CHAPTER 2: METHODOLOGY

Data Collection

The data collection effort for this project included compiling existing data and gathering new data in the field to support traffic analysis and planning efforts for the overall study.

Existing data and information compiled included the following:

- City of Seattle traffic counts
  (most current counts available; in most cases year 2001 data was used)
- City of Seattle signal timing data
- City of Seattle travel forecasting model output
- Puget Sound Regional Council demographic data for years 2000, 2020, and 2030
- City of Seattle Comprehensive Plan (1994, updated 2002)
- South Lake Union Neighborhood Plan (1998)
- King County Metro bus stop locations
- King County Metro transit routes
- AWVSRP traffic counts

New data collected in the field included the following:

- Field surveys of facilities related to all transportation modes in study area, including:
  - Bus stop locations
  - Bus shelter locations
  - Bus routes and headways
  - Bicycle routes
  - Location and condition of sidewalks
  - Roadway geometry
  - Location of on-street parking
- Specific origin and destination data for Valley Street traffic between Fairview and Westlake Avenues, which included a special emphasis on truck movements in the area.

Objectives/Measures of Effectiveness

In order to evaluate the proposed improvement packages (as will be described in Chapter 6) the study team developed objectives that corresponded to the SLU Transportation Study goals. The overall study goals and corresponding objectives are shown in Table 2.1.

Table 2.1: SLU Study Goals and Corresponding Evaluation Criteria

Goal	Objectives
Improve Mobility and Access for All Modes within and between SLU, Surrounding Neighborhoods, and Downtown Seattle	Provide improved connections across SR 99/Aurora Avenue
	Improve transit service possibilities within SLU, surrounding neighborhoods, and downtown Seattle
	Improve pedestrian and bicycle connection throughout SLU, across SR 99/Aurora and to Eastlake and Capitol Hill
	Improve non-motorized connections across Mercer & Valley Streets to SLU Park
	Encourage pedestrian, bicycle and transit use as a way to accommodate travel demand
	Improve transit speed and/or reliability through and within SLU
	Improve arterial connections between SLU and surrounding neighborhoods and downtown Seattle
	Improve or maintain vehicle travel times on key routes through SLU
	Improve or maintain average vehicle system delay throughout SLU
Improve Safety for All Transportation Modes	Improve roadway and intersection geometry (e.g., to reduce weaving movements, improve way finding, etc.)
	Provide appropriate separation between pedestrians, bicyclists and vehicles
	Provide safe pedestrian crossings
	Provide safe pedestrian access to transit
Improve Regional Access To and Through South Lake Union	Improve arterial street connections to and from I-5 and SR 99
	Improve connections between I-5 and SR 99
	Improve regional transit service to SLU
	Improve local transit connections to regional transit service/lines
	Improve bicycle connections to regional bicycle facilities and routes
	Improve or maintain regional freight routes
Promote Economic Vitality, Neighborhood Livability, Sustainable Development and Quality of Life	Improve streetscape design
	Accommodate local business access and circulation needs
	Encourage transit and/or pedestrian oriented development.
	Provide for a safe and active pedestrian environment within SLU
	Improve non-motorized access to SLU park
	Manage parking appropriately to reflect a sustainable balance between parking demand and supply, and study area mode split goals
	Minimize adverse environmental impacts
	Minimize residential and business displacements
Work Toward Implementing Comprehensive Plan Goals and Other City Policies and Plans	Support projected growth and planned land-use patterns
	Support SLU Neighborhood Plan Goals and Policies
	Support City Plans and Policies
	Support other infrastructure and development plans
	Support the Mercer Corridor Project recommendations
	Reflect feedback from SLU Stakeholders
Implementation Feasibility (not a formal goal)	Constructability (relative ease or difficulty in constructing the improvements)
	Financial limitations
	Public/Political Acceptability
	Cost effectiveness (qualitative)

The objectives were used as criteria to evaluate the overall effectiveness of alternative improvement scenarios in meeting the study goals. Implementation feasibility was added to the list of formal study goals. Even though this particular goal was not included in the original list, the ability to implement the recommended project was deemed critical to a successful planning effort.

