SYSTEM PERFORMANCE

15

INTRODUCTION

The monitoring of system performance has long been a part of operational management of the transportation system. A more recent trend is to apply performance monitoring to the evaluation of transportation policy and planning objectives. The benefits of performance monitoring in transportation planning include:

- Measuring and feedback of existing policies and plans
- Informed decision making
- Increased accountability through periodic reporting

The Transportation System Plan (TSP) incorporates a set of performance indicators and measures to monitor the results of the plan over its 20-year span. These serve as the dynamic link between TSP policies and plan implementation by providing a periodic feedback and update process to ensure the TSP satisfies the City's transportation and land use goals. Performance monitoring satisfies mandated benchmarks specified by the State Transportation Planning Rule (TPR). It also provides criteria for advancing major capital improvements from the TSP into the capital improvement program (CIP).

REQUIREMENTS

Transportation Planning Rule

The TPR supports the use of performance monitoring by requiring TSPs to adopt interim benchmarks. TPR Section 660-012-0035 specifically identifies the following three objectives that require measurable interim benchmarks:

- In metropolitan planning organization (MPO) areas of more than 1 million population, reduce vehicle miles traveled per capita by 10 percent within 20 years of adoption of a plan as required by OAR 660-012-0055(1).

- Increase the modal share of non-automobile vehicle trips (transit, bicycle, pedestrian).

- Increase average automobile occupancy (persons per vehicle).

In addition, TPR Section 660-012-0045 requires the implementation of a parking plan that achieves a 10 percent reduction in the number of parking spaces per capita in the MPO area over the life of the TSP. The TSP supports the regional reduction in parking through implementation measures identified in the Transportation Demand Management and Parking Plan (Chapter 5: Modal and Management Plans).

The TPR requires jurisdictions to set five-year interim benchmarks to ensure progress toward meeting these objectives. If benchmarks are not met, the TPR stipulates that the TSP must be amended to include new or additional efforts to meet the requirements.

Regional Transportation Plan

Policy 19 of Metro's 2000 Regional Transportation Plan (RTP) requires local jurisdictions to establish non-single-occupant vehicle (non-SOV) mode split targets for each 2040 design types, consistent with the RTP's mode split targets as identified in Table 15.1.

Table 15.1
RTP Non-SOV Modal Targets

2040 Design Type	Non-SOV Modal Target
Central City	60-70%
Regional Centers Town Centers Main Streets Station Communities Corridors	45-55%
Industrial Areas Intermodal Facilities Employment Areas Inner neighborhoods Outer Neighborhoods	40-45%

DEFINITIONS

The TSP refers to the process of plan evaluation over time as '*performance monitoring*.' Within this framework, the TSP uses '*performance indicator*,' '*performance measure*,' and '*benchmark*' to label the distinct elements of performance monitoring.

An *indicator* is categorical term for a particular feature of the transportation system. Indicators are conceptual and qualitative. No single indicator provides a comprehensive evaluation of the transportation system. Instead, each indicator contributes a piece of information that, when considered with all other indicators, provides a complete picture of the transportation system's status.

A *performance measure* is a quantitative method of analysis used to evaluate the condition or status of an indicator. Quantified results from performance measures can be compared to baseline data over time. This is very important for measuring improvement or maintenance of existing conditions. There is no single approach that is most applicable or appropriate for measuring performance. Rather, many alternative methodologies exist to evaluate each indicator.

A *benchmark* is the expressed goal of the indicator. Benchmarks are expressed in quantitative terms. The TSP includes five-year interim benchmarks for several of the performance indicators.

RESEARCH AND DEVELOPMENT

The TSP performance indicators and measures result from an extensive research and evaluation process. In the initial phase of TSP development, several studies were prepared to provide background information about applying performance monitoring in transportation planning and identifying specific performance indicators and methodologies for measuring. These studies include:

- Portland Centers Descriptors, prepared by Tim Houchen.
- 2040 Centers Transportation Strategies and Mode Split Targets Project, a TGM grant-funded report. (See Chapter 12: Area Studies, for more information.)
- Traffic System Performance Evaluation, prepared by JHK & Associates

The TSP citizen advisory committee (CAC) and technical advisory committee (TAC) provided integral input into the development of the TSP's performance monitoring system. Based on the CAC's TSP vision, together with the City's Comprehensive Plan Goal 6 policies, the following key policy areas were identified to represent TSP goals and guide the selection of the TSP performance indicators:

- Cost effectiveness
- Economic development
- Environmental quality
- Mobility and access
- Neighborhood livability
- Safety and efficiency
- Transportation choice
- Land use integration

By applying the research findings to the key policy areas, an initial set of 20 performance indicators and measures was identified. The TSP CAC and TAC then worked with staff to narrow the pool of candidate indicators and measures, using the following four criteria:

- **A manageable number of indicators should be created.**
  A range of indicators should be identified to capture the state of the transportation system without being too large or unwieldy.

- **Data should be relatively easy to collect and maintain.**
  Data should not be too difficult or time consuming to gather. An important outcome of the indicator process is guidance about more efficient ways to target organizational resources, including staff time. If data become too cumbersome to collect, there are diminishing returns in terms of feedback information provided versus the staff time investment.

