

# **Impacts of Regional Transportation Alternatives on Public Costs of Services in the Puget Sound Region**

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David C. Clark  
Battelle Human Affairs Research Centers  
Seattle, Washington

Catherine McDole Rao  
Economic Databank Consultants  
Seattle, Washington

Prepared for Cambridge Systematics, Inc.  
Cambridge, Massachusetts

and

Puget Sound Regional Council of Governments

## **Battelle**

Human Affairs Research Centers  
Seattle, Washington

## **ABSTRACT**

**REPORT TITLE:** Impacts of Regional Transportation Alternatives on Public Costs of Services in the Puget Sound Region

**AUTHOR:** Battelle Human Affairs Research Centers and Economic Databank Consultants.

**SUBJECT:** Estimate of the public costs for providing all urban services for each of the VISION 2020 alternatives.

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216 1<sup>st</sup> Avenue South  
Seattle, WA 98104

**ABSTRACT:** This report on public service costs was prepared in support of the VISION 2020 project at the Puget Sound Council of Governments. The VISION 2020 project is analyzing growth and transportation alternatives for the central Puget Sound region.

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## **EXECUTIVE SUMMARY**

In October, 1988, the Puget Sound Council of Governments (PSCOG) began developing the Regional Transportation Plan and Development Strategy (RTP/RDS), a major initiative to address long-range transportation needs in the Puget Sound region (King, Pierce, Snohomish, and Kitsap Counties). The RTP/RDS is a comprehensive evaluation of alternative transportation systems designed to meet the regions increasingly pressing transportation needs. Six alternative transportation systems (including "No Action") encompassing rail, highway, ferries, bus, and parking management systems, have been developed for further evaluation. Each of the alternatives is matched with a different vision of generalized land-use patterns in the region, with a planning horizon to the year 2000.

A Draft Environmental Impact Statement (DEIS) is being developed for the RTP/RDS alternatives. Among the issues of concern in the DEIS are the implications of the RTP/RDS alternatives regarding costs of public services and infrastructure. Battelle's Human Affairs Research Centers (HARC) and Economic Databank Consultants were contracted to perform the analysis. This report describes the methodology used and the results of the study.

The services evaluated were:

Water supply	Waste disposal (solid and hazardous)
Sewage treatment and disposal	Water quality/drainage
Energy	Health
Education	Social services
Fire	Parks/recreation/culture
Police	Libraries
Transportation (city and county only)	Government/administration

(The database used for this study allowed an analysis of transportation costs. However, no cost forecasts are presented, since transportation system valuation is being performed under a separate task by Cambridge Systematics, Inc.)

The approach to estimating the impacts of each alternative on costs of public services and institutions ("fiscal impacts") consisted of two primary elements: an econometric analysis, and a more traditional survey-based evaluation. Both analyses focused on (1) projecting total costs of public services for each alternative and (2) especially, determining whether population densities, as projected by PSCOG for each plan alternative, would affect fiscal conditions for the regions municipalities and counties. Service costs were projected in general, for each of the 161 Forecast and Analysis Zones (FAZs, PSCOGs basic geographic unit of analysis).

The results of the analysis indicated that for some services, population density does influence the per capita costs of public services and facilities—in some cases, by raising per capita costs as density increases, and in other cases, by lowering per capita costs. Since each of the RTP/RDS alternatives entails different distributions of population in the region, each alternative would imply different distributions of public costs.

There are small different distributional effects for the RTP/RDS alternatives. Some areas would be better off from one alternative, others would be benefited by another alternative. There are some FAZs for which different alternatives create noticeably different costs, but at more aggregated areas of analysis, the project costs then to be quite similar. An evaluation of the impacts on city costs and educational expenses for four of the region's five major cities was undertaken.<sup>1</sup> Different alternatives yielded the lowest per capita costs for different cities, but the differences were quite small. A summary of the results of the analysis is shown on page ii. On a region-wide basis, the major Centers alternative yielded the lowest per capita costs for all cities and the Dispersed Growth and No

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<sup>1</sup> Bellevue could not be evaluated since the PSCOG forecasts are not done for cities, only planning units which do not coincide with Bellevue's city boundaries.

Action alternatives the highest costs. When costs of county services were included, the Dispersed Growth option yielded the lowest per capita costs, in all cases the differences were too small to support and identification of the least-cost alternative.

