ROGUE VALLEY EMPLOYMENT CAMPUS

ECONOMIC IMPACT ANALYSIS

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1. EXECUTIVE SUMMARY

1.1 Project Overview

Competition for economic development is fierce among communities, states and countries. Firms with specific needs for site configuration and public amenities shop for potential locations by comparing the advantages of locating in a wide variety of communities. Through the Regional Problem Solving land use planning process, the City of Medford has identified a site that has the potential to compete nationally and regionally for firms. This site is referred to herein as the Rogue Valley Employment Campus. The economic analysis presented in this report examines the potential economic benefit to Jackson County and Southwest Oregon which result from infrastructure investments and policy choices. The Rogue Valley Employment Campus is intended to be marketed regionally and nationally to firms expected to have a competitive advantage by locating in the Rogue Valley described in below Table 1.

Table 1:
Competitive Advantage Industries:[1]

Instruments
Electronic Components
Measuring and Control Instruments
Special Dies, Tools, Accessories
Surgical and Medical Instruments
Special Industry Machinery
Fabricated Metal Products
Dental Equipment and Supplies
Engineering and Scientific Products
Photographic Equipment and Supplies
Electric Measuring Instruments
Communications
Radio and TV Communications Equipment

The employment campus is a business park style development focused on small to medium industrial and office employers. Specialty manufacturing, telecommunications, research and development, corporate offices, and government institutions are the target market for the Campus. The Campus will cater to firms with location priorities which include access to skilled labor, access to I-5, a relative lack of congestion, uncomplicated ingress and egress for trucks, customers and employees, natural gas, electrical and other basic infrastructure. Similar regional business parks exist throughout the country but have not been developed in the Medford area on this scale. At 150 acres, the proposed business park will be one of the largest in Oregon outside of metropolitan Portland.

The Rogue Valley Employment Campus is adjacent to the southerly boundary of Medford, Oregon and lies immediately east of Interstate 5. This analysis considers the

[1] Medford Economic Market Analysis (Hovee 2003)

economic impacts of successfully attracting major employers. The analysis recognizes that a site which is better served with transportation will be more competitive in attracting major employers.

The analysis considers three potential transportation infrastructure investment scenarios. For each of these infrastructure investment scenarios, three potential private development scenarios are considered. This yields a total of nine scenarios that include both infrastructure and private development. Two additional *control* scenarios are considered that contemplate two of the three transportation investment scenarios, but do not assume any development of the Rogue Valley Employment Campus project. In total eleven scenarios were considered and these are presented as a scenario matrix in below Table 2.

Table 2:
Scenarios for the REMI Analysis

		Public Investment Choice	
	Interchange	**Over Crossing Converted to Interchange in 2020**	**Over-crossing Only**
Private Sector Absorption (Use Mix)	Interchange Office	2020 Interchange Office	Over-crossing Office
	Interchange Balanced	2020 Interchange Balanced	Over-crossing Balanced
	Interchange Industrial	2020 Interchange Industrial	Over-crossing Industrial
	Interchange No Build		Over-crossing No Build

Three transportation scenarios were considered for this analysis. The most aggressive infrastructure scenario contemplates construction of an interchange in 2010. The second scenario is a balanced infrastructure approach that would construct an over crossing in 2010 and convert the over-crossing to an interchange in 2020. The least aggressive transportation infrastructure scenario would construct an over crossing in 2010 without future construction conversion to an interchange during the analysis period.

For each transportation scenario, three scenarios for the types of businesses which will be located at the Employment Campus were considered. These were an office oriented employment campus, a campus oriented toward industrial uses and one balanced between these two types of end users. Scenarios were also considered in which businesses do not choose to occupy the employment campus. A detailed review and discussion of the various scenarios is provided in the Introduction section with additional details in the methodology section.

The analysis presented here treats both public and private investments as new dollars to the regional economy because a necessary condition of the proposed investment is a change to the Urban Growth Boundary of Medford. This regulatory change would increase the supply of urbanizable land thereby creating a new resource and a new input for industry.

1.2 Results Summary

This section of the Executive Summary reports the major categories of the modeled economic impacts created by the Rogue Valley Employment Campus project.

Table 3:
Summary of Results for Year 2030
(Monetary results are in millions of 2004 dollars)

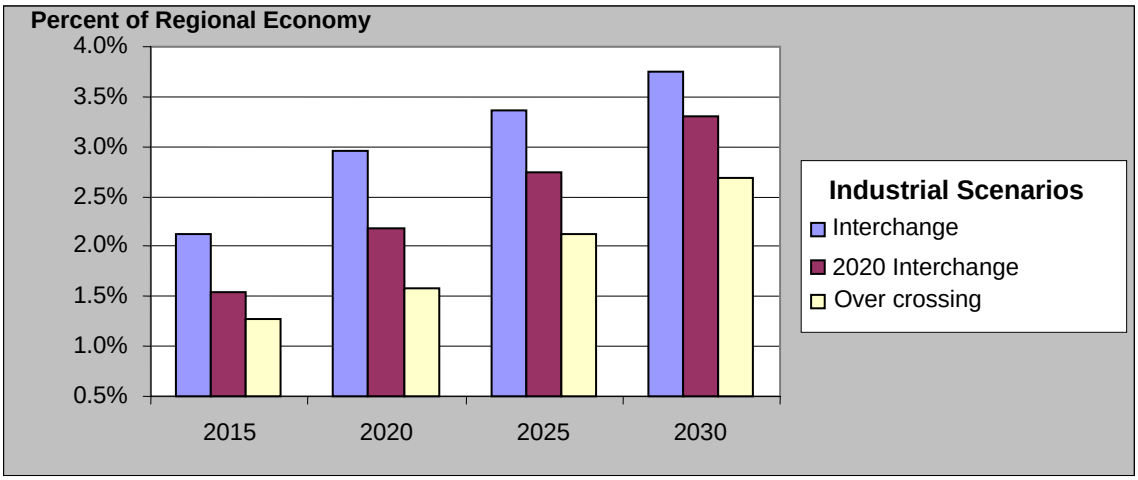
Scenarios for Development of the Rogue Valley Employment Campus

Project Description	Total Exogenous Investment		Annual GRP Increase		Total Employment Growth	
	Govt.	Private	Jackson County	Oregon	Jackson	Oregon
Over crossing No Build	$20.0		$1.5	$1.7	5	7
Interchange No Build	$30.0		$1.5	$1.7	5	7
Interchange Office	$30.0	$156.3	$281	$316	3,225	3,517
Interchange Balance	$30.0	$156.3	$337	$379	3,225	3,572
Interchange Industry	$30.0	$156.3	$385	$434	3,218	3,611
2020 Interchange Office	$35.0	$156.3	$248	$278	2,862	3,115
2020 Interchange Balanced	$35.0	$156.3	$297	$334	2,855	3,156
2020 Interchange Industry	$35.0	$156.3	$340	$382	2,844	3,184
Over crossing Office	$20.0	$156.3	$201	$225	2,332	2,537
Over crossing Balanced	$20.0	$156.3	$241	$270	2,325	2,568
Over crossing Industry	$20.0	$156.3	$275	$309	2,314	2,590

Table 3 shows summary results of the analysis for each of the eleven scenarios. Note that the interchange is assumed to cost 30 million dollars if it is constructed all at once. It is assumed to cost 35 million dollars if it is first built as an over crossing in 2010 and then rebuilt as an interchange in 2020. The over crossing and associated road improvements are assumed to cost 20 million dollars. By delaying the interchange project until 2020 a 10 million dollar expenditure can be delayed for 10 years but at a cost of 5 million dollars, a 4.1% annual rate of interest. In Table 3, aggregate impacts to the regional economy are shown for Oregon as a whole and for Jackson County in the year 2030.

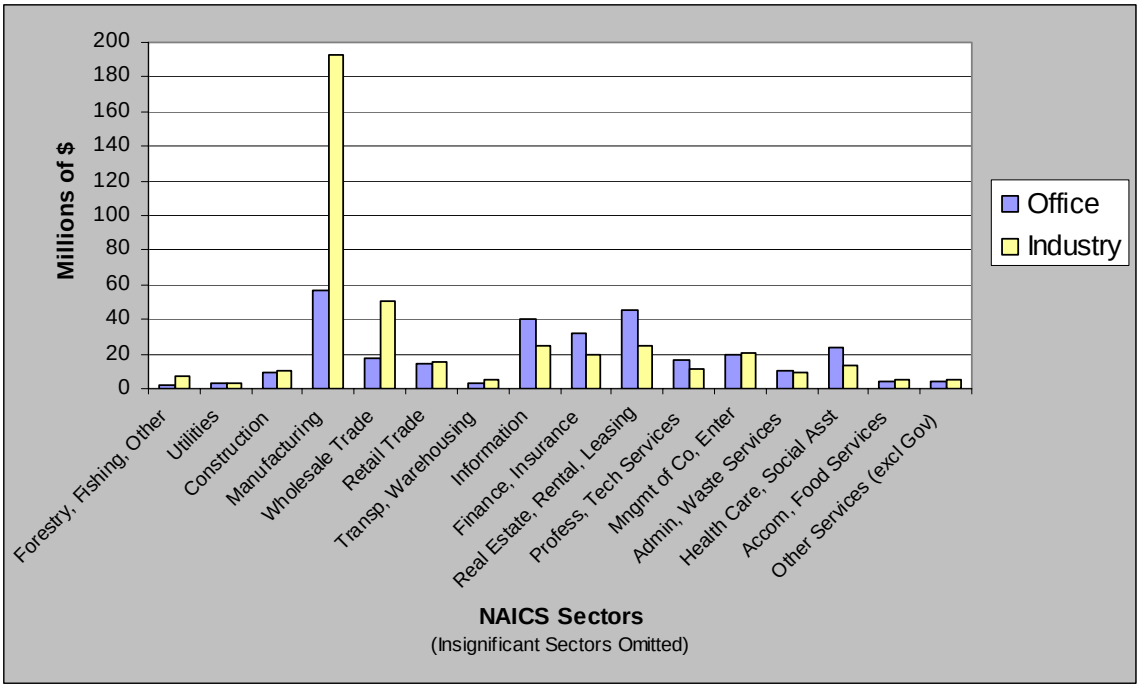
The relative impacts of postponed transportation infrastructure investments are illustrated below:

Figure 1:
2030 Impacts as a Percent of the Gross Regional Product (GRP) of Jackson County



By 2020, the economic benefit of the project is reduced by 58 million dollars in every year as a consequence of postponing transportation investments by 10 years. This economic growth gap is not immediately recaptured when the interchange is built. Ten years *after* the delayed interchange is built, the Gross Regional Product (GRP) is projected to be 38 million dollars less per year when compared to construction of an interchange in 2010. In other words, lost economic development opportunities are difficult to recapture. The impact of the project as a percent of the regional economy is shown in Figure 1. It can be seen clearly in figure one that a delayed interchange or no interchange at all cause the project to be much smaller parts of the regional economy. In Figure 5, the impacts to State tax revenue are shown for each infrastructure scenario. Reduced or delayed infrastructure investment will effectively reduce the size of Jackson County's economy by 1.5 percent from 2020 to 2030.

Figure 2:
2030 Annual Impacts to Statewide Value Added by Industry



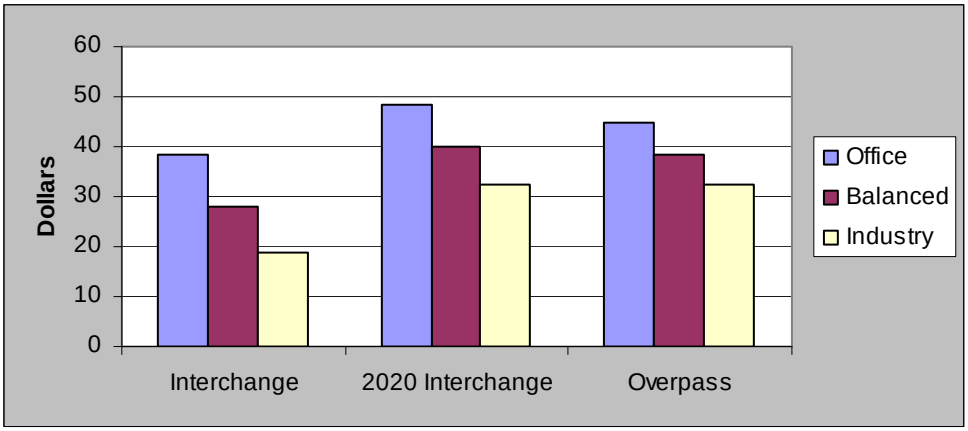
1.2.1 Value Added

Figure 2 presents the value added component of gross regional product results shown in Table 3. Manufacturing produces more value added than services which typically occupy office space. The industry oriented campus therefore shows much greater value added, especially in the manufacturing and wholesale trade sectors of the economy. In economic development objectives set forth by the State of Oregon manufacturing is referred to as *Traded Sector Industry,* and is greatly encouraged.

Figure 2, above, shows the relative value added of the manufacturing sector. A much higher value added contribution in the manufacturing sector is typical, and this higher value added product helps to create economic activity and tax revenue for Oregon. While the industry focused scenario is projected to create only 100 more jobs statewide than the office focused scenario, economic activity is projected to be at least $100 million greater in the industrial scenario. The industrial scenario generates almost $200 million in value added in the manufacturing sector alone.

However, output is not the only measure to consider when evaluating strategic economic development objectives. Another measure to consider is Real per Capita Disposable Income which provides a general measure of the real level of living experienced by the residents of a region which is affected by economic development; this is reported in below Figure 3.

Figure 3:
2030 Annual Impacts to Real Per Capita Disposable Personal Income



1.2.2 Income

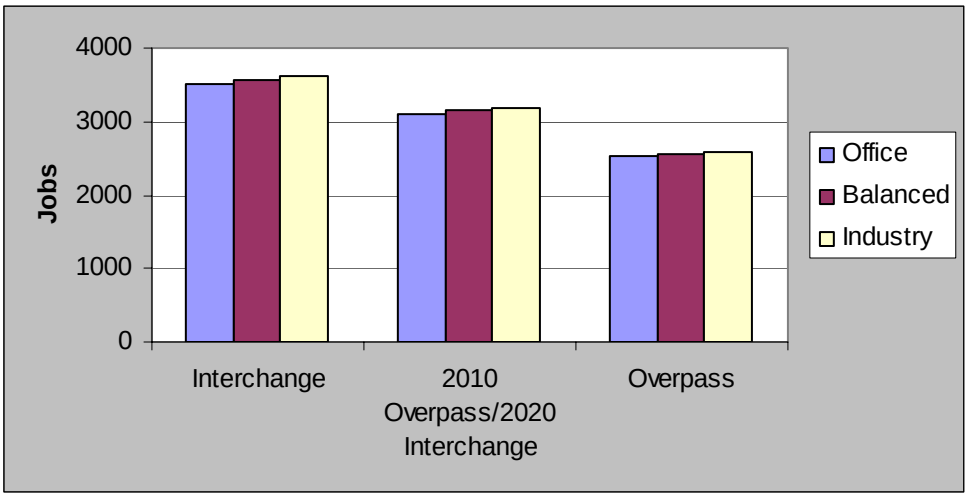
Real per capita disposable incomes are smaller in the industrial scenario despite the fact that $27 million more in annual salary disbursements are projected to occur under the industrial interchange scenario than the office interchange scenario by 2030. This counterintuitive result indicates that the office scenario is a slightly better fit for the labor force in Jackson County than the industrial scenario.

The more detailed REMI outputs provide some insight into this phenomenon. While in-migration due to the project is small in all scenarios, the labor force participation rate grows by .035% more in the office scenario, offsetting the slightly higher wages for workers in the industrial scenario. In-migration in the office scenario is about 70 people per year higher than the no build alternative and 80 people per year more than the no build alternative in the industrial scenario. Labor force participation rises by .214% in the office scenario and .179% in the industrial scenario, modest gains in both cases. A higher labor force participation rate and a lower rate of in-migration in the office scenario mean that a relatively greater number of people are working. Despite relatively lower wages, relatively more people working causes per capita income to be higher in the office scenario.

The project presents opportunities for public private partnerships that will harmonize workforce development and economic development objectives. The project can be constructed to match the advantages of the labor force in the Rogue Valley and over time and the labor force can be developed to match the particular needs of industry.

Because office uses have somewhat higher employment densities, but create fewer support jobs elsewhere in the economy the total employment impacts are very comparable between development scenarios as depicted in below Figure 4.