- **PDOT should control or have major influence on the ability to achieve the benchmarks.**
  PDOT should maintain responsibility for meeting established benchmarks and has the authority to make changes in the transportation system to realize these goals. While many of the agreed-upon indicators involve cooperation with other jurisdictions, PDOT should retain a principal role in the decision making regarding elements of the transportation system related to these indicators.

- **There should be an overall balance among indicators.**
  It should be recognized that the combined set of indicators contributes something to the overall evaluation of the transportation system. Integral to this is the recognition that all transportation modes are of equal importance.

The narrowing process resulted in the selection of 13 indicators. Baseline data collection took place after the preferred set of performance indicators and quantitative measures were determined.

TSP PERFORMANCE MONITORING

The TSP uses a two-tiered approach to monitor transportation system performance.
The following first-tier indicators are required by the TPR and RTP to show progress toward meeting State and regional policy goals.

- Vehicle miles traveled per capita
- Non-single-occupancy vehicle (SOV) mode split
- Auto occupancy per capita

Baseline data for the first-tier indicators are derived from Metro's regional travel forecast model (regional model), created using EMME/2 transportation modeling software. As mandated by the TPR and RTP, five-year interval benchmarks are identified for the first-tier indicators.

The ten second-tier indicators are deemed essential to monitor in order to meet policy goals for Portland's transportation system over the course of the TSP.

- Bikeway network
- Condition of street system
- Efficient use of resources
- Freight movement
- Intelligent transportation system (ITS) corridor performance
- Pedestrian network
- Stream habitat restoration
- Street connectivity
- System safety
- Transportation demand management (TDM)

These second-tier indicators do not include interim benchmarks.

First-Tier (Required) Performance Indicators with Benchmarks

Vehicle Miles Traveled per Capita Indicator

Policy Area(s)

- Environmental quality
- Mobility and access
- Safety and efficiency
- Transportation choice

Performance Measure(s)

- Average vehicle miles traveled/capita/day for residential production trips
- Average vehicle miles traveled/capita/day for employment production trips
- Average vehicle miles traveled/capita/day for employment attraction trips

Objective

Vehicle miles traveled (VMT) is a measure used to describe total automobile use on a daily or annual basis. It is an important descriptor of changes in travel demand in an urban area and is a good indicator of the reliance on autos for urban mobility. VMT is more comprehensive than other indices used to measure travel by automobile because it incorporates both the number of vehicle trips and the length of those trips.

Methodology

The City relies on Metro's regional model to estimate travel within the region. Two methodologies can be used to estimate VMT: a network-based approach and a trip-based approach. The type of methodology selected depends on the desired data output. Calculations for the TSP use a trip-based approach, which multiplies average vehicle trip length (derived from the model) by the number of vehicle trips to establish VMT. Since the regional model can identify vehicle trips by origin, destination, and purpose, this approach is valuable for subregional analysis. Local travel is identified through intrazonal trips (travel within a zone).

All VMT calculations for the TSP rely on data from the City's conversion of the regional model under the 2020 strategic scenario of the RTP (round 3). The most recent year for which model data are available is 1994.

The daily travel demand from the regional model is separated into its component trip purposes. The TPR definition of VMT excludes commercial and external trip purposes, buses, heavy trucks, and through-trips, and these are therefore not calculated in the model. Daily auto person trips by purpose are multiplied by auto occupancy rates for each purpose to create daily vehicle trips. Finally, VMT is obtained by multiplying vehicle trips by the zone-to-zone distances. (See Appendix A.1 for a detailed discussion of the methodology used to calculate VMT per capita.)

Baseline Data

Table 15.2 presents the VMT per capita for each of the districts, the City, and the region as a whole. It is important to note that the regional VMT shown here includes the entire four-county area. In the RTP, VMT was calculated excluding both Clark County and the area outside of the urban growth boundary (UGB).

Table 15.2
1994 and 2020 VMT per Capita

District	VMT Productions[1]				VMT Attractions[2]	
	Residential Trips[3]		Employment Trips[4]		Employment Trips	
	1994	2020	1994	2020	1994	2020
Downtown subdistrict	3.47	2.18	3.15	2.95	13.73	9.00
Lower Albina subdistrict	5.17	2.79	4.39	3.42	18.25	9.73
Lloyd Subdistrict	7.86	2.81	6.36	4.85	25.26	15.60
Central Eastside Industrial Subdistrict	5.19	3.81	3.81	3.87	17.05	16.24
N. Macadam Subdistrict	8.71	5.55	4.84	4.58	17.66	15.90
Goose Hollow subdistrict	4.43	2.52	3.62	4.07	20.40	13.44
North	8.82	7.34	6.90	6.79	27.68	26.94
Northeast	8.55	7.83	7.67	8.78	33.26	35.70
Southeast	8.31	7.23	5.97	6.32	27.36	27.90
Far Northeast	11.95	10.68	6.59	6.86	29.60	28.27
Far Southeast	11.89	11.08	7.18	6.57	33.02	27.03
Southwest	10.92	10.64	5.83	5.82	28.13	30.09
Northwest	8.01	8.96	4.78	4.68	22.85	22.14
City	*9.35*	*8.53*	*5.44*	*5.49*	*24.19*	*22.24*
Region (for comparison)	*12.25*	*12.23*	*5.89*	*5.88*	*25.96*	*23.68*

[1] VMT Productions – All weekday vehicle miles traveled for trips produced in a district, regardless of destination.
[2] VMT Attractions - All weekday vehicle miles traveled for trips attracted to the district, regardless of origin.
[3] Residential VMT – Includes all home-based trip purposes and the residential component of the non-home-based, non-work purposes.
[4] Employment VMT – Includes all non-home-based trip purposes except the residential component of the non-home-based, non-work purposes.