**Summary of Projected Per Capita Costs for Seattle, Tacoma, Everett, and Bremerton, Municipal Service and Education Costs only**  
 (PSCOG year-2020 population in parentheses, least-cost alternatives in boldface)

	<u>No Action</u>	<u>Major Centers</u>	<u>Multiple Centers</u>	<u>Dispersed Growth</u>	<u>Existing Plans</u>
<b>Seattle</b>	\$2,040 (521,719)	\$2,035 (400,567)	\$2,034 (489,252)	<b>\$2,025</b> (423,049)	\$2,039 (512,737)
<b>Everett</b>	<b>\$1,628</b> (69,022)	<b>\$1,628</b> (72,110)	<b>\$1,629</b> (68,910)	\$1,629 (69,808)	<b>\$1,628</b> (69,103)
<b>Tacoma</b>	<b>\$1,895</b> (188,304)	\$1,896 (198,396)	\$1,896 (200,588)	<b>\$1,895</b> (179,654)	<b>\$1,895</b> (188,479)
<b>Bremerton</b>	\$1,634 (57,629)	\$1,634 (58,853)	<b>\$1,631</b> (67,356)	\$1,633 (68,849)	\$1,634 (57,713)
<b>Rest of Region</b>	<b>\$1,669</b> (3,229,556)	<b>\$1,669</b> (3,235,744)	\$1,672 (3,241,789)	\$1,681 (3,234,323)	<b>\$1,669</b> (3,227,428)
<b>Region Average</b>	\$1,726 (4,066,229)	<b>\$1,723</b> (4,066,460)	\$1,724 (4,056,894)	\$1,726 (3,959,582)	\$1,725 (4,055,455)

The next example shown illustrates the predicted effects of population growth on a hypothetical “average” city, in this case one with a current population of 25,000, and a gross population density of 3,000 persons per square mile. Assuming the city grows at about the regional average by the year 2020 (50 percent) without annexing additional land, the predicted per capita costs of service would grow by 53 percent (entries under 50 percent indicate declining per capita costs, and those above 50 percent indicate increasing per capita costs). Including education costs, the predicted increase in cost is just under 50 percent. Thus, for the average city, total per capita costs are predicted to remain virtually unchanged as population and density increase.

**Impact of a 50 Percent Increase in Population on Costs of Services for a City of 25,000 Population and Gross Population Density of 3,000 Persons Per Square Mile**

<b>Law Enforcement</b>	46%	<b>Water</b>	49%
<b>Detention/Correction</b>	69%	<b>Sewer</b>	36%
<b>Fire Protection</b>	63%	<b>Electric and Gas</b>	53%
<b>Mental/Physical Health</b>	38%	<b>Garbage and Solid Waste</b>	24%
<b>Social Services</b>	55%	<b>Physical Environment</b>	58%
<b>Culture and Recreation</b>	75%	<b>General Government</b>	50%
	<b>Total Municipal Services</b>	53%	

The analysis indicates that in terms of overall regional averages, differences among the alternatives would also be extremely small. This result occurs because (1) the PSCOG forecasts by panning area tend to force the cost-of-services results to be a “wash” in aggregate, and (2) the analysis indicated that although higher density does have a slightly beneficial effect on per capita total costs of services, this effect is very small. Although the Dispersed Growth alternative produced the lowest per capita costs and the No Action alternative the highest projected costs, the regional average per capita public costs of service projected under each alternative are so similar that it is impossible to say with any certainty that any one alternative would yield the lowest regional aggregate costs. A tabulation of the results is presented below.

**Summary of Projected Regional Average Costs of Service (1988 dollars)**

	<b>Total Public Costs</b>	<b>Projected Population</b>	<b>Average Per Capita Costs</b>
<b>No Action</b>	\$7,017,328,000	4,066,229	\$1,985
<b>Major Centers</b>	\$6,989,150,000	4,055,460	\$1,982
<b>Multiple Centers</b>	\$6,995,284,000	4,056,894	\$1,980
<b>Dispersed Growth</b>	\$6,834,059,000	3,959,582	\$1,973
<b>Existing Plans</b>	\$6,994,704,000	4,055,455	\$1,984

This result, on the surface, may appear to contradict some of the literature concerning the costs of differ land use densities and configurations; it is often asserted that higher-density developments tend to yield lower per capita costs of service. However, the apparent contradiction of this study with some of the literature is illusory, because this study has examined a full range of services, including not only the capital costs of development, but also the long-run costs of operation and maintenance of services.

