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THESIS APPROVAL

The abstract and thesis of Glen A. Fleming for the Master of Science in Geography, were presented November 29, 1995, and accepted by the thesis committee and the department.

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ABSTRACT

An abstract of the thesis of Glen A. Fleming for the Master of Science in Geography presented November 29, 1995.

Title: An Analysis of Oregon Department of Transportation Planned Highway Construction Projects for Selected Years From 1978 to 1992.

Construction of highway projects is one of the most important and expensive state government functions. Highway construction projects bring revenue and jobs to the locales in which they are built, in addition to providing a better transportation infrastructure within or between communities, states or nations.

In the state of Oregon, its Department of Transportation (ODOT) publishes a document forecasting planned highway construction expenditures for the next six years. This document was called, until recently the six-year highway program; it is the Department's primary programming document for planned highway construction expenditures in the next six years, with updates every two years. More recently the document has been renamed the Statewide Transportation Improvement Program (STIP).

The purpose of this study was to examine the distribution of planned highway construction projects within the state of Oregon from 1978 to 1992 by analyzing five selected ODOT six-year programs. Planned highway project expenditures were analyzed statistically, by county, to explain patterns of expenditure by project location, work type, highway level of importance, and changes in these over time. To analyze

the significance of proposed highway expenditures by county, the cost of highway projects was compared and statistically measured against county factors such as population, area, total state highway mileage, and vehicle miles traveled (VMT). Data was collected from ODOT, the Oregon Secretary of State and the Center for Population Research and Census. Analysis consisted of simple grouping and sorting by program year, work type, etc., bivariate linear regression, and multiple linear regression. These analyses were performed on individual project data, and project data aggregated to the county level, for each of the five selected ODOT programs.

The analyses determined that there was a positive correlation between relatively high programmed highway expenditures, large county populations (and population densities) and high total highway mileages per county in Oregon; in other words, the highway funds went where the people and state highways were. Furthermore, the analysis confirmed relative ranking hypotheses between highway expenditures work types, and the type of highway (LOI) the projects were to be performed on. These two secondary "ranking by type" hypotheses were: 1.) project work type, from most to least expensive: modernization, bridge, preservation, safety, and miscellaneous; 2.) LOI, from highest to least importance: interstate, statewide, regional, and statewide.

Observations on the trends of expenditures over time showed that 1.) modernization expenditures in Oregon increased from 1978 to 1988, then declined in 1992 when preservation projects increased; and that 2.) interstate highways in Oregon received the highest funding overall from 1978 to 1988, but that from 1986 onward, statewide highways received more and more funding, and by 1992 were receiving more funding than the interstates.

AN ANALYSIS OF
OREGON DEPARTMENT OF TRANSPORTATION
PLANNED HIGHWAY CONSTRUCTION PROJECTS
FOR SELECTED YEARS FROM 1978 TO 1992

by
GLEN A. FLEMING

A thesis submitted in partial fulfillment of the
requirements for the degree of

MASTER OF SCIENCE
in
GEOGRAPHY

Portland State University

1996

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STUDY OBJECTIVE

This study analyzes the distribution of planned highway construction projects within the state of Oregon by its Oregon Department of Transportation (ODOT) by type, year and location. Proposed highway expenditures are analyzed statistically to explain patterns of highway expenditures by county. Variation in project level expenditures are analyzed to explain the influence of type of roadway project and highway level of importance. The objective of the study is to determine the major significant factors, such as population, area or highway mileage, which influence the distribution of highway expenditures. A secondary objective of this study is to determine the priorities of ODOT highway construction projects concerning project type and highway classification types, and how those priorities have changed from 1978 to 1992.

INTRODUCTION

This project is a study of selected Oregon Department of Transportation (ODOT) Six-Year Highway Programs, specifically the study of proposed highway construction projects put forward in these programs. All highway construction projects were taken from the five selected Programs and condensed into a tabular spreadsheet format. Other data used in the analysis consisted of state population, vehicle miles traveled (VMT) and per capita income by county and year for each of the selected Program years. County area and length of highway by type per county were held as constants throughout the study period.

The analysis examined correlation between proposed highway construction expenditures per program year and total county highway miles, county area, county population, and county (VMT) to develop insights and relationships. For example, if a county has either high population or highway mileage, then consistently high levels of proposed highway expenditures for that county was expected. Two other relationships were examined: the first quantifies the extent to which some types of construction projects are consistently more expensive than others; and second that ODOT's ranking of highways by functional importance explains the relative cost of proposed projects.

A search of pertinent literature over the last fifteen years revealed little concerning the distribution of highway expenditures within a state by project type or location. The two documents which came closest to explaining a statewide distribution of highway construction projects (expenditures) were the 1987 American Association of State Highway and Transportation Officials (AASHTO) publication "Local Finance Study " and the 1992

ODOT internal memo "1992 County Equity Study." The AASHTO publication consisted of the summarization and tabulation of nine questions asked by AASHTO of the fifty state Departments of Transportation. This study dealt primarily with how revenues were raised at the state and local level, and how the revenues were distributed between state and local jurisdictions; it did not deal with the statewide distribution of planned construction funds. This report did, however, ask the various states how they distributed state collected revenues to the counties; the primary factors affecting distribution were mileage, vehicle registrations, population and area (AASHTO, 1987).

The ODOT study consisted of four data tables: one was a short tabulation of selected statistics for ten counties; the other three were comparisons of contributions (federal and state fees and taxes paid, such as fuel, excise and weight-mile taxes and permit and registration fees) to benefits (ODOT expenditures and allocations) in various combinations by county. The results of the study found 30% of the counties paid in equal to what they received back, 30% received less than paid in and 40% received more than paid in. It also found that urban counties received 55% of all expenditures, while paying in 64% of all taxes and fees. The ratio of payments received to taxes paid was \$0.87 for urban counties and \$1.23 for rural counties (ODOT, 1992a).

The results of the 1992 ODOT survey were interesting, but not pertinent to this particular project, since the expenditures from the state were actual amounts spent and included indirect costs such as administration, overhead, usual maintenance activities, and debt service. The 1992 study did not relate to planned construction projects, and was seeking to determine a funding input/output for each county. The 1992 ODOT study mentioned previous studies, but also said there was not any way to directly compare them due to use of different measures and fiscal or calendar years (ODOT, 1992a). Copies of

the earlier reports were not available, while the personnel who prepared them were primarily temporary employees, or had moved out of the agency. Overall, the 1992 study did not seek to use the same measures of evaluation as this study, and in particular included only actual ODOT expenditures, making no differentiation between construction and maintenance/operations expenditures.

Other than the AASHTO report and the ODOT studies which focused on distribution of state collected road user fees to states and local jurisdictions, there is a dearth of studies on the distribution of funds for the construction of state highways via the capital improvement programming process. There appears to be little study of the process that has evolved over a long period of years, although the research will show there appears to be some equity in the process in terms of equal distribution to population.

DATA COMPONENT DESCRIPTIONS

The Six-Year Highway Program

The first Six-Year Program, approved by the Oregon Transportation Commission (OTC) in May, 1975, was the result of a requirement of the first Oregon Action Plan for Transportation published in 1974. The Six-Year Program was one element of the Oregon Action Plan, and for its editions through 1990, was primarily focused on highway projects. The Oregon Action Plan detailed the system planning, programming and project development process for highway and other transportation projects statewide (ODOT, 1974).

Planning activities of the Action Plan, last revised in 1989 (ODOT, 1989), called for publication of statewide, multimodal, and long term plans, plus more specific modal and regional plans. It was not until 1992, despite the mandate for multimodal planning, that the publication occurred of the first actual statewide multimodal plan, the Oregon Transportation Plan (ODOT, 1992b). The first modal plan, the 1985 Oregon Highway Plan (ODOT, 1985), was republished in 1991 (ODOT, 1991b) and is scheduled for revision in late 1996. Other modal plans have been, and will be published in the future; these include, but are not limited to, the rail (passenger and freight), aeronautics, public transit, and pedestrian/bicycle programs. This study is solely concerned with highway plans, programs and projects. Project development primarily includes engineering and design of projects, not planning, and is not further considered in this study.

This study concerns itself with the programming element called for in the Action Plan; the programming element for Oregon's highway projects is the Six-Year Highway

Improvement Program - HIP (from 1975 through 1991, subsequently renamed as the Statewide Transportation Improvement Program - STIP). Programming is the process of setting priorities for highway projects identified at local and statewide levels in the planning process. Briefly, Oregon's programming process follows these steps:

- 1.) develop ranking criteria and procedures (technical ranking, work types, policy, fiscal constraints, geographic areas) by various section and regional managers within ODOT;
- 2.) project identification from staff, the public and local jurisdictions at a regional level;
- 3.) project categorization, rough costs and time frame at a regional level;
- 4.) project prioritization by work type at the regional level;
- 5.) development of a statewide preliminary six-year program;
- 6.) public review and comment on the preliminary program;
- 7.) revision of the public review program to a proposed program;
- 8.) presentation and approval of the final program by the OTC (ODOT, 1991a).

The Six-Year Program has been through twelve editions, with work beginning on the thirteenth. All of the Six-Year Programs described in this presentation will be called by their publication year, and abbreviated to "Program", such as the 1992 Program. Prior to the 1993-98 Six-Year Program (called the 1992 Program in this report), these programs only dealt with planned highway projects (thus the name HIP), receiving state or federal funding; the last three reflect a department-wide funding strategy and include all transportation projects. The Six-Year Programs are implementation and funding documents, setting priorities for highway construction based on frequently changing political and fiscal conditions. As such, these programs are considered to be planning tools for capital (fiscal)

outlays for transportation projects, and therefore do not reflect accurately what actually got built or when projects were started. Another shortcoming of the programs is that multi-year projects may be represented a number of times, with changing costs, descriptions, lengths and durations. Repetition and "double-counting" of projects was therefore unavoidable. In this study, only highway projects were used for analysis and comparison purposes.

Description of the Six-Year Program

The Six-Year Program is published biennially (except the first two published one year apart), and lists highway projects for the next six fiscal years. The Programs reflect changes primarily for the two earliest years in each Program, thus having two new years added to each program at the end, for example: 1980-85, 1982-87, 1984-89, etc. This two-year revision cycle for a six-year planning document leads to a carryover effect and leads to the "double-counting" problem described above. The Programs followed a state fiscal year (July 1 to June 30) until the 1987-1992 Six-Year Program, which adopted the federal fiscal year (October 1-September 30). Organization of the Programs vary slightly, but generally follow a pattern of four types of projects: construction, development, reconnaissance, and considered. Projects in the first three categories have identified funding, while considered projects comprise a "wish list" of unfunded projects requested by local jurisdictions or the state. Projects are then broken down by highway region, and then divided by fiscal year. Only projects listed in the construction section have funds programmed for construction; the categories of development and reconnaissance consist of projects in the design or preliminary planning stages. Highway projects used in this study were taken from the construction category only; thus keeping the focus on programmed projects and a reasonable number of entries for the evaluation and analysis dataset.

The Oregon Department of Transportation uses five geographic regions for administrative purposes. Projects in the Six-Year Programs are also divided by region. Region 1 is primarily composed of the greater Portland metropolitan area and a small rural area surrounding it. Region 2 covers the entire north Pacific Ocean coast of the state, and the mid Willamette Valley to the crest of the Cascade Mountains. Region 3 covers the southwestern part of the state from the Pacific coast of Oregon to the crest of the Cascades. Region 4 is the entire central portion of the state, while Region 5 is the entire eastern portion of the state. Figure 1 shows the state, county and regional boundaries for the state of Oregon.

Construction projects are identified by a map index number within each region, and keyed (with a project identifier number) to a location on an accompanying region vicinity map. Each project lists the signed route number, ODOT highway name, county, work section and length in miles, work description, estimated construction cost, and projected year and type of project funding. Some variations occur in this format from Program to Program, but all contain the same basic information. One important consideration is that, given the format of the Programs, each project in each Program has its own unique identifier; these identifiers do not carry over from Program to Program and thus make it difficult to avoid or minimize “double-counting” of projects.

One important fact concerning these construction projects is that they are planned; for any given Six-Year Plan, many projects were not built. This is especially true for later projects in each Plan, and some projects can be found as “carry-over” projects in later Programs. A good example is the 1993-98 Plan; this plan was renamed as the State

FIGURE 1. Oregon counties and ODOT highway regions.
Source: ODOT, 1993c.

Transportation Improvement Program (STIP), to better reflect the inclusion of all state transportation projects, not just highway projects. The 1993-98 STIP was a very ambitious program, based upon assumptions of full federal funding and increased state funding through state legislative measures. In fact neither the federal or state anticipated funding increases came to pass, and the 1993-98 STIP was greatly over-programmed (ODOT, 1992c). This STIP has been revised for the next iteration, and has been scaled back to a four-year STIP: the 1995-98 STIP (ODOT, 1994). This new Program, issued in December, 1994, has the last four years of the previous plan (but no new program years added), but even fewer projects. New federal funding policies and regulations stipulate state programs to be 'fiscally constrained' to reflect realistic proposed expenditures based upon projected existing revenues. The latest STIP, to be published in Winter 1996, is the preliminary 1996-98 'interim STIP'; this will be used in light of further funding cuts and a revised publication schedule.

County Area, Population, Vehicle Miles Traveled (VMT), and Income Data

Land areas for Oregon counties were obtained from the 1993 edition of the Oregon Blue Book, published biennially by the Oregon Secretary of State. The areas for the counties, in square miles, (Oregon Secretary of State, 1993) are listed in Table I; this table also lists total state highway mileage for each county (ODOT, 1991c).

Population data was assembled from the Center for Population Research and Census (the Center) at Portland State University in Portland, Oregon. The Center has been designated by the State as the official entity charged with tabulating State population data and estimating census data in between federal decennial censuses. Population data obtained from the Center was entered into a spreadsheet and tabulated. The population

TABLE I

OREGON HIGHWAY MILEAGE BY COUNTY AND LEVEL OF IMPORTANCE
WITH LAND AREA (SQ. MI.) BY COUNTY

COUNTY	#	Interstate Highways	Statewide Highways	Regional Highways	District Highways	TOTAL Highways	LAND AREA (Sq. Mi.)
Baker	1	65.80	22.67	43.38	169.16	302.01	3089
Benton	2	0.00	19.36	42.40	57.32	121.08	679
Clackamas	3	20.84	94.21	12.94	125.98	256.97	1879
Clatsop	4	0.00	88.69	0.00	77.81	170.50	873
Columbia	5	0.00	51.19	0.00	41.88	98.07	687
Coos	6	0.00	96.16	0.00	72.55	174.71	1629
Crook	7	0.00	46.19	9.98	117.65	180.82	2991
Curry	8	0.00	77.10	0.00	5.55	90.65	1648
Deschutes	9	0.00	177.04	2.31	44.67	233.02	3055
Douglas	10	87.75	109.36	87.39	53.61	348.11	5071
Gilliam	11	34.95	0.00	41.13	58.12	145.20	1223
Grant	12	0.00	172.09	26.82	34.88	245.79	4528
Harney	13	0.00	123.69	93.68	75.91	306.28	10228
Hood River	14	25.64	38.62	0.00	25.32	103.58	533
Jackson	15	52.19	38.45	0.00	186.40	292.04	2801
Jefferson	16	0.00	66.71	16.30	12.33	111.34	1791
Josephine	17	28.07	45.50	1.66	60.74	152.97	1641
Klamath	18	0.00	211.93	94.67	78.24	402.84	6135
Lake	19	0.00	14.54	229.28	62.68	325.50	8359
Lane	20	39.50	207.54	40.88	148.36	456.28	4620
Lincoln	21	0.00	101.49	0.00	71.90	194.39	992
Linn	22	37.11	52.93	80.15	77.48	269.67	2297
Malheur	23	26.01	258.94	39.31	75.84	423.10	9926
Marion	24	40.14	59.61	22.73	84.91	231.39	1194
Morrow	25	27.86	0.00	75.51	73.31	201.68	2049
Multnomah	26	68.95	27.10	0.00	99.83	221.88	465
Polk	27	0.00	40.76	35.78	44.86	148.40	745
Sherman	28	14.70	48.54	16.92	35.58	143.74	831
Tillamook	29	0.00	76.97	32.51	37.01	175.49	1125
Umatilla	30	77.84	96.89	71.91	142.00	418.64	3231
Union	31	42.21	31.95	19.65	101.55	226.36	2038
Wallowa	32	0.00	44.90	0.00	72.57	149.47	3153
Wasco	33	32.13	26.94	60.74	92.83	245.64	2396
Washington	34	8.82	54.75	36.25	73.11	206.93	727
Wheeler	35	0.00	45.86	66.39	43.18	190.43	1713
Yamhill	36	0.00	32.80	45.06	70.32	184.18	718
Statewide TOTALS		730.51	2,701.47	1,345.73	2,705.44	7,483.15	97060

Sources: ODOT, 1991c (Highway Mileages).
Oregon, Secretary of State, 1993 (County Areas).

data was tabulated by county, with urban and rural breakdowns and a county total. Each of the five Program years was thus tabulated, with statewide totals for each year; this data was used in the datasets. Population data is shown in Table II, which tabulates total county population for each program year and percentage increases per year and for the total time span from 1978 to 1992.

Vehicle Miles Traveled (VMT) data was obtained from the Oregon Department of Transportation's Transportation Data Section. This data is collected each year for all local roads and state highways by county, and is a summation of road miles driven by all vehicle types on roadways within the state. Data for the selected plan years for this project was requested, and then tabulated into the countywide dataset. This data is shown in Table III, and is for state highways only in each county.

The Oregon Department of Human Resources, Employment Division, Research and Statistics branch compiles annual statistics on per capita personal income in the state. The Research and Statistics branch publishes a summary sheet of this data covering the last two decades. The most recent data published, and used for this study, is for 1992. Per capita income data for the year of preparation of each of the five study Six-Year Programs was tabulated by county and as a statewide average.

