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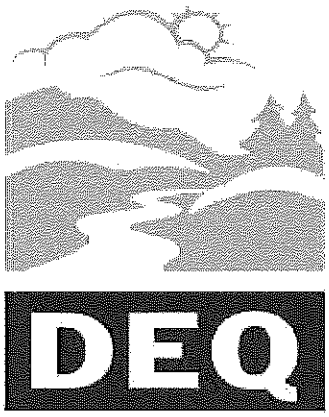
OREGON
ENVIRONMENTAL QUALITY
COMMISSION MEETING
MATERIALS 04/22/1993



State of Oregon
Department of Environmental Quality

COMBINED MEETING
OF

- OREGON ENVIRONMENTAL QUALITY COMMISSION -
- OREGON LAND CONSERVATION AND DEVELOPMENT COMMISSION -
- OREGON TRANSPORTATION COMMISSION -

April 22, 1993 - 6:00-9:00 PM

Quality Inn
3301 Market St. NE
Salem

– AGENDA –

6:00		Social Half Hour
6:30		Dinner
7:00	Honorary Chairman Mike Hollern	Introduction of participants and purpose of meeting. Present award.
7:05	Introduction of Governor Roberts	Governor acknowledges the good work of of all three commissions, but there is more to do. There is a need for their interaction in these difficult times when all of government needs to work toward common solutions
7:15	Duncan Wyse, Benchmarks	A presentation of benchmarks and Oregonian values to define statewide and national issues and values that bring the three commissions together to achieve a common result
7:25	Setting the Stage (3 directors)	Introductory discussion of common objectives the three departments are working on and a definition of where we want to be in 10 to 15 years from now
7:40	Commission Discussion	The facilitator, Chairman Hollern, involves the three commissions in a discussion focused on how we are going to get where we want to be in the next ten years
8:50	Summarize Discussion	Chairman Blosser concludes and summarizes discussion that has occurred by the commissioners
9:00	Wrap-up and Adjourn	Chairman Hollern

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TRI-COMMISSION MEETING
APRIL 22, 1993

Environmental Quality Commission

William W. Wessinger (Chair)
Emery N. Castle (Vice Chair)
Henry Lorenzen
Carol A. Whipple
Linda R. McMahan

Fred Hansen, Director

Land Conservation & Development Commission

Bill Blosser (Chair)
Hector Macpherson (Vice Chair)
John Brogoitti
Ginny Burdick
Art Johnson
Tom Throop
Pam Whiley

Dick Benner, Director

Oregon Transportation Commission

Michael P. Hollern (Chair)
John Whitty (Vice Chair)
Susan E. Brody
Cynthia J. Ford
Roger L. Breezley

Don Forbes, Director

This material has been assembled by the Tri-Agency Committee composed of:

Department of Environmental Quality

Harold Sawyer
Tina Olson
John Kowalczyk

Department of Land Conservation and Development

Craig Greenleaf
Carol St. Louis

Department of Transportation

Ron Schaadt
Don Byard
Brian Gregor

D R A F T

Growth and Livable Communities

January 12, 1993

PREFACE

In 1991, after its successful completion of the Human Investment Strategy, the Progress Board turned its attention to livable communities. They invited experts from across the state to speak to them on growth issues. They heard state agency directors, local government officials, legislators, and planners describe their views on growth and livability. The Board distilled this testimony into a discussion paper, "Livable Communities Strategy: Addressing the Impacts of Growth."

At the same time, Gov. Barbara Roberts recognized that a unified state response was essential if the state was to successfully meet the challenges of growth. She formed the Urban Livability Team to develop the state's livable communities agenda. It is composed of agency heads from the Departments of Energy, Transportation, Land Conservation and Development, Economic Development, and Environmental Quality.

This report is a synthesis of the work of both the Oregon Progress Board and the Urban Livability Team.

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INTRODUCTION

This report proposes a strategy to not only maintain, but to enhance, the quality of life in Oregon's communities as they grow in the decades ahead. Section 1 describes why Oregon needs such a strategy. It presents the outlook for population growth and examines the major issues that face growing communities. Section 2 displays the benchmarks we will use to measure our progress toward achieving more livable communities. Section 3 discusses some strategies to achieve those benchmarks.

THE EVOLUTION OF THIS REPORT

The 1989 Legislature created the Oregon Progress Board and charged it to do what no state has done: develop benchmarks that measure how Oregon is doing as a people and a place. The Progress Board is submitting its second round of benchmarks to the 1993 Legislature.

The report contains some 250 benchmarks aimed at the essential components of livability: nurturing families and thriving children; healthy, educated, independent, and publicly-involved citizens; a clean, beautiful, and accessible natural environment; accessible, affordable, safe, and enriching places to live and work; and a prosperous economy that provides a balanced distribution of jobs and income.

Each benchmark sets a standard by which progress can be measured. Taken together, the benchmarks look to a future for Oregon that features exceptional citizens, an outstanding quality of life, and a diverse, robust economy.

Quality of life encompasses a wide range of values ranging from economic and social well-being to environmental quality and sense of community. The plan of action to achieve the benchmarks aimed at enhancing Oregon's quality of life will be addressed in separate reports. This report, the first in the series, focuses on the challenges facing

growing communities. It focuses on the physical features of communities -- air, water, land, transportation systems, housing, and public works. Future reports will address other livability issues such as rural decline, crime, and the sustainability of Oregon's natural ecosystems.

GUIDING PRINCIPLES

This report proposes Oregon embark on a long-run course to keep our state a special place with vital communities, clean air, abundant and fresh water, affordable housing for everyone, quality public services, ample and accessible open spaces, and a transportation system of choices. These principles will guide our strategies to achieve those goals:

1. We recognize the interrelatedness of the environment, the economy, and community. We cannot enjoy a rich and sustained quality of life if any of these components is ignored. An integrated and coordinated approach to problem-solving will be taken.

2. We will take the long view so that we may bequeath to our children and their children a healthy and diverse environment and livable communities.

3. Protecting Oregon's quality of life in an era of change will require the participation of all Oregonians.

4. We will articulate a common vision of where we want to be and fashion a course of action to get there. At the same time, we will seek solutions that preserve the unique character of each Oregon community.

5. Government all too often addresses problems after they have been created. We need to change this approach by focusing our efforts on preventive measures.

6. We will emphasize market-oriented policies that signal the full costs and benefits of individual decisions.

7. We recognize that we don't have all the answers, but the urgent problems caused by growth require that we take action now.

1. WHERE WE ARE TODAY

Oregon's quality of life is widely recognized. First-time visitors and natives alike are struck by the beauty and variety of our natural environment: a beautiful coastline, majestic mountains, dense forests, high deserts, and wilderness lakes and rivers. Recreation opportunities abound. Most Oregonians are within short distances of skiing, hiking, crabbing, fishing, hunting, birdwatching, and other outdoor recreation.

Oregon's cities and towns consistently rank high in national livability comparisons. The National Civic League has awarded the "All-American City" designation to Salem (twice), Milton-Freewater, Cottage Grove, Eugene, Portland, and Grants Pass. The London-based Economist recently touted Portland as one of the few successful major American cities, being both "prosperous" and "beautiful."

The passion Oregonians feel for their natural environment is reflected in state laws that provide the public access to all ocean beaches, protect scenic rivers from development, protect farm, forest, and coastal resources by land-use planning, and reduce roadside litter through the pioneering bottle bill.

We value our quality of life because it is intrinsic to who we are. Today, it is key to our economic prosperity as well. It is a magnet for keeping and attracting businesses and high-wage jobs. To quote Oregon Shines: An Economic Strategy for the Pacific Century:

> "Preserving Oregon's advantage in quality of life must be a critical element of the state's strategy for economic growth. ...Especially for knowledge-intensive industries, where people can make a critical difference in the success of a firm, a region that can boast affordable housing, good transportation, and access to quality urban and outdoor recreation experiences will have a substantial advantage."

Today, Oregon is growing at a fairly fast clip. Growth brings many benefits -- more jobs, more amenities, and a more resilient economy. It also imposes costs. Few, if any, states have undergone rapid growth without spoiling the environment or sacrificing some of the qualities that made those states so enticing to newcomers in the first place.

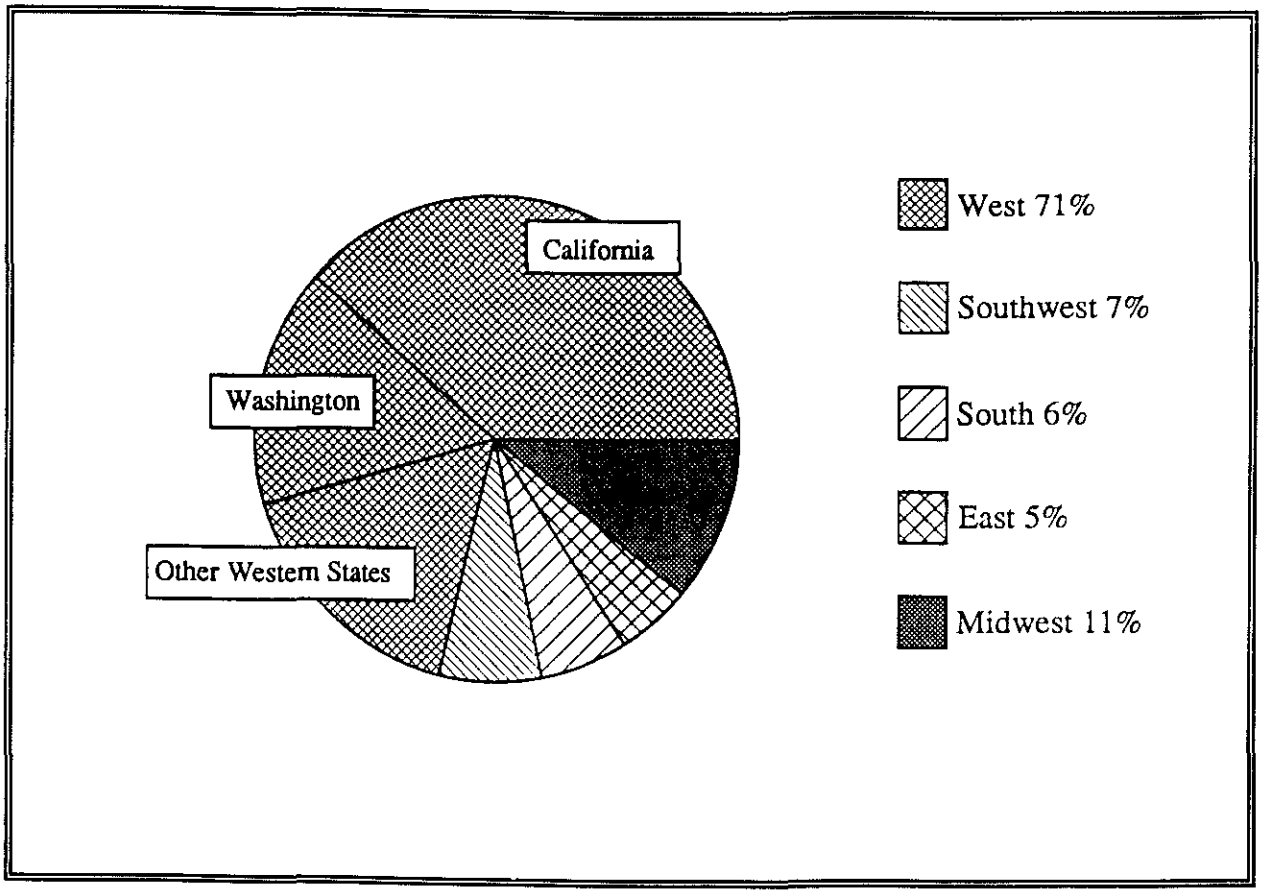
OUTLOOK FOR GROWTH

Just how many people will come to Oregon in the decades ahead is unknown. The Oregon Department of Transportation predicts Oregon will grow by 880,000 people by 2010. If Oregon's economy prospers and our quality of life continues to be viewed as desirable, we could grow a lot more.

Past growth trends

In the boom years of the 1970s, Oregon's population grew at a 2.3 percent yearly rate. Some areas, notably Deschutes and Washington counties, grew much faster -- at 7.4 percent and 4.5 percent, respectively. The strong statewide growth ended with the nationwide recession of the early 1980s. Between 1981 and 1987, in fact, more people moved out of Oregon than moved in. Once the economy recovered and quality of life became more valued, however, Oregon began growing again, at a modest rate at first, and then more rapidly.

A California speaker at a recent Portland City Club meeting told her audience that "every Californian wants to come to Oregon." California is, in fact, Oregon's largest source of newcomers. According to estimates from the Oregon Department of Motor Vehicles, Californians account for about 40 percent of the immigrants each year. Washington is next with 16 percent. All told, two-thirds of the immigrants to Oregon come from the Western states.



Between 1970 and 1990, Oregon grew at an average rate of 1.5 percent a year -- an increase of more than 750,000 people. Two-thirds of the new growth occurred in just six counties:

County	Amount of Growth	Percentage of Oregon growth
Washington	152,000	20
Clackamas	112,000	15
Marion	76,000	10
Lane	67,000	9
Jackson	51,000	7
Deschutes	44,000	6
		67

The impact of growth on a particular community stems in part from the speed at which it grows. At an annual rate of 3.5 percent, for example, population doubles in 20 years. The yearly growth rates of today's fastest-growing cities include:

City	1990-1991 growth rate
Bend	8%
Tualatin	6
Beaverton	6
Hillsboro	4
Ashland	4
Tigard	4
West Linn	4

Future growth

Much of the new growth for Oregon is projected to occur in areas where population is already the most concentrated. As Dean Nohad Toulan of the Portland State University School of Urban and Public Affairs has observed, much of the growth we have experienced in the past has occurred in the I-5 corridor between Portland and Ashland. Should this trend continue, "it will surprise no one since it is a natural extension of what has been happening in the State since 1870."

- Portland metro: Half of the expected growth will occur here. Its population growth for the next two decades is estimated at almost 450,000.

- Mid-Willamette Valley: Benton, Lane, Linn, Marion, Polk, and Yamhill counties are forecast to gain about 200,000 people, or one-quarter of the total state growth, by 2010.

- Deschutes County: The fastest-growing county over the last two decades, it is forecast to add another 36,000 people.

- Southern Oregon: Nine percent of the state's growth is predicted to go to Jackson, Josephine, and Douglas counties -- nearly 80,000 people.

- Eastern Oregon: Eastern Oregon, excluding Deschutes County, is expected to grow by 57,000 residents.

- Coast: The population along the coast is forecast to grow by nearly 50,000 persons, or six percent of statewide growth. This does not count increases in vacation or second homes.

QUALITY OF LIFE AT RISK

The challenge facing Oregon today is this: How can we reap the benefits of growth and, at the same time, keep our valued quality of life?

Oregon remains essentially untrammeled by development, relatively unpolluted, and and its natural areas are readily accessible to Oregonians and visitors alike. Nonetheless, the quality of life benchmarks aim high and achieving them will be an ambitious endeavor under the best of circumstances. The demands of growth will make the venture even more challenging.

The nearly one million newcomers expected to come to Oregon in the next two decades are equivalent to adding eight new cities the size of Salem or Eugene. At present trends, however, much of the development that springs up to accommodate the growth will occur at the edges of our cities. Eventually, an aerial view of Oregon could

show one continuous strip of development between Portland and Ashland and spots of development elsewhere.

Oregonians are particularly aware of the problems sprawling growth has imposed on Los Angeles and, closer to home, Seattle. In a Catch-22, ownership of the car makes sprawl possible, but it is sprawl that makes car ownership a virtual necessity. Clearly, sprawl and auto dependence are costly, not only in terms of the land gobbled up, but also in air pollution, high housing costs, inefficient public works, congestion, social segregation, and loss of community.

We are beginning to see some disturbing signs of uncontrolled growth already. Traffic congestion is occurring with increasing regularity in the Portland, Eugene, Salem, and Medford metropolitan areas, in Bend, and on the coast. Housing prices in the pockets of high growth have risen dramatically. There is growing concern that we are preserving too little park and open space for future Oregonians. Providing public works is becoming both less efficient and more expensive.

Following are more detailed discussions of the growth issues that face Oregon in terms of land use, mobility, air quality, public works, water supply and quality, parks and open spaces, affordable housing, and sense of community.

Land Use

Oregon's nationally-recognized land-use program aims to fend off sprawl and preserve and protect forest and farm lands. Urban growth boundaries define where growth and development should occur. The local land-use plans call for compact, orderly development within those boundaries. To date, Oregon's program has averted both widespread development of farm and forest lands and rampant sprawl.

However, the rapid growth occurring now is sorely testing the plans. Studies of development during 1985-1989 in four fast-growing areas -- Bend, Brookings, Medford, and Portland -- sound an alarm of sprawl:

- Each of these urban areas is growing at a low density. Single-family subdivisions in the Bend area averaged just over 2 homes per acre. Their plans called for an average of 6. New single-family housing in Brookings, Medford, and the Portland metropolitan area was also well below planned densities. Some new developments averaged just one house per acre.

  "We use Los Angeles and its urban spread as an example of what we do not want to be, while conveniently forgetting that most of our suburban development is taking place at densities lower than those encountered in Southern California," according to Dean Toulan.

  Not only are the new housing developments low-density, many are built outside city limits where there are no schools, sewer lines, or good roads. Developers gravitate to areas away from the city center because land is cheaper -- in part because of the lack of urban services. With cheaper land, developers find it more profitable to build low-density development. Sprawling developments like these impose higher costs in terms of streets and water and sewer lines than developments that are closer in and more compact.

- Residential development continues outside the urban growth boundaries. More than half of new single-family housing in the Bend area was built outside its urban growth boundary. For Brookings, it was 37 percent, and for Medford, 24 percent. These homes were built not only on "exception" lands, where profitable farm and forest operations are already precluded, but also on lands zoned for forest and farm use.

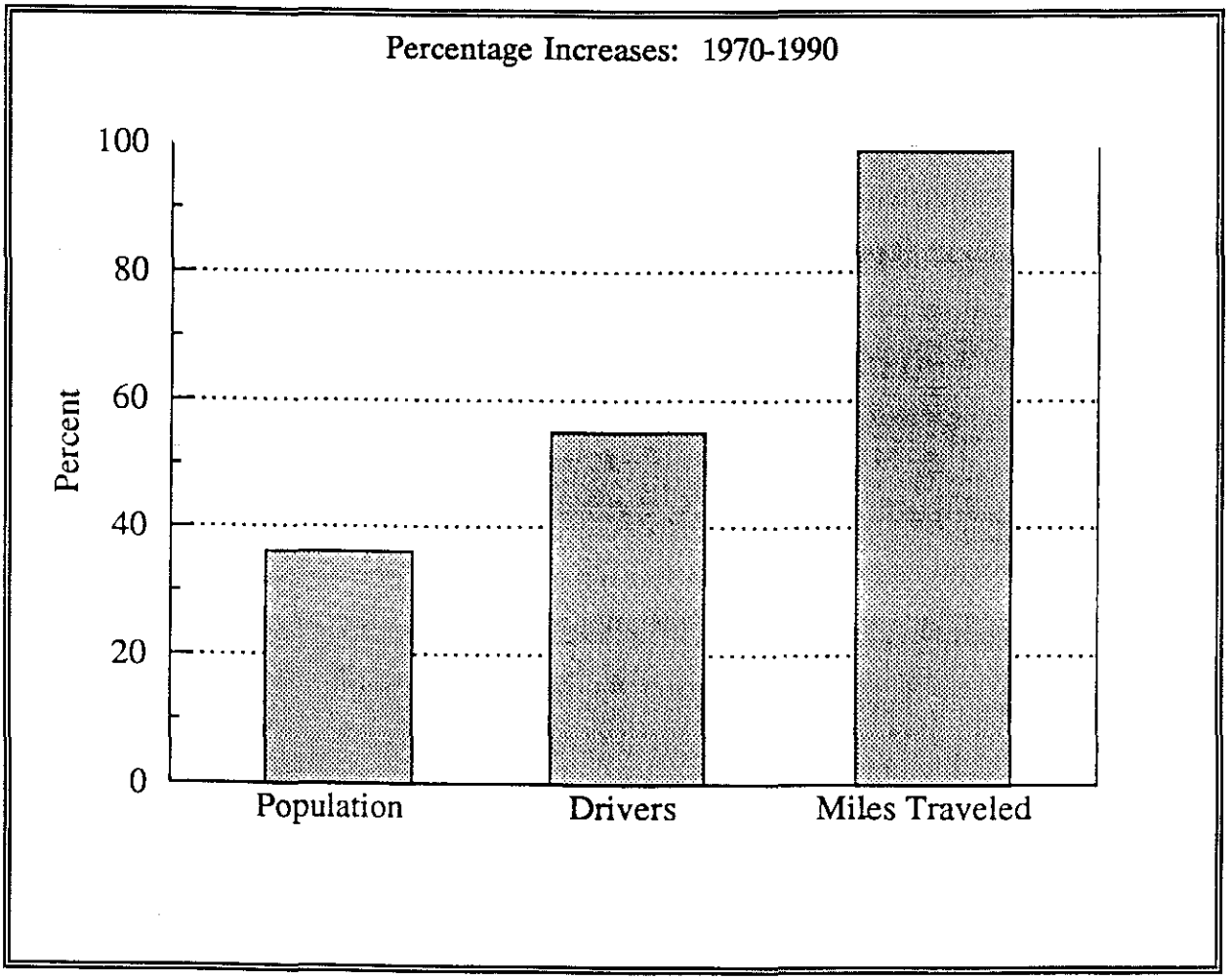
More development outside urban growth boundaries is likely to occur. In the Portland area, the study estimated that with the amount of land outside the boundaries already zoned for residential development, an estimated 11,000 homes could be built there. In the Bend area, the estimate is 12,000 homes.

- Rural homes on half-acre to five-acre plots with well water and septic tanks are common on the fringe of urban growth boundaries. Should cities need to expand their boundaries to accommodate increased population, annexation of these areas will be difficult. Extending streets, water, and sewer lines into those areas is often too costly. Other times, rural residents oppose annexations. As a result, cities could be forced to leapfrog these areas, adding pressure to develop farm and forest lands.

- Sprawl is eroding urban livability. All four cities experienced declines in key indicators of livability from 1985 to 1989. Traffic volume and congestion increased on all major roadways. With a few exceptions, new park development failed to keep up with population growth. Housing prices and rents increased faster than household incomes.

Mobility

In Oregon, as in other states, auto travel exploded during the past two decades. The increase in per-household driving, coupled with the growth in population, caused a jump in auto travel of 99 percent, or 13 billion miles.



The social costs of ever-increasing auto travel are huge. Oregon's yearly gasoline bill exceeds 1.5 billion dollars. Oregon imports all of its oil, so most of those dollars leave the state. Our economy is vulnerable to the erratic price fluctuations over which we have no control. Autos emit nearly 15 million tons of carbon dioxide a year which add to global warming. Auto exhaust causes smog and carbon monoxide pollution.

Congestion is the most visible consequence of exploding auto travel. More than a million cars crisscross the roads and highways of Oregon cities in the daily work commute. Oregon drivers spend roughly 15 million hours a year stuck in traffic.

Congestion also lowers worker productivity, increases air pollution, and raises the costs of goods and services.

The causes of the growth in travel in the past two decades stem partly from a 36 percent increase in the general population and a 68 percent boom in the work force. But it's how we're configured that makes any increase in population translate into an automatic increase in car travel. Sprawling development and the segregation of homes, work sites, shops, services, and schools make the auto the only practical mode for most trips.

1990 Nationwide Car-Trip Destinations

Type of trip	Percent of Total trips	Percent of total miles traveled
Work-related	27.9	35.6
Shopping	20.2	11.9
School/church	5.3	4.5
Other personal business	25.2	21.4
Social/recreation	21.4	25.6

In the work commute, car- and van-poolers, bikers, walkers, and bus riders have made a dent in relieving congestion, but it is a very small dent. The 1990 U.S. Census reveals for 1990 that 3 percent of Oregonians took public transit to work and 13 percent shared the ride in cars or vans. Overall, little more than one-quarter of the work

commuters got to work in some way other than driving solo. Not only are the percentages small for non-auto travel, they are less than what they were a decade ago.

1990 Work Commute

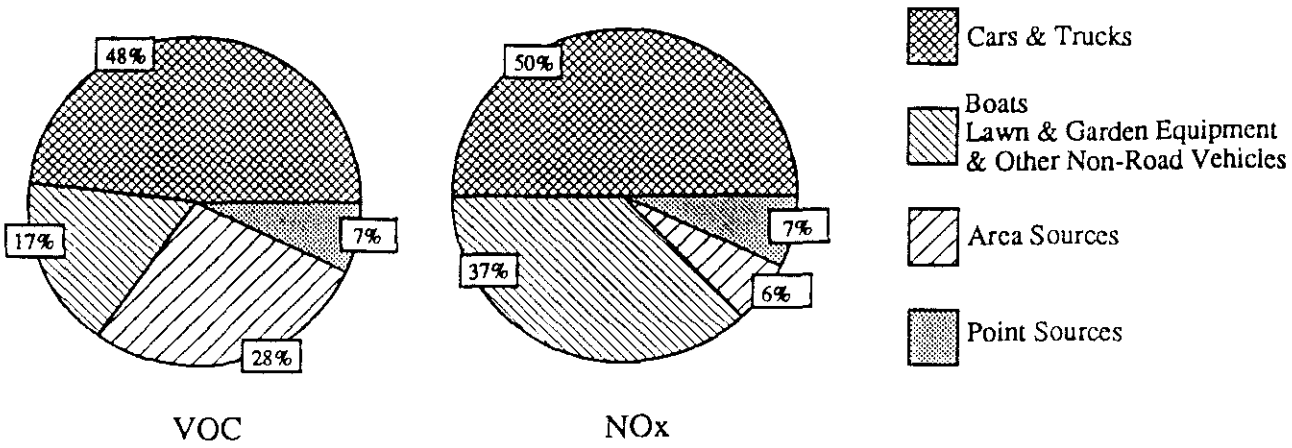
	Drive alone	Carpool	Transit	Other	Average travel time (minutes)
Ashland	67%	11%	1%	21%	14
Beaverton	77	11	5	7	21
Bend	75	13	-	11	13
Brookings	77	13	0	11	11
Cannon Beach	59	4	-	38	9
Corvallis	63	9	2	26	10
Eugene	69	10	4	18	16
Medford	79	11	1	9	17
Portland	65	13	11	11	20
Roseburg	78	12	1	9	15
Salem	73	15	3	10	18
Wilsonville	81	11	1	8	23
Oregon average	73	13	3	11	20

Air Quality

One of the main costs of more and more auto travel is the air pollution it generates. Polluted air threatens public health. It degrades quality of life in terms of odor and reduced visibility. It damages materials, crops, trees, and other vegetation.

To protect human health and welfare, the federal Clean Air Act defines minimum standards for air quality. The Portland metro area currently violates the standards for carbon monoxide and ground-level ozone; Medford, Grants Pass, and Klamath Falls violate the standard for carbon monoxide. Auto exhaust is a major source of both carbon monoxide and ozone. Other sources such as paints and solvents and non-road vehicles, including boats and lawn mowers, are also major polluters.

Ozone-Causing Emissions in the Portland Area: 1990



Ozone forms when oxygen and nitrogen (NOx) and volatile organic compounds (VOC) react in the presence of sunlight.

In the early 1970s, Portland violated the carbon monoxide standard almost one out of every three days. Smog was even worse, with levels often exceeding the standard by as much as 100 percent. In 1978, the Environmental Protection Agency identified Medford as having the worst carbon monoxide emissions in the nation. It violated the standard one out of every two days.

Since then, there have been dramatic declines in auto emissions due to more efficient cars, motor vehicle inspection and maintenance programs, traffic improvements, limits on on the availability of parking, efficient bus service, and MAX, the light rail in Portland. Large gas stations are now required to install vapor recovery systems. Cleaner burning oxygenated fuels are now being sold.

As a result, DEQ is confident the state will meet the ozone and carbon monoxide standards by the 1993/1995 deadlines set by the Clean Air Act. Success, however, may be short-lived for Portland. The influx of new drivers and continuation of the trend toward more driving per driver could easily outstrip the technological improvements.

Failure to meet standards not only jeopardizes health, but also the state's economic well-being. EPA could withhold federal money for streets and roads and impose measures to improve the air quality. Their restrictions could limit industrial growth.

Public Works

Streets, roads, water and sewer systems, waste disposal facilities, parks, libraries, schools, jails, and other public works form the backbone of a community. With the influx of people over the next 20 years, Oregon communities will need to build new streets, parks, and schools and expand water and sewer systems to serve them. At the same time communities must meet the demands of growth, they face a huge backlog of projects: substandard streets and roads in need of repair and replacement; crowded

parks, schools, and roads in need of expansion; and aging water, sewer, and stormwater systems in need of maintenance. All told, the bill to restore, maintain, and expand city and county roads, water systems, sewer systems, parks, and schools runs into the tens of billions of dollars.

On top of these costs, Oregon communities must upgrade and improve their drinking water, sewer, and storm systems to meet new pollution standards. Monitoring and reducing pollutants in drinking water could cost more than $1 billion over the next 10 years. Upgrading sewer and stormwater systems could cost more than $2 billion over the next 20 years. Portland alone needs $1 billion to improve its current sewer and stormwater systems. For some smaller communities, the investments they must make could quadruple rates to consumers.

Sprawling development is the most expensive form of development. Roads, water, and sewer lines need to extend long distances in every direction. While new capacity is built to serve the new developments, capacity in other areas remains underused.

Water Supply

Oregon is blessed with abundant water resources, boasting over 6,000 lakes and reservoirs and a network of 112,000 miles of rivers and streams. Although the total amount is not known, groundwater is a major source of water supply for households, industries, and farms.

Despite our natural abundance, however, summer water shortages often plague Oregon farmers, ranchers, industries, and cities. Most rivers are already allocated beyond their capacity during parts of the year and during droughts. Measures to protect

the endangered salmon and other species will most likely reduce the water available for out-of-stream uses -- irrigation, city water, and industrial processing. In some developing areas, groundwater withdrawals are restricted to ensure sustainability.

Many of Oregon's fast-growing communities will soon need to develop new supplies to meet burgeoning summertime demand. Portland's peak day water needs are expected to reach one billion gallons in 2050, more than twice the water available today. A Washington County water management committee predicted that peak water demand could exceed the capacity of its water supply systems as early as 1995. Ashland recently developed a new water resource plan to prevent shortages predicted to occur in the late 1990s. Conservation was chosen as the cornerstone of its plan because it can provide sufficient water for Ashland's residents at one-tenth the cost of developing new supplies.

The growing population will increasingly compete for limited water supplies with fish and wildlife, agriculture, hydro power production, and industry. State agencies are seeking to protect stream and river flows to reduce pollution, enhance fisheries, and provide for adequate recreation and navigation. The Water Resources Department is imposing limits on new withdrawals of many streams to prevent overuse. Ultimately, the water availability may limit growth in otherwise fast-growing areas.

Water Quality

Clean rivers, lakes, and underground reservoirs are essential to providing water that is safe for drinking, recreation, and fish and wildlife. We have made great strides in cleaning up our waterways -- notably the Willamette, once one of the nation's dirtiest rivers. But some Oregon waterways do not meet clean water standards.

Rivers and Lakes. Industrial, agricultural, and municipal wastes all contribute to the pollution of the 1,100 miles of Oregon rivers that fail to meet clean water standards. Sources of urban wastes include wastewater treatment plants, urban run-off, and combined sewer and storm systems. Wastewater treatment plants do not remove all the pollutants from household and industrial sewage. Consequently, the water it discharges into nearby waterways is to some degree polluted.

Urban run-off occurs as rainwater washes over streets and other areas and collects toxic metals, bacteria, organic compounds, debris, and dirt. This polluted water flows into storm sewers and ditches which then goes directly into waterways. Sewer systems in Portland and a few towns collect storm water as well as wastewater. Heavy rains cause overflows and some raw sewage is discharged directly to nearby rivers.

Today, many Oregon communities are required to reduce the pollution discharged into waterways to meet clean water standards. The changes they must make to their sewer and stormwater systems will be expensive. In Washington County, for example, DEQ limits phosphorus discharge into the Tualatin River. To meet DEQ standards, the Unified Sewerage Agency, which serves the county, must change its treatment process at a cost of $100 million to $200 million. Many other communities, including Ashland, Myrtle Point, and Coquille, also must upgrade their wastewater treatment facilities to comply with standards. McMinnville has already begun plans to modify its treatment plant. If the measures communities take are not sufficient, they will likely have to control new development.

Groundwater. Underground aquifers store groundwater. Through a systems of wells and piping, groundwater is taken up to provide water for drinking, crop irrigation and industrial uses. Today, more than one million Oregonians rely on groundwater as their primary source of water. Groundwater also serves as back-up supply to another million Oregonians.

Pollutants from the earth can filter down through the soil to contaminate groundwater. Sources of groundwater pollution number in the hundreds. In particular, landfills, chemical spills, fertilizers, septic tanks, and leaking fuel from underground storage tanks pose significant pollution threats. Although we do not know the quality of all of our groundwater, there are many documented cases of contamination throughout the state. Milwaukie, for example, found it necessary to clean up chemicals in its water supply, at a cost of $1.5 million.

Affordable Housing

Every Oregonian deserves a decent, safe, and affordable place to live. Today, many low-income households pay a large portion of their income on housing-related costs, leaving too little money for food, child care, health services, and other necessities. Some of these households then become trapped in lasting poverty.

An affordability rule-of-thumb says the proportion of a household's income spent on rent or mortgage payments should be less than 30 percent. In 1990, nearly 250,000 households with incomes below the median spent 30 percent or more for housing.

Energy costs also make up a significant portion of housing-related expenses for the low-income. For some households, particularly those whose homes are unweatherized, energy bills add another 20 to 30 percent to their housing budget. For households who live long distances from work, transportation costs are another burden.

The problems of the homeless are even more severe. The state Housing and Community services Department estimates more than 30,000 people are homeless, and the number is growing, particularly homeless families. A listing of the kinds of people

who are homeless illustrates the needs of the homeless do not center exclusively on shelters, but on the provision of a wide range of social services.

- abandoned or runaway youth
- mentally ill
- mentally retarded
- developmentally disabled
- domestic violence victims
- sexual abuse victims
- veterans
- elderly
- alcohol and drug abusers
- people with AIDS
- families where the head of household is unemployed or under-employed

Adequacy of the housing supply is reflected in the percentage of housing units for rent and for sale. Vacancy rates for 1990 reveal the tightness of the Oregon housing market. The statewide averages were 1.4 percent for houses for sale and 5.3 percent for housing for rent. Normal vacancy rates for housing for sale range between 1.5 and 2 percent; for housing for rent, between 6 and 8 percent.

Housing prices are escalating in the most rapidly growing parts of Oregon. In Clackamas county, for example, housing prices rose 10 percent between 1991 and 1992. Between 1985 and 1989 house prices in Brookings increased twice as fast as personal income.

Open Spaces

Oregon's topography forms a rich mosaic of forests and farmlands, range lands, mountains, brush steppes, deserts, wetlands, bogs, marshes, estuaries, waterways, beaches, and dunes. These areas are habitat for thousands of species of fish and wildlife. This spectacular variety also provides a wealth of recreational opportunities. It's no

wonder that tourism has become Oregon's third largest industry. From luxury resorts to wilderness adventures, windsurfing to white water rafting, rock climbing to hang gliding, Oregon's attractions draw millions of visitors each year.

Oregon's 225 state parks consistently rank among the nation's top 10 in attendance. Our 13 national forests include miles of coastline, sand dunes, mountain lakes, glacier-clad volcanoes, whitewater rivers, high desert as well as the vast coastal and interior forests. Other national lands include the Columbia Gorge National Scenic Area, Hells Canyon, and the Oregon Dunes as well as four national parks, Crater Lake among them.

Within the urban landscape, Oregon has kept some of the natural world. Downtowns and residential neighborhoods are liberally dotted with trees and other greenery. Parks of all kinds, playgrounds, and sitting areas offer residents retreats from city activity as well as havens for wildlife.

Sense of Community

A city that is lively, safe, and attractive is one where its residents feel strong ties to it. They are aware of city-wide issues, voice their concerns in community forums, and work to make their city a better place.

Community spirit stems in part from a network of vibrant neighborhoods. A vibrant neighborhood is readily identifiable by its particular set of landmarks -- whether they be architectural, historical, social or scenic. Its unique character evolves over time as new and old residents stamp it with their individuality. Most importantly, it's a place where people interact face to face and take care of each other in the small but significant ways that connect people. Residents may also express their commitment more formally by joining their neighborhood association, volunteering at local schools, participating in crime watch and block home programs, and helping in neighborhood clean-ups.

A city's public spaces also strengthen community spirit. They serve as a kind of living room where people from throughout the community may gather. They are the sites of parades and celebrations, festivals of one kind or another, craft fairs, and political rallies. These social centers give people the opportunity to meet one another as well as to participate in and support community-wide events.

The sense of community tied to the city has become more fragile, due in part to development patterns that separate homes from people's daily activities: working, shopping, going to the doctor or dentist, visiting friends or relatives, eating out, or going to the library. Not only does this segregation require people spend a sizable chunk of their time driving from place to place, it also hinders people from meeting each other in spontaneous, casual settings.

As we design new communities and revitalize old ones to meet Oregon's benchmarks, we can look to the popularity of those compact, mixed-use neighborhoods in Portland, Eugene, Ashland and other Oregon cities where residents can walk to do their shopping, run other errands, or visit with each other; where bustling activity is the norm; and where community spirit runs high. Neighborhoods like these where residents are involved make a city livable.

2. WHERE WE WANT TO BE: THE BENCHMARKS

The benchmarks in this section describe the quality of life we want for Oregon's growing communities by 2010. They are the second round of benchmarks which are being submitted to the 1993 legislature. The outstanding quality of life we want to keep and enhance includes these features:

A clean, healthy environment. It is essential to our health and welfare that Oregon is a place where the air is clean and the water is fresh and plentiful. We aim to meet the standards set by the federal Clean Air and the Clean Water Acts and to avoid sanctions that could limit economic opportunity.

A transportation system of choices. The car will be the mainstay of individual mobility for decades to come, but we cannot meet our goals if it is the only viable option for most personal travel. We want to design our communities and transportation systems so that more people find it convenient, safe, and comfortable to get where they need to go by foot, bike, bus, rail, or train.

Quality services. We want well-maintained roads, bridges, water and sewer systems, parks, and other public facilities to serve Oregonians both now and in the future. We also want to become more efficient in both the delivery and use of services.

Affordable housing. We want to make sure every Oregonian has a place to live. In addition to providing a mix of available housing at all price levels, we must ensure that education and training opportunities are available to everyone so people can afford to rent or buy the kind of homes they want.

Open spaces. We want to continue the legacy begun by our forebears: cityscapes that include a generous sprinkling of natural areas, parks, and other open spaces. We want

to protect farm and forest lands and natural areas surrounding our cities. We want ample and diverse recreational opportunities in and near population centers.

Vital communities. We want communities that feature attractive and lively downtowns, dynamic neighborhoods, and involved citizens.

Clean Beautiful Natural Environment

Air	1970	1980	1990	1992	1995	2000	2010
1. Percentage of Oregonians living where the air meets government ambient air quality standards	33%	30%	89%	50%	100%	100%	100%
2. Carbon dioxide emissions (million metric tons) as a percentage of 1990 emissions			100%	102%	100%	100%	100%

Water	1970	1980	1990	1992	1995	2000	2010
3. Miles of assessed Oregon rivers and streams not meeting government state and federal in-stream water quality standards			1,100	1,100	723	75	0
4. Groundwater:							
a. Total amount							
b. Percentage that is contaminated							
5. Percentage of key rivers and rivers with in-stream water rights meeting in-stream flow needs							
a. Less than 9 months out of the year				35%	30%	26%	21%
b. 9 to 11 months out of the year				25%	28%	33%	36%
c. 12 months out of the year				35%	35%	35%	36%

Land	1970	1980	1990	1992	1995	2000	2010
6. Percentage of Oregon agricultural land in 1970 still preserved for agricultural use	100%	100%	96%	95%	95%	94%	94%
7. Percentage of rangelands which are in good or excellent condition				22%	23%	27%	35%

8. Percentage of land with allowable soil loss erosion rates							
a. Cropland		54%		72%	72%	75%	80%
b. Pasture land		92%		95%	95%	95%	96%
c. Forest land		87%		90%	90%	91%	92%
9. Forest land:							
a. Percentage of Oregon forest land in 1970 still preserved for forest use	100%	97%	92%	92%	91%	91%	90%
b. Percentage of Eastern Oregon forests that are healthy (all ownerships)							
10. Percentage of Oregon wetlands in 1990 still preserved as wetlands			100%	100%	100%	100%	100%
11. Percentage of identified Oregon hazardous waste sites that are cleaned up or being cleaned up			57%	62%	73%	87%	100%
12. Percentage of high-level radioactive nuclear waste cleaned up at the Hanford Nuclear Reservation				0%	0%	0%	40%
13. Pounds of Oregon municipal solid waste landfilled or incinerated per capita per year				1,826	1,800	1,400	1,050

Plants, Fish, and Wildlife	**1970**	**1980**	**1990**	**1992**	**1995**	**2000**	**2010**
14. Percentage of native fish and wildlife that are:							
a. Threatened, endangered, or sensitive				23%	25%	27%	28%
b. Uncertain status				66%	63%	60%	54%
c. Healthy				11%	12%	13%	18%
15. Percentage of native plant species that are:							
a. Threatened, endangered, or sensitive				10%			
b. Uncertain status				7%			
c. Healthy				83%			
16. Percentage of key sub-basins in which wild salmon and steelhead populations are increasing or at target levels	13%	13%	25%		38%	88%	100%

Outdoor Recreation	1970	1980	1990	1992	1995	2000	2010
17. Acres of primitive and wilderness public land in Oregon (millions)	15.7	16.1	17.1	17.1			
18. Acres of multi-purpose public land available for recreation in Oregon (millions)	25.8	25.4	24.4	24.4	24.8	24.8	24.8
19. Acres of Oregon parks and protected recreation land per 1,000 Oregonians			157		160	160	160

Developed Environment Which Is Convenient, Affordable, Accessible, and Environmentally Sensitive

Community Design	1970	1980	1990	1992	1995	2000	2010
20. Percentage of new developments where occupants are within mile of a mix of stores and services, transit, parks, and open spaces							
21. Percentage of existing developments where occupants are within mile of a mix of stores and services, transit, parks, and open spaces							
22. Percentage of development in Oregon per year occurring within urban growth boundaries				89%			
23. Residences per acre within urban growth boundaries							
24. Number of Oregonians (in thousands) with drinking water that does not meet health standards		250	160	75	45	0	0
25. Number of Oregonians (in thousands) with sewage disposal that does not meet government standards			200	143	134	67	0
26. Percentage of total land within the Portland metropolitan area which is open space				20%			
27. Percentage of total land within the Portland metropolitan area preserved as open space				3%			
28. Acres of community parks, designated recreation areas and designated open space per 1,000 Oregonians living in communities			16		18	20	20

Transportation	1970	1980	1990	1992	1995	2000	2010
29. Percentage of Oregonians who commute (one-way) within 30 minutes between where they live and where they work			88%	88%	88%	88%	88%
30. Percentage of miles of limited access highways in Oregon metropolitan areas that are not heavily congested during peak hours		93%	65%	66%	60%	60%	60%
31. Access to alternative transportation modes:							
a. Transit hours per capita per year in Oregon metropolitan areas	0.4	1.3	1.0	1.2	1.3	1.5	1.7
b. Percentage of streets in urban areas that have adequate pedestrian and bicycle facilities							
32. Percentage of Oregonians who commute to and from work during peak hours by means other than a single occupancy vehicle				29%	29%	33%	38%
33. Vehicle miles travelled per capita in Oregon metropolitan areas (per year)			7,764	7,957	8,256	8,778	7,848

Housing	1970	1980	1990	1992	1995	2000	2010
34. Percentage of Oregon households that can afford the median-priced Oregon home for sale			47%		50%	50%	50%
35. Home Renters: Percentage of Oregon households below median income spending less than 30 percent of their household income on housing (including utilities)							
a. Overall			41%		60%	68%	75%
b. African-Americans							
c. American Indians							
d. Asians							
e. Hispanics							
f. Whites							

36. Home Owners: Percentage of Oregon households below median income spending less than 30 percent of their household income on housing (including utilities)							
a. Overall			49%		73%	84%	92%
b. African-Americans							
c. American Indians							
d. Asians							
e. Hispanics							
f. Whites							
37. Number of Oregonians who were homeless at some time in the last year			30,000	53,000	20,000	10,000	5,000
38. Percentage of families with children with affordable housing							
39. Energy use per dollar of household income (BTU per dollar)			5,298		5,000	4,500	3,500

Access to Facilities	**1970**	**1980**	**1990**	**1992**	**1995**	**2000**	**2010**
40. Percentage of public buildings and facilities accessible to Oregonians with physical disabilities							

Access Between Communities	**1970**	**1980**	**1990**	**1992**	**1995**	**2000**	**2010**
41. Percentage of Access Oregon Highways built to handle traffic at a steady 55 mile-per-hour rate			42%	54%	56%	66%	90%
42. Percentage of Oregonians living in communities with daily scheduled inter-city passenger bus, van, or rail service			92%				
43. Percentage of Oregonians living within 50 miles of an airport with daily scheduled air passenger service			90%		90%	92%	95%

Emergency Preparedness	1970	1980	1990	1992	1995	2000	2010
44. Property damage per year in Oregon due to wildfires (millions of 1989 dollars; 5-year rolling average)	$5.23	$2.84	$14.25	$13.90	$10.0	$7.0	$2.5
45. Structure fire damage per year in Oregon (millions of 1989 dollars; 5-year rolling average)		$89.42	$82.44	$72.52			
46. Percentage of counties with emergency management programs incorporated into the basic government structure				53%	75%	100%	100%
47. Percentage of counties with the capability to respond to a disaster, effectively coordinate multi-jurisdictional resources, and assist communities to recover fully from the effects							

Communities That Are Safe, Enriching, and Participative, With Access to Essential Services

Public Safety	1970	1980	1990	1992	1995	2000	2010
48. Index crimes rate per 1,000: Willful murder, aggravated assault, burglary, larceny, motor vehicle theft, arson							
a. Overall		64.1	63.1	57.8	44	28	22
b. Urban areas		70.7	70.1	64.3	49	32	24
c. Rural areas		52.1	48.2	44.1	34	22	17
49. Other crimes punishable by statute rate per 1,000 (e.g., negligent homicide, kidnapping, simple assault, forgery, fraud, vandalism, weapon laws, drug and liquor laws, prostitution)							
a. Overall		69.6	80.4	80.5	56	36	28
b. Drug crimes		3.5	5.8	4	4	2.6	2
50. Juvenile arrests per 1,000 juvenile Oregonians per year		32	38	49	35	20	10
51. Average rate of reincarceration of paroled offenders within three years of initial release				41%	35%	20%	15%
52. Rate of arrestees who have one or more drugs in their system at time of arrest				30%-60%			
53. Percentage of parole revocations involving substance abuse problems				67%			
54. Number of communities involved in a community-based strategic plan for law enforcement							

Justice	1970	1980	1990	1992	1995	2000	2010
55. Time the judicial system takes to resolve cases							
a. Civil cases disposed of in 18 months				95.8%	98%	98%	98%
b. Domestic relations cases disposed of in 9 months				95.2%	98%	98%	98%
c. Felony cases disposed of in 6 months				86.6%	98%	98%	98%
56. Felony arrest rate per 100,000 community adult population							
a. African-Americans			9.1	6.9			
b. American Indians			1.4	1.5			
c. Asians			0.5	0.4			
d. Hispanics			1.8	2.1			
e. Whites			0.8	0.9			
57. Felony conviction rate per 100,000 community adult population							
a. African-Americans			8.3	7.8			
b. American Indians			1.4	1.3			
c. Asians			0.2	0.7			
d. Hispanics			1.0	1.1			
e. Whites			0.9	0.9			
58. Victimization rates: Homicides (rate per 100,000 community population)		4.3	5.1	4.7			
a. African-Americans		32.0	29.9	35.2			
b. American Indians		17.7	9.6	7.7			
c. Asians		4.9	4.4	4.7			
d. Hispanics		2.1	9.4	9.0			
e. Whites		3.7	4.3	3.8			

59. Victimization rates: Hate crimes (rate per 100,000 population)							
a. African-Americans			361.1	317.0			
b. American Indians			9.6	43.2			
c. Asians			23.7	35.5			
d. Hispanics			45.2	66.9			
e. Whites			5.9	14.1			

Access to Cultural Enrichment	1970	1980	1990	1992	1995	2000	2010
60. Number of arts events attended per capita in Oregon per year		1.4	1.7	3.1	2.0	3.0	5.0
61. Rank in per capita arts funding							
a. State funding (out of 56 states and territories)	38th	46th	41st	39th	35th	30th	25th
b. Private funding							
62. Percentage of counties with significant cultural exchange opportunities							
63. Percentage of Oregonians served by a public library which meets minimum service criteria		73%	86%	83%	88%	95%	100%

Sense of Community	1970	1980	1990	1992	1995	2000	2010
64. Percentage of eligible Oregonians registered to vote	80%	79%	70%	78%	80%	90%	100%
65. Percentage of eligible Oregonians who vote	62%	61%	58%	62%	65%	75%	85%
66. Oregon's rank among states in percentage of adults who vote		15th	14th		10th	5th	1st
67. Percentage of Oregonians who volunteer at least 50 hours of their time per year to civic, community, or nonprofit activities							
a. All Oregonians				30%	60%	80%	100%
b. Age 18 and under							100%
c. Age 65 and over				31%			100%
d. African-Americans				36%			100%
e. American Indians				32%			100%
f. Asians				29%			100%
g. Hispanics				24%			100%
h. Whites				34%			100%

68. Percentage of Oregonians who understand the Oregon governmental system							
69. Percentage of Oregonians with a positive view of the state				69%			

Access to Health Care	1970	1980	1990	1992	1995	2000	2010
70. Percentage of Oregonians with economic access to health care							
a. All Oregonians			84%	85%	99%	100%	100%
b. Children (0-17)			79%	85%	99%	100%	100%
c. African-Americans				84%	99%	100%	100%
d. American Indians				74%	99%	100%	100%
e. Asians				81%	99%	100%	100%
f. Hispanics				67%	99%	100%	100%
g. Whites				86%	99%	100%	100%
71. Percentage of Oregonians with geographic access to health care			94%	94%	96%	98%	99%
72. Percentage of families with a member with a disability who receive in-home support				7%	20%	75%	100%
73. Percentage of injured workers who receive adequate compensation							
74. Percentage of Oregonians with access to public or private treatment for mental or emotional problems							
a. Adults							
b. Children							
75. Percentage of seniors seeking nursing homes who access them							
76. Percentage of people seeking drug and alcohol treatment receive it			90.0%	89.5%	100%	100%	100%
77. Percentage of offenders needing drug and alcohol treatment who receive it				43%	100%	100%	100%

Access to Child Care	1970	1980	1990	1992	1995	2000	2010
78. Percentage of child care facilities which meet established basic standards			20%		90%	100%	100%
79. Accredited child care facilities as a percent of regulated child care facilities				5.8%	12%	24%	50%
80. Number of identified child care slots available for every 100 children under age 13			13	15	16	20	25
81. Percentage of families for whom child care is affordable				69%			

Customer Satisfaction: Percentage of Oregonians who think Oregon is doing a good job at:	1970	1980	1990	1992	1995	2000	2010
82. Protecting natural resource lands				56%			
83. Maintaining clean air and water				65%			
84. Maintaining highways, roads, and bridges				59%			
85. Providing parks and open spaces				86%			
86. Developing mass transit				51%			
87. Developing clean and attractive cities				65%			
88. Providing easy access to work, shops, parks and recreation				67%			
89. Providing economic access to health care				18%			
90. Controlling crime				40%			
91. Making available cultural and entertainment opportunities				69%			

3. HOW TO GET WHERE WE WANT TO GO

The idea of Oregon Benchmarks began with the premise that Oregon will have the best chance of keeping its quality of life if Oregonians agree clearly on where we want to go. On that score, the benchmarks have been remarkably successful.