Travel Demand Forecasts

The SLU Transportation Study Team developed year 2030 traffic forecasts by using growth rates obtained from the City of Seattle EMME/2 travel demand model and applying them to existing observed traffic counts. The travel demand model projects future traffic volumes by estimating the growth in trips due to projected growth in employment and housing throughout the four County region (King, Snohomish, Pierce, and Kitsap). The trips between areas within the region are assigned to modes (drive alone, carpool, and transit) and assigned to the future transportation network.

The year City of Seattle 2030 network for this study is consistent with the regional transportation plan, Destination 2030, with two exceptions: 1) the Destination 2030 network assumes one additional general purpose lane and one HOV lane per direction on the SR 520 bridge, while the City of Seattle model assumes only HOV lanes; 2) parking prices, which affect mode choice, are assumed to increase by 1.5 percent per year in the city model compared to 3 percent per year in the Destination 2030 model.

A variety of screenlines were drawn throughout the study area to capture the projected north-south and east-west traffic demands from the forecasting model at different locations throughout the area to ensure that reasonable average growth rates could be developed across groups of parallel arterial facilities. The intent of this process was to understand overall future demands for the area prior to developing the more detailed arterial and turning movement volumes.

The study team then applied the screenline growth factors to existing intersection approach and turning movement counts in the study area, to arrive at raw projected volumes. The raw projected volumes were then reviewed in conjunction with the current or proposed roadway facilities and known or expected traffic patterns. This information was used to balance the volumes and develop the draft post-processed arterial volumes and turning movement estimates for selected streets in the SLU study area.

These volumes were then input into the Synchro/SimTraffic model to perform traffic simulations of future conditions. Based on initial SimTraffic model results the input volumes were further refined to develop final post-processed study area analysis volumes.

Simulation Model Development

The primary analysis tool used to evaluate study-area traffic conditions in terms of average vehicle delays, level of service, and point-to-point travel times was the Synchro/SimTraffic package (version 5.0). Synchro/SimTraffic is commonly used in transportation planning to simulate traffic flow and intersection operations based on accepted macroscopic and microscopic simulation analysis techniques. The basic input program, Synchro, is a macroscopic analysis modeling tool intended to estimate vehicle delays, queuing, and traffic stream progression based on static analysis equations and calculations. Synchro provides a relatively quick and easy way to determine vehicle congestion through automated analysis calculations similar to those documented in the year 2000 *Highway Capacity Manual* (HCM). Typical intersection-level inputs and parameters used in Synchro follow.

- Turning Movement Traffic Volumes (in vehicles per hour)
- Heavy Vehicle Proportion (percentage of trucks)
- Non-Motorized Traffic (number of pedestrians/bicyclists)
- Lane Geometry (width, number, length of through/turn lanes)
- Signal Data (cycle lengths, green time allocation, phasing, etc.)
- Transit Movements (number of bus movements)
- Parking (number parking maneuvers)

The SimTraffic module takes the Synchro model analysis to the "next step" in an effort to simulate individual vehicle movements and their discrete interactions during a designated time period (typically a peak hour). This type of analysis is useful for determining in greater detail the effects of queue spill-back (traffic back-ups) from one intersection to an adjacent intersection. SimTraffic also provides a more accurate picture of how long vehicles are waiting at signals within the roadway system, by evaluating the performance of each vehicle individually and determining how other vehicles affect their specific paths of travel.

Basic input data for Synchro/SimTraffic was provided either by the City of Seattle (from previous studies conducted in the South Lake Union Area) or where needed, from field data collected during peak traffic periods. To evaluate existing AM and PM traffic conditions, the basic inputs were entered in their unprocessed state to emulate current traffic parameters and conditions accurately.

For the future 2030 analysis scenarios, roadway lane geometries in terms of number of lanes, directional configurations, and connections across Aurora Avenue N. were modified to reflect the specific options under consideration. Future-year peak-hour traffic volumes were developed based on output from the City of Seattle's EMME/2 travel demand model, which reflected the projected job and housing growth in the region, including SLU. Growth rates were derived from the travel demand model output and applied to existing volumes to arrive at future year volumes.

Other traffic-related inputs (e.g., transit and non-motorized traffic volume estimates) and signal data were also estimated and/or changed accordingly, to reflect anticipated conditions and, in the case of signal timings, to ensure that the overall system was optimized to accommodate the expected increases in congestion. Due to the anticipated congestion levels for existing conditions and the various 2030 future condition scenarios (and associated intersection queuing), results for the simulation and analysis were reported from SimTraffic, rather than from the Synchro model output.