ODOT's Level-of-Importance (LOI) Highway Classification System

The Oregon Department of Transportation developed the LOI highway classification system in 1985 as part of the first Oregon Highway Plan. In the 1985 Oregon Highway Plan, the system had three levels: interstate, statewide and regional, ranking from most to least important. Interstate highways are high volume facilities connecting not only with other states, but also serving Oregon's largest population centers. Highways in the

TABLE II
OREGON POPULATION BY COUNTY

COUNTY	#	1978	1982	1986	1988	1992	% Increase Total	% Increase per year
Baker	1	16,050	16,240	15,500	15,100	15,800	-1.56	-0.11
Benton	2	66,900	69,600	68,100	70,100	72,900	8.97	0.64
Clackamas	3	233,100	245,100	248,200	262,200	294,500	26.34	1.88
Clatsop	4	31,400	32,700	32,900	34,000	33,100	5.41	0.39
Columbia	5	33,900	36,200	36,100	36,800	38,800	14.45	1.03
Coos	6	62,950	61,750	57,500	58,800	62,100	-1.35	-0.10
Crook	7	12,350	12,900	13,500	13,300	15,000	21.46	1.53
Curry	8	15,900	17,200	16,900	18,400	21,400	34.59	2.47
Deschutes	9	53,950	64,350	65,400	68,700	82,600	53.10	3.79
Douglas	10	90,250	92,050	92,700	93,000	96,300	6.70	0.48
Gilliam	11	2,150	1,960	1,800	1,850	1,750	-18.60	-1.33
Grant	12	7,875	7,970	8,350	8,350	8,000	1.59	0.11
Harney	13	7,775	7,515	7,100	7,400	6,950	-10.61	-0.76
Hood River	14	15,800	15,870	16,200	16,500	17,600	11.39	0.81
Jackson	15	126,900	133,725	138,400	143,400	152,900	20.49	1.46
Jefferson	16	11,150	12,225	12,000	11,900	14,600	30.94	2.21
Josephine	17	56,250	59,000	61,450	64,000	65,400	16.27	1.16
Klamath	18	58,200	59,200	56,700	57,300	59,400	2.06	0.15
Lake	19	6,975	7,625	7,300	7,300	7,350	5.38	0.38
Lane	20	262,700	270,650	261,650	273,700	293,700	11.80	0.84
Lincoln	21	32,200	36,600	36,900	38,800	39,600	22.98	1.64
Linn	22	86,450	88,850	86,050	88,800	95,000	9.89	0.71
Malheur	23	26,000	27,175	26,200	26,400	26,800	3.08	0.22
Marion	24	191,700	207,350	209,200	219,000	241,500	25.98	1.86
Morrow	25	6,675	7,260	7,800	7,800	8,100	21.35	1.52
Multnomah	26	558,500	564,500	566,200	570,500	605,000	8.33	0.59
Polk	27	44,300	45,060	45,600	47,300	53,000	19.64	1.40
Sherman	28	2,000	2,210	2,100	2,000	1,800	-10.00	-0.71
Tillamook	29	20,000	21,150	21,300	21,400	22,500	12.50	0.89
Umatilla	30	55,100	60,000	58,700	57,600	61,100	10.89	0.78
Union	31	23,350	24,410	23,000	23,300	24,000	2.78	0.20
Wallowa	32	7,000	7,390	7,200	7,200	7,150	2.14	0.15
Wasco	33	20,800	22,700	21,600	20,600	22,600	8.65	0.62
Washington	34	221,450	259,700	273,300	287,000	340,000	53.53	3.82
Wheeler	35	2,000	1,425	1,500	1,350	1,500	-25.00	-1.79
Yamhill	36	51,750	56,575	57,100	59,800	69,200	33.72	2.41
Statewide TOTAL		2,521,800	2,656,185	2,661,500	2,740,950	2,979,000	18.13	1.29

Source: Portland State University, 1993, 1992 and 1989.

TABLE III
OREGON VEHICLE MILES TRAVELED BY COUNTY

COUNTY	#	1978	1982	1986	1988	1992	% Increase Total	% Increase per year
Baker	1	159,534	150,333	157,143	178,124	227,321	42.49	3.04
Benton	2	164,377	160,982	175,490	199,186	222,389	35.29	2.52
Clackamas	3	782,108	826,377	1,089,380	1,222,920	1,410,584	80.36	5.74
Clatsop	4	194,124	193,022	225,233	217,454	269,382	38.77	2.77
Columbia	5	135,641	144,689	172,265	203,946	199,007	46.72	3.34
Coos	6	305,316	289,796	303,962	328,225	375,186	22.88	1.63
Crook	7	52,715	54,032	62,380	60,459	85,780	62.72	4.48
Curry	8	112,985	109,852	119,039	132,127	140,289	24.17	1.73
Deschutes	9	281,626	291,248	347,207	379,110	488,569	73.48	5.25
Douglas	10	784,199	701,227	864,374	920,782	990,350	26.29	1.88
Gilliam	11	91,153	87,303	93,719	101,387	130,912	43.62	3.12
Grant	12	61,966	58,135	61,403	63,085	68,475	10.50	0.75
Harney	13	72,286	69,356	62,306	75,612	83,380	15.35	1.10
Hood River	14	160,063	149,496	165,019	184,836	228,879	42.99	3.07
Jackson	15	605,150	586,534	704,572	768,151	834,332	37.87	2.71
Jefferson	16	107,377	108,612	116,618	126,774	147,740	37.59	2.68
Josephine	17	306,026	302,210	363,882	392,010	419,092	36.95	2.64
Klamath	18	393,922	350,685	370,570	418,422	456,110	15.79	1.13
Lake	19	61,566	56,758	58,934	64,020	79,081	28.45	2.03
Lane	20	1,028,907	999,713	1,092,065	1,206,852	1,308,984	27.22	1.94
Lincoln	21	226,816	238,976	279,634	315,271	327,941	44.58	3.18
Linn	22	600,197	585,412	678,083	765,519	852,050	41.96	3.00
Malheur	23	206,221	201,339	205,264	229,622	274,466	33.09	2.36
Marion	24	805,650	819,307	986,529	1,086,923	1,220,420	51.48	3.68
Morrow	25	94,456	91,352	107,850	113,884	131,692	39.42	2.82
Multnomah	26	1,724,199	1,732,274	2,219,583	2,467,458	2,725,186	58.06	4.15
Polk	27	216,177	212,621	245,852	280,388	318,276	47.23	3.37
Sherman	28	65,625	66,919	76,176	78,998	95,044	44.83	3.20
Tillamook	29	158,924	161,077	166,389	192,635	215,899	35.85	2.56
Umatilla	30	371,612	357,288	384,384	408,587	493,251	32.73	2.34
Union	31	146,473	135,613	157,859	168,188	217,382	48.41	3.46
Wallowa	32	34,937	31,112	34,483	37,505	46,371	32.73	2.34
Wasco	33	205,738	205,578	219,805	246,586	278,641	35.43	2.53
Washington	34	870,138	966,329	1,204,854	1,371,410	1,458,210	67.58	4.83
Wheeler	35	16,256	18,504	18,694	18,740	20,849	28.25	2.02
Yamhill	36	214,586	221,772	262,266	282,653	321,865	49.99	3.57
Statewide TOTAL		11,819,046	11,735,833	13,853,266	15,307,849	17,163,385	45.22	3.23

Source: ODOT, 1993b.

NOTE: All the above VMT data are in thousands (1000s) of miles.

interstate category include only the signed interstate freeways (I-5, I-82, I-84, I-105, I-205, and I-405). Statewide highways, such as US20, US26, US97, OR58, and OR42, are those which serve other population or economic centers within Oregon not served by the interstates. The statewide highways also serve as interstate connections. Regional highways, mostly Oregon state routes and some minor US routes, serve more of an intrastate local function. The regional routes connect smaller Oregon communities, or provide access to regional economic or recreational areas (ODOT, 1985).

The 1991 Oregon Highway Plan added another LOI to the three previous, this being the district Level-of-Importance. The district LOI was split apart from the previous regional classification to distinguish those highways serving an almost exclusively local function. The net result of this division was a large total of district highways and a rather small mileage total of regional highways. The significant aspect of this was a four tiered LOI system, with the order from most to least importance being: interstate, statewide, regional, and district. Another change in the 1991 Oregon Highway Plan versus the 1985 Oregon Highway Plan was a subdivision of the statewide category; this category is the Access Oregon Highway (AOH) system. The AOH system was designated in 1986 to receive a half billion dollars in state funds over a ten year period to improve connectivity amongst economic/population centers outside the Willamette Valley. The AOH routes generally connect the Oregon coastal areas or central/eastern Oregon to other parts of the state via other statewide routes or interstate routes. For purposes of this report, however, all Access Oregon Highways are considered only as statewide facilities in the LOI classification (ODOT, 1991).

Highway mileages for the various LOI's were obtained from ODOT's Transportation Development Branch, Transportation Inventory and Mapping section. Mileage data was in

two formats-computer printouts from the Automated Milepoint Log (AML) and the 1991 annual edition of the Oregon Mileage Report. The two data sets were compared for consistency, and then tabulated by LOI for each Oregon county (ODOT, 1993a) and the statewide totals (ODOT, 1993b). The LOI data is included in Table I, and graphically depicted on Figure 2.

Administrative Boundaries

One of the most convenient and widely used administrative units for data compilation is the Oregon county. All data used in this report has been correlated on a county basis, and most was received in a county-based form. Oregon has thirty-six counties; data used in this report is related to counties by a number from 1 to 36, assigned to the counties in alphabetical order. Many state agencies, particularly ODOT, use the numerical values to identify counties. (Number 37 is assigned for statewide information in some ODOT data.) All data tables in this document list the counties alphabetically and include the county number.

ODOT uses another administrative and functional unit for its internal activities, the region. The state is divided into five regions roughly as follows:

- 1.) the Portland Metropolitan area;
- 2.) the Willamette valley and north Oregon coast;
- 3.) southern Oregon and the south Oregon coast;
- 4.) central Oregon, and;
- 5.) eastern Oregon.

The region boundaries do not follow county boundaries in all instances, but closely enough for rough groupings. Figure 1 shows the relationship of Oregon counties to ODOT regions.

FIGURE 2. ODOT highway levels of importance (LOI).
Source: ODOT, 1993c.

For data reported by region, it was assumed that if most of a county was within one region (as shown on Figure 1), it would be counted for only that one region.

Project land use designations were determined from project descriptions contained in the various Programs. In addition to the project name (in part a description), the Programs listed beginning and ending milepoints for each project. Each state highway has its own discrete set of milepoints for its entire length, and by comparing milepoints with jurisdictional boundaries (from ODOT computer files and maps), a generic land use of urban or rural was developed.

The highway milepoints were also used for the length of projects by determining the difference between beginning and ending milepoints. Later Programs deleted the milepoints for beginning and end, instead giving a total project length.

DATA BASE CREATION METHODOLOGY

Some method of compilation had to be developed in order to perform any analysis between Six-Year Programs. The first consideration was which plans to include; the first two Programs (the 1976-81(OSHD, 1975) and 1976-82 (OSHD, 1976) were dropped because they were only a year apart. The first Program included is the 1979-1984 Program (ODOT, 1978). The 1980-85 Program (ODOT, 1980) was not included since it was only one year after the 1979-84 Program. The 1982-1987 Program (ODOT, 1982) was included because it was developed during an economic recession, representing a 'minimum expenditure', or fiscally constrained program. The 1984-89 Program (ODOT, 1984) was not included. The 1987-1992 Program (ODOT, 1986) was included to represent the most "typical" financial and organizational period for ODOT. The 1989-1994 Program (ODOT, 1988) was included due to a large injection of state funding (from the Access Oregon Highways program). The 1991-96 Program (ODOT, 1990) was not included since it was almost a duplication of the previous Program. Finally, the 1993-1998 Program was selected to reflect ODOT reorganization and a new federal funding program in the form of the Intermodal Surface Transportation Efficiency Act (ISTEA). The five included Programs were each prepared after a major funding change or a departmental reorganization/policy shift, and would be most likely to reflect those changes in construction project funding statewide. The last two Programs, the 1995-98 and the 1996-98, were (or will be) published after work was begun on this project, and therefore were not considered; these last two Programs also were not six-year programs.

ODOT's Program Section, the unit responsible for preparation and publication of the Six-Year Programs, did not have any of the Programs on computer files, therefore a database file had to be created. This file is composed of the numbered construction projects from the five Programs 1979-1984, 1982-1987, 1987-1992, 1989-1994, and 1993-1998; these will be referred to as the 1978, 1982, 1986, 1988, and 1992 Programs. It must be emphasized that only construction projects were included, since these were the only ones actually programmed to be built. Each construction project was identified by the map index number prefaced by a letter; the letter prefix (A through E) identified the Six-Year Program in chronological order from the earliest to latest.

The selected programs contained lots of data not germane to this project, and did not possess other data deemed to be necessary. Thus a new database needed to be constructed from the selected five programs, plus supplemental data from other previously described sources. The project database consists of ten attributes for each project; each attribute was condensed into as few characters as possible. The ten project attributes are:

- 1. project identification (as described above - a unique number designating which Program the project came from; the code is an initial letter followed by three digits, with the letters A through E corresponding to 1978, 1982, 1986, 1988, and 1992);
- 2. region (ODOT highway region number, from 1 to 5);
- 3. county (1 -36 alphabetically, with 37 used for statewide projects);
- 4. land use (urban or rural, as determined from project descriptions and highway milepoints as described in the five Programs);
- 5. highway designation (Interstate route, US route or Oregon route number);
- 6. highway classification (ODOT level-of-importance);

- 7. length of project (in miles and tenths of miles);
- 8. fiscal year (proposed first year of construction);
- 9. project cost (estimated construction cost in 1000's of dollars);
- 10. project work type (five general categories-see below).

The ten attributes for each project were taken directly from the five selected plans and abbreviated for easy use and coding with computer programs (ODOT, 1978, 1982, 1986, 1988, and 1992c).

The "class" attribute refers to the ODOT highway classification scheme which is similar to a functional classification. Functional classifications for roads most often are described for roads at a local (city or county) level; ODOT uses a statewide classification scheme called the level-of importance (LOI). The LOI system is a four level classification scheme composed of Interstate (I), Statewide (S), Regional (R), and District (D) highways. Each state highway is assigned to one of the four levels depending on the areas it serves or links together. All projects in the database were assigned a LOI class from this system. Highway LOI's were more fully described in a previous section.

The "work type" attribute describes one of five general construction categories: modernization (M); preservation (P); safety (S); bridge (B); and miscellaneous (X). Modernization includes new construction, widening and major alignment corrections. Preservation is mostly limited to pavement overlays and minor repaving. Safety projects correct highway safety problems such as rockfall mitigation, channelization (such as adding left-turn lanes) and traffic signal installation. Bridge projects include replacement and structural repair of bridges. Miscellaneous work includes projects at rest areas, weigh stations, landscaping, etc. Projects from all five Programs were categorized using this work type classification, even though it was only adopted in the last Program. All Programs

included a work description which was directly transferred to the "work type" attribute taken from the 1992 Six-Year Program.

INITIAL DATASET ANALYSIS METHODOLOGY

General Information

Cost was selected as the evaluation variable. Any useful measure for determining geographic distribution of planned highway projects throughout the state could be evaluated against cost, since expenditure criteria are commonly used and readily understood. In most of the evaluations, costs in a given program year were calculated, this being used for comparisons over time. The independent variables used would have to possess quantifiable parameters such as population, which could be related to distinct areas, in this analysis by counties of the state. Ultimately the independent variables evaluated included population, area, total highway mileage, and vehicle miles traveled (VMT). Later analyses included derived variables such as population density or VMT per capita.

The initial dataset contained the original ten project attributes. This initial dataset was used to create the "county" dataset. The county dataset contained summarized and derived data from the initial dataset grouped by county, plus additional data available only as countywide data. The final dataset used for analysis, henceforth referred to as the "project" dataset, consisted of the project dataset combined with selected county parameters. The county data could be attached to the initial data based upon county identification and program year.

The project database was first created in the dBase III program. Subsequently the project database was imported to Microsoft Windows Excel 5.0, where the initial data manipulations were performed. Excel was subsequently used with the project, county and combined datasets to perform simple grouping, sorting and calculation functions. More

complex statistical analysis was later done with SPSS 6.0 for Windows. The SPSS analysis consisted primarily of multiple regression runs for both datasets.

Aggregated County Data Analysis

At the beginning of the analysis, rough cost comparisons were performed based upon highway regions. Problems became evident with this approach, which led to its elimination for further analyses. One problem was that of region geographic boundaries not following county boundaries, but being rather arbitrary; this was not acceptable. A second problem was that a sample size of five, versus thirty-six, gave rather coarse data not entirely suited for valid analysis. It should be pointed out, however, that the "1992 ODOT County Equity Study" evaluated some data based on highway regions (ODOT, 1992c). The next set of evaluations was performed using the Programs (a dataset of five: 1978, 1982, 1986, 1988, and 1992) to determine if any trends were apparent.

The first database analysis consisted of simple breakdowns and summations of the project data into county-based totals of proposed costs by highway LOI, with total work types (such as safety and preservation) and mileages also included. Selected data was then tabulated and plotted as bar graphs for each Program, with proposed cost plotted against work type and highway LOI. Two graphs were prepared for each work type and LOI plot - one showing absolute dollar expenditures, and the other being a percentage of total expenditures graph. These graphs are included as Figures 3 through 6, with Figures 3 and 4 describing work type and Figures 5 and 6 describing LOI expenditures. An apparent discrepancy should be noted concerning Figures 3 through 6, and that is these Figures use the total program year range, rather than the program year of publication, to identify which

FIGURE 3. Planned ODOT expenditures by work type and program.

FIGURE 4. Planned ODOT expenditures by work type and program, percentages.

FIGURE 5. Planned ODOT expenditures by highway level of importance (LOI) and program.

FIGURE 6. Planned ODOT expenditures by highway level of importance (LOI) and program, percentages.

program is being evaluated. In the case of Figures 3 through 6, merely subtract one year from the first year of the range listed to obtain the corresponding Program year as used throughout the remainder of this report.

Examination of Figures 4 and 6, depicting planned expenditures as percentages of the total program, show some interesting trends. Figure 4 shows that modernization project expenditures grew from 1978 to 1988, primarily at the expense of bridge and preservation projects. In 1992 the modernization projects have been decreased in favor of preservation, and to a lesser extent, bridge projects. The increase in preservation projects in the 1992 program may reflect the intent of the federal ISTEA program, which emphasized maintenance of existing roadways over the construction of new ones. The steady, but relatively slow growth of both safety and miscellaneous projects can be attributed to better project type definition over the duration of the project programming process conducted by ODOT; for example, in earlier programs, the category of miscellaneous did not even exist (one more reason for excluding the first two Programs from the analysis). Figure 6 plots the percentages of proposed expenditures for the five study Programs in terms of highway level of importance (LOI). Planned expenditures on interstate highways remained fairly constant from 1978 to 1988, but decreased quite significantly in 1992 in order fund more work on statewide highways (a trend which began in the 1986 program). This increase of expenditures for statewide highways versus interstate highways, beginning in 1986, can be attributed to the state of Oregon's enactment of a gas tax for the Access Oregon Highways program in 1986; all of the AOH highways are statewide LOI facilities (ODOT, 1986).