The second premise was that once the goals were agreed on, Oregonians would join together in achieving them. With a forecast of continuing population growth, that will be no simple matter. Despite the great strides Oregon has made in protecting its quality of life, we cannot meet some of the benchmarks on the course we are on today.

We don't need to lower our sights. But if we want to achieve the benchmarks, all of us -- individuals, businesses, and governments -- will need to chart a new course that recognizes the links between individual actions and environmental and social well-being. That effort should include:

- **Education/communication.** The forecast of nearly a million more people by 2010 won't occur all at once. Unfortunately, the impacts of unmanaged growth are usually not felt until the numbers become very large. Then we notice what we've lost -- a once-scenic hillside that's become a housing development, a favorite fishing hole that's become crowded, a 20-minute drive to work that's become a 40-minute commute.

  If the public is to support a new course, it needs to be informed of the population growth that is occurring now, how that growth is being accommodated, what the forecasts are for growth, and what the options are for managing growth. Once conditions and consequences are understood, tradeoffs can be articulated. On the benchmarks themselves, there will be little debate. The means to achieve them, however, will require considerably more airing before any agreement is reached.

The means to achieve them, however, will require considerably more airing before any agreement is reached.

- **Local benchmarks.** The benchmarks serve as the blueprint for the state as a whole. If a city or county or region also assesses where it is today with respect to relevant benchmarks, the benchmarks will become a more meaningful and powerful tool. It will give local governments measurable outcomes to which they hold themselve accountable.

  Crafting specific actions for achieving some of the benchmarks may also benefit from a local perspective. The problems Portland faces in terms of traffic congestion are not the problems of Bend. The water distribution issues of Medford and Southern Oregon do not plague Salem and Marion County.

- **Collaboration.** Achieving some benchmarks calls for a collaborative approach among all levels of government with generous input from citizens. Creating less sprawling developments, for example, will require demand for compact housing by the home-buying public, support from builders and bankers, zoning overhauls by local governments, and financial incentives from the state. Otherwise, developments will continue to be built the way they are.

UMBRELLA STRATEGIES

Seven umbrella strategies have been formulated to meet the benchmarks at risk from unmanaged growth:

1. **Create a pattern of urban development that is compact, fosters a sense of community, and offers a range of mobility choices.**

Oregon has been growing in typical suburban fashion -- houses spread out over acres of subdivisions and separated from stores and shops, services, and work sites. The only practical way to get from one place to another is by car. Distances are usually too great for walking or biking, and developments are too sparsely populated to support mass transit.

Sprawling development not only eats up land, but it brings the twin ills of too much driving -- congestion and poor air quality. It makes providing public services inefficient and more expensive. It diminishes community spirit because it isolates people from each other. It blurs the distinctive character of individual communities.

An influx of 880,000 new people will require roughly 300,000 more houses. This amount is equivalent to adding a group of cities with populations the size of Eugene, Salem, Gresham, Beaverton, Medford, Corvallis, Springfield, Hillsboro, Albany, Lake Oswego, Tigard, Keizer, Bend, Milwaukie, McMinnville, Klamath Falls, Roseburg, Grants Pass, West Linn, Ashland, Oregon City, Tualatin, Pendleton, Coos Bay, and Forest Grove -- Oregon's 25 largest cities after Portland.

How we accommodate this growth is the key to Oregon's future quality of life. Preserving Oregon's magnificent landscape while providing places for people to live that are inviting, that reduce the need for driving, and that preserve open spaces suggests not only a less sprawling pattern of development but also one with these characteristics:

1. Mixed uses/mixed housing: The heart of the community is a mix of stores, restaurants, theaters, civic services, offices, and the like, surrounded by a mix of housing.

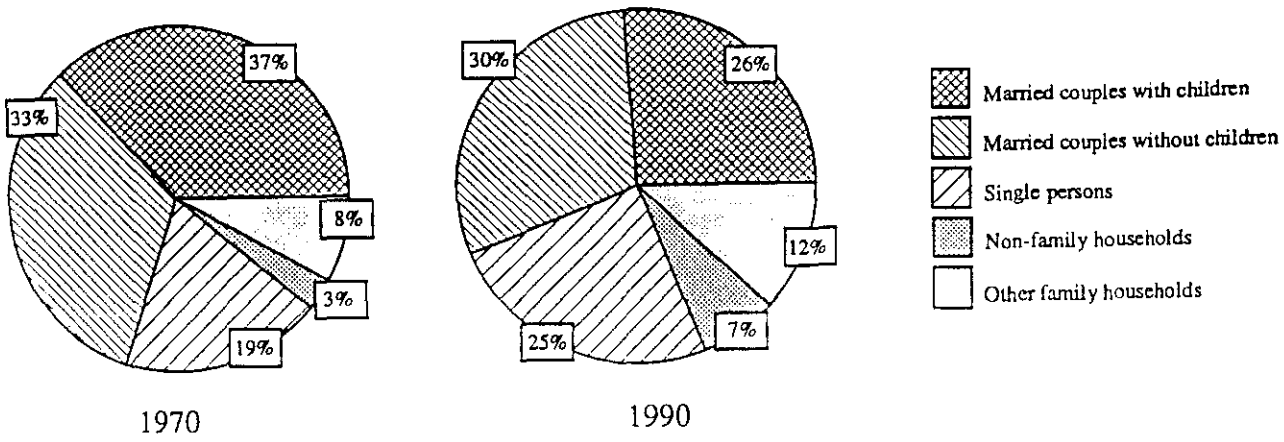
2. Transportation choices: A pedestrian-friendly layout and design allows people to get to where they want to go by foot, bike, and transit, as well as by car.

3. Sense of community: While community spirit does not spring from architectural plans, development designs that weave together housing, stores, and work sites with parks, open areas, and public spaces provide opportunities for residents to interact with one another and develop ties to their neighborhood and community.

As science writer James Gleick puts it, "An urban planner learns that the best cities grow dynamically, not neatly, into complex, jagged, interwoven networks with different kinds of housing and different kinds of economic uses all jumbled together." For decades though, that kind of mixed development has been largely restricted by zoning laws.

The changing character of Oregon's households may also signal a preference for this kind of development. Census numbers point to smaller households, fewer households with a single wage earner, more mothers working outside the home, and increasing numbers of elderly. A greater variety of housing closer to jobs and other daily activities may better suit households who have little need or desire for large houses on large lots and less time or ability to drive from place to place.

How Oregon Is Changing: Percentage of Households by Type



Source: U.S. Census

2. **Implement pricing strategies that reflect environmental and social costs.**

Some of the problems we face today stem from the fact that, individually, we don't bear the full costs of the decisions we make or the actions we take.

Air pollution from auto exhaust is one example. As a society, we pay the costs of auto pollution in diminished health, higher health care costs, smoggy vistas, property damage, and potential global climate change. At another level, we also pay the costs of controlling pollution through mandatory auto inspection and maintenance programs, technological fixes, and other government regulation. As individuals, however, we don't pay directly for the consequences of driving cars that pollute. Because those costs are hidden, travel by car is viewed as cheaper than it really is, and people drive more than they would otherwise.

If drivers paid directly for the air pollution their cars emitted, a wider spectrum of travel modes would become attractive. Some people would find it more cost-effective to carpool, ride the bus, or make fewer trips. In the long run, more people might prefer to live nearer work. They might also tune their cars more often, and when they buy new cars, they may choose to buy those that are cleaner-burning and fuel-efficient. These personal responses would reduce pollution.

Similarly, the costs of congestion -- delay and the building of more lanes to serve peak-hour traffic -- are not borne by rush-hour drivers. If they paid the costs of driving on congested roads, they might avoid those times or drive on less-crowded roads, make fewer trips, travel by bus, or carpool. These options would not only reduce congestion and defer expensive road expansions, but also help reduce air pollution.

Likewise, water rates could be designed to reflect the full costs of acquiring new water supplies and water storage and distribution systems. At the same time, households and businesses who used more water would pay more and those who used less water would pay less. Such a pricing strategy would encourage consumers to conserve by either using less water or by installing water-saving measures.

Had Portland and other cities been pricing water based on use, the impact of the summer drought might have been far less severe. Even if shortages had not been averted, cities could have raised the price of water beyond some base amount instead of imposing penalties for lawn watering and the like. In that way, households and businesses could have chosen their own actions to cut their water use.

To solve these and other problems, such as water pollution and solid waste, charging people directly may be the most efficient and effective tool. The revenues raised by those fees could go toward programs that lessen their impact. Air pollution fees

could go toward transit, bikeways, and other less-polluting travel options. Congestion fees could go toward road maintenance and improvements. Or, revenues could be used to reduce or eliminate some other tax. In addition, some portion might be rebated to low-income persons and others who may not have other alternatives.

3. **Concentrate growth within urban growth boundaries.**

On our present course, many new housing tracts will continue to spring up outside urban growth boundaries. Such growth at the city fringe adds to traffic woes, increases pressure to develop farm and forest land and open spaces, and raises the cost of providing public services. At the same time, the configuration of such growth chokes off the possibility for orderly, compact developments should cities need to expand in the future.

NEW JERSEY GROWTH STUDY

New Jersey recently studied the impacts of a population increase of 520,000 people. The study compared two patterns of development. One pattern was the continuation of sprawl; the other featured higher-density housing near shops and work, more multi-family housing, and more development within cities.

Among the study's findings:

- The compact pattern would use 175,000 (or 60 percent) fewer acres than the sprawl pattern.
- The compact pattern would result in the development of 42,000 (or 40 percent) fewer acres of agricultural lands and 30,000 (or 80 percent) fewer acres of critical environmental lands than the sprawl pattern.
- Public service capital costs would be $1.4 billion less under the compact pattern. More specifically, the compact pattern would require $699 million less for additional roads, $478 million less for sewers, $85 million less for water systems, and $178 million less for new schools and equipment. The compact pattern would also save $380 million a year in operation and maintenance costs.
- The compact pattern would generate 40 percent less water pollution than the sprawl pattern.

4. **Preserve and expand open spaces, park lands, and natural areas.**

Demand for recreational opportunities has been growing rapidly. In the Three Sisters Wilderness Area, for example, use has doubled in the past 10 years. In 1991-92, the tally of state park visits was 43 million, double the number two decades earlier. State park popularity has reached a point where visitors must make reservations months in advance.

Within urban areas, much of what people believe are permanent vistas of green space is privately owned. As population grows and more land is developed, these open spaces could disappear. In the Portland metropolitan area, for example, more than 90 percent of the natural areas, whether open fields or forested hillsides, are zoned for development.

Three measures on open spaces were on the November general election ballots. Voters rejected two statewide measures for state parks. Measure 1 would have authorized the state to issue up to $250 million in general obligation bonds for expanding and maintaining state parks. Measure 2 would have allowed future gasoline taxes to fund state parks. Portland area voters turned down a bond measure to buy roughly 7,000 acres of land for parks, open space, and wildlife habitat.

Funding is clearly an issue. But the state, more than ever, also needs a vision of what we want for future generations. Looking ahead 20 years and more, what lands should we set aside for future parks, open spaces, and natural areas? How much? Where? Developing a single vision will require an unprecedented level of communication and coordination among federal, state, and local landowners and the public. Once a vision is clear, we can begin to develop an integrated plan to identify potential sites and how they may be acquired, developed, and maintained.

5. **Expand the travel options available to meet Oregonians' mobility needs.**

While the car is likely to remain the predominant mode of travel, the costs it imposes can no longer be ignored. Meeting the benchmarks on air quality and congestion requires we reduce the amount of driving and increase the use of other travel modes.

Creating mixed-use, pedestrian-friendly developments should reduce the number of trips people make by car and also make other travel modes more attractive. At the same time, Oregon needs to improve transit services and increase support for mass transit, biking, ridesharing, vanpools, and working at home. Today, however, comparatively few state dollars go to these alternatives. The Oregon Constitution mandates most transportation money go to highway-related projects.

More funds, however, will be available from the federal government for non-auto travel modes. In the past, federal highway funds had been earmarked for either construction or improvement of highways. But the most recent federal spending authorization, the Intermodal Surface Transportation Efficiency Act, dubbed ISTEA, recognizes the need for transportation alternatives to cut energy use, manage congestion, and reduce air pollution. Accordingly, local governments will have more leeway in choosing how to use ISTEA funds.

OREGON'S TRANSPORTATION RULE UNDER STATEWIDE PLANNING GOAL 12

Recognizing the inherent link between transportation and land use, the Land Conservation and Development Commission and the Department of Transportation developed a transportation planning rule in 1991. Aimed at reducing auto travel, it calls on communities to promote walking, biking, and transit in their transportation plans. It requires Portland, Eugene, Salem, and Medford to reduce the number of miles traveled per capita by car by 20 percent during the next 30 years. It requires the Portland metropolitan area to consider changes to its land use plan to reduce travel demand. For cities with populations greater than 25,000, the rule requires they make new housing developments less auto-dependent.

6. **Make housing more affordable.**

Population growth, a sprawling pattern of development, and zoning restrictions will make achieving the housing affordability benchmarks more difficult. With growth ncomes increased demand for housing, which pushes up land costs, which in turn drive up the cost of housing. Sprawling development reduces the long-run supply of land for housing, which also increases land costs. Zoning that excludes manufactured homes, smaller homes on smaller lots, and multi-family homes limits the supply of lower-cost housing and contributes to the shortage.

The rise in housing costs can be held down by more flexible development designs that accommodate smaller lots, smaller units, and a broader mix of housing types, including multi-family and manufactured homes. In addition, housing clustered around a center core with a mix of houses, stores, services, and schools where walking, biking, and transit are practical choices will reduce travel costs.

In 1990, Congress passed the The National Affordable Housing Act requiring cities or counties receiving federal funds for housing to prepare comprehensive housing affordability strategies. These strategies identify, in detail, city or county housing needs and propose one-and five-year plans for meeting those needs. Individual strategies have been written for Clackamas and Washington counties, Portland, Gresham, Eugene, Salem, and Medford.

In 1992, under the Housing Act, the federal HOME Investment Partnerships Program, allocated $1.5 billion to develop affordable housing for low- and very low-income households. Oregon's share is $15 million, which will spent according to the priorities set forth in the comprehensive plans. The recipients are:

▪ State of Oregon, for rural areas	$6,776,000
▪ Portland/Multnomah County/Gresham	4,297,000
▪ Washington County	1,026,000
▪ Eugene/Springfield	860,000
▪ Salem	750,000

THE METROPOLITAN HOUSING RULE

In 1981, the Land Conservation and Development Commission established the Metropolitan Housing Rule to promote adequate and affordable housing in the Portland metropolitan area. It required regional governments to redraw their plans to achieve a housing mix with at least half the homes multi-family or attached single-family units. It also set minimum housing densities. A study by the Metropolitan Homebuilders Association and 1000 Friends of Oregon in 1991 concluded the rule significantly increased affordable housing in the Portland metropolitan area.

7. **Reform the funding of public works.**

With inadequate funding, the quality of public works that sustain our communities has declined. Today, we have deteriorating roads and buildings, crowded schools and parks, reduced library hours, traffic jams, and overburdened water and sewer systems.

Recent studies of Oregon's public works point to a long list of problems. Among them: tax and fee structures that do not generate enough revenue to pay the full costs of new development; limited local government revenues that tend to go for higher priority services such as police and fire protection; gasoline taxes too low to cover road maintenance and expansion; increasingly stringent environmental standards for water, sewer, and storm systems; inequitable cost distribution between local governments; inefficient pricing practices that encourage waste; and fragmented service provision that cannot achieve economies of scale. Without change, public facilities will deteriorate further. For the short run, Oregon needs to develop tax and fee structures that fund improvements, upgrades,

and expansions to public works in a timely fashion. At the same time, public works dollars can be spent more efficiently. Measures that conserve water and reduce travel, for example, will save money by deferring expensive expansions. For the longer run, more compact developments will enable Oregon to provide public works, particularly streets, sewers, and water lines, more efficiently.

LOCAL GOVERNMENT INFRASTRUCTURE FUNDING

Forecasts of the money needed to pay for high-quality roads, water systems, sewer systems, storm drainage systems, parks, school buildings, police and fire stations, libraries, transit systems and other public facilities far outstrip projected revenues. A 1990 study, Oregon Local Government Infrastructure Funding, estimated more than a $500 million a year shortfall in available revenues. The study's recommendations to increase public works funding include:

- Expand the use of mechanisms to charge users directly.
- Increase state financial aid to local communities.
- Expand state assistance to improve local government's ability to borrow from private lenders.
- Remove the legal barriers that limit local public works funding.

THE STATE RESPONSE: KEY LEGISLATIVE AND BUDGET ACTIONS

State agencies have proposed several new initiatives to advance the livable communities agenda. Highlights of the major initiatives are described below.

Local governments and state agencies continue to work to improve air quality, clean up our waterways, provide affordable housing, maintain parks, and meet other benchmarks on quality of life. The proposals build on these efforts and reflect an unprecedented degree of coordination across traditional agency lines to achieve the benchmarks.

The proposals also reflect the realities of Ballot Measure 5 budget cuts. There is no money, for example, for new state parks. For the most part, funding for these proposals will come from federal dollars, lottery money, and increases in some fees.

Transportation

The New Oregon Trail, Oregon's new transportation plan developed by the Oregon Transportation Commission and the Department of Transportation, is a bold, new blueprint for meeting Oregon's mobility needs. The Commission is submitting a comprehensive legislative and budget package to the 1993 Legislature to implement the plan. Some of the major elements include:

- Improving city bus services by adding more buses and expanding routes and operating hours.
- Speeding up the construction of the Westside light rail and beginning the design, engineering, and environmental analysis for a light rail extension from Portland to Clackamas County.
- Upgrading the tracks and signals in preparation for a high-speed passenger rail system from Portland to Eugene.
- Creating more bike and walk paths by increasing gasoline and highway taxes and fees.
- Expanding programs to encourage carpooling, vanpooling, working at home, and other alternatives to single-occupant car travel.
- Authorizing the levy of tolls or congestion fees on two pilot roadways where drivers pay for using a congested roadway during peak hours.

Air Quality

In spite of great strides in the technologies to reduce pollutants, Portland's air quality may not withstand increases in travel demand. The 1991 legislature called for the creation of a Task Force on Motor Vehicle Emissions Reductions to study ways to reduce emissions in the Portland-Vancouver area. The Task Force has proposed actions to the 1993 legislature that include:

- Strengthening the vehicle emission inspection and maintenance programs in the Portland metropolitan area.
- Setting emission standards for new gasoline-powered lawn and garden equipment, paints, solvents, architectural coatings, and other non-vehicle sources of air pollution.
- Charging drivers a "smog fee" for the amount of pollutants emitted from their cars. Amend the state constitution to allow the revenues generated from these fees to go toward faciliting and promoting other travel modes -- transit, car- and van-pools, biking, and walking.
- Requiring Portland metropolitan firms with 50 or more employees to establish programs that encourage employees to commute to work by means other than driving alone.
- Providing funds to developers to build new housing developments that facilitate and promote walking, biking, and transit.

Land Use

The Land Conservation and Development Commission is submitting a major budget and legislative proposal to the 1993 Legislature aimed at fending off sprawl. The proposal includes:

- Amending local transportation plans to facilitate and promote biking, walking, and travel by carpool, bus, and light rail.
- Providing financial incentives and technical help to local governments to update their land-use plans and revamp their zoning ordinances to encourage mixed-use and pedestrian-friendly developments.
- Providing financial incentives to developers to design mixed-use and pedestrian-friendly developments.
- Establishing a streamlined method for cities and special districts to annex lands to make the long-run provision of urban services more efficient.
- Requiring cooperative agreements among cities, counties, and special districts to ensure planning is coordinated, integrated, and consistent.
- Providing financial incentives to local governments to attract more people into underused urban areas; to require all housing developments be built with all necessary public services, including parks; and to promote higher densities.
- Identifying lands which are suitable for industrial development and planning for necessary infrastructure.

Water Quality and Supply

Several agencies charged with water responsibilities are proposing the following:

- Funnel an extra $20.3 million in lottery funds to local communities to upgrade water and sewer systems so they can comply with clean water standards.
- Reform the state's Water Pollution Control Revolving Fund to increase the revenues the state can lend to communities to upgrade their sewage treatment plants.

- Require local governments to regulate sources of contamination of groundwater used for drinking water through programs funded from a surcharge on water use.
- Require municipal water suppliers to evaluate the efficiency of their water systems and include conservation proposals in water supply management plans.

WORKING TOGETHER TO CHART A NEW COURSE

Achieving the benchmarks for livable communities will require concerted action statewide by state and local governments, as well as by the private and non-profit sectors and individuals. No one institution or level of government can achieve our quality of life goals alone. We must work together.

In the last section, we addressed some of the steps that the state is taking to achieve the benchmarks for livable communities. At the same time, communities across the state are creating their own visisons or plans for the future. Among them are Stayton, Bend, Ashland, Cannon Beach, Salem, Gresham, the Portland metropolitan area, and Corvallis.

Now it is time to bring together a broad-based network of community leaders statewide to develop a shared understanding of the challenges facing Oregon as a whole and what needs to be done to meet our benchmarks. With a common vision, we will be better prepared at all levels to move forward in concert. To address this need, we recommend creating regional groups to address livability issues. They should include representatives from local governments, the private sector, and interested citizens who would review trends facing the region, and develop a strategy and action plans to achieve livability benchmarks.

State agencies would be partners in these regional panels -- providing their perspectives on problems and needed strategies, helping explore ways to meet statewide and local needs, and providing technical resources when possible to help work through the process. Since issues may vary from region to region, state agency representation will also vary.

To help the regional committees focus, we recommend that the relevant benchmarks for quality of life be developed by region and county. This will permit each area to understand where it currently stands on quality of life, establish measurable goals, and monitor progress.

With benchmarks as a framework, the regional groups may also wish to target the benchmarks according to local needs and priorities. They could then develop strategies to address quality of life benchmarks.

The strategies presented in this report are a major step forward in addressing root causes that threaten Oregon's livability. What we need now are regional efforts to help tailor strategies and specific action plans to local needs. In this way, the benchmarks can become a tool for new state and local partnerships to help protect Oregon's livability. It could be a daunting effort to launch this effort all at once. It may prove more fruitful to start with one or two regions and learn as we go.

WHAT NEXT?

Oregon

DEPARTMENT OF
LAND
CONSERVATION
AND
DEVELOPMENT

April 12, 1993

TO: Land Conservation & Development Commission

FROM: Richard P. Benner, Director

SUBJECT: **April 22, 1993, Joint LCDC, OTC, EQC Meeting**
Interagency Land Use Issues

As you know, you will meet jointly with the Oregon Transportation Commission and the Environmental Quality Commission on Thursday evening, April 22. With this memorandum are reading materials I believe will stimulate your thinking about the principal topic of discussion at the meeting: "Livable Communities." As a further stimulant, here is a listing and brief discussion of "Livable Communities" issues deserving attention by the three commissions.

The Governor's budget contains money for a joint ODOT/DLCD program to implement the Transportation Planning Rule and the urban growth management recommendations (John Kelly project). The program is a key ingredient of the "Livable Communities" agenda, together with the New Oregon Trail (new state transportation plan) and the recommendations of the Motor Vehicles Emissions Reduction Task Force for the Portland Metropolitan Area. The ODOT/DLCD program aims particularly at the Progress Board's "Urban Mobility" Benchmark: reducing vehicle miles traveled per capita by 20 percent in 30 years. The desired outcomes are a cost-effective, efficient transportation system and a new development pattern that offers alternatives to current, nearly exclusive reliance upon the automobile for all trips.

ISSUES

1. Funding. The Governor's budget looks to federal dollars coming to the state under ISTEA (Intermodal Surface Transportation Efficiency Act) as the principal source of funding for the ODOT/DLCD Urban Mobility benchmark program. However, the budget also turns to the general fund and the lottery for matching funds for the ISTEA dollars and to pay for portions of the program that might fall outside ISTEA eligibility criteria. It is uncertain, at best, that the Legislature will approve the general fund and lottery portions of the program budget. What can be done to improve the chances for appropriation of these funds? What happens to the program if there are no general or lottery funds?

Barbara Roberts
Governor

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2. Effectiveness. In order for the "Livable Communities" program to succeed--as measured by attainment of the Urban Mobility and Air Quality benchmarks--all of the program's parts must succeed: the New Oregon Trail must find money to build the proposed transportation system; the Legislature must enact and provide for implementation of the recommendations of the Motor Vehicle Emissions Reduction Task Force (MVERTF); and we must build the new development patterns. Put another way, the new development patterns won't work to reduce vehicle miles travelled (VMT) unless the transportation system provides alternatives to the automobile and motorists are getting the price signals from the MVERTF measures. And the OTP and price signals won't work without supportive land use patterns. For LCDC's part, how do we most effectively get development built into new patterns?

3. Coordination. Given the interdependence of elements of the "Livable Communities" strategy, how do the three agencies and commissions coordinate their efforts? Is the existing model--interagency meetings to coordinate individual agency activity--adequate or should it be strengthened? Do other agencies need to be involved?

<dickb>

The link between planning, pollution, and economic development . . .

New DEQ plan needed for business vitality

By JAMES M. WHITTY

IN MY OPINION

The Portland metropolitan area has an air-pollution dilemma that could seriously affect future economic growth.

The federal Clean Air Act restricts growth in areas where air pollution exceeds or is likely to exceed federal air-quality standards. Portland fits the bill.

In assessing blame, the average Portlander may point the finger at industry. Wrong answer, says Oregon's Department of Environmental Quality.

According to DEQ, industry emits only a small amount of problem air pollutants in the Portland metropolitan area. Industry contributes only 13 percent to Portland's carbon monoxide problem and 7 percent for ozone pollution.

The real culprit is automobiles, says the DEQ. Motor vehicles in Multnomah, Washington, Clackamas and Clark counties cause 75 percent of carbon monoxide pollution and 50 percent of ozone pollution. With as many as a half-million more people expected to move into the metropolitan area during the next 20 years, the air pollution problem is expected to worsen.

Although Portland's air-pollution problem is largely attributable to cars, the Clean Air Act places the strongest restrictions on industry and economic growth. If growth restrictions are necessary for clean air, some Oregonians may say it's worth it. Growth restrictions alone, however, cannot achieve clean air in the Portland area.

The Clean Air Act's industrial-growth restrictions are painful and will get worse with time. Business expansion is allowed only if the new air emissions are more than offset by air-pollution reductions at the site or elsewhere in the area. If Portland is simply one of several locations under consideration for expansion, a company or business may well choose an area without growth restrictions.

Other industrial restrictions include a requirement for expensive new emissions-control equipment to be added to smaller and smaller businesses the longer growth restrictions are in effect. In today's weak economic climate, many businesses will fail under the weight of such restrictions.

It is possible to avoid growth restrictions in Portland and still be assured of clean air. If the state adopts an Environmental Protection Agency-approved maintenance plan to control air pollution caused by automobile travel, the growth restrictions will be eliminated.

Working with a governor's task force of industry representatives, environmental advocates, transportation experts and citizens, the DEQ is identifying ways to control growth in automobile pollutants over the next 20 years.

Today Portland's top air polluter, the automobile, is subject to few pollution-control requirements. Tri-county drivers must have their cars inspected by DEQ every two years. Less polluting but more expensive fuels are required this fall and next winter. Vapor-recovery nozzles are required for gasoline pumps.

DEQ says these steps are not enough to maintain federal air-quality standards. Portland can no longer rely on cleaner cars and fuels to solve its air-pollution problems. People are simply driving more. Miles traveled per car is growing four times as fast as the metropolitan area's population.

Automobile air-pollution-control plans include stricter DEQ inspection and maintenance, electronically controlled toll fees during rush hour, parking fees, air-pollution charges, cleaner gasolines and cleaner new car standards.

Portland should not stop with automobile strategies. If residents must drive less, there must be transportation alternatives. The metropolitan area has a good transit system, but suburban routes are not always convenient and bus frequency often unsatisfactory. Max light-rail lines are expanding to Hillsboro, but other routes should get scrutiny as well.

Land-use planning should be updated for transportation needs. Oregon's land-use planning has been a national model for two decades, but local planning does not adequately take into account an efficient transportation system. Current travel routes in the metropolitan area require longer driving time than would be the case with a well-considered transportation component to the local land-use plan. These land-use planning amendments are long overdue.

Portlanders and their neighbors must support some combination of new ideas of controlling automobile pollutants as well as better mass transit and transportation planning if the region is to have clean air and economic viability in the 21st century.

James M. Whitty is general counsel for Associated Oregon Industries and is involved with public affairs and government relations for environmental issues.

From a guest editorial in the *Oregonian* by Jim Whitty, September 24, 1992

APPENDIX G

VEHICLE MILES TRAVELED — A MAJOR ROAD NEEDS ISSUE IN OREGON

The people of Oregon are traveling more miles per person, and many are increasingly driving alone. This trend, which reflects national transportation trends, is producing excessive road costs, air emissions, traffic congestion, and higher user costs. It is possible to reverse these trends. Some successful approaches are discussed below.

Support for VMT Reductions

Between 1980 and 1990 Oregon experienced 3.4 percent annual growth in vehicle miles traveled (VMT). The Oregon Land Conservation and Development Commission (LCDC) adopted the Transportation Planning Rule which requires a reduction in vehicle miles traveled in the four largest urban areas of Oregon. The federal ISTEA legislation also calls for per capita VMT reduction efforts.

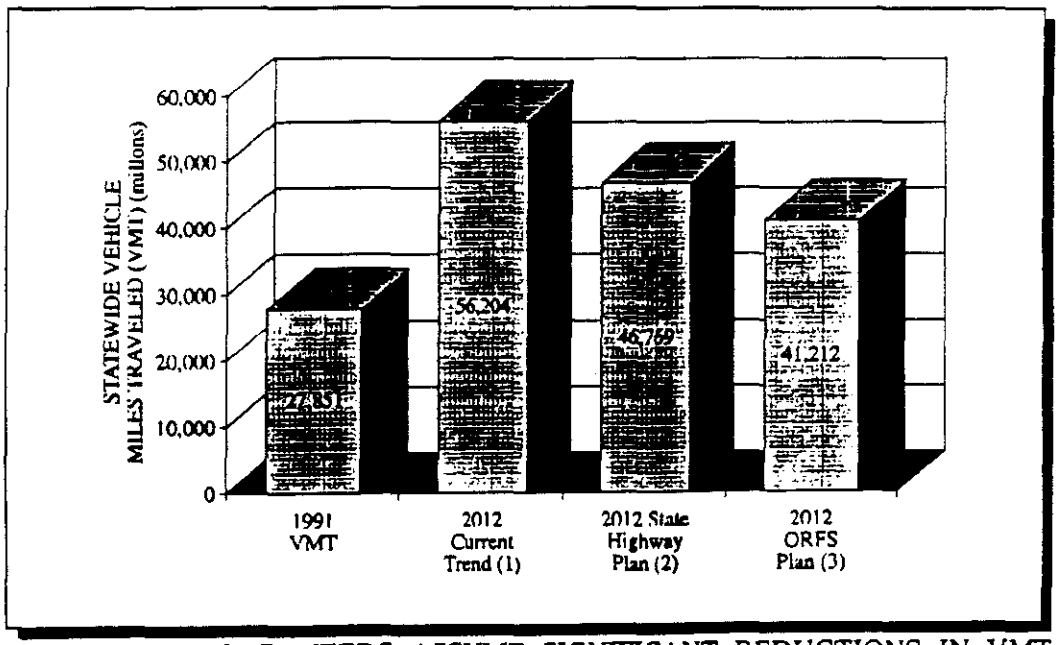


Exhibit G-1. ROAD NEEDS ASSUME SIGNIFICANT REDUCTIONS IN VMT GROWTH RATES. The study assumes full attainment of LCDC's Transportation Planning Rule goal, and hence the lowest VMT growth rate of any statewide plan.

The Oregon Roads Finance Study endorses efforts to reduce VMT growth. The study projects annual VMT growth at a reduced rate of nearly 1.9 percent, and bases its needs estimates on this reduction. The impact is significant, as shown in Exhibit G-1, with nearly 15 billion miles of vehicle travel (and associated costs, congestion delays, air pollution and fuel consumption) foregone.

Travel Demand Reduction Strategies

Oregon has established a policy to reverse the rapid growth in VMT. This formidable undertaking will require a comprehensive program of travel reduction policies and practices. Exhibit G-2 (A-E) lists potential approaches to VMT growth reduction, their relative effectiveness, implementation and legal requirements, relative support/resistance, and time required for benefits to accrue. Exhibit G-3 projects the responsiveness of automobile users to changes in such factors as pricing, land use, and travel time.

Land use controls. Several studies indicate that a 10 percent increase in urban density produces a 2.5 percent reduction in per capita VMT. Oregon's efforts to define and implement urban growth boundaries should help reduce urban sprawl over the long term and contribute to higher density. Zoning laws which separate land use types (e.g., residential, commercial, office buildings) contributes to higher VMT. By contrast, mixed development communities often provide for better mobility with lower VMT. Many land use and zoning requirements also set minimum parking space requirements quite high. Lower minimum parking requirements should help reduce VMT. Where transit is available, some states, such as Florida, require transit access to be built into new developments.

Land use measures can generally be incorporated into Oregon's existing system of land use planning, zoning and control, at little additional cost. Statewide implementation of reforms may be necessary to ensure full regional coverage of better land development practices from a transportation point of view. Enforcing the policies and limiting the exceptions may be more difficult, but necessary.

POTENTIAL VMT REDUCTION MEASURES

A. Land Use Controls

Activity	Demand Impact	Technical/ Administrative Requirements	Public Acceptance	Legal Requirements	Supporting Measures	Time frame
Reduce mandated minimum parking space requirements (especially for commercial development) and concurrently provide better access to transit.	Could be significant at individual development. Regional impact likely small.	Pro-Active planning of transit service vis-a-vis new commercial development. Can use existing inspection and approval mechanisms.	Neutral to negative. Depends on effectiveness of transit services.	Zoning standards enforcement. Implement statewide or at least major urban areas will ensure consistency.	Congestion pricing, transit service expansion.	Immediate benefits may occur around individual new developments. It will take a long time to change the character of a community.
Encourage mixed use development (e.g., developments that may include work centers, schools, shopping centers, daycare centers) and increased density.	For isolated planned communities, car ownership (and probably VMT) reduced by as much as 20%. 10% increase in density results in 2.5% decrease in VMT.	Transportation infrastructure (especially easy access to transit) has to be in place.	Positive big help to families with children and working parents.	Zoning regulations need allow mixed use developments.	Congestion pricing; transit service, HOV, bikeway, pedestrian access improvements.	It usually takes a long time to redevelop or newly develop an entire mixed land use community.

Exhibit G-2, A. LAND USE CONTROLS WHICH REDUCE VMT. Reduced parking availability, mixed-use developments, and increased development densities all result in lower VMT.

POTENTIAL VMT REDUCTION MEASURES

B. Congestion Pricing

Activity	Demand Impact	Technical/ Administrative Requirements	Public Acceptance	Legal Requirements	Supporting Measures	Time frame
Reduce employer subsidies for parking and/or increase parking tax.	Up to 40% VMT reduction is possible.	Collection and enforcement mechanisms need to be put in place. Minimum new requirements; use existing parking fee collection systems.	Negative, especially from commercial establishments.	Tax increase. Region wide policy preferable.	Land use controls to avoid development flight (urban sprawl). Improve transit, HOV, bikeway and pedestrian access.	Short term, if non-SOV options are available.
Establish limited toll facilities.	Up to 15% VMT reduction is possible for affected travelers.	Infrastructure development (e.g., toll booths), collection mechanisms, enforcement.	Generally negative. Required travelers to pay for access which was previously free.	Legislative action will be required. Tolls are now allowed on federally funded facilities under ISTEA legislation.	Land use control, and alternate mode and rideshare availability.	Medium term benefits. Requires time to build toll collection and queuing infrastructure.

Exhibit G-2, B. CONGESTION PRICING STRATEGIES WHICH REDUCE VMT. Increased parking prices and tolls help reduce VMT growth.

POTENTIAL VMT REDUCTION MEASURES

C. Transportation Demand Management

Activity	Demand Impact	Technical/ Administrative Requirements	Public Acceptance	Legal Requirements	Supporting Measures	Time frame
Encourage ridesharing programs (possibly including guaranteed ride home).	Generally weak potential impact, depends on applying policies consistently region wide.	Automated systems for matching travelers/ commuters, administration of systems and services.	Positive. Requires substantial marketing and public education for constant visibility.	None.	Requires regional approach, congestion pricing supports if rideshare is free.	Short to medium term.
Encourage flexible hours for public and private concerns.	Weak to moderate impact on VMT, but reduces congestion.	None on an ongoing basis, by substantial up-front consensus building efforts may be required.	Positive. Not all business types allow flexible hours.	None.	Requires regional approach.	Short term, but moderate benefits expected.

Exhibit G-2, C. TRANSPORTATION DEMAND MANAGEMENT STRATEGIES WHICH REDUCE VMT. Ridesharing and flexible work hours contribute to small reductions in VMT.

POTENTIAL VMT REDUCTION MEASURES

D. Transit Expansion

Activity	Demand Impact	Technical/ Administrative Requirements	Public Acceptance	Legal Requirements	Supporting Measures	Time frame
Increase service levels and geographic coverage (possibly implement rail systems and/or express service).	Low impact unless coupled with other measures. Highest impact requires increasing SOV costs.	Additional resources (e.g., vehicles, operation).	Positive. Primary regional impact could be increased tax requirements to fund transit.	None.	Land use controls, congestion pricing.	Medium. Will take time for public to learn alternatives. Expanded service on some routes. Requires 6-12 months to build up ridership. New transit routes or extensions require 12-24 months to build ridership.
Reduced fare pricing.	Low impact in general, yet may increase total number of person trips (and arguably mobility as a whole).	Development of a fare pricing and public education system.	Positive.	None. (Legislature may have to appropriate additional funding).	Land use controls, congestion pricing.	Short term. Minimal impacts expected. Increasing auto cost is much more effective than reducing transit cost.

Exhibit G-2, D. TRANSIT EXPANSION STRATEGIES WHICH REDUCE VMT. Transit service increases and fare reductions are most effective if coupled with automobile travel cost increases.

POTENTIAL VMT REDUCTION MEASURES

E. Rural Roadway Improvements

Activity	Demand Impact	Technical/ Administrative Requirements	Public Acceptance	Legal Requirements	Supporting Measures	Time frame
Direct routing (developing new road alignment to eliminate circuitous routing).	Low, since number of affected trips is relatively small, and activity focuses on rural areas.	Infrastructure improvement, including all applicable environmental and public processes.	Generally positive, albeit pubic condemnation process may generate significant resistance.	None. Implementation must follow existing environmental and land condemnation procedures.	None.	Long, since improvements take a relatively long time to complete (e.g., 3-10 years depending on impacts).

Exhibit G-2, E. ROADWAY RURAL IMPROVEMENTS WHICH REDUCE VMT. Changing road alignments to reduce out-of-direction travel has a modest effect on VMT reduction.

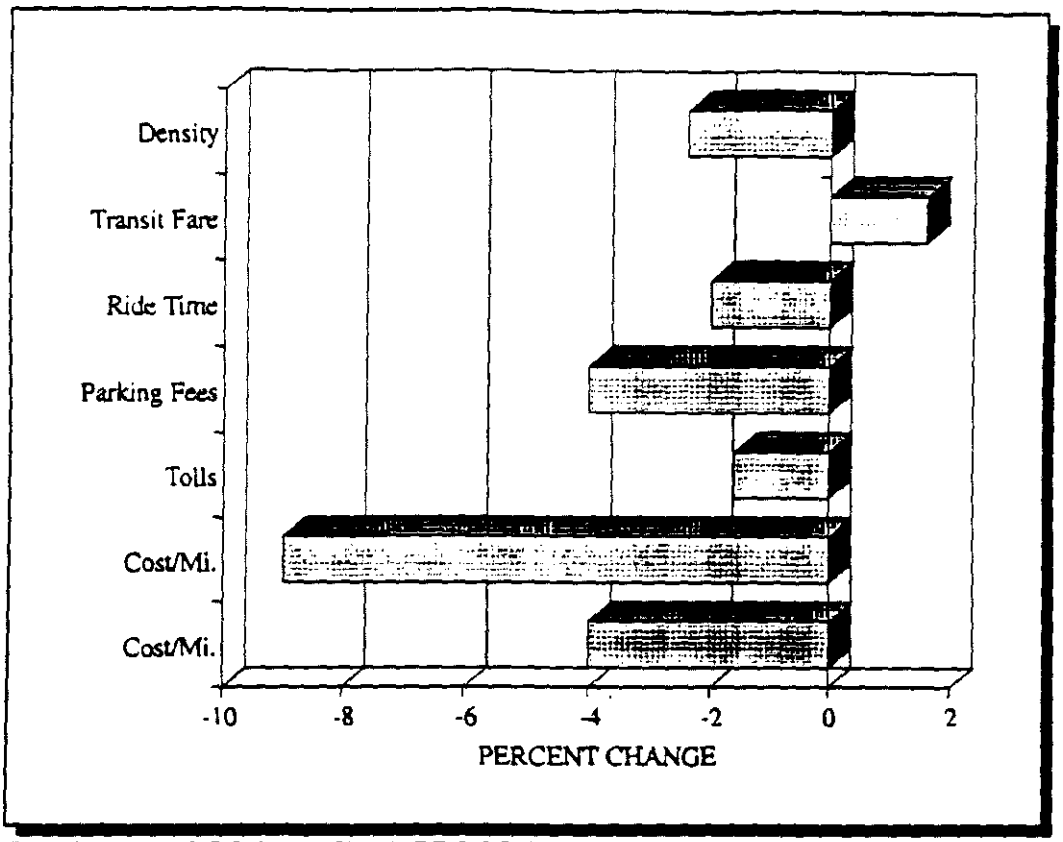


Exhibit G-3. AUTO VMT CHANGE RESULTING FROM 10 PERCENT CHANGE IN VARIABLES. Higher auto travel expenses and parking costs create the largest decrease in auto VMT.

Changes to VMT encouraged by land use changes generally take a long time to realize as urban form changes slowly. Because new regulations would apply to new developments, substantial time must pass before the community character is changed. If land use changes are desired in the future, requirements for developments must be modified today. Land use is closely linked with transportation requirements and VMT rates, and therefore must be part of an effort to change travel behavior in Oregon's urban areas. Land use controls are an essential element of congestion pricing as well, particularly in focusing business activity in dense areas.

Trip pricing. Pricing trips is an effective way to reduce VMT growth. Perhaps the most successful tool for vehicle travel demand management and reduction worldwide is pricing. Pricing can take the form of limited tolls, area pricing and parking pricing. Increasing the price of auto trips to areas where good alternatives to auto travel exist has resulted in VMT growth reductions of about 15 to 40 percent. Surprisingly, limited tolls have the lowest impact (about 15 percent) and parking has the highest impact (up to 40 percent).

Parking fees. Raising parking fees is the most common approach employed to reduce VMT growth. Collection systems are easy to implement with minimal investment and maximum VMT impact. Limited tolls and area pricing fees are more difficult to collect, whether collection systems can be largely manual (e.g., area license, or manned toll booths) or highly automated (e.g., automatic vehicle identification and location systems).

The public often resists congestion pricing since people perceive a new and higher cost for previously free, albeit poor, service or access. Commercial establishments often view congestion pricing as a deterrent to customers (congestion pricing is twice as likely to reduce non-work trips as work trips), and such pricing can dampen the commercial activity of a congested area and prompt business relocation. Congestion pricing also raises the cost of doing business for employers. Land use controls are important complements to congestion pricing to avoid business relocation and further urban sprawl.

Transportation demand management. Transportation demand management (TDM) is not a new concept, and in fact is required in many forms as a condition of federal funding. TDM techniques include freeway ramp metering, ridesharing, parking limitations, flexible hours for employees, and telecommuting. Most TDM applications have been limited in scope (i.e., applied by a single company or development, or on a single transportation facility). TDM strategies noted above have had favorable impacts on the roads immediately surrounding the program application, but have done little to curb regional VMT growth. Many applications are not really designed to reduce VMT, but rather are intended to spread it to less congested periods.

Transportation investments in alternatives to the automobile. Such investments complement land use and congestion pricing policies. People cannot shift trips away from the automobile if viable options are not available. This requires coordinated investments in pedestrian facilities, bikeways, transit (rail and bus), rideshare and even communications systems. It is important to note that reducing the cost of alternative modes while maintaining the same auto costs has not been an effective VMT growth reduction measure. Automobile costs generally need to increase directly to encourage shifts to other modes.

Further, simply expanding service levels of transit has not been particularly effective in reducing regional VMT growth. These investments need to be coordinated with land use and congestion pricing policies for maximum effectiveness.

Investments in public education. Information about the social and economic costs of auto travel in congested areas may be an effective tool for change. People select their mode of travel based on perceptions of options available, the price of options, perceived convenience, safety, flexibility and so forth. Communicating the full range of options available, and the total financial and social cost of each (e.g., from lost time, fuel consumed, air emissions, noise) can result in different choices by the traveling public. Research is limited in this area, but public awareness of social and environmental issues and the desire for livable communities is on the rise. Transportation authorities can contribute to this raised social consciousness and help people make informed travel choices.

Rural road improvements. Discussions about VMT growth reduction are often limited to urban areas where congestion is greatest and where transportation options are available. VMT growth reductions might also span rural areas of Oregon where congestion is also apparent. Improvements in these areas sometimes include new roads with more direct routing to avoid circuitous trips, and general public demand responsive services where densities will not support fixed route services.

Oregon must take aggressive and comprehensive measures if VMT growth per capita is to be halted and eventually reversed in urban areas. Many VMT control efforts have substantial lead time and must be authorized and begun in the immediate future if reductions to growth rates are expected in the coming five years. It is imperative that VMT growth reduction efforts be comprehensive and coordinated. Congestion pricing, land use controls, alternative travel investments and information dissemination must all be implemented in a coordinated and complementary manner.

Significant benefits to Oregon

As described in Section II of this report, the role of VMT growth reduction in meeting Oregon's high-priority road needs illustrates graphically the importance of reducing rates of travel growth. If current growth rates continue in urban areas, the majority of the benefits promised by funding high-priority needs will be diminished as higher traffic volumes consume benefits. The only reasonable way to increase benefits to individul users is to reduce VMT and increase road revenues.

Removing a single automobile during peak hours from a major highway in the Portland area saves other users more than 50 cents for each decreased mile of travel. As additional auto traffic is reduced, the marginal savings per vehicle mile declines.

Potential savings are great even on rural highways. Traffic levels are currently high enough that removing a car from the rural interstate system during peak hours would save other users 17 cents per mile; on the rural principal arterial system, savings would be 13 cents per mile. Savings from removing a single truck would be much greater, because trucks require much more highway capacity than cars, and produce more interference. Again, as each vehicle mile is removed from the system, the marginal savings to other drivers declines.

The marginal increase in costs to other forms of travel (e.g., rail, barge, bus, air, bicycle, pedestrian) is not calculated as part of the Oregon Roads Finance Study. If current capacity on the alternative system is underutilized, marginal costs of higher travel would be quite low. If current capacity is overutilized, the marginal costs could be high. The study does assume increased funding of all alternates to automobile travel as part of its funding proposals, with the intent that these alternatives should accommodate a greater share of total travel in the future.

