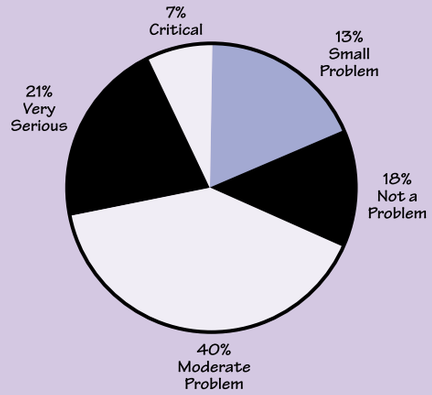
# Alternative Transportation Futures Project

## Why Should We Care?

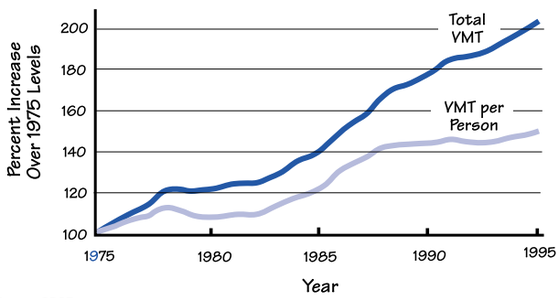
- Willamette Valley residents are worried about traffic congestion

***Public Perception of Congestion Problems in the Willamette Valley***




*Source: ODOT, May 1998*

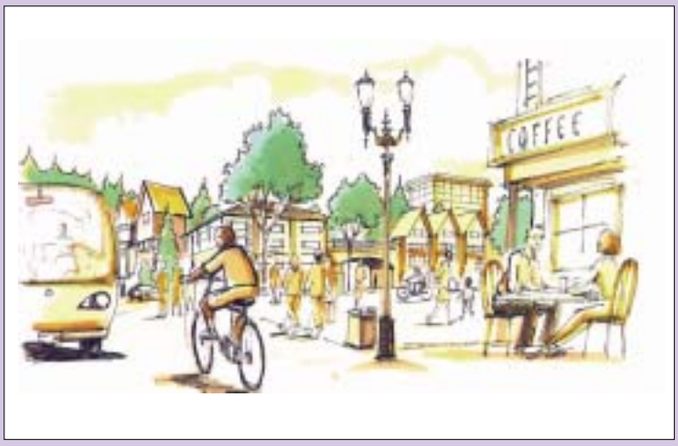
***Vehicle Miles Traveled (VMT)***




*Source: ODOT*

- We are driving more – the number of miles traveled in cars and trucks has increased at a faster rate than the Valley's growing population.

- By 2050, 1.7 million additional residents are expected in the Valley – totaling nearly four million people. That is enough people to add three cities with the population of Portland or 13 with the population of Eugene.




- How will this growth affect our livability and ability to get around safely and efficiently?

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# State of Affairs

- The Valley's predominant land use and development patterns shape how we travel – primarily by car.

- In general, most Valley residents do not have convenient alternative transportation choices, and many do not have access to public transportation at all.

- Despite efforts, many Valley roads, particularly those in urban areas, are congested.

*"Americans will put up with anything provided it doesn't block traffic."*

— Arnold Bennett, British writer, novelist (1867-1931)

- The Valley's roads and bridges are deteriorating and money is short for maintaining and repairing the existing road system.

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# Tough Choices

- How will we pay for improving, caring for, and operating an efficient transportation system?

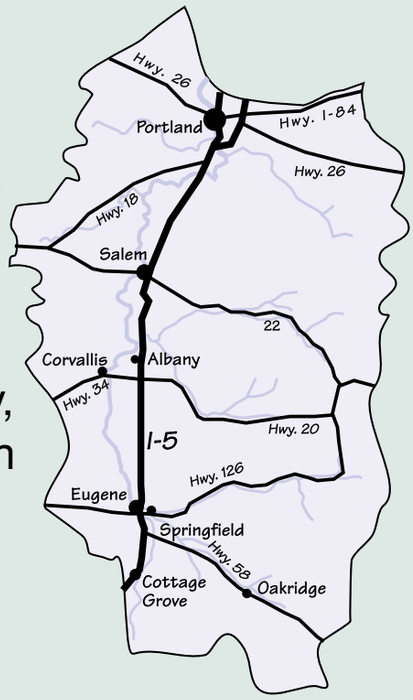
- How do we balance the practical need for mobility –and its costs– with other elements of livability?

- Will we unite behind a long-range vision for a transportation strategy that is consistent with our livability objectives?

# Alternative Transportation Futures Project

## Purpose

*The Willamette Valley Livability Forum (Forum) set out in July 1999 to:*




- Take a long-range look at the future of transportation and land use in the Willamette Valley.
- Help understand the complex relationships among Oregon's economy, land use patterns, and transportation system.
- Identify strategies and actions that can help minimize future impacts of growth on transportation.