Figures 3 through 6 show general trends of relatively steady investments for both modernization work and interstate highways from 1978 to 1988. An increase in preservation work and work on statewide highways in the 1992 program, reflect the

changes of both state and federal priorities due to the state's AOH program and the federal ISTEA program. This coarse analysis helped to focus on the need to develop more meaningful data regarding project work type, and the highway level of importance.

Further data measures were developed by incorporating county-based raw data, such as population and VMT, with the project-by-county data summaries. Examples of this type of derived data include cost per mile per highway LOI, VMT per capita, cost per mile per square mile, and population density. Additionally, the four highway LOI categories were put into two new groups: the first being primary highways, composed of the interstate and statewide LOIs; the second being secondary highways, composed of the regional and district LOIs. The Oregon highway system is often categorized on the primary/secondary basis, and until 1985 was the only categorization scheme used by ODOT; use of this two-tiered highway classification system simplified analysis without loss of detail. This expanded county dataset now included ten original variables, a half dozen county variables plus over a dozen of the newly derived variables. This expanded county dataset was the basis for all remaining analysis of gross county data. Printouts of all five county datasets are included as Appendix A.

1988 was selected as the sample program year for the most complete analysis, which would indicate which variables might be significant and which might be eliminated from further consideration. The 1988 program was selected because it reflected a "full-funding program" at both state and federal levels, therefore having the greatest potential for showing equitable geographic project expenditure distributions.

A number of pairs of the derived data sets were plotted against each other on scatter diagrams; then a bivariate linear regression was performed and plotted on the charts. These simple bivariate linear regressions were performed in the Excel spreadsheet

program. Initial plots and calculations used the county, by number, as the dependent variable, plotted against cost per unit (x) as the independent variable. The cost variable was an aggregate cost of all five types of projects within each county for 1988. Simple bivariate linear regression results of these plots were not indicative of good correlation, with R-squared values of less than 0.25. The next set of simple regressions on the 1988 county program dataset differed in the use of a cost per unit (x) per unit (x); this was done in order to try and reduce the data scatter and get better correlation. A sample of the data used is shown in [Table IV](#), while a sample plot is included as [Figure 7](#). [Figure 7](#) shows the plot of cost per mile (for total highways, primary plus secondary) per mile of highway type (in this case, total) per square mile plotted against the counties, arranged from smallest to largest land area. Similar regressions to those which were used to plot [Figure 7](#) were done for each highway type, primary, secondary and total against population, population density, highway miles, VMT, and VMT per capita. This set of linear regressions produced slightly better results, but still not satisfactory: the highest R-squared value obtained was 0.3349. The results of the fifteen bivariate linear regressions run for the 1988 sample dataset are shown in [Table V](#).

Even though the results of the simple regression on the 1988 program sample county dataset were not conclusive, some observations were noted. The foremost observation was that further analysis should be done at the project level, since aggregated data results were inconclusive, based upon the low R-squared values shown above. A second observation was instead of simple linear regression, multiple regression should be used for analysis. The third observation concerned the data itself : which to eliminate in further analysis. Data withheld from future analysis included per capita income, any of the (cost per unit (x) per unit (x)) variables, land use, or population breakdowns by urban or

TABLE IV

1988 PROJECT COST PER MILE PER MILE PER SQUARE MILE BY COUNTY

COUNTY	#	Cost / Mi / Mi of Hwy / Sqr Mi			AREA (Sq. Mi.)
		Primary	Seconday	TOTAL	
Multnomah	26	27.95	58.20	14.91	465
Hood River	14	89.93	0.00	64.51	533
Benton	2	659.29	35.83	60.47	679
Columbia	5	21.96	0.23	4.45	687
Yamhill	36	53.85	0.00	11.92	718
Washington	34	42.28	8.25	11.02	727
Polk	27	23.92	128.17	8.98	745
Sherman	28	10.47	0.00	5.72	831
Clatsop	4	6.78	1796.02	11.65	873
Lincoln	21	10.67	63.09	6.99	992
Tillamook	29	12.01	4.88	5.62	1125
Marion	24	7.34	4.43	2.96	1194
Gilliam	11	0.55	2.03	0.19	1223
Coos	6	13.04	106.11	15.74	1629
Josephine	17	13.27	0.50	5.56	1641
Curry	8	13.38	0.00	12.48	1648
Wheeler	35	8.22	10.66	2.50	1713
Jefferson	16	8.21	0.00	5.75	1791
Clackamas	3	2.39	2.89	1.27	1879
Union	31	1.40	0.45	0.52	2038
Morrow	25	0.09	0.00	0.01	2049
Linn	22	14.51	2.63	3.22	2297
Wasco	33	6.29	0.16	1.03	2396
Jackson	15	3.28	1.51	1.06	2801
Crook	7	1.89	0.00	0.50	2991
Deschutes	9	2.11	0.00	1.66	3055
Baker	1	4.44	3.96	1.31	3089
Wallowa	32	0.55	1.54	0.72	3153
Umatilla	30	1.33	0.69	0.49	3231
Grant	12	0.48	0.00	0.35	4528
Lane	20	0.70	0.51	0.35	4620
Douglas	10	1.31	1.18	0.66	5071
Klamath	18	0.48	0.09	0.11	6135
Lake	19	0.00	0.24	0.23	8359
Malheur	23	0.08	1.24	0.08	9926
Harney	13	0.51	0.17	0.13	10228

Source: Oregon Secretary of State, 1993 (Areas only).

NOTE: All costs in dollars and cents

FIGURE 7. Cost per mile per mile of highway per square mile by county, total highways.

rural. Land use designations were too arbitrary for useful analysis, and analysis of population data broken down in two components provided no insights.

TABLE V
County Dataset Linear Regression Results

Dependent Variable	Independent Variable	Constant	R-Squared
Cost/Mi/Capita, Primary	-0.0628 P	+2.1191	0.1015
Cost/Mi/Capita, Secondary	-0.0708 P	+3.2819	0.0089
Cost/Mi/Capita, Total	-0.0323 P	+0.9836	0.2270
Cost/Mi/Sq Mi, Primary	-3.6981 A	+97.997	0.1267
Cost/Mi/Sq Mi, Secondary	-5.4563 A	+163.04	0.0370
Cost/Mi/Sq Mi, Total	-0.7880 A	+21.942	0.3349
Cost/Mi/Unit Density, Primary	-121.44 D	+3729.3	0.1622
Cost/Mi/Unit Density, Secondary	-77.923 D	+3896.5	0.0117
Cost/Mi/Unit Density, Total	-55.141 D	+1660.3	0.3148
Cost/Mi/Unit VMT, Primary	-0.0068 V	+0.2566	0.0344
Cost/Mi/Unit VMT, Secondary	-0.0239 V	+0.7134	0.0436
Cost/Mi/Unit VMT, Total	-0.0006 V	+0.0514	0.0116
Cost/Mi/UnitVMT/Capita, Primary	-767.01 C	+20277	0.0964
Cost/Mi/UnitVMT/Capita, Secondary	-280.83 C	+14287	0.0052
Cost/Mi/UnitVMT/Capita, Total	-84.641 C	+2801.4	0.1304

NOTE: P = Population A = Area D = Population Density V = VMT C = VMT/Capita

The final observations regarding countywide linear regression were the effects of certain types of 'abnormal' projects. These unusual projects were the bridge, safety and miscellaneous work type projects. Miscellaneous projects are unusual due to their limited numbers (a very low percentage of the total projects in any one program). Bridge projects are very short (usually one-tenth of a mile) but very expensive. Safety projects, on the other hand, are often quite long (up to over a hundred miles long for a sign replacement job) but very low cost. The net effect of the main two 'abnormal' types of projects, high cost/low mileage and low cost/high mileage, is to boost the cost per mile per mile variables, thereby skewing the data. Another effect of abnormal cost which can be inferred is that a large expenditure of money on one project, usually in one county (such as a bridge project), will

tend to increase the cost per mile per mile to a higher degree than a low cost per mile per mile (typically a safety project) will lower the cost per mile per mile.

Aggregate County Dataset Multiple Regression Analysis

The next step was to perform multiple regression on selected variables in the county dataset to determine any significant relationships at the county level and to determine what to analyze in the project database. As with the simple linear regression, the 1988 program dataset was selected as the trial run, with total project costs per county as the dependent variable. This initial set of multiple regressions was run mainly to eliminate inconclusive variables for future multiple regressions at the project dataset level.

Three separate multiple regressions were run on the 1988 sample: 1.) cost versus total, primary and secondary highway LOI mileages; 2.) cost versus population, population growth rate and population squared; and 3.) cost versus population, area and population density. Examination of the regression results showed that the total highway mileage, population and population growth rates showed the most potential for further analysis, while density and area also indicated further promise. The variables which were dropped from further analysis included: the primary and secondary highway mileages, and population squared.

Further multiple regressions were run on the county datasets after the project datasets had been analyzed. These last multiple regression analyses were performed on the county datasets for all five program years, and were warranted by examination of the project level regressions. Description and discussion of the results of the final county dataset regression analyses follows the description and analysis of the project datasets.

DETAILED PROJECT DATASET ANALYSIS

Project Dataset Composition

The individual project dataset consisted of the original ten variables, plus the appended county data to each project. The appended data assumed that each project was unique to only one county. The appended data was based upon the plan year for the particular project, thus five datasets were formed from the all inclusive original; the 'new' project datasets were now for 1978, 1982, 1986, 1988, and 1992. The inclusion of the countywide data in the project dataset enabled analysis at the project level, but capable of being examined using data available only at the aggregate county level. Another data type was used to supplement the project data set, this being dummy variables. Three categories of dummy variables were created for each project in all five datasets: work type, region and work type mileage. The first two were simply creating five new variables, with a 1 for the proper region or work type and a 0 in the other four variables. The third was similar, but used the project mileage combined with work type; this was coded as a one-place decimal number for the appropriate project work type, and a 0 for the other four categories. Ultimately the regional dummy variables were not used. The new appended data are listed as follows, along with a variable identifier, or name (shown in **BOLD type**). It should be noted the first ten variables are the variables used to create the original database.

- 1. project identification (a unique number also designating which Program the project came from), (**ID**);
- 2. region (ODOT highway region number, from 1 to 5), (**RGN**);

- 3. county (1 -36 alphabetically, with 37 used for statewide projects), (CO);
- 4. land use (urban or rural, as determined from project descriptions and highway milepoints as described in the five Programs),(LU);
- 5. highway designation (Interstate route, US route or Oregon route number), (HWY);
- 6. highway classification (ODOT level-of-importance), (LOI);
- 7. length of project (in miles and tenths of miles), (MI);
- 8. fiscal year (proposed first year of construction), (FY);
- 9. project cost (estimated construction cost in 1000's of dollars), (COST);
- 10. project work type (five general categories-see below), (WK);
- 11 through 15. project work type dummy variables (coded as a 1 or a 0 for bridge (BR), modernization (MOD), preservation (PRES), safety (SAFE), or miscellaneous (MISC);
- 16 through 19. highway LOI classification dummy variables (coded as a 1 or 0 for district (DIST), interstate (INST), regional (REG), and statewide (STW);
- 20 through 24. ODOT region dummy variables (coded 1 or 0 for regions 1 through 5: R1, R2, R3, R4, and R5);
- 25. county area in square miles (AREA);
- 26. county population for the program year (POP);
- 27. county VMT for the program year, in 1000s of miles (VMT);
- 28. total state highway miles in each county (HWY MI);
- 29. county population density for the program year (persons per square mile) (DENSITY);

- 30. county VMT per mile of state highway for the program year (**VMT/MI**);
- 31. county VMT per capita for the program year (**VMT/CAP**);
- 32. county population growth factor (gain/loss in population from 1978 to 1992 divided by 15) (**POPGRW**);
- 33 through 37. dummy variables formed from combining work type with length (coded as the project length for a work type (X.X) or a 0 for bridge miles (**BRMI**), modernization miles (**MODMI**), preservation miles (**PRESMI**), safety miles (**SAFEMI**), or miscellaneous miles (**MISCMI**);
- 38. county population density squared (**DNSTSQR**); and
- 39. county population squared (**POPSQR**).

A sample printout of the 1988 project dataset is included as [Appendix 2](#).

Project Dataset Analysis Methodology

The previous runs of simple linear regression were of little importance in analysis of the county datasets, therefore all analyses performed on the project datasets were multiple linear regression. Based upon previous simple regression analysis of the county aggregate dataset, some project level analyses were not performed due to their lack of significance or inconclusive results. Some of these were analyses involved eliminating ODOT region or highway level of importance variables. The multiple regression was performed from the Excel spreadsheets by importing the files into the SPSS, Version 6.0 statistical analysis program; this program was also used to determine correlations amongst the dataset variables.

As with the county datasets, one typical sample program year was used for testing combinations of variables with the multiple regression analysis. The 1988 program was

used to maintain consistency with the other analyses; this dataset contained 331 samples (projects). Once again project **COST** was the dependent variable. Regressions were run with numerous variables, not including ones previously eliminated earlier in the county analysis. Analysis efforts focused on the following variables: **AREA, POP, POPGROW, POPSQR, DENSITY, VMT**, and the dummy variables for work type and LOI (**BR, MOD, PRES, SAFE, MISC, DIST, INST, REG, and STWD**). Initial regression analysis on the above variables consisted of normal and no - intercept (through the origin) methods; the no - intercept method produced no significant improvements in the analysis, and was subsequently eliminated. Eight regression models were ultimately run, all using the **POPGROW, POPSQR, LOI** and work type variables, plus the following combinations of other variables: 1.) **AREA, POP, DENSITY, and VMT**; 2.) **AREA, POP and DENSITY**; 3.) **AREA, DENSITY and VMT**; 4.) **AREA, POP and VMT**; 5.) **AREA and POP**; 6.) **AREA and VMT**; 7.) **DENSITY and VMT**; and 8.) **DENSITY**.

Analysis of the 1988 project program sample regressions showed no significance for the variables **AREA, POPGROW, POPSQR** or **DENSITY**; these variables were not used further in the project analysis. The regression and correlation results for the 1988 project program led to the elimination of the dummy variables in subsequent project dataset regressions. When performing the dummy variable regressions, one in each category (**PRES** in work type and **DIST** in LOI) was withheld as the reference variable, to which the others in the same category were compared. The reference dummy variable **PRES** was used since preservation projects seemed to represent the middle ground for cost of project versus length, while the **DIST** dummy variable represented the lowest class of highway, therefore most likely receiving the least cost per mile of project. Although the dummy variables were not to be used in subsequent analysis, they did prove useful to corroborate

the two secondary hypotheses. The first hypothesis concerned work types: **MOD** and **BR** projects had more impact than **PRES**, while **SAFE** and **MISC** had less. The second test hypothesis concerned highway LOI types, projects on **REG** had less impact, while **INST** and **STWD** had more impact than work on **DIST**. The lesser impact of **REG** projects, even though a higher level of importance, can be explained by the facts that there are fewer regional highway miles than any other class, and that the regional class was created out of the district class when the LOI system originally contained only three classes. In the case of the LOI dummy variable analysis, the initial assumption was also proved by the regression results. The two test hypotheses, one concerning relative ranking of highway LOIs and the other the ranking of work types, were carried through to the next round of regressions.

The first regression runs on all five of the project program datasets used **COST** as the dependent variable, and the following independent variables: **POP**, **VMT**, **DIST**, **INST**, **REG**, **STWD**, **BRMI**, **SAFEMI**, **PRESMI**, **MODMI**, and **MISCMI**. The last five variables are collectively called the “**WKTYPEMI**” variables. The two variables, **DIST** and **PRESMI**, were left out of the analyses as the reference variables. These regressions produced very low R-squared values, ranging from a low of 0.083 for 1992 to a high of 0.230 for 1986.

The low R-squared values for the above “**WKTYPEMI**” analyses led to substitution of the five combined “**WKTYPEMI**” variables with the five work type variables **BR**, **SAFE**, **PRES**, **MOD**, and **MISC**, along with the variable **MI**. Two reference variables were left out, as with the previous regressions one was for LOI (**DIST**) and the other for work type (**PRES**). Three regressions, using **POP** and **VMT**, singly and in combination, were run for each of the five datasets, once again using **COST** as the dependent variable. The regressions included the four work type variables, the three highway LOI variables, the mileage variable, and the combinations of **VMT** and **POP**. The population model produced

the best results, and is the project dataset model used hereafter for analysis and discussion. The population regression results for the project dataset are shown in Table VI.

Comparison of the highway LOI coefficients for **INST**, **REG** and **STWD** indicates that in 14 out of 15 cases, projects planned for these types of highways were more costly than projects on district (**DIST**) highways. Interstate highway projects (**INST**) were the most costly, followed by statewide (**STWD**) and regional (**REG**), with the district highways remaining the reference variable for LOI. This order of cost was consistent with the anticipated cost structure for LOI types, based upon function. Interstate freeways are higher level facilities, and therefore would cost more to construct than the other types. The district highways are almost local roads in many areas, and would consequently have lower traffic volumes, design standards and costs. The one instance of regional highway projects costing less than district, in 1988, may be attributed to proportionally fewer and lower cost projects in 1988 than other study program years. This cost structure based upon highway LOI is consistent with the first of the secondary hypotheses of this report. To restate that hypothesis, planned highway construction projects, based upon a level of importance (LOI) system, rank from most to least cost in the following order: interstate (**INST**), statewide (**STWD**), regional (**REG**), and district (**DIST**). This LOI ranking was also indicated earlier when the dummy LOI variables were used in the regressions.