These additional costs can be viewed in several ways. First, they illustrate the value of transportation demand management programs. Second, they

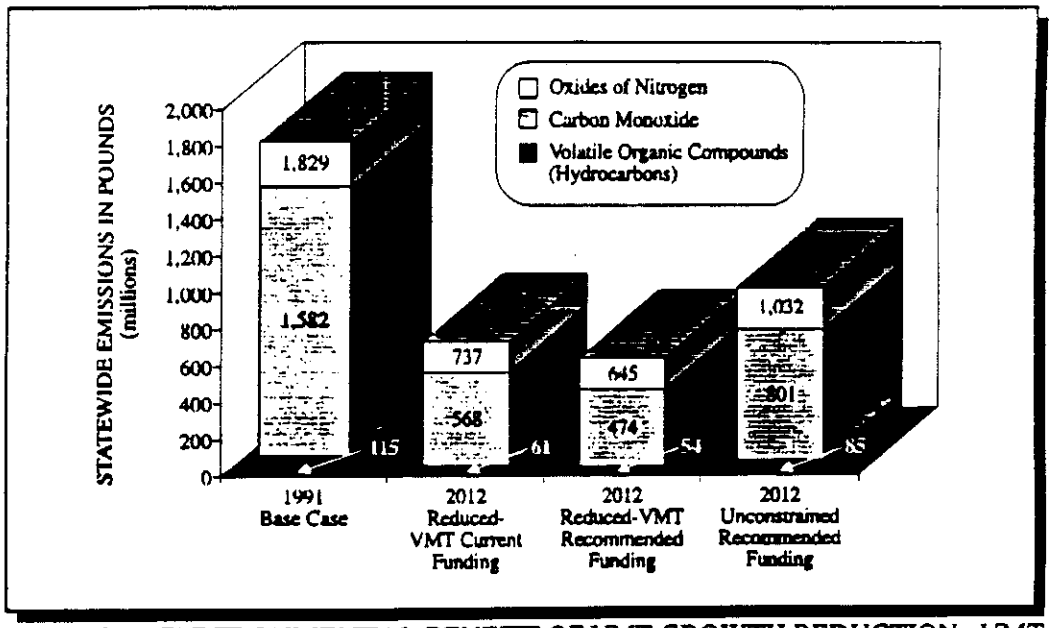


Exhibit G-4. ENVIRONMENTAL BENEFIT OF VMT GROWTH REDUCTION. VMT growth reduction combined with increased funding offers the best hope of lowering air pollution caused by transportation sources.

show the large costs that could result if travel growth is higher than projected. Finally, cost savings of this magnitude could be used to justify transferring funds from highway users to users of other modes when direct subsidies of other modes are more cost effective than highway investments at reducing highway user costs. The additional costs to other modes and the users of those modes are not included in these calculations.

Study analysis demonstrates significant degradation of road performance if VMT growth is not curtailed. If VMT continues to grow at current rates, user benefits can still be achieved by increasing road revenues by another $11.5 billion in 1991 dollars, or $21 billion in current dollars. This would more than double the net additional user fees and taxes needed to achieve recommended funding results.

The costs to Oregon's environment are also high, as shown in Exhibit G-4. Air emissions from mobile sources will increase by more than 60 percent, or 387 million pounds of pollutants annually if VMT continues to grow. Increased air pollution creates a host of dilemmas in urban and rural areas, contributing to more health problems, faster physical deterioration of fixed assets (e.g., buildings, cars) from acid rain, and lower crop production and forest growth per acre.

Transit-Oriented Development Impacts on Travel Behavior

compiled by
Calthorpe Associates

August 21, 1992

Introduction

A number of studies have recently been prepared which examine the travel behavior characteristics in Transit-Oriented Developments (TODs) as compared with conventional suburban development. Although the name implies that transit is the primary focus of this development pattern, **the effects of mixed-use, walkable environments would have many positive benefits:**

- higher mode split to walking and bicycling, as well as transit ridership (Peers, Chellman)
- increased combining of trips to reduce the overall number of trips (Peers, Kulash)
- shorter, more direct routes to local destinations (Kulash, Holtzclaw)
- reduced auto ownership (Holtzclaw)
- reduced speeds for local trips (Kulash)
- reduced congestion on collector and arterial roadways (Kulash)
- reduced household cost for auto ownership and usage (Holtzclaw)

The problem of course is convincingly quantifying these potential benefits and developing a validated modeling capacity to predict the effects of regional applications of the design principles. The **following implications of such changes in travel behavior** are critical to effective planning for regional growth;

- regional air quality impacts
- street and highway size and costs
- street and highway levels of service
- transit ridership and funding
- quantity of required off-street parking
- energy consumption
- household travel costs

The current modeling capabilities primarily relate household income and housing density to auto ownership, mode split, and the quantity of household trips per day. Effective estimation of the impacts of TOD development would add **land use heterogeneity** (the variety of destinations within walking distance) and **walkability** (the distance and quality of pedestrian trips to local destinations) as significant variables. These additional variables, if validated with travel behavior from existing neighborhoods with TOD-like characteristics, should provide a valuable tool for comparing the effects of different development patterns.

The enclosed reports may or may not be conclusive in their methodology or results. They do however paint a consistent picture. Kulash shows a 43% reduction in vehicle miles travelled (VMT) for local trips in Traditional Neighborhood Developments (TNDs) versus typical suburban development, because of their [redacted] Holtzclaw shows an overall VMT reduction of 50% for TOD-like communities versus newer suburban areas in the Bay Area. Chellman measures a 50% reduction in average daily trips (ADT) for a TND-like section of Portsmouth, New Hampshire, over the ITE Handbook's trip generation standards. Fehr and Peers' analysis estimates changes in travel behavior for TOD communities versus with pre-war urban neighborhoods and post-war suburban tract development, including: reductions in driving mode split, a near doubling in transit ridership, and a substantial increase in the walking and bicycling mode shares.

Findings:

- The total daily trip generation in suburban tracts (11.03 trips/household) was 23% higher than the rate for traditional communities (9.0 trips/household), the report then estimates that TODs would achieve comparable rates (9.0 trips/household) because of the mixed-use nature of their commercial core areas;

- **households in newer suburban tract communities exhibit dramatically higher drive alone rates** (68% vs. 49%), the rate for TODs is 54% (a 20% reduction compared with suburban tract communities);

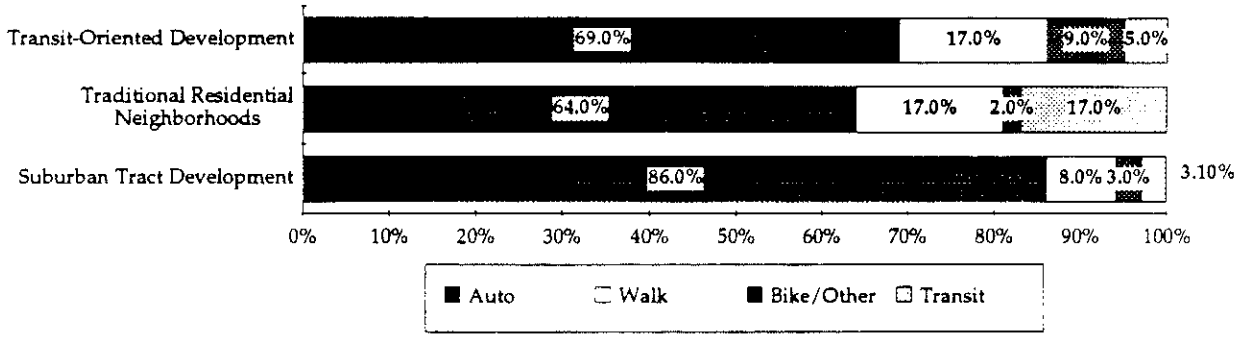
- **the walk mode share for TODs equals that for traditional communities (17%), 112% of that in suburban tracts;**

- **the transit share for TODs (5%) is nearly double that of suburban tracts (3%),** and lower than for traditional communities (17%) because of their more established and higher frequency transit service, over time TOD ridership should continue to improve as transit systems mature; and

- **the bicycle share for TODs (9%) would be higher than that for traditional communities (2%) or suburban tracts (3%), because of the compact mixed-use** land use **pattern and provision of bicycle paths and parking facilities.**

Graph 1:

Daily Trip Generation
By All Modes in the San Francisco Bay Area
1980 MTC Surveys



Source: Fehr and Peers, 1992.

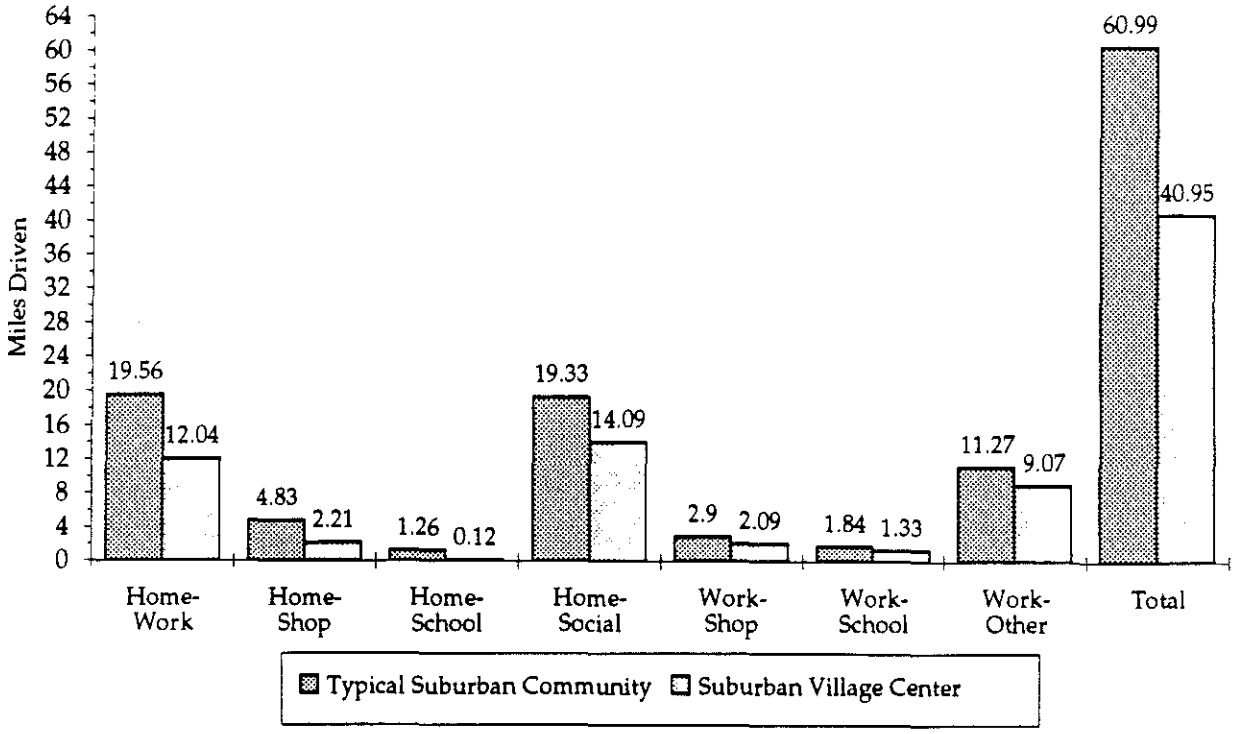
2. *Traditional Neighborhood Development: Will the Traffic Work?*

Methodology: This paper compares the performance of Traditional Neighborhood Developments (TND's) to Conventional Suburban Development (CSD's), on the basis of widely accepted criteria such as vehicular capacity, travel times, motorist and pedestrian safety. To compare the performance of the two prototypes, a modeling was performed which generated traffic based on identical land use programs assigned to respective streets. Figures 1 and 2 illustrate TND and PUD street hierarchy and prototype street patterns.

The typical suburban community and suburban village center data were used to estimate the VMT for the various trip types and for all trips, see graph 4.

Graph 4:

Comparison of Vehicle Miles Travelled
Suburban Village Center vs Typical Suburban Community



Source: Fehr & Peers, Inc. *Effect of Stockton's Proposed Suburban Village Center Development on Travel Mode Choice and Auto Use*, 1992.

Findings:

- **The proportion of [illegible] daily auto trips is nearly 25% lower in a community [illegible] pattern;**
- **[illegible] reduced by 39% in the village center pattern; and**
- **[illegible] trips are reduced by nearly 40%.**

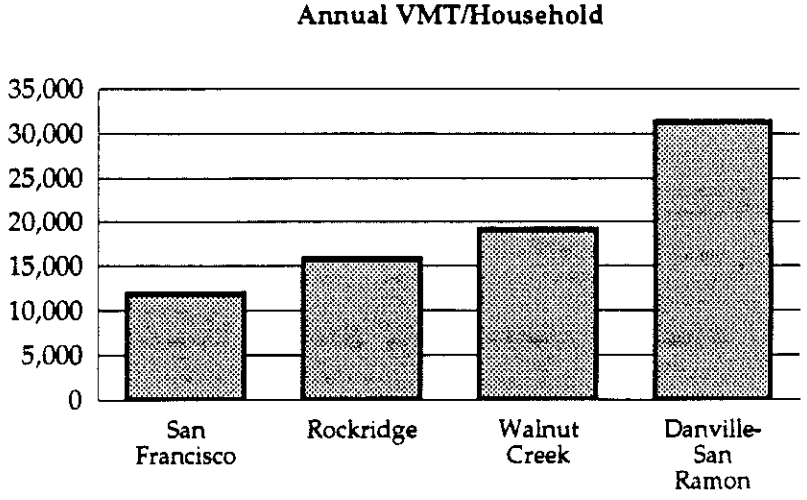
4. *Explaining Urban Density and Transit Impacts on Auto Use*

Methodology: In this study John Holtzclaw analyzed data from two types of communities in the San Francisco Bay Region with characteristics of standard suburban development (e.g. - San Ramon in Contra Costa County) and traditional mixed-use development (e.g. - Rockridge in Oakland). The analysis uses existing data from smog check odometer readings and trip logs to estimate annual VMT and correlates this data with neighborhood density, transit service, and commercial intensities.

Findings: Through an analysis of this data the study identifies a relationship between the pattern and intensity of land uses and availability of transit service with VMT. The data also indicates associated reductions in pollutant emissions and auto ownership costs.

- **Annual VMT in a traditional neighborhood (Rockridge) is nearly 50% lower than that in more recent standard suburban development** (San Ramon-Danville), see graph 5;
- **a doubling of residential or population densities reduces annual VMT by 20 to 30 percent;**
- **annual auto costs per family are 50% lower in a traditional neighborhood;** and
- **CO emissions are over 40% lower and NOx emissions are over 5% lower in the traditional neighborhood.**

Graph 5:



Source: Holtzclaw *Explaining Urban Density and Traffic Impacts on Auto Use*, 1990.

5. City of Portsmouth, New Hampshire, Traffic/Trip Generation Study

Methodology: In this study Chester Chellman measured the actual average daily trip generation of two traditional neighborhoods in Portsmouth, New Hampshire, and compared this empirical data with the predictions of Fifth Edition ITE techniques. Two study areas within the community were selected and existing physical conditions were mapped and recorded. Traffic counts were then taken at 15 minute intervals at all access points to the study areas. Manual methods were used to measure internal traffic and cut-through traffic. Questionnaires were distributed residents in one of the study areas and employees of the other.

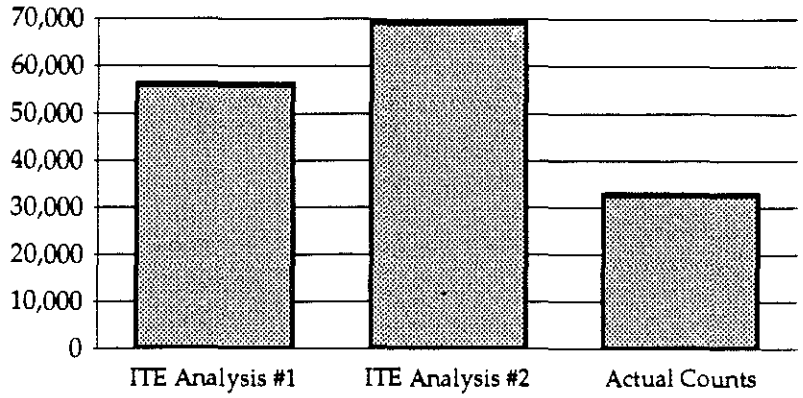
Findings: The majority of the data has been compiled and the ITE modeling runs were made, resulting in significant findings:

- The mixed-use study areas have residential densities averaging approximately 10 units per acre;

- ADT generation outside of these neighborhoods was approximately 50% lower than predicted by conventional Fifth Edition ITE techniques, see graph 6;
- peak hour traffic generation rates were 60 to 70% less than predicted using Fifth Edition ITE trip generation rates; and
- the neighborhoods were very well liked by residents and employees despite the fact that the cut-through traffic was higher than in typical suburban development.

Graph 6:

Actual Counts vs. ITE Trip Generation Projections
Average Daily Traffic



Source: Chellman *City of Portsmouth Traffic/Trip Generation Study*, 1991.

6. *Urban Policy Travel Behavior as the Outcome of Public Policy*

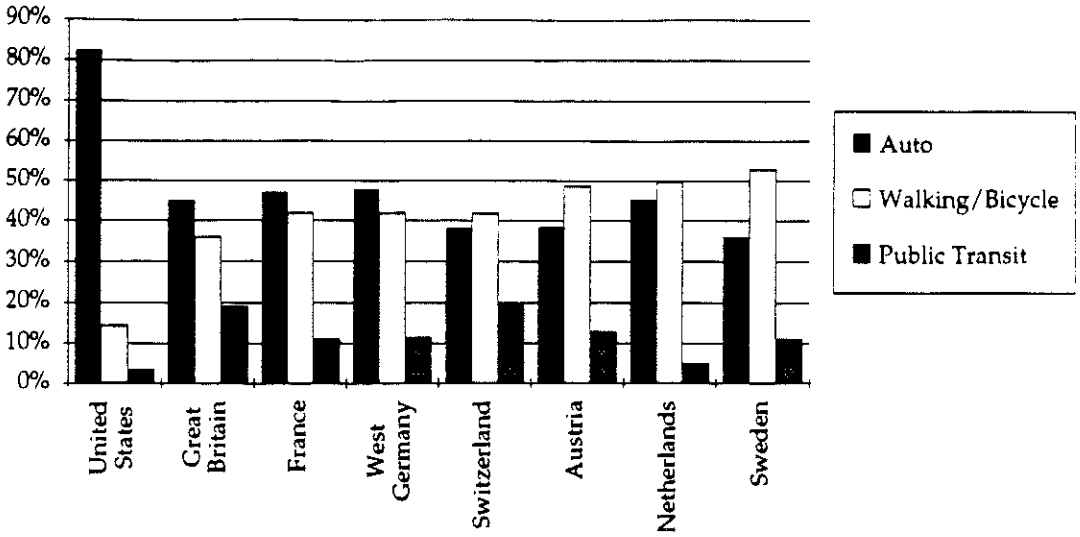
Methodology: In this paper, John Pucher compares modal-split for 12 countries in Western Europe and North America. The major objective of the paper is to examine the relationship between public policies and travel behavior. The paper compares modal-splits measured in the countries for all purposes, not only commuting. This data was collected from studies made during the years 1978 to 1984. Graph 7 illustrates the data compiled for this paper.

Findings:

- The percentage of auto trips in the United States (82%) is more than double that measured in the majority of the Western European countries;
- the 3.4% public transportation mode-split in the United States is less than 25% of that measured in the majority of the Western European countries;
- public transportation depends more on supportive urban development and auto restraint policies than on transit subsidies; and
- the absence of auto complementary policies in the United States explains the ineffectiveness of the attempt to revive American public transportation exclusively through large subsidies.

Graph 7:

Modal-Split as Percent of Total Trips



Source: Pucher, *Urban Travel Behavior as the Outcome of Public Policy*, 1988.

State Task Force on Motor Vehicle Emission Reductions in the Portland Area

FINDINGS AND RECOMMENDATIONS

EXECUTIVE SUMMARY

MISSION

House Bill 2175, enacted by the 1991 Oregon legislature, required the Governor to appoint a Task Force to study alternatives for reducing motor vehicle emissions in the Portland area. The legislation required the Task Force to consider both market-based and regulatory approaches. In addition to meeting air quality goals through its recommendations, the Task Force was also to address methods of meeting the region's mobility needs.

The Legislation required the Task Force to make recommendations to the Oregon Department of Environmental Quality (DEQ) and the Metropolitan Service District (Metro) on items for inclusion in the State Implementation Plan required under the Federal Clean Air Act, and to report its recommendations to the appropriate interim committees of the Legislative Assembly by October 1, 1992. The bill explicitly stated that any joint recommendations of the Task Force, DEQ and Metro relating to the imposition of motor vehicle emission fees were to be submitted as proposed legislation to the 1993 Oregon Legislature.

The Task Force understood that it would make conceptual recommendations and that detailed implementing mechanisms would need to be evaluated and developed by and through normal and applicable legislative and administrative processes.

The Task Force expected that its recommendations would become the basis for a long term air quality maintenance plan required as one of the conditions of the Clean Air Act to reclassify the Portland area from non-attainment to attainment with federal air quality standards.

DELIBERATION PROCESS

On March 11, 1992 Governor Barbara Roberts appointed a 24 member Task Force on Motor Vehicle Emission Reductions in the Portland Area to fulfill the requirements of House Bill 2175. Michael Hollern, chair of the Oregon Transportation Commission was appointed to chair the Task Force.

The Task Force met in a series of seven meetings beginning on April 1, 1992 and ending on September 22, 1992, when final recommendations were made. The Task Force was provided with technical information primarily by the staff of DEQ and Metro. An intergovernmental coordinating committee provided technical review of material before it was presented to the Task Force.

Representatives of diverse government, citizen, and business organizations provided both verbal and written information and comment to the Task Force. A narrated slide show and brochure were prepared and distributed or presented to numerous individuals and interest groups. The Task Force deliberation process included TV and newspaper coverage. Results of related public opinion polls were reviewed.

The Task Force was extensively briefed on the status of Portland air quality conditions. The Task Force selected strategies for detailed emission reduction and cost/benefit analysis. It also identified growth rates and other parameters which established expected future-year air quality levels, and defined emission reductions needed for the Portland area to stay in attainment with federal air quality standards for a 10 to 20 year period.

The Task Force used a consensus process in order to reach its recommendations. The base recommendations received support from virtually all members.

A summary report of the Task Force findings and recommendations, including recommended legislation, was presented to the Senate Agriculture and Natural Resources Interim Committee on September 29, 1992 by the Task Force Chair and representatives of DEQ and Metro, as required by House Bill 2175.

FINDINGS

In determining the need for motor vehicle emission reductions, the Task Force made the following findings:

- The Portland area currently does not meet federal air quality standards for ozone and carbon monoxide. However, with currently adopted emission reductions strategies, the Portland area should be able to reach attainment with federal ozone and carbon monoxide air quality standards by the Clean Air Act deadlines of 1993 and 1995, respectively.

- After attaining the carbon monoxide standard, the region should be able to stay in attainment for the foreseeable future. However, anticipated growth in population and traffic is expected to cause the region to exceed the ozone standard again after the mid 1990's unless further measures are taken to reduce emissions.

- The state must submit an enforceable air quality maintenance plan to the Environmental Protection Agency that covers at least a ten year period after expected EPA approval in order for the Portland area to be redesignated to attainment. Based on this requirement and the expected time to develop a maintenance plan, the year 2007 was estimated as a minimum maintenance plan target. The Task Force felt that development of the maintenance plan should be based on the following considerations:

    - Motorized vehicles are a primary source of emissions of ozone precursors and should be addressed in the maintenance plan. Currently-expected reductions in motorized vehicle emission rates will be more than offset by population growth and vehicle travel increases.

    - Area sources like paints and solvents and gasoline powered lawn and garden equipment will also be significant contributors of ozone precursor emissions in future years. These sources should be included in emission reduction strategies to maintain compliance with the federal ozone air quality standard.

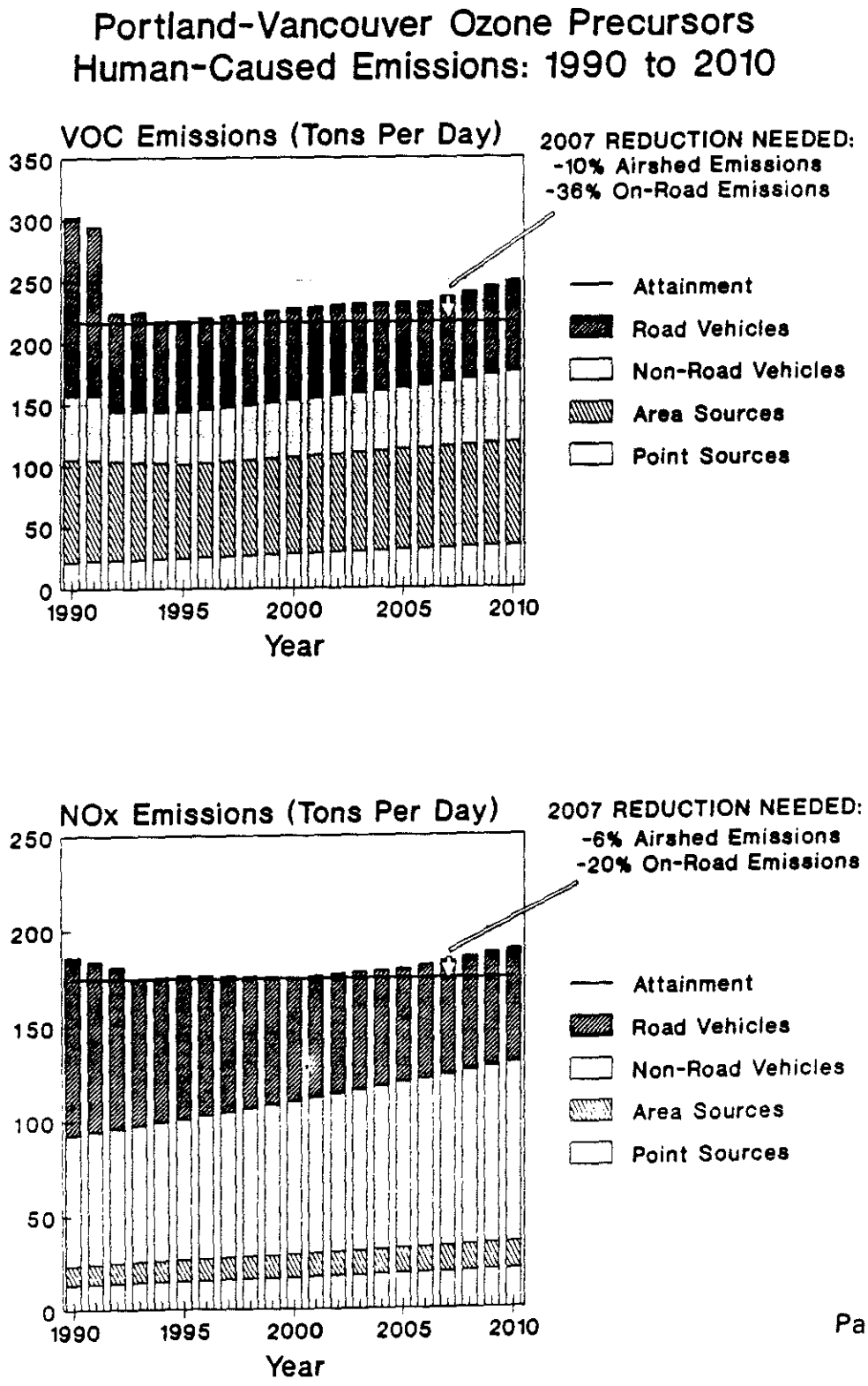
    - The business representatives on the Task Force and Associated Oregon Industries urged adoption and submittal to EPA of an enforceable ozone maintenance plan as soon as possible to remove current emission offset and high-cost control technology requirements that apply to major new and expanding industry in non-attainment areas. These current requirements are an impediment to growth and development of new jobs in the region.

- A reduction in motorized vehicle emissions of 36 percent volatile organic compounds and 20 percent oxides of nitrogen is expected to be needed by the year 2007 in order to insure maintenance of the ozone air quality standard in light of an expected 31 percent increase in population and 47 percent increase in vehicle miles traveled (see Figure S-1). These reductions are based on the following key assumptions:

    - A population increase of 1.6 percent per year and a vehicle miles travelled (VMT) per capita increase of 0.6 percent per year for a total VMT increase of 2.2 percent per year are reasonable and moderate estimates of expected future growth in the Portland area. The projections are consistent with revisions expected by Metro to the regional travel forecast and will form the basis for regional transportation planning in response to the State's Transportation Plan.

FIGURE S-1

Emission Reduction Required to Maintain Federal Air Quality Standards



Base Case Projection

- In order to insure continuous attainment with the ozone air quality standard over the next 15 years to 2007, weather conditions representing the highest ozone levels that have occurred over the last 15 years should be assumed in future year ozone modelling.

- Industrial emissions growth has averaged about one percent per year during the last ten years. This factor should be assumed in future year ozone modelling to provide an emission growth allowance for expanding industry. While new and expanding industry will still be subject to stringent emission standards and permitting requirements, an emission growth allowance will avoid the necessity for the purchase of costly emission offsets and installation of most-costly pollution control equipment, which impede growth and new jobs development in the region.

RECOMMENDATIONS

General

The recommendations of the Task Force for reducing motor vehicle and area source emissions are summarized below. Expected emission reductions and implementation dates are provided in Table S-1. The recommendations include a base strategy which contains:

- Emission standards for the sale of new gasoline powered lawn and garden equipment;

- Several improvements in the Portland area vehicle inspection program (including more extensive testing and expanded boundaries);

- A phased-in vehicle emission fee based on actual emissions and actual miles driven;

- Credit for the Land Conservation and Development Commission's rule relating to transportation - land use planning and vehicle travel reduction; and

- A mandatory employer trip reduction program.

Several additional strategies, including an adequately funded public education program, were recommended to provide a safety factor to compensate for unknowns or inaccuracies in modelling and to insure that the base strategies achieve their expected emission reductions. The Task Force selected reformulated fuel and regional congestion pricing to meet the contingency strategy requirement of the Clean Air Act. Pursuit of a congestion pricing demonstration project was also supported.

TABLE S-1
RECOMMENDATIONS OF THE STATE'S MOTOR VEHICLE EMISSIONS TASK FORCE*

Strategy to Maintain Compliance with federal Air Quality Standards in the Portland area through 2007

Objective: Maintain healthful air quality and remove Clean Air Act impediments to industrial growth while accommodating up to a 31% increase in population and associated 47% in vehicle miles travelled over the next 15 years.

Base Strategy	Date Implemented	Emission Reduction (%VOC / % NO_x)
1. California 1994 Emission Standards for sale of new gasoline powered lawn and garden equipment.	1994	6.1 / 0
2. High Option (Enhanced) Vehicle Emission Inspection.	TBD**	17.5 / 9.0
3. Expansion of Vehicle Inspection Boundaries from Metro to Tri-County area.	TBD**	1.0 / 0.5
4. Require 1974 and later vehicle models to be permanently subject to Vehicle Inspection.	TBD**	2.4 / 0.8
5. Phased in Vehicle Emission Fee*** based on actual emissions and mileage driven. -Starting 1994 at $50 average ($5 to $125 range). -Reaching a $200 average ($20 to $500 range) by 2000.	1994 - 2000	5.0 / 5.5
6. Pedestrian, Bike, Transit friendly Land Use for new construction.	1995 - 1996	5.2 / 4.4
7. Mandatory Employer Trip Reduction Program (50 or more employees).	TBD**	1.2 / 1.1
TOTAL EMISSION REDUCTION** (Need 35.6% VOC / 20.2% NO_x by 2007)**		37.1 / 20.6
NET COST/BENEFITS: $119 million/year savings, 8% traffic reduction, 11% energy savings		

Safety Factor Strategy	
1. Adequately Funded Public Education Program ($1/vehicle/year).	1994
2. Continue and improve public request for voluntary reductions in emissions on bad ventilation days.	1993
3. Incident Management Program (rapid removal of accidents to minimize congestion)	TBD**
4. Emission Standards for new outboard motors if and when California or EPA adopts such standards.	--

Contingency Plan Strategy (To be implemented if base strategies fail to achieve expected results or if other unexpected factors threaten compliance with air quality standards.)	
1. Reformulated gasoline (to be implemented no sooner than 2005).	20.6 / 5.6
2. Congestion Pricing. (Regional full-scale application)*****	8.6 / 7.8

* Established by the 1991 Oregon Legislature and appointed by the Governor.

** TBD - To Be Determined, but expected sometime in 1995-2000 period.

*** Revenue dedicated to provide better private/public transit service, selective free transit, mitigation of fee impact on low income households, and other incentives to provide lower polluting and less costly transportation. Will need constitutional amendment.

**** Total adjusted for strategy overlaps.

***** The Task Force also recommended immediate pursuit of a congestion pricing demonstration program.

Overall, the base strategy recommendations provide the reductions in emissions needed to insure attainment of the ozone standard through 2007 at a net savings to the region of over $100 million/year. The savings result because the strategies promote development and use of an overall more efficient transportation system. From the perspective of the region's residents, costs would come from expenditures for new gasoline powered lawn and garden equipment, increased vehicle inspection fees, and the emission fee. Savings would come from the use of less costly modes of transportation, including the savings in fuel and other costs associated with single occupancy motor vehicle use.

State goals with respect to mobility and energy, expressed in the new Oregon Transportation Plan, the Land Conservation and Development Commission's Transportation Planning Rule, the Oregon Benchmarks, and the Oregon Department of Energy's Energy global warming strategy are positively addressed by the base strategy which would reduce VMT by 8% and transportation-related energy consumption by 11% by the year 2007.

Base Strategy Specifics

- **Gasoline-powered lawn and garden equipment standards:** This strategy would mandate adoption of standards that California has adopted for new gasoline powered lawn and garden equipment which take effect in 1994. The Task Force felt that this source of air pollution should be addressed because of its significant contribution to the ozone air pollution problem.

- **High option (Enhanced) vehicle emission inspection:** In contrast with the present idle test, enhanced I/M includes analysis of tailpipe emissions when the car is run through all cycles of operation, and tests of the charcoal canister and other parts of the system that capture evaporative emissions. This strategy is mandated by the Clean Air Act in the six worst ozone areas of the country and is being considered for adoption in other areas. The strategy was attractive for its high NO_x reduction credit. Additionally, EPA reports that vehicles that fail the emissions test have improved fuel economy following repairs, resulting in relatively small, if any, net costs to individual owners.

- **Expanded vehicle inspection boundary:** Currently, vehicles within the Metro boundary must pass biennial emission inspections. This strategy would expand the boundary to encompass vehicles registered in all areas of Clackamas, Multnomah, and Washington Counties. Task Force members felt that this strategy would increase the fairness of the I/M program, by bringing those most likely to drive within the region into the program. Other, larger boundaries (including the entire Willamette Valley) were considered but not recommended because their costs were too great in relation to the benefits.

- **Elimination of the 20-year-old vehicle rolling I/M exemption:** As vehicles reach twenty years of age, they have traditionally been exempted from the region's emission inspection requirement. This strategy eliminates the exemption for model years 1974 and later. It rated highly because old vehicles tend to pollute much more than newer vehicles, and the effective date chosen would not subject vehicles to the test that have already been exempted.

- **Vehicle emission fee:** This strategy would assess a fee for the actual air pollution generated by use of motor vehicles. The Task Force favored this strategy because it would use market pressures to reduce pollution in a cost-effective manner. The program was to be designed to minimize the financial impact on people with low incomes, while maintaining full emission reduction benefits. Fee revenue was anticipated to be used to provide expanded public and private transit service, targeted fare subsidies, and financial assistance to low-income persons for repair or replacement of high-emitting vehicles.

- **Pedestrian, bike and transit-friendly land use:** This strategy would encourage mixed-use, denser development along public transit lines. The strategy basically gives credit to the Transportation Planning Rule adopted by the Oregon Land Conservation and Development Commission (LCDC), and assumes land use will change accordingly. However, the strategy's projected emission reductions are only credited because of the companion market-based strategy (the vehicle emission fee) which creates the necessary demand or incentive to use alternate mode choices which will become available because of the Transportation Planning Rule.

- **Mandatory employer trip reduction program:** Employers with more than fifty employees would be required to submit plans for reducing commute trips, with reductions of 5 to 10 percent expected depending on the size of the employer. The program would not require employers to provide any economic subsidies and would limit penalties to failure to submit or implement adequate plans. No penalties would be assessed for failure to achieve the trip reduction target of an approved plan.

Intent/Qualifications

In adopting the strategy recommendations, Task Force members agreed on the following qualifications regarding implementation:

- The Task Force did not select implementation dates for all recommended strategies, but it did intend that the emission reductions be phased in at least in a linear manner between 1994 and 2007 since there was questionable accuracy in projecting expected emission increases and decreases for individual years.

- While the Task Force did not specify detailed strategy implementation criteria, the Task Force understood that to achieve projected emission reductions, the strategies would need to be implemented consistent with strategy modelling assumptions or their equivalent.

- The Task Force recognized that impacts of the vehicle emission fee on low income individuals should be mitigated, but emphasized that this should be accomplished without reducing the effectiveness of the fee in reducing emissions. The Task Force did not propose to apply this fee to the expanded portion of the vehicle inspection boundary.

- The Task Force expected that actual air quality conditions and growth rates, actual emission reductions achieved by control measures, and availability of new control measures should be periodically evaluated and that appropriate adjustments should be made in strategy implementation to insure attainment without excessive control.

Strategies Seriously Considered but not Recommended

The Task Force discussed several other vehicle emission reduction control measures which were not adopted as base strategy recommendations. The following summarizes the reasons these were not recommended:

- Reformulated Fuels - There was disagreement over the magnitude of emission reduction benefit available and cost-effectiveness of this strategy. Serious concerns were raised about near term implementation of this control measure because of the substantial financial impact it would place on oil refineries in the Puget Sound Area which supply gasoline to the Portland Area. Also, more cost-effective strategies were available, and a concern was expressed that such a requirement might jeopardize the supply of gasoline to the area.

- Old Car Buy Back - This control measure has significant air quality benefits in the near term because of the existence of a large number of older vehicles in the current fleet which do not have pollution control devices. However, its value for long term maintenance is low because future fleets will contain very few uncontrolled, high polluting, vehicles.

- Alternative Fuels / California Low Emission Vehicle (LEV) Program - Retrofitting vehicles for use of alternative fuels was discussed, but available information indicated questionable emission reduction potential. Requiring sale of dedicated new alternative fueled vehicles which do have significant air quality benefits, such as through adoption of the California LEV program, was not recommended because of the concern about the high costs compared to benefits. It was also recognized that the recommended emission fee would provide an incentive to purchase new alternative fueled vehicles because of their lower emissions. Also, during the Task Force's deliberations it was anticipated that funds from the emission fee could be used for non-highway purposes such as development of alternative fueling stations or other alternative fuel promotional activities.

- Parking Fees - Several options were considered. There was some support for certain options, but there was greater support for other alternatives which formed the base strategy.

Oregon

DEPARTMENT OF
LAND
CONSERVATION
AND
DEVELOPMENT

TRANSPORTATION PLANNING RULE (TPR) BACKGROUND

Overview

The Transportation Planning Rule (TPR) requires local governments must plan for reduced reliance on the automobile. To meet the rule, the states four largest urban areas (Portland, Salem, Eugene and Medford) must plan to reduce vehicle miles travelled (VMT) per capita by 10% within 20 years and by 20% within the next 30 years.

Major means of reducing VMT are:

- Increasing bike, pedestrian and transit travel.
- Reducing single occupancy vehicle use, particularly for commuting.
- Reducing auto-trip making and trip length by mixing uses, better jobs/housing balance.

Reducing auto dependency will require changes to other federal, state and local policies. These include:

- True cost pricing of auto travel through emissions fees, congestion charges, parking pricing and energy pricing.

- Better funding for transit and other modes.

- Change transportation financing to shift bias from road/highway solutions to transportation problems.

Interim Measures

TPR requires the following changes to local zoning and subdivision ordinances by May 1992:

- Bicycle parking at most new developments

- Safe and convenient bicycle and pedestrian access between and within most new developments

- Separate bikeways or walkways to minimize travel distances, where appropriate

- Internal pedestrian circulation within new developments

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- Orienting and clustering new retail, office and institutional buildings around transit stops

- Preferential parking for carpools and vanpools at new commercial and industrial development

- Allow redevelopment of a portion of parking areas for transit oriented uses

- Require road systems which can adequately be served by transit including adequate pedestrian and bike access to transit routes.

Updating Regional and Local Plans

Regional plans must be revised to comply with the TPR by April 1995. City and county plans must comply by April 1996. Key elements to reduce auto-dependency include the following:

Integrated Land Use-Transportation Strategy

The Portlan Metropolitan area must consider changes to land use designations, densities and design standards to meet local and regional transportation needs. (Other areas are encouraged to reconsider land use patterns but are not required to do so.) A land use strategy must consider:

- Increased residential densities near transit lines, and major employment and retail areas

- Increased density in new commercial and retail development

- Designating sites for neighborhood commercial uses within convenient walking and cycling distance of residential areas

- Achieving jobs/housing balance

- Limiting parking at office and institutional developments

Transit Supportive Land Uses

- Designate land uses and densities along transit routes adequate to support transit use

- Allow transit oriented developments (TOD's) along transit routes

Bicycle-Pedestrian Plan

- Bicycle and pedestrian element of the Transportation System Plan which provides a network of routes throughout the planning area

- Identify bicycle and pedestrian connections to facilitate bike and pedestrian trips in developed areas

Parking Plan

- Achieve a 10% per capita reduction in the number of parking spaces in the region through new restrictions and redevelopment

- Set minimum and maximum parking limits

<bcort>trans

Joint DLCD/ODOT Urban Mobility Project

OBJECTIVES:

- ***Mobility*** -- a transportation system with choices
- ***Mobility*** -- less traffic congestion
- ***Air Quality*** -- clean air in growing cities
- ***Air Quality*** -- capacity for industry and new jobs
- ***Highways*** -- protect investment in state highway system
- ***Costs*** -- save highway construction and maintenance dollars

Joint DLCD/ODOT Urban Mobility Project

MEASURABLE OUTCOMES:

- *Urban Mobility* -- reduce vehicle miles traveled
- *Air Quality* -- have all Oregonians live in areas that meet standards
- *Costs* -- save $11.5 *billion* in highway costs over next 20 years

Joint DLCD/ODOT Urban Mobility Project

PROJECT ELEMENTS:

- Carry out Transportation Planning Rule
- Enable and facilitate new land use patterns
- New tools for land use planning
- Remove obstacles to transportation-efficient land use

METHODS:

- Grants
- Technical assistance
- Model ordinances
- Pilot projects and demonstrations
- New policies

Joint DLCD/ODOT
Urban Mobility Project Budget

DLCD	
General Funds	363,213
Lottery Funds	229,723
Other Funds (ISTEA)	458,825
SUBTOTAL	***$1,051,761***
ODOT	
General Funds	34,636
Lottery Funds	1,136,277
Federal Funds (ISTEA)	5,007,175
SUBTOTAL	***$6,178,088***
COMBINED PROJECT	
General Funds	397,849
Lottery Funds	1,366,000
Federal Funds (ISTEA)	5,466,000
TOTAL	***$7,229,849***

Joint DLCD/ODOT
Urban Mobility Project Budget

Grants:	**4,896,430**
Personal Services, S & S, Capital Outlay:	**1,138,419**
Contract Services:	**1,195,000**
TOTAL:	**7,229,849**

State of Oregon
Department of Environmental Quality Memorandum

Date: April 5, 1993

To: Don Byard: ODOT

From: John Kowalczyk

Subject: Briefing Paper - Tri-Commission Meeting

Following are some thoughts to assist you in preparing the joint agencies briefing paper for the Tri-Commission meeting. Also attached for background purposes is a report prepared by the House Special Task Force on Emissions. This report puts the Portland air quality problem in prespective and includes the recommendations of the Governor's motor vehicle Task Force and the modifications made by the House Special Task Force on Emissions.

INTERRELATIONSHIP BETWEEN AIR QUALITY, TRANSPORTATION AND LAND USE

There is a distinct and strong relationship between land use, transportation and air quality. This relationship may be summarized as follows.

- o Over the latter half of this century land use has centered on motor vehicle friendly designs.
- o In response, the transportation system has been focused on meeting this demand with abundant roadways and parking spaces.
- o The resulting high use of motor vehicles has contributed to congestion, high infrastructure costs and nonattainment of federal air quality standards.
- o Continuation of this pattern threatens continued negative impacts, particularly in the Portland area where the projected population growth is high.
- o Land use changes brought about by new transportation plans and alternative travel facilities can result in a reduction in future potential traffic congestion and air pollution.
- o Addressing the land use, transportation and air quality problems with the same or similar strategy offers the opportunity to accomplish all three objects in the most cost

effective manner.

DLCD TRANSPORTATION RULE ISSUES

The DLCD Transportation rule, with its objective of reducing VMT and parking spaces per capita, offers the opportunity to head in a new, coordinated and positive direction with respect to land use, transportation and air quality. The Rule requires local governments to develop an implementation plan by May 1996. It is generally felt that some form of a market or regulatory program will be necessary as an implementation mechanism to provide a disincentive to driving and that pedestrian, bike and transit infrastructure will need to be significantly expanded. Implementation of the transportation rule presents some difficult challenges and policy issues which are already surfacing. There are primarily three implementation issues that should be discussed by the Tri-Commission:

Air Quality Strategy as an Implementation Mechanism.

The Governor's Motor Vehicle Emission Task Force for the Portland area recommended a substantial emission based vehicle fee for the Portland area. While providing a major emission reduction strategy element, this fee could also provide a major regional implementation force in reducing vehicle trips per capita while providing funding of a level that would greatly enhance the transit capacity in the region. This approach was generally supported by the region and could save local governments considerable future debate in developing a consensus approach to developing an implementation plan to meet the transportation rule requirements

Issue: The House Special Task Force on Emissions was adamantly opposed to an emission fee. They have recommended an aggressive employer trip reduction program and parking space restrictions on new construction as a substitute. This regulatory approach could also serve as a major regional implementation force in meeting the transportation rule.

Question: Is the Tri-Commission comfortable with this approach?

Transit Funding

Substantial new revenue will be needed by Tri-Met to provide new service to meet the demand created by the reduction in vehicle trips required by the Transportation Rule.

Issue: The Oregon Transportation Plan funding package was relying on the vehicle emission fee recommended by the Governor's Task force to provide a substantial portion of the funds needed by Tri-Met to provided needed transit service improvement. The House Special Task Force on Emissions has indicated that a substantial increase in vehicle registration fees should be considered for providing this revenue.

Question: Does the Tri-Commission feel any further efforts should be made to pursue a vehicle emission fee as the emission reduction credit for an equivalent registration fee would be much less (because it has no market force on reducing driving) although revenue generated may be the same?

Local Government Implementation Plans

The Transportation Rule requires local governments to develop a detailed implementation plan by May 1996.

Issue: Some local governments already appear unable to meet the Transportation Rule May 1993 deadline for more minor portions of the implementation plan. If state imposed regional air quality strategy is adopted that has major trip reduction program such as parking ratio's and employer trip reduction programs the job for local government to meet the May 1996 deadline may not be as difficult and controversial.

Question: Should anything further be done to provide greater assurance that an effective implementation program will be in place in a timely manner to meet the transportation rule requirements? Should the option to require individual land use actions to conform to the transportation rule if local governments fail to submit implementation plans be made a firm requirement?

OREGON TRANSPORTATION PLAN
1993 LEGISLATIVE PROGRAM

THE CHALLENGE

The newly adopted Oregon Transportation Plan (OTP), reinforced by the 1993 Oregon Roads Finance Study and other transportation planning conducted during the past biennium, envisions a statewide transportation system that supports jobs, strengthens our economy, fosters clean air and arises from sound land use decisions.

This system takes advantage of the inherent efficiencies of each transportation mode, strengthens all modes, and encourages interconnection between modes. The system is responsive to Oregon land use goals for transportation, especially in achieving reduction of vehicle miles traveled.

Planning calls for managing, not just meeting, demand on the system, and prioritizing needs to address the most urgent requirements and make the wisest investments.

The challenge is to implement the plan through a stable but flexible financing program, adhering to the Oregon transportation funding principle of user pays and providing equity among alternative transportation modes.

THE UNMET NEED

Authorization for added financial resources will be required to cover long-term transportation needs in Oregon.

> Some $3.5 billion* in additional funding -- beyond current levels -- will be required to meet the projected transportation needs of the first six years.
>
> More than $27.7 billion* in new funding will be needed over the 20 years, to be added to the estimated $40 billion to be collected in that period for transportation in Oregon under the current authority.
>
> **inflated dollars*

The 1993 Oregon Roads Finance Study, dealing with the largest component of the statewide transportation system, established a shortfall in funding for priority roads and bridges projects of $19.2 billion between available revenue and costs of high priority needs between 1993 and 2012.

INVESTMENT GOALS

- ***PRESERVE SAFE ROADS***

  Facility preservation is the highest priority for road funding. Meeting this need, as well as serving the expected demand for truck, bus and automobile travel, requires increased road funding. Discussions of road funding should also consider that roads provide the basic infrastructure for transit bus service and provide essential feeder service to non-road modes of travel. A balance of rural and urban road needs is met, assuring equity in the allocation of road funds.

- ***FULFILL TRANSIT'S ROLE***

  Under the OTP, the primary role of transit providers is to alleviate road needs through expanded service levels. At the same time, transit agencies must address a backlog of fleet replacement needs and meet the requirements of the Americans with Disabilities Act. While this will require significant increases in funding for transit capital, finding the financial support to fund transit operations is essential. Flexibility of funding transit along with roads under new federal transportation law is utilized.