***Alternative Transportation Futures Project***

**Funders**

***Federal Highway Administration***
***Oregon Department of Transportation***

**Steering Committee**

**Joan Baker**
*Environmental Protection Agency*
**Richard Brandman**
*Metro*
**Susan Brody**
*Willamette Valley Livability Forum*
**Jon Chandler**
*Oregon Building Industries Association*
**Bob Cortright**
*Department of Land Conservation and Development*
**Ed Gallagher**
Governor's Office
**Craig Greenleaf**
*Oregon Department of Transportation, Development Division*
**Chris Hagerbaumer**
*Oregon Transportation Reform Advocates Network*
**Gary Johnson**
*Oregon Department of Transportation – Region 2*
**Marcia Kelley**
*Mid-Willamette Area Commission on Transportation*
**Robert Liberty**
*1000 Friends of Oregon*
**Mike Propes**
*Polk County Board of Commissioners*
**Bob Russell**
*Oregon Highway Users Alliance*
**Tom Schwetz**
*Lane Council of Governments*

**Researchers**

**Parsons Brinckerhoff**
*Oregon Department of Transportation*
*Lane Council of Governments*

# Approach

- Used Oregon's Integrated Statewide Model – the first statewide application of this type of model in North America.

- Simulated the effects of alternative land use and transportation policy choices over the next 50 years to gain an understanding of how alternative land use and transportation policies affect:
  - Traffic congestion and travel time,
  - Trip characteristics,
  - Transport costs,
  - Population and employment distribution, and
  - Land use patterns and prices.

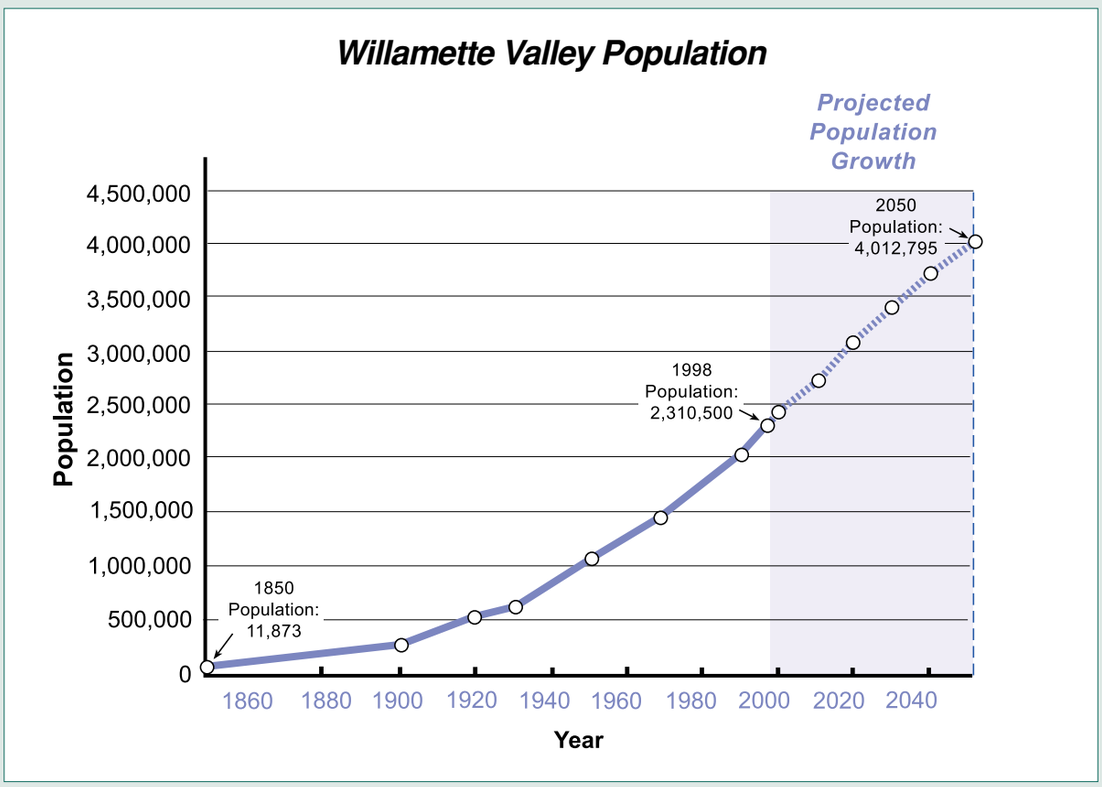
- Policies considered represent the standard components in transportation planning:
  - Amount of urban land available for development,
  - Investments in highways and transit, and
  - Transportation pricing.

# Alternative Transportation Futures Project

## Scenarios

- Created seven scenarios with distinct differences, representing a range of policy types, to facilitate evaluation of results.
- Evaluated each scenario to the year 2050 using the same statewide population and employment projections (derived from Oregon Office of Economic Analysis forecasts).