Interim Benchmarks

Table 15.3 lists the City's interim benchmarks for reduction of VMT per capita. The TPR calls for a 10 percent reduction in VMT per capita in the Portland metropolitan region over 20 years. The 2020 regional model output estimates a decline in the City's VMT per capita of 9 percent for residential production trips, 8 percent for employment attraction trips, and an increase of 1 percent for employment production trips.

Table 15.3
VMT per Capita Reduction Benchmarks

VMT Type	VMT per Capita Reduction Targets			
	5-year	10-year	15-year	20-year
Residential Productions Employment Productions Employment Attractions	2.5%	5%	7.5%	10%

Non-Single-Occupancy Vehicle (SOV) Mode Split Indicator

Policy Area(s)

- Environmental quality
- Transportation choice

Performance Measure(s)

- Citywide non-SOV mode split
- Non-SOV mode split by 2040 regional center, town center, and station community

Objective

The objective of this performance indicator is to increase the percentage of non-SOV daily person trips within Portland. Non-SOV person trips include transit, bicycling, walking, or shared rides (two or more to a vehicle) as modes of transportation. This indicator represents all of the factors leading to increases in non-SOV mode share, including land use changes and system improvements such as increased transit service, TDM programs, bike lanes, and sidewalks.

Mode split is the percentage of person trips taken using each of the possible modes.

Methodology

Non-SOV mode split is the aggregation of mode split for shared ride, transit, bicycle, walk, and school bus person trips. The 1994 base year and 2020 future year mode split are derived from the RTP preferred scenario (round one) regional model run. Factors from travel behavior surveys applied to auto person trips are used to calculate SOV use. These factors include auto ownership, age and income, transit accessibility, parking costs, trips distance, trips purpose, and relative travel time. (The 2040 Centers Transportation Strategies and Mode Split Targets Project report, chapter 2, contains a detailed discussion of methodology.)

Baseline Data

Table 15.4 shows changes in non-SOV mode split for each transportation district. District values include all trips to, from, and within a district. Citywide non-SOV mode split is expected to increase from 38 percent in 1994 to 43 percent in 2020.

Table 15.4
Non-SOV Mode Split by Transportation District

District	1994	2020
Central Business District	46.28%	63.91%
Lower Albina	31.29%	46.54%
Lloyd District	35.19%	46.34%
Central Eastside Industrial District	34.13%	42.42%
North Macadam	25.88%	41.55%
Goose Hollow	45.47%	65.85%
North	35.81%	37.13%
Northeast	37.55%	39.09%
Southeast	39.27%	42.06%
Far NE	35.33%	37.18%
Far SE	37.58%	39.18%
Southwest	35.25%	37.52%
Northwest	34.80%	41.83%
City	*37.99%*	*42.97%*
Region (for comparison)	*38.04%*	*39.44%*

Table 15.5 lists the 1994 and 2020 non-SOV mode split for key 2040 design types, excluding the Central City, which is reported by subdistrict in Table 15.4. Baseline data are not currently available for the new Airport MAX or the Interstate MAX station communities.

Table 15.5
Non-SOV Mode Split by 2040 Design Type

2040 Center	1994	2020
Gateway Regional Center	37%	39%
Hollywood Town Center	39%	45%
Lents Town Center	43%	43%
St. Johns Town Center	42%	40%
West Portland Town Center	38%	37%
60th Station Community	42%	44%
82nd Station Community	42%	44%
122nd Station Community	40%	41%
148th Station Community	43%	48%

Interim Benchmarks

The interim benchmarks listed in Table 15.6 are set citywide and for key 2040 design types, including the Central City. The 20-year benchmarks are consistent with the RTP's 2040 regional non-SOV mode split targets.

The citywide benchmarks track non-SOV mode split across all areas of the City, from urban Central City to suburban southeast Portland. The 20-year citywide benchmark is slightly lower than the 2040 design type benchmarks because it takes into consideration the differences in travel characteristics of these diverse areas.

The 2040 design type benchmarks originate from the non-SOV mode split goals recommended in the 2040 Centers Transportation Strategies and Mode Split Targets Project.

The Central City benchmarks derive from the RTP's 2040 target mode split for this design type. In addition, Policy 3 of the Central City Transportation Management Plan (CCTMP) identifies 2010 transit and pedestrian/bicycle mode split targets for commuter trips. Although the TSP Central City benchmark takes into account additional modes and trip purposes, it is consistent with CCTMP policy goals. Refinements to the current CCTMP targets will occur during the CCTMP update process, which begins in 2002.