- ***ENSURE OREGON SHIPPERS CAN EFFICIENTLY SHIP FREIGHT TO DOMESTIC AND INTERNATIONAL MARKETS***

  This will be accomplished through channel deepening, state support of high priority port and port access improvements, and rehabilitation of rail branchlines when the branchlines can be self-supporting.

- ***REDUCE DEMAND FOR TRANSPORTATION CAPACITY***

  Many activities can reduce the need for (expensive) peaking capacity on our transportation system. These may include construction of park and ride lots, rideshare programs, encouragement of alternative work hours, congestion pricing, mixed use patterns of land development and the encouragement of telecommuting. The funding for such transportation demand management (TDM) programs will come out of budgets for road and transit programs. TDM will be a key component of efforts to meet the requirements of the State's Transportation Planning Rule to reduce growth in vehicle miles traveled (VMT), and to limit the need for highway capacity improvements.

- ***REVIVE INTERCITY PASSENGER SERVICE AS A TRANSPORTATION ALTERNATIVE***

  Effective statewide, intercity passenger access is the goal; a service which does not exist today. Intercity bus links to rural areas can be revived when linked to a statewide system. The centerpiece of this concept is the development of relatively high speed rail service between Eugene and Seattle, backed by hourly service (bus and rail) between Eugene and Portland, coordinated with intracity bus services. Intercity bus links to rural areas will then connect to this "trunk" system.

- ***ENHANCE DEVELOPMENT OF BASIC COMMERCIAL AIR SERVICES TO ISOLATED URBAN AREAS AS WELL AS MAJOR AVIATION HUBS IN OREGON***

  This package begins the process of ensuring that regions of the state with market potential for commercial air service have adequate and safe airport infrastructure.

- ***DEVELOP EFFICIENT BICYCLE TRANSPORTATION NETWORKS***

  Currently, bicycle projects on roadway right-of-way are reasonably well funded from the Highway Fund. However, there are many bicycle route connections off the roadway right-of-way that cannot be made because there is no funding source. The new bicycle registration fee will provide this source.

PROGRAM BENEFITS

- ***JOB CREATION AND ECONOMIC DEVELOPMENT,***
  promoting expansion and diversity of the Oregon economy. $400 million annual net savings in transportation costs to Oregon's economy.

  35.9 jobs created per $1 million spent on new construction (AGC estimate).

- ***IMPROVED QUALITY OF LIFE,***
  supportive of livability goals in both urban and rural areas; reduced congestion, improved air quality, more efficient land use.

- ***AN INTEGRATED AND EFFICIENT STATEWIDE TRANSPORTATION SYSTEM***
  that's balanced, serves urban and rural communities statewide, and is safe.

- ***BEST USE OF NEW FEDERAL TRANSPORTATION FUNDING PROGRAMS.***
  Federal match requirements can be met, and the flexibility offered by new federal programs for meeting transit as well as highway needs can be fully utilized.

- ***IMPROVED MOBILITY.***
  Modest increases in vehicle operating speeds are achieved in congested areas; improved service to those who must rely on transit (senior citizens and disabled persons).

- ***REDUCED AIR POLLUTION EMISSIONS,***
  from mobile sources, by 14%. Traffic congestion, a major reason for the emission problem, will be relieved. Opens limited airsheds to new industry.

- ***SAVINGS FOR AUTO AND TRUCK OPERATORS,***
  on average of 38 hours per year driving the same miles. Each vehicle operator saves an average of $322 in operating costs per year; the average driver saves 75 gallons of gasoline per year.

- ***REDUCED ROAD AND BRIDGE REPAIR COSTS,***
  as maintenance is performed on a timely basis. Net additional cost of maintenance deferral is a four to five times cost increase.

OTP LEGISLATIVE PROGRAM

Update: March 25, 1993

HIGHWAY MEASURES

HB 2415
Gas tax increase $.04 per year for 4 years with a comparable weight mile factor increase.

HB 2416
Increase annual vehicle registration fee by $15 ($30 per biennium) effective January 1, 1995.

HB 2421
Transportation access fee (system development charge) in the form of a $200 fee on net additions to existing fleet.

HB 2422
$2 studded tire fee for damage to state, county and city roads.

HB 2423
Accelerates sunset provision for special $.05 gas tax rate reduction for ethanol blended fuels from December 31, 1997 to December 31, 1993.

HB 2424
Expand ODOT's revenue bonding authority to give the OTC authority to advance projects for which the increase in benefits from advancement exceeds increased financing costs.

TRANSIT MEASURES

Expand transit use of flexible federal funds (i.e., STP funds).

HB 2419
Portland area vehicle emission fee based on actual emission rating and miles driven. Initial rates will range from $5 to $125 per vehicle per year.

HB 2420
Extension of payroll tax authority to transportation districts and change in implementation requirements to allow implementation by district boards.

HB 2428
Expand state in-lieu of payroll payments for transit to all fixed route systems receiving public support.

HJR 7
Constitutional amendment to allow use of emissions fee for transit and other vehicle emission reduction measures.

HB 2425
Allocation of lottery funds for light rail transit capital.

HB 2426
Set up rail fund and bonding authority for high speed and light rail.

HB 2427
Institute a tire and battery fee for transit similar to HB 3055 of 1989 not to exceed $2 each.

HB 3173
Statewide vehicle emission fee based on the age of the vehicle. Fee will range from $2 to $4 per vehicle per year with revenue distributed to ensure regional equity.

AVIATION MEASURES

HB 2417
$.005 increase in jet fuel taxes for commercial airports similar to HB 2313 in 1991 effective January 1, 1994.

HB 2418
$.02 aviation gasoline tax increase similar to HB 2717 in 1991 effective January 1, 1994.

PORTS AND RAIL FREIGHT

HB 2429
Allocation of lottery funds for marine/rail access. Up to $25 million for Port and Marine Navigation fund.

HB 3174
Allocation of up to $5 million for freight rail improvements.

BICYCLES

HB 2430
New bicycle registration fee for 24" tire and larger, administered by retailers.

CONGESTION PRICING

HB 3299
Authorizes Metro, following a thorough public involvement process, to establish a congestion pricing pilot project.

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LCDC'S TRANSPORTATION PLANNING RULE: LINKING TRANSPORTATION WITH LAND USE

Mark J. Greenfield

A. INTRODUCTORY SUMMARY.

After years of "talking about it," the Land Conservation and Development Commission (LCDC), with the blessing and support of the Oregon Department of Transportation (ODOT), has adopted a new administrative rule, the Transportation Planning Rule (OAR 660, Division 12), governing transportation planning and project development at local, regional and statewide levels. In 32 pages, the rule explains what Goal 12 (Transportation) takes one paragraph to state. Here, in about 11 pages, we attempt to explain what those 32 pages require of your local government or district.

The good news is that rule implementation should result in a more carefully planned, multi-modal transportation network that is sensitive to the interrelationship between transportation and land use planning. The bad news is that (1) for many local governments, this rule will be expensive to implement; and (2) while the rule significantly clarifies how the statewide goals apply to transportation improvements, a number of complex issues remain unresolved and may necessitate further rulemaking or litigation.

Basically, the rule requires ODOT, regional planning bodies and local governments to provide a network of transportation facilities and improvements sufficient to meet identified state, regional and local transportation needs. This is achieved through:

(1) More and better coordination between ODOT, Metropolitan Planning Organizations (MPOs), counties, cities, and special districts providing transportation services;

(2) Development of multi-modal transportation system plans (TSPs) that encourage alternatives to and reduced reliance upon the automobile;

(3) Amendments to plans, land use regulations and subdivision ordinances to allow needed transportation facilities and improvements and mandate development patterns that are pedestrian, bicycle and transit friendly;

(4) Ordinance amendments that ensure that planned land uses and compatible with the function and capacity of the planned transportation system network.

The rule also explains how Goal 12 relates with other LCDC goals, including Goal 3 (Agricultural Lands), Goal 4 (Forest Lands), Goal 11 (Public Facilities and Services), and Goal 14 (Urbanization). A significant portion of the rule addresses transportation facilities on rural lands.

Practically speaking, for smaller local governments (urban areas less than 25,000) the rule requires amendments to plans and ordinances to require residential, commercial and industrial development patterns that encourage pedestrian and bicycle travel. For larger jurisdictions (within urban areas over 25,000), the rule requires development patterns that are transit friendly and careful consideration of alternatives to highway expansion, including transportation and demand management measures. Further, for areas inside a Metropolitan Planning Organization (MPO), the rule mandates that within 30 years following adoption of the TSP, total automobile vehicle miles travelled (VMT) must be reduced by 20 percent. For the Portland metropolitan area, the rule also requires evaluation of alternate land use designations, densities and designs. Outside urban areas, the rule indicates what transportation uses are consistent with Goals 3, 4, 11 and 14, and explains when and how exceptions must be taken.

B. BACKGROUND.

LCDC adopted the Transportation Planning Rule on April 26, 1991. This new rule, if fully implemented, will dramatically change the appearance of residential, commercial and industrial developments and the nature of land use patterns over the coming decades. In the short term, local governments throughout the state will be required to amend their comprehensive plans and land use regulations within the next two to five years to carry out the many new requirements of the rule. How the rule affects a particular city or county generally depends on the location and size of the local government.

The aims of this rule are lofty: to encourage a multi-modal transportation system designed to reduce reliance on the automobile and assure that planned state, regional and local transportation systems "support a pattern of travel and land use in urban areas which will avoid the air pollution, traffic and livability problems faced by other areas of the country." 660-12-000. Towards these ends, the rule adopts stringent standards geared to enhance pedestrian and bicycle travel and, in urban areas over 25,000 population, the use of transit. Simultaneously, the rule takes steps to reduce automobile usage through reductions in total vehicle miles traveled, parking restrictions, and the like.

The rule will require a substantial planning effort by all but the smallest Oregon cities and counties. Because LCDC was aware that the rule will tax the planning resources of many communities, the rule states explicitly that it is not its purpose to "cause duplication of or to supplant existing applicable transportation plans and programs" to the extent they meet rule requirements, OAR 660-12-010(2). Moreover, to reduce the burden on smaller jurisdictions, the rule provides for "whole or partial exemptions" to rule requirements for cities under 2500 population outside Metropolitan Planning Organization (MPO) areas and counties under 25,000 population. OAR 660-12-055(5).

Preparation of the rule involved a joint effort by the Department of Land Conservation and Development (DLCD) and the Oregon Department of Transportation. The rule clearly recognizes both the need to provide transportation facilities meeting the needs for movement of people and goods between and through regions of the state, and the need to protect those facilities for their intended functions. If properly implemented, plan amendments permitting land uses which would be inconsistent with the intended functions of state highways and other state transportation facilities will be difficult to achieve. As a consequence of this rule, local governments should expect ODOT to play a more active, and tougher, role on issues such as access to state highways.

The Transportation Planning Rule followed several years of meetings, hearings, and other efforts at "consensus building." While portions of the rule clearly are aimed at interpreting and implementing the specific provisions of Statewide Goal 12, Transportation,[1] other elements are aimed at responding to issues raised in administrative and judicial appeals challenging transportation decisions contained in the Metropolitan Service District's Regional Transportation Plan and Washington County's Transportation Plan.[2] In particular, there is an effort to explain how Goal 12 interrelates with Goals 3, 4, 11 and 14 on rural lands.

C. TRANSPORTATION SYSTEM PLANNING.

1. What is a Transportation System Plan?

The principal planning requirement in the rule is the requirement of cities, counties, MPO's and ODOT to prepare and adopt transportation system plans. A TSP is defined as:

> "a plan for one or more transportation facilities that are planned, developed, operated and maintained in a coordinated manner to supply continuity of movement between modes, and within and between geographic and jurisdictional areas."

The transportation system plan represents the "first phase" of transportation planning. The TSP establishes land use controls and a network of facilities and services to meet overall transportation needs. The "second phase" is transportation project development, during which the local government determines the precise location, alignment, and preliminary design of improvements included in the TSP. See OAR 660-12-010(1).

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[1] Under Goal 12, local governments must adopt transportation plans which "provide and encourage a safe, convenient and economic transportation system." Specifically, each transportation plan:

> "shall (1) consider all modes of transportation including mass transit, air, water, pipeline, rail, highway, bicycle and pedestrian; (2) be based upon an inventory of local, regional and state transportation needs; (3) consider the differences in social consequences that would result from utilizing differing combinations of transportation modes; (4) avoid principal reliance upon any one mode of transportation; (5) minimize adverse social, economic and environmental impacts and costs; (6) conserve energy; (7) meet the needs of the transportation disadvantaged by improving transportation services; (8) facilitate the flow of goods and services so as to strengthen the local and regional economy; and (9) conform with local and regional comprehensive land use plans."

[2] See especially STOP v. Metropolitan Service District, 18 Or LUBA 221 (No. 89-030) (1989), reversed Sensible Transportation v. Metro. Service Dist., 100 Or App 564, 787 P2d 498 (1990), and Washington County Farm Bureau v. Washington County, 17 Or LUBA 861 (1989)).

2. Requirement for Multi-Modal Planning.

A major emphasis in the rule is the adoption of multi-modal TSPs. The rule requires each TSP to include as necessary to meet state, regional or local needs: (1) a road plan for arterials and collectors; (2) a public transportation plan, including plans for transit for communities with transit or capable of developing a feasible transit system at buildout; (3) a bicycle and pedestrian plan; (4) an air, rail, water and pipeline plan; (5) for areas within an urban area containing a population greater than 25,000 persons, a plan for transportation system management and demand management (to increase the efficiency, capacity or level of service of existing facilities without increasing size, and to reduce the need for additional road capacity); and (6) within MPOs, a parking plan.

Key aspects of TSP preparation are the determination of needs and evaluation of alternatives. OAR 660-12-030 requires counties and MPOs preparing regional TSPs to rely on the analysis of state transportation needs in adopted elements of the state TSP, while cities and counties preparing local TSPs must rely on the analyses in both the regional and state TSPs. This section further requires cities, counties and MPOs to determine local and regional transportation needs based not only on population and employment forecasts, but on measures to encourage reduced reliance on the automobile, including, in MPO areas, stringent measures aimed at reducing automobile vehicle miles travelled by 20% by the year 2021. OAR 660-12-035 requires evaluation of potential impacts of system alternatives, including (1) improvements to existing facilities or services; (2) new facilities and services, including different modes or combinations of modes; and (3) transportation and demand management measures. Obviously, compliance with these requirements will keep local planners busy, particularly within MPO areas.

3. Adoption of the TSP is a Land Use Decision.

Adoption of the TSP is a land use decision "regarding the need for transportation facilities, services and major improvements and their function, mode and general location." OAR 660-12-025(1). TSP adoption is subject to review by LCDC and appeal to LUBA. The rule requires affected governments to adopt findings showing compliance with applicable statewide goals and acknowledged comprehensive plan policies and land use regulations.

D. APPLICABILITY.

1. Generally.

The rule applies, in different ways, to cities, counties, metropolitan planning organizations (MPOs)[3] and the Oregon Department of Transportation (ODOT). Under OAR 660-12-015, ODOT must prepare, adopt and amend a state Transportation System Plan (TSP) identifying a system of transportation facilities and services adequate to meet identified state transportation needs, while MPO's and counties must do the same for

[3] Metropolitan Planning Organizations have been designated by the Governor to coordinate transportation planning for the Portland, Salem, Eugene and Medford metropolitan areas. Any additional areas designated subsequent to adoption of the rule will be subject to the requirements for MPOs in the rule.

facilities of regional significance and cities and counties must adopt TSPs adequate to meet identified local transportation needs.

"Transportation needs" are defined as:

> "estimates of the movement of people and goods consistent with acknowledged comprehensive plans and requirements of this rule. Needs are typically based on projections of future travel demand resulting from a continuation of current trends as modified by policy objectives, including those expressed in Goal 12 and this rule, especially those for avoiding principal reliance on any one mode of transportation [i.e., the automobile]." OAR 660-12-005(16).

"State transportation needs" means the needs for interstate and interregional movement of people and goods. "Regional transportation needs" refers to the needs for movement of people and goods between and through communities and accessibility to regional destinations within a metropolitan area, county or associated group of counties. "Local transportation needs" means the needs for movement of people and goods within communities and portions of counties and the need to provide access to local destinations. Undoubtedly, there will be "overlap" between these types of needs, which may result in conflict as to solutions. While the rule and ODOT's state agency coordination agreement provide mechanisms for conflict resolution, it will be interesting to see how these issues are resolved.

Under OAR 660-12-055, MPO's must complete regional TSPs for their planning areas by no later than May, 1995. Cities and counties preparing local TSP's within MPO areas must adopt their TSP's within one year thereafter. For areas outside MPO's, cities and counties must complete regional and local TSP's by May, 1996. However, notwithstanding these timelines, all cities and counties in urban areas of 25,000 or more population must adopt specified land use and subdivision ordinances or amendments by May, 1993. Following initial adoption of TSPs, updates will be required at each subsequent periodic review.

2. *Exemptions.*

OAR 660-12-055(5) permits the director of DLCD to "grant a whole or partial exemption" from rule requirements "to cities under 2,500 population outside MPO areas and counties under 25,000 population." An exemption extends to the next periodic review. The rule permits an exemption to be granted based on consideration of the five factors:

1. Whether the existing and committed transportation system is generally adequate to meet likely transportation needs;

2. Whether new development or population growth is anticipated in the planning area over the next five years;

3. Whether major new transportation facilities are proposed which would affect the planning area;

4. Whether deferral of planning requirements would conflict with accommodating state or regional transportation needs; and

5. Consultation with ODOT on the need for transportation planning in the area, including measures needed to protect existing transportation facilities.

It is likely the department will receive many requests for exemptions. How DLCD will respond to them is anyone's guess. Except for small, isolated communities, it may be that a request for a partial exemption will stand a better chance of success than a request for a full exemption. In particular, it seems likely that DCLD will want local governments to adopt, at a minimum, land use and subdivision ordinance amendments enhancing pedestrian and bicycle travel. ODOT is preparing model ordinances to assist local governments in that regard.

E. COORDINATION.

Coordination is a critical element of the rule. Under OAR 660-12-015(1), ODOT must prepare, adopt and amend its TSP in accordance with its state agency coordination program certified by LCDC and in a manner compatible with acknowledged comprehensive plans. Disagreements between ODOT and affected local governments must be resolved in the manner established in OAR 731, Division 15 (ODOT's State Agency Coordination Rule).[4] Regional TSP's prepared by MPOs or counties must be consistent with adopted elements of the state TSP, while local TSP's must be consistent with regional TSP's and adopted elements of the state TSP. Where ODOT or regional bodies have not yet adopted their TSPs, then cities, counties or MPOs (as appropriate) must coordinate with the regional planning body or ODOT "to assure that regional and state transportation needs are accommodated."

The coordination provisions raise interesting issues. Clearly, the "hierarchy" starts at the state level and works it way down to local plans. However, ORS 197.180 requires that state agency plans be "compatible" with acknowledged comprehensive plans. It is anyone's quess, what actually will happen when provisions of an acknowledged comprehensive plan are incompatible with ODOT's plans for state transportation facilities.

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[4] Conflict resolution mechanisms in that rule include (1) changes in ODOT's modal systems and facilities plans to eliminate conflicts between proposed new state transportation facilities and incompatible land uses; (2) changes in acknowledged local comprehensive plans to eliminate those conflicts; (3) adopting policies in ODOT's plans committing ODOT to resolve the conflicts prior to conclusion of the transportation planning process; and (4) asking LCDC to make a compatibility determination in accordance with OAR 660-30-070 (7) through (12). See especially OAR 731-15-055, 731-15-065 and 731-15-115.

The rule also requires coordination with special districts, such as mass transit, airport and port districts. Under OAR 660-12-015(6), these districts not only must "participate" in the development of TSPs for those transportation facilities and services they provide, but they also must "prepare and adopt plans for" the same facilities and services, consistent with and adequate to carry out relevant portions of applicable local and regional TSPs. Cooperative agreements under ORS 197.185(2) are encouraged.

F. REDUCED RELIANCE ON THE AUTOMOBILE.

"Reduced reliance on the automobile" is the heart and soul of the Transportation Planning Rule. Through a multitude of measures, the rule demands action at all levels of government to get people out of single occupancy vehicles and into carpools or other modes of transportation.

1. Reduction in Automobile Vehicle Miles Travelled.

Measures to accomplish reduced reliance on the automobile are particularly stringent within MPO areas. Within MPO areas, regional and local TSPs must achieve the following objectives for reducing automobile vehicle miles travelled (VMT) per capita:

1. Within 10 years of plan adoption, no increase in VMT;

2. Within 20 years of plan adoption, a 10% reduction in VMT;

3. Within 30 years of plan adoption, a 20% reduction in VMT.

Moreover, regional TSPs must specify measurable objectives for increasing average automobile occupancy (e.g., to 1.5 persons per vehicle) and the modal share of nonauto trips (e.g., a doubling of the number of pedestrian, bicycle and transit trips), and demonstrate how the combination selected will accomplish these VMT reduction objectives. As part of this effort, the TSPs must include "interim benchmarks at five year intervals" so that MPOs and local governments can evaluate and assure progress towards meeting these long term requirements. See OAR 660-12-035.

2. Land Use Alternatives in Portland Area.

Within the Portland metropolitan area, the requirements are more severe. There, local governments are required to evaluate alternative land use designations, densities and design standards to meet local and regional transportation needs, including consideration of (1) increasing residential densities and establishing minimum residential densities along transit corridors; (2) increasing floor area ratios in new commercial office and retail developments; (3) designating lands for shopping centers within convenient walking and bicycling distances of residential areas; and (4) designing land uses to "provide a better balance between jobs and housing." OAR 660-12-035(2). Having already gone through a rancorous public participation process to achieve existing plan designations and zoning, these local governments can look forward to more of the same as they move towards compliance with this requirement.

3. Enhancing Bicycle/Pedestrian Travel in All Areas.

Implementation requirements in OAR 660-12-045 also are geared towards achieving reduced reliance on the automobile. This section requires local governments to adopt land use or subdivision regulations requiring bicycle parking facilities as part of new multi-family residential developments of four units or more, new retail, office and institutional developments, and all transit transfer stations and park and ride lots. Also, these regulations must provide for safe and convenient pedestrian and bicycle access "within and from new subdivisions, planned developments, shopping centers and industrial parks to nearby residential areas, transit stops, and neighborhood activity centers, such as schools, parks and shopping." OAR 660-12-045(3). Practically speaking, developers of new subdivisions and PUDs may be required to provide easements for direct pedestrian and bicycle travel to nearby collectors and arterials, stores and activity centers, rather than requiring pedestrians and bicyclists to take roundabout routes which encourage auto travel. If so, these provisions alone may go a long way towards making this rule a success.

4. Enhancing Transit Travel in Urban Areas over 25,000.

Within urban areas containing a population greater than 25,000, where transit service exists or is shown to be feasible, local governments must adopt land use and subdivision regulations that encourage transit use, including preferential access to transit at new retail, office and institutional buildings at or near existing or planned transit stops.

5. Other Measures for Reducing Reliance on the Automobile.

Finally, within MPOs, local governments will be required to adopt land use and subdivision regulations which (1) allow "transit oriented developments" on lands along transit routes; (2) implement a demand management program to meet measurable standards in the TSP; (3) implement parking plans, including minimum and maximum parking requirements, to achieve a 10% reduction in the number of parking spaces per capita in the MPO area over the planning period; and (4) require all major industrial, institutional, retail and office developments to provide either a transit stop on site or connection to a transit stop along a transit trunk route when the transit operation requires such an improvement. Again, these provisions, if implemented, could have a substantial impact in reducing reliance on the automobile. Key questions include whether local governments will balk at these requirements and, if they do, whether LCDC or local interest groups will force compliance through enforcement or other administrative action or through appeals before LUBA and the courts.

G. PROTECTION OF TRANSPORTATION FACILITIES.

Another significant purpose of the implementation provisions in OAR 660-12-045 is "to protect transportation facilities, corridors and sites for their identified functions." Towards this end, local governments will be required to adopt land use and subdivision regulations, consistent with applicable federal and state requirements. Those regulations must include (1) access control measures that are consistent with the functional classification of roads and, in rural areas, "consistent with limiting development on rural

lands to rural uses and densities"; (2) standards to protect future operation of roads, transitways and major transit corridors; (3) measures to protect public airports by controlling land uses within noise corridors and imaginary surfaces; (4) a process for coordinated review of future land use decisions affecting transportation facilities, corridors or sites, including notice to ODOT; and (5) regulations assuring that amendments to land use designations, densities and design standards are consistent with the functions, capacities and levels of service of facilities identified in the TSP.

Local governments should expect increased scrutiny and participation by ODOT, among others, to ensure that proposed plan or zoning amendments affecting transportation facilities meeting state needs do not result in an unacceptable level of service or inhibit the ability of the facility to meet its intended function. Potentially, these requirements may be as significant as any in the rule in prohibiting the continuation of sprawl patterns of development. The test will be whether local governments are able to "hold the line," particularly when faced with applications for development that may provide economic enhancement to the area, but in a manner inconsistent with the function or capacity of adjacent or nearby transportation facilities.

H. PROJECT DEVELOPMENT.

The TSP will identify the need for transportation facilities and services and their function, mode and general location. Under certain circumstances the rule allows some of these decisions to be put off to a "refinement plan." See OAR 660-12-025(3).

Project development occurs when the local government or ODOT prepares to implement a project or service identified in the TSP. This process will involve land use decisionmaking "to the extent that issues of compliance with applicable requirements remain outstanding at the project development phase." Typically, issues would include compliance with regulations protecting or regulating development within floodplains or other hazard areas, identified Goal 5 resource areas, estuarine or coastal shoreland areas, and the Willamette River Greenway.

An issue arises as to the extent House Bill 2261 (Oregon Laws 1991, ch. 817) exempts project development activities from the land use decisionmaking process. The answer appears to be, not very much. Some transportation improvements, such as transit stations inside urban growth boundaries, may be subject to limited review under the definition of "limited land use decision." However, that definition applies only within urban growth boundaries and does not appear to address concerns like development in hazard or natural resource areas. Further, amendments to ORS 197.015(10) (definition of "land use decision") indicate that a local government decision "which determines final engineering design, construction, operation, maintenance, repair or preservation of a transportation facility which is otherwise authorized by and consistent with the comprehensive plan and land use regulations" is not a land use decision. However, this provision begs the question whether that consistency is present. In any event, the issue at the project development stage is not final design, but preliminary design. Under the typical process followed for transportation planning, this is the appropriate time for land use decisionmaking.

I. PLAN AND LAND USE REGULATION AMENDMENTS.

The rule requires that amendments to functional plans, acknowledged comprehensive plans and land use regulations "that significantly affect a transportation facility" must assure that allowed land uses "are consistent with the identified function, capacity, and level of service of the facility." OAR 660-12-060. This is a potentially far-reaching provision, because it provides for the overturning of plan amendments and land use regulations if the proposal is shown to be inconsistent with a facility's identified function, capacity or minimum acceptable level of service.

The rule requires coordination with affected transportation facility or service providers whenever a proposal for a plan or regulation amendment would significantly affect a transportation facility. This will likely result in greater ODOT participation in local land use proceedings.

J. TRANSPORTATION IMPROVEMENTS ON RURAL LANDS.

Sections 660-12-065 and 660-12-070 of the Transportation Planning Rule address transportation facilities on rural lands. This issue has caused much confusion, particularly since transportation facilities connect urban areas besides serving rural lands. The thrust of the rule is to discourage rural sprawl by limiting access to and avoiding oversizing of transportation facilities on rural lands.

Essentially, the rule lists a variety of transportation activities and improvements deemed to be consistent with Goals 3 (Agricultural Lands), 4 (Forest Lands), 11 (Public Facilities and Services) and 14 (Urbanization) on rural lands. Certain of these uses are deemed inherently consistent with those goals. Other uses are deemed consistent if they satisfy additional standards in the rule. These uses include (1) new local service roads and extensions of existing local service roads on farm or forest lands); (2) major road improvements to state highways of regional and statewide significance; and (3) other transportation facilities, services and improvements which are unspecified in the rule but serve local needs. Typically, the standards limit the number of lanes, control accesses, impose restrictions on new interchanges and intersections, and limit or prohibit major realignments. For those facilities and improvements which cannot satisfy these standards, goal exceptions are required pursuant to OAR 660-12-070.

Many questions will arise concerning whether a proposed facility or improvement is permitted on rural lands without an exception. These questions are more complicated by differences between permitted scale of uses on agricultural land as opposed to rural residential land. For example, LUBA has held that the legislature, in regulating agricultural lands under ORS chapter 215, did not place limits on the size or capacity of uses permitted in EFU zones. However, Goals 11 and 14 clearly limit the scale of development on rural lands that are not zoned EFU. If a proposed facility or improvement includes rural nonresource lands, the matter may require very careful attention for compliance with the rule. Similarly, even where a transportation facility or improvement is permitted on EFU land under the statute, questions will arise concerning whether the proposed use complies with the provisions in ORS 215.213 or 215.283. For example, it may

not be clear whether a proposed improvement constitutes "reconstruction or modification of" a public road or would result in the creation of "new land parcels" (see. e.g., ORS 215.213(1)(n) and 215.283(1)(l)). It may take further rulemaking or land use appeals to get answers to these questions.

K. CONCLUSIONS.

The Transportation Planning Rule is an expression of LCDC's vision for future land conservation and development in the coming decades. Its principal focus is on providing alternatives to the automobile. Because development patterns over the past several decades literally necessitate automobile reliance at the expense of other transportation modes (including walking and bicycling), with consequent expansion of sprawl, energy consumption, and deterioration of air quality and livability, and because those patterns have proven difficult to change, the rule mandates rather than encourages action to reverse the direction. Because the provisions have the force of law, aggressive enforcement of the rule by DLCD or other interested parties should have the effect of changing development patterns and, at a minimum, enhancing opportunities for pedestrian, bicycle and transit travel.

The rule also achieves important ODOT objectives. Repeatedly, ODOT has observed local development patterns impede transportation facilities meeting statewide needs from serving their intended function. When a road intended to serve interregional traffic becomes a parking lot because of local government failure to provide adequate alternative access to adjacent and nearby land uses (e.g., shopping centers), then roadway capacity must be increased or a new facility constructed. This approach is expensive and often inefficient and it contributes to sprawl. Through more careful and coordinated planning, these results can be minimized if not eliminated.

The rule will require a major planning effort by local governments. At a minimum, local governments will need to amend their land use and subdivision regulations to enhance opportunities for pedestrian and bicycle travel. Within larger metropolitan areas, more stringent steps will be required to reduce reliance on the automobile. While those steps may be popular with some local residents, many others will kick and scream throughout the series of public hearings held on the matter.

The Transportation Planning Rule is new and untested. Particularly with respect to rural lands, there is ambiguity that may not be fully resolved until addressed by LUBA or the appellate courts. Still, despite some deficiencies, the rule potentially constitutes a giant step away from the development patterns that have forced continued reliance on the automobile. While many members of the public and business community may oppose this new direction, and while the rule may force people to change their transportation habits (particularly in large urban areas), local governments should be mindful that there was substantial input favoring adoption of the rule and, now, a substantial level of excitement over what the rule might bring. Practically speaking, in smaller communities, great changes should not be anticipated. The thrust of the rule is towards larger urban areas suffering from urban sprawl, air pollution, congestion and reduced quality of life. There, the rule should have a major impact.

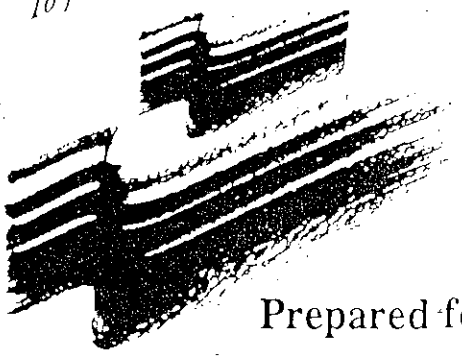
A Summary

Intermodal Surface Transportation Efficiency Act of 1991

U.S. Department of Transportation

Moving America

To jobs... To homes... To market



Prepared for Oregon

Message by
Transportation Secretary Skinner
Summary of
The Intermodal Surface Transportation Efficiency Act of 1991

The Intermodal Surface Transportation Efficiency Act of 1991, signed into law by President Bush on December 18, 1991, establishes a new vision for surface transportation in America. It represents a victory for the Nation, its citizens, and our economic vitality. The Bill embodies one of the President's top domestic agenda items: the renewal of our surface transportation programs to address the changing needs for America's future. It will create jobs, reduce congestion, and rebuild our infrastructure. It will help maintain mobility. It will help State and local governments address environmental issues. Finally, it will ensure America's ability to compete in the global marketplace of the 21st Century.

Overall, this landmark Bill embodies the President's vision and direction as stated in his National Transportation Policy. It maintains and expands the Nation's Transportation system; fosters a sound financial base for transportation; keeps the industry strong and competitive; and promotes safety, protects the environment, and improves the quality of life.

To all our partners in the transportation community, who worked so hard and long for this Bill, best wishes for every success as you take this Bill and create our transportation system of the 21st Century.

Samuel K. Skinner
Secretary of Transportation

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Intermodal Surface Transportation Efficiency Act of 1991

On December 18, 1991, the President signed the Intermodal Surface Transportation Efficiency Act of 1991 providing authorizations for highways, highway safety, and mass transportation for the next 6 years. Total funding of about $155 billion will be available in fiscal years (FY) 1992-1997. (See Table 1, pages 40-43 for a summary of funding by program.)

The purpose of the Act is clearly enunciated in its statement of policy:

"to develop a National Intermodal Transportation System that is economically efficient, environmentally sound, provides the foundation for the Nation to compete in the global economy and will move people and goods in an energy efficient manner."

The provisions of the Act reflect these important policy goals. Some of the major features include:

* A National Highway System (NHS), consisting primarily of existing Interstate routes and a portion of the Primary System, is established to focus Federal resources on roads that are the most important to interstate travel and national defense, roads that connect with other modes of transportation, and are essential for international commerce.

* State and local governments are given more flexibility in determining transportation solutions, whether transit or highways, and the tools of enhanced planning and management systems to guide them in making the best choices.

* New technologies, such as intelligent vehicle-highway systems and prototype magnetic levitation systems, are funded to push the Nation forward into thinking of new approaches in providing 21st Century transportation.

* The private sector is tapped as a source for funding transportation improvements. Restrictions on the use of Federal funds for toll roads have been relaxed and private entities may even own such facilities.

* The Act continues discretionary and formula funds for mass transit.

* Highway funds are available for activities that enhance the environment, such as wetland banking, mitigation of damage to wildlife habitat, historic sites, activities that contribute to meeting air quality standards, a wide range of bicycle and pedestrian projects, and highway beautification.

* Highway safety is further enhanced by a new program to encourage the use of safety belts and motorcycle helmets.

* State uniformity in vehicle registration and fuel tax reporting is required. This will ease the record keeping and reporting burden on businesses and contribute substantially to increased productivity of the truck and bus industry.

The bill's comprehensive coverage is reflected in its eight titles:

TITLE 1 -
Surface Transportation (related to highways)

TITLE II -
Highway Safety

TITLE III -
Federal Transit Act Amendments of 1991

TITLE IV -
Motor Carrier Act of 1991

TITLE V -
Intermodal Transportation

TITLE VI -
Research

TITLE VII -
Air Transportation

TITLE VIII -

Extension of Highway-Related Taxes
and Highway Trust Fund.

OBLIGATION LIMITATIONS

The ISTEA provides a limitation on obligations for many programs in FY 1992 which is lower than the sum of authorization levels provided in the Act. The Office of Management and Budget must also score the budgetary impact of the Act and make further reductions in obligation authority as necessary to bring total spending into line with the overall Federal budget. The amounts shown herein do not reflect obligation limits.

Throughout the remainder of this document, information pertaining to Oregon is shown shaded.

TITLE I

Surface Transportation

This title covers matters relating mainly to highways, generally administered by the Federal Highway Administration (FHWA). Authorizations of $121 billion are provided in this title through programs that have been dramatically restructured from previous highway law. Some of the program funds are distributed through procedures that are significantly different from the formulas of the past. Layered on these differences are revised program eligibilities and requirements.

PROGRAMS

The Federal-aid Highway Program, for the past 20 years, had been directed primarily toward the construction and improvement of four Federal-aid systems - Interstate, Primary, Secondary and Urban - which constituted about 851,000 miles of the 3.9 million miles of roads in the United States. In Oregon, these four systems totaled 15,646 miles, or about 16 percent of the 94,969 miles of road in the State. Now, instead of four Federal-aid systems, there are two systems:

- the National Highway System, and
- the Interstate System, which is a component of the NHS.

Plus, a new block grant type program, the Surface Transportation Program, will be available for all roads not functionally classified as local or rural minor collector. Thus, the Federal-aid program will encompass about 920,000 miles and will be based on a new framework. In Oregon, 17,706 miles of road, or approximately 19 percent of the total road mileage in the State will now be eligible for Federal-aid.

The major Federal-aid programs are discussed below. For a more complete list of authorizations and programs refer to Table 1. Federal shares and availability periods are shown on Table 2, page 44. Oregon's FY 1992 apportionments and allocations are shown on Table 3, page 45.

National Highway System

The National Highway System (NHS) will consist of 155,000 miles (plus or minus 15 percent) of major roads in the United States. Included will be all

Interstate routes, a large percentage of urban and rural principal arterials, the defense strategic highway network, and strategic highway connectors. The system, which will be proposed by the Secretary of Transportation, after consultation with the States, must be designated by law by September 30, 1995. In the interim, the NHS will consist of highways classified as principal arterials. In the interim that means about 3,500 miles of Oregon highways are eligible for NHS funding.

An illustrative NHS was developed by the FHWA in cooperation with the States prior to passage of the Act. For Oregon, the rural portion consisted of 2,461 miles as shown in Figure 1, pages 24-25. No attempt was made to include urban area mileage in the illustrative system although about 265 urban miles were shown simply to provide continuity for the rural routes as they passed through urban places. Nationwide, urban mileage is expected to comprise about 15 percent of the final NHS. While this illustrative system is not the final system, the final system is expected to be very similar to it. One notable exception will be the addition of the remaining sections of U.S. 395 from the Washington State line to the Nevada State line (about 240 miles). This route was specifically designated in the Act as a high priority corridor on the National Highway System.

The NHS funding level is $21 billion for the 6 years. The formula for distribution is the same as for the Surface Transportation Program (STP) (see discussion below). A State may choose to transfer 50 percent of the NHS funds to the new STP; if the Secretary approves, 100 percent may be transferred. Oregon's share of NHS funding is subject to change slightly from year to year as the factors in the distribution formula change. In FY 1992, Oregon will receive $34.5 million in NHS funds, about 1-1/4 percent of the total amount distributed to all states.

Interstate

Although a part of the NHS, the Interstate System will retain its separate identity and will receive separate funding. Provided is:

- Complete funding of Interstate Construction ($7.2 billion).

- Interstate Substitute highway projects ($960 million) (Interstate Substitute transit projects are funded at $325 million in Title III).

- An Interstate Maintenance program, at a total of $17 billion, finances projects to rehabilitate, restore, and resurface the Interstate System. Reconstruction is also eligible if it does not add capacity. However, high-occupancy-vehicle (HOV) and auxiliary lanes can be added.

The formulas for the three Interstate programs are basically the same as in previous law. Interstate Construction and Interstate Substitute are based on an estimate of cost to complete. The factors used for Interstate Maintenance, like the previous Interstate Resurfacing, Restoration, Rehabilitation, and Reconstruction, (4R) program, are lane miles and vehicle miles travelled.

In Oregon, only two short sections of the Interstate System remain eligible for Interstate construction funding. Both are in the Portland area. Eligible work remains on I-5 between the east end of the Marquam Bridge and I-84, and on I-84 between 181st Avenue and Troutdale. The amount of Interstate funding which will be provided by the Act over the next four years to complete these two sections is approximately $80 million. About $23 million of this amount was made available for FY 1992.

Portland is also the only area of the State entitled to receive Interstate Substitute funds. This eligibility continues as a result of earlier withdrawa of Interstate segments in the Portland area. The remaining eligibility under Title I is approximately $27 million. About $2.3 million of this amount is made available for FY 1992. These funds can now be used on any public road or transit project.

Oregon's FY 1992 apportionment of Interstate Maintenance funds is $35.1 million, about 1-1/2 percent of the amount distributed nationally. The total amount of Interstate Maintenance funds available nationwide will increase by about 20 percent in FY 1993 and then remain relatively constant through the life of the Act.

Surface Transportation Program

The Surface Transportation Program (STP) is a new block grant type program that may be used by the States and localities for any roads (including NHS) that are not functionally classified as local or rural minor collectors. These roads are now collectively referred to as Federal-aid roads. Bridge projects paid for with STP funds are not restricted to Federal-aid roads but may be on any public road. Transit capital projects are also eligible under this program.

The total funding for the STP over the 6 years is $23.9 billion. However, this level may be augmented by the transfer of funds from other programs and by the equity funds (Donor State Bonus, Reimbursement, Hold Harmless, and 90 Percent of Payments) which may be used as if they were STP funds. I addition, Minimum Allocation funds may be used for STP projects, as well as for projects under certain other categories.

The formula for distribution of funds is based on each State's FY 1987-1991 share of total national funding with appropriate adjustment for Interstate Maintenance and Bridge apportionments.

Once the funds are distributed to the States, each State must set aside 10 percent for safety construction activities, i.e., hazard elimination and rail-highway crossings, and 10 percent for transportation enhancements, which encompass a broad range of environmentally-related activities.

Each State must divide 50 percent (62.5 percent of remaining 80 percent) of the funds by population between each of its areas over 200,000 and the remaining areas of the State. **Portland, which accounts for about 35% of Oregon's total population, is the only area in Oregon with a population of 200,000 or more. Therefore, in Oregon, 50 percent of the STP funds will be split between Portland and the remaining areas at about a 35/65 ratio.**

The remaining 30 percent (37.5 percent of remaining 80 percent) can be used in any area of the State. **The Act guarantees that the amount of STP funds spent in small areas, with populations less than 5,000 people, cannot be less than 110 percent of Oregon's 1991 Secondary System apportionment (an amount equal to $10.9 million). Suballocation to small areas individually is not required but is a State prerogative.**

For FY 1992, Oregon's STP apportionment is $34.1 million. This is exclusive of any transfers, equity funds, or minimum allocation which are discussed below. Oregon STP funding limitations are shown on Table 4, page 46.

Congestion Mitigation and Air Quality Improvement Program

The Congestion Mitigation and Air Quality Improvement Program directs funds toward transportation projects in Clean Air Act non-attainment areas for ozone and carbon monoxide (CO). Non-attainment areas for particulate matter (PM-10) are not included. These projects will contribute to meeting the attainment of national ambient area air quality standards.

Oregon has six non-attainment areas eligible for funding under this program. Eugene/Springfield (CO), Grants Pass (CO), Klamath Falls (CO), Medford/Central Point (CO), Portland/Vancouver (CO and Ozone) and, Salem/Keizer, (CO and Ozone). If a State has none of these non-attainment areas, the funds may be used as if they were STP funds.

Total funding for the program is $6 billion. The funds are distributed based on each State's share of the population of air quality non-attainment areas weighted by degree of air pollution. A 1/2 percent minimum apportionment is guaranteed to each State.

Oregon's FY 1992 Congestion Mitigation and Air Quality Improvement Program funds are approximately $4.4 million. The amounts to be received by Oregon in each of the remaining five years of the Act will depend on how its air pollution changes over time compared with non-attainment areas in other states.

Bridge Replacement and Rehabilitation Program

The Bridge Replacement and Rehabilitation Program is continued at a total authorization level of $16.1 billion to provide assistance for any bridge on a public road. The program is basically unchanged from previous years in its formula and requirements. However, newly eligible are bridge painting, seismic retrofitting, and calcium magnesium acetate applications. A bridge discretionary program is continued with a new timber bridge component with $400 million in funding. Forty percent of a State's bridge funds may be transferred to the NHS or the STP; the transferred amounts are not subject to the STP set-asides and sub-State distribution requirements.

Oregon has 6,610 bridges which are open to travel by the public. Of these, 1,514 or 23 percent are considered deficient either structurally or functionally. These deficient bridges determine Oregon's share of Bridge Replacement and Rehabilitation funds.

Oregon's FY 1992 allocation of Bridge Replacement and Rehabilitation Program funds is about $25.2 million. This is more than a 260 percent increase in program funds over FY 1991. The principal reason for this large increase is a coincidental change in the way existing bridges are coded in the National Bridge Inventory, rather than a change in the distribution method brought about by the Act.

The State must spend between 15 percent and 35 percent of its Bridge Replacement and Rehabilitation funds on projects not otherwise eligible for STP funding. These funds are made available throughout Oregon using a fair and equitable prioritization method developed by the ODOT, in consultation with cities and counties.

Oregon's share over 6 years will depend on the relative condition of its bridges compared with those of other States, and therefore it cannot be estimated with accuracy at this time.

Federal Lands

The Federal Lands Program authorizations, previously available through four categories, are now provided through three categories --

* Indian Reservation Roads,
* Parkways and Park Roads, and
* Public Lands Highways, which incorporates the previous Forest Highway category.

Total funding for Federal Lands is $2.6 billion. The funds are allocated on the basis of relative needs. The Forest Highway portion of Public Lands Highways and the Indian Reservation Roads authorizations are allocated by administrative formula.

In FY 1992, Oregon will receive approximately $12.4 million in Federal Lands Highway funds. All of these funds will be in the Public Lands Highways category and are attributable to forest highways.

Since some of the Federal Lands Highway funds are discretionary in nature and distribution is based on need, it is not possible to estimate Oregon allocations beyond FY 1992.

Special Programs

* Special Projects -- There are 539 Congressionally-designated highway projects in 6 broad groups:

  - High Cost Bridge;
  - Congestion Relief;
  - High Priority Corridors on NHS;
  - Rural and Urban Access;
  - Priority Intermodal; and
  - Innovative Projects.

Oregon has four such projects: $23.7 million is provided for the Ferry Street Bridge in Eugene in the High Cost Bridge category; $6.0 million is provided for the reconstruction of I-5 around Salem in the Innovative Projects category; and $2.1 million and $15.1 million respectively are provided for the Columbia Slough Intermodal Expansion (Railroad) Bridge, and the widening of U.S. 26 in coordination with light rail in the Priority Intermodal category. These funds will be made available over the six-year life of the Act with about 8% available in FY 1992 and 18.4% in

each year thereafter. **Construction can be undertaken in advance of apportionments with deferred reimbursement.**

There are other special projects and provisions throughout the Act that receive separate funding, some with contract authority from the Highway Trust Fund and some requiring annual appropriations.

* National High-Speed Ground Transportation Programs -- A magnetic leviation (Maglev) prototype development program is authorized at a sum of $725 million ($500 million from the Trust Fund and $225 million from the general fund). These funds will be directed toward the development of one prototype project, selected from applicants across the Nation.

  A separately funded ($25 million from the Highway Trust Fund and $25 million from the general fund) high-speed ground transportation demonstration program will fund selected projects that demonstrate new technologies related to any high-speed ground transportation projects, rail or maglev, already under construction or in operation.

* Scenic Byways Program -- Grant funds totaling $50 million are authorized for the planning, design, and development of State scenic byway programs. In addition, an interim Scenic Byways grant program is funded at $30 million to allow States to undertake scenic byways projects. Scenic byways, additionally, may be funded through the 10 percent set-aside of STP funds for enhancement activities.

  Oregon has submitted a proposal under the interim Scenic Byways Grant Program, for a $5 million study of the U.S. 101 corridor. The study, if funded, will be done jointly with the States of Washington and California.

* Use of Safety Belts and Motorcycle Helmets -- The Act permits the Secretary to provide grants to States that enact motorcycle helmet and safety belt use laws. To carry out this program an authorization of $17 million is provided in the first year. Thereafter, the program will be funded by set-asides from Section 402 funds totalling $48 million. States that do not enact these laws by FY 1994 will have penalties applied to their STP, NHS, and Congestion Mitigation and Air Quality funds. The penalty amounts must be transferred and used for the State's 402 Safety program.

  Oregon currently has a safety belt law and a motorcycle helmet law.

* National Recreational Trails Funding Program -- Recreational trails for non-motorized and motorized uses will be funded from the Highway Trust Fund (see Title VIII discussion). Funds will be allocated to the States based in part on the amount of non-highway recreational fuel use and may be used for a variety of activities to construct and maintain recreational trails. The program will be administered by the Department of Transportation (DOT) in consultation with the Department of the Interior.

Equity Adjustment Categories

Equity adjustment categories are the funds that were legislated to achieve equity in funding levels among the States. They cannot be considered programs because they are not directed toward a particular group of roads or activities. However, they do represent amounts of funds that will be distributed o the States. Following is a brief description of each category's formula and eligible uses.

* **90 percent Minimum Allocation** - Each State is guaranteed an amount to ensure that a State's percentage of its total apportionments and prior year allocations for the base programs (Interstate Construction, Interstate Maintenance, Interstate Substitute, NHS, STP, Bridge, Scenic Byways, and Safety Belt and Motorcycle Helmet grants) equal 90 percent (compared to 85 percent in previous law) of the percentage of its estimated contributions to the Highway Account of the Highway Trust Fund. One-half of the amount distributed to each State is subject to the sub-State distribution rules of the STP. **Oregon will receive about $1.2 million in Minimum Allocation funds in FY 1992. The limitations on these funds are shown in Table 4.**

  Minimum Allocation funds may be used for the following: Interstate, Interstate Substitute, Bridge, NHS, STP, Congestion Mitigation and Air Quality, Hazard Elimination, and Rail Highway Crossing projects.