- No-Action
- Compact Development
- Highway Expansion
- Transit Expansion
- Mileage Tax
- Hybrid 1
- Hybrid 2



# *Alternative Transportation Futures Project*

# Scenarios

## No-Action Scenario

- Urban expansion about the same rate as now
- No major highway or transit expansion

## Compact Development Scenario

- Urban development that achieves density targets in comprehensive plans
- No major highway or transit expansion

## Highway Expansion Scenario

- Urban expansion about the same rate as now
- Add new lanes to congested state highways
  - Maximum limits: ten-lane freeway in metropolitan areas; eight-lane freeways outside metropolitan areas; six-lane for other major thoroughfares
- No major transit expansion

## Transit Expansion Scenario

- Urban expansion about the same rate as now
- No major highway expansion
- Major transit expansion
  - Commuter and frequent city-to-city passenger rail
  - City-to-city bus
  - Portland light-rail system extensions, including addition to Clark County, Washington
  - Bus rapid transit system in Eugene-Springfield

## Mileage Tax Scenario

- Urban expansion about the same rate as now
- 20 cents/mile tax on autos and trucks traveling in the Willamette Valley
- No major highway or transit expansion

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# Scenarios

## Hybrid Scenarios

- Recognizes one solution will not solve mobility and congestion issues
- Combine elements of five previous scenarios

**Hybrid 1**

- Compact development
- Full transit expansion
- Expansion of rural highways
  Graduated mileage tax - 10 cents/mile in 2005; 20 cents/mile in 2025

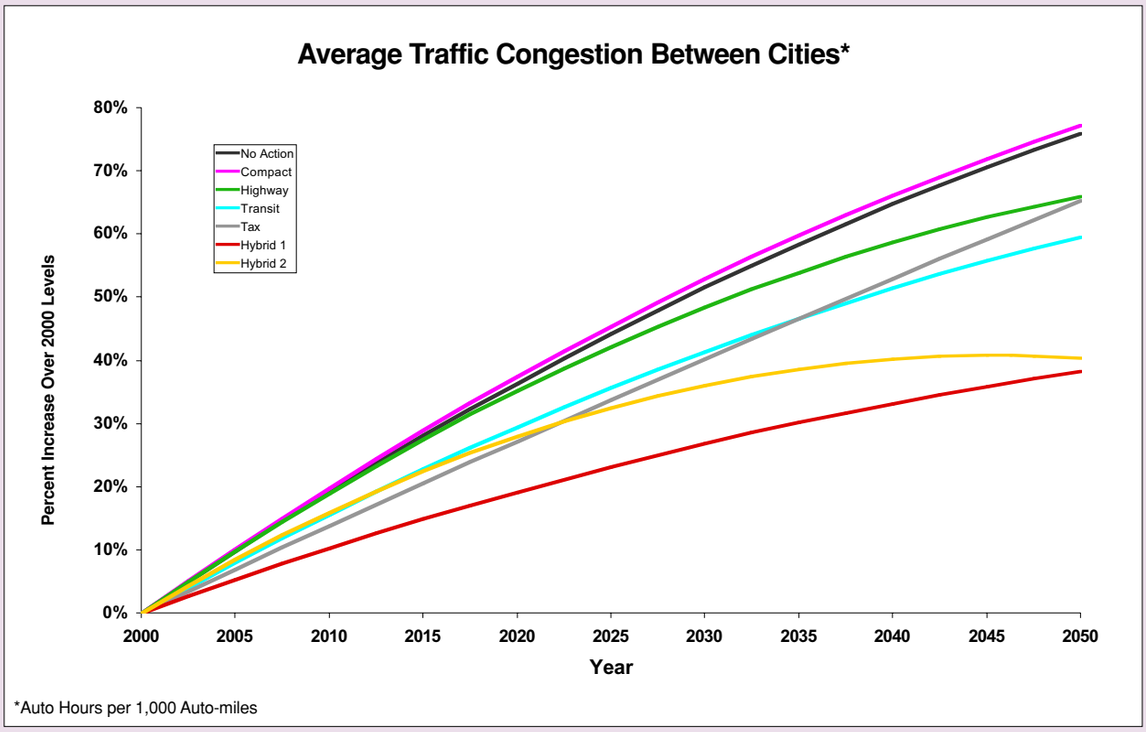
**Hybrid 2**

- Compact development
- Partial highway and transit expansion
- Graduated mileage tax - 5 cents/mile in 2005; 10 cents/mile in 2025

# *Alternative Transportation Futures Project*

# Key Findings

## There is no silver bullet – whatever we do, population growth in the Valley over the next 50 years will result in increased traffic congestion. However, we can minimize the increase depending on decisions we make now.