Table 15.6
Non-SOV Interim Benchmarks

Type	Benchmarks			
	5-Year	10-Year	15-Year	20-Year
Citywide	38%	38.5%	39%	40%
Central City	45%	50%	55%	60%
Regional Centers, Town Centers, and Station Communities	40%	41%	43%	45%

Auto Occupancy per Capita Indicator

Policy Area(s)
- Environmental quality
- Mobility and access
- Safety and efficiency

Performance Measure(s)
- Average persons per vehicle

Objective
Increasing the number of people per vehicle, particularly for trips during normal commuting times when there is the greatest constraint on capacity, reduces congestion and improves the overall efficiency of the transportation system. Increasing the average auto occupancy also reduces total vehicle miles traveled per capita, helping to minimize air pollution and mitigate parking problems.

Methodology
The data are derived from Metro's regional travel forecast model, and represent Metro's 2020 strategic scenario of the RTP (round 3). The base year is 1994.

Baseline Data
Table 15.7 shows the average number of persons per vehicle by transportation district. The City average is 1.20 persons per vehicle in 1994, dropping slightly to 1.19 in 2020. There are no significant differences between districts or horizon years. There is a slight decrease for most City districts over the planning horizon.

Table 15.7
Average Auto Occupancy by Transportation District (persons)

District	1994	2020
Central Business District	1.19	1.19
Lower Albina	1.16	1.16
Lloyd District	1.19	1.18
Central Eastside Industrial District	1.16	1.17
N. Macadam	1.14	1.17
Goose Hollow	1.19	1.21
North	1.19	1.18
Northeast	1.20	1.19
Southeast	1.21	1.20
Far Northeast	1.20	1.18
Far Southeast	1.21	1.20
Southwest	1.19	1.18
Northwest	1.17	1.17
City	*1.20*	*1.19*
Region (for comparison)	*1.20*	*1.19*

Interim Benchmarks
Benchmarks are not set for this measure. Metro has proposed a TPR revision that limits jurisdictional responsibility for benchmarking auto occupancy. Metro reasons that the information from the regional travel demand model is not useful to set objectives, since vehicle occupancy appears to be driven more by demographics, family size, and school-age versus aging populations than by transportation policy. The shared ride survey data show only the smallest variation over time.

Second-Tier (Supplemental) Performance Indicators

Bikeway Network Indicator

- *Policy Area(s)*
- Environmental quality
- Mobility and access
- Neighborhood livability
- Safety and efficiency
- Transportation choice
- Transportation and land use integration

Performance Measure(s)
- Percentage of City bikeway network completed

Objective
The most frequently cited obstacle to increasing bicycle mode share is the threat of unsafe traffic conditions. Improvements to the bike network, such as striping and signage, have increased the safety of bicycle travel in the City. The bike network is defined by the Bicycle Master Plan, adopted in 1996 and most recently updated in 1998. This indicator tracks progress toward completing the bicycle network over the 20-year timeframe of the TSP.

Methodology
Bicycle facilities are grouped into four categories: lanes, boulevards, paths, and signed connections. Within each category are three levels of bicycle facility completion:

- Facilities that currently exist
- Facilities that are planned and funded
- Facilities that are recommended

MapInfo® GIS software application tools are used to measure total mileage of each category, by level of completion. The City's bicycle coordinator maintains the database.

Baseline Data
Table 15.8 lists the status of the City's efforts to complete the bikeway network, as of February 2001. The City's bicycle network is 35 percent complete.

Table 15.8
City Bicycle Network Completion Status (in miles)

Bicycle Facilities	Existing	Planned	Recommended	Total Miles	% Completed
Lanes	139.0	17.4	266.5	423.0	33%
Boulevards	25.8	2.4	51.8	80.0	32%
Paths	51.6	14.3	31.7	97.6	53%
Signed Connections	0	24.6	0	24.6	0%
Total	*216.4*	*58.7*	*350.0*	*625.2*	*35%*

Condition of Street System Indicator

Policy Area(s)

- Cost effectiveness
- Neighborhood livability
- Safety and efficiency

Performance Measure(s)

- Five-year average of unmet pavement need

Objective

The ability to keep the road system in good repair is an important indicator of transportation system health. . This measure tracks success in reducing Portland's backlog of streets needing maintenance. The Bureau of Maintenance (BOM) currently tracks annual unmet pavement needs to determine the backlog of street maintenance. Large backlogs indicate a growing pool of streets that are deteriorating and will need increasingly costly repairs over time.

Methodology

The performance measure is calculated using the BOM pavement management system.

Baseline Data

Table 15.9 lists unmet pavement needs for 1996 to 2000. For these baseline years, there are 496 lane miles of unmet need. The five-year trend indicates a continuous increase in unmet need.