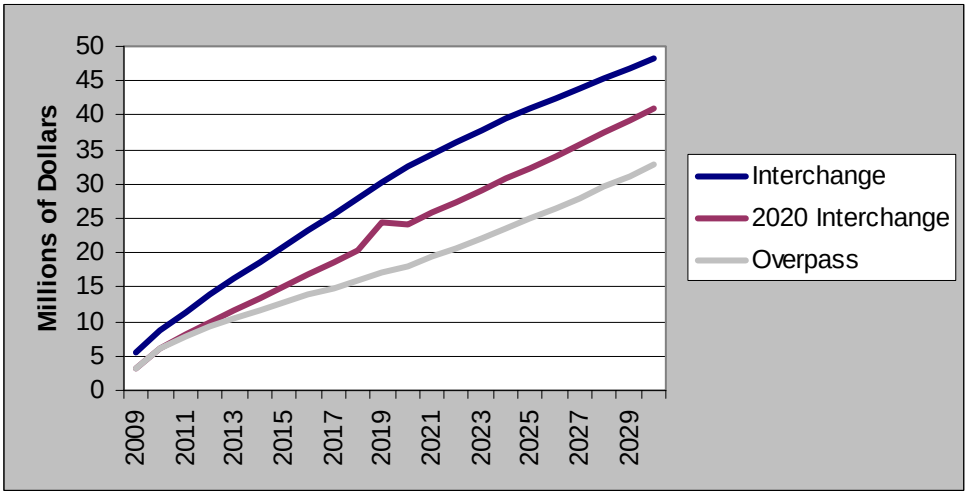
Figure 4:
2030 Impacts to Oregon Employment in 2030



1.2.3 Employment

Figure 4 and Table 3 combine to present another instance where the higher value added components of the manufacturing sectors create different results between the scenarios when comparing total employment to local employment. Higher value added products in the manufacturing sector result in more total jobs created statewide for all absorption/infrastructure scenarios. The REMI model predicts higher numbers of support jobs outside Jackson County from a relatively higher percentage of manufacturing jobs.

Figure 5:
Annual State Revenue Growth for Three Transportation Investment Scenarios



1.2.4 Government Revenues

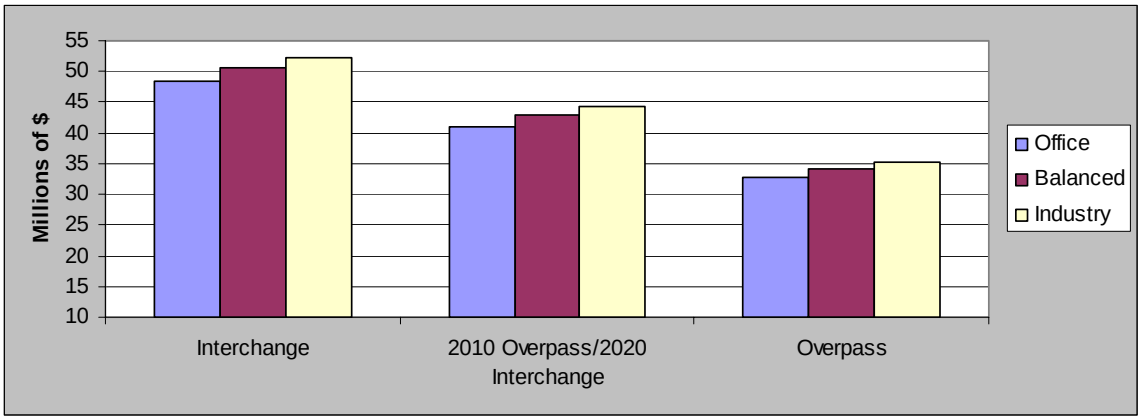
Table 4:
State and Local Tax Revenue in 2030
(Monetary results are in millions of 2004 dollars)

Project Description	State Fuel Sales Tax	State of Oregon	Jackson County Local Gov.	Total Taxes
Over crossing No Build	-	$0	$0	$0
Interchange No Build	-	$0	$0	$0
Interchange Office	$0.43	$29.1	$16.6	$45.7
Interchange Balance	$0.44	$30.5	$16.9	$47.4
Interchange Industry	$0.44	$31.7	$17.1	$48.8
2020 Interchange Office	$0.38	$25.1	$13.9	$39
2020 Interchange Balanced	$0.39	$26.3	$14.1	$40.4
2020 Interchange Industry	$0.39	$27.2	$14.3	$41.5
Over crossing Office	$0.31	$20.1	$11.0	$31.1
Over crossing Balanced	$0.31	$21.1	$11.2	$32.3
Over crossing Industry	$0.32	$21.9	$11.3	$33.2

As one would expect, impacts to State and Local Revenue are higher for interchange scenarios than for over crossing scenarios due to faster projected absorption. This pattern is the same as with impacts to employment and gross regional product. In 2020 when the delayed interchange is built, tax revenue will be approximately 10 million dollars lower in the delayed scenario than in the scenario where an interchange is built in 2010. Ten years after the delayed interchange is eventually built, in 2030, State and Local tax revenue are still projected to be 7 million dollars lower. This difference is the cost of delaying infrastructure investment for this project.

REMI projects that the revenue increase directly to ODOT will be relatively strong with the State fuels taxes projected to increase by from $440,000 to $300,000 annually by 2030. As infrastructure choices are developed, more detailed cost estimates will become known and funding mechanisms will be considered. This REMI analysis provides a good starting point to begin a more in-depth fiscal analysis specific to ODOT.

Figure 6:
2030 Annual Impacts to State and Local Revenue



When comparing the private development scenarios, impacts to tax revenue are about 10% higher for industrial scenarios than for office scenarios reflecting greater incomes and greater value added for industrial jobs than office jobs. The office scenarios are projected to produce about eight percent less revenue to the State than the industrial scenario whereas the differential in local revenues is only about three percent. Thus, the industrial scenarios generate relatively more state tax revenue, even though the total state and local tax revenues presented in Figure 6 are small. This is because state's emphasis on income taxes versus the local government's emphasis on property taxes.

1.2.5 Transportation Efficiency

In addition to analyzing development alternatives and associated transportation improvements, the above results also capture regional economic benefits associated with the regionally significant transportation improvements necessary to execute the project. Regional transportation efficiency changes associated with the various development and transportation improvement scenarios were estimated. The analysis utilized the transportation rate index as its measure of efficiency and the same are reported in Table 5 below.

Table 5:
Summary of Transportation Rate Index (TRI)
(TRI of 1.0 indicates free flow travel rate)

	No Improvements	Over crossing with No Employment Campus	Interchange with No Employment Campus	Interchange with Office Employment Campus	Over crossing with Industry Employment Campus
2010	1.05825	1.05799	1.05674	1.05732	
2020				1.07905	
2030	1.10007	1.09970	1.10135	1.10108	1.09950

The transportation rate index for Medford indicates the Region's transportation system is expected to reach the level of congestion currently experienced in Salem by 2010. Over

the period between 2010 and 2030 the base case transportation scenario provided by ODOT estimates that the travel rate index will deteriorate (slower rates due to more congestion) by approximately 4.1% from 1.058 to 1.1. A score of 1.00 is an un-congested condition and 1.10 means that during peak hours travel rates will diminish by about 10% when compared to an un-congested condition. For example, a commute of twenty miles would take thirty minutes in an area where the TRI is 1.00 and the un-congested travel rate would be 40 mph. In an area where the TRI is 1.10, the same commute would take 33.3 minutes, because the travel rate would decrease to 36 mph.

The differences between scenarios reported in the above table are not statistically meaningful. All scenarios showed approximately the same four percent decline in efficiency regardless of the development or transportation alternative analyzed.

That no statistically meaningful difference can be detected among the scenarios suggests three important observations. First, it indicates that the project is well situated from a regional transportation perspective. If the project were not well situated on the transportation system one would expect significant increases in the TRI as a result of increased employment causing increased congestion and decreased regional travel rates. Second, the transportation improvement itself would have little economic impact if it were not coupled with economic development. Third, the project does not appear to be inducing travel on a regionally measurable basis. These results should not be over-interpreted to mean that the employment campus would cause no localized congestion. Careful local planning and engineering is always appropriate to minimize localized congestion impacts, but such detailed planning and engineering is not the focus of this economic analysis.

1.3 Summary Conclusions

Based upon the above discussion and REMI results, several important conclusions can be reached:

- The scale of transportation investments is small relative to the economic growth potential if the project is successful. The Rogue Valley Employment Campus is strategic, targeted economic development that will return the State's investment in every year after it is built.

- The industrial emphasis has higher outputs, but the office scenario is projected to be a better fit for Jackson County's labor force.

- For all economic performance measures considered, the potential benefits of rapid absorption are more significant than the potential benefits for emphasizing one development mix over the other.

- Lost economic growth from retarded absorption is not projected to be recaptured quickly. This supports rapid delivery of infrastructure facilitating rapid absorption.

- Rapid market absorption of the Rogue Valley Employment Campus project has the potential to increase the Gross Regional Product of Jackson County by over 3.5 percent.

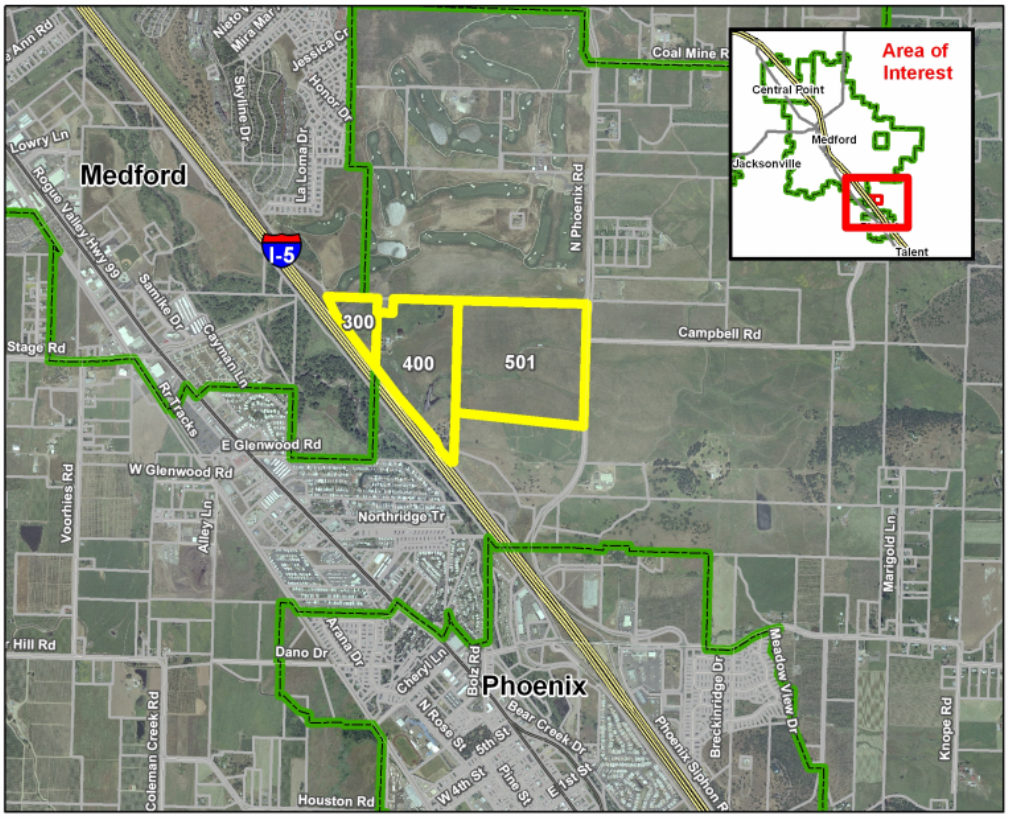
- The project appears to be well situated from a regional transportation perspective that supports economic growth without collateral system degradation.

The results presented in this analysis are generally consistent with expectations and support the conclusion that successful execution of the Rogue Valley Employment Campus concept will result in significant short and long term economic growth.

2. INTRODUCTION

The economic analysis presented in this report examines the potential economic benefits to the City of Medford, Jackson County and the State of Oregon resulting from Comprehensive Plan Map amendments that would add 150 acres of land with frontage on I-5 to the employment land base in Medford. The proposal is combined with a proposal for investment in crossing and accessing I-5 at the same location. The policy question in this analysis is to identify economic and fiscal impacts of expanding the Urban Growth Boundary of Medford to include lands that have been identified by the Regional Problem Solving process for an employment campus which caters to the industries identified in Medford's Economic Element to have a competitive advantage to locate in Medford. The Campus may develop with a design and management emphasis or an industrial production emphasis and the State may choose to serve the site with an interchange or an over-crossing. The various permutations of these scenarios and their impacts have been analyzed and presented below.

Figure 7:
Proposed Employment Campus Adjacent to Medford UGB



The location is suitable for National and Regional business, adjacent to I-5, and central to existing and planned population. An infrastructure investment is a necessary condition for the economic benefits shown below but the investments and indirect impacts shown will only occur if policy makers make regulatory changes that will allow the business community to capitalize on the advantages of this location.

The analysis considers three potential transportation infrastructure investment scenarios. For each of these infrastructure investment scenarios, three potential private development absorption scenarios are considered. This yields a total of nine scenarios that include both infrastructure and private development. Two additional *control* scenarios are considered that contemplate two of the three transportation investment scenarios, but do not assume any private development of the Rogue Valley Employment Campus project. In total eleven scenarios were considered and these are presented as a scenario matrix in below Table 6.

Table 6:
Scenarios for the REMI Analysis

	Public Investment Choice		
	Interchange	**Over Crossing Converted to Interchange in 2020**	**Over-crossing Only**
Private Sector Absorption (Use Mix)	Interchange Office	2020 Interchange Office	Over-crossing Office
	Interchange Balanced	2020 Interchange Balanced	Over-crossing Balanced
	Interchange Industrial	2020 Interchange Industrial	Over-crossing Industrial
	Interchange No Build		Over-crossing No Build

Three transportation scenarios were considered for this analysis. The most aggressive infrastructure scenario contemplates construction of an interchange in 2010. The second scenario is a balanced infrastructure approach that would construct an over crossing in 2010 and convert the over-crossing to an interchange in 2020. The least aggressive transportation infrastructure scenario would construct an over crossing in 2010 without future construction conversion to an interchange during the analysis period. Transportation investments and their relations to rates of private sector development are addressed in below Section 2.2

For each transportation scenario, three scenarios for the types of businesses which will be located at the Employment Campus were considered. These were an office oriented employment campus, a campus oriented toward industrial uses and one balanced between these two types of end users. Scenarios were also considered in which businesses do not choose to occupy the employment campus; those are the 'No-Build' scenarios in the matrix table above.

2.1 Private Development Absorption Scenarios

The analysis assumes that the Rogue Valley Employment Campus will include some offices, retail, and industrial in all scenarios, but that the proportion of each cannot be known with certainty in advance. As such, each scenario analyzed a different proportion of office to industrial development. The amount of each type of development is presented in below Table 7:

Table 7:
Use of Square Feet within the Employment Campus for the Various Scenarios

	OFFICE	BALANCED	INDUSTRIAL
USE OF SPACE			
Office	1,213,000	806,500	450,000
Retail	100,000	100,000	100,000
Industrial	250,000	656,500	1,013,000
Total Square Feet	1,563,000	1,563,000	1,563,000

Whether the market chooses to occupy the campus with office or industrial buildings, the campus is expected to require approximately $156,000,000 direct private investment, approximately $100 per square foot for actual construction costs. The analysis assumes the same amount of total square footage consumed by buildings under each scenario. This assumption was derived from development analysis in the market area and accounts for two factors that tend to cancel one another out. Industrial buildings are almost universally single story, but they have lower employment densities and therefore require less parking. Office buildings tend to be two and three stories, but have higher employment densities that require more parking. The end result is that land consumption per built square foot is similar for either development pattern.

The density of workers within any given building can vary widely. Depending upon the industry, employment densities can be anywhere from several thousand square feet per worker or in some cases only a handful of building square feet are required for each worker. Table 7 shows employment density assumptions taken from analysis by the Urban Land Institute and the Federal Energy Information Agency. The distribution of workers to each industry is data from Regional Economic Models Inc. which is modified with tables made by REMI Northwest which redistribute Bureau of Economic Analysis data to land use categories.

Table 8:
Employment Density Assumptions

EMPLOYMENT CATEGORY	EMPLOYMENT DENSITY ASSUMPTION
Education	813
Food Sales	364
Food Service	177
Health Care	227
Lodging	476
Mercantile and Service	481
Office	274
Public Assembly	1514
Public Order and Safety	232
Religious Worship	1670
Warehouse and Storage	977
Other**	488
Vacant	2187
Manufacturing	910
No Space Required	0

In the scenario where primarily office park uses are chosen by occupants of the employment campus, the analysis assumes 1,213,000 square feet of office space, 100,000 square feet of balanced office and industrial space and 250,000 square feet of industrial space will be built. 1,563,000 square feet of buildings will be constructed. On average, one job for every 305 square feet of building space will occur at full absorption. This level of employment density is lower than some large public or institutional employment centers usually located in high quality four-plus story buildings, but the densities are consistent with two and three story higher quality office complexes according to the Urban Land Institute. Office employment density is much greater than industrial employment density where warehouse and production space is often occupied by storage and machinery.