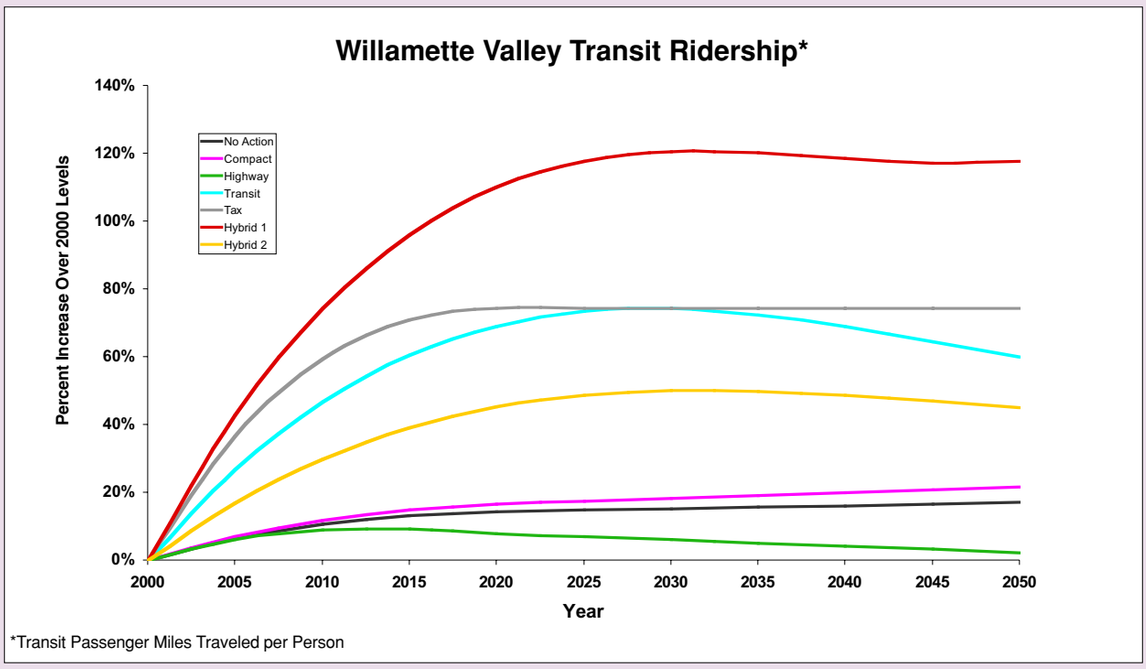



*Auto Hours per 1,000 Auto-miles

- If recent development trends continue and there are no policy changes by 2050, traffic congestion will increase by nearly 80 percent.
- Compact development alone has little effect in alleviating traffic congestion for longer trips on the Valley's major highways.
- Even with major transportation investments, traffic congestion will increase.
- Pricing has a positive effect on reducing traffic congestion.
- No single approach is as effective in keeping traffic moving as instituting a combination of policy changes.
- The most effective hybrid scenario (Hybrid 1) increased the cost of driving to a greater extent and targeted infrastructure investments to support transit ridership.

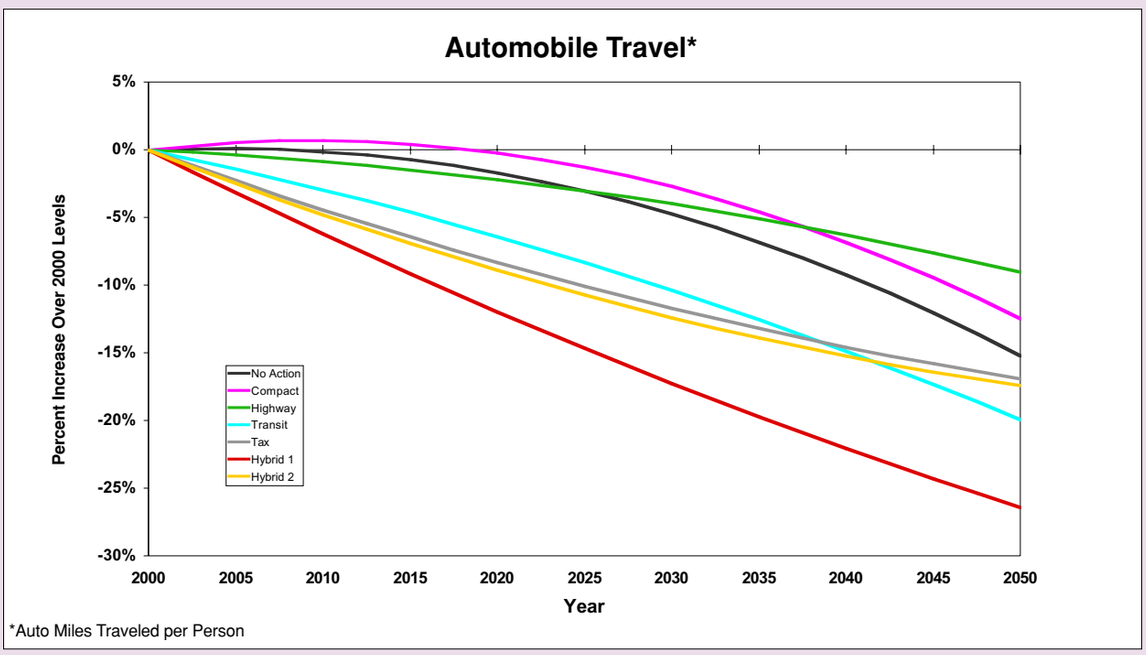
# Alternative Transportation Futures Project

# Key Findings




*Transit Passenger Miles Traveled per Person

- A mileage tax increases transit ridership.
- Increasing the frequency and convenience of the public transit system (bus and rail) encourages more use.