Table 15.9
Unmet Pavement Need (in lane miles)

Type of Unmet Need	1996	1997	1998	1999	2000	5-Year Average
Major Rehabilitation/ Reconstruction	67.1	67.6	79.8	72.2	72.3	71.8
Structural Overlay	150.3	153.9	133.9	109.7	106.0	130.8
Preservation Overlay	127.6	131.3	127.2	143.7	155.3	137.0
Slurry Seal	146.1	141.7	153.6	171.3	168.1	156.2
Total	*491.1*	*494.5*	*494.5*	*496.9*	*501.7*	*495.7*

Source: Status & Condition Report 1999 (Bureau of Maintenance 2000)

Efficient Use of Resources Indicator

Policy Area(s)
- Cost effectiveness

Performance Measure(s)
- Percentage of capital budget from non-general tax revenues (GTR)
- Ratio of GTR dollars to non-GTR dollars

Objective
GTR (a combination of the City's of State gas tax distribution, vehicle registration distribution, and local parking revenues) is the Portland Office of Transportation's (PDOT) most flexible funding source. GTR dollars are not dedicated to specific uses, so may be applied to local projects, programs, or maintenance or may be used to match federal, state, or other agency (e.g., Portland Development Commission or Port of Portland) funds. The objective of this performance measure is to take full advantage of the power of GTR to leverage other funds. The caveat to this strategy is that Portland's discretionary funds are committed to earmarked projects, leaving less flexibility to meet local transportation policy objectives.

Methodology
Information is derived from PDOT's annual adopted CIP budget.

Baseline Data
Table 15.10 lists the distribution of CIP funds between GTR and non-GTR sources, by total dollars and percentage. The baseline data is derived from the most current adopted budget for fiscal year 2001-2002. The baseline budget year shows that 94 percent of PDOT's CIP budget was funded by non-GTR sources. For every $1 of GTR, PDOT leverages nearly $16 from other sources.

Table 15.10
Distribution of CIP Funds by GTR and Non-GTR Funds

Fiscal Year	Total CIP Funds	GTR Funds		Non-GTR Funds	
		Dollars	% of CIP	Dollars	% of CIP
2000-2001[1]	$51,264,800	$4,326,889	8%	$46,937,911	92%
2001-2002[2]	$29,843,248	$1,931,738	6%	$27,911,510	94%
2002-2003[3]	$38,330,787	$1,869,758	5%	$36,461,029	95%

[1]Data derived from City of Portland adopted budget for 2000-2001
[2]Data derived from City of Portland adopted budget for 2001-2002
[3]Data derived from FY2002-2003 CIP budget request

Freight Movement Indicator

Policy Area(s)

- Economic development
- Mobility and access
- Safety and efficiency

Performance Measure(s)

- Number of hours of truck delay caused by congestion in the p.m. peak
- Number of hours of truck delay caused by congestion in the mid-day

Objective

Freight mobility within and through Portland is key to the region's economic vitality. Delay in goods shipment incurs significant costs for businesses and consumers and detracts from the City's commercial competitiveness. The intent of this measure is to track progress toward accommodating the freight movement needs of commerce and industry. The goal is to minimize hours of delay to trucks on Major Truck Streets during both peak and off-peak times.

Methodology

The data for this performance measure are derived from the RTP strategic scenario (round 3) regional model results. The model base year is 1994. Freight delay is defined as the increased travel time attributable to congestion. This is the time increment accrued on road links above a 90 percent volume/capacity ratio. Only the positive differences are summed. Roads within the City are compared to all roads in the region.

Baseline Data

Freight delay is measured for both the 2-hour p.m. peak and the 1-hour mid-day off-peak periods. The results are presented in Table 15.11. Mid-day (off-peak) delay in the 1994 model base year is quite small. Trucks encounter very few delays as a result of congested facilities in this time period. In the scenario representing the 2020 constrained RTP conditions, hours of truck delay are expected to increase significantly because of a rise in congestion.

Table 15.11
Truck Delay (Hours)

	1994 Mid-Day 1-Hour	**2020 Mid-Day 1-Hour**	**1994 P.M. 2-Hour**	**2020 P.M. 2-Hour**
City Street System	1.8	29.3	82.0	344.5
Region	6.5	82.2	129.9	809.2

ITS Corridor Indicator

Policy Area(s)
- Mobility and access
- Safety and efficiency

Performance Measure(s)
- Average a.m. peak-hour travel time by ITS corridor
- Average p.m. peak-hour travel time by ITS corridor
- Average off-peak travel time by ITS corridor

Objective
VMT growth is expected to outstrip population growth in the Portland metropolitan region during the next 20 years. Given the cost and livability impacts of expanding capacity on the motor vehicle network, it is increasingly important to maximize the efficiency of traffic movement on existing arterials, without adding new lanes. The aim of intelligent transportation systems (ITS) is to address peak-period travel to help manage unusual high-volume traffic incidents (for example, public events and collisions on parallel highway and arterial routes) and reduce bottlenecks to provide efficient, consistent traffic flow through a travel corridor.

Methodology
Travel time is the proxy measure for the efficiency of vehicle movement along significant radial and circumferential routes. Measurements performed every five years provide an indication of travel time change in a given corridor, and give planners and traffic engineers information about where to target land use and transportation projects (including ITS projects) to better balance travel patterns in the identified corridors. Degradation of travel time in a given corridor can trigger prioritization of ITS projects such as better signal timing.