TABLE VI

Project Dataset Multiple Regression Results

Independent Variable	1978	1982	1986	1988	1992
N	401	269	411	330	433
R-squared	0.242	0.252	0.169	0.222	0.251
Constant	-1003.732	-1548.102	-696.947	64.249	-878.944
T	-1.344	-1.257	-0.891	0.081	-0.956
sig T	0.180	0.210	0.373	0.936	0.335
MI	59.544	37.904	11.451	7.847	-8.009
T	0.982	0.770	0.732	0.591	-0.342
sig T	0.327	0.442	0.465	0.555	0.733
POP	0.009	0.005	0.002	0.003	0.006
T	5.486	3.549	1.459	2.576	2.828
sig T	0.000	0.001	0.145	0.011	0.005
BR	1630.236	3189.118	1604.668	987.427	872.224
T	1.786	2.413	1.859	1.093	0.863
sig T	0.075	0.017	0.064	0.275	0.389
MOD	2413.105	3870.403	2670.579	2756.839	5489.383
T	3.909	3.444	3.831	4.080	6.682
sig T	0.000	0.001	0.000	0.000	0.000
MISC	-4459.309	-2381.139	-1872.340	-2018.446	-2740.613
T	-1.912	-1.104	-1.823	-2.120	-1.390
sig T	0.057	0.271	0.069	0.035	0.165
SAFE	-889.467	-427.055	-603.418	-926.649	-2227.600
T	-1.163	-0.371	-0.808	-1.234	-2.303
sig T	0.246	0.711	0.420	0.218	0.022
INST	3599.834	4018.721	3204.051	2122.631	6046.815
T	3.993	4.480	5.462	3.484	5.728
sig T	0.000	0.000	0.000	0.001	0.000
REG	183.503	278.491	1199.766	-332.370	1114.599
T	0.232	0.289	1.480	-0.440	0.965
sig T	0.817	0.773	0.140	0.660	0.335
STWD	587.605	1302.839	1328.307	183.737	2944.088
T	1.001	1.828	2.649	0.373	3.871
sig T	0.317	0.069	0.008	0.709	0.000

NOTES: Dependent Variable = COST

BOLD data are significant at the five percent level

The regression results of the population model runs for the five years produced better R-squared values for four out of five years, 1986 excepted; still the R-squared values did not exceed 0.252. Three of the independent variables, as indicated by the T values shown in Table VI, were significant : **POP**, **MOD**, and **INST**; the last two do not have any relevance to geographic distribution. Examination of Table VI shows the mileage (**MI**) variable was not significant for any program year, while population (**POP**) was significant in all years but 1986. One trend indicated by the decreasing constant for the **MI** variable is that the investment per mile of highway project has decreased over time, from about \$60 to \$8 per mile. The lower T value for the **POP** variable in 1986 may be due to the close interval between it and the previous plan from 1988. The constant values for the **POP** variable in these regressions signify that highway investments were projected for areas with larger populations.

An examination of the coefficient values for the work type and LOI independent variables for the program year 1988 is useful to indicate the relative ranking of priorities of highway projects.

These coefficients for highway work types verify the anticipated ranking of costs, with **MISC** and **SAFE** lower, and **BR** and **MOD** higher than the reference variable **PRES**. The 1988 coefficients for work type, in the above order, are: -2018.446; -926.649; 1.000 (reference); 987.427; and 2756.839. This indicates that modernization projects in 1988 received over \$2700 per project related to preservation projects receiving \$1 per project, while miscellaneous projects received over \$2000 less per project than the reference preservation projects. 1988 coefficients for the work type variables indicate a priority of construction projects, from least to most expensive, as follows: modernization, bridge, preservation, safety, and miscellaneous. The coefficients for these variables in the other

four programs follow the exact same ranking priority. Modernization (**MOD**) projects usually entail either new construction or major reconstruction, while bridge (**BR**) projects are high cost/short length projects; both of these would be more expensive than relatively uncomplicated roadway resurfacing (preservation, **PRES**) projects. Safety (**SAFE**) and miscellaneous (**MISC**) projects usually are low cost projects, being relatively simple jobs such as sign or guardrail installations, frequently spread out along many miles of highway. The regression analysis confirmed the ranking of work types from most to least expensive: **MOD**, **BR**, **PRES**, **SAFE**, and **MISC**, thus verifying second of the secondary hypotheses.

The coefficients for level of importance (LOI) for 1988 are, from highest to lowest, as follows: interstate (**INST**), 2122.631; statewide (**STWD**), 183.737; district (**DIST**), 1.000 (reference); and regional (**REG**), -332.370. The 1988 coefficients differed from the other four program results in that the other four had positive values for regional highways; the different (negative) value for the 1988 **REG** may have been due to fewer and less expensive projects on the regional highways. The coefficients for 1988 show that for each dollar of district (**DIST**) highway project spent, the cost for a project on interstate (**INST**) highways was \$2122 more, those on statewide highways \$183 more, and those on regional (**REG**) \$332 less. Values for the coefficients for the other programs reflected similar trends, with the 1988 **REG** being the unusual value. Aside from the aberrant value for 1988 noted above, the ranking of projects from most to least expensive by highway level of importance (LOI) is: interstate (**INST**); statewide (**STWD**); regional (**REG**); and district (**DIST**).

The project level multiple regression results on the project dataset confirmed earlier assumptions on two hypotheses, ranking of projects by work type and highway level of importance, while once again showing population as a significant variable. However, these same regressions, based upon the low R-squared values for all runs, failed to show

anything conclusive regarding the main hypothesis; therefore it became necessary to run additional analysis on the county dataset.

Revised County Dataset Multiple Regression Analysis

The final multiple regression analysis was performed on the county datasets. Going back to regressions on the county data was necessary due to the lack of any meaningful geographic correlations with the project dataset regressions. The new county regressions were performed using total cost (TOT\$\$) as the dependent variable, and a selection of independent variables likely to give useful geographic distribution results. The county datasets used some of the same variables as the project dataset, but more were different. Aggregate county data for projects included three LOI categories: primary, secondary and total; and only two work types: modernization and preservation. Combinations of these formed the remainder of the county dataset. Only the variables used in the final set of county regressions which have not been previously described will be explained.

Two regressions for each program year were run using a total of six independent variables in each regression. The two runs differed in the use of either VMT or POP as one of the independent variables, the others being AREA, DENSITY, POPGROW, TOTMI (the total mileage of both primary and secondary highway projects in a program year), and TOTMAX (the total mileage of all highways in a county). The POP runs providing slightly better R-squared values than the VMT runs, and also had greater T values. The POP regression results are summarized in Table VII.

TABLE VII

County Dataset Multiple Regression Results

Independent Variable	1978	1982	1986	1988	1992
R-squared	0.939	0.906	0.867	0.946	0.796
N	36	36	36	36	36
Constant	-13028.381	-20780.668	-16582.975	-13416.926	-6414.894
T	-1.427	-2.624	-1.860	-2.901	0.493
sig T	0.164	0.014	0.073	0.007	0.626
AREA	-1.222	-3.225	-5.773	-3.688	-2.691
T	-0.570	-1.636	-2.550	-3.312	-0.890
sig T	0.573	0.113	0.016	0.003	0.381
POP	-0.043	-0.152	-0.151	-0.097	0.306
T	-0.495	-2.108	-1.846	-2.349	2.955
sig T	0.625	0.044	0.075	0.026	0.006
DENSITY	368.917	257.668	260.787	218.613	38.596
T	8.973	6.992	6.382	10.441	0.754
sig T	0.000	0.000	0.000	0.000	0.457
POPGROW	-5040.743	-1249.970	-681.479	-973.521	2785.722
T	-1.768	-0.501	-0.242	-0.652	0.657
sig T	0.088	0.620	0.811	0.520	0.517
TOTMI	135.392	427.149	29.592	-1.463	56.432
T	0.966	2.639	0.391	-0.039	0.678
sig T	0.342	0.013	0.699	0.969	0.503
TOTMAX	92.843	168.679	235.995	182.778	133.472
T	1.320	2.722	3.184	5.279	1.414
sig T	0.197	0.011	0.004	0.000	0.168

NOTES: Dependent Variable = TOT\$\$

BOLD data are significant at the five percent level

T values for **POP** are significant in 1982, 1988 and 1992, while the T values for **AREA** are significant twice, in 1986 and 1988. However, the highest and most significant of all the independent variables is **DENSITY** (population divided by area); only in 1992 is it not significant. The data for 1992 is unusual in that the constant values of the **POP** and **POPGROW** variables changed from negative to positive; the 1992 data were examined in detail, but no blunders were uncovered. The overall regression results of this set of runs, in

terms of the R-squared values, was much better than any of the previous runs, either bivariate or multiple linear regression.

The highest absolute values are for the variable **DENSITY**, followed by **TOTMAX** and **TOTMI**. The regression results in Table VII show that , while not very significant in themselves at the project level, the variables **POP** and **AREA** (the two variables used to create the **DENSITY** variable) have the greatest positive influence on the cost of highway projects. A sample regression was run on the 1988 dataset, without **DENSITY**; the constants and T values for **AREA** and **POP** switched from negative to positive, but the R-squared value was lowered by over 0.100. Next in importance is the total highway mileage in a county, followed by the total mileage of proposed construction projects; for both these variables, the coefficients are positive, except the negative value for 1988 **TOTMI**. The combination of the high R-squared values and the significance of the geographic variables **DENSITY** and **TOTMAX** in the above regressions signify a meaningful and positive relationship between high expenditure planned highway projects, high concentrations of highway mileage and high concentrations of people.

It is the author's opinion that the results of the final set of county dataset regressions show enough geographic correlation to eliminate the theory of random distribution of highway projects throughout the state of Oregon, but instead show that the planned highway expenditures go where the people and the highways are. This is shown by the **DENSITY** and **TOTMAX** variables; these two variable consistently explain variation in planned expenditure by county. The importance of density declined however, from 1978 to 1988, while the importance of total highway mileage increased form 1978 to 1988. However the 1992 program, the first under ISTEA, these two variables fail; the funding appears to be allocated on a per capita basis under this program. This is reflected in the

coefficient of POP, which changed from a negative value of less than 0.1 to a positive value of over 0.3, showing an investment of over \$300 per person.

SUMMARY AND CONCLUSION OF ANALYSIS

Summary

A dataset was created from five ODOT highway construction program documents from 1978 to 1992; the dataset contained ten variables from the programs, county data from ODOT and other agencies, and many variables derived from the previous two groups of data. The original dataset was used to create two other, more detailed datasets: the county and project datasets. Both county and project datasets were organized by program year, and then submitted to statistical analysis.

Initial analysis of the county datasets by program, using simple graphical techniques, showed a steady increase in expenditure percentages for modernization projects from 1978 to 1988, with a corresponding steadily increasing expenditure rate for interstate highway work in the same period. The first change in these patterns occurred in 1986, when expenditures for interstate highway work began to fall; this was due to the beginning of increased state funding for statewide highways. The second pattern change was expenditures for preservation projects increasing in the 1992 program, due to a change in emphasis at the federal level due to ISTEA, from new construction to preservation of existing highway facilities.

Later analyses used project cost, either individual projects or summarized projects by county, as the dependent variable, with from one to a dozen independent variables. The first simple bivariate linear regression analysis on the county dataset was used as a 'screening process' to limit the number of variable to be evaluated in future analyses, and indicated multiple regression as the next step. The first county dataset multiple linear

regression analysis was performed on the 1988 program as a test; results indicated the need for multiple regression on the project dataset.

The next round of regression analysis was on the project dataset, and produced slightly better statistical results than the first regressions on the county dataset. The first project dataset analysis confirmed the two secondary hypotheses on highway project ranking. The ranking hypotheses were: 1.) that highway project work types can be ranked, from most to least expensive - as modernization, bridge, preservation, safety and miscellaneous; 2.) that highway project cost can be ranked from most to least expensive by what type of highway (level of importance) it is - interstate, statewide, regional, and district.

The final multiple regression was run once again on the county dataset. The results of this regression showed a high probability for greater highway project costs in counties with high population densities and high highway mileages, thus validating the primary thesis hypothesis.

Conclusion

Regression analysis of project and county datasets showed a high correlation between planned highway expenditures and counties with high population densities and large amounts of highway mileage, substantiating the primary hypothesis. Regression analysis also confirmed the project work type ranking hypothesis; the ranking from most to least expensive is: modernization, bridge, preservation, safety, and miscellaneous. The last hypothesis confirmed by the regression was which highways, by level of importance, received the most funding; the ranking, from most expenditures to least is: interstate, statewide, regional, and statewide.

Simple grouping and sorting of project data by county and program led to the following conclusions:

- 1.) Modernization work type project expenditures increased from 1978 to 1988.
- 2.) In 1992, preservation work type expenditures increased at the expense of modernization due to changed federal funding emphasis from modernization to preservation.
- 3.) Expenditures for interstate highways increased from 1978 to 1988.
- 4.) Beginning in 1986, expenditures for statewide highways began increasing at the expense of interstate funding, due to increased funding from Oregon to the Access Oregon Highway (AOH) program - all AOH facilities are statewide highways; by 1992, statewide highways were receiving more funding than interstate highways.

One problem with the analysis was that use of county population, area and density as proxies for highway demand misses the component of through traffic. Future research on the topic of statewide distribution of planned highway project expenditures might focus on the volume of traffic for the roadway associated with the project. Project specific is average daily traffic (ADT) volumes should yield better results. Project and traffic would have to be related by use of a Geographic Information System (GIS). This would require project level and milepoint limits to relate to ADT locations.

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APPENDIX A

COUNTY DATASET PRINTOUTS

1978 THROUGH 1992

Source: From varied sources; refer to main thesis text
for individual variable sources.

COUNTY	#	PriMi	SecMi	TotMi	Pri\$\$	Sec\$\$	Tot\$\$	PriMax	SecMax	TotMax	PriMod\$	SecMod\$	TotMod\$	PriPres\$	SecPres\$	TotPres\$	Area	Pop	PopSqr	Density	PopGrow	VMT
Baker	1	0.0	1.8	1.8	0	320	320	88.8	212.5	301.3	0	320	320	0	0	0	3089	16,050	257,602,500	5.20	-0.11	159,534
Benton	2	5.0	4.4	9.4	1200	2700	3900	19.4	99.7	119.1	0	2100	2100	1200	0	1200	679	66,900	4,475,610,000	98.53	0.64	164,377
Clackamas	3	18.5	30.9	49.4	10580	77065	87645	115.1	138.9	254.0	8000	70850	78850	1480	4080	5560	1879	233,100	54,335,610,000	124.06	1.88	782,108
Clatsop	4	36.7	14.1	50.8	12920	3033	15953	88.7	77.8	166.5	5620	0	5620	6550	1400	7950	873	31,400	985,960,000	35.97	0.39	194,124
Columbia	5	10.9	22.4	33.3	7570	3860	11430	51.2	41.9	93.1	5400	860	6260	2170	3000	5170	687	33,900	1,149,210,000	49.34	1.03	135,641
Coos	6	33.1	7.5	40.6	10570	4580	15150	96.2	72.6	168.7	3470	2100	5570	3400	280	3680	1629	62,950	3,962,702,500	38.64	-0.10	305,316
Crook	7	19.0	0.0	19.0	2800	0	2800	46.2	127.6	173.8	2800	0	2800	0	0	0	2991	12,350	152,522,500	4.13	1.53	52,715
Curry	8	7.1	0.0	7.1	2600	0	2600	77.1	5.6	82.7	2000	0	2000	600	0	600	1648	15,900	252,810,000	9.65	2.47	112,985
Deschutes	9	29.7	5.9	35.6	9600	925	10525	177.0	47.0	224.0	8300	750	9050	1000	0	1000	3055	53,950	2,910,602,500	17.66	3.79	281,626
Douglas	10	88.0	28.8	116.8	31410	5430	36840	197.1	141.0	338.1	22600	4060	26660	3200	1370	4570	5071	90,250	8,145,062,500	17.80	0.48	784,199
Gilliam	11	0.0	36.6	36.6	0	6250	6250	35.0	99.3	134.2	0	3100	3100	0	2860	2860	1223	2,150	4,622,500	1.76	-1.33	91,153
Grant	12	38.3	2.1	40.4	6400	1230	7630	172.1	61.7	233.8	4400	1150	5550	1720	0	1720	4528	7,875	62,015,625	1.74	0.11	61,966
Harney	13	13.0	10.9	23.9	2110	1980	4090	123.7	169.6	293.3	2110	1680	3790	0	300	300	10228	7,775	60,450,625	0.76	-0.76	72,286
Hood River	14	6.4	0.4	6.8	5120	1230	6350	64.3	25.3	89.6	4300	1000	5300	820	0	820	533	15,800	249,640,000	29.64	0.81	160,063
Jackson	15	6.6	11.4	18.0	1500	8050	9550	90.6	186.4	277.0	1500	6700	8200	0	600	600	2801	126,900	16,103,610,000	45.31	1.46	605,150
Jefferson	16	10.2	0.0	10.2	3320	0	3320	66.7	28.6	95.3	3320	0	3320	0	0	0	1791	11,150	124,322,500	6.23	2.21	107,377
Josephine	17	17.4	19.2	36.6	10210	1420	11630	73.6	62.4	136.0	2200	0	2200	410	670	1080	1641	56,250	3,164,062,500	34.28	1.16	306,026
Klamath	18	72.8	24.1	96.9	14710	10515	25225	211.9	172.9	384.8	4700	8355	13055	8050	1600	9650	6135	58,200	3,387,240,000	9.49	0.15	393,922
Lake	19	0.0	5.8	5.8	0	800	800	14.5	292.0	306.5	0	0	0	0	800	800	8359	6,975	48,650,625	0.83	0.38	61,566
Lane	20	59.0	9.7	68.7	19245	8014	27259	247.0	189.2	436.3	10700	7930	18630	7730	0	7730	4620	262,700	69,011,290,000	56.86	0.84	1,028,907
Lincoln	21	17.7	5.1	22.8	10960	1500	12460	101.5	71.9	173.4	6900	1000	7900	3060	0	3060	992	32,200	1,036,840,000	32.46	1.64	226,816
Linn	22	11.0	58.4	69.4	11350	11070	22420	90.0	157.6	247.7	5800	4400	10200	4900	5620	10520	2297	86,450	7,473,602,500	37.64	0.71	600,197
Malheur	23	75.6	31.9	107.5	12240	5250	17490	285.0	115.2	400.1	8000	2650	10650	4200	400	4600	9926	26,000	676,000,000	2.62	0.22	206,221
Marion	24	22.4	42.9	65.3	27170	9475	36645	99.8	107.6	207.4	21100	3560	24660	3300	2815	6115	1194	191,700	36,748,890,000	160.55	1.86	805,650
Morrow	25	0.0	25.8	25.8	0	3620	3620	27.9	148.8	176.7	0	2120	2120	0	1500	1500	2049	6,675	44,555,625	3.26	1.52	94,456
Multnomah	26	23.7	13.5	37.2	418330	22784	441114	96.1	99.8	195.9	280850	17100	297950	980	4960	5940	465	558,500	#####	1201.08	0.59	1,724,199
Polk	27	15.7	6.1	21.8	4790	1200	5990	40.8	80.6	121.4	4450	0	4450	340	1200	1540	745	44,300	1,962,490,000	59.46	1.40	216,177
Sherman	28	13.8	0.1	13.9	2500	210	2710	63.2	52.5	115.7	1000	0	1000	1500	0	1500	831	2,000	4,000,000	2.41	-0.71	65,625
Tillamook	29	10.8	21.8	32.6	13140	3100	16240	77.0	69.5	146.5	11850	1100	12950	930	1600	2530	1125	20,000	400,000,000	17.78	0.89	158,924
Umatilla	30	30.0	36.8	66.8	39840	9975	49815	174.7	213.9	388.6	37130	7500	44630	1900	1820	3720	3231	55,100	3,036,010,000	17.05	0.78	371,612
Union	31	9.7	0.0	9.7	2735	0	2735	74.2	121.2	195.4	2700	0	2700	0	0	0	2038	23,350	545,222,500	11.46	0.20	146,473
Wallowa	32	1.7	0.0	1.7	1420	0	1420	44.9	72.6	117.5	1200	0	1200	0	0	0	3153	7,000	49,000,000	2.22	0.15	34,937
Wasco	33	3.8	13.4	17.2	1200	3070	4270	59.1	153.6	212.6	0	2200	2200	1200	0	1200	2396	20,800	432,640,000	8.68	0.62	205,738
Washington	34	27.2	20.3	47.5	26710	5244	31954	63.6	109.4	172.9	21350	0	21350	4080	3870	7950	727	221,450	49,040,102,500	304.61	3.82	870,138
Wheeler	35	0.0	1.6	1.6	0	920	920	45.9	109.6	155.4	0	890	890	0	0	0	1713	2,000	4,000,000	1.17	-1.79	16,256
Yamhill	36	3.1	15.0	18.1	1110	2090	3200	32.8	115.4	148.2	0	0	0	1110	2090	3200	718	51,750	2,678,062,500	72.08	2.41	214,586