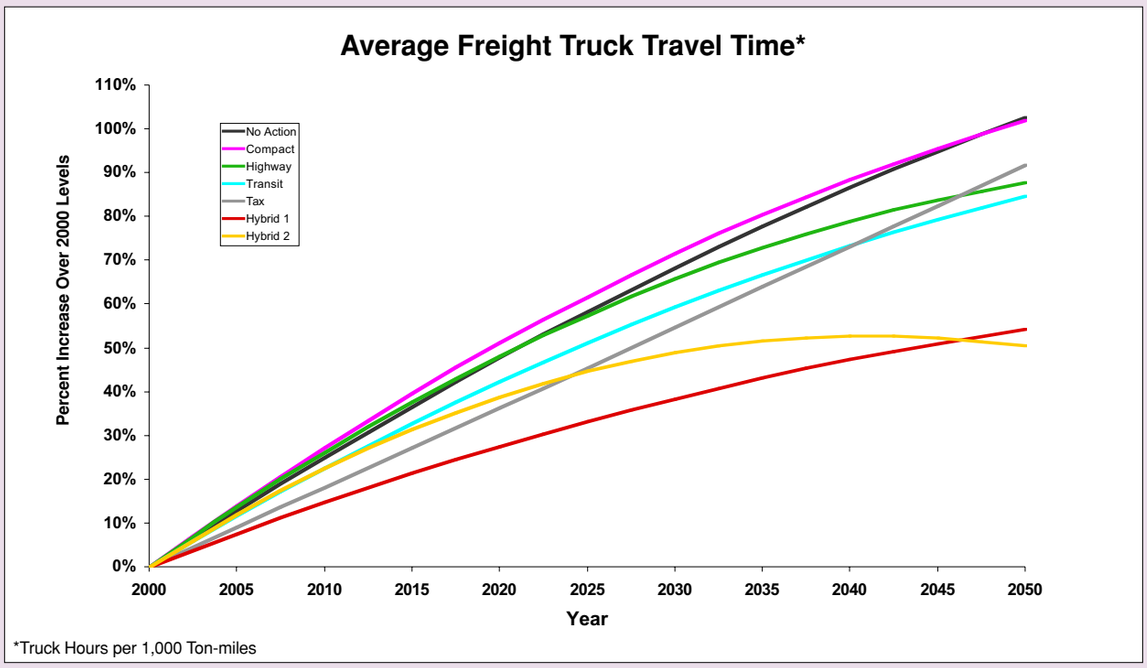



*Auto Miles Traveled per Person

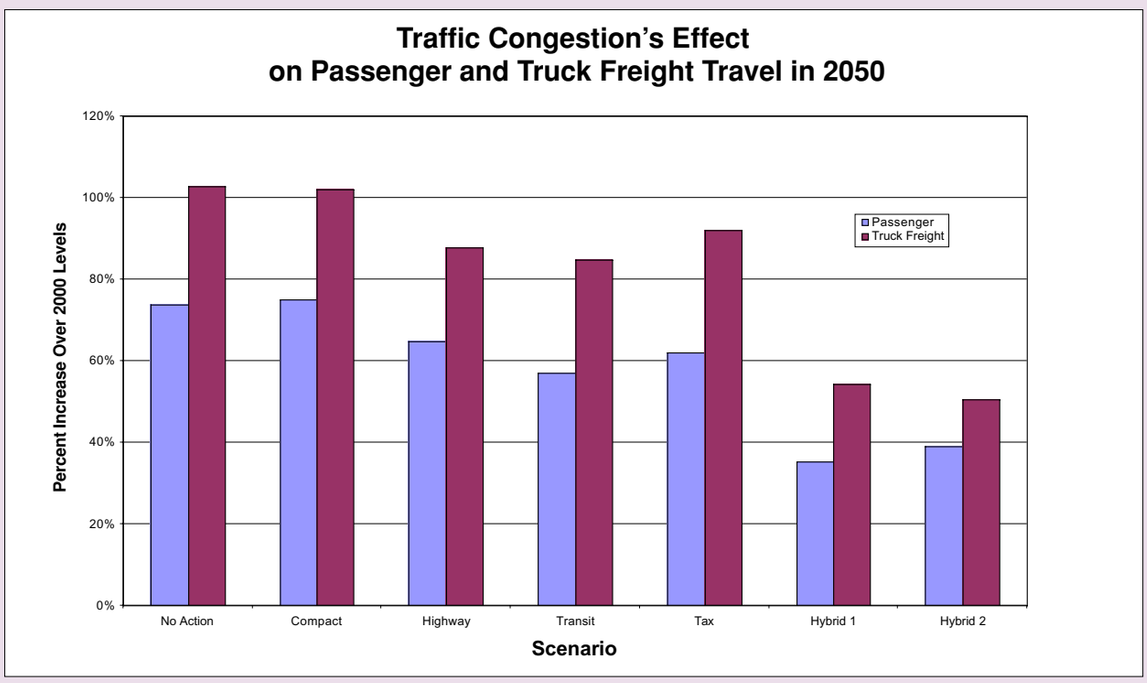
- While each of us may be driving less, there will be more of us.

