APPENDIX C

Fehr & Peers Response to Rajiv Bhatia Letter of March 3, 2006

FEHR & PEERS
TRANSPORTATION CONSULTANTS

MEMORANDUM

Date: June 6, 2006

To: Patrick Van Ness, Signature Properties

From: Chris Gray, Fehr & Peers
Matthew Ridgway, Fehr & Peers

Subject: ***Response to Rajiv Bhatia's March 3, 2006 Letter Related to Pedestrian Injuries Related to the Oak to 9th Development***

1031-1998

At your request, we have completed a review of a letter prepared by Rajiv Bhatia, MD, related to the proposed Oak to 9th Development. In his letter, Dr. Bhatia asserts that increased traffic from the project would cause a significant number of pedestrian injuries at various locations throughout the City of Oakland. Dr. Bhatia supports his assertion through a review of the City of Oakland's *Pedestrian Master Plan*, various research studies, and a collision prediction model.

Based on our review of this letter, we have identified the following comments:

1. Pedestrian safety is an important consideration but the methodology used in the letter to draw a connection between the Project and the need for pedestrian safety enhancements lacks nexus.

    a. The macro-level conclusion that increasing traffic volumes increases pedestrian collision likelihood lacks site specificity. Our analysis of traffic impacts and mitigation measures is based on a site specific analysis. It is likely that any increased pedestrian collisions may occur at only a few locations or at locations with certain characteristics, for instance at unsignalized intersections or those lacking crosswalks.
    b. Without site specificity, it is not possible to draw a nexus between the impact and a proposed improvement/mitigation. This nexus is critical under CEQA to require a project to contribute to a specific mitigation measure.
    c. Dr. Bhatia's analysis is based on hypothetical numbers of pedestrian collisions rather than actual data regarding pedestrian collisions.

2. Analysis of site-specific pedestrian safety considerations is not supported by state of the practice tools.
    a. There is no safety-consideration comparable to the Highway Capacity Manual (although a new Highway Safety Manual is under development) that would allow assessment of whether an intersection is safe and whether project-level changes to the subject intersection increases the likelihood of pedestrian collisions.
    b. The City of Oakland does not have a policy or other guidance to form the basis of significance criteria even if there were a basis for conducting the site-specific

safety analysis. Without a policy, standard, or significance criteria, we can not determine if additional pedestrian impacts are a significant impact under CEQA.

3. There is no precedent, in Oakland or elsewhere, for such an analysis.
    a. As noted in the studies cited by Dr. Bhatia and other relevant studies identified by Fehr & Peers, there was no instance identified instance where an increase in pedestrian was correlated with a historical increase in volume at the same intersection. Copies of these studies are attached to this document.
    b. There were no studies which analyzed the impact of a development project's traffic on a pedestrian system.
    c. The nearest thing would be an analysis of collisions per million vehicles or collisions per million pedestrians for study intersections. A potential basis for determining whether the observed collision rates are problematic would be to compare the rate of collisions per million vehicles with statewide average collision rates for comparable intersections published by Caltrans annually. (There is no basis for determining an appropriate rate of collisions per million pedestrians because the is little or no data on pedestrian volumes).
    d. Such a comparison would allow us to identify intersections with safety concerns and we could proceed to review actual collision reports for the subject intersection to determine whether there are engineering solutions (for example - if a disproportionate number of collisions were between right-turning vehicles and pedestrians in a particular crosswalk, we could then recommend a No Right Turn on Red sign).
    e. Even if this process were to be employed, there would be no way to determine if a significant impact occurs under CEQA and if there is adequate mitigation for such an impact.

4. The number of pedestrian collisions at an intersection is a function of the traffic volume, speed, intersection configuration, traffic control, surrounding land uses, location, and number of pedestrians. At any location, it is difficult to isolate the contribution of traffic volume growth to any increases in pedestrian volumes.

5. The City's Pedestrian Master Plan lists 10 intersections where a majority of the pedestrian collisions occur. These intersections generally averaged 1 collision per year or more from 1996 to 2000. None of these 10 intersections carry a significant amount of project traffic.

Fehr & Peers has also obtained data from the City of Oakland regarding historical reported pedestrian collisions at the 50 study intersections that are analyzed in the Oak-to-Ninth EIR. Figure 1 shows the locations of these intersections, many of which are in the downtown core and Chinatown areas, which have high levels of pedestrian traffic. A significant shortcoming of collision reporting systems throughout the US is that minor collisions, particularly those within no injuries are unreported. As a result, the data presented below should not be considered all-inclusive, but is good for cross-intersection comparisons.

1. As shown in Figure 2, nearly half (20) of the 50 study intersections had no reported pedestrian-related collisions from 1995 to 2004. Given that pedestrian-related collisions normally represent only a fraction (generally less than 10 percent) of the total collisions, this is not an unusual finding.

2. At 20 of the remaining 30 intersections, three or fewer pedestrian collisions took place over the nine-year period (1995 to 2004), which represents one or fewer collision per three-year period.

3. At one intersection, Webster/8th, an average of one pedestrian collision per year occurred. The conclusion from this and the prior two bullets is that there are not sufficient numbers of pedestrian collisions to allow a reliable statistical analysis; this despite a sampling of 50 intersections with a total of 98 reported pedestrian-involved collisions. This also highlights the complexities of collision prediction, which is normally based on a statistical analysis of collision trends and factors.

4. The number of pedestrian collisions by year varied significantly. As shown on Figure 3, the highest number of pedestrian collisions occurred in 1995 with 20 collisions. In other years, the number of pedestrian collisions varied between 6 and 12 per year at our study intersections. There was no clear trend of pedestrian collisions increasing or decreasing over the nine-year period.