In the scenario where industrial uses will be the predominant use in the employment campus, the uses are estimated to be 450,000 square feet occupied by office space, 100,000 square feet of balanced office and industrial space and 1,013,000 square feet of industrial space. The relatively lower density of industrial space in this scenario than density of office space in the office scenario reflects the need for office space within industrial buildings for the purpose of managing the site.

In this scenario it is estimated that one job will occupy approximately 507 square feet of building space. This range is slightly lower than job density normally expected in research and development facilities and slightly higher than the mean density for light industrial operations. Because Medford does not have a comparative advantage for heavy industrial growth it is not assumed that the employment campus will accommodate any such uses which tend to have low employment densities. The campus is not expected to be planned to accommodate heavy industrial uses.

The balanced absorption scenario assumes that business will require light industrial/research type buildings and office buildings as well as a minority which are a hybrid of the two uses. In this scenario it is estimated that one job will occupy approximately 387 square feet. 806,500 square feet of office space, 100,000 square feet of hybrid space and 656,500 square feet of industrial space are assumed at full absorption.

2.2 Transportation Investment Scenarios

Two important assumptions in the analysis revolve around transportation. First, the analysis assumes that the regional economy is sensitive to changes in the efficiency of the system as a whole. This assumption was captured throughout the analysis and Section 4.3 of this report provides detailed review of this component of the analysis. The second important assumption is that development rates for the Rogue Valley Employment Campus itself will vary depending on the level of infrastructure provided to serve the project.

The below table depicts the modeled absorption rates. Actual absorption of projects like the Rogue Valley Employment Campus are difficult to predict in precise terms because of their dependence on a wide range of macro-economic factors and the stiff competition for attraction and retention of major employers. For this reason, assumed absorption rates are more appropriately considered in terms of their relative economic impacts and total calculated results are presented to inform the scope and scale of successful execution of the project.

Table 9:
Build-out Scenarios

	Transportation System Scenarios- Percent Build-out		
	2010	**2020**	**2030**
Interchange at Opening	35%	75%	90%
2010 Over-crossing, 2020 Interchange	25%	55%	80%
Over-crossing Only	25%	40%	65%

Economic impacts are a direct result of building and occupying the site. Impacts continue to occur in years after businesses initially locate. New business also creates more new business. Self reinforcing processes and lagged effects make contributions to the economy greater for earlier investments which happen sooner.

3. DETAILED RESULTS

The results presented here focus on the marginal benefits associated with the scenarios described above. Employment is presented in number of actual jobs and dollars are in 2006, inflation adjusts dollars. Only the most salient result categories are presented here and are discussed below:

- *Net Impacts to Employment*: This results category presents the total aggregate employment change as a result of the project in each County and the Rest of Oregon.
- *Gross Regional Produc*t: This results category presents the aggregate total final goods and services production. Intermediate output is excluded from these results.
- *Net Impacts to Per Capita Real Personal Disposable Income*: This results category is a measure of impacts of projects on the financial situation of individuals; conceptually this result describes how *well-off* the population is over time as a result of the project. This result is important because it reflects demographic changes predicted by the model. Demand-side economic stimuli support population growth from increased berths and in-migration which off-sets the economic expansion to varying degrees depending on the nature of economic stimuli.
- *State Revenue*: These results report the aggregate annual state revenue that can be expected from the project.

3.1 Regional Transportation Impacts

Table 10:
Summary of Transportation Rate Index (TRI)
(TRI of 1.0 indicates free flow travel rate)

	No Improvements	Over crossing with No Employment Campus	Interchange with No Employment Campus	Interchange with Office Employment Campus	Over crossing with Industry Employment Campus
2010	1.05825	1.05799	1.05674	1.05732	
2020				1.07905	
2030	1.10007	1.09970	1.10135	1.10108	1.09950

The transportation rate index for Medford indicates the Region's transportation system is expected to reach the level of congestion currently experienced in Salem by 2010. Over the period between 2010 and 2030 the base case transportation scenario provided by ODOT estimates that the travel rate index will deteriorate (slower rates due to more congestion) by approximately 4.1% from 1.058 to 1.1. A score of 1.00 is an un-congested condition and 1.10 means that during peak hours travel rates will diminish by about 10% when compared to an un-congested condition. For example, a commute of twenty miles would take thirty minutes in area where the TRI is 1.00 and the un-congested travel rate would be 40 mph. In an area where the TRI is 1.10 the same commute would take 33.3 minutes. The differences between scenarios reported in Table 10 are not statistically meaningful. All scenarios showed approximately the same four percent decline in efficiency regardless of the employment campus.

That no difference can be detected is an important conclusion in itself. One would expect the TRI to be most sensitive to change when the system is relatively more congested. Also, the index may be sensitive to development that affects an existing bottleneck in an otherwise un-congested system. No response from the index implies that the proposal is well located on the transportation system and that the system will function normally if the project is built. This would not be true if the proposal were adding large numbers of vehicle trips to already congested streets that were important for regional travel.

3.2 Jobs and Population

Job growth by 2030 is approximately the same for each of the absorption scenarios as is shown above in Figure 4. Transportation scenarios have dramatically different employment impacts owing to the difference in the amount of time it takes for the employment campus to become occupied. The interchange transportation scenario generates up to 3,225 jobs by 2030 and leads to migration of up to 3,634 people to Jackson County. Small increases in incomes are expected in all of the scenarios although inflationary pressures in the job market are mostly offset by immigration.

Figure 8:
Population and Employment Growth by 2030, Industrial Emphasis

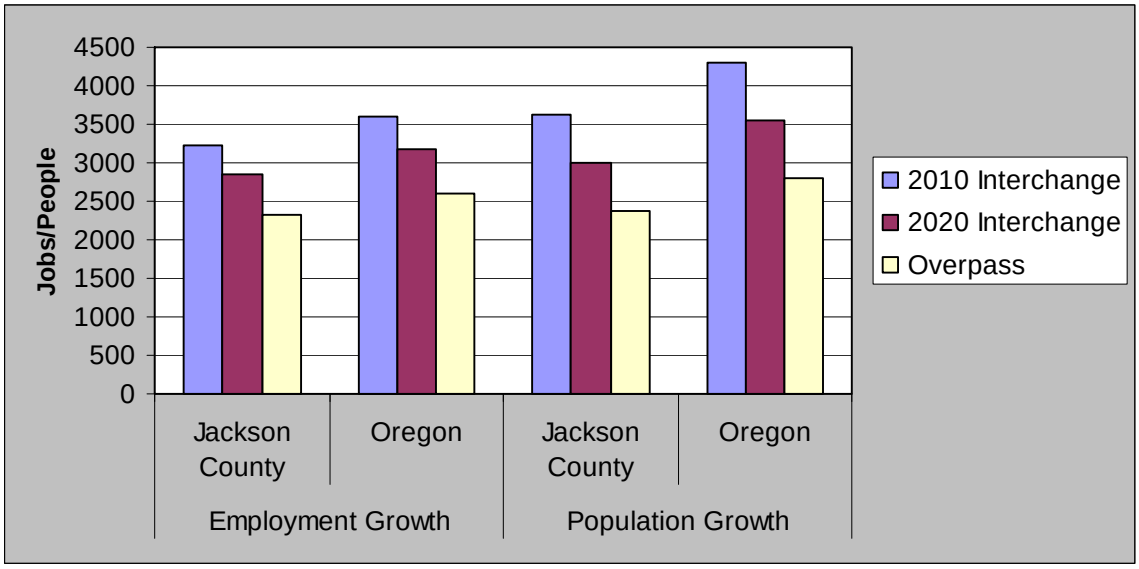
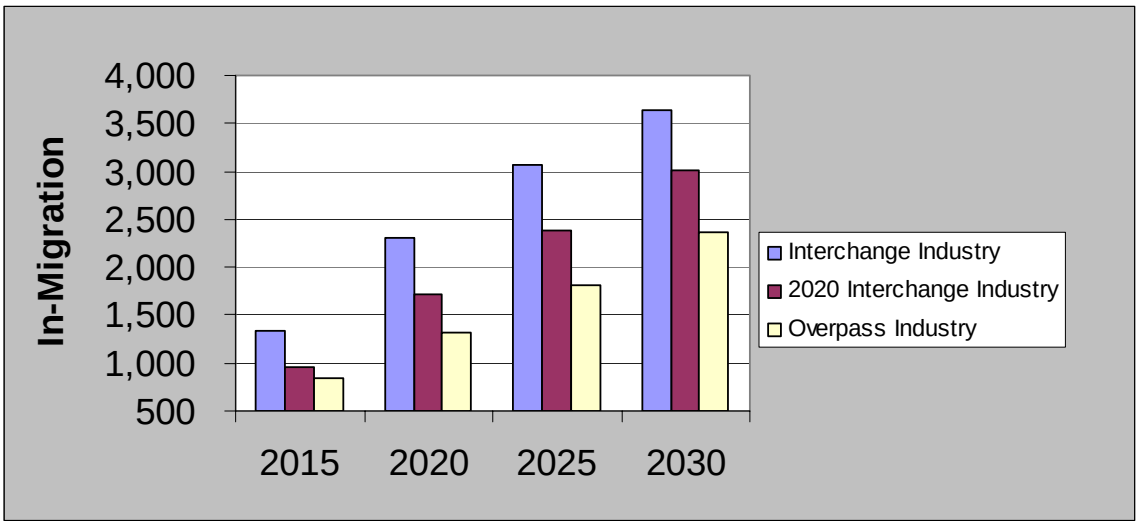


Figure 9:
In-migration to Jackson County by 2030, Industrial Emphasis



3.3 Office Use Scenario

In the scenarios where office uses predominate in the employment campus the benefits to the economy of Oregon are dramatically higher if an interchange is constructed in 2010 than if a simpler over crossing is constructed in stead. The difference between over-crossing and interchange scenarios is as much as $100 million. Not surprisingly, the office scenario sees the least amount of benefit from an interchange because office consuming businesses are expected to be less dependent on direct connections with the interstate than industrial businesses. Almost all of the benefit to gross regional product is concentrated in Jackson County.

Figure 10:
Investment, Tax Revenue and Gross Regional Product

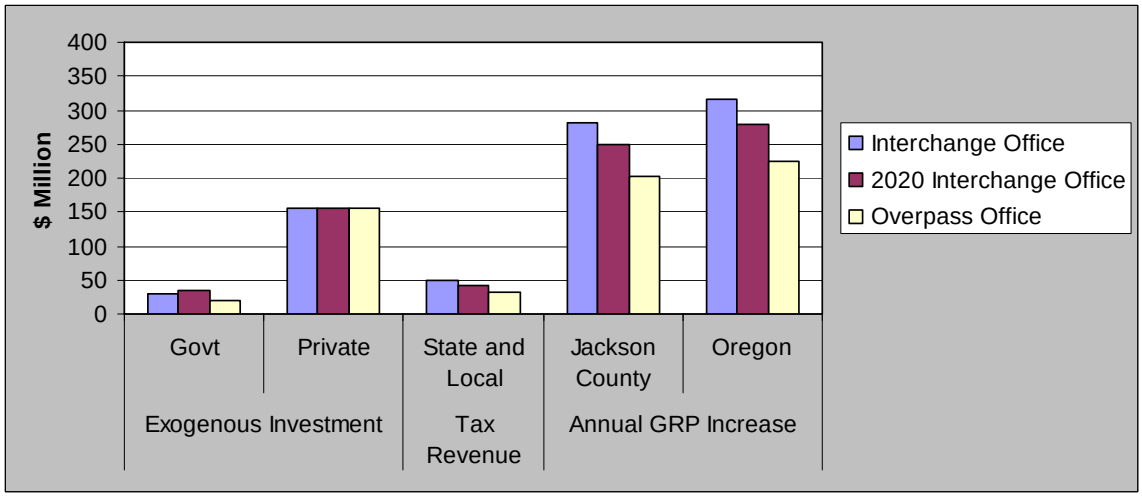


Figure 11:
Gross Regional Product in 2030- Office Uses

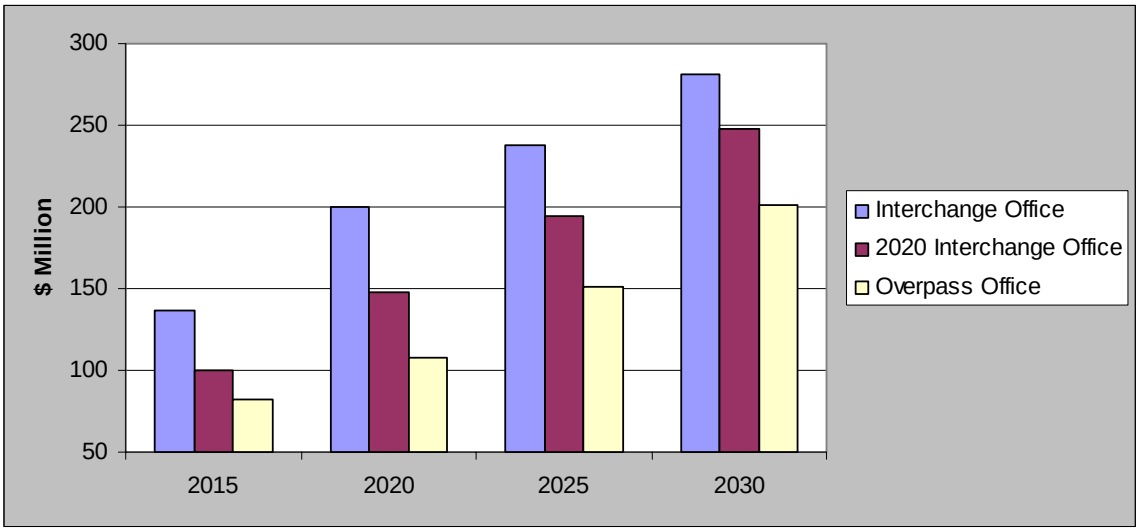


Figure 12:
Combined State and Local Tax Revenue in 2030- Office Uses

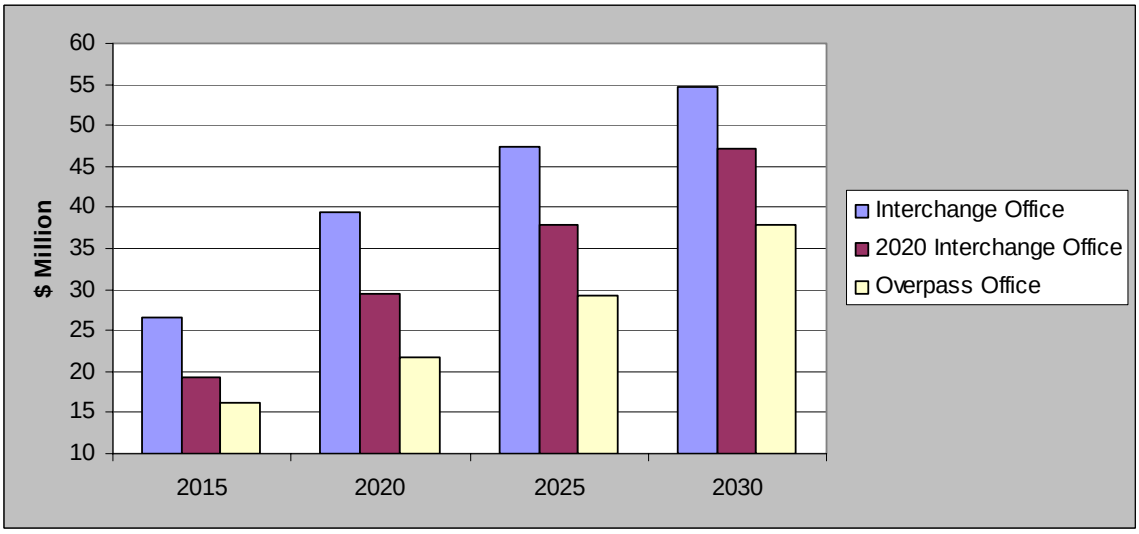


Figure 13:
Real, Per Capita, Disposable Income in 2030- Jackson County Office Uses

