

# TRAFFIC OPERATIONS & SIMULATION



Bicycle & Pedestrian Planning  
Intelligent Transportation Systems  
Land Use & Transportation Planning  
Parking  
Smart Growth  
Traffic Calming  
Traffic Engineering Design  
**Traffic Operations & Simulation**  
Transit Planning & Simulation  
Transportation Systems Planning  
Travel Demand Forecasting

Fehr & Peers is a recognized national leader in the area of Traffic Operations and Simulation. We have developed a unique expertise in the area of micro-simulation through the use of leading-edge software programs such as VISSIM, CORSIM, Paramics, and SimTraffic. We have successfully applied these and other software packages to solve some of the most complex transportation projects in the country. The results of our work form the basis for conclusions and recommendations to solve a range of transportation problems in such areas as freeway and arterial systems, traffic signal operations, intelligent transportation systems, and the interface between autos and other travel modes (e.g. light rail, bus, rapid transit, cycling, and walking).

## UNIQUE APPROACH

We believe that our success is the result of our unique approach to traffic operations projects. Key elements of this approach include:

- Utilizing the latest analytical techniques as appropriate to the client's needs.
- Integrating related practice areas including intelligent transportation systems and travel demand forecasting.
- Incorporating all travel modes including transit, cycling, and walking.
- Focusing on the practical application of the results.
- Emphasizing the visual presentation of our findings including 3-D graphics.

We are consistently refining and improving this approach through our comprehensive internal training program. Led by our senior in-house experts, the program is designed to expand both the depth and breadth of our expertise. Our senior staff also works to improve the state of the practice through such activities as publishing professional papers, serving on industry committees, collaborating with software developers, and teaching external training courses.



### ***Experience Using Vissm and Visum***

Fehr & Peers is one of the leading firms in the country in the successful application of the VISSIM and VISUM software packages for corridor studies. Our use of the VISSIM micro-simulation software for over 40 projects throughout the western United States gives us the knowledge and experience to match the right analysis tools to key technical and policy questions. We have also developed our own post-processor that calculates performance measures such as intersection volume-to-capacity ratios, delays, and levels of service for all modes of travel. This includes not only automobiles, but also public transit users, pedestrians and bicyclists.

Our integrated approach to corridor modeling projects combines traffic operations and micro-simulation with travel demand forecasting through the VISSIM and VISUM simulation models. VISUM is a travel demand model that converts link-level travel demand flows and geometric data to a format readable by the VISSIM micro-simulation model. This tool allows us to dynamically assign traffic in VISSIM, which provides a more accurate trip assignment than a travel demand model because it includes all of the real-time delays caused by signal or stop sign operations, influences of buses, parking maneuvers, etc. These state-of-the-art transportation analysis tools provide results for system-wide and isolated facility performance and can address technical issues such as induced travel and peak-hour spreading. In addition, these tools emphasize the communication of technical results by providing 3-D simulations.

The VISSIM and VISUM modeling package allows for analysis of multiple scenarios with a variety of travel modes and visually simulates complex analysis results for inspection by all reviewers and decision makers.

Fehr & Peers' related VISSIM project experience includes:

- Denver Bus Rapid Transit Simulation Analysis – Denver, Colorado
- Fitzsimons Site-Wide Traffic and Transportation Study – Aurora, Colorado
- Interstate 80/680 Interchange – Solano County, California
- Sand Hill Road Improvement Projects – Palo Alto, California
- 3500 South EIS – West Valley City, Utah
- North Las Vegas Boulevard Bus Rapid Transit System – Las Vegas, Nevada
- Reno ReTRAC Project – Reno, Nevada
- U.S. 101 Corridor Improvements – San Jose, California



### **I-80/I-680/STATE ROUTE 12 INTERCHANGE – SOLANO COUNTY, CA**

Fehr & Peers is currently responsible for the travel demand forecasting and traffic operations analysis for I-80/I-680/State Route 12 interchange in Solano County, California. This junction of three major transportation facilities is one of the most highly-congested interchanges in Northern California, especially during peak weekend periods. The study area includes the freeway corridors, the connecting interchanges, and the local arterial system – due to the heavy diversion of traffic to local roadways during peak hours and the impact this diversion has on local neighborhoods. The problems are exacerbated by the presence of truck scales located directly on I-80 in the heart of the interchange. Given the complexity of the traffic operations in the area, Fehr & Peers developed a unique operations model that integrated the travel demand model (TranPlan) with the traffic simulation model (i.e. VISSIM) using the VISUM software as the interface. This integrated approach enabled us to dynamically assign the demand volumes to the roadway network to develop more accurate forecasts that reflect the impacts of congestion in the system. The result of this approach was a validated base year operations model that accurately reflected the unique operational aspects of the interchange including the traffic diversion and peak-hour spreading. This tool is now being used to develop and test improvement alternatives and phasing plans. This analysis will form the basis for the project report and environmental document (i.e. EIR/EIS).