COUNTY	#	PnMi	SecMi	TotMi	Pn\$\$	Sec\$\$	Tot\$\$	PnMax	SecMax	TotMax	PnMod\$	SecMod\$	TotMod\$	PnPres\$	SecPres\$	TotPres\$	Area	Pop	PopSqr	Density	PopGrow	VMT
Baker	1	21.0	1.1	22.1	3460	855	4315	88.8	212.5	301.3	0	800	800	3460	0	3460	3089	16,250	264,062,500	5.26	-0.11	150,333
Benton	2	0.1	3.8	3.9	70	9390	9460	19.4	99.7	119.1	0	8260	8260	0	1010	1010	679	69,600	4,844,160,000	102.50	0.64	160,982
Clackamas	3	5.3	16.9	22.2	10450	24048	34498	115.1	138.9	254.0	10100	20530	30630	0	0	0	1879	245,100	60,074,010,000	130.44	1.88	826,377
Clatsop	4	3.2	0.0	3.2	5054	0	5054	88.7	77.8	166.5	2334	0	2334	0	0	0	873	32,700	1,069,290,000	37.46	0.39	193,022
Columbia	5	38.8	0.0	38.8	1354	0	1354	51.2	41.9	93.1	480	0	480	0	0	0	687	36,200	1,310,440,000	52.69	1.03	144,689
Coos	6	0.5	1.9	2.4	6520	12260	18780	96.2	72.6	168.7	450	390	840	0	0	0	1629	61,750	3,813,062,500	37.91	-0.10	289,796
Crook	7	0.0	0.0	0.0	0	0	0	46.2	127.6	173.8	0	0	0	0	0	0	2991	12,900	166,410,000	4.31	1.53	54,032
Curry	8	14.0	0.0	14.0	3245	0	3245	77.1	5.6	82.7	1720	0	1720	1445	0	1445	1648	17,200	295,840,000	10.44	2.47	109,852
Deschutes	9	12.7	0.0	12.7	8250	0	8250	177.0	47.0	224.0	6760	0	6760	0	0	0	3055	64,350	4,140,922,500	21.06	3.79	291,248
Douglas	10	25.7	2.9	28.6	26321	3140	29461	197.1	141.0	338.1	18009	2950	20959	5062	0	5062	5071	92,050	8,473,202,500	18.15	0.48	701,227
Gilliam	11	0.0	0.2	0.2	0	200	200	35.0	99.3	134.2	0	0	0	0	0	0	1223	1,950	3,802,500	1.59	-1.33	87,303
Grant	12	13.0	0.0	13.0	2590	0	2590	172.1	61.7	233.8	0	0	0	2590	0	2590	4528	7,970	63,520,900	1.76	0.11	58,135
Harney	13	10.5	0.0	10.5	5280	0	5280	123.7	169.6	293.3	5280	0	5280	0	0	0	10228	7,525	56,625,625	0.74	-0.76	69,356
Hood River	14	25.7	0.5	26.2	14330	26	14356	64.3	25.3	89.6	10700	0	10700	3500	0	3500	533	15,870	251,856,900	29.77	0.81	149,496
Jackson	15	18.9	14.3	33.2	6002	4875	10877	90.6	186.4	277.0	3700	4376	8076	1552	0	1552	2801	133,725	17,882,375,625	47.74	1.46	586,534
Jefferson	16	3.6	0.0	3.6	813	0	813	66.7	28.6	95.3	213	0	213	0	0	0	1791	12,225	149,450,625	6.83	2.21	108,612
Josephine	17	14.0	0.1	14.1	6462	7	6469	73.6	62.4	136.0	5152	0	5152	0	0	0	1641	59,000	3,481,000,000	35.95	1.16	302,210
Klamath	18	9.0	1.4	10.4	3430	7084	10514	211.9	172.9	384.8	3430	3480	6910	0	0	0	6135	59,200	3,504,640,000	9.65	0.15	350,685
Lake	19	0.0	0.0	0.0	0	0	0	14.5	292.0	306.5	0	0	0	0	0	0	8359	7,625	58,140,625	0.91	0.38	56,758
Lane	20	65.1	0.8	65.9	22866	2155	25021	247.0	189.2	436.3	16170	1800	17970	6123	0	6123	4620	270,650	73,251,422,500	58.58	0.84	999,713
Lincoln	21	73.8	0.0	73.8	7310	0	7310	101.5	71.9	173.4	6260	0	6260	0	0	0	992	36,800	1,339,560,000	36.90	1.64	238,976
Linn	22	10.0	7.8	17.8	4282	5414	9696	90.0	157.6	247.7	0	3944	3944	4147	850	4997	2297	88,850	7,894,322,500	38.68	0.71	585,412
Malheur	23	9.8	2.3	12.1	4280	6174	10454	285.0	115.2	400.1	4280	5730	10010	0	0	0	9926	27,175	738,480,625	2.74	0.22	201,339
Marion	24	4.9	13.7	18.6	37539	2480	40019	99.8	107.6	207.4	10010	860	10870	922	0	922	1194	207,350	42,994,022,500	173.66	1.86	819,307
Morrow	25	0.7	11.4	12.1	2500	3170	5670	27.9	148.8	176.7	2500	1540	4040	0	1630	1630	2049	7,260	52,707,600	3.54	1.52	91,352
Multnomah	26	95.0	24.2	119.2	267473	24532	292005	96.1	99.8	195.9	223864	17140	241004	7610	0	7610	465	564,500	#####	1213.98	0.59	1,732,274
Polk	27	4.8	10.1	14.9	214	1731	1945	40.8	80.6	121.4	210	1301	1511	0	0	0	745	45,050	2,029,502,500	60.47	1.40	212,621
Sherman	28	11.0	0.0	11.0	2940	0	2940	63.2	52.5	115.7	0	0	0	2940	0	2940	831	2,200	4,840,000	2.65	-0.71	66,919
Tillamook	29	3.1	17.2	20.3	12416	11380	23796	77.0	69.5	146.5	0	10730	10730	0	0	0	1125	21,150	447,322,500	18.80	0.89	161,077
Umatilla	30	42.0	20.9	62.9	96859	11822	108681	174.7	213.9	388.6	72010	9820	81830	2780	1551	4331	3231	60,000	3,600,000,000	18.57	0.78	357,288
Union	31	0.7	0.2	0.9	951	209	1160	74.2	121.2	195.4	951	0	951	0	0	0	2038	24,400	595,360,000	11.97	0.20	135,613
Wallowa	32	0.0	0.0	0.0	0	0	0	44.9	72.6	117.5	0	0	0	0	0	0	3153	7,400	54,760,000	2.35	0.15	31,112
Wasco	33	4.4	0.1	4.5	810	300	1110	59.1	153.6	212.6	440	0	440	320	0	320	2396	22,700	515,290,000	9.47	0.62	205,578
Washington	34	3.5	4.5	8.0	39787	2288	42075	63.6	109.4	172.9	38070	730	38800	0	0	0	727	259,700	67,444,090,000	357.22	3.82	966,329
Wheeler	35	0.0	0.0	0.0	0	0	0	45.9	109.6	155.4	0	0	0	0	0	0	1713	1,425	2,030,625	0.83	-1.79	18,504
Yamhill	36	1.1	0.1	1.2	1390	1800	3190	32.8	115.4	148.2	1060	0	1060	0	0	0	718	56,575	3,200,730,625	78.80	2.41	221,772

COUNTY	#	PriMi	SecMi	TotMi	Pri\$\$	Sec\$\$	Tot\$\$	PriMax	SecMax	TotMax	PriMod\$	SecMod\$	TotMod\$	PriPres\$	SecPres\$	TotPres\$	Area	Pop	PopSqr	Density	PopGrow	VMT
Baker	1	242.3	2.7	245.0	24790	2440	27230	88.8	212.5	301.3	23600	2160	25760	290	160	450	3089	15,500	240,250,000	5.02	-0.11	157,143
Benton	2	0.3	3.1	3.4	1410	17420	18830	19.4	99.7	119.1	1360	15070	16430	0	0	0	679	68,100	4,637,610,000	100.29	0.64	175,490
Clackamas	3	30.7	18.4	49.1	19250	11610	30860	115.1	138.9	254.0	15300	9070	24370	3000	0	3000	1879	248,200	61,603,240,000	132.09	1.88	1,088,380
Clatsop	4	9.7	1.3	11.0	10118	1310	11428	88.7	77.8	166.5	2038	350	2388	1200	0	1200	873	32,900	1,082,410,000	37.69	0.39	225,233
Columbia	5	3.2	0.1	3.3	8870	170	9040	51.2	41.9	93.1	8800	0	8800	0	0	0	687	36,100	1,303,210,000	52.55	1.03	172,265
Coos	6	3.9	4.6	8.5	5990	22030	28020	96.2	72.6	168.7	2610	4280	6890	900	0	900	1629	57,500	3,306,250,000	35.30	-0.10	303,962
Crook	7	7.5	0.1	7.6	2360	470	2830	46.2	127.6	173.8	0	0	0	2310	0	2310	2991	13,500	182,250,000	4.51	1.53	62,380
Curry	8	11.0	0.0	11.0	2290	0	2290	77.1	5.6	82.7	0	0	0	0	0	0	1648	16,900	285,610,000	10.25	2.47	119,039
Deschutes	9	33.1	0.1	33.2	17110	50	17160	177.0	47.0	224.0	16170	0	16170	860	0	860	3055	65,400	4,277,160,000	21.41	3.79	347,207
Douglas	10	8.5	3.0	11.5	13920	4610	18530	197.1	141.0	338.1	13620	4610	18230	0	0	0	5071	92,700	8,593,290,000	18.28	0.48	864,374
Gilliam	11	116.0	4.5	120.5	3540	752	4292	35.0	99.3	134.2	0	2940	2940	2940	0	2940	1223	1,800	3,240,000	1.47	-1.33	93,719
Grant	12	8.2	0.1	8.3	7160	310	7470	172.1	61.7	233.8	7000	0	7000	0	0	0	4528	8,350	69,722,500	1.84	0.11	61,403
Harney	13	0.0	7.9	7.9	0	1500	1500	123.7	169.6	293.3	0	0	0	0	1500	1500	10228	7,100	50,410,000	0.69	-0.76	62,306
Hood River	14	17.4	0.2	17.6	5010	600	5610	64.3	25.3	89.6	70	0	70	600	0	600	533	16,200	262,440,000	30.39	0.81	165,019
Jackson	15	48.5	18.4	66.9	45090	9240	54330	90.6	186.4	277.0	39710	8170	47880	2500	0	2500	2801	138,400	19,154,560,000	49.41	1.46	704,572
Jefferson	16	10.4	0.0	10.4	4594	0	4594	66.7	28.6	95.3	1024	0	1024	1870	0	1870	1791	12,000	144,000,000	6.70	2.21	116,618
Josephine	17	11.0	4.9	15.9	30050	810	30860	73.6	62.4	136.0	30000	210	30210	0	0	0	1641	61,450	3,776,102,500	37.45	1.16	363,882
Klamath	18	45.2	77.4	122.6	14210	3550	17760	211.9	172.9	384.8	7390	3200	10590	5580	0	5580	6135	56,700	3,214,890,000	9.24	0.15	370,570
Lake	19	9.6	13.4	23.0	2500	6350	8850	14.5	292.0	306.5	0	6350	6350	2500	0	2500	8359	7,300	53,290,000	0.87	0.38	58,934
Lane	20	86.0	12.6	98.6	30420	5195	35615	247.0	189.2	436.3	15820	5095	20915	9910	0	9910	4620	261,650	68,460,722,500	56.63	0.84	1,092,065
Lincoln	21	34.0	0.5	34.5	60301	2950	63251	101.5	71.9	173.4	9970	0	9970	1700	0	1700	992	36,900	1,361,610,000	37.20	1.64	279,634
Linn	22	16.9	17.9	34.8	24990	24100	49090	90.0	157.6	247.7	24020	22420	46440	0	1090	1090	2297	86,050	7,404,602,500	37.46	0.71	678,083
Malheur	23	15.1	2.3	17.4	6800	2060	8860	285.0	115.2	400.1	0	2000	2000	4500	0	4500	9926	26,200	686,440,000	2.64	0.22	205,264
Marion	24	0.8	7.2	8.0	8010	5070	13080	99.8	107.6	207.4	6120	4640	10760	0	430	430	1194	209,200	43,764,640,000	175.21	1.86	986,529
Morrow	25	0.1	0.0	0.1	170	0	170	27.9	148.8	176.7	0	0	0	0	0	0	2049	7,800	60,840,000	3.81	1.52	107,850
Multnomah	26	156.0	13.3	169.3	242270	30945	273215	96.1	99.8	195.9	187350	28995	216345	16090	0	16090	465	566,200	#####	1217.63	0.59	2,219,583
Polk	27	0.3	5.0	5.3	2160	2870	5030	40.8	80.6	121.4	0	790	790	0	1200	1200	745	45,600	2,079,360,000	61.21	1.40	245,852
Sherman	28	13.4	0.0	13.4	7370	0	7370	63.2	52.5	115.7	0	0	0	7350	0	7350	831	2,100	4,410,000	2.53	-0.71	76,176
Tillamook	29	3.3	1.2	4.5	4710	670	5380	77.0	69.5	146.5	13340	0	13340	0	0	0	1125	21,300	453,690,000	18.93	0.89	166,389
Umatilla	30	65.1	23.4	88.5	67820	15902	83722	174.7	213.9	388.6	65300	14082	79382	0	1800	1800	3231	58,700	3,445,690,000	18.17	0.78	384,384
Union	31	1.4	1.7	3.1	2990	315	3305	74.2	121.2	195.4	2430	315	2745	0	0	0	2038	23,000	529,000,000	11.29	0.20	157,859
Wallowa	32	1.7	0.0	1.7	2400	0	2400	44.9	72.6	117.5	2400	0	2400	0	0	0	3153	7,200	51,840,000	2.28	0.15	34,483
Wasco	33	4.3	4.3	8.6	1610	250	1860	59.1	153.6	212.6	1030	0	1030	480	0	480	2396	21,600	466,560,000	9.02	0.62	219,805
Washington	34	23.8	17.0	40.8	37310	13290	50600	63.6	109.4	172.9	34340	11970	46310	1680	0	1680	727	273,300	74,692,890,000	375.93	3.82	1,204,854
Wheeler	35	15.8	0.2	16.0	8190	880	9070	45.9	109.6	155.4	8000	0	8000	0	0	0	1713	1,500	2,250,000	0.88	-1.79	18,694
Yamhill	36	6.4	0.0	6.4	6600	0	6600	32.8	115.4	148.2	5800	0	5800	800	0	800	718	57,100	3,260,410,000	79.53	2.41	262,266