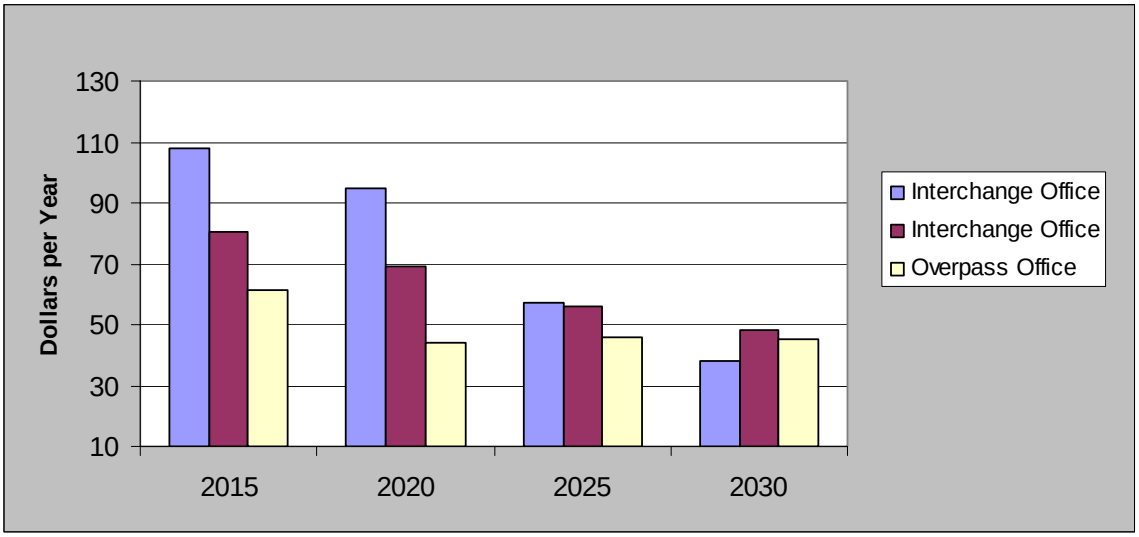
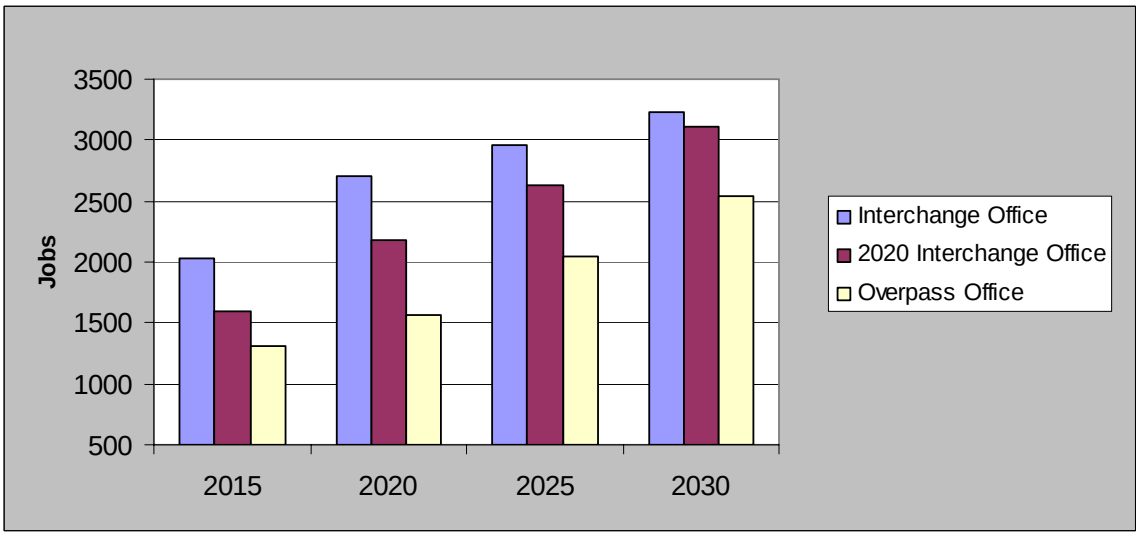


Figure 14:
2030 Increase in Employment- Jackson County Office Uses



3.4 Balanced Mix of Uses

Figure 15:
Investment, Tax Revenue, Gross Regional Produce- Balanced Mix of Uses

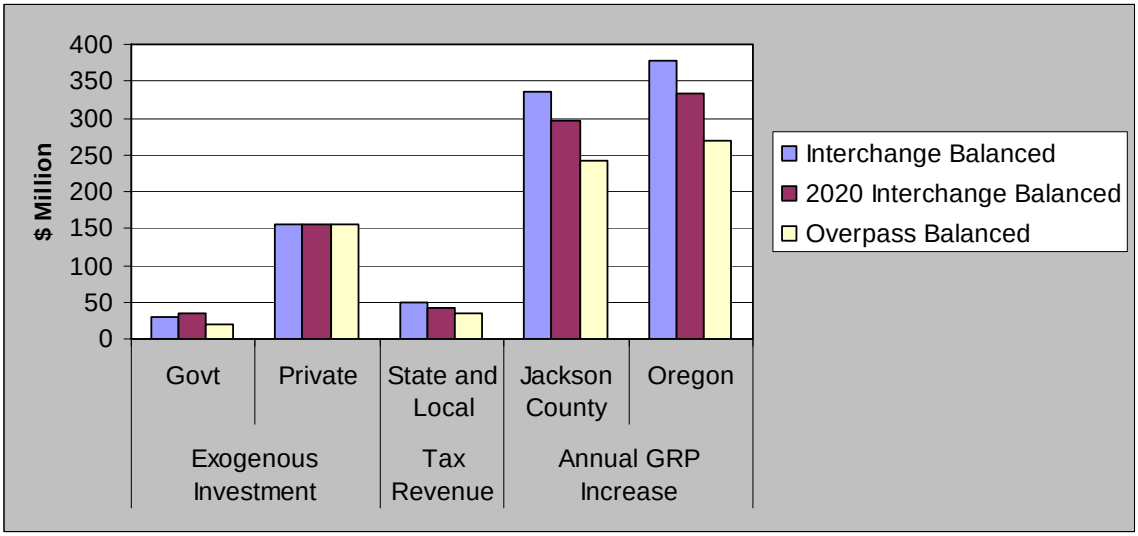


Figure 16:
2030 Growth in Gross Regional Product- Jackson County Balanced Mix of Uses

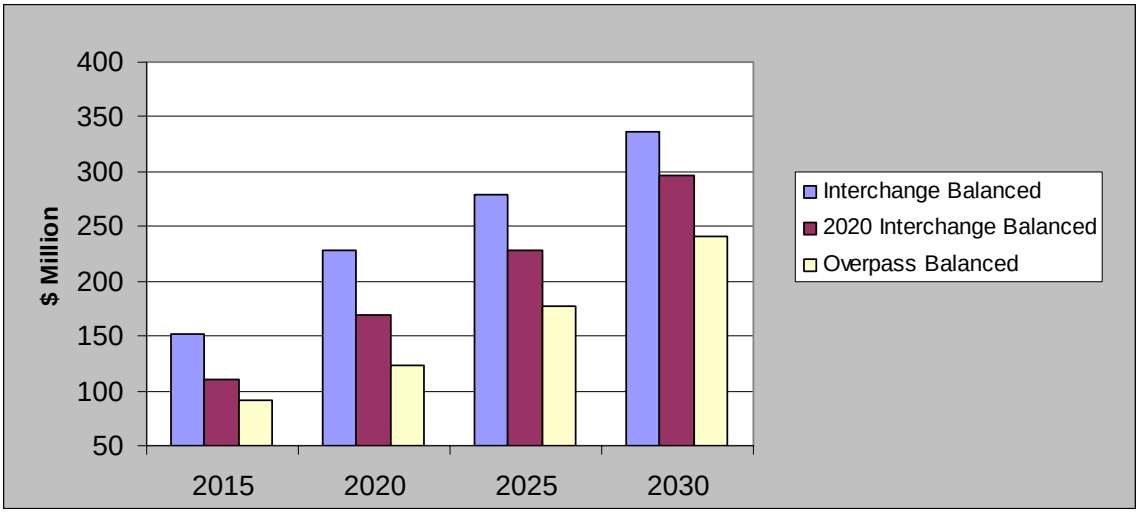


Figure 17:
Combined State and Local Tax Revenue in 2030- Jackson County Balanced Mix of Uses

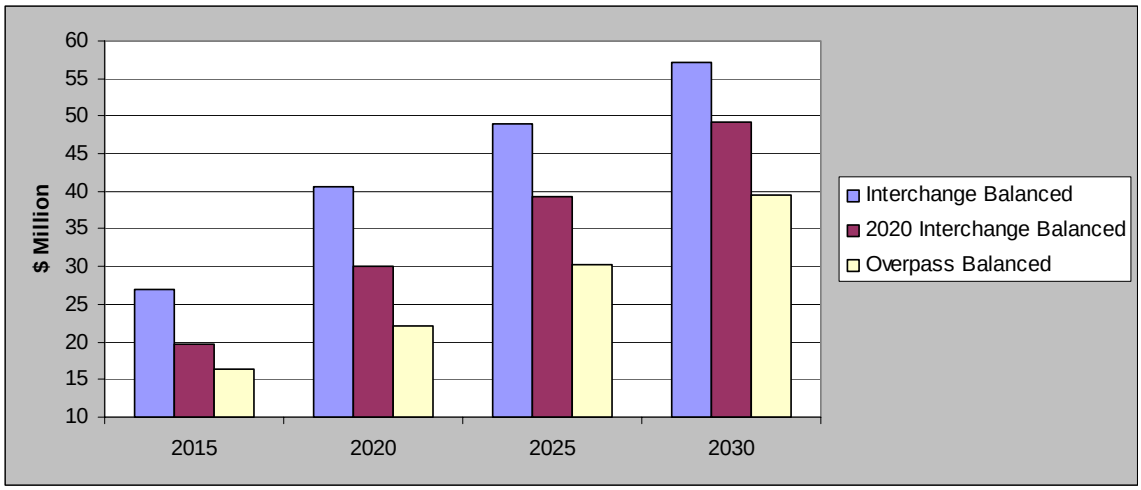


Figure 18:
Real, Per Capita, Disposable Income in 2030- Jackson County Balanced Mix of Uses

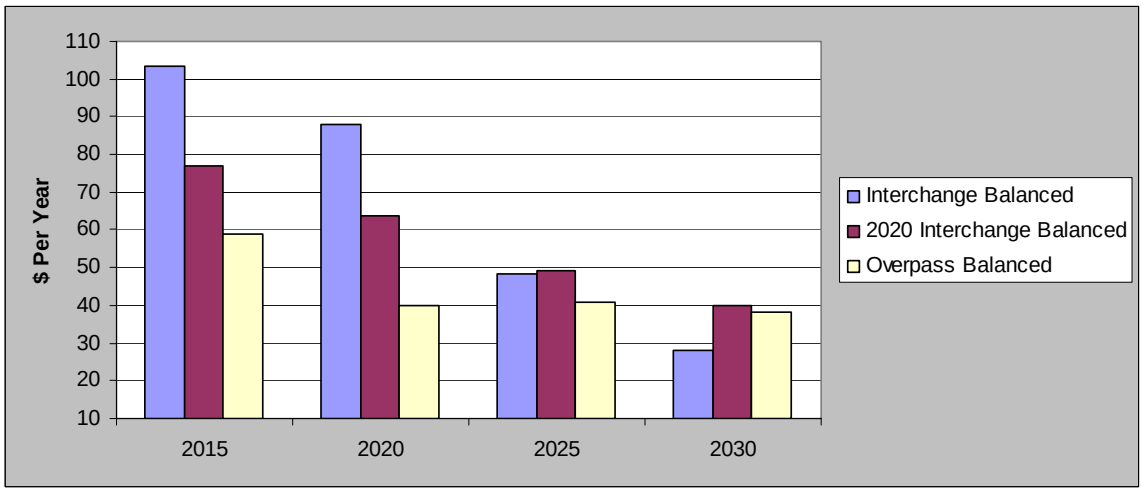
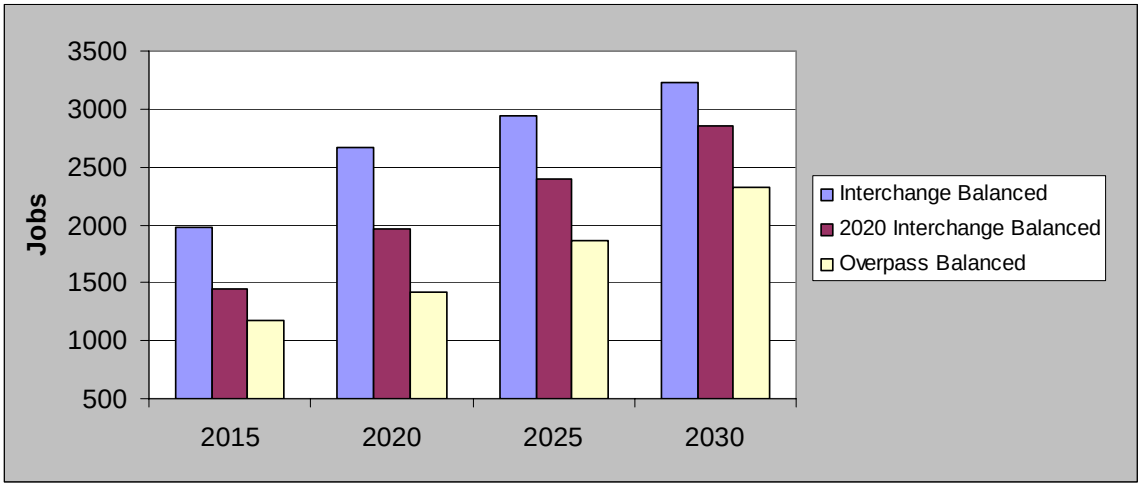


Figure 19:
2030 Increase in Employment- Jackson County Balanced Mix of Uses



3.5 Predominately Industrial Uses

Figure 20:
Investment, Tax Revenue and Gross Regional Product- Industrial Uses

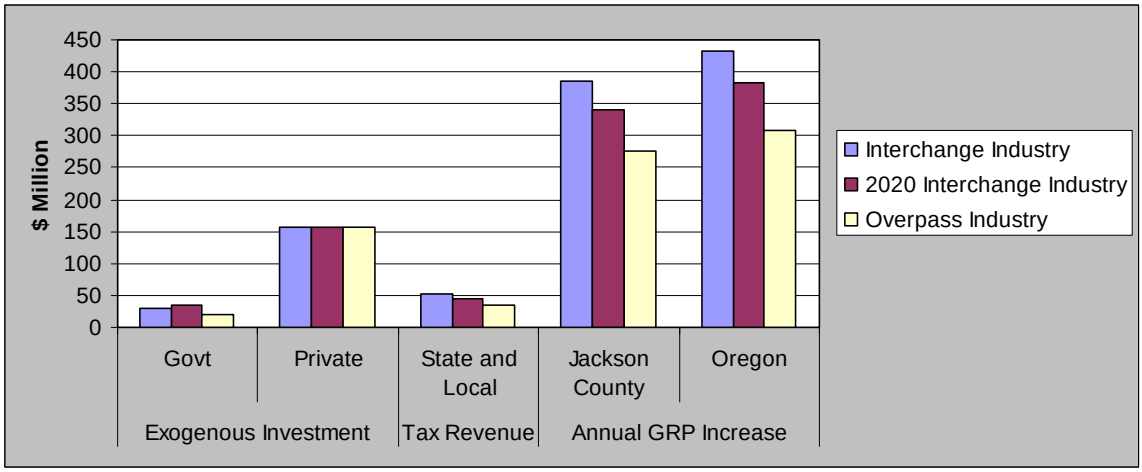


Figure 21:
2030 Growth in Gross Regional Product- Jackson County Industrial Uses

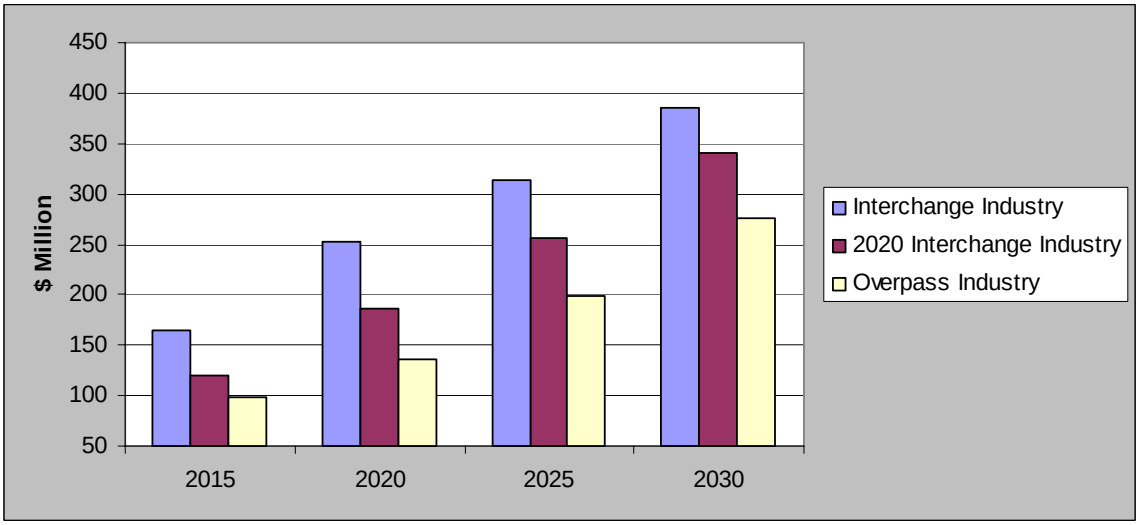


Figure 22:
Combined State and Local Tax Revenue in 2030- Jackson County Industrial Uses