In addition, a somewhat different question is being addressed. The traditional literature addresses the question: “For a given level of service and population, does clustered and/or contiguous development create savings in the costs of new development?” These traditional analyses typically used case studies, at the level of the subdivision.<sup>2</sup> This study, however, answers the question “What would be the costs of services associated with the five different alternatives?” This analysis is at a fairly broad geographic level, with the smallest geographic unit being the PSCOG Forecast and Analysis Zone (FAZ; generally, these are comprised of several Census tracts), as opposed to the subdivision level typically examined in the technical literature.

In the course of this analysis, the study team developed an approach that enables an examination of the overall, long-run effect of population growth on public costs. However, no assumption has been made concerning the kinds of site development regulations that local jurisdictions might enact under any of the RTP/RDS alternatives. The analysis has shown that there is no reason to expect that higher densities, per se, are associated with lower costs of services. It is possible that if further assumptions were made regarding “micro scale” site development regulations, for example that all jurisdictions would require clustered housing, differences among the alternatives might be found; however, the literature on the costs of clustered versus “sprawl” development is not conclusive. At the more “macro scale” of the FAZ, any of the RTP/RDS plan alternatives—including the Dispersed Growth

<sup>2</sup> The traditional literature on the subject is not entirely in agreement that clustered housing provides savings, though the general theme is that some savings are likely for some services. However, each of the studies done on the subject contains mild to serious research design flaws. In his review of the literature, James Frank notes “None of the studies are free of technical problems. None, furthermore, reach unassailable conclusions. The studies represent stimulating but faulty and ultimately unsatisfying attempts to define efficient patterns of development.” Thus, even were clustered housing an underlying assumption, it is not clear that savings could be demonstrated. For an overview of the literature, see James. E. Frank, The Costs of Alternative Development Patterns: A Review of the Literature (Washington, D.C.: The Urban Land Institute, 1989).

alternative—could entail a clustered housing assumption, without altering the population forecasts for the alternatives. This study, however, strongly points to the conclusion that density per se does not necessarily yield lower total costs of services.

The cost curves generated for each service tended (with some exceptions) to confirm the conclusions in other studies of cost of services, i.e., that for most services, higher densities bring economic saving in terms of capital costs. However, for “non-essential” services such as parks, recreation, and culture, higher per capita costs can be expected, though not necessarily due to diseconomies of scale. It could be that higher-density areas—typically, larger cities—have preferences for increased levels and ranges of public services and more rural areas, and better tax bases to pay for those higher service levels. Thus, although higher per capita costs for these “nonessential” services are primarily responsible for the study result although higher population density yields very little in dollar savings, it is also likely true that higher-density areas are receiving better services, which would be a benefit.<sup>3</sup> This implies that if the study’s purpose had been to hold level of service constant, the cost projections would show a greater benefit from higher densities in terms of per capita costs of service; the alternatives which concentrate population most could, with service levels held constant, have been the most favored in terms of cost. As noted earlier, however, the study as not designed to hold level of service constant.

The analysis suggests area for future research. First, a more complete data base, including 1098-1988 date (the study used 1986-1988 data) and incorporating special districts as well as cities would be very useful in providing additional depth to the study results. Additional data for the study could include employment, retail sales, personal income, and improved land use data. Since this study made no assumptions concerning “micro scale” site development regulations, incorporating such assumptions into the analysis might yield additional information, although the current study design would not be suitable for examining design issues such as those presented by clustered housing. Finally, as noted above, it would be useful to alter the study design somewhat, by holding service levels constant, to determine if doing so could change the results, i.e. that there are no significant differences among the alternatives.

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<sup>3</sup> An opposing view might be that larger governments are simply less efficient, so that higher populations translate into heir government budgets and a proportionally larger amount of waste. The study design did not seek to address the issue of the reason for higher per capita costs for non-essential service as areas become more dense, but the argument that it is largely due to changes in community preferences and ability to pay, appear very plausible.