COUNTY	#	PriMi	SecMi	TotMi	Pri\$\$	Sec\$\$	Tot\$\$	PriMax	SecMax	TotMax	PriMod\$	SecMod\$	TotMod\$	PriPres\$	SecPres\$	TotPres\$	Area	Pop	PopSqr	Density	PopGrow	VMT	
Baker	1	20.5	0.1	20.6	24940	260	25200	88.8	212.5	301.3	24610	0	24610	330	0	330	3089	15,150	229,522,500	4.90	-0.11	178,124	
Benton	2	1.5	2.3	3.8	13000	5580	18580	19.4	99.7	119.1	13000	3780	16780	0	0	0	679	70,100	4,914,010,000	103.24	0.64	199,186	
Clackamas	3	31.3	18.9	50.2	16190	14250	30440	115.1	138.9	254.0	14370	11540	25910	1000	0	1000	1879	262,200	68,748,840,000	139.54	1.88	1,222,920	
Clatsop	4	10.3	0.1	10.4	5410	12200	17610	88.7	77.8	166.5	2740	0	2740	720	0	720	873	34,000	1,156,000,000	38.95	0.39	217,454	
Columbia	5	14.8	26.0	40.8	11430	170	11600	51.2	41.9	93.1	6000	0	6000	5430	0	5430	687	36,800	1,354,240,000	53.57	1.03	203,946	
Coos	6	5.4	1.5	6.9	11030	18810	29840	96.2	72.6	168.7	8640	0	8640	410	0	410	1629	58,800	3,457,440,000	36.10	-0.10	328,225	
Crook	7	10.8	0.0	10.8	2820	0	2820	46.2	127.6	173.8	2820	0	2820	0	0	0	2991	13,300	176,890,000	4.45	1.53	60,459	
Curry	8	3.0	0.0	3.0	5100	0	5100	77.1	5.6	82.7	3100	0	3100	0	0	0	1648	18,400	338,560,000	11.17	2.47	132,127	
Deschutes	9	22.8	0.0	22.8	25970	0	25970	177.0	47.0	224.0	25970	0	25970	0	0	0	3055	68,700	4,719,690,000	22.49	3.79	379,110	
Douglas	10	16.8	9.4	26.2	21940	7910	29850	197.1	141.0	338.1	21660	7910	29570	0	0	0	5071	93,000	8,649,000,000	18.34	0.48	920,782	
Gilliam	11	116.0	4.5	120.5	2740	1110	3850	35.0	99.3	134.2	0	1100	1100	2140	0	2140	1223	1,850	3,422,500	1.51	-1.33	101,387	
Grant	12	20.8	0.0	20.8	7790	0	7790	172.1	61.7	233.8	7550	0	7550	130	0	130	4528	8,350	69,722,500	1.84	0.11	63,085	
Harney	13	5.8	15.3	21.1	3750	4440	8190	123.7	169.6	293.3	3750	3800	7550	0	640	640	10228	7,400	54,760,000	0.72	-0.76	75,612	
Hood River	14	0.5	0.0	0.5	1540	0	1540	64.3	25.3	89.6	0	0	0	0	0	0	533	16,500	272,250,000	30.96	0.81	184,836	
Jackson	15	21.1	8.4	29.5	17550	6630	24180	90.6	186.4	277.0	14530	6140	20670	2500	0	2500	2801	143,400	20,563,560,000	51.20	1.46	768,151	
Jefferson	16	2.1	0.0	2.1	2061	0	2061	66.7	28.6	95.3	1771	0	1771	0	0	0	1791	11,900	141,610,000	6.64	2.21	126,774	
Josephine	17	12.8	3.9	16.7	20500	200	20700	73.6	62.4	136.0	20500	200	20700	0	0	0	1641	64,000	4,096,000,000	39.00	1.16	392,010	
Klamath	18	42.4	84.7	127.1	26600	7740	34340	211.9	172.9	384.8	19240	7310	26550	5640	0	5640	6135	57,300	3,283,290,000	9.34	0.15	418,422	
Lake	19	0.0	1.3	1.3	0	750	750	14.5	292.0	306.5	0	750	750	0	0	0	8359	7,300	53,290,000	0.87	0.38	64,020	
Lane	20	33.3	11.3	44.6	26690	5080	31770	247.0	189.2	436.3	21350	5000	26350	0	0	0	4620	273,700	74,911,690,000	59.24	0.84	1,206,852	
Lincoln	21	12.9	0.5	13.4	13860	2250	16110	101.5	71.9	173.4	6420	0	6420	420	0	420	992	38,800	1,505,440,000	39.11	1.64	315,271	
Linn	22	7.4	9.8	17.2	22210	9320	31530	90.0	157.6	247.7	21420	9200	30620	0	0	0	2297	88,800	7,885,440,000	38.66	0.71	765,519	
Malheur	23	37.9	2.3	40.2	8900	3250	12150	285.0	115.2	400.1	4600	0	4600	3250	0	3250	9926	26,400	696,960,000	2.66	0.22	229,622	
Marion	24	17.5	15.1	32.6	15290	8590	23880	99.8	107.6	207.4	13850	8590	22440	0	0	0	1194	219,000	47,961,000,000	183.42	1.86	1,086,923	
Morrow	25	218.7	0.0	218.7	1110	0	1110	27.9	148.8	176.7	0	0	0	0	0	0	2049	7,800	60,840,000	3.81	1.52	113,884	
Multnomah	26	162.1	13.2	175.3	202390	35660	238050	96.1	99.8	195.9	166270	34310	200580	23970	0	23970	465	570,500	#####	#####	0.59	2.467	458
Polk	27	8.0	0.1	8.1	5810	770	6580	40.8	80.6	121.4	3610	0	3610	2200	0	2200	745	47,300	2,237,290,000	63.49	1.40	280,388	
Sherman	28	13.4	0.0	13.4	7370	0	7370	63.2	52.5	115.7	0	0	0	7370	0	7370	831	2,000	4,000,000	2.41	-0.71	78,998	
Tillamook	29	5.2	1.1	6.3	5410	420	5830	77.0	69.5	146.5	2390	0	2390	0	0	0	1125	21,400	457,960,000	19.02	0.89	192,635	
Umatilla	30	49.8	45.5	95.3	37270	21800	59070	174.7	213.9	388.6	34600	21780	56380	0	0	0	3231	57,600	3,317,760,000	17.83	0.78	408,587	
Union	31	18.9	1.0	19.9	3990	110	4100	74.2	121.2	195.4	3430	0	3430	0	0	0	2038	23,300	542,890,000	11.43	0.20	168,188	
Wallowa	32	5.1	11.6	16.7	400	4080	4480	44.9	72.6	117.5	0	4080	4080	400	0	400	3153	7,200	51,840,000	2.28	0.15	37,505	
Wasco	33	5.5	4.3	9.8	4900	250	5150	59.1	153.6	212.6	4900	0	4900	0	0	0	2396	20,600	424,360,000	8.60	0.62	246,586	
Washington	34	23.7	18.5	42.2	46310	12130	58440	63.6	109.4	172.9	39850	7550	47400	4750	2580	7330	727	287,000	82,369,000,000	394.77	3.82	1,371,410	
Wheeler	35	13.7	0.2	13.9	8850	400	9250	45.9	109.6	155.4	0	0	0	0	0	0	1713	1,350	1,822,500	0.79	-1.79	18,740	
Yamhill	36	8.2	0.0	8.2	10400	0	10400	32.8	115.4	148.2	10400	0	10400	0	0	0	718	59,800	3,576,040,000	83.29	2.41	282,653	

COUNTY	#	PriMi	SecMi	TotMi	Pri\$\$	Sec\$\$	Tot\$\$	PriMax	SecMax	TotMax	PriMod\$	SecMod\$	TotMod\$	PriPres\$	SecPres\$	TotPres\$	Area	Pop	PopSqr	Density	PopGrow	VMT
Baker	1	4.0	41.0	45.0	7530	9570	17100	88.8	212.5	301.3	24610	0	24610	330	0	330	3089	15,800	249640000	5.11	-0.11	227,321
Benton	2	9.9	2.0	11.9	17640	8430	26070	19.4	99.7	119.1	13000	3780	16780	0	0	0	679	72,900	5314410000	107.36	0.64	222,389
Clackamas	3	22.9	37.2	60.1	26400	21550	47950	115.1	138.9	254.0	14370	11540	25910	1000	0	1000	1879	294,500	86730250000	156.73	1.88	1,410,584
Clatsop	4	44.5	3.6	48.1	73880	530	74410	88.7	77.8	166.5	2740	0	2740	720	0	720	873	33,100	1095610000	37.92	0.39	269,382
Columbia	5	13.8	1.5	15.3	43170	2190	45360	51.2	41.9	93.1	6000	0	6000	5430	0	5430	687	38,800	1505440000	56.48	1.03	199,007
Coos	6	23.3	1.3	24.6	36460	3430	39890	96.2	72.6	168.7	8640	0	8640	410	0	410	1629	62,100	3856410000	38.12	-0.10	375,186
Crook	7	0.1	0.0	0.1	1410	0	1410	46.2	127.6	173.8	2820	0	2820	0	0	0	2991	15,000	225000000	5.02	1.53	85,780
Curry	8	8.6	0.0	8.6	15850	0	15850	77.1	5.6	82.7	3100	0	3100	0	0	0	1648	21,400	457960000	12.99	2.47	140,289
Deschutes	9	31.5	0.0	31.5	61520	0	61520	177.0	47.0	224.0	25970	0	25970	0	0	0	3055	82,600	6822760000	27.04	3.79	488,569
Douglas	10	31.9	30.0	61.9	95870	25140	121010	197.1	141.0	338.1	21660	7910	29570	0	0	0	5071	96,300	9273690000	18.99	0.48	990,350
Gilliam	11	0.0	6.2	6.2	0	5540	5540	35.0	99.3	134.2	0	1100	1100	2140	0	2140	1223	1,750	3062500	1.43	-1.33	130,912
Grant	12	332.1	0.1	332.2	29310	530	29840	172.1	61.7	233.8	7550	0	7550	130	0	130	4528	8,000	64000000	1.77	0.11	68,475
Harney	13	69.9	0.0	69.9	8390	0	8390	123.7	169.6	293.3	3750	3800	7550	0	640	640	10228	6,950	48302500	0.68	-0.76	83,380
Hood River	14	3.8	0.1	3.9	13460	480	13940	64.3	25.3	89.6	0	0	0	0	0	0	533	17,600	309760000	33.02	0.81	228,879
Jackson	15	44.2	9.5	53.7	91430	22440	113870	90.6	186.4	277.0	14530	6140	20670	2500	0	2500	2801	152,900	23378410000	54.59	1.46	834,332
Jefferson	16	40.9	0.0	40.9	20890	0	20890	66.7	28.6	95.3	1771	0	1771	0	0	0	1791	14,600	213160000	8.15	2.21	147,740
Josephine	17	29.5	3.6	33.1	14440	7380	21820	73.6	62.4	136.0	20500	200	20700	0	0	0	1641	65,400	4277160000	39.85	1.16	419,092
Klamath	18	30.2	40.8	71.0	39910	7360	47270	211.9	172.9	384.8	19240	7310	26550	5640	0	5640	6135	59,400	3528360000	9.68	0.15	456,110
Lake	19	0.0	10.8	10.8	0	7430	7430	14.5	292.0	306.5	0	750	750	0	0	0	8359	7,350	54022500	0.88	0.38	79,081
Lane	20	55.0	13.8	68.8	110260	46900	157160	247.0	189.2	436.3	21350	5000	26350	0	0	0	4620	293,700	86259690000	63.57	0.84	1,308,984
Lincoln	21	10.7	6.7	17.4	24320	1790	26110	101.5	71.9	173.4	6420	0	6420	420	0	420	992	39,600	1568160000	39.92	1.64	327,941
Linn	22	20.6	27.3	47.9	19260	18560	37820	90.0	157.6	247.7	21420	9200	30620	0	0	0	2297	95,000	9025000000	41.36	0.71	852,050
Malheur	23	101.1	0.0	101.1	23150	0	23150	285.0	115.2	400.1	4600	0	4600	3250	0	3250	9926	26,800	718240000	2.70	0.22	274,466
Marion	24	46.0	7.4	53.4	114090	5620	119710	99.8	107.6	207.4	13850	8590	22440	0	0	0	1194	241,500	58322250000	202.26	1.86	1,220,420
Morrow	25	0.0	0.1	0.1	0	360	360	27.9	148.8	176.7	0	0	0	0	0	0	2049	8,100	65610000	3.95	1.52	131,692
Multnomah	26	103.9	6.3	110.2	249390	6780	256170	96.1	99.8	195.9	166270	34310	200580	23970	0	23970	465	605,000	3.66025E+11	1301.08	0.59	2,725,186
Polk	27	17.0	18.5	35.5	13730	11160	24890	40.8	80.6	121.4	3610	0	3610	2200	0	2200	745	53,000	2809000000	71.14	1.40	318,276
Sherman	28	0.0	0.0	0.0	0	0	0	63.2	52.5	115.7	0	0	0	7370	0	7370	831	1,800	3240000	2.17	-0.71	95,044
Tillamook	29	15.4	7.0	22.4	6680	4550	11230	77.0	69.5	146.5	2390	0	2390	0	0	0	1125	22,500	506250000	20.00	0.89	215,899
Umatilla	30	149.3	12.3	161.6	38600	5010	43610	174.7	213.9	388.6	34600	21780	56380	0	0	0	3231	61,100	3733210000	18.91	0.78	493,251
Union	31	28.3	2.9	31.2	34180	3710	37890	74.2	121.2	195.4	3430	0	3430	0	0	0	2038	24,000	576000000	11.78	0.20	217,382
Wallowa	32	6.9	0.1	7.0	8320	640	8960	44.9	72.6	117.5	0	4080	4080	400	0	400	3153	7,150	51122500	2.27	0.15	46,371
Wasco	33	47.7	9.7	57.4	45290	1060	46350	59.1	153.6	212.6	4900	0	4900	0	0	0	2396	22,600	510760000	9.43	0.62	278,641
Washington	34	80.2	22.3	102.5	153370	33240	186610	63.6	109.4	172.9	39850	7550	47400	4750	2580	7330	727	340,000	1.156E+11	467.68	3.82	1,458,210
Wheeler	35	1.8	19.1	20.9	1190	2320	3510	45.9	109.6	155.4	0	0	0	0	0	0	1713	1,500	2250000	0.88	-1.79	20,849
Yamhill	36	7.5	18.6	26.1	10540	7550	18090	32.8	115.4	148.2	10400	0	10400	0	0	0	718	69,200	4788640000	96.38	2.41	321,865

APPENDIX B

SAMPLE PROJECT DATASET, 1988

Source: From varied sources; refer to main thesis text
for individual variable sources.