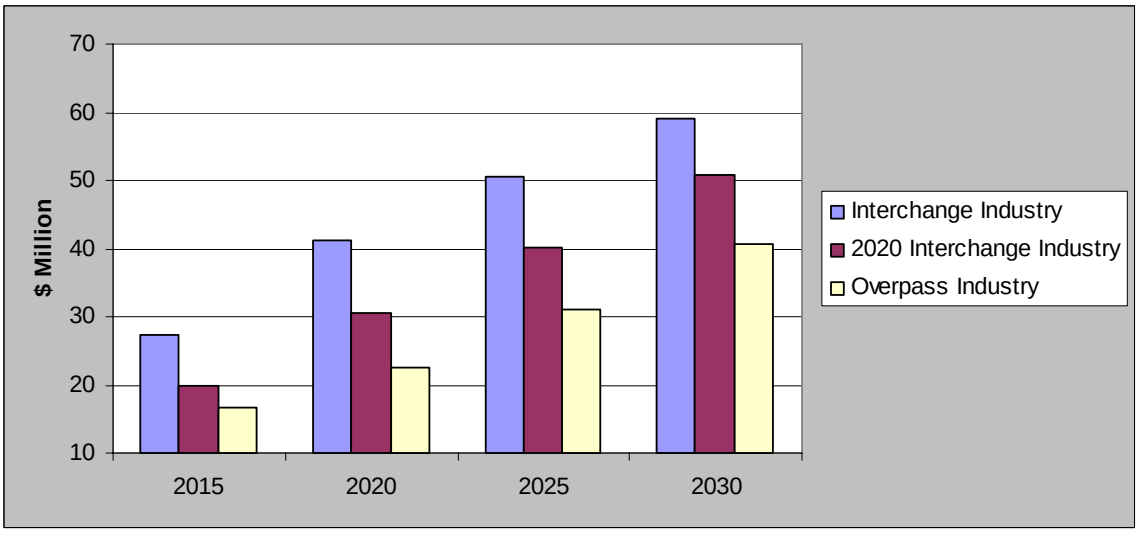


Figure 23:
Real, Per Capita, Disposable Income in 2030- Jackson County Industrial Uses

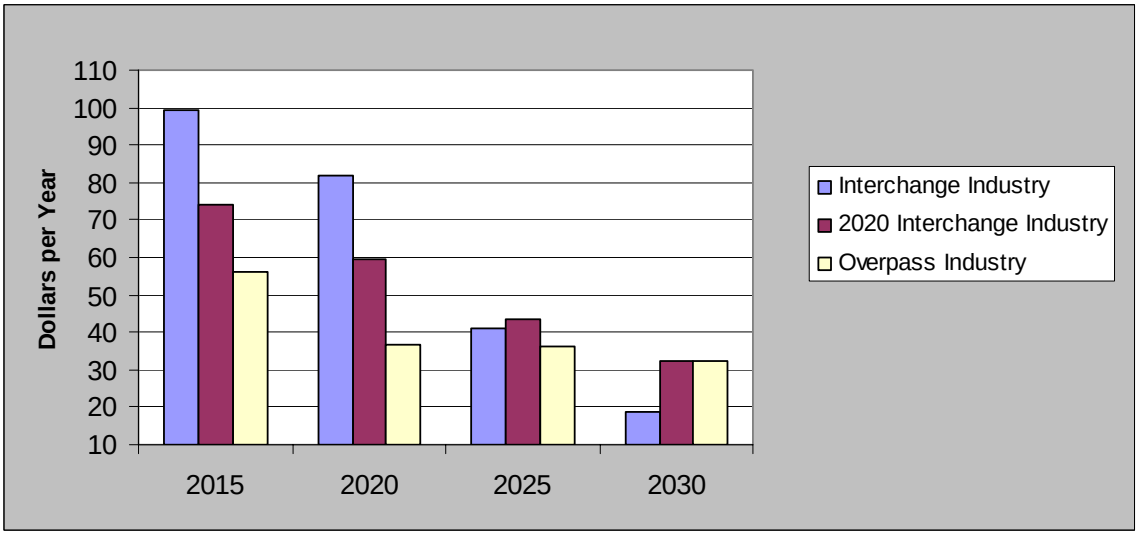
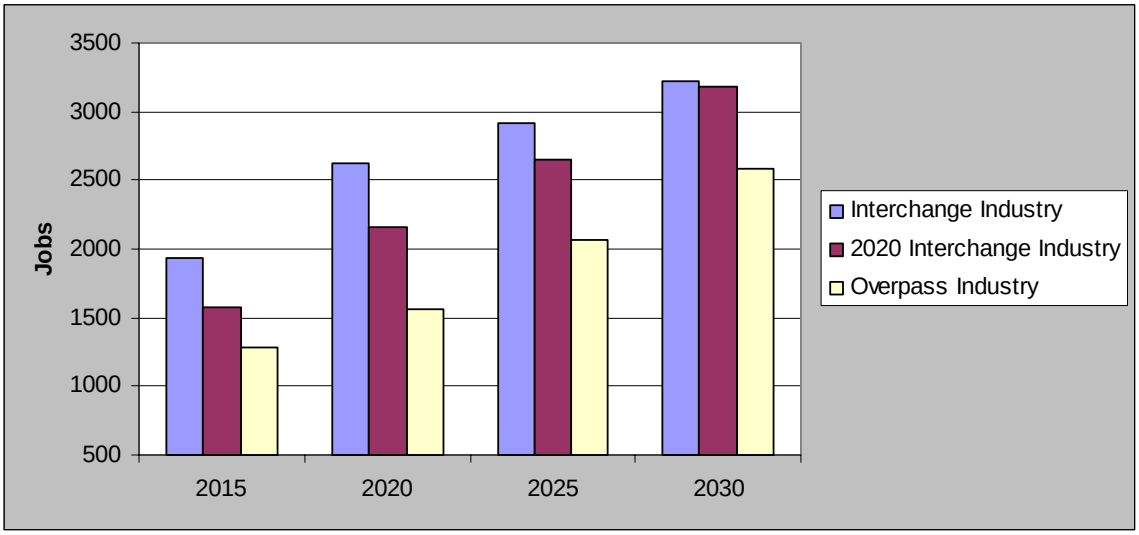


Figure 24:
2030 Increase in Employment- Jackson County Balanced Mix of Uses



4. *METHODOLOGY*

This section of the report discusses the technical aspects of the REMI model. This section also discusses the assumptions that were utilized in developing model inputs to capture transportation and utility improvements that would reduce effective distance and stimulate economic activity through increased access and reduced transportation and energy costs.

4.1 REMI Policy Insight® Model

4.1.1 The distinguishing features of the REMI Policy Insight Model:

- The REMI model is a multi-year forecasting and simulation model, enabling users to evaluate policy simulations of "what if" scenarios to determine the economic impacts. The model has strong dynamic properties, which means that it forecasts not only what *will* happen but also *when* it will happen.

- REMI developed a custom multi-regional economic and demographic forecast for the 5-County Region of Coos, Curry, Douglas, Jackson and Josephine Counties as well as the rest of Oregon. This dynamic year-by-year forecast represents the baseline, or no-build scenario. The REMI forecast extends to the year 2030, although REMI is capable of forecasting to 2050.

- The Industrial Sectors in Policy Insight are based on the North American Industry Classification System (NAICS). NAICS replaced the old Standard Industrial Classification (SIC) System in 1997, and was developed jointly by the US, Canada, and Mexico to allow business statistics comparability across North America[2].

- Policy Insight's forecast was assembled at the county level using data from the Bureau of Economic Analysis (BEA), the Bureau of Labor Statistics (BLS), the Department of Energy, Department of Defense (DOD), the Bureau of Census, and other public sources.

- The REMI model generates estimates for the *DIRECT* and *INDIRECT* impacts. Direct Impacts in this case are discussed in above Section III and include construction demand and labor demand. Indirect impacts are those demands for goods and services that increase as a result increased direct demand and demand increases that result from induced impacts.

- REMI's dynamic model structure is also capable of capturing the supply increases that result from increased demand stimuli, sometimes called induced impacts.

- The model structure has been developed to include "new economic geography" assumptions. Economic geography theory explains regional and urban economies in terms of competing factors of dispersion and agglomeration. Producers and consumers

[2] www.census.gov/epcd/www/naics.html

are assumed to benefit from access to variety, which tends to concentrate production and the location of households.

Cost:

- For businesses, the demand for labor, capital, and fuel depends on their relative costs. For example if there were an increase in the price of capital, businesses would likely have a preference shift away from capital toward labor and fuel.

- The population responds to price changes. Economic migrants will respond to wages, employment opportunity, local prices, and other labor market conditions.

Figure 25 is a representation of REMI Policy Insight's structure and shows the linkages within the local economy. The Output block shows how a business will produce goods to sell to other firms, consumers, investors, governments, and purchasers outside the region. The Labor and Capital Demand block shows how labor and capital requirements depend both on total sales (output) and on relative costs. In the Demographic block, the Population and Labor Supply size contribute to consumer spending (demand) and influence wages. Supply and demand interact in the Wage, Price, and Profit block. Production costs determine market shares locally, for the rest of the US, and for the Rest of the World. Output depends on market shares and the components of demand.

Figure 25
REMI Model Structure and Linkages
Excluding Economic Geography Linkages
Source: REMI

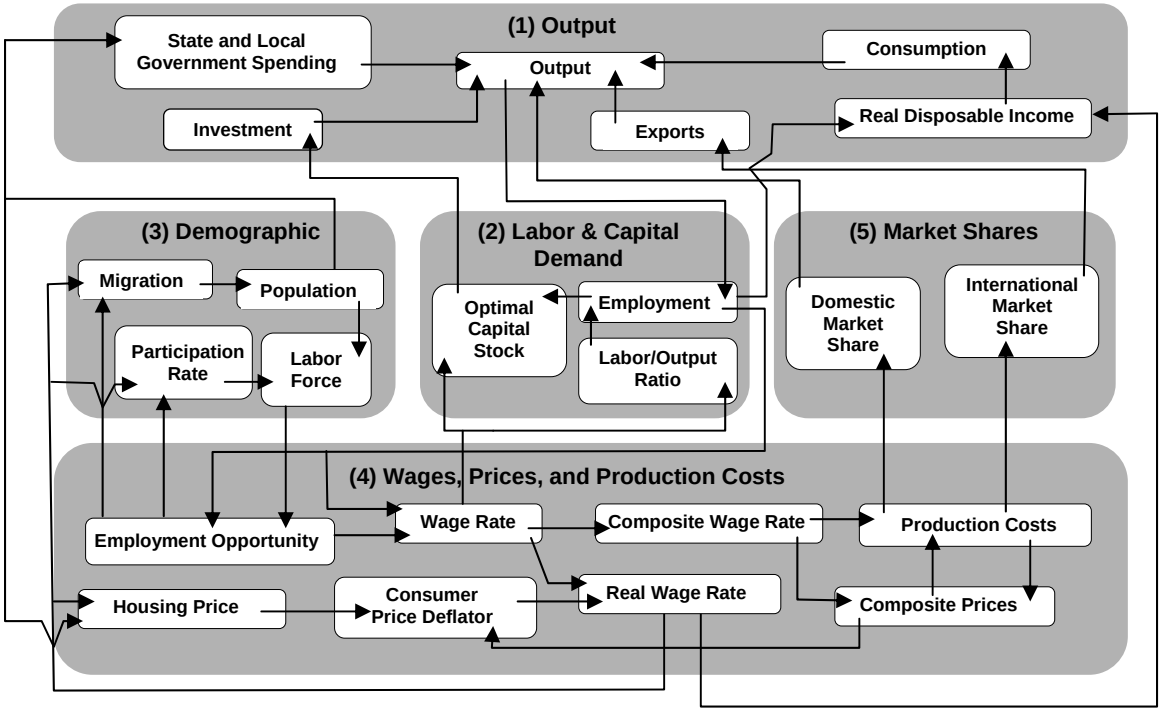
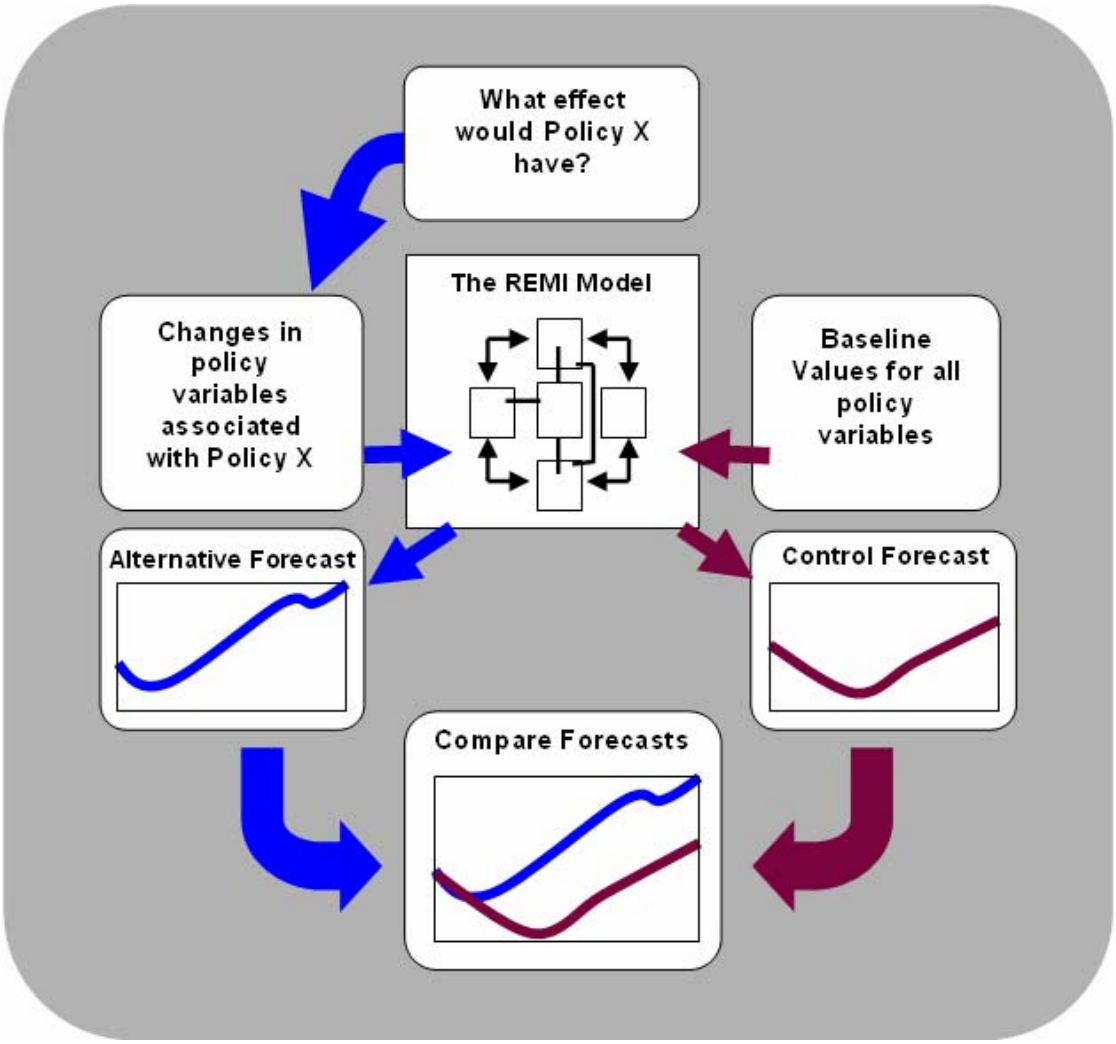


Figure 26 shows the policy simulation process for a scenario called "Policy X". To show the effects of this scenario, the user must select the appropriate policy variables to enter the values and assumptions that represent the direct effects of the scenario. The alternative forecast is then generated using these policy variable inputs. The impacts of a scenario are now determined by comparing the baseline REMI forecast with this new alternative forecast simulation "Policy X" to quantify the change to the economy.

Figure 26
REMI Model Policy Simulation Process
Source: REMI



4.2 REMI Transight® Model

Regional Economic Models, Inc. (REMI) developed a custom Policy Insight Model that incorporates the Southwestern Oregon Region which consists of the Counties: Jackson, Josephine, and the rest of Oregon State. This configuration allows REMI Northwest to estimate the economic impacts for counties individually and for the entire state. Once northwest travel data and project-specific data are entered into TranSight, the model translates the information into REMI Policy Variables and enters the data into REMI's Economic and Demographic Forecasting Simulation model for 70 Industrial Sectors (EDFS-70). EDFS-70 includes the REMI economic and demographic baseline forecast, or no-build scenario, and produces multi-year forecasts comparing them to the baseline forecast. REMI used the same baseline forecast, which included updated fiscal information, for the Highway and Port analysis.