* **Donor State Bonus** -- Donor States (those that contribute more to the Highway Trust Fund than they receive back in Federal-aid highway programs) receive a predetermined amount ($3 billion dollars over the 6 years) based on a comparison of a projection of all payments into the Highway Trust Fund and the amount received in Federal-aid apportionments. Starting with the State with the lowest return, States are brought up to the level of return for States with the next higher level of return until available funds are depleted.

These bonus amounts effectively are treated as STP funds, except that the amounts are available until expended and one-half of the amount is subject to the sub-State distribution rules of the STP. **For FY 1992, Oregon will receive about $6.8 million in Donor State Bonus funds. The limitations on these funds are shown in Table 4.**

* **Reimbursement** -- This category reflects each State's share of the cost of routes incorporated into the Interstate System in 1956. For each of FYs 1996 and 1997, $2 billion are authorized. A 1/2 percent minimum apportionment is guaranteed to each State.

These funds are transferred to the STP; however, one-half of the amount will not be subject to the set-asides and sub-State distribution requirements of the STP.

At the time the Interstate System was created in 1956, portions of I-5 and I-84 in Oregon were incorporated into the system. The amount of funds Oregon receives in this category will be approximately $28 million dollars in each of FYs 1996 and 1997.

* **Hold Harmless** -- The Act establishes a legislative percentage of the Nation's funding each State must receive annually. The funding programs included in this adjustment process, which includes apportionments and prior year allocations, are: Interstate Construction, Interstate Maintenance, NHS, STP, Congestion and Air Quality, Interstate Substitution, Bridge, Minimum Allocation, Federal Lands, Reimbursement, and Donor State Bonus.

Additions are made to the STP apportionment so that each State's total will achieve the legislative percentage. One-half of Hold Harmless funds received is subject to the set-asides and sub-State distribution requirements of the STP. The 90 percent guarantee and priority projects are not included in this hold harmless adjustment. **Oregon will receive about $22.2 million in Hold Harmless funds in FY 1992. The limitations on these funds are shown in Table 4.**

* **90 Percent of Payments Guarantee** -- This category guarantees all States 90 cents in return for every dollar they are estimated to have contributed to the Highway Trust Fund (other than the Mass Transit Account) for each year of the Act. The computation is based on all highway funds in the bill, except for special projects.

These also will be used as if they were STP funds; however, one-half of the amount is not subject to the set-asides and sub-State distribution requirements of the STP.

After the previous adjustments are made, Oregon will receive at least 90 percent of its estimated payments into the Highway Trust Fund. Therefore, in FY 1992, Oregon will receive no further adjustment under this provision.

OTHER IMPORTANT PROVISIONS

Eligible Activities

The Act greatly expands the type of projects and activities that are now eligible under the basic programs. Some of the notable eligibilities are:

* Transit capital improvements are eligible under the STP program, as noted before. Previous law only allowed the Federal-aid Urban Program funds to be used for transit capital. Also, transit projects (and non-NHS highway projects) are eligible for NHS funds, under certain conditions, in the corridor of fully access-controlled NHS routes.

* A State may choose to use an unrestricted amount of NHS and STP funds on transportation planning, and research and development. Transit research and development is also eligible for STP funds.

* Participation in wetland mitigation efforts is now an eligible use of NHS and STP funds.

* Start up costs for traffic management and control (limited to 2 years on the NHS) is eligible for both NHS and STP funds.

* Improvements necessary to accommodate other transportation modes are eligible uses of both NHS and STP funds.

Metropolitan Planning and Project Selection

The metropolitan planning provisions of the Act feature an enhanced role for local governments. The metropolitan planning organization (MPO) is responsible for developing, in cooperation with the State and affected transit operators, a long-range transportation plan and a transportation improvement program (TIP) for the area. The TIP must be consistent with this plan and must include all projects in the metropolitan area that are proposed for funding with either Title 23 or Federal Transit Act monies.

The planning process must now include additional considerations such as land use, intermodal connectivity, methods to enhance transit service, and needs identified through the management systems.

Projects in areas over 200,000 population, which must be designated as Transportation Management Areas (TMA), are to be selected by the MPO in consultation with the State, except that projects on the NHS, Bridge, and Interstate Maintenance projects are selected by the State in cooperation with the MPO. In other areas, projects are selected by the State in cooperation with the MPO.

Metropolitan planning is funded by 1 percent of the funds authorized for the NHS, STP, Congestion Mitigation and Air Quality Program, Interstate Maintenance Program and Bridge Program. **For Oregon, the FY 1992 Metropolitan Planning apportionment amounts to nearly $986,000.** In addition, metropolitan planning is an eligible activity under the NHS and STP.

Statewide Planning

Newly required under this Act are:

* a statewide planning process,
* statewide transportation plan, and
* a statewide transportation program.

The statewide TIP must include all projects in the State proposed for funding with Title 23 or Federal Transit Act funds, and must be consistent with the long-range plan. The States' funds that are earmarked for planning and research under 23 U.S.C. 307(c)(1), which amount to 2 percent of the major program funds (NHS, STP, Congestion Mitigation and Air Quality Improvement Program, Interstate Maintenance Program, Interstate Completion Program, and Bridge Replacement and Rehabilitation Program) are available to carry out the statewide planning requirements, with some conditions. **The FY 1992 funds earmarked for HPR in Oregon amount to about $3.6 million. One-quarter of these funds are to be spent for research, development, and technology transfer unless the State certifies that the total amount it will spend for transportation planning purposes will exceed three-quarters of the amount available for HPR.** Statewide planning also is an eligible activity under the NHS and STP.

Management Systems

In addition to carrying out the statewide and metropolitan planning requirements, the State must develop, establish, and implement six management systems --

* highway pavement,
* bridge,
* highway safety,
* traffic congestion,
* public transportation facilities and equipment, and
* intermodal transportation facilities and systems.

The States can finance the management systems with NHS, STP, Congestion Mitigation and Air Quality, apportioned Bridge, and Planning funds.

In metropolitan areas, the systems must be developed and implemented in cooperation with MPO's, and in Transportation Management Areas the traffic congestion management system must be developed through the transportation planning process. In TMA's that include non-attainment areas for ozone and carbon monoxide, highway projects which significantly increase capacity for single-occupant vehicles must be part of an approved congestion management system. In Oregon, the Portland metropolitan area is the only area required to be a TMA. Other TMAs could be designated. Non-implementation of the systems by FY 1996 will result in a 10 percent penalty of apportioned highway funds and transit funds. Additionally, the States shall develop traffic monitoring systems for highways in keeping with DOT guidelines and requirements.

Program Operation

States have more responsibility for standards applying to highways under the new law. All non-NHS projects must be constructed in accord with standards established under State law. Standards approved by the Secretary need only apply to NHS new construction, NHS reconstruction and NHS 3R (resurfacing, restoring, and rehabilitating) on multilane limited-access highways.

Under prior legislation, the FHWA Division office was required to approve plans, specifications, and estimates (PS&E) on all Federal-aid projects except those constructed under certification acceptance procedures. The States may now elect to approve PS&E on NHS 3R projects if all work meets or exceeds applicable standards. Also, the State may elect to approve PS&E on any NHS project costing less than $1 million and on all non-NHS projects.

Certification acceptance is retained substantially as it existed. It will apply to all apportioned programs (NHS, STP, Congestion Mitigation and Air Quality, and Bridge), except for Interstate projects. Final inspection of each project is no longer required. Oregon's current Certification Acceptance agreement applies only to projects constructed under the former Secondary Road Plan and bridge replacement and rehabilitation projects under $100,000. If the Oregon Department of Transportation elects to continue under certification acceptance procedures, that agreement will have to be modified to be consistent with the new programs.

Similarly, the State has options to exempt some projects from other FHWA approval actions now required under Title 23 of the Code of Federal Regulations.

Toll Roads

Tolls are permitted to a much greater degree than in the past on Federal-aid facilities, i.e., roads, bridges and tunnels. Types of work that may be done are:

1) Initial construction of toll facilities (except for Interstate),

2) 4R work on toll facilities,

3) Reconstruction or replacement of free bridges or tunnels and conversion to toll facilities,

4) Reconstruction of free highways (except Interstate roads) to convert to toll, and

5) preliminary studies to determine the feasibility of the above work.

Tolls may be continued if used for Title 23 purposes.

For the first time private entities may own the toll facilities which are funded with Federal Highway funds. However, the applicable public authority, regardless of ownership, must ensure that Title 23 requirements are being carried out. A State may loan the Federal share of a project's cost to another public or a private agency constructing the project. Repaid funds may be used for any of the purposes under the original category from which the loans were made.

Congestion Pricing

A congestion pricing pilot program that could involve the imposition of tolls will be initiated and will consist of five projects. Up to three of the projects may be on the Interstate System. The program will be funded by $25 million of FHWA's administrative funds for each of the FY's 1992-1997.

Outdoor Advertising

States may now use their regularly apportioned highway funds for removal of any lawfully erected nonconforming outdoor advertising sign, display, or device. Outdoor advertising controls will apply to the Interstate System and roads that were on the Federal-aid Primary System as it existed on June 1, 1991, and any highway which is not included above but which is on the National Highway System.

National Maximum Speed Limit Compliance Program

The Act amends the speed limit law to:

1) Make permanent the law allowing 65 mph speed limit on some non-Interstate highways that are constructed to Interstate standards (Oregon currently has no non-Interstate routes that meet Interstate standards),
2) Provide for data collection on roads posted at 65 mph as well as 55 mph, and
3) Require regulations for a new speed limit monitoring and compliance program that will take into account different types of roads and the degree to which the speed limit is exceeded.

Transfer of funds as determined through rulemaking will be required if the States fail to enforce the speed limit. However, for those states which failed to comply with the speed limit requirements in FYs 1990 and 1991, the Act provides an enforcement moratorium.

Congressional Reports

Contained in this title are 40 special studies and associated Congressional reports. These reports range from Allocation Formulas for Distributing Federal Highway Funds to Feasibility of Recycling Pavement Material to an International Border Infrastructure study.

Most studies are required to be prepared by FHWA in collaboration with other Federal agencies; some, however, are the responsibility of other agencies (eg. General Accounting Office).

In other titles in the ISTEA, there are an additional 27 Congressionally-required studies and associated reports.

TITLE II

Highway Safety

The non-construction highway safety programs, which are covered under this title, are basically unchanged from existing law. These provisions are generally administered by the National Highway Traffic Safety Administration (NHTSA) and FHWA. A total of $1.63 billion is authorized. The major programs are discussed below; a full listing of authorized programs can be found in Table 1, Authorizations.

MOTOR VEHICLE SAFETY AND COST SAVINGS

The Act provides funding to continue the provisions of the National Traffic and Motor Vehicle Safety Act of 1966, and the Motor Vehicle Information and Cost Savings Act.

The Act includes a number of motor vehicle safety rulemaking requirements and additional directions for rulemaking, including:

* Rollover protection for occupants of passenger cars, multipurpose passenger vehicles, and light trucks.

* Side impact protection for occupants of multipurpose passenger vehicles.

* Improved head impact protection (from interior components) for occupants of passenger cars.

* Air bag crash protection systems for drivers and right front passengers in new passenger cars and new light trucks (including light buses) and multipurpose passenger vehicles.

STATE AND COMMUNITY GRANTS -- 402 PROGRAM

The Act expands the list of uniform guidelines for the State and Community Highway Safety Grant Program under 23 USC 402, requiring the Secretary to issue guidelines for programs on: speed limits, occupant

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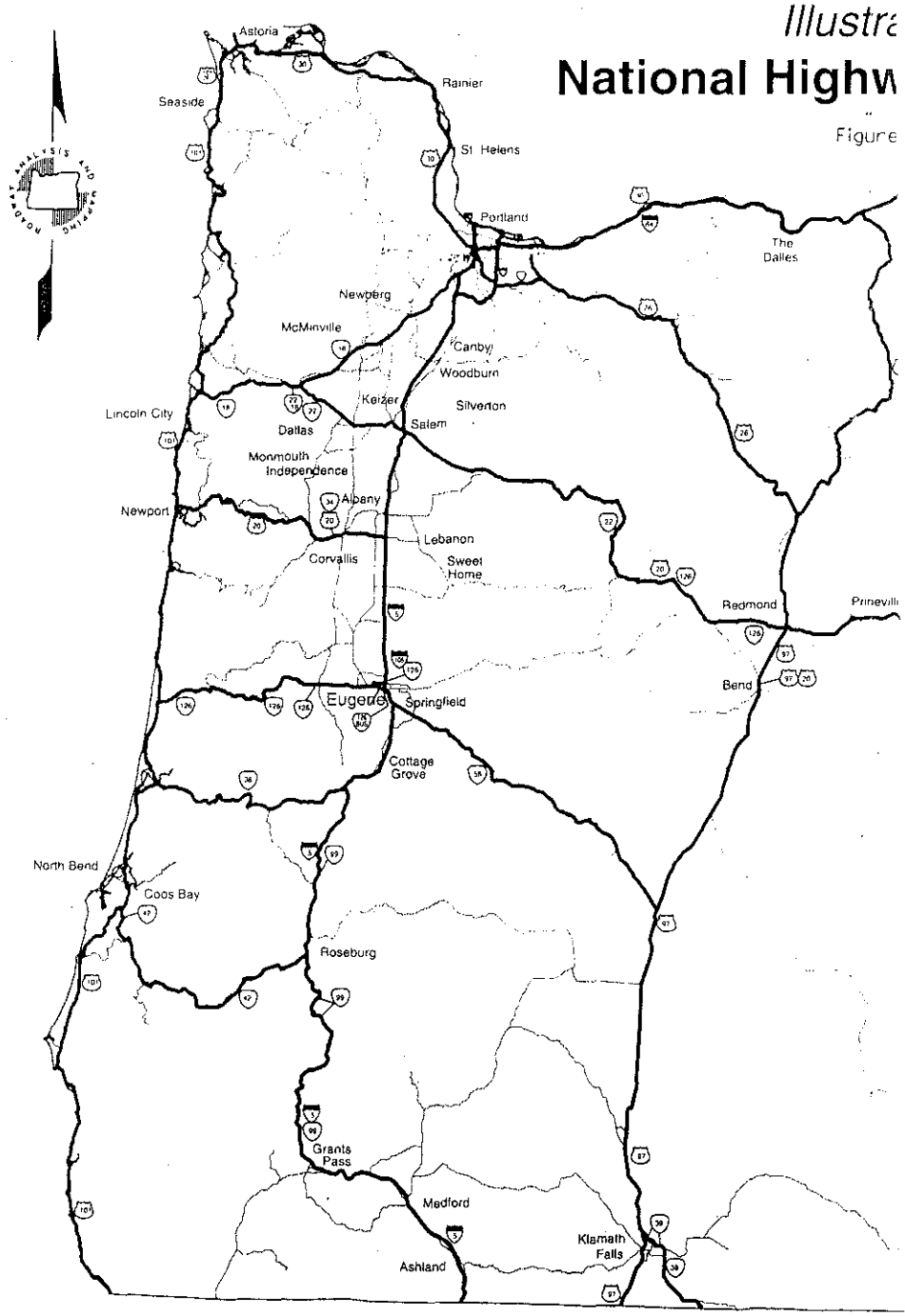

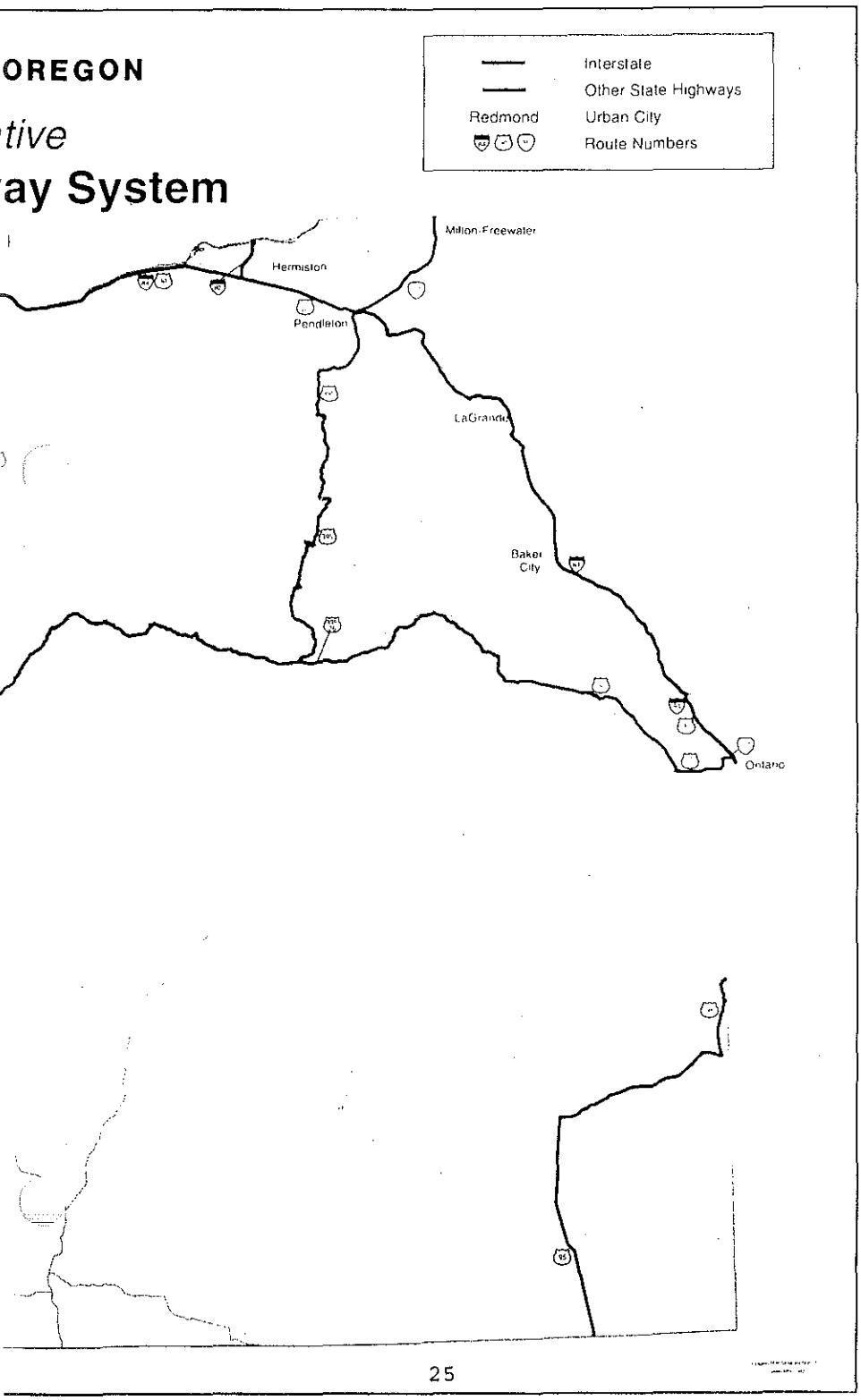
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protection, impaired driving, motorcycle safety, school buses, law enforcement services, and the collection and reporting of data on traffic-related deaths and injuries. Beginning in FY 1993, the amounts are made available out of Section 402 authorizations for specific purposes (Section 410 alcohol incentive grants; motorcycle helmet and safety belt use law grants; and the National Driver Register). Oregon's FY 1992 apportionment is nearly $237,000. While this represents about a 68% increase over FY 1992 funding, the obligation limitation included in the Act limits the amount available for projects to about $139,000.

SAFETY RESEARCH AND DEVELOPMENT -- 403 PROGRAM

Much of Section 403 is restated for clarity, but the substance of the program is not materially affected.

ALCOHOL-IMPAIRED DRIVING INCENTIVE GRANT -- 410 PROGRAM

The Act revises the existing Section 410 Alcohol-Impaired Driving Incentive Grant Program, making a new 6-year incentive program. Under this program the Secretary will make basic and supplemental grants to States that adopt and implement specific programs such as prompt suspension of the driver's license of impaired drivers and mandatory sentences for persons who drive while under the influence of alcohol or a controlled substance.

For FY 1992, $25 million is authorized, and in the next 5 years, $125 million is authorized from the sums made available for the Section 402 program.

DRUG RECOGNITION EXPERT TRAINING PROGRAM

A regional program is established to implement drug recognition programs and for training law enforcement officers to recognize and identify people operating a motor vehicle while impaired by alcohol, a controlled substance, or other drug.

NATIONAL DRIVER REGISTER ACT

The National Driver Register Act of 1982 is reauthorized without change in its provisions.

TITLE III

Federal Transit Act Amendments of 1991

The transit formula and discretionary programs requirements and program structure remain basically unchanged from previous law, but achieve such objectives as transit and highway funding flexibility and identical matching shares, rail modernization funding by formula, increased use of the trust fund, and an expanded research program. However, a number of programs, including planning and research, are now funded as percentage takedowns from the total amount of funding provided rather than as separate line items.

Reflecting the broader mandates of the transit program, the Urban Mass Transportation Administration, which generally administers these provisions, is renamed the Federal Transit Administration (FTA).

A total of $31.5 billion is authorized over the 6 year period of the Act. Of this amount $18.2 billion (58 percent) is to come from the Mass Transit Account of the Highway Trust Fund and is contract authority. The remaining $13.3 billion is authorization of appropriations from the general fund. The authorization table (Table 1) lists all the programs and funding by year.

TRANSIT FORMULA PROGRAMS

The formula grant programs, Sections 9, 16(b)(2), and 18, are authorized at a $17.4 billion level over the 6 years. During FY 1992, approximately $19 million is expected to be available for Oregon.

The Section 9 formula grant program makes funds available on the basis of a statutory formula to all urbanized areas in the country. The program is authorized at $16.1 billion for the 6 years. In FY 1992, approximately $13.6 million is earmarked for the Portland Oregon/Vancouver Washington area. In addition, Oregon will receive slightly over $3 million that is attributed to its other urbanized areas (Salem/Keizer, Eugene/Springfield, Medford/Central Point and, Longview/Kelso/Rainer). This $3 million will be administered as a single combined fund that will be distributed at the discretion of the Governor.

For the first time, Section 9 funds may be used for highway projects in "Transportation Management Areas" (all areas over 200,000 and any other areas which the Governor requests), if all needs related to the Americans with Disabilities Act are met, the MPO approves, and there is a balanced local approach to funding highways and transit.

The Section 18 program provides funds on the basis of a statutory formula to rural areas. The program is funded at $937 million for the 6 years. Its share is established at 5.5 percent of the total for Sections 9 and 18, up from 2.93 percent in previous law. A new requirement is that a State must use 5 percent of the funds it receives in FY 1992, 10 percent in FY 1993, and 15 percent in FY 1994 for intercity bus service projects, unless the State certifies that intercity bus needs have been met. **The amount of Section 18 funds available to Oregon in FY 1992 is about $1.6 million.**

The formula factors do not change. However, areas under 200,000 get a slightly larger share: 9.32 percent of the Section 9 amount, and larger areas receive 90.68 percent.

The Section 16(b)(2) program provides transportation services for elderly and disabled persons. The program authorization is established at 1.34 percent of the total program or $428 million. The current administrative practice to allocate these funds to the States is made statutory. The funds may go to private, non-profit organizations or to public bodies which coordinate service. Funds can continue to be used for capital costs or for capital costs of contracting for services. **Oregon's FY 1992 allocation is expected to be about $704,000.**

Operating assistance is continued as an eligible expense under Section 9. Operating assistance caps will be adjusted for inflation for all areas, not just those under 200,000 population as is the case in previous law.

SECTION 3 DISCRETIONARY AND FORMULA CAPITAL PROGRAM

The Section 3 program is authorized at $12.4 billion for the 6 years. Funds are split 40 percent for New Starts, 40 percent for Rail Modernization, and 20 percent for bus and other.

New Starts

Authorizations for new starts total $5.0 billion. New Starts projects must meet the criteria that they are:

1) Based on the results of alternatives analysis and preliminary engineering;

2) Justified based on mobility improvement, environmental benefit, cost effectiveness, and operating efficiency; and

3) Supported by an acceptable degree of local financial commitment.

Projects may not advance from alternative analysis to preliminary engineering, unless the project meets the requirements for projects justification and local financial commitment, and is considered likely to do so at the end of preliminary engineering.

The criteria are waived if:

1) The project is in an extreme or severe non-attainment area and the plan is on the State Implementation Plan,

2) The project requires less than $25 million in Section 3 funds,

3) The Federal share is less than one-third, or

4) The project is funded entirely with FHWA funds.

A substantial number of New Starts projects are earmarked in the bill.

Projects are to be funded using Letters of Intent and Full Funding Grant Agreements. The sum of outyear commitments may not exceed the amount authorized, although contingent commitments equal to one-half the uncommitted cash balance in the Mass Transit Account may be made.

Rail Modernization

Authorizations for the Section 3 Rail Modernization Funds, now called fixed guideway modernization, a total of $5 billion over the 6 years, are allocated by formula rather than on a discretionary basis as in previous law. The formula uses statutory percentages to allocate the first $492 million to the 11 historic rail cities. The next $70 million is allocated one-half to the historic rail cities and one-half to all cities with fixed guideways at least 7-years-old (and

any other fixed guideway city which can demonstrate rehabilitation needs), on the basis of the Section 9 Rail Tier formula factors. Any remaining funds are allocated to the same cities. **Oregon will not be eligible for fixed guideway modernization Section 3 funds in FY 1992.**

Bus and Other

Authorizations for bus and other projects total $2.5 billion.

At least 5-1/2 percent of Section 3 Bus funds must be used in non-urbanized areas.

MATCHING RATIO

The basic matching ratio for capital projects is 80 percent Federal, the same as for highway projects in the FHWA program. This is the same as previous law for Section 9, but is an increase from the present 75 percent for Section 3.

The matching ratio is 90 percent Federal for the incremental costs of bus-related equipment needed to meet the requirements for the Clean Air Act and Americans with Disabilities Act.

The matching ratio for operating assistance remains at 50 percent of net operating costs.

TRANSIT PLANNING AND RESEARCH PROGRAM

A new comprehensive transit planning and research program is funded as a 3 percent takedown of the total amount of funding provided. A total of $944 million is authorized over 6 years. This program combines the former Sections: 6 Research, 8 Planning, 10 Managerial Training, 11(a) University Research, 18(h) Rural Transportation Assistance Program (RTAP), and 20 Human Resources Programs. Of these funds, 45 percent is for Metropolitan Planning, 5 percent for RTAP, 10 percent will go to States for planning, research, and training, 10 percent for a new Transit Cooperative Research Program, and 30 percent for a National Planning and Research Program. **In FY 1992, Oregon can expect about $316,000 for Metropolitan Planning, $76,000 for RTAP and, $76,000 for state planning research and training.**

The National Planning and Research Program includes a transit technology development program, and establishes an Industry Technical Panel to assist in identification of priority technology development areas.

A new Transit Cooperative Research Program, modeled after the National Cooperative Highway Research Program, will conduct problem solving research for transit operators. The program will have an independent governing board and will be managed by the National Academy of Sciences.

The metropolitan planning provisions in this title basically parallel those in the highway title. Metropolitan planning funds are allocated to the States under a formula apportionment on behalf of MPO's. States will pass through these funds to MPO's based on a State formula cooperatively developed with MPO's and approved by the Secretary.

TITLE IV

Motor Carrier Act of 1991

Title IV of the Act relates to motor carriers. It reauthorizes the Motor Carrier Safety Assistance Program, establishes deadlines for States to participate in the International Registration Plan (IRP) and International Fuel Tax Agreement (IFTA), directs the Interstate Commerce Commission (ICC) to establish a new program for motor carriers with ICC operating authority to register with States, and imposes a freeze on State requirements and limitations on the operation of trucks with double or triple trailers that weigh more than 80,000 pounds.

MOTOR CARRIER SAFETY ASSISTANCE PROGRAM (MCSAP)

MCSAP funds State enforcement of Federal truck and bus safety requirements or compatible safety requirements. States also may use MCSAP funds to support drug interdiction, vehicle weight, and traffic enforcement. The Act authorizes a total of $479 million over six years. **Oregon's FY 1992 share is estimated to be about $982,000.**

STATE PARTICIPATION IN IRP AND IFTA

By September 30, 1996, States must join the International Registration Plan, a base-State agreement for the registration of trucks and buses operating in different States. Likewise, States must join the International Fuel Tax Agreement, a similar agreement for fuel taxes, by September 30, 1996. The Act Authorizes a total of $30 million for grants to States for technical assistance, training, and equipment associated with participation in IRP and IFTA. It also authorizes $6 million to fund a working group of State and local government officials which must report in 2 years with recommendations on improving IRP and IFTA.

SINGLE-STATE REGISTRATION

The Act eliminates the bingo stamp program associated with 39 States' requirements for interstate motor carriers to register their Interstate Commerce Commission operating authority. In its place, the ICC must establish a base-State system, whereby a motor carrier would register its ICC-operating authority

and provide proof of required liability insurance with one State, and that State will distribute the collected fees to other participating States in which the carrier's vehicles operate.

LONGER COMBINATION VEHICLES (LCV)

The Act limits the operation of double and triple trailer combinations with gross weights in excess of 80,000 pounds to the States in which they were operating on June 1, 1991, and prohibits the expansion of routes or the removal of operating restrictions on the National Truck Network after that date. States must submit information on LCV limitations and requirements to the FHWA within 60 days of enactment. The FHWA will publish an interim list of the requirements and limitations in the Federal Register within 90 days of enactment and a final list within 180 days. The FHWA also will study the operation and safety of longer combination vehicles.

TITLE V

Intermodal Transportation

The purpose of Title V is to promote intermodal transportation.

The focus of the intermodal effort will be a new Office of Intermodalism, established within the Office of the Secretary of Transportation. The office will develop, maintain, and disseminate intermodal transportation data, and coordinate Federal research on intermodal transportation.

The Secretary is authorized to make available $3 million in grants to States to develop model intermodal transportation plans. These plans must include systems for collecting data.

The Act establishes a National Commission on Intermodal Transportation to study the status of intermodal standardization, intermodal impacts on public works infrastructure, legal impediments to efficient intermodal transportation, financial issues, new technologies, problems in documenting intermodal transfers of freight, research and development needs, and the relationship of intermodal transportation to productivity. The report is due to Congress by September 30, 1993.

TITLE VI

Research

This title, covering transportation research, is divided into three parts:

Part A- Programs, Studies and Activities,
Part B- Intelligent Vehicle-Highway Systems Act, and
Part C- Advanced Transportation Systems and Electric Vehicles.

PART A - PROGRAMS, STUDIES, AND ACTIVITIES

Research and Technology

Substantial support is provided for enhanced research and development and the effective application of innovative technology to solve highway problems. An important provision related to this initiative is new authority for collaborative research and development with other public and private entities, with an average Federal share up to 50 percent of the activity costs.

The Act provides a total of $108 million to implement the products of the completed Strategic Highway Research Program and to continue the Long Term Pavement Performance Program.

To expand technology transfer activities, the Act provides authority to carry out a transportation assistance program to supply modern technology to highway and transportation agencies in rural areas and in urbanized areas of 50,000 to 1,000,000 population. Technology Transfer centers may be established for this purpose.

A new Applied Research and Technology Program is required to provide accelerated testing, evaluation, and implementation of technologies designed to improve the durability, efficiency, environmental impact, productivity, and safety of highway, transit, and intermodal transportation systems. Program guidelines from the Secretary are required within 18 months, and a total of $240 million is authorized with a Federal share of 80 percent.

The Act provides a strong focus on planning and guidance for the research and development agenda. The Secretary is to develop an integrated national plan for surface transportation research and development. Also, a

National Council on Surface Transportation Research, as well as a new Research Advisory Committee, are created. The Council will study: current surface transportation research and technology developments in the United States and abroad; identify gaps and duplication; and determine research areas which may increase efficiency, productivity, safety, and durability in the Nation's surface transportation systems.

The Committee will provide ongoing advice and recommendations to the Secretary regarding issues with respect to short-term and long-term surface transportation research and development.

International Highway Transportation Outreach Program

A new International Highway Transportation Outreach Program will provide for informing the U.S. highway community of foreign transportation innovations, promoting U.S. highway transportation expertise internationally, and increasing the transfers of U.S. highway transportation technology to foreign countries.

Bureau of Transportation Statistics

A Bureau of Transportation Statistics is created in the Department of Transportation to enhance data collection, analysis, and reporting, and to ensure the most cost-effective use of transportation monitoring resources. A total of $90 million is provided over the 6 years of the Act. The Bureau is to publish a Transportation Statistics Annual Report; the first report is due January 1, 1994.

National Transit Institute

A National Transit Institute is established to conduct training programs for all involved in Federal-aid transit work. Funding is $18 million over the 6 years of the authorization.

University Transportation Center/Research Institutes

Five new university transportation centers have been added to the University Transportation Centers (UTC) Program. These centers, as well as the original 10 UTC's are funded by both the FHWA and the FTA. **The Transportation Research Center serving Oregon is located at the University of Washington in Seattle.**

Also, five additional university research institutes are established. Funding is from the Highway Trust Fund, other than the Mass Transit Account, and is in the amount of $37.5 million over the 6-year period.

PART B - INTELLIGENT VEHICLE-HIGHWAY SYSTEMS ACT

An Intelligent Vehicle-Highway Systems (IVHS) Program is established, with approximately $660 million authorized for the 6-year authorization period.

The Act requires the promotion of compatible standards and protocols to promote widespread use of IVHS technologies, the establishment of evaluation guidelines for IVHS operational tests, and the establishment of an information clearinghouse.

A strategic plan must be submitted to Congress no later than 1 year after this Act is effective. The plan must include the goals, mile-stones, and objectives of the IVHS program.

The Act also requires development of a completely automated highway and vehicle system which will serve as the prototype for future fully automated IVHS systems. The goal is to have the first fully automated roadway or test track in operation by the end of 1997. An IVHS Corridors program is established to provide for operational tests under "real world" conditions. Corridors which meet certain transportation and environmental criteria can participate in developing and implementing IVHS technologies.

Other provisions relating to IVHS include authority to use advisory committees for carrying out the IVHS program and the availability of planning grants to State and local governments for studying the feasibility for development and implementation of IVHS.

PART C - ADVANCED TRANSPORTATION SYSTEMS AND ELECTRIC VEHICLES

A grant program is established for electrical vehicle and advanced transportation research and development. The grants will be awarded to at least three consortia that must provide services including obtaining funding for the acquisition of plant sites, conversion of plant facilities, and acquisition of equipment for the development or manufacture of advanced transportation systems or electric vehicles or other related systems or equipment, especially for environmentally benign and cost-effective manufacturing processes. The non-Federal share of the grants must be at least 50 percent.

TITLE VII

Air Transportation

This title concerns amendments to the Metropolitan Washington Airports Act of 1986.

TITLE VIII

Extension of Highway-Related Taxes and Highway Trust Fund

The Highway Trust Fund, which is the source of funding for most of the categories in Titles I, II, III, IV, and VI, is extended to the end of FY 1999. This means that highway-related user taxes, which were scheduled to expire at the end of FY 1995, have been extended 4 years. The tax rate on motor fuel will be reduced by 2.5 cents per gallon after September 30, 1995. The rate per gallon then will be 11.5 cents for gasoline and special fuels and 17.5 cents for highway diesel fuel.

The Mass Transit Account of the Highway Trust Fund will be credited with 1.5 cents per gallon of the motor-fuel taxes, with the remainder going to the Highway Account. This Act allows expenditures from the Mass Transit Account for "capital-related" as well as for "capital" purposes.

A National Recreational Trails Trust Fund is established to support the National Recreational Trails Funding Program. Monies transferred to this Trust Fund will be equivalent to 0.3 percent of total Highway Trust Fund receipts in the first year, and afterwards, to "nonhighway recreational fuel taxes." These taxes are from fuel purchased for use on recreational trails and in outdoor recreational equipment (e.g., camp stoves).

The National Highway Institute, which conducts training programs for Federal, State, and local highway employees, may now include training for employees of private agencies. The Institute also may now charge fees to users of its training programs as long as they do not exceed the costs of the services provided.

PROGRAM	1992	1993	1994	1995	1996	1997	Total
TITLE I							
Interstate Construction Program	1,800.00	1,800.00	1,800.00	1,800.00	0.00	0.00	7,200.00
Interstate Substitute Program	240.00	240.00	240.00	240.00	0.00	0.00	960.00
Interstate Maintenance Program	2,431.00	2,913.00	2,914.00	2,914.00	2,914.00	2,914.00	17,000.00
National Highway System	3,003.00	3,599.00	3,599.00	3,599.00	3,600.00	3,600.00	21,000.00
Surface Transportation Program	3,418.00	4,096.00	4,096.00	4,096.00	4,097.00	4,097.00	23,900.00
Congestion Mitigation and Air Quality Improvement Program	858.00	1,028.00	1,028.00	1,028.00	1,029.00	1,029.00	6,000.00
Bridge Program	2,288.00	2,762.00	2,762.00	2,762.00	2,763.00	2,763.00	16,100.00
Federal Lands Highway Programs:	371.00	445.00	445.00	445.00	447.00	447.00	2,600.00
Indian Reservation Roads	(159.00)	(191.00)	(191.00)	(191.00)	(191.00)	(191.00)	(1,114.00)
Public Lands Highways	(143.00)	(171.00)	(171.00)	(171.00)	(172.00)	(172.00)	(1,000.00)
Parkways and Park Highways	(69.00)	(83.00)	(83.00)	(83.00)	(84.00)	(84.00)	(486.00)
Donor State Bonus Amounts	429.00	514.00	514.00	514.00	514.00	515.00	3,000.00
Reimbursement for non-Federally aided Interstate Segments	0.00	0.00	0.00	0.00	2,000.00	2,000.00	4,000.00
Hold Harmless *	606.60	606.60	606.60	606.60	606.60	606.60	3,639.60
90% of Payment Adjustments *	0.00	83.00	83.00	83.00	83.00	83.00	415.00
Additional Allocation-Wisconsin	40.00	47.80	47.80	47.80	47.80	47.80	279.00
Highway Use Tax Evasion Projects	5.00	5.00	5.00	5.00	5.00	5.00	30.00
Highway Use Tax Evasion Projects-GF	2.50	2.50	2.50	2.50	2.50	2.50	15.00
Scenic Byways Program	1.00	3.00	4.00	14.00	14.00	14.00	50.00
Interim Scenic Byways Program	10.00	10.00	10.00	0.00	0.00	0.00	30.00
Ferry Boat and Facilities Construction	14.00	17.00	17.00	17.00	17.00	18.00	100.00
Emergency Relief	100.00	100.00	100.00	100.00	100.00	100.00	600.00
Arkansas Traffic Control Device	1.20	0.00	0.00	0.00	0.00	0.00	1.20
Minimum Allocation *	1,160.00	803.40	803.40	803.40	803.40	803.40	5,177.00

Projects:	542.62	1,225.46	1,158.85	1,100.52	1,100.52	1,100.52	6,228.49
High Cost Bridge Projects	(22.82)	(52.48)	(52.48)	(52.48)	(52.48)	(52.48)	(285.20)
Congestion Relief Projects	(39.20)	(90.17)	(90.17)	(90.17)	(90.17)	(90.17)	(490.04)
High Priority NHS Corridors	(94.65)	(270.99)	(204.38)	(204.38)	(204.38)	(204.38)	(1,183.16)
Rural Access Projects	(73.65)	(169.40)	(169.40)	(169.40)	(169.40)	(169.40)	(920.63)
Urban Access and Mobility Projects	(44.49)	(102.32)	(102.32)	(102.32)	(102.32)	(102.32)	(556.10)
Innovative Projects	(232.85)	(459.71)	(459.71)	(401.38)	(401.38)	(401.38)	(2,356.41)
Priority Intermodal Projects	(34.96)	(80.40)	(80.40)	(80.40)	(80.40)	(80.40)	(436.95)
High Priority NHS Corridor Studies	8.00	8.00	8.00	8.00	8.00	8.00	48.00
High Priority NHS Corridor Revolving Fund	0.00	40.00	40.00	40.00	40.00	40.00	200.00
Infrastructure Awareness Education Program	2.00	0.00	0.00	0.00	0.00	0.00	2.00
Safety Belts and Motorcycle Helmets	17.00 Continues as $24 million drawdown from Sec. 402 for 93-94.						17.00
Trauma Study	(5.00)	0.00	0.00	0.00	0.00	0.00	(5.00)
FHWA Highway Safety (402) Program	17.00	20.00	20.00	20.00	20.00	20.00	117.00
FHWA Highway R&D Safety (403) Program	10.00	10.00	10.00	10.00	10.00	10.00	60.00
National Magnetic Levitation Dev't.-TF	5.00	45.00	100.00	100.00	125.00	125.00	500.00
High-Speed Ground Transportation Dev't.-TF	0.00	5.00	5.00	5.00	5.00	5.00	25.00
National Magnetic Levitation Dev't.-GF	225.00	0.00	0.00	0.00	0.00	0.00	225.00
High-Speed Ground Transportation Dev't.-GF	25.00	0.00	0.00	0.00	0.00	0.00	25.00
High-Speed Ground Transportation Development R&D-GF	25.00	0.00	0.00	0.00	0.00	0.00	25.00
Railroad Relocation Demonstration Program-TF	10.00	10.00	10.00	0.00	0.00	0.00	30.00
Railroad Relocation Demonstration Program-GF	5.00	5.00	5.00	0.00	0.00	0.00	15.00
Private Sector Involvement Program-GF	5.00	5.00	5.00	5.00	5.00	5.00	30.00
Miscellaneous Highway Projects	987.20	0.00	0.00	0.00	0.00	0.00	987.20
Recreational Trails *	30.00	30.00	30.00	30.00	30.00	30.00	180.00
TITLE I TOTAL	18,692.12	20,478.76	20,469.15	20,395.82	20,386.82	20,388.82	120,811.49

* ESTIMATED AMOUNTS

TABLE 1 AUTHORIZATIONS (millions of dollars)

PROGRAM	1992	1993	1994	1995	1996	1997	TOTAL
TITLE II							
NHTSA Highway Safety (402) Program	126.00	171.00	171.00	171.00	171.00	171.00	981.00
NHTSA Highway R&D Safety (403) Program	44.00	44.00	44.00	44.00	44.00	44.00	264.00
Drug Recognition Expert Training Program	4.00	4.00	4.00	4.00	4.00	4.00	24.00
National Driver Register Act Authorizations	4.00 Continues as $4 million drawdown from Sec. 402 for 93 and 94.						4.00
Alcohol Traffic Safety Incentive Grants	25.00 Continues as $25 million drawdown from Sec. 402 for 93-97.						25.00
Traffic and Motor Vehicle Safety	68.72	71.33	74.04	76.86	0.00	0.00	290.95
Motor Vehicle Information and Cost Savings Programs	6.49	6.73	6.99	7.25	0.00	0.00	27.46
TITLE II TOTAL	278.21	297.06	300.03	303.11	219.00	219.00	1,616.40
TITLE III							
MASS TRANSIT							
Section 3 Discretionary and Formula	1,342.17	2,030.00	2,050.00	2,050.00	2,050.00	2,900.00	12,422.17
New Starts	(536.87)	(812.00)	(820.00)	(820.00)	(820.00	1,160.00)	(4,968.87)
Rail Modernization Formula	(536.87)	(812.00)	(820.00)	(820.00)	(820.00)	1,160.00)	(4,968.87)
Bus	(268.43)	(406.00)	(410.00)	(410.00)	(410.00)	(580.00)	(2,484.43)
Section 9 Formula Capital & Operating	1,822.76	2,604.14	2,642.57	2,642.57	2,642.57	3,741.02	16,095.64
Section 18 Rural	106.09	151.56	153.80	153.80	153.80	217.73	936.78
Interstate Transfer-Transit	160.00	164.84	0.00	0.00	0.00	0.00	324.84
Section 16(b)(2)	54.88	70.15	68.68	68.68	68.68	97.15	428.21
Transit Planning and Research	109.12	157.05	153.75	153.75	153.75	217.50	944.92
National	(39.51)	(45.62)	(44.62)	(44.62)	(44.62)	(63.75)	(282.75)
State	(8.96)	(14.96)	(14.62)	(14.62)	(14.62)	(21.00)	(88.79)
Cooperative	(8.96)	(14.96)	(14.62)	(14.62)	(14.62)	(21.00)	(88.79)
Sec. 8 MPO Planning	(43.69)	(70.67)	(69.19)	(69.19)	(69.19)	(97.88)	(419.80)
Rural Transit Assistance Program	(5.00)	(7.85)	(7.69)	(7.69)	(7.69)	(10.87)	(46.79)
National Transit Institute	(2.99)	(3.00)	(3.00)	(3.00)	(3.00)	(3.00)	(17.99)

University Transportation Centers	6.99	7.00	7.00	7.00	7.00	7.00	41.99
Program Administration	37.00	50.26	49.20	49.20	49.20	69.60	304.46
TITLE III TOTAL	3,639.01	5,235.00	5,125.00	5,125.00	5,125.00	7,250.00	31,499.01
TITLE IV							
MOTOR CARRIER SAFETY							
Motor Carrier Safety Grants Programs	65.00	76.00	80.00	83.00	85.00	90.00	479.00
Motor Carrier Safety Functions	49.32	0.00	0.00	0.00	0.00	0.00	49.32
Longer Combination Vehicles	1.00	1.00	1.00	0.00	0.00	0.00	3.00
Uniformity	6.00	Continues as $6 million drawdown from MCS Grants for 93-97.					6.00
TITLE IV TOTAL	121.32	77.00	81.00	83.00	85.00	90.00	537.32
TITLE VI							
RESEARCH							
Bureau of Transportation Statistics	5.00	10.00	15.00	15.00	20.00	25.00	90.00
Bus Testing	3.99	0.00	0.00	0.00	0.00	0.00	3.99
Howard Transportation Information Center	2.24	0.00	0.00	0.00	0.00	0.00	2.24
Nat'l, Center for Advanced Transportation Technology	2.50	3.00	2.50	0.00	0.00	0.00	8.00
University Transportation Centers	5.00	6.00	6.00	6.00	6.00	6.00	35.00
University Research Institutes	6.25	6.25	6.25	6.25	6.25	6.25	37.50
Intelligent Vehicle Highway Systems	94.00	113.00	113.00	113.00	113.00	113.00	659.00
TITLE VI TOTAL	118.98	138.25	142.75	140.25	145.25	150.25	835.73
TOTAL	22,849.63	26,226.07	26,117.93	26,047.18	25,961.07	28,098.07	155,299.96
Highway Trust Fund-Highway Account	17,805.91	20,903.01	20,901.93	20,833.07	20,831.07	20,843.07	122,118.03
Highway Trust Fund-Transit Account	1,900.00	2,875.00	2,975.00	2,875.00	2,775.00	4,800.00	18,200.00
General Funds	3,143.72	2,448.06	2,241.03	2,339.11	2,355.00	2,455.00	14,981.92

TABLE 2

FEDERAL SHARE AND AVAILABILITY
FOR SIGNIFICANT PROGRAMS

Program	Federal Share Percent	Availability Years
Interstate Construction	90	1
Interstate Substitution	85	2
Interstate Maintenance	90	4
National Highway System	80	4
Surface Transportation Program	80	4
Congestion Mitigation and Air Quality Program	80	4
Bridge Replacement and Rehabilitation Program	80	4
Federal Lands	100	4
Toll roads	50 - 80	N/A
Transit Capital Section 3	80	Until Expended
Section 9	80	4
Section 18	80	3
Section 16(b)(2)	80	1
Transit Operating	50	4
National Magnetic Levitation Prototype	75 - 90	Until Expended
National High-Speed Ground Transportation Technology Demonstration	80	Until Expended
Demonstration Projects	80	Until Expended
Highway Safety Programs	80	4
Motor Carrier Safety Assistance	80	Secretary-Until Expended; States - 2 years
IVHS Corridors Program	80	4

TABLE 3
OREGON FY 1992
APPORTIONMENTS AND ALLOCATIONS *

OREGON PROGRAM	1992 Amount
Interstate Construction Program *	$ 22,842,602
Interstate Substitute Program *	2,326,205
Interstate Maintenance Program *	34,446,722
National Highway System *	33,857,773
Surface Transportation Program *	33,438,070
Congestion Mitigation and Air Quality Improvement Program *	4,337,451
Bridge Program *	24,664,492
Federal Lands Highway Programs:	
Indian Reservation Roads	0
Public Lands Highway	12,444,777
Parkways and Park Highways	0
Donor State Bonus Amounts	6,812,553
Hold Harmless *	21,831,297
90% of Payment Adjustments	0
Scenic Byways Program	0
Minimum Allocation	1,257,963
Special Projects:	
High Cost Bridge Project: Eugene,Ferry St.	1,837,501
Congestion Relief Project	0
High Priority NHS Corridors	0
Rural Access Projects	0
Urban Access & Mobility	0
Innovative Projects: Salem Bypass, I-5	465,190
Priority Intermodal Projects:	
Portland, Columbia Slough Bridge	162,817
Portland, US 26 Highway Lanes / Light Rail Alignment	1,100,950
FHWA Highway Safety (402)	236,742
Subtotal:	$ 202,063,105
Metropolitan Planning	985,955
Highway Planning & Research	3,627,436
TITLE I TOTAL:	$ 206,676,496

* Reflects 2% HPR "Takedowns"

TABLE 4
OREGON
SURFACE TRANSPORTATION PROGRAM
FUNDING LIMITATIONS
FY 1992

LIMITATIONS	FUNDS			
	* STP/ Hold Harmless	Donor State Bonus	Minimum Allocation	TOTALS
Safety	$4,435,371	$0	$0	$4,435,371
RR Protection	($1,064,939)	$0	$0	($1,064,939)
RR Hazard Elimination	($1,064,938)	$0	$0	($1,064,938)
Highway Hazard Elimination	($2,305,494)	$0	$0	($2,305,494)
Transportation Enhancement	$4,435,371	$0	$0	$4,435,371
Portland	$7,838,860	$752,510	$138,953	$8,730,323
Areas Outside Portland	$3,380,306	$1,376,412	$254,160	$5,010,878
Non-Urban Areas < 5000 Pop.	$10,957,694	$0	$0	$10,957,694
Any Area Statewide	$24,221,765	$4,683,631	$864,850	$29,770,246
TOTALS	$55,269,367	$6,812,553	$1,257,963	$63,339,883

* Reflects 2% HPR "Takedowns" DOES NOT REFLECT OBLIGATION LIMITATION

U.S. Department of
Transportation

FHWA-PL-92-008
HPP-24/12-91 (5M)E
HPP-24/R 12/91 (50M)E

REVISED FOR OREGON BY THE
FHWA OREGON DIVISION 2/18/92

FORWARD OREGON

ROADS IN A NEW CONTEXT

1993 OREGON ROADS FINANCE STUDY

OREGON DEPARTMENT OF TRANSPORTATION
ASSOCIATION OF OREGON COUNTIES
LEAGUE OF OREGON CITIES

EXECUTIVE SUMMARY

JANUARY 1993

Distribution of Trust Fund Revenues

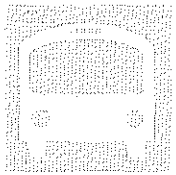
Distribution of revenues from the Oregon Highway Trust Fund is designed to equitably fund high priority needs among State, county, and city governments through a three-way percentage split: 60 percent to the state, 24 percent to the counties, and 16 percent to the cities. If revenues should fall below levels needed to meet high-priority needs, all jurisdictional levels will share shortfalls proportionate to their share of trust fund revenues.