# Alternative Transportation Futures Project

# Key Findings




*Truck Hours per 1,000 Ton-miles




■ Future congestion impacts truck freight movement to a greater extent than passenger travel.

*Alternative Transportation Futures Project*

# Key Findings

## Effects on Population and Employment Distribution

- Expanding public transit tends to concentrate jobs in major urban centers while pulling population to outlying cities.


- Expanding highways tends to draw both people and jobs to outlying cities.
- A transportation pricing policy, such as a mileage tax, encourages some people and jobs to move to areas outside the Willamette Valley where pricing is not a factor.

- Constricting urban land supplies directs more population and employment growth away from major urban centers to smaller cities.

# *Alternative Transportation Futures Project*

## Project Steering Committee's

# Conclusions and Recommendations

**Conclusion:** The model results confirm the interconnection between the economy, land use, and transportation and reinforce the importance of regional approaches for transportation planning.

***Recommendation 1:*** *Develop and implement regional, multi-jurisdictional approaches to manage growth that involves all affected communities.*

- *Metropolitan areas and surrounding communities should work together to set and achieve regional land use, transportation, and economic objectives.*
- *Investigate institutional arrangements to increase planning coordination between metropolitan areas and surrounding communities.*

**Conclusion:** Transportation infrastructure investments and demand management strategies influence population and employment distribution.

***Recommendation 2:*** *Ensure that transportation infrastructure investments and demand management strategies are consistent with growth management and economic development objectives.*

**Conclusion:** No single approach (more efficient land use, infrastructure investments, or pricing) is as effective in keeping traffic moving as is instituting a balanced combination of these approaches.

***Recommendation 3:*** *Minimize increases in traffic congestion by implementing a strategy that combines highway and transit expansion, compact land-efficient development patterns, and transportation pricing measures.*

# *Alternative Transportation Futures Project*

## Project Steering Committee's

# Conclusions and Recommendations

**Conclusion:** Pricing has a positive impact on reducing traffic congestion, increasing transit ridership, and can generate revenue to fund transportation system improvements.

***Recommendation 4:*** *Include roadway pricing as part of the long-range transportation strategy.*

- *Begin raising the notion of pricing in public discussions.*
- *Create an environment where people make transportation choices based on costs.*

**Conclusion:** Major investment in transit reduces traffic congestion and helps concentrate employment in major urban areas.

***Recommendation 5:*** *Increase the availability, convenience, and speed of rail and other transit services to reduce traffic congestion and provide transportation choices.*

**Conclusion:** Traffic congestion adversely impacts freight movement to a greater extent than passenger travel.

***Recommendation 6:*** *Implement strategies (e.g., toll lanes, designated truck lanes, alternative routing) on designated truck routes to mitigate the impact of increasing traffic congestion on freight movement.*

## Project Steering Committee's

# Conclusions and Recommendations

**Conclusion:** The statewide model improves the ability to evaluate policy initiatives at state and regional levels.

***Recommendation 7:*** *Evaluate existing state and local plans, policies, and programs in light of project findings to determine whether they need to be changed to support the recommended strategies and actions. For example, use the statewide model to evaluate recommendations in the Willamette Valley Transportation Strategy.*

***Recommendation 8:*** *Undertake a thorough exploration of financial incentives and disincentives (e.g., employer-provided bus passes, mileage-based insurance, parking fees) as policy instruments for managing transportation demand.*

***Recommendation 9:*** *Examine the potential of pricing to reduce transportation infrastructure needs.*

***Recommendation 10:*** *Improve the robustness of statewide model to enable more thorough investigations of interrelationships between land use, transportation, and the economy by:*

- *Increasing the geographic resolution (i.e., more analysis zones) and expanding the detail of the transportation network to allow for short-distance trip evaluations.*
- *Accounting for freight transported by rail and barge.*
- *Adding capabilities to evaluate peak congestion periods and congestion pricing policies.*
- *Representing economic interactions among Oregon and the rest of the nation.*