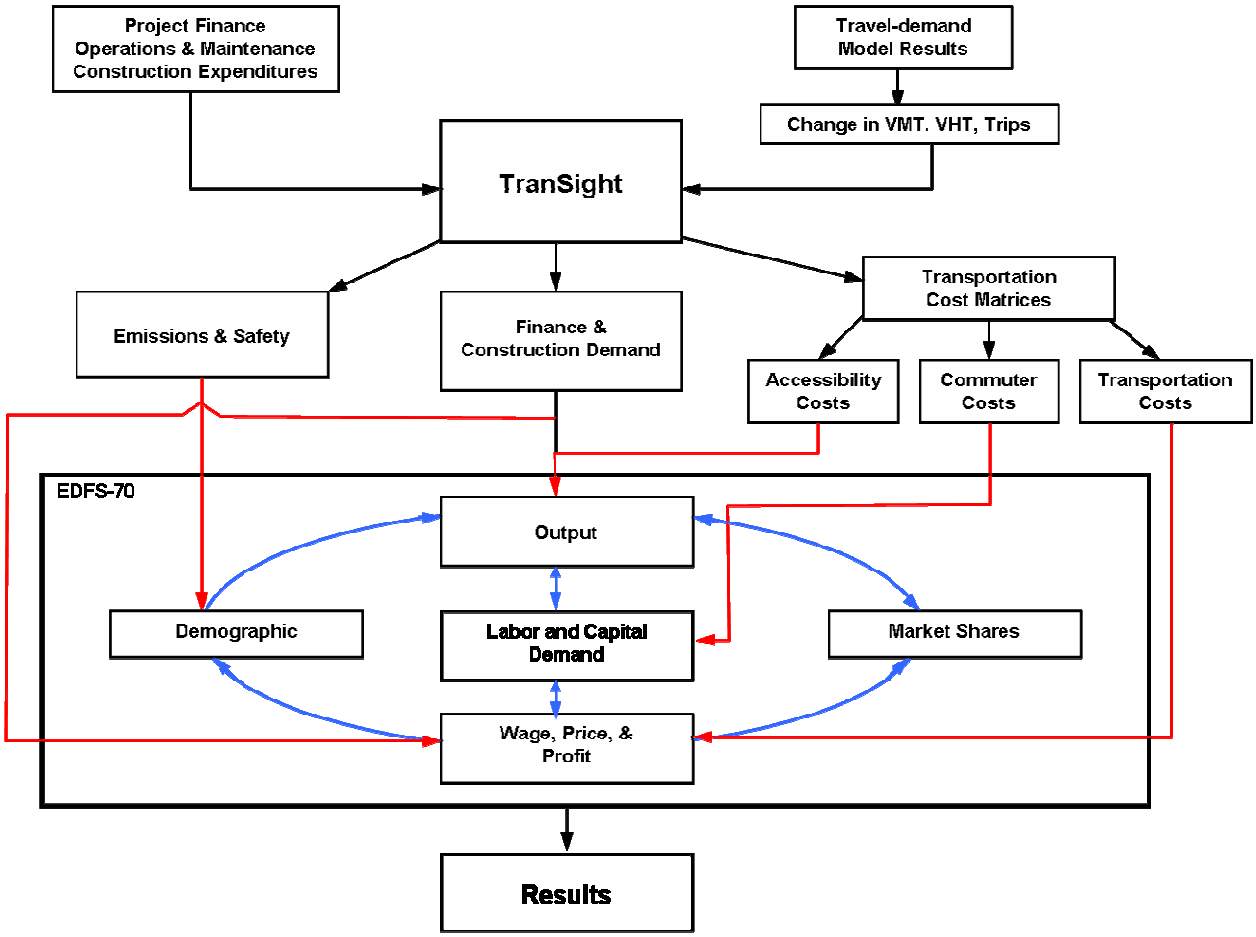
The travel-model outputs enter TranSight and are then passed onto the transportation cost matrix, which includes individual matrices for transportation costs, accessibility costs, and commuter costs. The travel data enter each individual matrix as changes to "effective distance."[3] These changes are then passed onto the EDFS-70's five major blocks as changes to delivered costs, production costs, and commuter costs for the region.

The change in truck movement (VHT, VMT, & Trips) enters the matrix as changes to transportation cost. The cost reduction or increase then enters the delivered-price equation and composite input-costs equation for each industry sector found in the Wage Price and Profit Block. The Accessibility Cost Matrix describes access to more diverse consumer goods and services by households, as well as access to a broader array of intermediate inputs by employers. Inputs to the accessibility cost matrix are calculated from the change in truck-trips per hour. The data from the accessibility cost matrix then enter into the output block as changes to the intermediate-input access index, which represents a price elasticity of demand[4] (price is sensitive to distance) and then feeds into the commodity access index giving both businesses and consumers more or less access to commodities.

The commuter cost savings over the average workday are entered into the model as savings in respect to auto movement (VHT, VMT, & Trips). These effective-distance changes enter the occupation labor access productivity equation found in the Labor and Capital Demand block in EDFS-70, which feeds into the industry labor-access productivity. Improvements in transportation would then mean an increase in labor access (i.e. workers willing to commute further), which would allow businesses to take advantage of a larger labor pool.

[4] Measures how the quantity demanded responds to a change in prices

Figure 27
Model structure of REMI TranSight Model
Source: REMI



TranSight uses motor-vehicle emissions rates obtained from the PART5 and MOBILE6b models developed by the EPA to specify emissions rates per vehicle-mile for specified pollutants. These pollutants include carbon monoxide, nitrogen oxides, volatile organic compounds, sulfur oxides, and particulate matter. Default emissions costs are based on a study by McCubbin and Delucchi[5] who quantified the health effects of vehicle pollution per VMT in the average urban area and the nation as a whole. TranSight uses these costs per gram for both motor-vehicle and public-transit modes. The change in emissions cost relative to baseline levels enters into the model as a non-pecuniary amenity, found in the

[5] McCubbin, Donald, and Mark Delucchi, "The Social Cost of the Health Effects of Motor Vehicle Air Pollution." Report 11 from The Annualized Social Cost of Motor-Vehicle Use in the United States. Institute of Transportation Studies. University of California-Davis. 1996.

Demographic block in EDFS-70, that accrues to workers and their dependents.[6] Because no difference could be discerned between scenarios in transportation system efficiency these results are not reported in this report.

TranSight includes annual mode-specific rates for three accident-consequence categories: fatalities, injuries, and Property Damage Only (PDO). Using national averages reported by the Federal Highway Administration, TranSight is configured with default highway accident rates. Although these accident rates were not updated for this analysis, the data can be updated to reflect accident rates for each individual county or all of Oregon State. TranSight also provides default cost-per-accident figures for each transportation mode, broken down by accident-consequence category. REMI bases these values on National Safety Council figures that incorporate wage and productivity losses, medical and administrative expenses, motor-vehicle damage, and a willingness to pay to reduce safety risks[7]. As with emissions costs, TranSight transfers these changes in safety costs into EDFS-70 as adjustments to the non-pecuniary amenities that affect individual welfare, which will induce a migration response in the demographic block of EDFS-70. Even for people not involved in accidents, the prevailing local accident rate, along with associated insurance and medical costs, can influence the relative attractiveness of living and/or working in a particular region, also influencing migration.

These costs then proceed to influence private decision-making by households in accordance with the tenets of the new economic geography, as articulated by Fujita et al.[8] and applied to regional macroeconomic modeling by Fan, Treyz, and Treyz.[9] This theory emphasizes the geographic location decisions of firms, demonstrating how improved access to intermediate inputs and a diversely skilled labor force can provide incentives for industries to cluster and agglomerate.

4.3 Effective Distance: The Transportation Cost Matrices

"Effective distance" is the mechanism through which the theory of economic geography enters the decision-making processes of economic agents in TranSight. It can be imagined as the geographic distance between two centers of economic activity, adjusted for the efficiency of multi-modal transportation between them. Hence, improvements in the transportation infrastructure reduce effective distance between two locations and, consequently, increase their interaction, in terms of the flows of labor, intermediate inputs, and end-use commodities. In general, as effective distance increases, the costs that deter economic activity rise through an exponential process called "distance decay." The rate of change by economic sector of the distance decay curve (known as the distance decay parameter, β) captures both the increased deterrence and the variable impact on flows by sector.

[6] Lieu, Sue and G. I. Treyz, "Estimating the Economic and Demographic Effects of an Air Quality Management Plan: The Case of Southern California." Environment and Planning 24 (1992): 1799-1811

[7] National Safety Council, Estimating the Cost of Unintentional Injuries.

[8] Fujita, Masahisa, Paul Krugman, and Anthony J. Venables, The Spatial Economy: Cities, Regions, and International Trade. Cambridge, MA: MIT Press, 1999.

[9] Fan, Wei, Frederick Treyz, and George Treyz "An Evolutionary New Economic Geography Model." Journal of Regional Science 4 (2000): 671-695.

For businesses involved in transporting goods, shorter travel times for their delivery vehicles translate into savings on fuel, wages, and perhaps vehicle and inventory costs. Furthermore, traveling sales personnel can potentially reach more clients during business hours. Although these savings can stem directly from additional roads, which provide quicker alternative routes between popular destinations, they can also result from widened roads, public transit networks, or enhanced traffic control systems, which can diminish congestion and lower accident rates.

The theory of economic geography (which is integrated into the EDFS-70 model) assumes that both firms and households obtain benefits from policies that expand their access to variety in labor, intermediate inputs, and end-use goods. Regarding labor markets, transportation upgrades improve compatibility between employers and employees through two complementary channels: firms can access a broader and more diverse labor pool, while workers can reach additional jobs that may be better suited to their preferences. Even in the absence of job switching, shorter commutes to existing jobs produce time - savings valuable to both workers and employers. The commuter-related benefits accruing to firms are captured through the commuter cost matrix, while the gains to suppliers of labor are described in the "Value of Time" section.

Economic geography also assumes that markets are characterized by monopolistic competition, meaning that goods and services are non-homogeneous. Therefore, all economic agents derive incremental utility from the ability to choose from a wider array of alternatives. By facilitating interactions among a more diverse set of buyers and sellers, transportation upgrades can broaden the scope for market transactions. Businesses can find better matches for their needs in the intermediate input markets, while households can purchase more varied goods and services.

Within the TranSight framework, effective distance implicitly enters the calculation in three distinct forms: commuter costs, transportation costs and accessibility costs. The transportation cost matrix displays time savings for on-the-clock business travel and transport of goods. Transportation costs can vary among regions as well as across forecast years. Thus, a new or expanded highway connecting two regions may have substantial impacts on transport costs between them, but also smaller secondary effects on costs between other regions as traffic patterns shift in response to the new alternative. The inter-temporal differences can capture the cumulative impact of business development that occurs along the new highway or near a new public transit station, which may steadily increase congestion and thereby increase average travel times.

Savings are grounded in the difference between the alternative and baseline scenarios in the ratio of VMT to VHT. This approach captures the offset between shorter travel times and additional miles traveled, both of which are likely consequences of an upgraded transportation infrastructure. TranSight computes the transportation cost savings parameters as follows. Because the baseline values are in the numerator, a cost change parameter greater than 1 implies a cost increase relative to the baseline case, whereas ΔTC_{ij} less than 1 suggests cost savings to the commercial and industrial sectors due to the transportation project. Thus, the value of 1 would indicate that the transportation improvement has a neutral impact on transportation costs, with the degree of deviation from 1 being associated with the magnitude of the cost effect.

$$\Delta TC_{ij} = \frac{(VMT_{ij}^{base} / VHT_{ij}^{base})}{(VMT_{ij}^{alt} / VHT_{ij}^{alt})}$$

where

VMT_{ij}^{base} = Vehicle miles traveled between i and j: base scenario

VHT_{ij}^{base} = Vehicle hours traveled between i and j: base scenario

VMT_{ij}^{alt} = Vehicle miles traveled between i and j: alternative scenario

VHT_{ij}^{alt} = Vehicle hours traveled between i and j: alternative scenario

The final cost matrix bridges business and consumer interests by reflecting the value of increased accessibility to intermediate inputs and consumer goods afforded by the upgraded transportation system. While widened roads may only marginally improve accessibility, other infrastructure upgrades such as new bus routes, highways, or commuter rail lines may yield notable decreases in accessibility costs. As with the preceding two cost matrices, accessibility costs are entered for each pair of modeled regions in each forecast year. TranSight measures the change in these costs by comparing the ratio of VMT to VHT between the alternative and baseline scenarios, through an equation comparable to the transportation cost formula above.

Increasing labor productivity will create a comparative advantage for firms in the region. Assuming wage rates remain constant, firms now increase their output with the same number of workers, essentially reducing production costs. This reduction leads to an economic snowball effect. Because the firms now have cheaper production costs, they can charge less money for their goods. Because they charge less for the goods, they will increase their share of foreign and domestic markets, thus increasing the demand for goods and services from those firms. To meet this higher output demand, a firm will have to purchase more capital and hire more workers. To attract more workers, the firm will have to increase wage rates. People from outside the region will see higher wages and increased employment opportunity and will start moving into the area.

Commuting costs describe how difficult it is for workers to travel within and between regions. One of the most significant deterrents for commuters is congestion (Weisbrod, Vary, Treyz). Decreasing an area's congestion increases commuters' ability to get to work. Workers who live farther away from the work place will be willing to commute into the region, and firms now have access to a larger pool of workers than before. This change in transportation infrastructure becomes an economic shock. Because firms have access to a larger number of workers, they have the ability to "specialize" their workers, which means that they can find workers that are more suitable to the position in the firm that needs to be filled.

TranSight passes them directly into EDFS-70, where they impact economic and demographic trends through different channels. Decreases in transportation costs lower the delivered prices of products, which are computed as the sum of the commodity's cost at its origin and the distance-related cost of transferring the commodity to its destination. These price changes translate into lower input costs for producers and into benefits for

consumers. Improved accessibility costs influence the location decisions of households via the economic migration module, and also indirectly diminish production costs due to improved access to well-suited factor inputs.

As a consequence of affecting commodity and labor access indices, transportation projects can have secondary effects on regional wages, employment, delivered prices, and market shares, among other variables. More importantly, an improvement in a region's transportation infrastructure can yield localized benefits in costs and productivity, which can increase its competitive position in relation to surrounding regions. However, at the same time, the project can create spillover effects in those neighboring regions, particularly on labor and capital inputs that are drawn from those areas.

The costs to move intermediate inputs, final goods, and labor directly affect a firm's production costs; as a firm's transportation costs rise, so do a firm's production costs. The three main transportation factors in production costs are a firm's access to intermediate inputs, access to laborers, and the firm's ability to deliver their goods and services to consumers. Dollar figures for these factors are difficult to estimate. To more easily quantify transportation costs, economic geography theorists use the concept of effective distance.

4.3.1 Travel Rate Index

In addition to growth resulting directly and indirectly from investments in large scale projects like the employment campus, economic cost and benefits may also result from changes to the transportation system which may affect efficiency of transportation. A transportation rate index (TRI) measure was computed from the Region's transportation model based upon ENIF data from the Oregon Department of Transportation and the recommended methodology for creating a Transportation Rate Index created by the Transportation Planning Analysis Unit at the Oregon Department of Transportation. The purpose of the transportation analysis for this project was not to analyze precise transportation impacts in and around the project, but rather to analyze the more general economic consequences on the region's system for this project in this location. The TRI provided a basis to compare transportation efficiencies between transportation infrastructure and employment scenarios.

Table 11: Speed Estimates and Travel Rate Index Values for Selected Western Cities in 2005

	Average Speed (mph)		
Urban Area	**Freeway**	**Principal Arterial**	**TRI**
Portland OR-WA	48.2	29.3	1.23
Salem OR	59.5	31.9	1.06
Eugene OR	59.3	31.1	1.05
Medford OR	54.5	37.6	1.058
Los Angeles Long Beach Santa Ana CA	34.7	29.9	1.53
San Francisco-Oakland CA	42	29.5	1.37
San Diego CA	45.6	29.9	1.28
Riverside-San Bernardino CA	45.2	30.7	1.25
Denver-Aurora CO	47.3	28.7	1.25
Phoenix AZ	45.8	30.8	1.23
San Jose CA	48.2	29	1.23
Portland OR-WA	48.2	29.3	1.23
Las Vegas NV	48.3	29.6	1.22
Sacramento CA	48.7	30.2	1.21
Seattle WA	49.1	30.2	1.2
Salt Lake City UT	51.5	30.1	1.16
Tucson AZ	53.8	29.9	1.15
Albuquerque NM	53.9	31.5	1.11
Oxnard-Ventura CA	54.6	31.2	1.11
Fresno CA	58.1	31.1	1.08
Boulder CO	59.9	32	1.05
Spokane WA	59.2	33.2	1.04
Bakersfield CA	58.8	33.5	1.03
Anchorage AK	60	32.1	1.03

The travel rate index is calculated by comparing the travel rates on each functional class of road segment to travel rates when traffic is flowing freely. The procedure for calculating the travel rate index is consistent with practice planned for Oregon's automated travel management centers. The TRI calculation process categorizes each segment of the road system into one of five congestion levels. The procedure uses the delay rate, the difference between free-flow and average speeds, to calculate the delay in each congestion level. The index is weighted by the amount of travel making it possible to compare index values between segments of the road network or between road networks. The TRI can be summarized with the following equation.