Study participants recommend continued distribution of the trust fund split the next four years according to the distribution formula now in effect. This formula assumes use of Surface Transportation Program funds for transit, and development of a cooperative statewide bridge funding increase. When the current federal funding legislation expires or is extended, the split should be re-evaluated.

Funding of All Transportation Modes

The hallmark of the 1993 Oregon Roads Finance Study is that it calls for fully meeting the high-priority needs of all transportation modes over 20 years. This comprehensive approach includes roads, transit, intercity bus and rail, marine/rail access, and aviation across Oregon.

New revenues for these needs total approximately $2.5 billion in the first six years, including $1.4 billion to be applied to the road system. Recommended funding over 20 years will yield $27 billion in net new revenues, including $19.2 billion for roads. This approach to funding transportation needs as a system of complementary modes will help Oregon meet its objectives for quality of life and economic growth.



ROADS IN A NEW CONTEXT

Despite recent signs of improvement, Oregon's road system — its largest capital investment — is at risk.

Nearly one-third of Oregon's road miles are in poor condition, and 785 of its bridges need structural repair. Traffic exceeds capacity on many urban and rural roads, and vehicle miles traveled are increasing at a faster rate than increases in population or employment warrant. Inflation threatens to overwhelm static revenue sources. The long-term outlook for roads, under current funding authorizations, is bleak. In recent years the State of Oregon and county and city governments have begun to reduce an extensive backlog of needed road and bridge improvements deferred due to inadequate funding resources. In particular, road user fees authorized by the Legislature since 1985 have reduced the backlog in both urban and rural areas, on all functional classifications of roads, and at all jurisdictional levels.

Expanding, Unmet Needs

Nevertheless, the unmet needs of Oregon's roads and bridges are still extensive, and these needs continue to multiply as the road system ages and bears the traffic of a growing population and economy. At the same time, the revenue sources established to pay for improvements remain fixed, unable to increase automatically with inflation. Existing authorizations for road revenues cannot keep pace with the road system's ongoing needs in maintenance, repair, and improvements to relieve traffic congestion.

Amid the Problem, an Opportunity

Despite these concerns, Oregon has a timely opportunity to make its roads and the companion elements of its transportation network high performing assets. Oregon has a clear vision of its transportation future and the role of roads as a critical component in maintaining the state's economic progress and livability. Oregon has demonstrated its willingness to meet that vision. The Legislature has consistently made high priority transportation investments. State and local agencies have taken steps to manage the travel demand that threatens to overwhelm Oregon's urban roads and draw away resources needed for all of Oregon's road system. Transportation agencies and interested parties have formed new partnerships to develop Oregon's first statewide blueprint for transportation, the Oregon Transportation Plan. In the same spirit, State, county, and city governments, have joined together to produce the 1993 Oregon Roads Finance Study.

The Study and Other Transportation Planning Efforts

The Oregon Roads Finance Study was conducted in the context of Oregon's broader transportation system needs. It was coordinated with and influenced by such major planning efforts as:

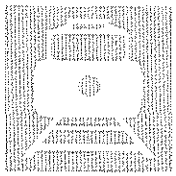
The **Oregon Transportation Plan,** which presents transportation needs and funding across all modes and systems.

The **Governor's Task Force on Motor Vehicle Emission Reductions,** which recommends ways to reduce vehicle emissions.

The **Cost Responsibility Study,** which has determined new recommended allocations of cost responsibility for vehicle types.

The Land Conservation and Development Commission's **Transportation Planning Rule,** which implements Goal 12. This rule provides the foundation for aggressive reductions in per capita vehicle miles traveled.

Oregon Benchmarks, which sets objectives to help Oregon become a state of exceptional people and an exceptional quality of life.



Availability of proposed new revenues to all transportation modes, including roads, transit, intercity bus and rail, marine/rail access, and aviation. This would total approximately $2.5 billion in the first six years and $27 billion over 20 years, as identified in the Oregon Transportation Plan.

Additional Steps

Study participants support a number of additional steps that can be taken to address Oregon's road needs:

The flexible use of federal Surface Transportation Program (STP) funds should be maximized. To achieve this objective, the study recommends transferring a portion of STP monies to meet transit capital needs across the state. The revenue loss to roads will be repaid or "backfilled" by a commensurate allocation of new statewide revenues.

Oregon should pursue the development of a cooperative, interjurisdictional bridge program. The Oregon Department of Transportation and local governments have made a start by fashioning a bridge rehabilitation and replacement program using federal bridge funds and new Oregon Highway Trust Fund monies.

Congestion pricing should be tried as a mechanism to manage demand on Oregon's most congested roads. Portland area governments propose to introduce congestion pricing pilot programs. The pilots should indicate whether congestion pricing can curb demand in VMT per capita and meet other state and local objectives, such as cleaner air.

To meet 20-year priority road needs, additional new revenue sources will be needed. Study participants plan to continue exploring alternative funding sources, including increased use of local transportation access fees, transportation-related excise fees, and other mechanisms.

Funding of Other Modes

To meet VMT growth reductions underlying the study's needs analysis, and to achieve goals for livability and economic advantage, Oregon must make a major investment in transit infrastructure and operations. In particular, it should strive to achieve:

Submission of a constitutional amendment to the voters in May 1994 to permit vehicle emission fee revenues to be used for transit purposes.

Enabling legislation allowing local emission fees.

Application of a portion of the increased ISTEA funds and the new "flexible" federal transportation funds to transit—effective with the collection of additional gas tax revenues. This shift would not occur unless sufficient revenue increases are made in the Oregon Highway Trust Fund to support it.

A change in the transit payroll tax authorities to permit "downstate" transit providers access to the payroll tax by governing body action. This authority is intended to provide revenues to supplant property tax bases that are shrinking as a result of Measure 5.

A $4 million legislative appropriation to help certain transit agencies with operational costs during the next biennium.

A tire and battery tax applied to transit operating expenses.

Earmarking of lottery revenues to be used for economic development transit projects after deductions for marine and rail needs.

THE OREGON ROADS FINANCE STUDY

The 1993 Oregon Roads Finance Study is a major analysis of long-term needs, revenue adequacy, and funding alternatives to preserve our road infrastructure. The study, which builds on a similar assessment in 1986, was jointly sponsored by the Oregon Department of Transportation, the Association of Oregon Counties, and the League of Oregon Cities.

Road Study Principles

The study is based on several principles:

Road priorities. Setting priorities for road system needs and funding is critical in a time of limited resources. Oregon's priorities are to fund road system preservation, safety, and improvements that selectively expand capacity.

Support for alternative transportation modes. Statewide support for other transportation modes must be increased if the benefits of a good road system are to be achieved. The recommended road system funding program is part of a broader plan to ensure adequate financing of a statewide, interconnected transportation system over the next 20 years. The study also endorses new funding for public transit, aviation, rail, and marine systems identified in the Oregon Transportation Plan.

Funding flexibility. Funding flexibility must be expanded to create new sources for funding roads and other transportation modes, and to capitalize on the benefits of new federal legislation. The recommended funding program asks the Legislature to expand the use of road sources and to authorize new sources to create greater funding flexibility.

VMT growth reduction. Vehicle miles traveled (VMT) in Oregon must be reduced to curtail the impact of growth and development on the road system, to allow better use of land, and to help achieve state goals for livability and economic advancement.

Technology application. Oregon must stay abreast of and, where appropriate, apply improvements in transportation technology. These might include information systems which alert drivers immediately to traffic conditions and alternate routes, and automatic vehicle identification systems which allow efficient use of pricing mechanisms to reduce growth of vehicle miles traveled.

Road Needs and Travel Growth Reductions

As measured in vehicle miles traveled, the people of Oregon are traveling more miles per person. This increase all too often results in:

- High road costs due to pavement deterioration and need to expand capacity to handle more traffic.
- Poor economic performance due to increased congestion, lower operating speeds, and lost productivity due to time spent in slow traffic.
- Excessive air emissions from vehicles traveling at slower speeds and operating for longer time periods.
- Greater fuel consumption attributable to slower speeds on congested roads, and less efficient travel by single occupancy vehicles.

The quality of Oregon roads — and Oregon's ability to fund its roads — will depend on aggressive, comprehensive reduction of VMT growth, especially in the largest urban areas. VMT growth reduction efforts might include congestion pricing, stronger land use controls, alternate travel investments, better traffic information systems, and expanded transit.

Proposed Action	Jurisdictions Benefiting	Recommended Year Effective	Expanded/New Authority
4 cents increase per gallon in each of next 4 years in motor vehicle fuel taxes	All	1/1/94	Expanded
Increases in weight/mile tax	All	Based on Cost Responsibility Study Findings	Expanded
$15 increase in motor vehicle registration fee	All	1/1/95	Expanded
Increased share of lottery money for economic development projects	All	1/1/94	Expanded
$200 transportation access fee	All	1/1/94	New
Registration fee per bicycle purchased	All	1/1/94	New
A repeal of the ethanol-blended fuel tax exemption	All	1/1/94	New
Fee per studded snow tire purchased	All	1/1/94	New

Exhibit 5
ROAD FUNDING RECOMMENDATIONS
Oregon's road needs can be funded the next six years with a blend of traditional and new revenue sources.

Expanded Use of Local Road Funding Sources

Cities and counties have a variety of local needs which are best funded by local sources. Local governments are urged to act on existing authority and meet local road needs and other transportation requirements by approving:

An additional local-option motor vehicle fuel tax of 2 cents per gallon in the eight most populous counties.

Additional local-option motor vehicle registration fees of $15 in the eight most populous counties.

imbalances between revenues and road needs. The Oregon Department of Transportation will need additional bonding authority for this purpose.

Authorization of New Road-Related Funding Sources

Action on new funding sources is also requested of the Oregon Legislature to meet the projected funding shortfall for roads, and to make full use of the flexibility under new federal transportation legislation:

A first-time transportation access fee to fund growth-related road needs. The fee, which would start at $200 and increase $5 per year, would apply to each net addition to the motor vehicle fleet in Oregon.

Repeal of the ethanol-blended-fuel tax exemption.

A purchase fee on each studded snow tire to defray the cost of repairing damage caused by these tires.

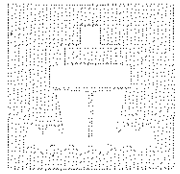
A one-time registration fee on each new bicycle purchased. The fee would help fund bikeways and connecting paths.

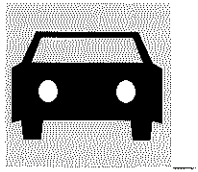
Additional access to lottery funds: The Oregon Department of Transportation, counties, and cities request an increase in lottery monies earmarked for roads through the Special Public Works Fund Program of the Oregon State Lottery. The additional funds would be used for road projects — including rail and port facility expansions tied to road use — that have clear economic development and job creation benefits.

Two Road System Futures

The funding program recommended in the study presents Oregonians with a clear choice of futures as they enter the 21st Century. In one future, Oregonians move themselves to work and move their products to market on good, safe roads reasonably free of congestion. They enjoy a higher quality of life, economic advantages, and better access to employment with a road system in sound condition. In this future, they also have greater choices in getting around. A well-maintained road system, interconnected closely with other transportation modes, functions smoothly in support of public transit within metropolitan areas and between towns and cities throughout the state. Adequate access for people and goods to airports, rail, and marine transportation is assured.

In the other future, if a sound funding program is not established, Oregonians are headed for a detour through jarring transportation conditions that will look and feel increasingly like those faced today in Puget Sound or Southern California. In this future, a worn, sometimes unsafe, and generally congested road system diminishes Oregonians' quality of life and economic competitiveness.





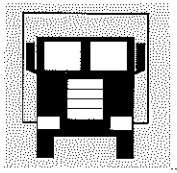
WHAT THE STUDY FINDS

Significant Road System Needs

Oregon's total road and bridge needs in the next 20 years are estimated at $48.8 billion in 1991 constant dollars ($79.4 billion in inflated dollars). This includes all current backlog needs and all projected needs through 2012 for the preservation, improvement, and operation of Oregon's 41,370 miles of road and 6,938 bridges.

A principal factor underlying the total road needs projection is the assumption that vehicle miles traveled will continue to grow at the current yearly rate of 3.4 percent. In its Transportation Planning Rule, which implements Goal 12, the Land Conservation and Development Commission has called for reducing VMT growth to 1.9 percent per year. Such restriction of VMT growth would lower road system needs to $37.3 billion in constant dollars (see Exhibit 1). Road system funding requirements can be further reduced by meeting only those needs which have a very high priority. High-priority needs over the next 20 years amount to $26.3 billion in 1991 constant dollars ($42.9 billion in inflated dollars). High-priority needs are defined as those necessary to preserve Oregon's substantial investment in road infrastructure, allow key safety improvements, and implement critical expansion projects.

Meeting current backlog needs—work set aside because of inadequate funds—is a significant part of Oregon's priority road improvements. Although existing backlog deficiencies have been reduced from 13,463 road miles in 1986 to 10,420 road miles in 1993, the remaining mileage comprises nearly a third of Oregon's high-priority 20-year road needs.
There are good reasons to meet the backlog needs of roads



THE RECOMMENDED SOLUTION

A program of early action by the State and by local governments is recommended to lay the foundation for meeting Oregon's road needs over the next 20 years. This program includes new funding authorities for roads and related transportation modes (see Exhibit 5), changes in allocating road system monies, and a commitment to periodic increases in road revenues over the long term.

Six-Year Funding Program

Six-year funding recommendations focus on existing revenue sources and new funding flexibility in the short term. Immediate actions are those which are already implementable and supportable; revenue sources which require new support and collection systems are phased in over time. These are the recommendations:

Traditional Funding Sources

A 4-cent per gallon increase each year over four years in the state motor vehicle fuel tax beginning January 1, 1994.

A commensurate increase in the weight/mile tax based on updated cost responsibility study findings.

A $15 increase in the annual motor vehicle registration fee beginning in 1995.

Use of short-term debt financing mechanisms available to the State and to local governments to correct cash flow

Conversely, paved roads with adequate lane width allow operating cost savings compared with narrow or unpaved highways. Increasing road funding to recommended levels would save every Oregon driver an average of 75 gallons of gasoline per year for the same miles of travel, compared to current funding.

There are other reasons, too, for acting promptly.

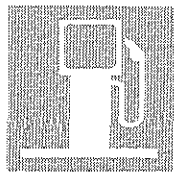
Needed road repair and enhancement will save each Oregonian an average 38 hours per year in driving time and $332 in reduced annual operating costs for vehicle fuel and maintenance (see Exhibit 4).

Better roads upgrade the entire state transportation system and the economy that depends on it.

Meeting priority road needs identified in the study will reduce pollutants from vehicles caught in traffic congestion by 92 million pounds per year, or 14 percent.

More efficient movement of traffic reduces consumption of energy in the form of vehicle fuel.

In short, improvements to roads and bridges result in lower vehicle operating costs and fewer delays. If Oregon funds just the additional high-priority needs of $19.2 billion, users will save more than $29.2 billion in vehicle operating costs and time savings (in inflated dollars) over the next 20 years.



and bridges. One is to avoid the higher vehicle operating costs and increased travel time caused by deficient roads. Another is to avoid the much higher costs of road repairs deferred to the point of road failure. Such work can cost four to five times more than timely repairs.

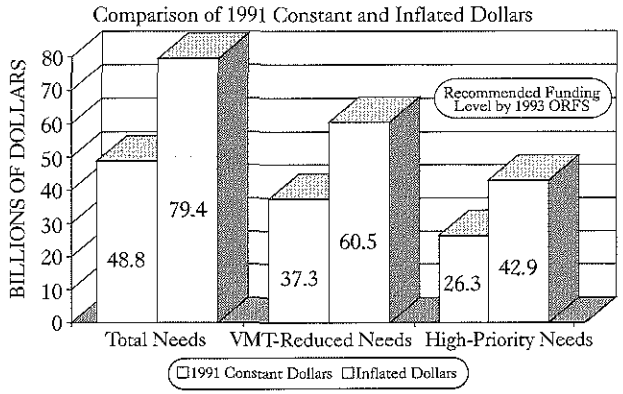


Exhibit 1
20-YEAR ROAD NEEDS UNDER DIFFERENT ASSUMPTIONS
This shows total road system needs, needs with VMT growth reductions, needs furtherreduced to high priority projects only.

Projected Revenue Shortfall

Oregon's road revenues are expected to total $23.7 billion in inflated dollars over the coming 20 years, based on currently authorized sources. This compares to high-priority needs of $42.9 billion in inflated dollars, producing a revenue shortfall of $19.2 billion. The shortfall involves all levels of state and local government throughout Oregon (see Exhibit 2), leaving Oregon unable to maintain and preserve its existing road and bridge system, and unable to expand service levels on other transportation modes in pursuit of LCDC's Transportation Planning Rule.

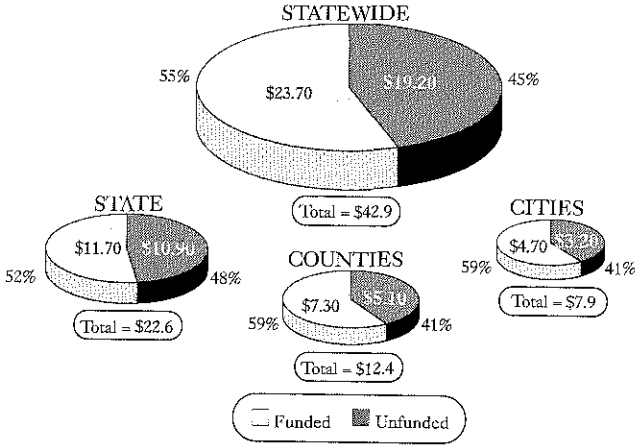


Exhibit 2

CURRENT REVENUES FOR HIGH PRIORITY ROAD NEEDS

More than 40 percent of Oregon's priority road needs are presently unfunded.

Oregon is a national leader in the application of user fees as a primary source of road system funding. Motor fuel taxes, weight distance charges, and vehicle registration fees have the virtue of charging road costs primarily to those who benefit directly from road usage. However, Oregon's usage fees have the drawback of being static: they do not grow automatically with inflation.

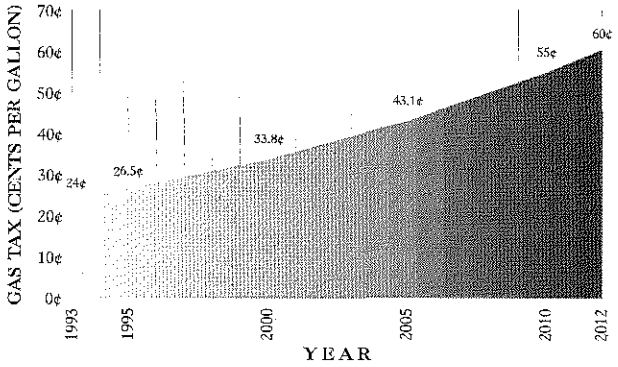


Exhibit 3

IMPACT OF INFLATION ON ROAD FUNDING NEEDS

Just a 5 percent annual inflation rate through 2012 would call for a fuel tax increase eventually rising to 60 cents per gallon.

The impact of inflation is significant, even when inflation rates are low. For example, Oregon's current fuel tax rate of 24 cents per gallon would have to be increased to 60 cents over 20 years just to keep pace with 5 percent inflation (see Exhibit 3).

Unlike states that have indexed road user fees and taxes to fuel prices and vehicle values that rise with inflation, Oregon must periodically raise its flat user fees to keep up with costs. To do that, the State Legislature has examined road performance, needs, funding, and cost increases every biennium, and then determined appropriate fee increases. This approach has the benefit of keeping pace with inflation while giving both road users and lawmakers an opportunity to assess road investment performance. The Oregon Roads Finance Study is part of this evaluation process.

Benefits of Acting Now

There are compelling reasons for Oregon to act swiftly on its road funding needs. Vehicles consume more fuel, wear out tires at a faster rate, and suffer more wear and tear as highways become more crowded and as pavements decline in quality.

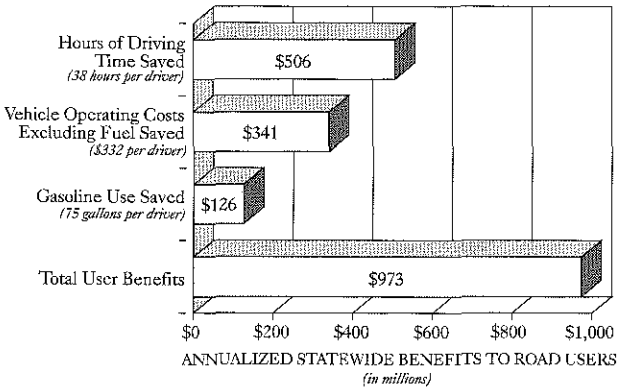


Exhibit 4

ADDED BENEFITS OF GOOD ROADS

Road upkeep translates into tangible time and cost savings to drivers in Oregon.

Printed 1/93

OREGON TRANSPORTATION PLAN

Adopted by the Oregon Transportation Commission
September 15, 1992

SUMMARY

OREGON DEPARTMENT OF TRANSPORTATION
STRATEGIC PLANNING SECTION

coordination and cooperation will be needed to carry out other measures.

According to preliminary estimates, implementation of the Preferred Plan will require an additional $12 billion in funding over the next 20 years, including local, state and federal commitments. Although 57 percent of the additional dollars will go to roads, streets and highways, the investment strategy calls for major new investments in railroads, marine ports, aviation, intercity bus and transit.

The financing program for the plan is still being formulated. The Transportation Commission plans to recommend a specific financing program to the 1993 Legislature by December 31, 1992.

This project was funded in part by the Federal Highway Administration, U.S. D.O.T.

To obtain copies of the Oregon Transportation Plan, contact:

OREGON DEPARTMENT OF TRANSPORTATION
STRATEGIC PLANNING SECTION
Room 405, Transportation Building
Salem, OR 97310

Phone: (503) 373-7571
FAX: (503) 373-7194

LONG-RANGE POSSIBILITIES

The long-range transportation possibilities worthy of discussion, but are either too far in the future or too uncertain to be included in this plan in a meaningful way, include:

- High-speed rail service in the Willamette Valley with connections to Seattle;
- A Willamette Valley/Columbia Gorge interurban rail service, which could be a way of serving commuter travel needs on the west side of the Willamette Valley and in the Columbia Gorge;
- A Klamath Falls intermodal air freight hub;
- A new international airport in the Willamette Valley, which may be needed if Portland International Airport reaches capacity;
- Passenger rail service from the Rogue Valley to California and later to Eugene as improved technologies are developed.

The Preferred Plan

The OTP Steering Committee selected the Livability Approach as the Preferred Plan for adoption.

In addition to the minimum levels of service and specific improvements listed above, the Preferred Plan includes provisions for system management, land use coordination, identification of facilities and systems serving statewide and interstate functions, and implementation and investment strategies.

The Preferred Plan emphasizes more intensive management of the existing transportation system. It encourages the use of fees and management techniques to reduce single occupant vehicle travel, alleviate congestion and promote shifts to more efficient and environmentally responsible modes of transportation.

The plan requires coordination of land use and transportation. It assumes urban growth boundaries will be maintained and land use and transportation actions will support each other.

The OTP will be implemented through integrated state, regional and local planning and private sector actions. ODOT multimodal and modal plans and system management will carry out or amplify the OTP and must be consistent with it. The Transportation Planning Rule calls for the transportation system plans of metropolitan planning organizations (MPOs), counties and cities to be consistent with the adopted elements of the OTP. Public and private transportation

PREFACE

The **Oregon Transportation Plan (OTP)** is intended to meet the requirements of ORS 184.618(1):

> *As its primary duty, the [Transportation] Commission shall develop and maintain a state transportation policy and a comprehensive, long-range plan for a multimodal transportation system for the state which encompasses economic efficiency, orderly economic development, safety and environmental quality. The plan shall include, but not be limited to aviation, highways, mass transit, pipelines, ports, rails and waterways. The plan shall be used by all agencies and officers to guide and coordinate transportation activities and to ensure transportation planning utilizes the potential of all existing and developing modes of transportation.*

The OTP also meets the requirements of the State Agency Coordination Program and the Land Conservation and Development Commission (LCDC) Goal 12: Transportation Planning Rule regarding the system plan. It carries out the federal Intermodal Surface Transportation Efficiency Act requirements for a state transportation plan.

The first part of the plan, the **Policy Element**, defines goals, policies and actions for the state over the next 40 years. It gives direction to the coordination of transportation modes; the relationship of transportation to land use, economic development, the environment and energy use; the coordination of transportation with federal, state, regional and local plans; transportation financing; transportation safety and related matters.

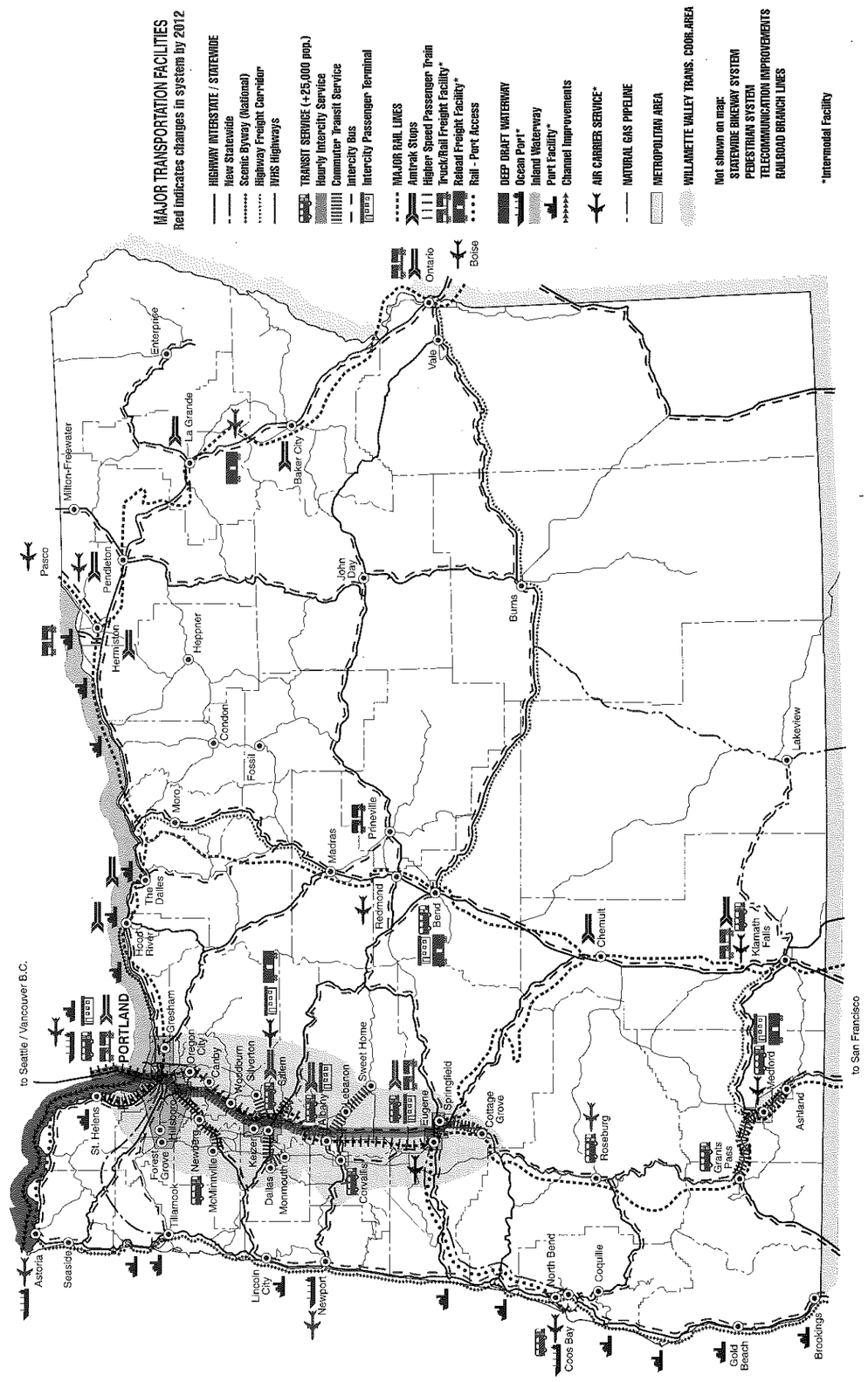
The **System Element**, the second part, identifies a coordinated multimodal transportation system, a network of facilities and services for air, rail, highways, public transit, pipeline, waterways, marine transportation, bikeways and other modes to be developed over the next 20 years in order to implement the goals and policies of the plan. The System Element includes an inventory of existing facilities and services, a base forecast of transportation demands, identification of corridors and transportation facilities of statewide significance, a description of minimum levels of service, and an implementation strategy. This document summarizes the data that form the basis of the System Element; the Multimodal System Element Technical Report contains the basic data.

Five advisory committees involving over 70 citizens participated in developing the goals and policies. The public reviewed this Policy Element in November and December 1991. The OTP Steering Committee, made up of members of the Oregon Transportation

Commission, state legislators and representatives of local governments, has guided the development of the System Element. After examining four alternative approaches to providing transportation facilities and services, the committee chose a preferred system. The committee distributed a draft of the System Element for public review in late spring 1992. This review included 23 public meetings throughout the state, meetings with local governments and business and civic organizations and written testimony.

The Oregon Transportation Commission held a public hearing on August 25 in Bend, and, at its September 15, 1992 meeting, adopted the OTP, including both the Policy and System Elements. Changes in transportation policies, financing and other legislation required for implementation of the plan will be introduced to the 1993 Legislature.

OREGON TRANSPORTATION PLAN
TRANSPORTATION SYSTEM BY YEAR 2012



- High occupancy vehicle (HOV) lanes and peak period congestion pricing established on freeways and arterials in metropolitan areas;

- Intelligent Vehicle Highway System (IVHS) networks in metropolitan areas and on I-5 and I-84;

- Walking and bicycle trips at double the present rate, and transit at double the base case forecast in metro areas;

- Intercity bus or commuter bus service available to cities of over 2,500 population;

- Urban transit service available in communities over 25,000 population;

- Intermodal passenger terminals established in Portland, Salem, Albany/Corvallis, Eugene, Medford and Bend/Redmond;

- Enhanced rural commercial air service, particularly to the Baker City and La Grande area;

- Expanded air freight handling capability at all commercial airports;

- International port improvements and maintained rail service on the lower Columbia River and Coos Bay;

- Improved intermodal truck/rail freight hub facilities in Portland, Eugene, Klamath Falls, Umatilla/Boardman and in Idaho near Ontario. Truck/rail freight reload hubs established in Medford, Bend, Salem, Baker City/La Grande;

- Additional major highway freight corridors on non-Access Oregon Highways;

- Additions to the statewide functional highway system;

- Natural gas pipelines extended to Coos Bay/North Bend and Tillamook to make alternative transportation fuel available. Improved pipelines to regions lacking adequate service to help industrial development;

- Full implementation of the LCDC Transportation Rule;

- Establishment of a Willamette Valley Transportation System Coordination Area.

SUMMARY

INTRODUCTION

Oregon's transportation system continues to be crucial to the state's livability and development. Opportunities and challenges facing the state require a strong and efficient transportation system to serve the needs of commerce and personal mobility.

Oregon's population is expected to grow faster than the nation's for most of the next 40 years. According to forecasts by the Oregon Department of Transportation (ODOT), Oregon's population is projected to increase from 2.8 million in 1990 to 3.8 million in 2012. After that, Oregon's growth rate will slow, reflecting national trends. Most of this growth is projected to take place in the Willamette Valley, especially in its suburban areas; the Valley's population densities will approach those of more urban states.

At the same time, growth pockets on the coast and in central and southern Oregon, especially in the Medford metropolitan area, will lead growth outside of the Willamette Valley. The population in eastern Oregon will also increase.

Increased demands for transportation services will be most prevalent in the fastest growing areas of the state. These areas will be concerned with air quality and energy conservation. New forms of land development will be required to avoid the type of urban sprawl that has reduced the livability of many American cities and limited opportunities for public transit, bicycling and walking.

As the state's economy develops more diversity, high-value manufacturing and services will be important industries along with wood products, agriculture and tourism. Links to international and national markets must be developed and improved in order to take advantage of the new economic trends.

Rural areas will increasingly need access to services and markets. Links between rural and urban areas must be maintained and enhanced in order to serve both areas and the economy of regions outside the Willamette Valley.

New technology should help make travel more efficient. Intelligent Vehicle Highway Systems (IVHS) will allow traffic to flow more efficiently, while high-speed rail offers the potential to divert trips from air. But the state also needs to improve linkages between transportation and land use so that each supports the other.

In anticipation of these challenges, Oregonians have set bold new directions for the state's future transportation system through the Oregon Benchmarks, the Land Conservation and Development Commission's (LCDC) Transportation Planning Rule, and the goals and policies developed in the Oregon Transportation Plan's (OTP) Policy Element. These form the basis for the System Element.

THE GOALS OF THE OREGON TRANSPORTATION PLAN

The purpose of the Oregon Transportation Plan is to guide the development of a safe, convenient and efficient transportation system which promotes economic prosperity and livability for all Oregonians.

The Transportation Commission drafted this purpose statement during development of the Policy Element of the Transportation Plan. The Policy Element establishes four goals for Oregon's future transportation system.

Goal 1 - Characteristics of the System

To enhance Oregon's comparative economic advantage and quality of life by the provision of a transportation system with the following characteristics:

- Balance
- Efficiency
- Accessibility
- Environmental Responsibility
- Connectivity among Places
- Connectivity among Modes and Carriers
- Safety
- Financial Stability

The transportation system must be designed and developed so that people have transportation choices in going from place to place. In urban areas people should be able to choose to commute, for example, by carpool, public transit or bicycle as well as by auto. Freight shippers need competitive services to hold down rates and encourage innovation.

increases for inflation, but without any change in emphasis or major funding enhancements. Under this alternative there would be unmet minimum levels of service standards for highways, transit, rail, aviation, marine transportation and pipelines; limited expansion of state highway capacity; and increased vehicle miles travelled per capita between 0.3 percent per capita in metropolitan areas and 1.5 percent per capita statewide.

Transit ridership and intercity passenger patronage would grow at the same rate as population growth, but the number of intercity bus routes would decline. Expansion of specialized elderly and disadvantaged transit services and establishment of new citywide transit systems would be limited. However, air service in Astoria, Newport and Roseburg would be enhanced. National scenic byways would be developed along the entire length of U.S. 101 and in the Columbia River Gorge national scenic area. The bicycle and pedestrian facility construction program would continue. Corvallis/Albany would be designated as a new metropolitan planning area.

CONTINUATION WITH MODAL SHIFTS

2012 Continuation of Existing Programs with Modal Shifts would implement all non-highway programs as in the next alternative, but with the same highway programs as in the Funding Decline.

LIVABILITY APPROACH

Livability Approach: Minimum Levels of Service - Plus Preferred Transportation System shows how the transportation system would look with full implementation of the economic development and livability alternative. (See map.) Under this alternative, it is expected there should be by 2012:

- A transportation system that helps maximize economic opportunities and quality of life, as measured by the Oregon Benchmarks;
- Significant expansion and improvements in metropolitan transit service, including construction of the light rail routes in the Portland metropolitan area that are identified in the 1992 Tri-Met Strategic Plan;
- Hourly intercity passenger service established in the Willamette Valley along I-5 between Eugene and Portland;
- Higher speed (110 to 125 m.p.h.) rail passenger service between Eugene and Portland with connections to Vancouver, B.C.; seven round trips per day;
- A sevenfold increase in the use of telecommunications over 1990 use;

7. It identifies local, state and federal roles in implementing the plan and sets planning and performance criteria for modal implementation plans and local and regional transportation plans.

8. It estimates the financial requirements to implement the plan.

The Alternatives

The System Element envisions the facilities and services which would be put in place within the next 20 years. Because of the length of time required to implement transportation projects and changes in technologies, it also envisions those major issues and projects which may be necessary in the next 20 to 40 years.

To place the possibilities in perspective, the Steering Committee examined four funding alternatives:

1. Funding decline with status quo program,

2. Continuation of existing program,

3. Continuation of existing program with modal shifts, and

4. Economic development and livability approach.

In each alternative, state and local governments are to (a) use system management techniques to handle traffic growth and protect facilities from congestion and (b) coordinate transportation plans with land use plans, emphasizing compact development and maintenance of urban growth boundaries.

FUNDING DECLINE

Funding Decline would not support expansion and improvement of the existing system. Efforts would be limited to preservation of existing infrastructure, and the following would be expected: no expansion of current service levels; increased traffic congestion; a decline in intercity bus, rail, specialized transit, aviation, marine transportation and pipeline services; and no improvements for intermodal passenger and freight facilities. Transit ridership in the Portland metropolitan area would increase because traffic congestion would significantly increase, but transit ridership would decline in other areas because of lack of funding.

CONTINUATION OF EXISTING PROGRAMS

2012 Continuation of Existing Programs would continue existing transportation programs at state and local levels with funding

The system must be efficient. Transportation agencies need to make decisions about whether to add lanes to freeways or to build light rail lines based on their full costs, including the costs to the environment and the community. User charges, such as gas taxes and vehicle registration fees, must reflect the cost of reducing air pollution in addition to road construction and maintenance.

Transportation services must be reliable and accessible to all potential users, including the young, the elderly and the disabled. Public transportation and transportation for special groups, like the elderly, must be coordinated to provide more effective service.

The system must be environmentally responsible. Vehicle emission standards and efforts to reduce the vehicle miles traveled per capita will improve air quality and reduce energy consumption. Routing plans will improve the transportation safety of hazardous materials.

Statewide transportation corridors must provide access for people and goods to all areas of the state, nation and the world. Travelers must be able to transfer easily from public transit to rail or plane. Freight must be easily shifted from truck to rail to ship or plane to take advantage of the most efficient mode.

Safety standards must target roadway design and education for drivers of all types of vehicles and for pedestrians. Increased law enforcement is needed to reduce accidents related to excessive speed, alcohol and other drug use.

The transportation system must have financial stability. Investments in highways, transit, and other transportation infrastructure must be protected, and transportation services must be reliable.

Goal 2 - Livability

To develop a multimodal transportation system that provides access to the entire state, supports acknowledged comprehensive land use plans, is sensitive to regional differences, and supports livability in urban and rural areas.

Oregon's transportation system must support statewide land use goals and regional, city and county land use plans. Transportation facilities and services need to support development of compact urban areas. Land use developments need to be designed so that people can live, work and shop in the same area. Walkways and bikeways should make walking and bicycling safe and convenient, and provide access to public transit. Access controls on intercity routes should be used to reduce congestion.

The state must define and assure appropriate minimum levels of transportation service to provide access to all parts of the state. In

rural communities, bus services need to be stimulated, and rural highways and bicycle routes need to be improved to provide safe travel. Since areas of Oregon vary greatly in their needs, transportation solutions need to be tailored to specific areas.

Supports for environmental quality and economic development, including scenic vistas and aesthetic values, must be included in the design and improvement of transportation corridors.

Goal 3 - Economic Development

To promote the expansion and diversity of Oregon's economy through the efficient and effective movement of goods, services and passengers in a safe, energy efficient and environmentally sound manner.

To foster economic development, people and goods must travel by the most efficient means possible. One mode must be connected with others through intermodal hubs which allow goods to move from truck to rail to ship or plane. Passenger terminals must be developed to allow efficient and convenient movement of people between modes.

Adequate facilities for rail service, air freight and marine transportation must be maintained. Air connections need to link all parts of Oregon to all parts of the nation and the world. Waterways and marine ports need to increase Oregon's ability to compete in international trade. Since the ports on the Columbia River share the river system, the state needs to maintain strong working relationships with Washington and Idaho Columbia/Snake River communities.

Goal 4 - Implementation

To implement the Transportation Plan by creating a stable but flexible financing system, by using good management practices, by supporting transportation research and technology, and by working cooperatively with federal, regional and local governments, Indian tribal governments, the private sector and citizens.

Transportation financing must be both stable and flexible. The finance system must provide equity among alternative transportation modes, state, regional and local jurisdictions, all regions of the state and individuals and businesses.

The transportation system must be managed so that steps are taken to ease the demands on the system before new facilities are constructed. For highways this can be done by reducing peak period travel, improving the traffic flow and encouraging the use of transit, bicycling and walking. In the future, congestion pricing or toll systems may be an important element of urban freeway management.

The state will support the development of innovative management practices, new technologies and other techniques that help to carry out the implementation of the Transportation Plan. Partnerships with universities and private industry will promote transportation research.

Further refinement and implementation of the Transportation Plan will depend on the cooperation of federal, regional and local governments, the private sector and the citizens of Oregon. The Land Conservation and Development Commission Transportation Planning Rule requires regional and local governments to be consistent with the state transportation plan, but the state will also adopt regional transportation plans when they meet established criteria. The state will work with federal land management agencies and Indian tribal governments to coordinate transportation plans and projects. The goal is a coordinated and complementary transportation system.

The Transportation Plan depends on the full involvement of the citizens and the private sector in Oregon. Many of the policies and actions will require private investment. Most depend on public consensus for change.

THE SYSTEM ELEMENT

The Preferred Alternative for the System Element meets the goals of the Policy Element in eight ways:

1. It identifies a multimodal system including air, rail, auto, truck, bus, bicycle, pedestrian, waterway and marine transportation, and pipelines to be implemented within the next 20 years.

2. It establishes minimum levels of service to be achieved by each mode of transportation.

3. It identifies other major improvements beyond minimum levels of service.

4. It identifies the transportation corridors and facilities which serve statewide and interstate functions.

5. It identifies transportation system and facility management processes that must be put into place, including local transportation demand management and financing principles.

6. It identifies land use patterns that must be put into effect to achieve the goals of the transportation plan.

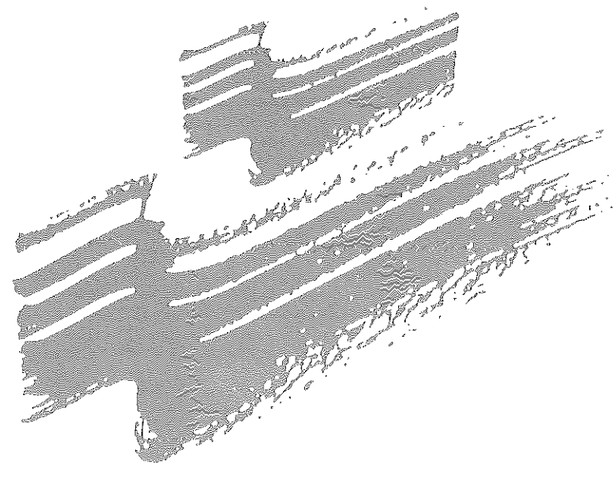
U.S. Department
of Transportation
**Federal Highway
Administration**

Number 5
August 1992

SEARCHING FOR SOLUTIONS

A Policy Discussion Series

Transportation and Air Quality



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NOTICE

The contents of this report reflect the views of the authors who are responsible for the facts and accuracy of the data presented herein. The contents do not necessarily reflect the official policy of the Department of Transportation.

The United States Government does not endorse the products or manufacturers. Trademarks or manufacturers' names appear herein only because they are considered essential to the objective of this document.

This report does not constitute a standard, specification, or regulation.

48. As a practical matter, "zero emission vehicle" is synonymous with electric vehicle. An electric vehicle is not truly zero emission (unless the local generating capacity is completely non-fossil), but the viewpoint in Los Angeles is that the associated emissions can be "exported" by purchasing power (fossil-based or other) from elsewhere. This same assumption may not hold for other parts of the country, where ozone problems often extend over a wider area. Each state contemplating an electric vehicle requirement will have to carry out a net emissions analysis to determine the actual benefit.

49. Studies of long-term vehicle use indicate that virtually all vehicles in the fleet are used at some point in a way that would violate the range of existing battery technology (assuming a conventionally-sized vehicle). Studies of single-day vehicle use, on the other hand, indicate that few vehicle trip patterns, on a given day, exceed the range of current battery technology (say, 100 miles). In addition, households have shown an increasing tendency to own more than one vehicle per licensed driver, partly to allow for special-purpose or limited-use vehicles. It would seem possible, then, for households to rearrange (or expand) their fleets to accommodate limited-range electric vehicles for use in everyday travel patterns. The key considerations for such a market would be price, ease of use, and reliability rather than range.

50. Presentation by Philip Lorang, EPA, in "Conference Summary: Best Practices for Transportation Modeling for Air Quality Planning", by Gary Hawthorne and Elizabeth Deakin, December 1991.

51. In the interest of brevity, this discussion does not address every possible emissions control measure. One group of measures that could prove significant in the long-run includes telecommuting and other technology-based changes designed to substitute computers and communication for travel. That emerging telecommunications technology can have a profound effect on work, shopping, and leisure is not in doubt, though the net effect on consumption of travel remains to be seen. As more is learned from current experiments, it may become possible to build telecommuting and similar measures into air quality plans.

52. This authority is being challenged, however, and the Legislature has been asked to remove it from the California Act.

53. No explicit recommendation for a state-administered insurance program was made at the time this proposal was put forward. However, since that time such a proposal has been introduced in the Legislature.

54. MTC analyzed the pricing measures using its data resources and system of regional models. A key feature of the MTC models is the presence of price throughout the model hierarchy.

55. Recent press reports of lung lesions among Los Angeles children, and of increased asthmatic sensitivity from chronic exposure to low levels of ozone, give some sense of the direction of this literature. However, the legislature may revise the permitted number of violations upward (perhaps making California Law inconsistent with the Federal Rule,) or may lengthen the time frame for attainment.

56. The legislature has adopted special requirements for several urban areas of the State, including the Bay Area.

57. California Office of the Governor. Governor's Budget Summary 1990-91.

SEARCHING FOR SOLUTIONS
A Policy Discussion Series
Number 5

Transportation and Air Quality

Sponsored by the Office of Policy Development,
Office of Environment and Planning,
and the Office of Traffic Management
and Intelligent Vehicle-Highway Systems
Federal Highway Administration

August 1992

The following is a list of other publications in the Federal Highway Administration's "Searching for Solutions: A Policy Discussion Series."

Number 1	March 1992	Exploring the Role of Pricing as a Congestion Management Tool
Number 2	June 1992	Exploring Key Issues in Public-Private Partnerships for Highway Development.
Number 3	August 1992	Public and Private Sector Roles in Intelligent Vehicle-Highway Systems (IVHS) Deployment
Number 4	August 1992	Assessing the Relationship Between Transportation Infrastructure and Productivity.

Note: In addition, the Office of the Associate Administrator for Policy has published a supplement to the policy discussion series entitled "Searching for Solutions: Annual Policy Contract Research Program."

31. The FTP is a precise sequence of accelerations and decelerations based on actual trip sampling conducted in Los Angeles in the 1960s. Recent studies by the California Air Resources Board indicate that a typical trip now entails more acceleration and deceleration than a similar trip would have entailed 30 years ago. EPA is repeating these tests in other cities chosen to be representative of the national urban setting.

32. Estimates of effectiveness are based on average fleet characteristics, but most TCMs would be more likely to affect trips by lower-than-average emitting vehicles, if newer, better-adjusted vehicles are used for commuting.

33. An in-motion monitoring program also would help to identify deficiencies in the inspection and maintenance program. Stedman has argued that variation due to correctable physical causes alone is large enough to justify an in-motion monitoring program, especially because it is difficult to gauge the "true" emissions performance of a vehicle in the artificial context of inspection and maintenance.

34. Although considered to be a "serious" ozone non-attainment area under California law, it is considered as "moderate" under the Federal law.

35. In September 1991, the American Lung Association filed suit against EPA to force a reduction (tightening) of the one-hour ambient ozone standard from .12 parts per million (ppm). The original federal standard was .08 (through 1978), but in the face of inconclusive scientific evidence supporting that standard and strenuous objections to over-control, the standard was relaxed to the current .12 level. The Lung Association argues that the epidemiological record now is clear enough to support a return to the original standard or to an even more stringent standard.

36. Note that these are reductions from future year emissions that would occur absent the TCMs. In a growing region, a package of TCMs estimated to reduce VMT by five percent on a continuing basis would have increasing effectiveness as measured in tons of pollutant reduced as the base grows.