Corridor travel time is measured using the PC-Travel for Windows software application. (See Appendix A.2 for detailed description of methodology.)

A starting point, ending point, and intermediate nodes are identified before performing the travel time measurement. The starting, ending, and intermediate nodes are typically intersections, with some exceptions (such as bridge abutments or other fixed landmarks).

The goal is to travel at a speed that is comparable with the rest of traffic. Each node passing is recorded, and the clock is stopped at the end of the route. If the route ends in an intersection, timing is complete after departing the intersection. Since variations occur between runs, approximately five to eight runs are performed in each direction for each route to ensure accuracy. Runs are performed for both the a.m. and p.m. peak periods, and during the off-peak period.

Baseline Data
Table 15.12 lists the ITS corridors and the 2001 baseline travel time, measured in minutes and fractions of minutes. (See Appendix A.3 for travel time and travel speed by ITS corridor.)

Table 15.12
Travel Time in ITS Corridors (minutes and fractions of minutes)

Corridor	A.M. Peak	Mid-Day	P.M. Peak
SW Macadam			
(NB) SE 15th – SW Lincoln	12.68	8.66	9.52
(SB) SW Jackson -- SE 15th	11.16	10.99	13.73
SW Barbur			
(NB) SW 68th Avenue-SW Lincoln	13.55	13.38	17.05
(SB) SW Jackson -- SW 68th Ave	14.02	12.80	15.40
Burnside			
(EB) NW Skyline -- NE 14th Ave.	11.24	13.93	19.58
(WB) NE 14th Ave. -- NW Skyline	13.80	14.52	17.51
NW Yeon/St. Helens Rd.			
(NB) SW 14th and Washington -- Lombard x-Walk E/	14.03	12.55	13.57
(SB) Lombard x-Walk E/ -- SW 14th and Washington	14.90	13.68	12.73
NE MLK/Grand			
(NB) Market -- Kilpatrick	14.66	14.38	16.14
(SB) Kilpatrick -- Market	12.50	13.19	18.71
NE Sandy Blvd.			
(EB) E 9th Ave. -- NE 105th	13.94	13.94	17.61
(WB) NE 105th -- E 9th Ave.	13.59	14.06	16.01
SE Powell Blvd.			
(EB) SW Jackson -- E/174th	23.55	25.10	30.72
(WB) E/174th -- SW Jackson	27.77	23.89	25.48
SE McLouglin			
(NB) SE Ochoco St. -- SE Taylor	7.79	6.06	6.28
(SB) SE Taylor -- SE Ochoco St.	5.96	5.99	7.92
N/NE Lombard			
(EB) N Alta Ave. -- NE 104th	19.85	22.25	24.39
(WB) NE 104th -- N Alta Ave.	20.63	22.01	23.85
NE/SE 82nd			
(NB) SE Clackamas St. -- Pacific Equipment D/W	15.59	16.90	19.60
(SB) Pacific Equipment D/W -- SE Clackamas St.	15.25	18.28	21.35

Notes:
Values are averages of between 5-8 runs completed for each corridor/direction/time of day combination.
NB= northbound; SB=southbound; EB=eastbound; WB=westbound

Pedestrian Network Indicator

Policy Area(s)

- Environmental quality
- Mobility and access
- Neighborhood livability
- Safety and efficiency
- Transportation choice
- Transportation and land use integration

Performance Measure(s)

- Percentage of streets designated as City Walkways or located in a Pedestrian District with completed sidewalks

Objective

The intent of this indicator is to measure progress toward completing Portland's City Walkway network over a 20-year period. The Pedestrian Master Plan design guidelines will be used to determine whether a street segment has facilities that are complete. The baseline data will be derived from the Infrastructure Management System (IMS).

Methodology

The sidewalk information will be obtained from PDOT's IMS database.

Baseline Data

Baseline data for this indicator are not currently available. Baseline data will be identified when the sidewalk asset class information becomes available in IMS.

Stream Habitat Restoration Indicator

Policy Area(s)

- Environmental quality
- Neighborhood livability

Performance Measure(s)

- Percentage of culverts reconstructed

Objective

As part of its response to the listing of salmonids under the Endangered Species Act, the City of Portland has been investigating the degree to which culverts obstruct salmonid access and movement within local watersheds. Culverts and other instream structures may impede adult migration to spawning areas, smolt migration to the ocean, or juvenile movement within the watershed during rearing. The City is evaluating culverts for the purpose of prioritizing impassable or partially passable culverts for replacement with more passable structures (e.g., arch culverts or bridges).

Methodology

Ultimately, the goal of a salmon recovery program should be to restore access to designated critical habitat. However, replacement of passage obstructions in an urban environment can be very expensive, and funds available for salmon recovery are limited. Objective criteria for ranking replacements and upgrades have been developed to provide the most benefit to salmon populations per unit of project cost.

The Riparian and Waterbody Construction and Maintenance technical team of the City's ESA Program uses the following criteria for rating culverts and other passage obstructions: (1) degree of blockage; (2) amount of habitat above the culvert; (3) quality of habitat above the culvert; (4) maintenance considerations; (5) environmental zone designation; (6) proposed future land use; (7) presence of steelhead; (8) fish access from downstream; and (9) expense of replacement.