***Recommendation 11:*** *Integrate statewide and metropolitan planning organization modeling tools (e.g., coordinate the statewide model with the Metroscope model in the Portland metropolitan area) to allow for more thorough analyses of proposed major transportation and land use changes.*

## *Alternative Transportation Futures Project*

# Oregon's Integrated Statewide Model

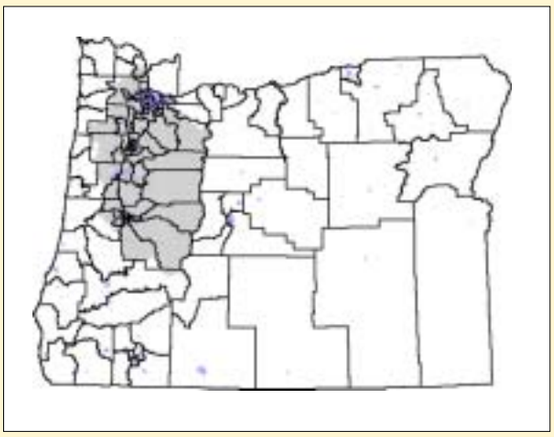
- Simulates economic, land use, and transportation interactions


- Evaluates the effects of transportation and land use policies
- Only model of its kind in the United States
- Improves ability to evaluate policy initiatives at state and regional levels
- Designed to address the policy concerns in Oregon such as the effects of:
  - *Land use and transportation policies on population and employment distributions;*
  - *Land use on travel behavior;*
  - *Highway capacity increases on travel behavior and land use;*
  - *Transit investments on highway use; and*
  - *Changes in the state's population and economy on transportation and land use.*
- Calibrated using data about Oregon's economy, businesses, households, and transportation system.
- Oversight provided by the Oregon Modeling Steering Committee and a panel of international experts in transportation and land use modeling.

# *Alternative Transportation Futures Project*

# Model Structure

- Includes all of Oregon and Clark County, Washington
- Divided into 122 zones with over half in the Willamette River Basin



*Willamette River Basin*
*Urban growth boundaries*

## Contains several linked submodels–

**Economic**

**Location**

**Transportation**

### *Model Development Oversight*

***Oregon Modeling Steering Committee***

- Four Metropolitan Planning Organizations *(Metro, Salem/Keizer, Eugene/Springfield, Medford/Central Point)*
- State Community Solutions Team Agencies *(Transportation, Land Conservation & Development, Environmental Quality, Housing, Economic Development)*
- Administrative Services Department *(State Economist's Office)*
- Federal Highway Administration

***Peer Review Panel***

- Julie Dunbar *(North Central Texas Council of Governments)*
- Robert Gorman *(Federal Highway Administration)*
- Frank Koppleman *(Northwestern University)*
- Gordon Shunk *(Texas Transportation Institute)*
- David Simmons *(David Simmons Consultancy)*
- Michael Wegener *(University of Dortmund)*
- Ed Weiner *(U.S. Department of Transportation)*

# *Alternative Transportation Futures Project*

# Economic Submodel

## *Calculates overall economic activity*

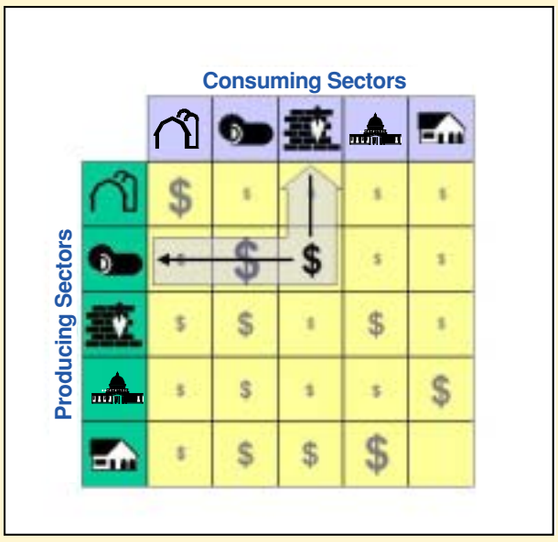
- All economic activity is grouped into 12 business and three household sectors.

**Business Sectors**

- Farms, forests, fisheries
- Mines, construction
- Food, metals, and minerals processing
- Wood, lumber, pulp, paper
- Printing and publishing
- Machinery and equipment manufacturing
- Transportation, utilities, and communications
- Wholesale
- Retail
- Finance, insurance, and real estate
- Hotel, health, and amusement services
- Education, government

**Household Sectors**

- Income less than $20,000 per year
- Income $20,000 to $50,000 per year
- Income greater than $50,000 per year




- Calculates how much each sector must consume from each other sector to produce its goods and services.

- Calculates induced growth resulting from increases in export production, tourism, etc.