37. These are in addition to vehicle operation-based sources of variability such as speed, acceleration, cold starts, and hot soaks.

38. There is no requirement for manufacturers to test the emissions performance of every vehicle (but manufacturers can pre-test each vehicle subjected to the Federal Test Procedure). Manufacturing defects and variability in component tolerances cause some super-emitting vehicles among the new car fleet.

39. In-use tests might be based on random application of the Stedman infra-red measurement device described earlier.

40. Unregistered vehicles have been presumed to be owned mostly by low income households, but this has not been verified through a focused study.

41. Oxygenated fuels generally have been put forward as a CO strategy. ROG reductions are less certain and depend on fuel formulation, but reductions of a similar magnitude appear to be feasible.

42. This would amount to $20 to $30 per vehicle per year if oxygenated fuel were sold for the four months during which CO exceedences most often occur.

43. There is a procedure to divert supplies to the most severe areas in the event of a shortage.

44. "Mobile" is the emissions factor model maintained by EPA and "EMFAC" is the model maintained by CARB. Mobile 4.1 and EMFAC 7SPD are the current versions.

45. This would involve an additional cost of $40 to $60 per vehicle per year, or about $10000 per ton of ROG removed (for typical vehicle usage and 1992 average emissions factors). This compares favorably with the average cost per ton of stationary source ROG reductions.

46. Operation (and the degree of inconvenience) would resemble the use of a glow plug on a diesel-powered vehicle.

47. If the device were effective enough to turn each cold start into a hot start, then trip start emissions of CO and ROG would be reduced by 25 to 35 percent, and overall emissions for an "average" urban trip would be reduced by 10 to 15 percent (based on CARB's EMFAC 7E factors and Bay Area trip data, and assuming full penetration of the fleet). It would take about 5 years of sales for the pre-heated catalyst equipped vehicles to account for half of the trips and VMT. Cost data are not available, but modifications are unlikely to cost as much as the catalyst itself (about $300), even with a second battery. There would be a modest increase in operating expense to cover the cost of periodic battery replacement.

with pre-existing labor contracts (free parking often is guaranteed explicitly).

21. By density is meant the number of individuals moving together in space and in time. Higher densities provide greater latitude for collective travel arrangements.

22. By behavioral consistency is meant the comparatively well-understood and consistent responses of work travelers to level-of-service indicators such as in-vehicle time, walk time, waiting time, price, and reliability. Workers have less choice about whether and when to travel, and so travel for work appears less complex and more predictable than travel for other trip purposes.

23. By institutional simplicity is meant the ease with which responsibility for work travel reduction can be assigned to the employer. Comparable institutions do not exist for most other types of travel. (Corporate fleets are one exception, though the same organizations are involved; schools, airports, and large office and retail developments also might provide convenient institutional "handles" for travel reduction.)

24. Home-based work trips constitute about 25 percent of all VMT and 20 percent of all vehicle trips that occur in an urban network. Speeds are somewhat lower on average for work trips because of peak period congestion (hence emissions per mile are somewhat higher), but less so than one would expect because most non-work trips occur on the local street system. A higher fraction of the work trips are cold starts (also resulting in higher emissions), but again the difference is smaller than expected because current catalyst-equipped vehicles become "cold" after only one hour. On the other hand, somewhat more of the work travel occurs in newer vehicles that are cleaner on average. The net result is that percentage emissions reductions calculated for work trips only are reduced by a factor of 4 or 5 when applied to the total mobile source emissions inventory. This may be an obvious point, but it results in much confusion and some consternation when TCM planning results are presented to decision-makers.

25. The need to address non-work travel may be even greater than suggested here. Ozone episodes often occur on weekends. Weekend emissions from mobile sources may be important contributors to these episodes. A 1981 Bay Area survey indicates that residents make about as many trips on a weekend day as on a typical weekday, and produce about 95 percent as many in-region vehicle miles. But aside from a cursory tabulation, no analysis has been performed on the weekend portion of the survey, and little is known about the nature of Bay Area weekend travel. As a result of clean air requirements, pressure for a deeper understanding of weekend travel is likely to arise.

26. Over a 7 to 10 year horizon. Reductions could be greater beyond this horizon, especially with supportive zoning changes (e.g., to increase density and assure mixed use development around transit stations).

27. Employer-based trip reduction programs were included in the initial Bay Area proposal, but in a mild form without a rigorous performance criterion (or the parking charges and monetary incentives likely to result from such a performance criterion). A Regulation 15-type program has been proposed in the Air District. The estimated effectiveness with this program added would be in the range of 7 to 10 percent.

28. The program envisions an annual expenditure of $600 to $700 million **per year** after 1993, for accelerated rail transit investment, expanded bus operations, and cost-effective shared access services to rail transit stations.

29. There also is the issue of packaging measures to increase implementation feasibility. In particular, apparently ineffective measures may be part of a political compromise that facilitates other politically difficult but more effective measures. Mass transit improvements often fall into this category. Viewed in isolation, a rail transit extension may "cost" $300-$500 thousand and a bus system operating subsidy may "cost" $50-$150 thousand per ton of ROG removed, whereas such highly effective measures as tolls or parking charges may be self-financing and may yield net benefits after accounting for travel time changes and other costs. Yet the provision of improved transit may be an absolute prerequisite to acceptance of tolls or parking charges. Taken together, the transit, tolls and parking charges in total might well achieve very large benefits through reductions in congestion.

30. A requirement for pre-heated catalytic converters, now under consideration by the California Air Resources Board, would decrease the relative importance of start emissions by half or more, but would not eliminate the problem.

FOREWORD

This report summarizes a Federal Highway Administration (FHWA) seminar on key issues in air quality and transportation planning held last year — supplemented by an individual perspective on findings which have emerged during the year since the 1991 seminar.

The passage of the Clean Air Act Amendments of 1990 confirmed attainment of air quality as a central objective of transportation policy, planning, and program development. The Intermodal Surface Transportation Efficiency Act (ISTEA) of 1991 further integrated conformity with the Clean Air Act into State and metropolitan transportation planning. These two pieces of legislation — the Clean Air Act Amendments of 1990 and the ISTEA — are two of the key elements of President George Bush's domestic agenda. This FHWA seminar provided an opportunity for a group of early participants in transportation/clean air planning to discuss a variety of emerging policy and technical issues. The individual presentations of seminar speakers have been summarized in Part B of this report. Part A of the report consists of an overview essay incorporating seminar discussions together with a perspective developed through the San Francisco Bay Area air quality conformity assessment by the authors who were key participants in associated technical activities over the last year. While recognizing that their conclusions and recommendations represent the authors' points of view, we believe the recent experience of California in meeting its own stringent air quality requirements has provided an instructive preview of several of the major challenges to be faced nationwide in the initial kinds of conformity assessment under the Clean Air Act Amendments of 1990.

While the discussion ranged widely, certain perspectives were substantially shared. First, conventional transportation control measures (TCMs) will not be sufficient to achieve attainment in many severe non-attainment areas and, therefore, unconventional approaches such as pricing and growth management may be considered. Second, political and institutional resistance to more effective TCMs may lead to a reexamination of vehicle technology-based solutions. Third, clean air mandates suggest the need for substantial investment in improved quantitative methods. These conclusions suggest that much remains to be learned about the fast-moving, rapidly changing field which is transportation/air quality planning.

This report is one of a series of *Searching for Solutions: A Policy Discussion Series.* The series will deal with key emerging highway transportation issues such as congestion pricing, privatization, transportation and air quality, and transportation and economic productivity. Issue papers will emanate from policy seminars sponsored by the FHWA to gather viewpoints on important topics or from FHWA policy research. We look forward to generating a wide-ranging dialogue on these and other important challenges facing transportation policy development.

Stephen C. Lockwood
Associate Administrator for Policy
Federal Highway Administration

Note, however, that pending revisions to emissions factors, based on the latest scientific evidence, are likely to raise estimates of both the absolute levels of CO and ROG emissions and the portion attributable to mobile sources. For example, in public presentations, staff of the California Air Resources Board (CARB) have reported that, based on preliminary findings, CO and ROG mobile source emissions may be underestimated by a factor of two or more.

10. Stationary sources were not directly addressed in the FHWA seminar. At least two points did emerge, however. First, while technology "fixes" for large stationary sources may be less painful politically than travel restrictions, it is not clear that the bulk of remaining control options for area sources (e.g., control of consumer items such as solvents, small gasoline engines, barbecues, and hair spray) are any less difficult to present to the public. Second, air quality planners generally can provide precise measures of cost-effectiveness for large stationary source controls, and comparable data will be expected from the transportation community even though transportation costs and benefits are much more difficult to specify and measure (because there are numerous benefits and costs, some of them externalities).

11. ISTEA allocates a portion of discretionary funds for clean air-related transportation projects in the most severely-polluted metropolitan areas.

12. There may be attempts in some regions to link Federal transportation grants to local implementation of TCMs that do not qualify for direct Federal funding. In the San Francisco Bay Area, for example, environmental groups have argued that implementation of TCMs requiring local government action could be a condition of Metropolitan Planning Commission (MPO) inclusion of localities' projects in the Federal transportation program.

13. The California Clean Air Act specifically calls for TCM implementation. See the reports on TCMs such as: U.S. Environmental Protection Agency, Office of Moblie Sources, Transportation Contol Measure Information Documents, 1992, prepared by Cambridge Systematics, Comsis Corporation, K.T. Analytics, and Deakin Harvey Skarbardonis. See also: U.S. Environmental Protection Agency, Transportation Control Measures: State Implementation Guidance, 1990, prepared by Douglas Eisinger et al, SAI.

14. South Coast Air Quality Management District (SCAQMD) Regulation 15 requires all employment sites above a certain size to submit and implement a plan for achieving peak-period worker-to-vehicle ratios of 1.3, 1.5, or 1.75, depending on location. Employers are given broad discretion in choosing trip reduction methods.

15. Fees of $40 to $100 a month are reported in "successful" programs.

16. For example, free close-in parking for carpools and vanpools, and subsidized transit passes.

17. There is considerable uncertainty about how to compensate low- and middle-income workers for the personal costs of TCMs without negating the trip-reducing effects. One viewpoint is that no net change in behavior will occur if a transportation fee is exactly offset by the addition of equivalent income. An opposing viewpoint is that behavior will change even with an exact offset because the average worker is not likely to spend an entire increment of general income on a single item (i.e., there are many other elements of the household utility function). The Los Angeles data seem to support that the second viewpoint, but this is far from a definitive conclusion.

18. Costs incorporated in the above figures include fees charged to cover the Air District's administrative expenses, consultant costs, and annual costs for Employee Transportation Coordinators (salary, benefits, and fees for training and annual refresher courses), as well as some direct costs of program elements. Parking fees and related income subsidies are not included.

19. Value-of-time benefits depend on peak period volume reductions, which are determined not only by mode and time-of-travel changes among directly-affected workers, but also by (potentially) compensating shifts by other travelers who perceive improved travel times. Since congestion and delay are highly sensitive to peak flows, relatively small changes in volume can yield large travel time benefits.

20. Other implementation problems with employer-based trip reduction include concerns over equity implications (lower income workers tend to be most affected) and conflicts

Endnotes

1. Deakin, Harvey, Skabardonis, P.O. Box 9156, Berkeley, CA 94709 (510/841-0438).

2. Deakin, Harvey, Skabardonis, Inc. and the University of California at Berkeley.

3. The presenters were (in order of appearance): Martin Wachs, the University of California at Los Angeles; John Suhrbier, Cambridge Systematics; Richard Joy, Sierra Research; George Scheuernstuhl, Denver Regional Council of Governments; Elizabeth Deakin, DHS Inc. and the University of California at Berkeley; and Greig Harvey, DHS Inc. A full transcript of the seminar is available upon request, and a summary of major points from each presentation may be found in the Appendix.

4. The past twelve months have been a period of intense debate over transportation/air quality issues, and the dimensions of some problems have become clearer since the April FHWA meeting.

5. Preparation of this paper was supported in part with funding from the Federal Highway Administration. However, the views expressed are those of the authors, who also remain solely responsible for any errors or omissions.

6. Debates as the 1990 Amendments and ISTEA were crafted stressed the historic role of stationary source and automotive technology improvements in achieving air quality goals, and suggested that a more explicit focus should be placed on measures to reduce travel along with (or even in place of) additional technology improvements. Both Acts were heavily influenced by these debates.

7. The Region's 1982 SIP submittal included a non-attainment plan for the post- 1987 period. When the Bay Area failed to attain the ozone standard in 1987, no action was taken to implement the region's contingency plan, except for those provisions underway as part of ongoing transportation programs. In one unimplemented provision, the Metropolitan Transportation Commission (MTC) committed to review the air quality effects of highway projects and to consider delaying any with negative consequences until the region was in attainment. The Sierra Club and Citizens for a Better Environment (CBE) brought suit in the Federal District Court of Northern California to force MTC to perform a substantive analysis of each project. Citizens for a Better Environment v. Wilson and Sierra Club v. Metropolitan Transportation Commission (consolidated cases), C89-2064TEH, U.S. Dist. Ct. for No. Dist. of CA, 1991. This case is discussed in greater detail in Greig Harvey and Elizabeth Deakin, "Toward Improved Regional Transportation Modeling Practice," December, 1991.

8. The extent to which these requirements also affect non-federal as well as federal projects is not entirely clear at the time of this writing, nor is there agreement on the transportation/air quality planning responsibilities of areas which attain the ambient air quality standards. Regardless, the legislation will have wide ranging effects. Moreover, even if non-federal projects are exempted from conformity reviews, they will have to be considered in the overall transportation emissions inventories required in nonattainment areas.

9. The transportation sector is more responsible for some pollutants than for others. According to current emissions factors, 90 percent or more of atmospheric carbon monoxide (CO) comes from mobile sources. Reactive organic (ROG) and oxides of nitrogen (NO_x) - the precursors of smog - arise from a broader range of sources in a mix that varies among metropolitan areas. In the San Francisco Bay Area, for example, about one-third of the anthropogenic (human-made) ROG emissions and one-half of the NO_x emissions arise from transportation sources. ROG emissions from natural sources (principally vegetation) are slightly greater than from anthropogenic sources.

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- Clean fuels could produce benefits, but are problematic because of high costs and the transitional nature of their applicability.
- Land use and growth management approaches have increasing credibility in may areas; localities need the flexibility to pursue these strategies.
- Capacity improvements' regional benefits appear to be partially offset by traffic growth and travel shifts, but not completely (70%+ of the benefits remain.)
- Localized impacts such as a project's attracting or shifting traffic into violation prone areas can be problematic for CO analyses. These potential impacts need to be considered, if possible, before the project reaches the EIS stage. This suggests a change in design practice to identify where CO violations might occur, and select the location and design of facilities and mitigation measures accordingly.
- The assumption that a region's growth pattern is not affected by transportation facilities or that trip rates and O-D patterns are exogenously determined and fixed is not supportable, although in many cases the effects will be minor.
- Models need improvement so that they are able to address the many issues raised about transportation, land use, growth, and air quality. This will be costly but necessary since shortcuts do not suffice. Models need to be consistent with theory (reflect the full range of travel responses, represent income effects, etc.).
- Good data are needed for good models, and this has been ignored in many areas.
- Modeling "chicanery" and advocacy via modeling are issues. Environmentalists are increasingly sophisticated about models, and will catch insupportable assumptions or inadequate approaches.
- Better analysis capabilities must be accompanied with greater attention to monitoring and feedback; analysis should be part of a broader learning process.
- Institution-building and institutional linkages will be needed to successfully implement many TCMs. Transportation agencies will need to consider air quality improvement one of their own responsibilities and not just the responsibility of air quality agencies.
- Federal and State law should make it possible to utilize the full battery of measures, conventional or otherwise, if regional agreements to do so can be forged. Federal and State agencies should provide incentives and remove barriers in this regard.
- Planning and implementation require adequate funding.
- Research is needed on the interrelationships among transportation, land development, urban form, economic development, and the environment.

quality agencies need to be improved, and air quality agency concerns must be accommodated in transportation planning. At the same time, MPOs must deal with multiple concerns and objectives of which air quality is but one. Responding to both mobility needs and air quality needs suggests that we should focus on projects which are mutually beneficial. Some of the likely candidates are TDM; arterial improvements; congestion management; and multimodal projects such as HOV lanes.

Mr. Scheuernstuhl also noted that, given modest resources for transportation investments of all types, it was particularly important to be objective about various measures' impacts: most TCMs have modest impacts, but some projects which have been favored in the past are fairly well understood not to be particularly effective. On the other hand, he noted, even major transformations of land use and transportation have relatively modest effects, largely because most development and most transportation infrastructure is already in place and changes work at the margin. Mr. Scheuernstuhl also echoed the view that demand management and pricing would be the most effective way to go but would likely face substantial institutional, political, social, and economic barriers.

Turning to modeling issues, Mr. Scheuernstuhl noted that the conformity procedure set forth in the Clean Air Act depends on regional modelling and is likely to be costly and time-consuming. He argued that the limitations of models are substantial but since we are going to continue to rely on them, investments in better modeling are necessary.

Mr. Scheuernstuhl's list of needed improvements began with better inputs on population, land use, and transportation networks. He noted that UTPS needs to be made more efficient to run (less costly and time-consuming); at the same time it needs to be more sophisticated. For example, MPOs increasingly must deal at a fine scale of urban impact, address non-home based trips, represent bus lanes and HOV lanes, etc. The regional models should support such analyses. Mr. Scheuernstuhl argued that much effort over the last decade has been devoted to cost-cutting mechanisms rather than model improvements. In his view, however, modeling shortcuts are inadequate, error from aggregation often outweighs cost savings, and certain microcomputer approaches represent false economies because the assumptions and simplifications they embody are not defensible. While sketch planning methods developed in the '70s are helpful, there is a need to update modeling capability for TCMs. Other needs, he indicated, include better data bases for tracking VMT, better procedures for project level analysis for conformity, and more research on pricing, tolls, and suburban transit options.

Summary and Interpretations: Greig Harvey, Deakin, Harvey, Skabardonis, Inc.

Mr. Harvey summarized the presentations and added his own views, as follows.

- TDM will need to be a major focus of transportation – air quality planning because it has both air quality and congestion benefits. However, the benefits are mostly modest and should not be exaggerated.
- Many TCMs are narrowly focused on peak period downtown work trips, and as a result they are aimed at only about five percent of total trips. Strategies which address other trip types are needed.
- Vehicle technology will continue to produce very important gains, but it comes at a cost.
- The cold start issue is critical and implies a need to reduce trips and not just VMT, though the problems may be reduced as technology improves.
- Unconventional measures such as identifying and retiring gross emitters and using tax and price incentives to induce consumers to buy and use clean cars may have great promise, but they face serious implementation difficulties.
- Parking pricing and road pricing strategies are economically rational and increasingly are advocated, but federal and state policy is not fully supportive and political opposition is likely.

Part A — Air Quality and Transportation Planning: An Assessment of Recent Developments

Greig Harvey[1]
Elizabeth Deakin[2]

Introduction

Last year, the United States Federal Highway Administration (FHWA) sponsored a seminar on air quality as a transportation planning issue for the 1990s. Six professionals with recent relevant experience in clean air-related research or program development provided perspectives on the implications of current technical and regulatory developments, as well as lessons from past experiences in air quality-related planning. On-going conformity activities associated with California's State clean air transportation requirements provided another important perspective on challenges to be faced in nationwide implementation of the 1990 Clean Air Act Amendments.[3]

This transportation/air quality nexus continues to evolve rapidly. This paper, therefore, provides a summary and expansion of key points made by presenters. In particular, it adds the perspective introduced by the 1991 Intermodal Surface Transportation Efficiency Act (ISTEA) which was in legislative proposal form at the time of the conference. It also integrates ideas and findings that have emerged in the period since the seminar,[4] discusses some major policy implications, and identifies topics on which additional work would be beneficial.[5]

The interest of transportation officials and professionals in the transportation/air quality nexus stems from a set of statutory and legal developments that appear to have given air quality a much larger role in urban transportation decision making than in the past. In particular, the 1990 Federal Clean Air Act Amendments (hereafter called the "1990 Amendments") contain explicit provisions about the responsibility of the transportation sector in improving air quality.[6] The 1991 ISTEA establishes the specific process by which transportation and air quality objectives are to be integrated in the planning and programming process. For example, the most polluted regions are specifically mandated to implement transportation control measures (TCMs) and a broad range of urban areas must reduce carbon monoxide (CO) and/or reactive organic (ROG) emissions significantly beyond the levels expected from currently mandated tailpipe controls.

Moreover, conformity is required among transportation plans, projects, and programs and the State Implementation Plan (SIP—the federally required air quality plan for each area); the conformity assessment must show that transportation investments will not exacerbate violations, cause new violations, or delay attainment, taking into account all elements likely to affect future ambient air quality (such as tailpipe emissions improvements and regional growth). Monitoring also is called for in the 1990 Amendments, with requirements for tracking vehicle-miles of travel (VMT) and other changes and incorporating the results into air quality plans. Together, these provisions seem likely to necessitate much more detailed examination of transportation-air quality relationships, and methodologies that adequately address key issues will be needed.

The laws of several States adds local impetus for transportation and air quality planning and analysis. A number have environmental impact

reviews that require detailed assessment of the emissions and air quality effects of transportation projects, and a few have "indirect source review" requirements which apply to the transportation emissions impacts of a wide variety of projects such as office complexes, shopping centers, and airports. In California, the 1988 State Clean Air Act requires local air quality management agencies to include trip and VMT reduction measures in their plans to attain the State ozone standard (which is set at .09, compared with the Federal standard of .12), and calls for progress in reducing emissions at a rate of some 5 percent a year.

Moreover, legal challenges over SIP status have drawn even greater attention to the impact of transportation on air quality. Notably, a lawsuit in the San Francisco Bay Area[7] has focused on the analyses that support transportation decision making. Of particular concern is the concept of "induced demand" for highway travel: whether and under what circumstances it may exist, what its effects on air quality might be, and whether current analytical tools can capture it. As the conformity provisions of the 1990 Amendments come into play, these analysis issues could be raised in other urban areas.

Air quality, thus, has become both a matter of some urgency and a long-range concern for transportation planners, particularly where highway programming is at issue. Past attention to the emissions and air quality impacts of transportation plans and programs might be described as episodic (i.e., linked to air quality plan submission deadlines in clean air legislation). But the 1990 Amendments have the potential to change that. Both the legislative history of the 1990 Amendments and the specificity of their transportation provisions suggest that Congress intended air quality to be a key criterion for transportation decision making in areas with persistent pollution problems. The 1990 Amendments define a transportation-air quality planning process that is ongoing and iterative, and require monitoring and revisions if adequate progress is not being made. They establish citizen suits as a means of enforcement. Hence, air quality seems likely to remain prominent on the transportation planning agenda as long as environmental groups and other concerned citizens show a determination to keep it there.

Against this backdrop, the seminar presenters identified a broad range of issues likely to emerge as the implications of recent clean air legislation become apparent. These can be grouped into two categories:

- **Alternate means of reducing mobile source emissions.** While the new legislation is more explicit about transportation controls, it retains great latitude for substitution among alternate approaches. Major options include additional changes in vehicle technology, vehicle inspection and maintenance, transportation control measures, land use modifications, and explicit pricing of transportation facilities.
- **Integration of transportation and air quality planning.** The new legislation carries a number of implications about the treatment of air quality issues in transportation planning and programming. Overall, it increases the responsibilities of transportation providers in air quality planning and standards attainment, mandates periodic review of transportation plans and programs and their air quality impacts, requires consistency among plans, programs, and projects, and underscores the role of quantitative analysis in transportation air quality planning.[8]

The remaining sections of the paper address these two broad areas. Key issues are raised, and matters deemed critical by the presenters are examined. Brief sections on policy directions and research are included at the end of the paper.

While the intent of the paper is to communicate recent air quality developments to the transportation planning community, it is difficult to escape several obvious conclusions. First, significant reductions in mobile source emissions through reductions in travel (i.e., much over 5 percent from "baseline" levels) would be hard to achieve without a fundamental change in U.S. policy toward transportation pricing and land use. Second, although the auto, energy, and manufacturing sectors may feel they have shouldered a more-than-fair share of the emissions reduction burden, the tailpipe and stationary sources probably are the simplest places to achieve further improvements, whether from a technical, a behavioral, an

be worked out. Zero emission vehicles will require electric technology. Similarly, federal requirements for cold temperature CO emissions can be met with available technology for the first round (though probably at relatively high cost), but will take technology development for later stages of required improvements (second tier standards.)

Overall, Mr. Joy argued, technology improvements can deliver emissions reductions at relatively low cost to consumers, and they will be needed, since TCMs are not likely to achieve the kind of emissions reductions mandated.

Issues of Highway Capacity and VMT, Trips, and Emissions: Elizabeth Deakin, Deakin, Harvey, Skabardonis, Inc. and the University of California at Berkeley

Professor Deakin noted that traffic flow improvements traditionally have been used to reduce emissions by reducing the number of stops and starts and increasing speeds. However, the benefits of traffic flow improvements are now being questioned by environmentalists, who argue that benefits may be offset because of route shifts, destination shifts, changes in travel mode, and eventually, locational shifts in response to the improved travel conditions.

Professor Deakin pointed out that many state and regional transportation agencies have carried out their analyses making the assumption that traffic levels and traffic patterns would be the same with or without the transportation investments they are proposing. However, such an assumption lacks theoretical backing. Theory says that short-term responses would include route shifts, mode shifts, time of day shifts, destination shifts, and higher trip rates; over the longer run shifts in housing location choice and employment location choice also could be expected.

One question is the magnitude of such responses, that is, the size of the long-term offset to short-term benefits resulting from improved traffic flows and speeds. Elasticities with respect to travel time provide some evidence; in the Bay Area the elasticities indicate that the offset is in the 10 to 30 percent range.

A second question concerns localized impacts of shifts in trip making, especially for CO. Bay Area corridor studies indicate such "hot spots" can be a significant issue, if new facilities concentrate traffic in areas vulnerable to CO violations.

Available modeling approaches tend not to consider these linkages, or to do so sketchily, according to Professor Deakin. Trip distribution is particularly poorly modeled; time of day of travel is not modeled much at all. The impacts of transportation improvements on trip rates, auto ownership, etc., are mostly ignored. Location shifts often are not modeled at all, and when they are modeled the approaches tend to be highly simplified (e.g., land price adjustment is not considered, though it is well understood that capitalization of benefits would partially offset shift effects.)

Professor Deakin reported a growing concern regarding the impacts of transportation investments on overall regional growth rates. This effect is not well understood, but it is hard to argue that no growth inducement occurs and still claim economic development benefits for transportation investments, she noted.

Overall, Professor Deakin said, demands for rigorous analysis of transportation – growth linkages raise questions about the state of practice versus research, about model reliability (uncertainty, error propagation, etc.); and about the degree to which forecasting is an art versus a science. she advocated research to address the transportation – growth issue and to build up modeling capabilities.

Air Quality, the Transportation Planning Process, New Control Measures, and Improvements to Forecasting Models: George Scheuernstuhl, Denver Regional Council of Governments

Mr. Scheuernstuhl argued that relationships between transportation agencies and air

third round. As a result, there is a strong body of knowledge on TCMs and their effectiveness. There also are numerous case studies of specific TCMs as well as studies of implementation experiences in a number of nonattainment areas. This work is a valuable resource base for the next round of TCM planning.

Mr. Suhrbier noted that many TCMs are voluntary, while others are mandatory. EPA must have enforceable SIPs and so tends to favor mandatory (enforceable) TCMs. Difficulties in implementation often stem from financing problems, from a lack of clear institutional responsibility for a measure, and/or from a lack of political support. TCM implementation nevertheless must be assured in order for EPA to approve a SIP. Consequently the implementation feasibility of various measures is a central concern.

Turning to TCM effectiveness, Mr. Suhrbier noted that their impacts vary widely. A distinction needs to be made between trip reduction and VMT reduction because of the cold start issue. Emissions reduction is also affected by speeds, stops and starts. Thus, TCM effectiveness depends on the what the measure itself does (reduce trips, reduce VMT, reduce stops and starts, increase speeds, etc.) and on the size of the market segment affected. Some TCMs are not very effective by either measure. Other TCMs are effective for the trips to which they apply, but they apply only to work trips, or are further confined to peak period trips to the central business district (CBD). Because this is a small fraction of overall travel, no matter how effective the measure, its overall impact will be modest.

Mr. Suhrbier noted an increasing interest in land use and growth management options, such as locating high density housing and mixed use development near transit and requiring growth to be compact. He pointed out that such policy options face serious implementation issues in many areas, and their effectiveness is not fully understood. Several studies now underway should help clarify these interrelationships.

Mr. Suhrbier concluded by noting that the analysis of transportation-air quality measures, and more generally of the impacts of transportation investments on overall growth patterns, is difficult and often strains existing models' capabilities. While quick response methods can help fill the analysis gap, model improvements are needed.

Air Quality Strategies Not Controlled by Highway Decision Makers: Richard Joy, Sierra Research

Mr. Joy noted that congestion relief and emissions reduction are not necessarily consistent. He showed data indicating that ramp metering, which is widely used to reduce congestion on freeways, may result in uncontrolled emissions due to accelerations at the ramps, which in turn may lead to higher overall emissions. He further argued that most TCMs that have been implemented provide for voluntary changes in travel rather than imposing restrictive regulations on travelers. On the other hand, he noted that one of the reasons people in Los Angeles may be willing to consider extensive TCMs is that congestion has become so severe that drastic actions seem necessary. An alternative to such measures may ultimately be sought in additional technological advances.

Mr. Joy pointed out that major improvements have resulted from technological changes to the automobile, and that more improvements are now mandated. He argued that, while additional controls on new vehicles will be costly, controls on the many older vehicles now in use could achieve a great deal. Enhanced inspection and maintenance programs also will produce substantial benefits, especially by identifying and removing gross emitters.

New fuels could produce important emissions reductions, depending on their formulation and application, but not all fuels work in current vehicles, and some are costly and would require substantial new infrastructure if they were to be put into widespread use. Others introduce questions about emissions benefits as well. Reformulated gasoline may be an attractive option because it works with existing vehicles and distribution systems. CAFE standards encourage alternate fuels, however.

California's low emission vehicle program and associated standards are based on research that shows the feasibility of further reductions in emissions, according to Mr. Joy, but questions of cost and durability remain to

economic, or an institutional (political) point of view. Third, even if the majority of new emissions reductions are achieved through tailpipe and stationary source measures, clean air requirements (along with provisions of the ISTEA), have the potential to force a comprehensive reexamination of urban transportation planning. These conclusions were suggested by the FHWA seminar, and have become more apparent in the period since then.

The seminar, sponsored by FHWA, was organized to encourage discussion of the major air quality and transportation issues. Six speakers made presentations: (1)Introduction to the Transportation and Air Quality Problem, by Martin Wachs of the University of California at Los Angeles; (2) Effectiveness of Transportation Control Measures in Reducing VMT, Trips and Emissions, by John Suhrbier of Cambridge Systematics; (3) Air Quality Strategies Not Controlled by Highway Decision Makers, by Richard Joy of Sierra Research; (4) Issues of Highway Capacity and VMT, Trips, and Emissions by Elizabeth Deakin of Deakin, Harvey, Skarbardonis, Inc. and the University of California at Berkeley; (5) Air Quality, the Transportation Planning Process, New Control Measures, and Improvements to Forecasting Models by George Scheuernstahl of the Denver Regional Council of Governments; and (6) Summary and Interpretations by Greig Harvey of Deakin, Harvey, Skarbardonis, Inc. Summaries of these presentations can be found in Part B of this report. The following material builds on the speakers' presentations, the seminar discussion, and added views of the authors based on the California experience.

Methods for Reducing Mobile Source Emissions

The 1990 Federal Amendments and the 1988 California Clean Air Act are more specific than earlier legislation about how to control transportation emissions. Depending on the severity of the pollution problem, and on the specific pollutant in question,[9] measures to reduce vehicle trips or vehicle miles traveled (VMT) may be required. Nevertheless, the legislation retains much flexibility to customize travel restrictions and to tradeoff travel restrictions for additional technological controls on vehicles and stationary sources. Under the 1990 Amendments, these tradeoffs will have to be initiated and maintained through an ongoing, negotiation-intensive process.

The first round of discussions among transportation and air quality planners will occur during preparation of the initial SIP submission (due 15 November 1992). Some envision a negotiation among transportation planners, air quality planners, the business community, environmental interests, and implementing agencies. One goal of such a process would be an agreed-upon division of responsibility for emissions reductions among stationary sources, vehicle controls, and travel restrictions. In order to be full and effective participants in the negotiation, transportation planners will have to develop clear, well supported evidence about what can and cannot be done to alter travel behavior (and at what cost), and also will have to become conversant in the language of vehicular and stationary source controls.

The following subsections highlight key issues in the debate about mobile source emissions controls, including the feasibility and cost-effectiveness of transportation controls, additional vehicle emissions controls, land use initiatives, and economic incentives.[10] This sequence mirrors the order in which questions have arisen under the 1988 California Act:

1. How much emissions reduction can be achieved with the bundle of transportation policies commonly referred to as "reasonably available transportation controls"?

2. If reasonably available transportation controls are not adequate to meet emissions reduction targets, what can be done to further reduce emissions at the tailpipe?

3. If sufficient tailpipe controls prove infeasible (either technically or politically), are there additional options – possibly land use planning and/or transportation pricing – for reducing mobile source emissions?

Conventional Transportation Control Measures

The term "Transportation Control Measure" (TCM) is broad enough to encompass virtually any action intended to decrease automotive travel or otherwise reduce vehicle emissions. Table 1 presents the list of TCMs for which guidance documents are mandated in the Clean Air Act. In common parlance, however, TCMs are most closely associated with a

core set of actions designed to: (1) Improve transit levels of service; (2) Support ridesharing; and (3) Build upon the special relationship between employer and employee to implement measures that make driving alone less attractive relative to other modes. It is in this more restricted sense that the term "TCM" will be used here.

Many areas will need TCMs to accomplish required mobile source emissions reductions. This has created pressure for funding TCMs through the federal transportation programs,[11] and for TCM implementation through the Transportation Improvement Programming (TIP) process.[12] Before enforceable commitments are made, however, there should be a concerted effort to understand the costs and effectiveness of individual measures, and the nature and extent of synergistic (or countervailing) effects.

The basis for such an understanding exists in the wealth of data available from recent nationwide experience with travel demand management (TDM), trip reduction ordinances (TROs), employer-based ridesharing, and rail transit expansion, as well as TCM program development under the California Clean Air Act of 1988.[13] This experience has made a number of things clear:

- **Employer-based trip reduction can be effective by limiting travel,** especially if discontinuation of free parking is an integral element. Evidence on this point comes from all over the country, but nowhere is it more instructive than in Los Angeles, where an Air District rule requires specific reductions in vehicular travel to each work site.[14] According to Giuliano and Wachs, Shoup, and others who have studied data from Los Angeles, the specified reductions appear feasible providing that: (1) employers are willing to charge for on-site parking;[15] (2) alternate free parking (e.g., on-street) is not readily available; and (3) incentives are offered to transit and ridesharing users.[16] Furthermore, parking charges appear to be nearly as effective when equivalent funds are returned as regular income,[17] so that the potential equity impacts of such a program might be managed in a politically acceptable way.

The Los Angeles program has raised concerns over the employer administrative cost of trip reduction – said to be in the range of $35 to $150 a year per employee at an affected site. Since it is not clear why a program of parking charges and transit/ridesharing subsidies should cost so much to administer, perhaps the reported costs reflect the expense of developing an initial plan and learning through hard experience what does and does not work. Under this hypothesis, one would expect administrative costs to drop as employers settled on the most effective measures.[18] After taking into account the fraction of the work force to which Regulation 15 applies, and the fraction of total travel contributed by work and work-related trips, the net effect of a fully-implemented program would be in the range of 3 to 5 percent reduction of total weekday ROG mobile source emissions.

For projected levels of ROG reduction, it is difficult to establish whether the benefits of an employer-based program are greater than the costs. As the previous paragraph suggests, individual employer costs (and implementation experiences) are highly variable. But even if implementation success could be measured accurately and related to specific employer actions, and direct costs could be made more precise, there would be a problem in assessing the full range of costs and benefits. There are likely to be significant effects on employee costs and benefits (price of parking, income enhancement, extra time for transit or participation in a carpool), employer costs and benefits (administrative costs, lost productivity associated with longer commute times, direct incentive payments), public sector costs (mostly administrative), and benefits to the society at large (reduced exposure to air pollutants, reduced peak congestion). From work in the Bay Area, it appears that employer-based trip reduction rules can be made to seem very expensive (per ton of emissions removed) or net beneficial simply by varying the assumptions about peak congestion relief between plausible

Part B — Summary of Presentations

Introduction to the Transportation and Air Quality Problem: Martin Wachs, University of California at Los Angeles

Prof. Wachs pointed out that the relationships between transportation and air quality are extremely complex, and our understanding of the relationships is inadequate. Nevertheless, he argued, we need to act despite each uncertainty. Mistakes will undoubtedly be made, and we need to establish mechanisms for learning from experience.

Prof. Wachs pointed out that air pollution health problems are real, and that over 100 million Americans live in areas that don't meet health standards; nevertheless, most people live in areas that do meet standards (60%-40%). Flexibility to address differences in areas' problems and opportunities would make sense: some of these differences are the pollutants at issue, the severity of the pollution problem, the options available, the contribution from transportation versus stationary sources, and whether the area is growing. But the practice has been to apply national uniform standards, and this raises issues about imposing costs on all because of the problems of some.

Because cars are a major source of pollution, strategies to clean up cars must be considered. With cars, technological improvements have produced major emissions reductions, but further reductions will come at increasing costs per unit of benefit. Cold starts will be an increasingly important issue (but work on pre-warmed catalysts will help reduce this problem.) Old cars and poorly tuned cars are being recognized as a major pollution source and addressing this problem may help reduce emissions problems. Alternative fuels are a possibility, but costs are high and their transitional character raises doubts about their practicality. Electric vehicles may be a long-term solution, but they currently pose performance shortcomings and market risks. Fleet vehicle strategies are a potential high-payoff area, but there is a lack of institutional framework for dealing with fleets.

Turning to TCMs, Professor Wachs pointed out that most measures can provide congestion relief as well as air quality improvements; but results are modest. He noted the difficulties in competing with subsidies for the auto via equally large subsidies for transit, and pointed out that auto taxes related to emissions are an option (but one that faces severe difficulties garnering support.) Similarly, elimination of parking subsidies and parking-related tax reforms would be highly effective but lack popular support. Congestion pricing, which has become more technically feasible thanks to advances in vehicle identification systems, is hampered by equity concerns and lack of political support.

Professor Wachs concluded by noting that while land use and urban form are long-term options, they are ultimately central to our ability to manage urban transportation and related concerns. We are pushing up against our state of knowledge, as well as raising fundamental issues concerning "command and control" intervention versus belief in letting the "market" work.

Effectiveness of Transportation Control Measures in Reducing VMT, Trips and Emissions: John Suhrbier, Cambridge Systematics, Inc.

Mr. Suhrbier pointed out that, while the new CAA introduces some changes in TCM emphasis (such as trip reduction ordinances), transportation-air quality planning is now in its

- Realistic short-term and long-term land use options and their benefits and costs.
- Potential emissions effects of pricing measures.
- Methods for mitigating adverse distributional consequences of pricing.
- Improvements to the state-of-the-art in urban transportation modeling:
  - network representation
  - time of travel (peaking)
  - trip chaining
  - auto ownership/trip generation (ef fects of infrastructure characteristics)
  - residential and employment location
  - regional growth.

A central issue is whether current institutions are capable of supporting activities which may challenge established beliefs and ways of doing things. Research sponsorship is one matter; put in broader terms, the issue may well be whether current institutions permit a search for improved mobility along many dimensions. Provisions of the new Intermodal Surface Transportation Efficiency Act challenge urban areas to begin such a search. Some institutional arrangements and assignments of responsibility may be better suited to the task than others, and this too would be a valuable topic for investigation.

A decision-making paradigm that is more informed than simple "fair-share" distribution of public capital, yet is less dependent on deterministic "knowledge of the future" than current rational planning approaches, would be another area for attention. Modeling assumes an ability to forecast the future that may not be realistic or necessary. Scenario testing approaches suggest an alternate use of modeling as a means of exploring policy implications; it gives explicit recognition to the "if-then" character of the models, clarifies the assumptions on which they rest, and provides opportunities for the introduction of qualitative information into forecasts. Control theory suggests another direction: data from monitoring could be used to make adjustments in operation and to identify needed improvements, perhaps selecting from a set of responses previously agreed upon in contingency plans. A broader look at such options might uncover new directions for transportation planning, policy, and institutions.

Resources

Citizens for a Better Environment et al. v. Peter B. Wilson et al., Civil No. C-89-2044-TEH, and Sierra Club vs. Metropolitan Transportation Commission, et al., Civil No. C-89-2064-TEH (consolidated).

Harvey, G. [1989] "Residential Location and the Journey to Work in Suburban Households". Department of Civil Engineering, University of California, Berkeley.

Harvey, G., and E. Deakin [1991] "Toward Improved Regional Transportation Modeling Practice", prepared for the National Association of Regional Councils, Washington, DC. December.

Hawthorn, G., and E. Deakin. [1991] "Conference Summary: Best Practices for Transportation Modeling for Air Quality Planning", prepared for the National Association of Regional Councils, Washington, DC. December.

Newman, P.W.G., and J.R. Kenworthy. [1989] **Cities and Automobile Dependence: A Sourcebook**. Gower, Brookfield, VT.

Stedman, D. [1991] Presentation at "The Transportation-Land Use-Air Quality Connection: A Policy and Research Symposium". Public Policy Program, UCLA Extension, Lake Arrowhead, CA. November 6-8. (Reported in Taylor, B. and E. Shirazi, "Symposium Summary", UCLA, January 1992.)

extremes.[19] In addition, a full cost-benefit analysis is hampered by wide disagreement over the health effects attributable to various atmospheric pollutants.

Thus, while it has proven possible to change employee travel behavior through employer-based programs, pervasive uncertainties over costs and benefits have made it difficult to achieve a level of implementation that would yield a significant overall reduction in emissions.[20]

- **Readily available TCMs mostly address work travel**. Home-based work travel is better understood than other types of travel, if only because peak-period capacity requirements have been the primary focus of transportation planning. In addition, home-based work trips appear more amenable to influence by explicit policy because of their relative density,[21] behavioral consistency,[22] and institutional simplicity[23] in comparison with non-work and non-home based trip types. As a consequence, the majority of proposed TCMs focus on home-based work trips. Since home-based work travel constitutes about 25 percent of all urban weekday VMT and an even smaller proportion of total trips, each percent of reduction among work trips appears much less significant when measured against the full spectrum of travel. For example, the California Clean Air Act's ambitious goal of a 1.5 worker-to-vehicle ratio in seriously-polluted areas, which implies a 25-percent reduction in vehicular work trips, yields less than a 5-percent reduction in ROG weekday mobile source emissions when it is spread over the full spectrum of travel.[24] **Transportation and air quality planners now recognize that TCM emissions reduction potential cannot be much greater than 5 percent without some way of addressing non-work and/or commercial travel.[25]**
- **A comprehensive program of conventional TCMs would produce a 5- to 8-percent reduction in daily trips and VMT.** The California Clean Air Act, with its stringent emission reduction requirements, provides an instructive preview of what may be expected from the federally mandated process. The first round of TCM planning under the California Clean Air Act, recently completed, has confirmed the lessons of earlier planning and implementation experience: that potential travel and emissions reductions from readily available TCMs (i.e., without major new funding or creation of new implementation authority) are generally small, and further reductions require significant new authority. For example, the Bay Area's program of conventional TCMs would reduce mobile source emissions by 1 to 3 percent without major new funding, and by 5 to 8 percent with a program that adds significant new capital investment.[26] Such a capital program would include aggressive transit expansion and a host of ridesharing incentives, together costing perhaps $100 per capita per year.[27,28]

  These predicted reductions appear small, but actually imply a 20- to 30-percent drop in work vehicle travel. This would constitute a massive change in Bay Area journey to work patterns. The need for such a change in work travel stems directly from the difficulty of reducing non-work travel.
- **TCM cost-effectiveness studies are difficult to carry out.** In air quality planning, cost-effectiveness typically is expressed as gross cost per unit of emissions removed. Such calculations, when carried out in a simple fashion for transportation measures, can be quite misleading, especially when comparisons to other emissions reductions measures are made. This is because, unlike tailpipe controls or stationary source controls, transportation measures often yield multiple benefits (by reducing more than one pollutant or improving travel times, for example) and entail both direct and indirect costs (including private costs). In addition, both costs and benefits vary over time, yet the absence of an unambiguous estimate of net benefit per unit of pollutant removed makes it difficult to

integrate the data over multiple periods.

Cost effectiveness estimates derived from the existing TCM knowledge base often fall short of being a reliable guide for policy-making. For example, in many of the reported cost-effectiveness studies, expenditures that would occur without an air quality motive have been accounted as costs of the emissions reduction program, but benefits other than those due to emissions reductions have been ignored in the calculus. Thus what is being reported is neither a true cost-effectiveness measure, nor a true marginal cost/marginal benefit measure. Other problems in calculating cost-effectiveness stem from interactions among transportation projects and programs. Measures which are mutually supportive (e.g., HOV lanes and ridesharing programs) and measures which compete with one another (e.g., ridesharing and transit) are often accounted for separately, even though their net impacts could be accurately considered only in relation to one another.[29]

In such cases use of simple measure-by-measure cost-effectiveness calculations could be quite misleading. Improving the situation may not be a simple matter of acquiring more information or doing more complex calculations: basic conceptual work is required in order to develop an appropriate framework for multi-cost, multi-benefit evaluation accounting for interactions among measures. If available, such a framework and associated facts could play an important role in discussions of the tradeoffs among TCMs, vehicle controls, and stationary source controls. Unfortunately, it is unlikely that the basic conceptual issues can be resolved in time for the next round of SIP revisions.

- **Trips, and not just VMT, will need to be considered in TCM planning.** Current emissions factors account for both running emissions (related to VMT) and trip start emissions (related to the number of trips). Technology improvements to date have influenced running emissions more than start emissions, so that starts now account for half or more of mobile source carbon monoxide (CO) and reactive organic (ROG) emissions.[30] In particular, measures such as freeway incident management and park-and-ride, which affect speed and VMT but not trips, are in general less effective in reducing emissions than an assessment based on VMT only would indicate. **Hence, improvement strategies must increasingly focus on TCMs which affect trip generation and assessments of TCM effectiveness must increasingly account for both trip and VMT effects in order to be accurate.**

- **New emissions factors may alter the assessment of emissions reductions from TCMs.** Emissions specialists at the California Air Resources Board (CARB) and the U.S. Environmental Protection Agency (EPA) have collected data which indicate that existing methods may underestimate mobile source emissions by a factor of two or more. The reasons for this are not yet fully understood, but at least some of the discrepancy seems due to the absence of full accelerations from the Federal Test Procedure (FTP) used to certify autos for the American market.[31] The test procedure was developed for an early dynamometer with a restricted acceleration range. As a consequence, it is possible for an engine design to satisfy the test procedure and still act essentially like an uncontrolled vehicle during periods of very rapid acceleration. For example, CARB staff have reported that under some conditions, one full-bore acceleration up a metered freeway ramp may produce more ROG emissions than the remainder of a ten-mile trip.

Underprediction is also caused by underrepresentation of older vehicle use in urban areas and deterioration rates in the Mobile and EMFAC computer emission model formulations.

Another discrepancy arises from the way emissions factors are applied. Mileage-based emissions factors rise sharply for speeds above 55 miles per hour, yet few of the regional network models used in estimating the emissions

- Whether non-federal projects are subject to conformity review
- Whether conformity requirements apply in attainment areas
- What to do if there is a change in background conditions and assumptions
- How detailed the assessment of Regional Transportation Plans must be
- How TIP amendments should be handled
- Whether transit projects should be subjected to a similar level of analysis as highway projects
- How to handle localized CO hot spot analyses.

The language of the 1990 Amendments is much more specific about conformity than ever before, but remains amorphous enough to allow great latitude for interpretation. Resolution of the above issues will determine how effective (and how onerous) the conformity provisions can be. Many observers, particularly in the environmental community, hold great hope for conformity assessment as a means of laying bare and ultimately rationalizing the way transportation decisions are made. For this reason alone, it is certain that DOT and EPA decisions about conformity will be scrutinized closely and disputed hotly if they fail to alter the status quo.

Conclusions

Several basic conclusions are supported by the findings of the FHWA seminar and subsequent events in California and elsewhere:

- Recent developments have made air quality a more important factor in transportation policy, and transportation planning and programming will have to adjust accordingly.
- Emissions controls on new vehicles and vehicle inspection and maintenance could yield additional emissions reductions, but necessary regulations might be strongly resisted by rural States and the automotive and petroleum industries.
- There is a likelihood that transportation controls will be necessary in perhaps two dozen of the most severely polluted metropolitan areas.
- In some areas, conventional transportation controls (transit improvements, ridesharing, employer-based incentives, traffic flow improvements) will not be sufficient to show attainment. For areas requiring more extensive emissions reductions, and for areas preferring not to implement the full spectrum of conventional TCMs, DOT and EPA will need to provide appropriate guidance on land use and pricing measures.
- MPOs will be under pressure to upgrade their data resources and modeling capabilities, both to provide more credible analyses of TCMs and to support conformity assessment.
- The requirement for conformity of transportation plans, programs and projects to state air quality plans is viewed by many outside the traditional transportation planning community as a critical feature of the 1990 Amendments. The guidelines implementing the conformity provisions will be hotly contested if they do not produce significant change in transportation decision-making.