The culvert ranking is a dynamic list that will change as information or conditions change. Appendix A.4 contains a full description of the culvert ranking process and an explanation of how criteria are weighted.

Baseline Data

Table 15.13 lists the high-ranking culverts identified for replacement. Currently, none of the culverts listed have been reconstructed or replaced. However, construction on the SE 162th/Foster replacement project will begin in summer 2002.

Table 15.13
Culverts Identified for Replacement

No.	Culvert Location	Culvert Identification	Total Score	Replacement Cost for Bottomless	Replacement Cost for Bridge
1	SE Flavel Street	JC09	84	$1,231,135	$1,162,752
2	162nd and Foster	JC10	81[1]	$800,000[1]	
3	SE Brookside Drive	JC07	73	$297,419	$642,646
4	SW Boones Ferry	TC01	73	$1,045,422	$1,408,346
5	SE 45th and Caldew	VC03	67	$566,002	$688,653
6	SW 45th Drive	VC06	67	$3,144,392	$2,615,250
7	NW Cornell Road	BC01	63	$1,324,446	$2,341,613
8	SW Maplecrest Drive	TC04	63	$397,383	$550,667
9	SE Tacoma Street	CS03	62	$382,697	$535,680
10	NW Miller Road	CM03	61	$1,267,381	$1,817,941
11	SE 45th Avenue	JC02	61	$283,693	$450,349
12	SE 162nd Avenue	JC12	61	$522,005	$934,006
13	SW 18th Place	TC05	60	$685,519	$672,749
14	SE Glenwood Street	CS05	60	$270,841	$468,875
15	SW 58th Avenue	FC02	59	$255,283	$304,012
16	SE Mt. Scott Boulevard	JC03	57	$658,545	$695,642
17	SW Hamilton Street	FC03	57	$1,262,961	$955,490
18	SW Dosch Road	FC08	56	$550,988[2] $1,450,585[4]	$728,073[3]
19	SE 28th Avenue	CS06	56	$256,659	$371,963
20	SE 44th Avenue	JC01	55	$170,518	$275,200
21	NW Mill Ridge Road	CM02	55	$968,782	$1,409,351
22	SW 45th Avenue	FC04	55	$280,822	$344,572
23	SW Dosch Road	FC07	55	$1,967,189[5]	$1,850,872[3]
24	SW Arnold Street	TC02	55	$395,293	$478,739
25	SW Lancaster Street	TC09	55	$375,480	$487,368
26	SW Vermont Street	VC01	55	$1,330,543	$1,082,124[3]

[1]Funding has already been identified for this location. The bottomless option was selected for this culvert.
[2]Only includes replacement to connection with FC07.
[3]Does not include cost to acquire property and recontour topography for open channel away from street crossings.
[4]Additional to replace to end of FC07.
[5]Replaces 655' ± with 655' ± continuous culvert.

Street Connectivity Indicator

Policy Area(s)
- Mobility and access
- Neighborhood livability
- Transportation choice
- Transportation and land use integration

Performance Measure(s)
- Percentage of city blocks with longest block face less than 570 feet

Objective
The TPR requires local jurisdictions to develop standards for local street layouts that improve pedestrian and bicycle access. The RTP requires the development of street master plans for emerging areas greater than five acres and the application of street spacing standards to both existing areas and emerging areas when new development occurs.
This performance indicator tracks Portland's progress toward improving street connectivity over time.

Methodology
Metro originally defined a block spacing standard of 660 feet for auto connectivity and 330 feet (half the original) for bike/pedestrian connectivity. A later study determined there are diminishing returns on connectivity (relative to capital investment) with connections more frequent than 530 feet. Based on this finding, the standard was reduced to 530 feet for auto connectivity. The standard for bike/pedestrian connectivity remains at 330 feet.

Information for this performance measure was derived from cadastral maps maintained by the PDOT mapping group. Blocks were created from right-of-way outline data using Modular GIS Environment (MGE) software. The longest face of each block was calculated in MapInfo software and then the data was converted into the ArcView 3.2 shapefile format.

City blocks are contiguous tax lots defined on all sides by full street connections. Tax lots separated by alleyways did not meet this criterion and, for the purpose of this performance measure, were considered contiguous.

City blocks with their centers within IG1, IG2, IH, OS, or p overlay zones were excluded from analysis because increased connectivity within designated protected and industrial sanctuary areas conflicts with other City goals.

City block length is defined as the linear measure of the longest street segment associated with a City block, measured between street centerline intersections. Because this measure is intended to characterize the block face, not inclusive of street width, the methodology was refined by adding an average of 40 feet to Metro's 530-foot measure to account for intersection spacing between blocks. The resultant performance measure is the percentage of City blocks, by district, with a longest block face street segment equal to or less than 570 feet.

Baseline Data

Table 15.14 lists the number and percentage of blocks meeting the 570-foot connectivity standard. Blocks were grouped by the TE District containing their geographic center. Baseline information is derived from December 1997 cadastral data maintained by the PDOT mapping group. Results were adjusted to correct for blocks having their geographic centers in the excluded zoning areas identified above. Additionally, as described above, constituent sub-blocks separated by alleyways were not considered complete blocks and were not counted individually. Instead, only the larger block they form was tallied into the final results.