Figure 28:
Method for Calculating the TRI

$$\text{Average Speed (mph)} = \frac{\text{Average Freeway Speed} \times \text{Freeway VMT} + \text{Average Arterial Street Speed} \times \text{Arterial VMT}}{\text{Freeway VMT} + \text{Street VMT}}$$

$$\text{Travel Rate} = \frac{60}{\text{Average System Element Speed}}$$

$$\text{(Ex. Congested Freeway) } 1.25 = \frac{60}{45.92} = 1.29$$

$$\text{Travel Rate Index} = \frac{\left(\frac{\text{Freeway Travel Rate}}{\text{Freeway Freeflow Rate}} \times \text{Peak Period Freeway VMT}\right) + \left(\frac{\text{Principal Arterial Street Travel Rate}}{\text{Principal Arterial Street Freeflow Rate}} \times \text{Peak Period Principal Arterial Street VMT}\right)}{\text{Peak Period Freeway VMT} + \text{Peak Period Principal Arterial Street VMT}}$$

$$\text{(Ex.) } 1.26 = \frac{\left(\frac{1.306}{1.0} \times 21{,}375{,}000\right) + \left(\frac{1.992}{1.71} \times 9{,}550{,}000\right)}{21{,}375{,}000 + 9{,}550{,}000}$$

Source: Gregor, Brian, Urban Mobility Report Appendix B Pg. 17ODOT 2004

Figure 28 shows how the TRI is calculated. The equations of the TRI employ vehicle miles traveled, free flow speed and peak hour speeds to arrive at an index which can be compared between cities despite the fact that transportation systems are very different from city to city.

4.4 Primary Historical Data

Table 12:
Data Sources

Concept	Source	Last Available Historical Year	Notes
Economic			
Employment	BEA-REIS (23 Sector)2001-2004	2001-2004	Total Employment Series
Wages	BLS QCEW; CBP		
Personal Income	BEA-REIS	2001-2004	
Compensation	BEA, BEA REIS	2002-2004	
Commuter Flows	Journey to Work-Regional Economic Measurement Division	2000	2000 flow matrix R.A.S.'d to BEA gross flows and reconciled to BEA's net residence adjustment ($)
Unit of Electricity	State-level data used: Energy Information Administration	2001	
Unit Natural Gas Cost	State-level data used: Energy Information Administration	2001	
Unit Residual Fuel Cost	State-level data used: Energy Information Administration	2001	
Purchased Fuel Weights	State-level data used: Energy Information Administration	2000	
Occupational Matrix	BLS	2004, 2014	Details 94 Occupations, linearly interpolated
Productivity	BLS	2001-2004; 2014	Calculated from detailed E&Q data
Technology Matrix	BLS	2001-2004; 2014	Make & Use matrices converted to industry-by-industry matrices. Interpolated by in-between years
Industry Deflators	BLS	2001-2004	Nominal & Real Q to calculate deflators
Final Demand	BLS	2001-2004; 2014	Interpolated by growth in labor force for in-between years.
Commodity Prices	Survey of Current Business: NIPA	2001-20004	
Business Cycle	RSQE	2004-2007	
Corporate Profit Tax Rate	Calculated State Rate Used (collections/profits)		
Collections	www.census.gov (current), Government Finances (historical)	2001-2004	Corporate net Income & Corporations in General
Estimated Profits	BLS Technical coefficients matrix and REMI, estimated outpur	2001-2004	Moving average to convert from fiscal year to calendar year.
Property Tax Rate	Calculated State Rate Used (collections/profits)		This rate reflects both residential & non-residential capital
Collections	www.census.gov (current), Government Finances (historical)	2000, 2002	
Estimated Stock	Allocation of U.S. non-residential and residential stock by the state's profit and real disp. Income weights	2001-2004	
Personal Income Taxes	BEA State Rates	2001-2004	Includes federal, state & state & local collections
Investment Tax Credit Rate	U.S. ratio - Survey of Current Business	2001-2004	
Housing Prices	Census of Housing and National Association of Realtors	1990,2000,1990-2004	Median Values; N.A.R. regional and metropolitan growth rates applied to interpolate inter-censal years.

Concept	Source	Last Available Historical Year	Notes
Demographic			
Population	Census: decennial (1 yr cohort) inter-censal (5 yr cohort)	1990-2004	Reconciled to BEA for consistency
Births, Deaths, Net International Migrants	Census	1990-2004	Net international migrants reconciled with national totals
Natality Rates	State rate used - Center for Disease Control and Prevention, National Center for Health Statistics	1999-2100	Birth Rates by Age and Race available for 1994, 1995, 1997, 1998, 1999
Survival Rates	Census: Population Projections of the United States by Age, Sex Race, Hispanic Origin, and nativity: 1999-2100	1990-2004	National survival rates adjusted to fit regional deaths observed in history
Retired Migrants	Census 2000 Migration Data on DVD	1000-2050	Age-specific retired migration rates are calculated using 2000 census data
Military Population	Census, Department of Defense	2000; 1990-2004	Personnel by location from DoD starting in 1994. Data by Race and Sex for 2000 only
Military Dependents	Department of Defense	1990-2004	National totals only; dependents are assigned to regions based on size of Military population.
College Population	Census, U.S. Department of Education, National Center fo Education Statistics	1990-2004	Data by Race and Sex for 2000 only
Prisoner Population	Census, U.S. Department of Justice	2000; 1990-2004	Data by Race and Sex for 2000 only
Labor Force	Census, Bureau of Labor Statistics	1990-2004	Data by Race and Sex for 2000 only
Labor Force Participation Rates Forecast	BLS	2000-2050	

4.4.1 BEA

The primary national, state, and county data source for REMI Policy Insight is the Bureau of Economic Analysis (BEA) employment, compensation, and personal income series (which includes total population). The BEA data is available for the nation and states at the summary level (94 industries), and for counties at the sector level (24 industries).

Employment

The BEA employment series for states and local areas comprises estimates of the number of jobs, full-time plus part-time, by place of work. Full-time and part-time jobs are counted at equal weight. Employees, sole proprietors, and active partners are included, but unpaid family workers and volunteers are not included. Employment can be measured either as a count of workers or as a count of jobs. In the former case, an employed worker is counted only once; in the latter case, all jobs held by the worker are counted.

The state and county employment estimates are a count of the number of jobs, so that, as with the earnings estimates, a worker's activity in each industry and location of employment is reflected in the measure.

Proprietors' employment consists of the number of sole proprietorships and the number of partners in partnerships. The description "by place of work" applies to the wage and salary portion of the series, and, with relatively little error, to the entire series. The proprietors' employment portion of the series, however, is more nearly by place of residence because, for non-farm sole proprietorships, the estimates are based on IRS tax data that reflect the address from which the proprietor's individual tax return is filed, which is usually the proprietor's residence. The non-farm partnership portion of the proprietors' employment series reflects the tax-filing address of the partnership, which may be either the residence of one of the partners or the business address of the partnership.

The employment estimates are designed to be consistent with the estimates of wage and salary disbursements and proprietors' income that are part of the personal income series. The employment estimates are based on the same sets of source data as the corresponding earnings estimates, and are prepared with parallel methodologies. Two forms of proprietors' income - the income of limited partnerships and the income of tax-exempt cooperatives - have no corresponding employment estimates.

Employment in industries covered by the UI programs

The estimates of about 95 percent of wage and salary employment are derived from tabulations by the state employment security agencies (ESAs) from their state employment security reports (form ES-202). These tabulations summarize the data from the quarterly UI contribution reports filed with a state ESA by the employers subject to that state's UI laws. Employers usually submit reports for each operating establishment, classified by county and industry. However, in some cases, an employer may group very small establishments in a single "statewide" report without county designation. Each quarter, the various state ESAs submit the ES-202 tabulations to the Bureau of Labor Statistics (BLS), which provides the data to BEA. The tabulations present monthly employment and quarterly wages for each county in Standard Industrial Classification four-digit detail. Data for 2001 and later are provided in North American Industry Classification System (NAICS) four-digit and five-digit industry detail.

BEA adds several million administrative records received from the states and the District of Columbia to its database annually. The records are checked for major errors by several computerized edit routines. One edit routine analyzes the current quarter county data for invalid SIC four-digit codes or invalid NAICS codes, duplicate records, and records that contain no data. Another edit routine calculates expected county-level average Employment and average wage estimates on a quarterly basis at the three-digit SIC level or NAICS industry group, based on percentage changes for that quarter in the previous two years. If the difference between the actual numbers and the estimated numbers exceeds established limits, the record is identified for further review. Anomalies that remain un-reconciled after reviewing comments and other supporting data are referred back to BLS for further investigation.

The basic procedure for preparing the local area estimates of wage and salary employment for each UI covered industry is to average the 12 monthly ES-202 employment observations and to allocate the higher level geographic totals (counties add up to states, and states add up to the nation) in proportion to the averaged series. However, ES-202 employment does not precisely meet the statistical and conceptual requirements for BEA's employment estimates. Consequently, the data must be adjusted to meet the requirements more closely. The necessary adjustments affect both the industrial and geographic patterns of county employment.

Employment not covered by the UI programs

• Railroads — The railroad industry is covered by its own unemployment insurance program, which is administered by the Railroad Retirement Board (RRB), rather than by the state UI system. Data suitable for estimating local area employment of railroads are available from the RRB only on a place-of residence basis. Because BEA's employment estimates are designed to conform conceptually and statistically to the place-of-work earnings estimates, the RRB data are adjusted to a place-of-work basis by using journey-to-work data from the 1990 Census of Population. The national totals for all railroad companies combined are allocated to counties in proportion to the adjusted RRB series.

• Private households — For this largely non-covered industry - mainly domestic servants - the national employment estimates are allocated to counties in proportion to place-of-work private household employment from the 1990 Census journey-to-work data.

• Farm labor contractors — This industry is classified in agricultural services rather than in farms. The UI coverage in Arizona and California is complete enough to permit the use of the ES-202 data for both the state and county estimates, but most state UI programs only partially cover this industry. For these states, the county estimates of farm labor contractor employment are based on the geographic distribution of expenditures for contract labor reported in the Census of Agriculture.

• Private elementary and secondary schools — Private elementary and secondary schools are treated as a non-covered industry because religiously affiliated elementary and secondary schools, which account for most of the employment in this industry, remain largely outside the scope of the UI program. The state estimates of private elementary and secondary school employment are primarily based on the employment reported annually by the Census Bureau's County Business Patterns (CBP).

The CBP data are tabulated from the administrative records of the social security program — old-age, survivors, disability, and hospital insurance — and are more complete for elementary and secondary schools than the data prepared under the UI program. The social security program, although exempting nonprofit religious organizations — including schools — from mandatory coverage, has elective coverage provisions that have resulted in broad participation among religiously affiliated elementary and secondary schools. In about half of the states, the UI coverage of elementary and secondary schools is complete enough to permit the use of ES-202 data as the basis for the county employment estimates. For the other states, the county estimates are based on the best available series of private elementary and secondary school employment chosen from data published by state departments of education, data from the U.S. Department of Education's 1998 survey of private elementary and secondary schools, or data from CBP, which cannot be used more generally because they are frequently suppressed at the county level to prevent disclosures.

• Religious membership organizations — The Federal Unemployment Tax Act permits the states to exclude religious membership organizations from mandatory UI coverage. Although most state UI laws do have some provisions for elective coverage, less than 10 percent of the national total employment of religious membership organizations is covered by UI. Therefore, the county estimates of the employment of religious membership organizations are based on CBP data. The CBP data are adjusted by allocation to sum to the BEA national employment totals for this industry.

• Military — County military employment is measured as the number of military personnel assigned to active duty units that are stationed in the area plus the number of

military reserve unit members. The estimates of active duty employment for the Army, Air Force, Navy, Marine Corps, and Coast Guard are based on the annual averages of 12 monthly observations, for a given year, from reports received from each branch of service. Navy personnel assigned to ships and other mobile units and Marines assigned to Fleet Marine Force units are measured according to the units' home ports rather than their actual locations as of the reporting date. The measure of the employment of the military Reserves — including the National Guard — is confined to members of reserve units that meet regularly for training. The state estimates are based on fiscal year-ending September 30 tabulations of military reserve pay provided by the Army, Air Force, Navy, Marine Corps, and Coast Guard. For consistency with the BEA estimates of military reserve wages, the state totals of military reserve employment are allocated to counties in proportion to civilian population.

• "Other" — In the local area employment series, this category consists of the number of U.S. residents employed in the United States by international organizations and by foreign embassies and consulates. The category differs from "rest-of-the-world" -- the corresponding category in the national employment estimates — in that "rest-of-the-world" also includes the net flow of international border workers — i.e., U.S. residents working across the border in Canada and foreign residents working in the United States. The border workers are not reflected in the county employment estimates. The county estimates of "other" employment are made by allocating the national totals for all years to counties in proportion to estimated 1968 administrative expenses of international and foreign organizations operating in the United States. The administrative expenses series was prepared by the BEA.

Wage and salary disbursements

Wage and salary disbursements consist of the monetary remuneration of employees, including corporate officers' salaries and bonuses, commissions, pay-in-kind, incentive payments, and tips. It reflects the amount of payments disbursed, but not necessarily earned during the year. Wage and salary disbursements are measured before deductions, such as social security contributions and union dues.

In recent years, stock options have become a point of discussion. Wage and salary disbursements include stock options of nonqualified plans at the time that they have been exercised by the individual. Stock options are reported in wage and salary disbursements. The value that is included in wages is the difference between the exercise price and the price that the stock options were granted.

All state and local area dollar estimates are in current dollars (not adjusted for inflation).
Wages and salaries for the military services The estimates of wages and salaries for the military services consist of the estimates of cash wages (including allowances) of full-time personnel of the armed services (including the Coast Guard), the estimates of cash
wages of the members of the Reserves including the National Guard, and the estimates of pay-in-kind received by the full-time and reserve enlisted personnel of the armed services.

Compensation

Compensation of employees, received, is the sum of Wage and Salary Disbursements and Supplements to Wages and Salaries.

Personal income and components

Personal Income is the income that is received by all persons from all sources. It is calculated as the sum of wage and salary disbursements, supplements to wages and salaries, proprietors' income with inventory valuation and capital consumption adjustments, rental income of persons with capital consumption adjustment, personal dividend income, personal interest income, and personal current transfer receipts, less
contributions for government social insurance.

The personal income of an area is the income that is received by, or on behalf of, all the individuals who live in the area; therefore, the estimates of personal income are presented by the place of residence of the income recipients.

Supplements to wages and salaries

This component of personal income consists of employer contributions for employee pension and insurance funds and of employer contributions for government social insurance.

Employer contributions for employee pension and insurance funds

This component of personal income consists of employer payments to private and government employee retirement plans, private group health and life insurance plans, privately administered workers' compensation plans, and supplemental unemployment benefit plans.

Employer contributions for government social insurance

These contributions, which are subtracted in the calculation of personal income as part of contributions for government social insurance, consist of employer payments under the following Federal and state and local government programs: Old-age, survivors, and disability insurance (OASDI); hospital insurance (HI); unemployment insurance; railroad retirement; government employee retirement; pension benefit guarantee; veterans' life insurance; publicly-administered workers' compensation; military employee programs (veterans' life and military medical insurance); and temporary disability insurance. The contributions are excluded from personal income by definition, but, as part of supplements to wages and salaries, are included in earnings by place of work.

Proprietors' income

This component of personal income is the current-production income (including income in kind) of sole proprietorships and partnerships and of tax-exempt cooperatives. Corporate directors' fees are included in proprietors' income, but the imputed net rental income of owner-occupants of all dwellings is included in rental income of persons. Proprietors' income excludes dividends and monetary interest received by non-financial business and rental incomes received by persons not primarily engaged in the real estate business; these incomes are included in dividends, net interest, and rental income of persons, respectively.

Rental income of persons with capital consumption adjustment

Rental income is the net income of persons consisting of income from the rental of real property except for the income of persons primarily engaged in the real estate business; the imputed net rental income of the owner-occupants of non-farm dwellings; and the royalties received from patents, copyrights, and rights to natural resources. The Capital Consumption Adjustment is the difference between private consumption of fixed capital (CFC) and private capital consumption allowances. Private CFC is a charge for the using up of private fixed capital. It is based on studies of prices of used equipment and structures in resale markets. Private capital consumption allowances consist of tax-return-based depreciation charges for corporations and non-farm proprietorships and of historical-cost depreciation, calculated by BEA, for farm proprietorships, rental income of persons, and nonprofit institutions.

Personal dividend income

This component of personal income is the dividend income of persons. It consists of the payments in cash or other assets, excluding the corporation's own stock, made by corporations located in the United States or abroad to persons who are U.S. residents. It excludes that portion of dividends paid by regulated investment companies (mutual funds) related to capital gains distributions.

Personal interest income

This component of personal income is the interest income (monetary and imputed) of persons from all sources.