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	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	AB	AC	AD	AE	AF	AG	AH	AI	AJ	AK	AL	AM	
1	ID	G	CO	LU	HWY	LOI	MI	FY	COST	WK	BR	MO	RE	SAF	MIS	DIST	INST	REG	TW	R1	R2	R3	R4	R5	AREA	POP	VTM	HWY MI	DENSITY	VTM/MI	VTM/Cap	PopGr	BrMi	ModMi	PresMi	SafeMi	MiscMi	DnstSqr	PopSqr	
74	D31	3	10	U	OR99	D	0.3	1989	870	M	0	1	0	0	0	1	0	0	0	0	0	0	1	0	0	5071	93000	920782	348.1	18.34	2645089	9901	0.48	0	0.3	0	0	0	336	8649000000
75	D32	3	10	R	OR138	D	0.4	1989	440	M	0	1	0	0	0	1	0	0	0	0	0	0	1	0	0	5071	93000	920782	348.1	18.34	2645089	9901	0.48	0	0.4	0	0	0	336	8649000000
76	D33	3	10	R	US101	S	2.0	1990	200	M	0	1	0	0	0	0	0	0	0	1	0	0	1	0	0	5071	93000	920782	348.1	18.34	2645089	9901	0.48	0	2	0	0	0	336	8649000000
77	D33	3	10	R	OR38	S	1.1	1990	1320	M	0	1	0	0	0	0	0	0	0	1	0	0	1	0	0	5071	93000	920782	348.1	18.34	2645089	9901	0.48	0	1.1	0	0	0	336	8649000000
78	D33	3	10	R	OR38	S	2.1	1990	2110	M	0	1	0	0	0	0	0	0	0	1	0	0	1	0	0	5071	93000	920782	348.1	18.34	2645089	9901	0.48	0	2.1	0	0	0	336	8649000000
79	D33	3	10	R	OR42	S	2.8	1990	4500	M	0	1	0	0	0	0	0	0	0	1	0	0	1	0	0	5071	93000	920782	348.1	18.34	2645089	9901	0.48	0	2.8	0	0	0	336	8649000000
80	D33	3	10	R	OR42	S	0.3	1990	560	M	0	1	0	0	0	0	0	0	0	1	0	0	1	0	0	5071	93000	920782	348.1	18.34	2645089	9901	0.48	0	0.3	0	0	0	336	8649000000
81	D33	3	10	R	OR42	S	0.8	1990	330	M	0	1	0	0	0	0	0	0	0	1	0	0	1	0	0	5071	93000	920782	348.1	18.34	2645089	9901	0.48	0	0.8	0	0	0	336	8649000000
82	D34	3	10	R	OR42	S	2.8	1991	5880	M	0	1	0	0	0	0	0	0	0	1	0	0	1	0	0	5071	93000	920782	348.1	18.34	2645089	9901	0.48	0	6.5	0	0	0	336	8649000000
83	D35	3	10	R	OR138	D	6.5	1991	2000	M	0	1	0	0	0	1	0	0	0	0	0	0	1	0	0	5071	93000	920782	348.1	18.34	2645089	9901	0.48	0	1.3	0	0	0	336	8649000000
84	D36	3	10	U	OR99	D	1.3	1992	3700	M	0	1	0	0	0	1	0	0	0	0	0	0	1	0	0	5071	93000	920782	348.1	18.34	2645089	9901	0.48	0	2	0	0	0	336	8649000000
85	D36	3	10	R	IS	I	2.0	1994	5300	M	0	1	0	0	0	0	1	0	0	0	0	0	1	0	0	5071	93000	920782	348.1	18.34	2645089	9901	0.48	0	2	0	0	0	336	8649000000
86	D35	3	10	R	IS	I	0.5	1994	130	X	0	0	0	0	0	1	0	1	0	0	0	0	1	0	0	5071	93000	920782	348.1	18.34	2645089	9901	0.48	0	0	0	0	0.5	336	8649000000
87	D41	4	11	R		D	4.5	1989	1100	M	0	1	0	0	0	1	0	0	0	0	0	0	1	0	0	1223	1850	101387	145.2	1.51	698258	54804	-1.33	0	4.5	0	0	0	2	3422500
88	D40	4	11	R	IS	I	21.2	1989	2140	P	0	0	1	0	0	0	1	0	0	0	0	0	1	0	0	1223	1850	101387	145.2	1.51	698258	54804	-1.33	0	0	21.2	0	0	2	3422500
89	D42	4	11	R	IS	I	94.8	1991	600	S	0	0	0	1	0	0	1	0	0	0	0	0	1	0	0	1223	1850	101387	145.2	1.51	698258	54804	-1.33	0	0	0	94.8	0	2	3422500
90	D51	5	12	R	US26	S	3.8	1990	150	M	0	1	0	0	0	0	0	0	0	1	0	0	0	0	1	4528	8350	63085	245.8	1.84	256662	7555	0.11	0	3.8	0	0	0	3	89722500
91	D52	5	12	R	US395	S	6.3	1990	7000	M	0	1	0	0	0	0	0	0	0	1	0	0	0	0	1	4528	8350	63085	245.8	1.84	256662	7555	0.11	0	6.3	0	0	0	3	89722500
92	D52	5	12	U	US26	S	0.3	1991	250	M	0	1	0	0	0	0	0	0	0	1	0	0	0	0	1	4528	8350	63085	245.8	1.84	256662	7555	0.11	0	0.3	0	0	0	3	89722500
93	D52	5	12	R	US26	S	3.9	1991	150	M	0	1	0	0	0	0	0	0	0	1	0	0	0	0	1	4528	8350	63085	245.8	1.84	256662	7555	0.11	0	3.9	0	0	0	3	89722500
94	D50	5	12	R	US26	S	1.8	1989	130	P	0	0	0	1	0	0	0	0	0	1	0	0	0	0	1	4528	8350	63085	245.8	1.84	256662	7555	0.11	0	0	1.8	0	0	3	89722500
95	D53	5	12	R	US26	S	4.7	1994	110	S	0	0	0	0	1	0	0	0	0	1	0	0	0	0	1	4528	8350	63085	245.8	1.84	256662	7555	0.11	0	0	0	4.7	0	3	89722500
96	D50	5	13	R	US20	S	5.8	1989	3750	M	0	1	0	0	0	0	0	0	0	1	0	0	0	0	1	10228	7400	75612	306.3	0.72	248872	10218	-0.76	0	5.8	0	0	0	1	5476000
97	D50	5	13	R	OR78	R	8.4	1989	3800	M	0	1	0	0	0	0	1	0	0	0	1	0	0	0	1	10228	7400	75612	306.3	0.72	248872	10218	-0.76	0	8.4	0	0	0	1	5476000
98	D50	5	13	R	OR205	D	6.9	1989	640	P	0	0	1	0	0	1	0	0	0	0	0	0	0	0	1	10228	7400	75612	306.3	0.72	248872	10218	-0.76	0	0	6.9	0	0	1	5476000
99	D06	1	14	R	IS	I	0.5	1991	1540	S	0	0	0	1	0	0	1	0	0	1	0	0	1	0	0	2801	143400	768151	292.0	51.20	2630294	5357	1.46	0	0.5	0	0	0	2621	20563560000
100	D30	3	15	R	IS	I	0.5	1989	2630	M	0	1	0	0	0	0	1	0	0	0	1	0	0	0	1	2801	143400	768151	292.0	51.20	2630294	5357	1.46	0	0	0	0	0	2621	20563560000
101	D34	3	15	U	OR99	D	0.8	1990	180	M	0	1	0	0	0	0	1	0	0	0	1	0	0	0	1	2801	143400	768151	292.0	51.20	2630294	5357	1.46	0	0	0	0	0	2621	20563560000
102	D34	3	15	R	OR62	R	4.6	1991	3340	M	0	1	0	0	0	0	0	0	0	1	0	0	0	1	0	2801	143400	768151	292.0	51.20	2630294	5357	1.46	0	4.6	0	0	0	2621	20563560000
103	D36	3	15	U	IS	I	6.8	1993	11900	M	0	1	0	0	0	0	0	0	0	1	0	0	0	1	0	2801	143400	768151	292.0	51.20	2630294	5357	1.46	0	6.8	0	0	0	2621	20563560000
104	D36	3	15	R	OR62	R	2.5	1993	2620	M	0	1	0	0	0	0	0	0	0	1	0	0	0	1	0	2801	143400	768151	292.0	51.20	2630294	5357	1.46	0	2.5	0	0	0	2621	20563560000
105	D32	3	15	R	IS	I	9.2	1990	2500	P	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	2801	143400	768151	292.0	51.20	2630294	5357	1.46	0	0	9.2	0	0	2621	20563560000
106	D34	3	15	R	OR62	R	0.5	1991	350	S	0	0	0	0	1	0	0	0	1	0	0	0	1	0	0	2801	143400	768151	292.0	51.20	2630294	5357	1.46	0	0	0	0.5	0	2621	20563560000
107	D36	3	15	U	OR99	D	0.0	1992	140	S	0	0	0	1	0	1	0	0	0	0	0	0	1	0	0	2801	143400	768151	292.0	51.20	2630294	5357	1.46	0	0	0	0	0	2621	20563560000
108	D30	3	15	R	IS	I	0.0	1989	40	X	0	0	0	0	0	1	0	1	0	0	0	0	1	0	0	2801	143400	768151	292.0	51.20	2630294	5357	1.46	0	0	0	0	0	2621	20563560000
109	D32	3	15	R	IS	I	0.0	1990	390	X	0	0	0	0	0	1	0	1	0	0	0	0	1	0	0	2801	143400	768151	292.0	51.20	2630294	5357	1.46	0	0	0	0	0	2621	20563560000
110	D32	3	15	R	IS	I	0.0	1990	30	X	0	0	0	0	0	1	0	1	0	0	0	0	1	0	0	2801	143400	768151	292.0	51.20	2630294	5357	1.46	0	0	0	0	0	2621	20563560000
111	D43	4	15	R	OR140	S	4.6	1994	100	S	0	0	0	0	1	0	0	0	0	1	0	0	0	1	0	2801	143400	768151	292.0	51.20	2630294	5357	1.46	0	0	0	4.6	0	2621	20563560000
112	D41	4	16	R	US26	S	1.5	1990	1771	M	0	1	0	0	0	0	0	0	0	1	0	0	0	1	0	1791	11900	126774	111.3	6.64	1138620	10653	2.21	0	1.5	0	0	0	44	141810000
113	D40	4																																						

1	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	AB	AC	AD	AE	AF	AG	AH	AI	AJ	AK	AL	AM	
ID	CO	LU	HWY	LOI	MI	FY	COST	WK	BR	MO	RE	SAF	MIS	DIST	INST	REG	TW	R1	R2	R3	R4	R5	AREA	POP	VTM	HWY MI	DENSITY	VTM/MI	VTM/Cap	PopGr	BrMi	ModMi	PresMi	SafeMi	MiscMi	DnstGr	PopGr			
146	D34	3	20	R	OR126	S	0.4	1990	560	M	0	1	0	0	0	0	0	1	0	0	1	0	0	4620	273700	1206852	456.3	59.24	2644981	4409	0.84	0	0.4	0	0	0	3510	749116900000		
147	D35	3	20	U	OR126	S	3.1	1991	9120	M	0	1	0	0	0	0	0	1	0	0	1	0	0	4620	273700	1206852	456.3	59.24	2644981	4409	0.84	0	3.1	0	0	0	3510	749116900000		
148	D35	3	20	R	OR58	S	1.0	1992	430	M	0	1	0	0	0	0	0	1	0	0	1	0	0	4620	273700	1206852	456.3	59.24	2644981	4409	0.84	0	1	0	0	0	3510	749116900000		
149	D36	3	20	R	OR126	S	13.0	1992	1200	M	0	1	0	0	0	0	0	1	0	0	1	0	0	4620	273700	1206852	456.3	59.24	2644981	4409	0.84	0	13	0	0	0	3510	749116900000		
150	D30	3	20	R	I5	I	0.0	1989	110	S	0	0	0	1	0	0	1	0	0	0	1	0	0	4620	273700	1206852	456.3	59.24	2644981	4409	0.84	0	0	0	0	0	3510	749116900000		
151	D35	3	20	R	OR58	S	0.0	1992	150	S	0	0	0	0	1	0	0	1	0	0	0	1	0	0	4620	273700	1206852	456.3	59.24	2644981	4409	0.84	0	0	0	0	0	3510	749116900000	
152	D35	3	20	R	OR58	S	5.1	1992	560	S	0	0	0	1	0	0	0	1	0	0	0	1	0	0	4620	273700	1206852	456.3	59.24	2644981	4409	0.84	0	0	0	0	0	3510	749116900000	
153	D36	3	20	R	OR98	D	9.9	1992	80	S	0	0	0	1	0	0	0	1	0	0	0	1	0	0	4620	273700	1206852	456.3	59.24	2644981	4409	0.84	0	0	0	0	0	3510	749116900000	
154	D36	3	20	R	OR126	S	0.1	1993	450	S	0	0	0	1	0	0	0	1	0	0	1	0	0	4620	273700	1206852	456.3	59.24	2644981	4409	0.84	0	0	0	0	0	3510	749116900000		
155	D20	2	21	R	US20	S	2.1	1989	280	B	1	0	0	0	0	0	0	1	0	1	0	0	0	992	38800	315271	194.4	39.11	1621848	8126	1.64	0.5	0	0	0	0	1530	15054400000		
156	D22	2	21	R	OR229	D	0.5	1989	2250	B	1	0	0	0	0	0	1	0	0	0	1	0	0	992	38800	315271	194.4	39.11	1621848	8126	1.64	0.6	0	0	0	0	1530	15054400000		
157	D25	2	21	U	US101	S	0.6	1991	5360	B	1	0	0	0	0	0	0	1	0	1	0	0	0	992	38800	315271	194.4	39.11	1621848	8126	1.64	1.8	0	0	0	0	1530	15054400000		
158	D21	2	21	R	OR18	S	1.8	1989	2960	M	0	1	0	0	0	0	0	1	0	1	0	0	0	992	38800	315271	194.4	39.11	1621848	8126	1.64	0	1.8	0	0	0	1530	15054400000		
159	D23	2	21	R	US101	S	1.9	1990	3460	M	0	1	0	0	0	0	0	1	0	1	0	0	0	992	38800	315271	194.4	39.11	1621848	8126	1.64	0	1.9	0	0	0	1530	15054400000		
160	D23	2	21	R	OR18	S	0.0	1990	420	P	0	0	0	1	0	0	0	0	1	0	1	0	0	992	38800	315271	194.4	39.11	1621848	8126	1.64	0	0	0	0	0	1530	15054400000		
161	D21	2	21	R	OR18	S	0.5	1989	250	S	0	0	0	1	0	0	0	1	0	1	0	0	0	992	38800	315271	194.4	39.11	1621848	8126	1.64	0	0	0	0.5	0	1530	15054400000		
162	D25	2	21	R	US101	S	0.0	1991	110	S	0	0	0	1	0	0	0	0	1	0	1	0	0	0	992	38800	315271	194.4	39.11	1621848	8126	1.64	0	0	0	0	0	1530	15054400000	
163	D26	2	21	R	US101	S	6.0	1994	280	S	0	0	0	1	0	0	0	0	1	0	1	0	0	0	992	38800	315271	194.4	39.11	1621848	8126	1.64	0	0	0	0	0	1530	15054400000	
164	D20	2	21	R	US101	S	0.0	1989	500	X	0	0	0	0	1	0	0	0	1	0	1	0	0	0	992	38800	315271	194.4	39.11	1621848	8126	1.64	0	0	0	0	0	1530	15054400000	
165	D20	2	21	R	US101	S	0.0	1989	240	X	0	0	0	0	1	0	0	0	1	0	1	0	0	0	992	38800	315271	194.4	39.11	1621848	8126	1.64	0	0	0	0	0	1530	15054400000	
166	D20	2	21	R	US101	S	0.0	1989	1200	M	0	1	0	0	0	0	0	0	1	0	0	1	0	0	2297	88800	765519	269.7	38.66	2838725	8621	0.71	0	0.2	0	0	0	1495	78854400000	
167	D22	2	22	R	US20	R	0.2	1989	3200	M	0	1	0	0	0	0	0	0	1	0	0	1	0	0	2297	88800	765519	269.7	38.66	2838725	8621	0.71	0	4.4	0	0	0	1495	78854400000	
168	D22	2	22	R	US20	R	1.2	1990	1200	M	0	1	0	0	0	0	0	0	1	0	0	1	0	0	2297	88800	765519	269.7	38.66	2838725	8621	0.71	0	1.2	0	0	0	1495	78854400000	
169	D23	2	22	R	OR22	S	1.7	1990	3000	M	0	1	0	0	0	0	0	0	1	0	1	0	0	0	2297	88800	765519	269.7	38.66	2838725	8621	0.71	0	1.7	0	0	0	1495	78854400000	
170	D23	2	22	R	OR34	S	3.7	1990	16000	M	0	1	0	0	0	0	0	0	1	0	1	0	0	0	2297	88800	765519	269.7	38.66	2838725	8621	0.71	0	3.7	0	0	0	1495	78854400000	
171	D24	2	22	R	US20	S	1.6	1991	1420	M	0	1	0	0	0	0	0	0	1	0	1	0	0	0	2297	88800	765519	269.7	38.66	2838725	8621	0.71	0	1.6	0	0	0	1495	78854400000	
172	D26	2	22	U	I5	I	0.3	1992	1000	M	0	1	0	0	0	0	1	0	0	0	1	0	0	0	2297	88800	765519	269.7	38.66	2838725	8621	0.71	0	0.3	0	0	0	1495	78854400000	
173	D26	2	22	R	OR228	D	4.0	1994	3600	M	0	1	0	0	0	1	0	0	0	0	1	0	0	0	2297	88800	765519	269.7	38.66	2838725	8621	0.71	0	4	0	0	0	1495	78854400000	
174	D21	2	22	R	OR126	S	0.1	1989	410	S	0	0	0	1	0	0	0	0	1	0	1	0	0	0	2297	88800	765519	269.7	38.66	2838725	8621	0.71	0	0	0	0.1	0	1495	78854400000	
175	D23	2	22	R	OR34	R	0.0	1990	120	S	0	0	0	1	0	0	0	0	1	0	0	1	0	0	0	2297	88800	765519	269.7	38.66	2838725	8621	0.71	0	0	0	0	0	1495	78854400000
176	D32	3	22	R	I5	I	0.0	1990	380	X	0	0	0	0	1	0	0	0	1	0	0	0	0	0	9926	26400	229622	423.1	2.66	542713	8698	0.22	0	9.4	0	0	0	7	6969800000	
177	D52	5	23	R	US26	S	9.4	1990	4600	M	0	1	0	0	0	0	0	0	1	0	0	0	0	0	9926	26400	229622	423.1	2.66	542713	8698	0.22	0	2.3	0	0	0	7	6969800000	
178	D52	5	23	R	US201	D	2.3	1990	3250	M	0	1	0	0	0	0	0	0	1	0	0	0	0	0	9926	26400	229622	423.1	2.66	542713	8698	0.22	0	0	27.5	0	0	7	6969800000	
179	D53	5	23	R	US95	S	27.5	1993	3000	P	0	0	1	0	0	0	0	0	1	0	0	0	0	0	9926	26400	229622	423.1	2.66	542713	8698	0.22	0	0	0	0	1	7	6969800000	
180	D51	5	23	R	I84	I	1.0	1990	1300	X	0	0	0	0	1	0	0	0	0	0	0	0	0	0	9926	26400	229622	423.1	2.66	542713	8698	0.22	0	0	0	0	1	7	6969800000	
181	D21	2	24	R	OR22	S	1.2	1989	3130	M	0	1	0	0	0	0	0	0	1	0	1	0	0	0	1194	219000	1086923	231.4	183.42	4697364	4963	1.86	0	1.2	0	0	0	33642	47961000000	
182	D21	2	24	R	OR22	S	10.2	1989	2420	M	0	1	0	0	0	0	0	0	1	0	1	0	0	0	1194	219000	1086923	231.4	183.42	4697364	4963	1.86	0	10.2	0	0	0	33642	47961000000	
183	D21	2	24	R	OR99E	R	2.8	1989	200	M	0	1	0	0	0	0	0	0	1	0	0	0	0	0	1194	219000	1086923	231.4	183.42	4697364	4963	1.86	0	2.8	0	0	0	33642	47961000000	
184	D22	2	24	U	I5	I	2.2	1989	3100	M	0	1	0	0	0	0	0	1	0	0	0	1	0	0	1194	219000	1086923	231.4	183.42	4697364	4963	1.86	0	2.2	0	0	0	33642	47961000000	
185	D23	2	24	R	OR22	S	3.3	1990	3550	M	0	1	0	0	0	0	0	0	1	0	1	0	0	0																