Table 15.14
Percentage of Street Connectivity by TE District

TE District	Blocks less than or equal to 570'	Blocks greater than 570'	Total Blocks in District	Percentage of Blocks that meet Metro's Standard
Central City	545	33	578	94%
North	664	440	1104	60%
Northeast	1690	684	2374	71%
Far Northeast	79	341	420	19%
Southeast	2163	1163	3326	65%
Far Southeast	157	447	604	26%
Northwest	285	153	438	65%
Southwest	713	615	1328	54%

System Safety Indicator

Policy Area(s)

- Neighborhood livability
- Safety and efficiency

Performance Measure(s)

- Number of intersections identified as Level A – Critical Condition for safety. (Level A – Critical Condition are intersections with 20 or more crashes within the past four years, and a crash cost greater than or equal to $48,000 per million entering vehicles or a crash rate equal to or greater than 1.60 crashes per million entering vehicles.)
- Traffic fatalities per 1000 capita (includes vehicles, bicycles, and pedestrians)
- Traffic injuries per 1000 capita (includes vehicles, bicycles, and pedestrians)

Objective

Improving transportation system safety is an integral part of the City's planning efforts. In addition to causing property damage, collisions are responsible for a significant number of fatalities and injuries, lost work time, and family trauma. Children are especially vulnerable in collisions. For these reasons, it is an important City goal to decrease collisions between all modes through safety improvements and education.

Methodology

Data for these measures is compiled from yearly crash data supplied by the Oregon Department of Transportation (ODOT), Transportation Development Branch, and Transportation Data Section. The data derives from records originally received by the Oregon Department of Vehicles.

PDOT's Bureau of Transportation System Management staff analyze the data for the number of crashes involving fatalities, injuries, and property damage per entering vehicle and the cost of accidents per intersection, to create a high accident location list.

The high accident location list identifies intersections in the City with 20 or more reported crashes in the four-year period between January 1996 and December 1999. All crash totals represent those reported crashes that occurred within intersections. The only exception is elaborate or complicated intersections, in which crashes that occurred in all applicable zones of those intersections were counted. Because crashes are underreported, this list should not be considered to definitively represent all intersections with 20 or more crashes occurring in the period between January 1996 and December 1999, nor should it be considered to represent all crashes occurring at the intersections listed. Appendix A.5 includes the complete list of high-accident locations.

The equation used to compute the collision rate (collisions per million entering vehicles) for these locations is:

- *Crash Rate = Total Crashes/(ADT x 340 days x 4 years/1,000,000 vehicles)*
  ADT is the approximate weekday daily traffic volume entering the intersection. Note that the volume used is considered to be approximate for a number of reasons—for example, there is daily variation in counts; the count may not have been taken specifically at the intersection; or the count may not be recent enough to reflect current conditions.

Level A – Critical Condition intersections are a subset of the high accident location list.

Baseline Data

As of July 1999, the City had 18 intersections identified as Level A – Critical Condition. The intersection are listed below:

- E Burnside at 80th
- N Cook at Williams
- N Broadway at Vancouver/I-5 SB off-ramp
- N Alberta at Missouri
- NE Weidler at Grand
- NE Halsey at 47th/Euclid
- NW Bridge at Germantown
- NW Broadway at Davis
- NW Everett at 6th
- SE Ankeny at 6th
- SE Stark at 2nd
- SE Stark at 102nd
- SE Main at 162nd
- Hawthorne Bridge (west end)
- SW Madison at 6th
- SW Market at 1st
- SW Naito at Ross Island Bridge
- SW Oak at 5th

Table 15.15 includes fatal and injury crash data for the years 1996 – 2000. The table demonstrates a reduction in serious traffic incidents in the City over the past five years.

Table 15.15
Fatal and Injury Crashes Per Thousand Capita (1995-2000)

Year	City Population	Fatal Crashes		Injury Crashes	
		Number	Crashes/1000 population	Number	Crashes/1000 population
1996	503,000	55	.11	6271	12.47
1997	508,500	45	.09	5938	11.68
1998	509,600	44	.09	4981	9.77
1999	512,400	37	.07	4439	8.65
2000	531,600	35	.07	5107	9.61

As of 2000, the City incurred .07 fatal crashes and 9.61 injury crashes for every 1000 Portland residents.

Transportation Demand Management Indicator

Policy Area(s)

- Environmental quality
- Transportation choice
- Transportation and land use integration

Performance Measure(s)

- Number of employees participating in local transportation management associations (TMAs)

Objective

This measure recognizes the importance of education and transportation demand management programs in encouraging the use of transportation alternatives. Transportation management associations (TMA) are formalized employer-based groups that promote transportation demand strategies to reduce single-occupancy vehicle trips by their employees, with a goal of increasing the number of employees who have access to transportation demand management programs.

Methodology

The individual TMAs maintain participation data. .

Baseline Data

As of January 2002:
Lloyd District TMA – 6,290 employees
Swan Island TMA – 6,790 employees