We hope you find this information helpful. If you have any questions, comments, or require any additional information, please call me at 949.859.3200.

Articles referenced by Dr. Bhatia (letter's endnotes are included in the references below):

7. Morrison, DS, Petticrew, M, Thomson, H. What are the most effective ways of improving population health through transport interventions? Evidence from systematic reviews. Journal of Epidemiol Community Health. 2003: 57: 327-333.

The authors reviewed published and unpublished research articles pertaining to transportation interventions to improve health. Traffic calming and nighttime lighting was found to reduce accidents, however it is unclear the type of accidents the authors are referencing in the review.

8. Jacobsen, PL. Safety in numbers: more walkers and bicyclists, safer walking and bicycling. Injurty Prevention. 2003: 9: 205-209.

Jacobsen studied bicycle and pedestrian collision data sets from around the world. He found that a motorist is less likely to collide with a pedestrian or bicyclists the more non-motorized users are present. The research demonstrates that this is the case at all levels of analyses, from intersections to regions.

9. Leden, Lars. Pedestrian risk decrease with pedestrian flow. Study based on data from signalized intersections in Hamilton, Ontario. Accident Analysis and Prevention. 2002: 34: 457-464.

The researcher studied pedestrian accidents at 300 signalized intersections in Hamilton, Ontario, Canada between 1983 and 1986. The results show that as the number of pedestrians increase the number of vehicle-pedestrian collisions decrease, pedestrian accidents increase with increases in vehicle flow, and that left-turning vehicles are more of a risk to pedestrians than right-turning vehicles.

11. LaScala EA, Gerber D, Gruenewald PJ. Demographic and Environmental Correlates of Pedestrian Injury Collisions: a spatial analysis. Accident Analysis and Prevention. 2000: 32: 651-658.

In this study, the researchers use a spatial analysis to study pedestrian injury collisions from San Francisco, California in 1990. The results found that a variety of environmental factors, including vehicle flow, population density, the local population's age, unemployment, gender, education, and availability of alcohol are all related to pedestrian injury rates.

14. Agran PF, Winn DG, Anderson CL, Tran C. Del Valle CP. The Role of the Physical and Traffic Environment in Child Pedestrian Injuries. Pediatrics. 1996: 98: 1096-1103.

This analysis was performed in Orange County, California during the afternoon hours, when more young pedestrians are present on streets. The authors conclude that residential streets with multifamily residences and on-street parking should receive high priority for intervention programs reducing children pedestrian injuries.

15. (Different Source but same author and topic) Zegeer CV, Stewart RJ, Huang HH, Lagerwey PA. Safety Effects of Marked Versus Unmarked Crosswalks at Uncontrolled Locations. Transportation Research Record. 1773: 56-68.

Research in this study includes five years of pedestrian crash statistics at 1,000 marked crosswalks and 1,000 unmarked crosswalks located at sites without traffic signals or stop signs in various United States' cities. Results found that marked crosswalks on two-lane roads presented no difference in pedestrian crash rates than unmarked crosswalks on two-lane roads. On multi-lane roads with 12,000 or more vehicles per day, the research found marked crosswalks increased pedestrian crash rates compared to unmarked crosswalks.

16. Landis, BW, Vattikuti, VR, Ottenberg, RM, McLeod, DS, Guttenplan, M. Modeling the Roadside Walking Environment: A Pedestrian Level of Service. TRB Paper No. 01-0511.

This research develops a Pedestrian Level of Service (LOS) Model for the state of Florida based on 1250 observations of 75 pedestrians in Pensacola, Florida. The Pedestrian LOS focuses on pedestrians' perception of safety and the "primary" factors that affect perception of safety. Factors include: separation between pedestrians and traffic, traffic volume, traffic speed, percentage of truck traffic, and driveway access and frequency.

20. Lee, C, Abdel-Aty M. Comprehensive Analysis of Vehicle-Pedestrian Crashes at Intersections in Florida. Accident Analysis and Prevention 2005: 37: 775-786.

This study focuses on vehicle-pedestrian crashes in Florida between 1999 and 2002. The authors found that demographic factors, road geometries, and traffic and environmental conditions are all related to the frequency of pedestrian crashes. The research found that higher average traffic volumes at intersections increases pedestrian crashes, but the rate of increase is steeper at lower average traffic volumes (in rural areas).

Other articles reviewed:

Houton, RV. The Effects of Advance Stop Lines and Sign Prompts on Pedestrian Safety in a Crosswalk on a Multilane Highway. Journal of Applied Behavior Analysis. 1988: 21: 245-251.

A study in Dartmouth, Nova Scotia, Canada focuses on the use of stop line bars at unsignalized crosswalks. The results found that stop line bars with pedestrian crossing signs reduce vehicle-pedestrian collisions or near vehicle-pedestrian collisions by almost 80 percent.

Lord, Dominique. Analysis of Pedestrian Conflicts with Left-Turning Traffic. Transportation Research Record. 1538: 61-67.

Lord analyzed pedestrian-vehicle conflicts at eight intersections in Hamilton, Ontario, Canada. In the analysis, he found that T-intersections have a greater traffic conflict rate between vehicles and pedestrians than four-legged intersections.

Markowitz, F, Sciortino, S, Fleck, JL, Yee, BM. Pedestrian Countdown Signals: Experience with an Extensive Pilot Installation. ITE Journal. January 2006, 43-48.

Researchers conducted a pedestrian countdown signal "before and after" study in San Francisco where 600 crossings were evaluated before installation and over 900 after installation. The results found that the number of pedestrian injury crashes with vehicles decreased by 52 percent after the installation of the countdown signals.