Personal current transfer receipts

This component of personal income is payments to persons for which no current services are performed. It consists of payments to individuals and to nonprofit institutions by Federal, state, and local governments and by businesses. Government payments to individuals include retirement and disability insurance benefits, medical payments (mainly Medicare and Medicaid), income maintenance benefits, unemployment insurance benefits, veterans' benefits, and Federal grants and loans to students. Government payments to nonprofit institutions exclude payments by the Federal Government for work under research and development contracts. Business payments to persons consists primarily of liability payments for personal injury and of corporate gifts to nonprofit institutions.

Contributions for government social insurance

These contributions, which are subtracted in the calculation of personal income, consist of employee and self employed contributions for government social insurance and employer contributions for government social insurance. Employee and self-employed contributions for government social insurance These contributions, which are subtracted in the calculation of personal income, consist of the contributions, or payments, by employees, by the self-employed, and by other individuals who participate in the following government programs: old-age, survivors', and disability insurance (Social Security); hospital insurance; supplementary medical insurance; unemployment insurance; railroad retirement; veterans' life insurance; and temporary disability insurance. These contributions are excluded from personal income by definition, but the

components of personal income upon which these contributions are based – mainly wage and salary disbursements and proprietors' income – are presented gross of the contributions.

Adjustment for residence

The adjustment for residence is the net inflow of the net labor earnings of inter area commuters. The state and county estimates of personal income are presented by the state and county of residence of the income recipients. However, the source data for most of the components of wage and salary disbursements, other labor income, and personal contributions for social insurance by employees are on a place-of-work basis. Consequently, a residence adjustment is made to convert the estimates based on these source data to a place-of-residence basis. The method of calculating place-of-work income requires two main sources. The first source is the net Residence Adjustment (RA), which is provided by the Bureau of Economic Analysis (BEA). A Resident Adjustment value for County X is simply the total outflow of workers' dollars minus the total inflow of workers' dollars for that county, where outflow dollars are wages earned in County X by residents of another county and inflow dollars are wages earned in another county by residents of County X. The second source is Journey to Work (JTW) data, which is calculated from the U.S. Census. This data is a comprehensive matrix of the number of employees and their average wages from each county to every other county.

While the Residence Adjustment calculation provides net dollar flows for each county, it does not tell us how much of a county's RA goes to and comes from specific counties. The JTW data provides these ratios and allows us to build models with accurate regional dollar flows. The decennial dollar flows in the JTW matrix are normalized to annual Residence Adjustment values to keep the flows current and accurate. With this county-level data, we can then calculate intra-regional dollar flows.

Population

BEA uses the Census Bureau's midyear population estimates. Except for college students and other seasonal populations, which are measured on April 1, the population for all years is estimated on July 1. Disclosure avoidance procedures like other statistical agencies, the Bureau of Economic Analysis (BEA) is legally required to safeguard the confidentiality of the information that it receives. In addition, like other agencies, it must balance its responsibility to avoid disclosing confidential information with its responsibility to release and to publish as much information as possible. It balances these responsibilities by presenting the estimates for regions, states, and local areas only at the Standard Industrial Classification (SIC) two-digit level or North American Industry Classification System (NAICS) sub-sector level, even though it receives source data at the SIC three- and four digit levels or NAICS four- and five-digit industry levels. Most of the data series that BEA receives from other agencies are not confidential. The agencies summarize this data to aggregate totals by program and by state or county, so that each record, or data cell, contains data for enough individuals or establishments to preclude the identification of the data for a specific individual or establishment and, therefore, to preclude the disclosure of confidential information. However, the ES-202 tabulations that BEA receives from the Bureau of Labor Statistics (BLS) include records that would disclose confidential information. The confidential information on wages and salaries for some business firms is identifiable from the state and county estimates of wages and salaries at the SIC two digit or NAICS sub sector level that are derived from the ES-202 data.

To prevent either the direct or the indirect disclosure of the confidential information, BEA uses the BLS state and county nondisclosure file. BEA uses as many BLS nondisclosure cells as possible, but cannot use some of them for various reasons. The most important reasons are that the industry structure published by BEA does not exactly match the SIC two-digit or NAICS sub-sector detail provided by BLS and that BEA does not use ES-202 data for the farm sector. When BEA drops BLS nondisclosure cells, other cells must be selected to prevent the disclosure of confidential information. In order to determine which estimates should be suppressed, the total wages and salaries file and the wages-and-salaries-nondisclosure file are used to prepare a multidimensional matrix. This matrix is tested, and the estimates that should be suppressed are selected

4.4.2 BLS

The second major source of historical data used by REMI is from the Bureau of Labor Statistics (BLS). These data pertain to workers covered by State unemployment insurance (UI) laws and Federal civilian workers covered by the Unemployment Compensation for Federal Employees (UCFE) program. The data for both private sector and public sector workers are reported to the BLS by the employment security agencies of the 50 States, the District of Columbia, Puerto Rico, and the Virgin Islands as part of the Quarterly Census of Employment and Wages (QCEW) program. The QCEW, also called ES-202, was formerly known as the Covered Employment and Wages (CEW). REMI uses their annual average employment and total annual wages at the summary level for all counties and states.

Employment

In general, QCEW monthly employment data represent the number of covered workers who worked during, or received pay for, the pay period that included the 12th day of the month. Virtually all workers are reported in the State in which their jobs are physically located.

Covered private industry employment includes most corporate officials, executives, supervisory personnel, professionals, clerical workers, wage earners, piece workers, and part-time workers. It excludes proprietors, the unincorporated self-employed, unpaid family members, and certain farm and domestic workers. Persons on paid sick leave, paid holiday, paid vacation, and the like are included. Persons on the payroll of more than one firm during the period are counted by each UI-subject employer if they meet the employment definition noted above. Workers are counted even though, in the latter months of the year, their wages may not be subject to unemployment insurance tax. The employment count excludes workers who earned no wages during the entire applicable pay period because of work stoppages, temporary layoffs, illness, or unpaid vacations.

Employment data reported for Federal civilian employees are a byproduct of the operations of State Employment Security Agencies in administering the provisions of Title XV of the Social Security Act—the program of Unemployment Compensation for Federal Employees. Federal employment data are based on reports of monthly employment and quarterly wages submitted each quarter to State agencies for all Federal
installations with employees covered by the act, except for certain national security agencies, which are omitted for security reasons.

Employment of all Federal agencies for any given month is based on the number of persons who worked during or received pay for the pay period that included the 12th of the month.

Wages

Covered employers in most states report total compensation paid during the calendar quarter, regardless of when the services were performed. A few state laws, however, specify that wages be reported for or be based on the period during which services are performed rather than the period during which compensation is paid. Under most state laws or regulations, wages include bonuses, stock options, severance pay, the cash value of meals and lodging, tips and other gratuities, and, in some states, employer contributions to certain deferred compensation plans such as 401(k) plans.

Covered employer contributions for old-age, survivors, and disability insurance (OASDI), health insurance, unemployment insurance, workers' compensation, and private pension and welfare funds are not reported as wages. Employee contributions for the same purposes, however, as well as money withheld for income taxes, union dues, and so forth, are reported even though they are deducted from the worker's gross pay.

Average wages

Average annual wages per employee for any given industry are computed by dividing total annual wages by annual average employment. A further division by 52 yields average weekly wages per employee. Annual pay data only approximate annual earnings because an individual may not be employed by the same employer all year or may work for more than one employer at a time. Average weekly or annual pay is affected by the ratio of full-time to part-time workers, as well as by the numbers of individuals in high-paying and low-paying occupations. When comparing average pay levels between States and industries, data users should take these factors into consideration. For example, industries characterized by high proportions of part-time workers will show average wage levels appreciably less than the weekly pay levels of regular full-time employees in these industries. The opposite is true of industries with low proportions of part-time workers, or industries that typically schedule heavy weekend and overtime work.

Average wage data also may be influenced by work stoppages, labor turnover, retroactive payments, seasonal factors, and bonus payments.

Disclosure restrictions

In accordance with BLS policy, data reported under a promise of confidentiality are not published and are used only for specified statistical purposes. BLS withholds publication of UI-covered employment and wage data for any industry level when necessary to protect the identity of cooperating employers. Totals at the industry level for the States and the Nation include the non-disclose-able data suppressed within the detailed tables. However, these totals cannot be used to reveal the suppressed data.

Imputed data

To reduce the effect of the exclusion of data that occurs because of late reporting by covered private and government employers, State agencies impute employment and wages for such employers and include them in each quarterly report. Corrections to data that may be entered after a report is filed will include replacement of imputations with reported data to the extent possible. Imputations are calculated at the individual establishment level, normally using historical data

reported by the employer. Sometimes, trends reported by employers in the same industry or information obtained from other sources is also used. If a report remains delinquent for more than one quarter and research shows that it is still active, the data for the establishment will again be imputed.

4.4.3 County Business Patterns

The final source of employment and wage data is County Business Patterns (CBP). County Business Patterns is an annual series that provides sub-national economic data by industry and covers most of the country's economic activity. The series excludes data on self-employed individuals, employees of private households, railroad employees, agricultural production employees, and most government employees. This data is available at a very detailed level, and while it has many suppressions due to confidentiality requirements, its advantage is that when the data is suppressed, ranges for the establishments are supplied. This provides some basis from which to make a rough estimate of employees in that industry in the absence of any other information.

Establishments

An establishment is a single physical location at which business is conducted or services or industrial operations are performed. It is not necessarily identical with a company or enterprise (firm), which may consist of one or more establishments. When two or more activities are carried on at a single location under a single ownership, all activities generally are grouped together as a single establishment. The entire establishment is classified on the basis of its major activity and all data are included in that classification. Establishment-size designations are determined by paid employment in the mid-March pay period. The size group "1 to 4" includes establishments that did not report any paid employees in the mid-March pay period but paid wages to at least one employee at some time during the year. Establishment counts represent the number of locations with paid employees any time during the year. This series excludes governmental establishments except for wholesale liquor establishments (NAICS 4228), retail liquor stores (NAICS 44531), Federally-chartered savings institutions (NAICS 522120), Federally chartered credit unions (NAICS 522130), and hospitals (NAICS 622).

Payroll

Total payroll includes all forms of compensation, such as salaries, wages, reported tips, commissions, bonuses, vacation allowances, sick-leave pay, employee contributions to qualified pension plans, and the value of taxable fringe benefits. For corporations, it includes amounts paid to officers and executives; for unincorporated businesses, it does not include profit or other compensation of proprietors or partners. Payroll is reported before deductions for Social Security, income tax, insurance, union dues, etc. First-quarter payroll consists of payroll during the January-to-March quarter.

Mid-March Employment

Paid employment consists of full- and part-time employees, including salaried officers and executives of corporations, who are on the payroll in the pay period including March 12. Included are employees on paid sick leave, holidays, and vacations; not included are proprietors and partners of unincorporated businesses.

4.4.4 Data Withheld from Publication

In accordance with U.S. Code, Title 13, Section 9, no data are published that would disclose the operations of an individual employer. The number of establishments in an industry classification and the distribution of these establishments by employment-size class are not considered to be disclosures, so this information may be released even though other information is withheld from publication. Estimation of Data Suppressions in Major Regions and States The current solving methodology is to use an optimization routine to minimize a constrained quadratic loss function. In order to begin this process, we obtain initial estimates and variances from regressions which will be used in our loss function. Once there are estimates, variances, and constraints for all suppressed points within the data set, we process that year. For each year, systems of suppressions can be formed that are all linearly dependent. These systems are defined by a sector-level industry that has suppressions and a Major Region containing the states. We pass each system of suppressions through an optimization procedure that finds the solution set of estimates that minimizes the total variance of the system while still obeying all of the regional and industrial constraints. If all the final estimates are positive (with the exception of personal income data, which may have legitimate negative values), the solution set is accepted.

Estimation of Data Suppressions in Counties

There are too many suppressions in the county data to allow the optimization function to solve, so instead we are using a series of RAS methods (bi-proportional adjustment of matrices). First we estimate all of the sector-level industry employment data, making sure that the sum of the industries equals total employment for the county, and the sum of each industry across all counties in a state equals that industry's employment in that state.

We use the midpoint of the maximum and minimum values calculated from the constraints (similar to calculation for states) as starting values to use in the suppressed cells for the RAS. Next, we repeat this process for the earnings by industry data, as well as the compensation by industry data. This leaves us with sector-level data for employment and summary-level data for earnings and compensation, but no wage data by industry, and we need to disaggregate employment to the summary level. The first data to be disaggregated to the summary level (REMI's 70 industries) is compensation. While some of this data is available from the BEA, there are still a large number of suppressions at this level. We bring in the BLS QCEW wage data at the county level. This data also has suppressions, so the first step is to estimate the missing values. This is initially done for all states and industries (making sure they add up to the nation). We use the CBP state wage data in order to start off with reasonable values for the RAS (where this data is suppressed, we estimate the value by multiplying the number of establishments in each size class by the midpoint of the employment size for that class, and then sum them together for each industry). Once the BLS wage state data is filled in to be internally consistent, we then use it as totals for estimating the suppressed BLS wage county data. For this step we start each missing county value with 1. Once complete, we change each BLS zero value to one (since BEA includes proprietors in their definition and BLS does not, it is possible to have zero values in the BLS data and non-zero values in the BEA data) and then run a final set of RAS procedures against the county BEA summary data and the county BEA sector data. This gives us complete summary-level industry data for every county in the US that is internally consistent with BEA's reported state and county data. In order to disaggregate the employment to the summary level, we use our recently estimated BEA compensation data at the state and county level. The BEA compensation data is scaled by the state compensation-to-employment ratio before it is used as a starting value

for estimating employment. We change any negative values in our starting estimates to a very small value (0.1) in order to prevent negative numbers from entering into the RAS, since employment cannot be negative (although under normal circumstances there should be no negative starting values). We then run a final set of RAS procedures against the state BEA summary data and the county BEA sector data. This gives us complete summary-level industry employment data for every county in the US that is internally consistent with BEA's reported state and county data.

The wages and personal income are done with a process that is similar to the employment process, but involves some additional checks and balances. As it was with compensation, some of the summary-level BEA county data does exist. For those values that are suppressed, we use our recently estimated BEA compensation data, scaled by the state compensation to wages/personal income ratio (as appropriate), as starting values. If any of the wage starting values are less than or equal to zero, we raise them to a small positive value (0.1) as they cannot be negative. If any of the personal income starting values are equal to zero, we raise them to a small positive value (0.1) because BEA suppressed values cannot be zero. We then run a final set of RAS procedures against the county BEA summary data and the county BEA sector data. This gives us complete summary-level industry employment data for every county in the US that is internally consistent with BEA's reported state and county data. While our methodology yields the complete, detailed, and internally consistent data sets required by the model, one must keep in mind that there is always more than one possible solution, so, while we have generated "a" solution, it is not necessarily "the" solution. The government goes to great length to suppress data in such a way that the real values cannot be determined. Our solution is not perfect, but we believe for the most part that it is reasonable.

5. CONCLUSION

The economic analysis presented in this report examines the potential economic benefits to Jackson County and the State of Oregon resulting from Comprehensive Plan Map amendments that would add 150 acres of land with frontage on I-5 to the employment land base in Medford. One component of the proposal is for public investment in crossing and accessing I-5 at the same location.

The policy question in this analysis is to identify economic and fiscal impacts of expanding the Urban Growth Boundary of Medford to include lands that have been identified by the City of Medford through the Regional Problem Solving process for an employment campus which caters to the industries identified in Medford's Economic Element to have a competitive advantage by locating in Medford. The industry may develop with a design and management emphasis or an industrial production emphasis and the State may choose to serve the site with an interchange or an over-crossing. The various permutations of these scenarios and their impacts have been analyzed and presented in this report.

Based upon the above discussion and REMI results, several important conclusions can be reached:

- The scale of transportation investments is small relative to the economic growth potential if the project is successful. The Rogue Valley Employment Campus is strategic, targeted economic development that will return the State's investment in every year after it is built.

- The industrial emphasis has higher outputs, but the office scenario is projected to be a better fit for Jackson County's labor force.

- For all economic performance measures considered, the potential benefits of rapid absorption are more significant than the potential benefits for emphasizing one development mix over the other.

- Lost economic growth from retarded absorption is not projected to be recaptured quickly. This supports rapid delivery of infrastructure facilitating rapid absorption.

- Rapid market absorption of the Rogue Valley Employment Campus project has the potential to increase the Gross Regional Product of Jackson County by over 3.5 percent.

- The project appears to be well situated from a regional transportation perspective that supports economic growth without collateral system degradation.

The results presented in this analysis are generally consistent with expectations and support the conclusion that successful execution of the Rogue Valley Employment Campus concept will result in significant short and long term economic growth.

Next steps in the process of developing the Rogue Valley Employment Campus are proceedings in consideration of the proposed regulatory changes and budgeting of proposed transportation improvements. While both steps require time consuming approval processes, the economic and fiscal benefits of initiating and successfully completing them are substantial.