attractive

The cost estimated for the implementation of Improvement 3 is approximately \$2,500.

Improvement 4 – Roadside Visibility Enhancement

For drivers traveling in the northbound direction of Hacienda Road, the trees/bushes on east side of the roadway at the beginning of the first curve and just north of the Avocado Crest Road intersection make it difficult to see oncoming vehicles. It is recommended that trees/bushes on the east side be cut or trimmed to improve the visibility and sight distance for the northbound direction of Hacienda Road.

The cost estimated for the implementation of Improvement 4 is approximately \$500. However, for the bushes that are located within private property instead of the public

right of way, the property owner(s) should be responsible for the cost upon City's request/notification (e.g., by letter).

Improvement 5 – Installation of Rumble Strips

Rumble strips are effective devices to alert drivers approaching a change of roadway condition or a hazard that requires substantial speed reduction or other maneuvering. They can be grooves or rows of non reflective raised pavement markers placed perpendicular to the direction of travel. As a vehicle passes over the rumble strips, noise and vibration are produced, alerting the driver they are approaching a hazard.

Generally, there are three types of rumble strips: 1) roadway rumble strips are placed across the travel path to alert drivers approaching a change of roadway condition; 2) shoulder rumble strips are placed on the shoulders just beyond the traveled way to warn drivers they are entering a part of the roadway not intended for routine traffic use; 3) centerline rumble strips are placed on centerline of undivided roadways to warn drivers they are leaving their intended lane of travel.

Considering that rumble strips create 24-hour noise that would have an immediate impact on the adjacent residential uses, we recommended installing centerline rumble strips along the entire curvature area.

The advantages and disadvantages of this improvement are presented below:

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|----------------|---|
| Advantages: | <ul style="list-style-type: none">• Centerline rumble strips are proven to be effective at locations with head-on, opposite sideswipe, and single vehicle crossover crashes.• Installation costs are low and little or no maintenance is required. |
| Disadvantages: | <ul style="list-style-type: none">• The noise produced by rumble strips may be disruptive to nearby residents.• Potential problem of migration of crashes may occur further down the roadway without rumble strips. |

The cost estimated for the implementation of Improvement 5 is approximately \$1,500.

Improvement 6 – Installation of a Traffic Signal

Another improvement to reduce traffic speeds and improve traffic safety for this study area is the installation of a traffic signal at the intersection of Hacienda Road and Avocado Crest Road intersection. The *Engineering Report on Right-turn Lane on Avocado Crest Road at Hacienda Road* for the January 12, 2006 City Council Meeting revealed that the existing traffic volumes on Avocado Crest Road may satisfy the minimum requirements of peak hour volume warrants for signalization of the intersection.

The advantages and disadvantages of this improvement are presented below:

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|----------------|--|
| Advantages: | <ul style="list-style-type: none">• May reduce traffic speeds• Improve traffic safety by providing protected phases for movements and pedestrians• Facilitate turns to/from Avocado Crest Road |
| Disadvantages: | <ul style="list-style-type: none">• Installation cost and maintenance fee is high• May increase vehicle delays along Hacienda Road |

The cost estimated for the implementation of Improvement 6 is approximately \$200,000.

In addition to the improvements described above, there was also consideration for the installation of stop signs on the northbound and southbound approaches of the intersection of Hacienda Road and Avocado Crest Road. However, given the high traffic volumes on Hacienda Road, providing an all way stop control at this intersection would cause significant delay with long vehicle queues on Hacienda Road. The potential queuing problem would not only significantly decrease mobility on Hacienda Road, but likely cause rear-end collisions that typically occur in congested areas. Therefore, we recommend against installing an all way stop control at the intersection of Hacienda Road/Avocado Crest Road.

Improvement 7 – Curb

Another potential improvement would involve the construction of a curb along the Chilson property. This raised curb would be constructed along the edge of southbound Hacienda Road and should prevent some vehicles from crashing onto the Chilson property. The curb is not likely to be as effective as a guard rail.

The advantages and disadvantages of this improvement are presented below:

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|----------------|--|
| Advantages: | <ul style="list-style-type: none">• May provide some protection for the Chilson property |
| Disadvantages: | <ul style="list-style-type: none">• Not as effective as a guard rail, some vehicles may jump curb• Aesthetics (inconsistent with rural character) |

The cost estimate for the curb would be \$8,000, assuming that 400 feet of curb is constructed from Avocado Crest Road to the Chilson driveway. An alternate configuration for the curb would be to construct a curb in conjunction with a guard rail. In this case, only 300 feet of curb would be needed at a cost of \$6,000.

FISCAL IMPACT:

We recommend implementing Improvements 1, 2, 3, 4 and 7 described above, and the total cost estimated for those improvements are approximately \$27,500. This cost estimate reflects the minimal guard rail installation (100 feet) with another 300 feet of curb along the Chilson Property.

RECOMMENDATION:

We recommend implementing Improvements 1, 2, 3, 4 and 7. We do not recommend Improvement 5 (rumble strips) or Improvement 6 (traffic signal). We also do not recommend the installation of stop signs along Hacienda Road.