1	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	AB	AC	AD	AE	AF	AG	AH	AI	AJ	AK	AL	AM		
1	ID	GO	LU	HWY	LOI	MI	FY	COST	WK	BR	MO	RE	SAF	MIS	DIST	INST	REG	TR	R1	R2	R3	R4	R5	AREA	POP	VT	HWY	MI	DENSITY	VT/MI	VT/Cap	PopGr	BrMi	ModMi	PresMi	SafeMi	MiscMi	OnstSqr	PopSqr		
218	D60	1	26	U	OR99E	S	0.6	1990	8300	M	0	1	0	0	0	0	0	1	1	0	0	0	0	465	570500	2467458	221.9	1226.88	1.1E+07	4325	0.59	0	0.6	0	0	0	1505239	325470250000			
219	D60	1	26	U	OR99E	S	0.9	1990	6100	M	0	1	0	0	0	0	0	1	1	0	0	0	0	465	570500	2467458	221.9	1226.88	1.1E+07	4325	0.59	0	0.9	0	0	0	1505239	325470250000			
220	D60	1	26	U	OR99E	S	2.0	1991	2700	M	0	1	0	0	0	0	0	1	1	0	0	0	0	465	570500	2467458	221.9	1226.88	1.1E+07	4325	0.59	0	2	0	0	0	1505239	325470250000			
221	D60	1	26	U		D	1.5	1992	15900	M	0	1	0	0	0	1	0	0	0	0	0	0	0	465	570500	2467458	221.9	1226.88	1.1E+07	4325	0.59	0	1.5	0	0	0	1505239	325470250000			
222	D60	1	26	U	OR99E	S	1.1	1993	4600	M	0	1	0	0	0	0	0	1	1	0	0	0	0	465	570500	2467458	221.9	1226.88	1.1E+07	4325	0.59	0	1.1	0	0	0	1505239	325470250000			
223	D00	1	26	U	IS	I	6.7	1989	1800	P	0	0	1	0	0	0	1	0	0	1	0	0	0	465	570500	2467458	221.9	1226.88	1.1E+07	4325	0.59	0	0	6.7	0	0	0	1505239	325470250000		
224	D00	1	26	U	IS	I	0.1	1989	880	P	0	0	1	0	0	0	1	0	0	1	0	0	0	465	570500	2467458	221.9	1226.88	1.1E+07	4325	0.59	0	0	0.1	0	0	0	1505239	325470250000		
225	D00	1	26	U	IS	I	0.2	1989	1410	P	0	0	1	0	0	0	1	0	0	1	0	0	0	465	570500	2467458	221.9	1226.88	1.1E+07	4325	0.59	0	0	0.2	0	0	0	1505239	325470250000		
226	D00	1	26	U	IS	I	0.7	1989	1600	P	0	0	1	0	0	0	1	0	0	1	0	0	0	465	570500	2467458	221.9	1226.88	1.1E+07	4325	0.59	0	0	0.7	0	0	0	1505239	325470250000		
227	D03	1	26	U	IS	I	0.0	1990	100	P	0	0	1	0	0	0	1	0	0	1	0	0	0	465	570500	2467458	221.9	1226.88	1.1E+07	4325	0.59	0	0	0	0	0	0	1505239	325470250000		
228	D03	1	26	U	IS	I	0.0	1990	250	P	0	0	1	0	0	0	1	0	0	1	0	0	0	465	570500	2467458	221.9	1226.88	1.1E+07	4325	0.59	0	0	5.1	0	0	0	1505239	325470250000		
229	D06	1	26	U	IS	I	5.1	1991	2000	P	0	0	1	0	0	0	1	0	0	1	0	0	0	465	570500	2467458	221.9	1226.88	1.1E+07	4325	0.59	0	0	9	0	0	0	1505239	325470250000		
230	D06	1	26	R	184	I	9.0	1991	4900	P	0	0	1	0	0	0	1	0	0	1	0	0	0	465	570500	2467458	221.9	1226.88	1.1E+07	4325	0.59	0	0	0.4	0	0	0	1505239	325470250000		
231	D10	1	26	U	IS	I	0.4	1994	950	P	0	0	1	0	0	0	1	0	0	1	0	0	0	465	570500	2467458	221.9	1226.88	1.1E+07	4325	0.59	0	0	0.4	0	0	0	1505239	325470250000		
232	D10	1	26	U	IS	I	2.0	1994	1500	P	0	0	1	0	0	0	1	0	0	1	0	0	0	465	570500	2467458	221.9	1226.88	1.1E+07	4325	0.59	0	0	2	0	0	0	1505239	325470250000		
233	D10	1	26	U	IS	I	1.1	1994	8590	P	0	0	1	0	0	0	1	0	0	1	0	0	0	465	570500	2467458	221.9	1226.88	1.1E+07	4325	0.59	0	0	1.1	0	0	0	1505239	325470250000		
234	D01	1	26	U	IS	I	0.0	1989	110	S	0	0	0	1	0	0	0	1	0	0	1	0	0	0	465	570500	2467458	221.9	1226.88	1.1E+07	4325	0.59	0	0	0	0	0	0	1505239	325470250000	
235	D01	1	26	U	US30BY	D	2.9	1989	320	S	0	0	0	1	0	0	1	0	0	0	1	0	0	0	465	570500	2467458	221.9	1226.88	1.1E+07	4325	0.59	0	0	2.9	0	0	0	1505239	325470250000	
236	D02	1	26	R		D	8.7	1989	280	S	0	0	0	1	0	0	1	0	0	0	1	0	0	0	465	570500	2467458	221.9	1226.88	1.1E+07	4325	0.59	0	0	8.7	0	0	0	1505239	325470250000	
237	D02	1	26	R		D	0.1	1989	240	S	0	0	0	1	0	0	1	0	0	0	1	0	0	0	465	570500	2467458	221.9	1226.88	1.1E+07	4325	0.59	0	0	0.1	0	0	0	1505239	325470250000	
238	D03	1	26	R	184	I	64.4	1990	600	S	0	0	0	1	0	0	1	0	0	1	0	0	0	465	570500	2467458	221.9	1226.88	1.1E+07	4325	0.59	0	0	64.4	0	0	0	1505239	325470250000		
239	D03	1	26	U	IS	I	0.9	1990	550	S	0	0	0	1	0	0	1	0	0	1	0	0	0	465	570500	2467458	221.9	1226.88	1.1E+07	4325	0.59	0	0	0.9	0	0	0	1505239	325470250000		
240	D04	1	26	U	OR99W	S	0.1	1990	250	S	0	0	0	1	0	0	0	0	1	0	0	0	0	465	570500	2467458	221.9	1226.88	1.1E+07	4325	0.59	0	0	0.1	0	0	0	1505239	325470250000		
241	D06	1	26	R	184	I	39.0	1991	1660	S	0	0	0	1	0	0	1	0	0	1	0	0	0	465	570500	2467458	221.9	1226.88	1.1E+07	4325	0.59	0	0	0	0	0	0	1505239	325470250000		
242	D07	1	26	U	US30B	D	0.0	1991	120	S	0	0	0	1	0	0	1	0	0	0	1	0	0	0	465	570500	2467458	221.9	1226.88	1.1E+07	4325	0.59	0	0	0	0	0	0	1505239	325470250000	
243	D08	1	26	U	OR99E	D	0.0	1991	60	S	0	0	0	1	0	0	1	0	0	0	1	0	0	0	465	570500	2467458	221.9	1226.88	1.1E+07	4325	0.59	0	0	0	0	0	0	1505239	325470250000	
244	D08	1	26	U	OR99E	S	3.0	1991	1200	S	0	0	0	1	0	0	0	0	1	0	0	1	0	0	465	570500	2467458	221.9	1226.88	1.1E+07	4325	0.59	0	0	0	0	0	0	1505239	325470250000	
245	D09	1	26	U	IS	I	0.0	1994	1000	S	0	0	0	1	0	0	0	1	0	0	1	0	0	0	465	570500	2467458	221.9	1226.88	1.1E+07	4325	0.59	0	0	0	0	0	0	1505239	325470250000	
246	D10	1	26	R	184	I	0.0	1994	250	S	0	0	0	1	0	0	1	0	0	1	0	0	0	465	570500	2467458	221.9	1226.88	1.1E+07	4325	0.59	0	0	0	0	0	0	1505239	325470250000		
247	D10	1	26	U	US30	S	1.2	1994	160	S	0	0	0	1	0	0	0	0	1	0	0	1	0	0	465	570500	2467458	221.9	1226.88	1.1E+07	4325	0.59	0	0	0	0	1.2	0	0	1505239	325470250000
248	D00	1	26	U	IS	I	3.1	1989	1750	X	0	0	0	0	1	0	0	1	0	0	1	0	0	0	465	570500	2467458	221.9	1226.88	1.1E+07	4325	0.59	0	0	0	0	3.1	0	0	1505239	325470250000
249	D01	1	26	U	IS	I	0.0	1989	40	X	0	0	0	0	0	1	0	0	1	0	0	1	0	0	465	570500	2467458	221.9	1226.88	1.1E+07	4325	0.59	0	0	0	0	0	0	1505239	325470250000	
250	D01	1	26	U	IS	I	0.0	1989	320	X	0	0	0	0	0	1	0	0	1	0	0	1	0	0	465	570500	2467458	221.9	1226.88	1.1E+07	4325	0.59	0	0	0	0	0	0	1505239	325470250000	
251	D06	1	26	U	IS	I	1.5	1991	900	X	0	0	0	0	0	1	0	0	1	0	0	1	0	0	465	570500	2467458	221.9	1226.88	1.1E+07	4325	0.59	0	0	0	0	1.5	0	0	1505239	325470250000
252	D06	1	26	U	IS	I	3.6	1991	1000	X	0	0	0	0	0	1	0	0	1	0	0	1	0	0	465	570500	2467458	221.9	1226.88	1.1E+07	4325	0.59	0	0	0	0	3.6	0	0	1505239	325470250000
253	D09	1	26	U	IS	I	0.9	1993	1100	X	0	0	0	0	0	1	0	0	1	0	0	1	0	0	465	570500	2467458	221.9	1226.88	1.1E+07	4325	0.59	0	0	0	0	0.9	0	0	1505239	325470250000
254	D24	2	27	R	OR221	R	0.0	1990	770	B	1	0	0	0	0	0	0	0	1	0	0	1	0	0	745	47300	280388	148.4	63.49	1889407	5928	1.40	2.6	0	0	0	0	4031	2237290000		
255	D21	2	27	R	OR18	S	2.6	1989	1700	M	0	1	0	0	0	0	0	0	1	0	0	1	0	0	745	47300	280388	148.4	63.49	1889407	5928	1.40	0	2.6	0	0	0	0	4031	2237290000	
256	D23	2	27	R	OR18	S	0.3	1990																																	

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	AB	AC	AD	AE	AF	AG	AH	AI	AJ	AK	AL	AM	
1	ID	G	CO	LU	HWY	LOI	MI	FY	COST	WK	BR	MO	RE	SAF	MIS	DIST	INST	REG	TW	R1	R2	R3	R4	R5	AREA	POP	VT	HWY	MI	DENSITY	VT/Mi	VT/Cap	PopGr	BrMi	ModMi	PresMi	SafeMi	MiscMi	DnstSqr	PopSqr
290	D03	1	34	U	I5	I	2.0	1990	6920	M	0	1	0	0	0	0	1	0	0	1	0	0	0	0	727	287000	1371410	206.9	394.77	6627410	4778	3.82	0	2	0	0	0	0	155846	82369000000
291	D04	1	34	U	US26	S	0.1	1990	12000	M	0	1	0	0	0	0	0	0	0	1	1	0	0	0	727	287000	1371410	206.9	394.77	6627410	4778	3.82	0	0.1	0	0	0	0	155846	82369000000
292	D04	1	34	U	US26	S	0.0	1990	5500	M	0	1	0	0	0	0	0	0	0	1	1	0	0	0	727	287000	1371410	206.9	394.77	6627410	4778	3.82	0	0	0	0	0	0	155846	82369000000
293	D05	1	34	U	OR210	D	1.7	1990	3700	M	0	1	0	0	0	1	0	0	0	1	0	0	0	0	727	287000	1371410	206.9	394.77	6627410	4778	3.82	0	1.7	0	0	0	0	155846	82369000000
294	D05	1	34	U	OR210	D	0.3	1990	580	M	0	1	0	0	0	1	0	0	0	1	0	0	0	0	727	287000	1371410	206.9	394.77	6627410	4778	3.82	0	0.3	0	0	0	0	155846	82369000000
295	D05	1	34	U		D	1.1	1990	200	M	0	1	0	0	0	1	0	0	0	1	0	0	0	0	727	287000	1371410	206.9	394.77	6627410	4778	3.82	0	1.1	0	0	0	0	155846	82369000000
296	D06	1	34	U	I5	I	1.0	1991	780	M	0	1	0	0	0	0	1	0	0	1	0	0	0	0	727	287000	1371410	206.9	394.77	6627410	4778	3.82	0	1	0	0	0	0	155846	82369000000
297	D10	1	34	U	I5	I	0.4	1994	7550	M	0	1	0	0	0	0	1	0	0	1	0	0	0	0	727	287000	1371410	206.9	394.77	6627410	4778	3.82	0	0.4	0	0	0	0	155846	82369000000
298	D10	1	34	U	US26	S	0.0	1994	3300	M	0	1	0	0	0	0	0	0	1	1	0	0	0	0	727	287000	1371410	206.9	394.77	6627410	4778	3.82	0	0	0	0	0	0	155846	82369000000
299	D60	1	34	U	OR210	D	0.2	1990	340	M	0	1	0	0	0	1	0	0	0	1	0	0	0	0	727	287000	1371410	206.9	394.77	6627410	4778	3.82	0	0.2	0	0	0	0	155846	82369000000
300	D04	1	34	U	OR99W	S	3.2	1990	1350	P	0	0	1	0	0	0	0	0	0	1	1	0	0	0	727	287000	1371410	206.9	394.77	6627410	4778	3.82	0	0	3.2	0	0	0	155846	82369000000
301	D06	1	34	U	I5	I	2.8	1991	3400	P	0	0	1	0	0	0	1	0	0	1	0	0	0	0	727	287000	1371410	206.9	394.77	6627410	4778	3.82	0	0	2.8	0	0	0	155846	82369000000
302	D07	1	34	U	OR8	D	5.9	1991	2580	P	0	0	1	0	0	1	0	0	0	1	0	0	0	0	727	287000	1371410	206.9	394.77	6627410	4778	3.82	0	0	5.9	0	0	0	155846	82369000000
303	D01	1	34	U	OR99W	S	0.1	1989	250	S	0	0	0	1	0	0	0	0	0	1	1	0	0	0	727	287000	1371410	206.9	394.77	6627410	4778	3.82	0	0	0	0.1	0	0	155846	82369000000
304	D02	1	34	U	OR99W	S	0.2	1989	510	S	0	0	0	1	0	0	0	0	0	1	1	0	0	0	727	287000	1371410	206.9	394.77	6627410	4778	3.82	0	0	0	0.2	0	0	155846	82369000000
305	D02	1	34	U		D	0.0	1989	150	S	0	0	0	1	0	1	0	0	0	1	0	0	0	0	727	287000	1371410	206.9	394.77	6627410	4778	3.82	0	0	0	0	0	0	155846	82369000000
306	D05	1	34	U		D	0.0	1990	130	S	0	0	0	1	0	1	0	0	0	1	0	0	0	0	727	287000	1371410	206.9	394.77	6627410	4778	3.82	0	0	0	0	0	0	155846	82369000000
307	D07	1	34	U	OR6	R	0.0	1991	20	S	0	0	0	1	0	0	0	0	1	0	0	0	0	0	727	287000	1371410	206.9	394.77	6627410	4778	3.82	0	0	0	0	0	0	155846	82369000000
308	D07	1	34	U	OR8	D	0.0	1991	40	S	0	0	0	1	0	1	0	0	0	1	0	0	0	0	727	287000	1371410	206.9	394.77	6627410	4778	3.82	0	0	0	0	0	0	155846	82369000000
309	D07	1	34	U	OR8	D	0.3	1991	80	S	0	0	0	1	0	1	0	0	0	1	0	0	0	0	727	287000	1371410	206.9	394.77	6627410	4778	3.82	0	0	0	0.3	0	0	155846	82369000000
310	D07	1	34	U	OR8	D	1.0	1991	290	S	0	0	0	1	0	1	0	0	0	1	0	0	0	0	727	287000	1371410	206.9	394.77	6627410	4778	3.82	0	0	0	0	1	0	155846	82369000000
311	D08	1	34	U	OR210	D	0.1	1991	140	S	0	0	0	1	0	1	0	0	0	1	0	0	0	0	727	287000	1371410	206.9	394.77	6627410	4778	3.82	0	0	0	0.1	0	0	155846	82369000000
312	D08	1	34	U		D	0.1	1991	190	S	0	0	0	1	0	1	0	0	0	1	0	0	0	0	727	287000	1371410	206.9	394.77	6627410	4778	3.82	0	0	0	0.1	0	0	155846	82369000000
313	D08	1	34	U	I5	I	0.0	1992	410	S	0	0	0	1	0	0	1	0	0	1	0	0	0	0	727	287000	1371410	206.9	394.77	6627410	4778	3.82	0	0	0	0	0	0	155846	82369000000
314	D08	1	34	U	US26	S	0.2	1993	10	S	0	0	0	1	0	0	0	0	0	1	1	0	0	0	727	287000	1371410	206.9	394.77	6627410	4778	3.82	0	0	0	0.2	0	0	155846	82369000000
315	D08	1	34	U	OR210	D	0.0	1993	150	S	0	0	0	1	0	1	0	0	0	1	0	0	0	0	727	287000	1371410	206.9	394.77	6627410	4778	3.82	0	0	0	0	0	0	155846	82369000000
316	D08	1	34	U		D	0.0	1993	100	S	0	0	0	1	0	1	0	0	0	1	0	0	0	0	727	287000	1371410	206.9	394.77	6627410	4778	3.82	0	0	0	0	0	0	155846	82369000000
317	D08	1	34	U		D	0.0	1993	60	S	0	0	0	1	0	1	0	0	0	1	0	0	0	0	727	287000	1371410	206.9	394.77	6627410	4778	3.82	0	0	0	0	0	0	155846	82369000000
318	D60	1	34	U	US26	S	6.1	1989	280	S	0	0	0	1	0	0	0	0	1	1	0	0	0	0	727	287000	1371410	206.9	394.77	6627410	4778	3.82	0	0	0	6.1	0	0	155846	82369000000
319	D02	1	34	U	I5	I	3.6	1990	250	X	0	0	0	0	0	1	0	0	1	0	0	0	0	0	727	287000	1371410	206.9	394.77	6627410	4778	3.82	0	0	0	0	0	3.6	155846	82369000000
320	D22	2	34	R	OR214	D	0.4	1989	850	B	1	0	0	0	0	1	0	0	0	0	1	0	0	0	727	287000	1371410	206.9	394.77	6627410	4778	3.82	3.5	0	0	0	0	0	155846	82369000000
321	D24	2	34	R	OR99W	S	3.5	1990	1000	M	0	1	0	0	0	0	0	0	0	1	0	1	0	0	727	287000	1371410	206.9	394.77	6627410	4778	3.82	0	3.5	0	0	0	0	155846	82369000000
322	D25	2	34	U	OR99W	S	0.5	1991	2800	M	0	1	0	0	0	0	0	0	0	1	0	1	0	0	727	287000	1371410	206.9	394.77	6627410	4778	3.82	0	0.5	0	0	0	0	155846	82369000000
323	D26	2	34	R	OR47	R	5.2	1993	2400	M	0	1	0	0	0	0	0	0	1	0	0	1	0	0	727	287000	1371410	206.9	394.77	6627410	4778	3.82	0	5.2	0	0	0	0	155846	82369000000
324	D40	4	35	R	US26	S	2.7	1989	8000	M	0	1	0	0	0	0	0	0	0	1	0	0	0	1	1713	1350	18740	190.4	0.79	98408.9	13881	-1.79	0	2.7	0	0	0	0	1	1822500
325	D43	4	35	R	US26	S	11.0	1993	850	S	0	0	0	1	0	0	0	0	0	1	0	0	0	1	1713	1350	18740	190.4	0.79	98408.9	13881	-1.79	0	0	0	11	0	1	1822500	
326	D52	5	35	R	OR19	R	0.2	1990	180	B	1	0	0	0	0	0	0	0	0	1	0	0	0	0	1	1713	1350	18740	190.4	0.79	98408.9	13881	-1.79	0	0	0	0	0	1	1822500
327	D52	5	35	R	OR19	R	0.0	1990	220	S	0	0	0	0	0	0	0	0	0	1	1	0	0	0	1	1713	1350	18740	190.4	0.79	98408.9	13881	-1.79	0	0	0	0	0	1	1822500
328	D21	2	36	R	OR18	S	3.4	1989	1460	M	0																													