### **MANZANITA AVENUE WIDENING – CHICO, CA**

Fehr & Peers prepared the traffic operations analysis for this major arterial widening project in Chico, California. The project involved the widening of Manzanita Avenue from two to four lanes through a sensitive environmental area adjacent to Bidwell Park. In addition to the corridor's environmental sensitivity, physical constraints such as homes and utilities were present. Fehr & Peers analyzed a variety of two, three, and four-lane alternatives, including variations on lane widths, turn lanes, and intersection control. All of the traffic operations analyses were conducted using the CORSIM and VISSIM micro-simulation traffic models. The VISSIM model was used specifically to evaluate an alternative containing roundabouts at key intersections. The results formed the basis for the transportation impact section of the EIR/EA.

### **CITYWIDE SIGNAL COORDINATION PROJECT – ELK GROVE, CA**

Fehr & Peers prepared a signal optimization/coordination analysis for 60 traffic signals in the City of Elk Grove, California. A combination of the Synchro and VISSIM software packages was used to create an existing conditions model, which was validated and calibrated based on travel time surveys, start-up lost times, and saturation flow rates. The calibrated models were then used to develop new coordinated signal timing plans for the AM and PM peak hours. Fehr & Peers also assisted in the field implementation by conducting travel time surveys two weeks after implementation. The results indicated that the new signal timing plans reduced delays by 15-25% and notably improved intersection operations.



### **MICRO-SIMULATION USING PARAMICS STATE ROUTE 99/PELANDALE AVENUE INTERCHANGE – MODESTO, CA**

Fehr & Peers was retained by StanCOG to conduct a peer review of traffic operations analysis completed by Caltrans District 10 staff for the State Route 99/Pelandale Avenue interchange in Modesto, CA. Our senior staff reviewed the traffic forecasts and the traffic operations analysis results developed by Caltrans staff using the Paramics software. Based on the review, we recommended refinements to the analysis that aided the process for selecting a preferred alternative.



### **LAS VEGAS BLVD. MAX BUS RAPID TRANSIT – NORTH LAS VEGAS, NV**

Fehr & Peers was retained by the Regional Transportation Commission of southern Nevada to evaluate the operational effectiveness of the first bus rapid transit system in Las Vegas. The corridor began at the Downtown Transportation Center (DTC) and continued north along North Las Vegas Boulevard to Craig Road in the City of North Las Vegas, a distance of seven miles.

We conducted a comprehensive review of transit signal priority alternatives and made specific deployment recommendations for the corridor. Using VISSIM micro-simulation model, we evaluated the operations of existing CAT bus routes and stations, calibrated and validated the existing model, and analyzed five bus rapid transit route alternatives. The final report included a comprehensive operational analysis report documenting measures of effectiveness and a comparison of the existing CAT bus routes and MAX bus rapid transit alternatives with and without the transit signal priority option.



### **CENTRAL CONNECTOR BRT OPERATIONS AND SIMULATION STUDY – DENVER, CO**

Fehr & Peers assisted with a planning and conceptual feasibility study for the Regional Transportation District in Denver, Colorado. Our initial role included assisting in screening preliminary light rail transit alternatives using broadly defined level-of-service criteria related to traffic volumes, vehicular travel times, and affected intersections. As the study progressed, a bus rapid transit solution was also suggested. We were asked to perform a detailed operations and simulation analysis for the bus rapid transit alternative using the VISSIM traffic operations and simulation software package. The multi-modal analysis included approximately 40 intersections along Broadway, Lincoln, and 18th and 19th Street in downtown Denver and was completed in less than two months.

### **U.S. 101 CENTRAL CORRIDOR STUDY – SAN JOSE, CA**

Fehr & Peers Associates worked with the Santa Clara Valley Transportation Authority (VTA) and Parsons Transportation Group to identify and evaluate short-term and long-term improvements to the central U.S. 101 corridor, which extends from the I-280/I-680 interchange to Yerba Buena Road in San Jose, California. The analysis developed traffic projections for 2025 conditions with and without the corridor improvement projects. A systems approach was used to evaluate both short-term and long-term freeway and arterial operations in the corridor. The VISUM and VISSIM micro-simulation software was used to develop the traffic projections and simulate the roadway and intersection operations within the corridor. The proposed improvements included both main line and interchange modifications. Measures of effectiveness, such as vehicle density, average travel time and average travel speed, were used in combination with other factors, to prioritize the projects and define the overall benefits.