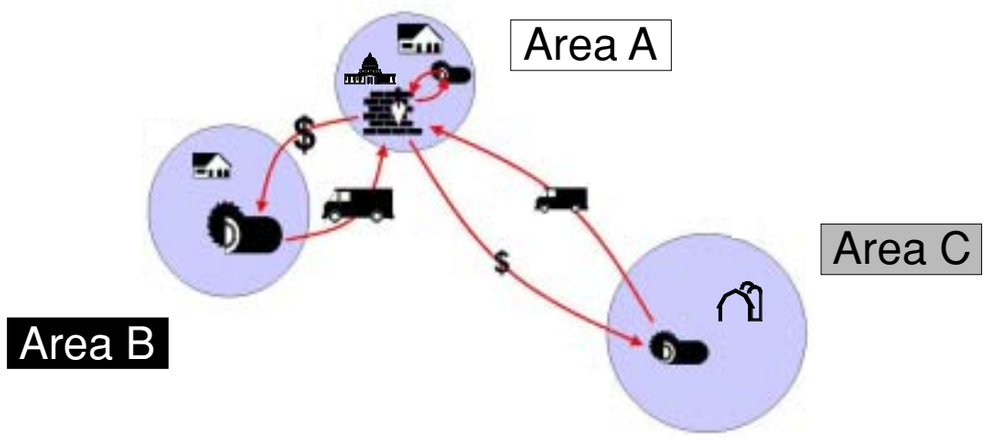
## *Alternative Transportation Futures Project*

# Location Submodel

## *Allocates population and employment growth*

- Allocations based on demand, supply, and cost considerations that include:
  - Cost of transporting goods and services;
  - Land prices, considering supply and demand; and
  - Zone-specific costs to account for other factors (amenities, public service quality, etc.)
- Movement of goods and services between zones is calculated simultaneously with the allocation of businesses and households.

### *Illustration of How the Location Submodel Works*




- Growth of the construction sector in Area A stimulates demand for growth of the wood products sector.

- Growth of wood products industries in Area A is constrained by high land prices caused by limited supply and high demand from other sectors.

- Growth of wood products industries in Area C is limited by their distance from markets, which results in higher transportation and production costs.

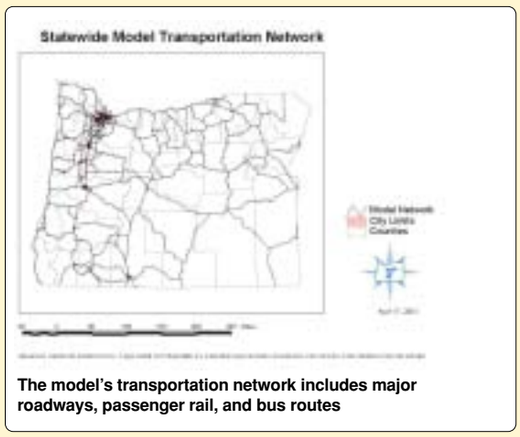
- Most growth occurs in Area B where land prices are not constraining and transportation costs are not too high.

## *Alternative Transportation Futures Project*

# Transportation Submodel

## *Calculates travel resulting from the movement of goods and services*

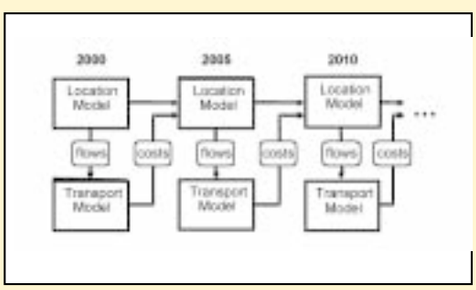
- Calculates passenger (auto, bus, train) and truck trips
- Trip rates vary with travel costs (people make more trips when the destination is easier to reach)
- Trips assigned to different routes and transportation modes based on overall travel costs
- Calculates transportation costs between zones




**The model's transportation network includes major roadways, passenger rail, and bus routes**

*The location and transportation models are linked to simulate the effect of land use on transportation and vice versa.*

- The location model allocates growth among zones and calculates movement of goods and services between zones.
- The transportation model allocates travel on the transportation network and calculates the cost of travelling between zones.




- The model steps through time in five-year increments.
- Transportation costs affect location calculations in the following period.

## *Alternative Transportation Futures Project*

# The Next Generation

***Work is underway on a second generation of the statewide model which will enhance the existing model in several ways:***

- Greater geographic resolution, increasing the number of zones to over 3,000
- Expand the detail of the transportation network to allow better evaluation of short-distance trips
- Consistency with analysis zones and transportation networks of the metropolitan area models will foster integration of the modeling tools
- Model trips to better represent how people schedule their activities to allow evaluation of peak congestion periods and congestion pricing policies
- Account for rail and barge freight movement
- Increase the number of economic sectors to better simulate economic interactions
- Expand the economic model to represent interactions between Oregon and the rest of the nation

***The second generation of the model is expected to be operational by the end of 2001.***

Oregon Model Improvement Program