Research Needs

Based on these findings and conclusions, several research needs can be identified. They include:

- A robust cost-effectiveness framework for TCM analysis.
- A clear exposition of vehicle technology options and the extent to which they could be implemented effectively, as an option for fleet vehicles, or perhaps more broadly in the most polluted cities.
- Better understanding of land-use - transportation - emissions relationships, ranging from site design impacts to longer term, larger-scale impacts on location of jobs and housing, distribution of shopping and other non-work trips, and number of trips made by vehicle.

transportation modelers have said that accurate, convincing analyses of all the phenomena noted here are well beyond the state-of-the-art (without denying their theoretical importance, however).

In one view, existing models were conceived to support relatively narrow sizing and location decisions, given assumptions about basic facility needs. This is certainly the dominant use to which urban travel demand models have been put. However, this view misses a larger issue: The world outside the transportation planning community shows increasing interest in decision making about infrastructure. In forums such as the Sierra Club/CBE lawsuit, as well as in less confrontational circumstances, interests concerned about environmental impacts are asking how transportation planners know what infrastructure should be built.

Rules of administrative procedure, requirements for environmental impact assessment, and the norms of rational decision making all imply a strong analytical foundation for transportation policy. In effect, the current institutional structure rests upon claims of solid analytical support for projects receiving Federal funds.

In truth, the aggregate of projects in a TIP is not likely to be a uniquely "best" way to spend available funds (in the rational, comprehensive decision-making sense). Viewing transportation decision-making in the larger context of urban governance, one must recognize the pressure on jurisdictions to compete for scarce public works resources, the momentum of plans laid out decades ago (because so many land use decisions anticipate infrastructure), and the natural tendency of elected officials to direct resources at problems that are immediate and apparent (rather than necessarily attacking the root causes). From this perspective the TIP may not be justified on technical grounds alone, but it does constitute an elaborately crafted set of agreements that the MPO endangers at its own peril.

This line of thought suggests a fundamental mismatch between the assumptions behind the Clean Air Act conformity assessment and the reality of urban transportation decision-making, more so in light of the 1990 Amendments' increased reliance on a rational, analytical paradigm. Political and legal conflict may well result from this mismatch, and could be quite intense as expectations clash during the next decade. Nevertheless, there is a learning process taking place. For example, the Bay Area conformity analysis did yield a positive conformity finding on the TIP, albeit with seemingly small benefits for so large an investment (and revealing several problematic corridors). There is some evidence that these results are filtering to sub-regional decision makers and ultimately will influence the kinds of projects brought into the TIP.

It appears likely that MPOs are going to have to conduct more far-reaching analyses of major projects, and that analytical procedures will be scrutinized in unprecedented detail. It would not be at all surprising to find groups with environmental concerns developing their own fully functional network models in some areas, as occurred in some controversies over electric utilities power plant development proposals. The transportation institution monopoly on technical analysis may not continue and the public will not be immune to competing views.

As this landscape becomes increasingly clear to MPOs, they will want to improve analytical capabilities and will need the resources to do so. The MPOs will seek a more theoretically sound, universally accepted knowledge base for urban travel demand analysis. In the absence of DOT investment in the development of new procedures, MPOs would be required to go out and get this on their own, through NARC or less formal cooperation, with funds solicited from a variety of sources. Yet, with so much Federal investment at issue, the DOT stake in good analysis would seem obvious. The reassertion of technical leadership on the part of DOT implied by ISTEA, together with the new "partnership" style promised through ISTEA implementation, suggests the following quartet of initiatives: a DOT in-house research program; an initiative carried out via committee established by the NAS or the Transportation Research Board (TRB); a model guidance and model development project sponsored by NARC; a set of assessments of model predictions versus performance carried out by MPOs, States, or perhaps university researchers.

The role of modeling is not the only significant issue brought out by the conformity provisions of the Clean Air Act. Questions have been raised about a host of technical and procedural matters, such as:

burden acknowledge speeds above 55. This is perhaps an understandable legacy of past efforts to enforce a 55-mph speed limit, but it also has the effect of underestimating emissions wherever faster speeds occur.

Whether or not "off-cycle" (high acceleration, high speed) emissions turn out to be a critical problem, it is clear that mobile source emissions specialists are moving toward a comprehensive reevaluation of certification procedures and emissions factors. This review is likely to produce a refined and perhaps much altered picture of how mobile sources contribute to the emissions burden, with substantial (but currently unpredictable) implications for TCM planning.

- **Emissions rates differ widely among operating vehicles.** The emissions performance of a randomly-chosen vehicle at a given instant is influenced by a number of factors, including the age of the vehicle (determining the basic level of emissions control), variations in the manufacturing process (affecting how well the vehicle matches its mandated performance), the extent of wear and tear and the vehicle's maintenance/modification history, the temperature of engine and catalyst (cold start, versus hot soak, versus fully warmed), roadway conditions (speed, volume, gradient, surface roughness), and the driver's style of operation (e.g., the intensity of acceleration and deceleration for a given average speed). Not one of these factors is trivial. Taken as a set of independent random variables, they would be expected to produce wide variation among the operating fleet—perhaps as much as several orders of magnitude difference between the best and the worst in a large sample.

  Using a roadside infra-red detection device, Stedman of the University of Denver has found that a few vehicles in the operating fleet account for a majority of mobile source emissions. He cites repeated instances of measurement in which the poorest one percent of a sampled fleet accounted for 30 percent or more of the total CO and ROG emissions. He argues that if his findings were to prove indicative of overall fleet condition, TCM programs would be a crude means of reducing emissions in comparison with a strategy that identified and directly removed "super-emitters" from the fleet. **He also argues that the least well-adjusted vehicles are probably owned by unemployed or marginally-employed individuals who are less likely to be reached through employer-based programs. Notwithstanding these issues, if the super-emitters identified in Stedman's work are used disproportionately for non-work travel, then conventional TCMs will not be able to attain even the modest emissions reductions suggested above.**[32]

  While there has been some controversy over the policy recommendations offered by Stedman, there is little dispute over the basic conclusion that super-emitters are present in the fleet. The problem lies in how one might go about finding and removing a significant portion of the super-emitting vehicles. Assuming that high emissions are due primarily to correctable physical causes, there are questions about the enforceability of spot readings from a Stedman-type device, about how many enforcement teams would have to be deployed to monitor a significant portion of the vehicle fleet, about the costs of the overall program (including court costs and follow-up), and about how to handle the equity concerns that will arise if low income households indeed do account for a majority of the super-emitting vehicles. There is also the possibility that much emissions variation is due to uncorrectable physical causes (cold starts) or driver behavior, in which case the ability to identify super-emitters in motion may not yield much improvement over an enhanced inspection and maintenance program.[33] Much research remains to be done.

- **The most polluted areas may require larger emissions reductions than conventional TCMs are likely to produce.** A number of areas appear to require overall emissions reductions on the order of 20 to 30 percent over what can

be achieved through currently adopted vehicle emissions controls. This level of emissions reduction may in fact be more than new vehicle controls and TCMs together will produce in this decade. In California, the requirements are even more stringent. For example, the San Francisco Bay Area, rated "serious" under the California Act,[34] is estimated by the regional Air Quality Management District to need an additional 35-percent mobile source ROG emissions reduction over-and-above what currently adopted California vehicle controls can achieve. The same will be true in other States if a recently filed lawsuit over Federal ozone standards is successful.[35] Conventional TCMs cannot produce reductions of this magnitude.

Thus, there is much uncertainty about TCMs just at the time when statutory support for TCM implementation has grown. There will be institutional pressure for rapid implementation of measures that are "reasonably available"—that is, measures which do not require additional statutory or regulatory authority. Some of these reasonably available measures benefit the transportation system in other ways (such as by helping in congestion relief), with few side effects and at relatively low cost. Implementation in such cases is rarely questioned. However, the majority of reasonably available measures do not offer such a clear imperative for implementation. Either costs are unknown (and difficult to know), or air quality benefits are made uncertain by developments such as CARB's findings on the effects of off-cycle emissions. The EPA, the U.S. Department of Transportation (DOT), and others have gathered information about experience with TCMs, but uncertainty over assumptions and local conditions limits the generalizability of findings.

In order to simplify and speed the process of screening potential TCMs, there is a need for reliable comparative documentation of experience with TCMs, particularly of the costs and of the actual emissions consequences based on up-to-date emissions models. Until this kind of information is made available to policy-makers, it will be difficult to respond quickly and with confidence to the new mandates for TCM implementation.

In summary, existing knowledge about TCMs probably is sufficient to support policy-making at the most basic level; i.e., for taking a first cut at the balance among stationary source, tailpipe, and TCM-based emissions reductions. Experience indicates that "available" TCMs (without additional funds or authority) will rarely yield more than a 5-percent reduction, and in most cases would not yield more than a 2-percent reduction, in overall mobile source CO and ROG emissions.[36] Analyses conducted for the Bay Area, Los Angeles, Denver, Phoenix, and several other metropolitan areas also indicated that further measures considered politically acceptable, but requiring extensive new funding, are unlikely to yield more than an additional 5-percent emissions reduction. In several cases, these additional measures would entail public expenditures on transportation infrastructure equal, on a per capita basis, to the full Federal, State, and local funding stream provided to the areas under ISTEA. Thus, conventional TCMs cannot reasonably be assigned responsibility for more than perhaps 2 percent of the required mobile source reductions (or 7 percent, if expanded funding authority is considered feasible).

Vehicle Technology

The limited potential of conventional TCMs, and uncertainties about implementability and air quality impacts, have led to a renewed push for vehicle technology as a primary means of achieving Clean Air Act goals. A number of improvements appear possible, including:

- **Enhanced inspection and maintenance.** "Inspection and maintenance" is a generic term for a range of programs that periodically test and renew the effectiveness of emissions control equipment. It is well established that emissions performance varies among otherwise identical vehicles, and that on average such performance tends to deteriorate as vehicles age. Emissions variability occurs for many reasons related to the physical condition of the vehicle,[37] including: (1) vehicles may come off the assembly line with flawed emissions equipment;[38] (2) the canister controlling evaporative emissions may behave unpredictably if a vehicle sits unused for too long a period; (3) catalytic con-

tradiction in the position of the transportation planning community was stressed in declarations prepared for the case.

The judge considered these arguments with substantial assistance from his Special Master. He accepted MTC's proposed conformity analysis procedure, including the argument that MTC at this time could not be reasonably expected to model the effect of infrastructure on regional growth. However, he explicitly qualified his finding and noted that nothing in his reading of the 1990 Amendments would preclude EPA from requiring such an analysis in future guidance.

In discussions and seminars since the judge's ruling, some observers have been struck by the very small differences found in emission and travel effects between the Build and the No Build scenarios - even though MTC's TIP is probably more ambitious than most (16% population increase, 2% increase in lane miles, 40% increase in HOV, and significant increases in transit.) This may mean that recent major capital investment decisions (major highway expansions, major rail transit expansions) will have relatively small importance from an air quality perspective.

Others inside the transportation planning community also have been concerned about the issue of regional growth. For MTC's execution of the approved analysis procedure has shown that the emissions benefits of the TIP may not be large (on the order of 1 percent ROG improvement regionwide, with larger improvements - and some ROG increases - corridor-by-corridor). It would not take much population growth – especially on the urban fringe – to outweigh this level of emissions reduction. Hence, it seems likely that growth stimulus will continue to be an issue in conformity assessment.

The effect of the Bay Area case on implementation of the 1990 Amendments is not clear. Nominally, the case turns on an MPO commitment to review highways, already included in an approved SIP, a requirement not found elsewhere in the country. However, the case explicitly addressed the issue of what kind of analyses would be needed to assess the regional impacts of highway capacity investments, and it entered into the public record extensive expert testimony and judicial rulings to the effect that analyses far more extensive and complex than those usually done by MPOs are needed to adequately comport with accepted theory.

EPA and FHWA have found that current analysis capabilities in all but a dozen or so of the largest regions are unable to support MTC's type of recursive methodology. There is a reluctance to require analysis procedures so far ahead of the state of practice and which have not been thoroughly tested. But there is a lingering suspicion that more extensive linkage and feedback loops may be needed. Several MPO Administrators have posed the question as follows: "If my organization is sued over a TIP approval or favorable environmental review, is there a chance that some other judge would be willing to invoke the analysis principles established via the MTC case?" Since the answer to this question is obviously affirmative, the natural extension is: "Wouldn't it be prudent to develop MTC-style analysis procedures now in order to avoid a potentially more expensive and more time-consuming legal entanglement later?" The answer to this question is not quite so obvious; the cost of data collection and model development now may or may not be less than the "expected" present cost of possible future delays and legal battles. Given the political and institutional costs of the kind of litigation MTC has experienced, there will be pressure from the MPOs (and probably from their local constituencies) to put more resources into model development. It also would not be surprising to see sentiment for standardized models, at least in terms of key variables and structural properties. Such standardization would lend credibility to each MPO's analyses.

Nor are these issues confined to the larger metropolitan areas. While more detailed and demanding requirements apply to the larger urban areas, the size of the metropolitan area is not necessarily a good indicator of the severity of the pollution problem(s) or of the complexity of the issues faced in air quality planning. Thus, small and medium-sized metropolitan areas might need to develop better planning and analysis capabilities than otherwise would be expected, in order to respond to air quality planning needs.

Some transportation professionals may be troubled by the extent of reliance on models implied by this discussion. Experienced urban

Transportation Improvement Program (TIP), and other federally-required plan or program must be certified as: 1) implementing all TCMs within its purview; and 2) not adding to mobile source emissions in a way that would alter progress toward attainment or nullify the attainment demonstration. As a practical matter, satisfying the second certification criterion will require an analysis of each plan or program sufficient to show that emissions with the plan or program in place will be at or below the levels assumed in the attainment demonstration.

The San Francisco Bay Area conformity lawsuit illustrates the challenge presented by this requirement. The MTC initially undertook a conventional "state of the practice" analysis to determine the emissions impacts of previous plans. The environmental groups argued that conventional regional transportation models overstate the emissions benefits of highway investments by fully reflecting speed improvements but showing little or none of the "induced" travel resulting from faster times since MTC rarely equilibrates its models beyond mode split. This is important because trip distribution (and other models in the MTC system) also depend on travel times. The environmental groups argued that MTC's conformity assessments would not be valid unless feedback and equilibration addressed all of the potential effects of travel time.

There followed a debate about theory versus practice in travel demand analysis. In reference to the literature of travel demand, all sides agreed that a wide array of travel time effects (on demand) could not be categorically ruled out. These range from the route choice, mode choice, and destination choice effects implied above, to trip generation, auto ownership, and various location choices by households and employers.

MTC suggested that good conventional practice would require some kind of feedback mechanism through trip distribution but no farther. The environmental groups replied that such a procedure would ignore the most basic sources of "induced" travel - namely, the possibility of location shifts and added growth stimulated by new infrastructure (either highway or transit). They suggested that a failure to account for such effects would constitute an unacceptable level of uncertainty in air quality assessments. In a situation of non-attainment, the appropriate response to such uncertainty (it was argued) would be to defer highway projects until the region was firmly in attainment.

MTC proposed an analysis procedure with travel time feedback to trip generation, auto ownership, residential location, and employment location. As it happened, MTC's travel models did incorporate the feedback to trip generation and auto ownership in a credible way (though the full set of linkages had been exercised only in selected model runs). Furthermore, land use models routinely employed by the Association of Bay Area Governments (ABAG) relied upon travel time inputs to determine basic land allocations.

MTC thus could propose a plausible analysis procedure addressing most of the travel responses highlighted in the lawsuit. Three potentially significant phenomena were still omitted: time-of-travel, trip chaining, and regional population and economic growth. MTC proposed to treat time-of-travel in an ad hoc way, making adjustments based on empirically-observed variations in peaking factors (i.e., corridor-by-corridor as a function of congestion). They argued that models of trip chaining in the literature were not yet sufficiently advanced for inclusion in a traditional travel model format, and that existing non-home-based models would account for at least some of the travel time effect on trip chaining. Finally, they argued that practical models of regional growth as a function of infrastructure investment were not available for inclusion in the conformity analysis procedure, and in any event the growth stimulus would not be important enough to matter.

The environmental groups countered that regional economic stimulation was a central issue in conformity, so important that its omission would compromise the integrity of the entire process. They pointed out that a small acceleration in population and job growth (and attendant vehicle trips) could swamp any expected emissions improvement from faster, smoother traffic flow (as determined for a specific horizon, such as the attainment year). And they noted that many of the highway and transit planning documents in the region stressed support of continued economic growth as a principal justification for projects. Economic stimulus has been an evident rationale for infrastructure investment, and studies often attribute specific areawide economic benefits to major projects. This seeming con-

verter performance can be severely degraded by even a single exposure to leaded or otherwise impure fuel; (4) performance deteriorates as engine parts age and wear; (5) errors occur during maintenance and repair; and (6) illegal modifications are made in order to alter engine characteristics (especially to improve acceleration). While more of these defects are likely to accumulate in older vehicles, it is quite possible for debilitating emissions control defects to be present in a vehicle of any age.

The purpose of an inspection and maintenance program is to identify and correct as many of these defects as possible. There are numerous issues involved in the design of such a program, including: (1) institutional setting (e.g., publicly versus privately operated); (2) measurement technology (e.g., idling tests, versus dynamometer-based tests, versus in-use tests);[39] (3) required performance levels for vehicles of different ages; (4) testing frequency; (5) allowable public and private costs; and (6) enforcement method. By varying the design of an I&M program along these six dimensions, it is possible to achieve widely different levels of effectiveness. For example, California has an I&M program to conduct idling tests annually in private garages, with certification required for vehicle re-registration but with a modest cap on repair costs (to protect low income households). One goal of this program is a 25-percent reduction in fleet hydrocarbon emissions, below the level expected from a fleet without I&M. However, a recent review indicated actual reductions of only 10 to 15 percent, which led the State to broaden the scope of the program and to raise the cap on repair costs. Additional changes will be considered if the next review shows a continued shortfall from the 25-percent goal.

While there is little doubt that significant improvement in fleet performance is possible, there also is much disagreement over the appropriate design of an I&M program (on both technical and political grounds). Through a combination of test center corruption, exemptions for very old vehicles, repair cost caps, and unregistered vehicles,[40] a substantial (possibly the dirtiest) portion of the fleet is not reached by conventional I&M. It may require a markedly different approach to reach this segment of the fleet and achieve the full potential of I&M. In particular, random in-use testing (as demonstrated by Stedman) with repair subsidies for low income households is seen by many as an attractive alternative to the conventional approach.

- **Oxygenated fuels.** The addition of oxygenated compounds directly to gasoline can improve the efficiency of combustion and lower the output of CO and ROG. The EPA and CARB studies indicate that a 2- to 2.5-percent increase in oxygen content would produce at least a 10 percent reduction in CO,[41] at an added cost of 10 to 15 cents per gallon.[42] Recognizing this, the 1990 Amendments require oil companies to sell oxygenated fuels in moderate and severe CO nonattainment areas starting in the fall of 1992.[43]

  Oxygenated fuels might offer several improvements over current emissions factors. For example: (1) since the fuel changes mandated by the 1990 Amendments do not yet appear in the Mobile or EMFAC series of emissions models,[44] it is legitimate to take additional CO running emissions credits of perhaps 10 percent; (2) if a State is willing to require oxygenated fuel sales year-round, similar running emissions credits could be extended to ROG calculations;[45] and (3) further CO and ROG reductions may be possible through additional fuel reformulation.

- **Pre-heated catalytic converters.** Cold starts have become a much larger segment of the mobile source emissions burden because the catalytic converter cannot function effectively until it has been heated by exhaust gases. This has led to proposals for equipping the catalytic converter with a heating element and an auxiliary power supply (presumably a second battery) that would bring the converter up to operating temperature in a brief period after the ignition is turned on.[46] Several designs have been suggested, and it appears technically feasible to require pre-heated catalysts on all new vehicles by the end of the decade. A clear

estimate of the emissions improvement and the added capital and operating cost per vehicle must await further R&D, however.[47]

- **Electric vehicles.** California has a requirement for the availability of a modest number of "zero-emission vehicles" (ZEVs) by the end of the decade, with substantial market penetration by 2010.[48] General Motors and others, while showing caution about the technology timetable, have indicated that they expect to be players in this market. Battery technology remains a serious constraint on the production of an electric vehicle that would replace existing vehicles in function, but there is reason to think that households could supplement their vehicle holdings with electric models based only on current battery technology and used largely for local trips.[49]

Together with a host of lesser improvements, the first three of these measures appear able to produce large additional reductions in tailpipe emissions of CO and ROG – perhaps as much as 35 percent. Electric vehicles are less certain, but may be able to contribute some reductions in California and possibly elsewhere by the turn of the century.

As simple as they appear, the technology options are not without potential impediments to implementation. At least three concerns have been raised:

- **Controlling oxides of nitrogen (NO_X).** Unlike CO and ROG, NO_X is a product of efficient combustion and so can increase as CO and ROG decrease. NO_X also is a key ingredient of smog. A recent National Academy of Sciences report argued that the balance of ROG and NO_X in the emissions stream may be nearly as important as overall levels, and that failure to attain Federal ambient air quality standards in some regions may result from inadequate controls on NO_X. Put plainly, some regions may need a NO_X strategy along with a ROG strategy to solve their ozone problems, yet most of the available tailpipe options either do not affect NO_X or actually increase NO_X emissions. Under a NO_X strategy, outright reductions in travel (in conventional vehicles) would become more important, relative to tailpipe solutions than they have been in the past.
- **Cost.** Auto manufacturers and legislators have expressed much concern over the effect of emission controls on the prices of new cars. Because auto price elasticity is substantial, even a modest increase in price (say, $300) can reduce sales by a couple of percent. Since the combined average cost of scheduled improvement plus pre-heated catalytic converters likely would be at least this high, it is difficult to deny that proposed tailpipe controls would be felt by the auto industry. In addition, application of new technologies to all vehicles would over control those sold in unpolluted areas, an issue for many States with little or no pollution problem.
- **Political acceptability.** In debates over the 1991 Amendments, there were a number of references to "sharing the burden" among tailpipe controls, stationary source controls, and travel reductions. Some argued that because travel reductions had not followed from earlier Amendments, it was now time to be more explicit about the role expected from transportation controls and the transportation planning sector. If anything, the impulse to protect American industry has grown since the 1991 Amendments were passed, and the political pressure to deflect the burden from the auto and petroleum industries may have grown as well.

It appears that further emission reductions resulting from fleet turnover, cleaner fuels, "high tech" inspection and maintenance, and new emission control technologies (etc.), will be far greater than those achievable from TCMs,[50] however, it is an open question whether there is either technical justification or sufficient political consensus to impose another round of technology changes on the auto and fuels industries and the traveling public. Whether this reluctance will continue as the costs and effectiveness of alternatives assume clearer form remains to be seen. As with TCMs, there is a need for better information about the costs and benefits of technology improvements. Through explicit language about TCMs, the 1990 Amendments created an expectation that

One question for national policy is whether California's unique circumstances alone account for its serious consideration of market-based measures. Looking at the factors cited above, only the statutory framework is truly unique to California (i.e., the more stringent ozone standard and the California Clean Air Act specifics). Most of the other factors are present throughout the country. Furthermore, while the Federal standard is less stringent than California's, other provisions of the Federal Act require rates of improvement that sometimes may not be attainable with only existing technologies and conventional TCMs. Thus, there is reason to think that at least some places outside California will look to pricing as an option.

If market-based measures do receive consideration in Federal TCM planning, a number of supportive actions may be necessary. In particular, suitable analysis tools will be needed; currently a surprising number of MPOs lack data on such basic factors in travel choices as household incomes and travel costs, and hence cannot adequately model any pricing policies. Even when good analyses can be done, however, there may be a big gap between the promise of pricing measures and their feasibility from a legal and political standpoint. Restrictions on tolls on Federal-aid highways have been substantially reduced by ISTEA (except for the Interstate System). Nonetheless, concerns about taking away a public benefit ("free" roads), equity issues, and the like may block implementation.

Market-based measures diverge so completely from existing transportation policy that both planning and implementation are bound to be problematic. But the potential benefits also are large, for air quality as well as for other transportation problems such as congestion. Momentum must develop at the grass roots, but Federal and State governments can help by making sure that localities are as free as possible to experiment with pricing measures, and by considering implementing legislation when they are asked to do so.

Summary

Mobile source emission reductions pose serious challenges for both transportation and air quality planners. Measures which are readily available and enjoy public acceptance are likely to have only modest impacts; measures whose impacts could be substantial, such as land use changes and revised transportation pricing policies, are more likely to face legal and institutional barriers as well as public opposition. Automotive technology probably remains the most publicly acceptable way to achieve large emissions reductions, but the costs could be substantial. A lack of data on the benefits of emission reductions and the full benefits and costs of alternative transportation policies hampers progress.

Integration of Transportation and Air Quality Planning

Another important aspect of the 1990 Clean Air Act is a provision requiring DOT plans and programs to "conform" with applicable SIPs. Without doubt, Metropolitan Planning Organizations (MPOs) and State Transportation Departments are as concerned about the conformity provisions as about any other element of the 1990 Amendments. The basis for this concern lies both in the process outlined by the Amendments and in the outcome of a recent court case brought by environmental groups against the Metropolitan Transportation Commission (MTC), the San Francisco Bay Area's MPO.

The role of transportation in the SIP is the same as it was under earlier Amendments. Each SIP is required to show attainment on a schedule dictated by the Act. Transportation influences the attainment demonstration in two ways: 1) based on projected emissions factors, demographic and travel forecasts, and assumed future highway and transit networks, a mobile source emissions inventory is estimated for the attainment year and at intervals prior to the attainment year; 2) transportation controls are included as necessary to show reasonable progress and attainment.

The conformity provisions were intended as a way of guaranteeing commitments assumed in the SIP attainment demonstration. Each Regional Transportation Plan (RTP),

- **Specific requirements for transportation/air quality planning under the California Clean Air Act** – The Bay Area was required to plan for attainment of the state standard without additional automotive emission controls.[56] Based on Air District estimates, this implied a five-percent per year reduction in mobile source reactive organic (ROG) emissions beyond what would be achieved through adopted California tailpipe controls. It was quickly apparent that stringent TCMs would be needed to achieve this level of reduction.
- **Experience with "command and control" transportation measures** – Trip reduction programs based on voluntary, advertising-induced mode shifts by commuters have had modest effect. Regulation 15 (the South Coast Air Quality District in Los Angeles mandatory employer trip reduction measure) has been most effective when employers instituted parking fees.
- **Plan and program conformity under the Federal Clean Air Act Amendments** – Conformity under the final EPA guidelines will be based on adherence to a mobile source emissions budget that includes specific reductions to be accomplished according to a specified schedule. Without a showing of attainment on schedule, and without a showing of progress at required intervals, it could be difficult to obtain the necessary plan and program approvals. A set of contingent pricing measures would make it possible to adjust the emissions reduction strategy year by year to keep it on the expected progression of reductions.
- **The ubiquity of congestion** – Many policy makers and civic leaders appear to have concluded that neither funding nor public support is present in sufficient quantity to "build our way out of congestion." This has led the business community (among others) to search for other means of reducing congestion, including land use changes and pricing.
- **Toll roads, public/private partnerships** – The interest in toll road development and privately funded and operated highway improvement offers a convenient opportunity to introduce pricing, somewhat outside the conventional institutional framework.
- **Advances in technology** – Automatic vehicle identification (AVI) has become sufficiently reliable to support large-scale monitoring of the vehicle fleet. Given an identifier on each vehicle, all congested points on the freeway and arterial system could be monitored and priced to reduce trips and/or VMT.
- **Fairness of the existing funding stream** – The gasoline tax and other fees proportional to use provide less than half of all transportation revenues in California, while local sales taxes now account for over 25 percent.[57] The view is increasing heard that explicit pricing might be fairer than the current system, especially if funds were directed at the transportation and/or housing needs of the low income community.
- **Evolution of the anti-tax movement** – Tax increases with vague targets remain a political anathema. However, the willingness of voters to impose new taxes for specific, desired projects has become apparent. It is possible that a large restructuring and expansion of the transportation funding stream would be feasible if accompanied by clear, geographically specific, iron-clad expenditure commitments.
- **The Congestion Pricing Pilot Program** – The 1991 ISTEA supports a continuing interest in "testing" pricing solutions and provides Federal support and "legitimatization" to the concept of time, place, and occupancy-specific user fees.

While these factors have kept pricing on California's planning agenda, there is no explicit commitment to implementation other than a statement that implementation will occur beginning in 1994 if the State Legislature provides appropriate statutory authority. In essence, the market-based plan challenges the Legislature to support its Air Act either by forcing fundamental change in vehicle technology or by helping the Region to implement a far reaching transportation pricing proposal (or some combination of the two).

vehicle technology would not have to carry the entire load. If that apparent intent of the legislation cannot be fulfilled, current political conditions dictate that a persuasive case be made on all sides.

Land Use

Two other approaches to mobile source emissions reduction are often suggested in air quality debates: fostering land use patterns that minimize emissions, and pricing transportation to achieve more efficient use of the infrastructure.[51]

Land use approaches have been part of the dialogue about emissions control since the 1970 Federal Amendments. They often are dismissed as impractical because of the fragmented institutional setting of most land use decisions in the U.S., and because of the long implementation horizon. Yet recent debates about air quality and other aspects of the urban environment have made much of the linkage between low density land uses and high rates of per capita travel. Data from large cities worldwide show a consistent, strongly negative correlation between residential density and measures of metropolitan average per capita vehicular travel consumption (VMT, trips, fuel consumption, emissions). Using readily-available survey and demographic data, the same relationships can be replicated for any metropolitan area. Some have suggested that income may be the driving force behind these relationships, but evidence indicates that income accounts for only a portion of travel variability with land use.

With wider dissemination of data about land use and travel consumption, interest in land use controls for emissions reduction has grown. Environmental groups, in particular, infer from the data that infrastructure investments will worsen per capita emissions when they support development at the urban fringe (where the lowest density, highest travel consumption districts are found) and will improve per capita emissions when they create arrangements of land uses that require less vehicular travel (either by placing compatible uses in close proximity or by linking activity centers and residential areas through mass transit).

Because statutory authority differs in each metropolitan area, available land use control mechanisms also vary. In California, the State Act allows air districts to establish indirect source review (ISR) programs for oversight of land use and facility location decisions.[52] It has been suggested that ISR could be used to elicit design features beneficial to air quality, such as mixed uses at employment centers, high-quality pedestrian treatments, bicycle facilities, and direct links to transit lines. Minnesota's ISR program is used in much this fashion.

Alternatively, locally-originating policies and programs could have the same effect. Such cities as San Diego, Portland, OR, Seattle, and Boston have many of these policies already in place. In a few cases state planning acts or regional planning laws may provide yet another way for land use and transportation to be more closely coordinated, though to date few areas have taken strong stances in response to air quality concerns.

Because of the heightened interest in transportation – land use connections, the current cycle of air quality planning has a chance of producing some kind of land use review among the proposed emissions control measures. But at the present state of knowledge, given the requirements for demonstrating feasibility, effectiveness, and implementability under the State Implementation Planning (SIP) process, EPA may find it difficult to assign emissions reduction credit to land use measures. Uncertainty exists in many aspects, including:

- **Which land use patterns correlate with reduced per capita vehicular travel consumption?** The process of averaging masks much of the informative variation present in land use data, especially the joint effects of household and neighborhood characteristics on travel consumption. By the same token, case study data (e.g., from new pedestrian-oriented developments) have been neither extensive enough nor well enough controlled to show whether the associated travel patterns are more efficient. Overall, the evidence is suggestive rather than definitive, and there is a need for objective analyses and evaluations in sufficient quantity and range to understand key relationships.
- **Which relationships are causal and what is the direction of causality?** Statistical correlations do not imply causal relationships. For example, we do not know whether less dense residential development (and associated decreases in retail/service

density) "causes" people to travel more by vehicle, or whether people with a proclivity toward extensive auto mobility select themselves into low density areas. In the second case, a gradual increase in density would be likely to yield much less of a drop in per capita travel than in the first case (assuming all those preferring easy auto mobility did not move instantly). Time-series data are needed for studying the relationship between land use and travel. A better form of time series data would be longitudinal panel studies that show changes in personal and household behavior as land use characteristics change.

- **What is the magnitude of improvement to be expected from various measures or combinations of measures, and over what time frame will the improvements materialize?** We are just beginning to understand the extent of variation in travel behavior with different patterns of development. It will take a number of years of careful research to gather enough reliable data to yield a systematic predictive capability (including an understanding of market size for preferred land use patterns). Until this occurs, it will be relatively easy to estimate the emissions effects of specific site designs with which we have prior experience, but difficult to draw conclusions about the feasibility or effectiveness of large-scale implementation.

In light of the above comments, it seems unlikely that a deep enough understanding of land use/travel interactions will be developed in time for the next round of SIP revisions, at least not at the level of generalizable regional impacts. On the other hand, the option of denying any credit for land use measures is unappealing if only because it would remove the incentive to initiate programs with a large potential long-term payoff. It might be possible for EPA and DOT or the NAS to convene a group of experts to review available case study data and form an early recommendation on a reasonable range of claimed emissions reductions. Subsequent studies would be likely to supersede such judgment-based recommendations, but such an approach would encourage regions to pursue land use options that otherwise might be lost for lack of timely initiation.

To summarize, it is difficult to assess the potential of land use measures in mobile source emissions reduction. Intuition—and data that appear to validate intuition—have led planners and environmentalists to argue that sparse, poorly integrated development is one root of the congestion and air quality problems that afflict urban areas. Whether or not this assertion is valid, and to what degree, many—perhaps most—participants in the pending transportation/air quality policy-making process are inclined to accept its basic premise and may expect to include land-use measures in TCM plans. Some Federal guidance to help clarify the options would smooth and speed the policy making process.

Pricing

Perhaps the most surprising aspect of the recent round of transportation-air quality planning in California has been the role played by congestion pricing and other transportation user fees. Economists have long argued that many functional problems in the transportation system stem from inaccurate price signals. But a presumption of political infeasibility has kept pricing from serious policy consideration. Faced with mounting congestion and the stringent goals of the California Act, planners in Los Angeles and the Bay Area have found it necessary to invoke fees, tolls, and the like simply to satisfy mandated planning goals in a technically feasible way. While most of these proposals have yet to run the political gauntlet—local and State—(and may not soon be raised in a legislative forum), they already have received a more serious public airing and garnered more media support than at any time in the past.

As proposed in the Bay Area, the pricing approach rests on four user fee concepts: congestion charges, smog charges, parking fees, and gasoline taxes. These fall into two conceptual categories: charges that are firmly rooted in the economics of transportation (i.e., "market-based") and fees that exploit a convenient institutional framework for revenue collection (i.e., "fee-based").

Market-based policies are ones that can be can be justified by the internal or external costs of transportation. The Bay Area Economic Forum, a business coalition based in San Francisco, introduced "market-based" to the terminology of the Bay Area clean air debate with a 1989 proposal for pricing as a substitute for

"command and control" emissions reduction measures proposed in Los Angeles. Two of their suggestions were adopted by Bay Area air quality planners:

- **Emissions charges** – This would be an annual charge based on an estimate of each vehicle's emissions in the previous year, set to recover the "true" marginal cost of auto emissions. It might be levied at the time of registration, based on a reading of the vehicle odometer and a measurement of the tailpipe emissions. Coupled with information about the characteristic performance of each make and model, these data would be used to develop an estimate of annual emissions. Health and damage costs per unit of emissions then would be used to set the annual fee. Vehicle fleet and emissions cost data suggest that fees for the existing fleet might vary between $5 and $1,000, with the average at $125 (about $.01 per mile).
- **Congestion charges** – These would involve a large number of localized tolls in congested corridors throughout the region, employing Automatic Vehicle Identification (AVI) technology. Under the Economic Forum proposal, revenues would be reinvested in new infrastructure (transit or highway) until the marginal cost of a capacity increment matched the congestion charge. Bay Area planners did not adopt such a rigorous approach, assuming that some portion of the revenues might have to be bartered for political support. They substituted an arbitrary highway level-of-service criterion (LOS D/E) in place of the Forum's marginal cost criterion.

Fee-based policies are ones arising from a convenient administrative framework for revenue collection. In the Bay Area, analyses made it clear that market-based measures alone could not achieve the state emissions reduction mandate. Planners fell back on two other pricing strategies with known administrative requirements:

- **Employee parking fees** – The intent of this proposal was to achieve a minimum employee parking charge of $3 per day, payable monthly, with the bulk of the revenues recycled as added transit and ridesharing incentives. The $3 level was loosely selected to represent the "opportunity cost" of land dedicated to parking in a typical suburban location.
- **Gasoline taxes** – A simple increase in the pump price of gasoline by $2 per gallon was proposed. The $2 level was selected to roughly match the average cost of a State-administered automobile insurance program.[53]

Many other pricing approaches would be possible, but a preliminary screening suggested these two would offer the strongest basis for analysis and public discussion.

The Bay Area pricing proposal is in the long-run phase of the Region's adopted State TCM Plan. Together with a program of conventional TCMs, these market-based measures would enable the Bay Area to achieve the emissions reduction goals of the State Clean Air Act.[54]

Given the politics of urban transportation policy, the fact that a pricing proposal of this type could survive so long on the public agenda is remarkable. A number of factors appear to have played a role in the altered status of pricing:

- **California's stringent ozone standards** – The California one hour ozone standard currently is .09 ppm with zero exceedences (versus the Federal standard of .12 ppm with not more than three exceedences in three years). It is virtually impossible to meet the .09 standard by the legislated deadlines without some degree of VMT and trip reduction; even remote areas record ozone levels in the .08 ppm range. Moving standards to lower levels would require significant lifestyle changes, and potentially have severe economic impacts nationwide. The California standard is based on a reading of the epidemiological literature, and there does not appear to be sentiment at this time for relaxing it. Thus, all of California's large cities (and a number of the smaller ones as well) must pursue TCMs.

OTP FUNDING PROGRAM

Updated March 10, 1993

	DESCRIPTION OF PROPOSED LEGISLATION	REVENUE GENERATED	
		93-95	6 YEARS
	HIGHWAY MEASURES		
HB 2415	Gas Tax and Weight-Mile: 4 cents/4 years	$141.3 M	$1.5 B
HB 2416	Registration Fee: Plus $30/biennium by 1995	$16.5 M	$179.2 M
HB 2421	Transportation Access Fee	$22.3 M	$83.9 M
HB 2422	Studded Tire Fee	$476,000	$2 M
HB 2423	Repeal Gasohol Exemption	$32.9 M	$84.7 M
HB 2424	Expand ODOT Bonding	N/A	N/A
	TRANSIT MEASURES		
HB 2419	Emissions Fee: Portland-area	$29.4 M	$425.8 M
HB 2420	Payroll Tax Extension	$2.1 M	$19.4 M
HB 2428	State "In-Lieu Of" Payments	$1.2 M	$3.5 M
HJR 7	Emissions Fee For Transit Constitutional Amendment	N/A	N/A
HB 2425	Lottery Money for Rail		
HB 2426	Rail Fund	$170 M	
HB 2427	Tire and Battery Tax	$8.8 M	$32.4 M
HB 3173	Statewide Vehicle Emission Fee	$4 M	$37.8 M
	AVIATION MEASURES		
HB 2417	Jet Fuel Tax: Plus 1/2 cent	$824,000	$3.5 M
HB 2418	Avgas Tax: Plus 2 cents	$150,000	$550,000
	PORTS AND RAIL FREIGHT		
HB 2429	Lottery Money for Marine/Rail	$25 M	
HB 3174	Rail Rehabilitation	$5 M	
	BICYCLES		
HB 2430	Bicycle Fee	$1.6 M	$6.6 M
	CONGESTION PRICING		
HB 3299	Congestion Pricing (Metro)	N/A	N/A

N/A Not applicable.

NOTE: As a complement to approval of Highway Fund revenue increases, the OTC will expand transit use of flexible federal funds.

COMPARISON OF AUTOMOBILE RELATED TAXES

		Bordering States				Other Western States	
Tax	Oregon	Washington	California	Idaho	Nevada	Arizona	Montana
Gas Tax	24¢	23¢	22.7¢[1]	21¢	27¢[1]	19¢	21.4¢
Registration Fee	$15/year	$24/year	$27/year	$44/year	$17/year	$16/year	$16/year
(Tax Equivalent Cents/Gallon)[2]	(2.4¢)	(3.8¢)	(4.3¢)	(7.0¢)	(2.7¢)	(2.5¢)	(2.5¢)
Average Ad Valorem Taxes	0	$155/year	$135/year	0	0	$133/year	$101/year
(Tax Equivalent Cents/Gallon)[2]	0	(24.5¢)	(21.3¢)	0	0	(21¢)	(16¢)
Prorated Automobile Sales Tax[3]	0	$154/year	$156/year	$99/year	$118/year	$118/year	0
(Tax Equivalent Cents/Gallon)[2]	0	(24.4¢)	(24.7¢)	(15.6¢)	(18.7¢)	(18.7¢)	0
TOTAL EQUIVALENT CENTS PER GALLON	26.4¢	75.7¢	73¢	43.6¢	48.4¢	61.2¢	39.9¢

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[1] California includes sales tax; Nevada includes average local option tax

[2] Calculated using 632 average gallons per year

[3] Prorated over 8 years

Source: Oregon Dept. of Transportation, Office of Future Technology Research

BF:ds
2/11/93

STATE GASOLINE TAX RATES

RANKING	EFFECTIVE TAX RATE*	STATE
1	.28	Connecticut
2	.277	New York
3	.268	Nebraska
4	.26	Rhode Island
5	.24	Nevada, Oregon
6	.235	Maryland
7	.233	Illinois
8	.23	Washington
9	.227	California
10	.224	Pennsylvania
11	.223	North Carolina
12	.222	Wisconsin
13	.22	Colorado
14	.214	Montana, Tennessee
15	.21	Idaho, Massachusetts, Ohio
16	.2035	West Virginia
17	.20	District of Columbia, Iowa, Louisiana, Minnesota, Texas
18	.198	Michigan
19	.196	Hawaii
20	.195	Indiana
21	.19	Arizona, Delaware, Maine, Utah
22	.187	Arkansas
23	.186	New Hampshire
24	.18	Alabama, Kansas, Mississippi, South Dakota
25	.177	Virginia
26	.17	New Mexico, North Dakota, Oklahoma
27	.16	South Carolina, Vermont
28	.152	Florida
29	.15	Kentucky
30	.13	Missouri
31	.123	Georgia
32	.105	New Jersey
33	.09	Wyoming
34	.08	Alaska

*Includes sales tax, where applicable, calculated assuming unleaded gasoline price of $1.20 per gallon.

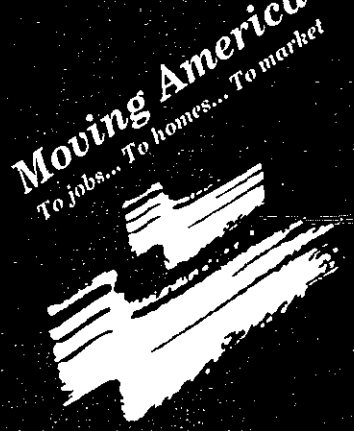
When comparing user fees, it is important to remember that Oregon has a low automobile registration fee and does not impose sales and excise taxes on automobiles, as in many other states. When these taxes are taken into consideration, the total automobile tax comparison changes.

February 8, 1993

A Summary

TRANSPORTATION PROGRAMS AND PROVISIONS of the Clean Air Act Amendments of 1990

U.S. Department
of Transportation
Federal Highway
Administration



Publication Number: FHWA-PD-92-023
HEP-41/10/92 (40M) QE

Federal Highway Administrator Thomas D. Larson's Message:

Americans want mobility and clean air. For the first 60 years of the 20th century, the Nation's road builders concentrated on mobility, on opening up America, with construction of the Interstate System as embodiment of this goal.

Throughout this period, Federal-aid highway acts were the primary legislative driving force. Beginning in the 1960's, however, non-highway legislation has played an increasingly important role in developing our Nation's transportation program. The National Environmental Policy Act of 1969, the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, and many others created a new awareness of the role of the road within the context of social, economic, and environmental concerns. Now, with enactment of the Clean Air Act Amendments of 1990 (CAAA), transportation planners have been challenged again, this time to maintain the Nation's mobility while enhancing our air quality.

The CAAA may have a greater effect on the Nation's transportation over the next 20 to 30 years than any of the non-highway laws enacted since the 1960's. More than a decade in the making, the CAAA recast the planning function to ensure that, in areas experiencing air quality problems, transportation planning is geared to improved air quality as well as mobility. State and local officials have been challenged by the

CAAA to find ways to reduce emissions from the vehicle fleet, to develop projects and programs that will alter driving patterns to reduce the number of single-occupant vehicles, and to make alternatives such as transit and bicycles an increasingly important part of the transportation network. For all nonattainment areas, the CAAA, with the tough political decisions they force government to make, are a strong incentive to expand efforts to reach attainment as expeditiously as possible.

To make the CAAA work, officials must understand their complex requirements. They involve rigorous planning, complex computer modeling, difficult choices, and changes in the way every traveler thinks about his or her mobility—as well as a complex new terminology. In preparing this brochure, our goals have been to make the law understandable and to do so in a way that explains how the CAAA affect transportation decision making.

Fortunately, the CAAA were followed by the Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA). Under the ISTEA, our restructured surface transportation programs give State and local officials the tools to adapt their plans to the requirements of the CAAA. Together, the CAAA and the ISTEA provide us with the means to help achieve BOTH mobility and clean air.

Contents

List of Tables and Figures

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A SUMMARY OF THE TRANSPORTATION PROGRAMS AND PROVISIONS

Overview

To achieve the goals of the Clean Air Act Amendments of 1990 (CAAA), State and local officials must first understand the requirements for transportation plans, programs, and projects. The Federal Highway Administration (FHWA) has prepared this brochure to explain in detail Title I of the CAAA, and selected parts of Title II. Technical terms are highlighted and defined throughout this document. For easy reference, the terms are again defined in the glossary.

Title I establishes criteria for attaining and maintaining the *National Ambient Air Quality Standards (NAAQS)*. These are Federal standards, developed by the Environmental Protection Agency (EPA), that set allowable concentrations and exposure limits for various pollutants. Subsequent to the passage of the CAAA, the EPA released the nonattainment area designations and boundaries for the following pollutants:

- ozone (O_3)
- carbon monoxide (CO)
- small particulate matter (PM_{10})

A *nonattainment* area is a geographic region of the United States that the EPA has designated as not meeting the NAAQS. Depending on the severity of the air quality problem, officials in each nonattainment area must take specified actions within a set time frame to reduce emissions and attain the NAAQS. The actions become more numerous and more stringent as the air quality problem gets worse. Title I also provides the following:

- a requirement that transportation plans, programs, and projects conform with the State Implementation Plan (SIP) for attaining the NAAQS;

- a requirement for greater integration of transportation and air quality planning procedures in order to address air quality concerns;
- the conditions under which EPA can impose sanctions, including the loss of Federal-aid highway funds.

Under Title II, the CAAA identify actions for reducing emissions from mobile sources, such as motor vehicles. State and local officials may not be responsible for these actions; many of the requirements apply to manufacturers of vehicles and fuels. Familiarity with these measures is important, however, because reducing mobile source emissions through technological improvements is important in attaining the NAAQS.

Persons responsible for developing, adopting, or implementing transportation plans, programs, and projects must understand how the CAAA affect their work. State and local officials not directly involved in transportation or attaining and maintaining air quality standards may also wish to read this brochure, and use it as an aid to decision-making.

TITLE I

TRANSPORTATION PROVISIONS FOR ATTAINMENT AND MAINTENANCE OF THE NATIONAL AMBIENT AIR QUALITY STANDARDS

The NAAQS ensure that certain pollutants do not exceed specified levels more than once a year. The threshold for each pollutant ensures protection for even the most sensitive groups of the population. Areas with levels that violate the standard are designated as nonattainment areas for whichever pollutants are involved.

Nonattainment areas must reduce the emissions from the source causing the pollution. There are three types of sources:

Mobile sources - Mobile sources include motor vehicles, aircraft, seagoing vessels, and other transportation modes. The mobile source related pollutants of greatest concern are CO, transportation hydrocarbons (HC), nitrogen oxides (NOx), and PM_{10}.

Stationary sources - Stationary sources are relatively large, fixed sources of emissions (i.e., chemical process industries, petroleum refining and petrochemical operations, or wood processing).

Area Sources - Area sources are small stationary and non-transportation pollution sources that are too small and or numerous to be included as stationary sources but may collectively contribute significantly to air pollution (i.e., dry cleaners).

Included in Title I are transportation provisions with attainment dates for defining and reducing the emissions problem. The provisions and attainment dates vary according to the type of pollutant and level of severity.

This brochure will describe only mobile source provisions of the CAAA. In practice, however, a mix of measures and tradeoffs between controls on mobile, stationary, and area sources will be required to reach the NAAQS.

The requirements are designed as a step process. Missing an attainment date causes an area to be "bumped up" to a more stringent classification, thus taking on the added responsibilities for that class. For example, if a nonattainment area's classification is raised from 'moderate' to 'serious' for ozone, it is responsible for all actions mandated by the CAAA for 'moderate' areas, and also must take on the additional responsibilities listed for 'serious' areas.

The following section explains the transportation-related requirements for ozone, CO, and PM_{10} nonattainment areas.

Transportation Provisions for Ozone Nonattainment Areas

Ozone is a colorless gas with a pungent odor and is associated with smog or haze conditions. Although the ozone in the upper atmosphere protects us from harmful ultraviolet rays, high ground-level concentrations of ozone produce an unhealthy environment.

Ozone is not a direct emission from transportation sources. It is a secondary pollutant formed when precursor emissions, HC and NOx, react in the presence of sunlight. Because of these complex relationships, understanding and controlling ozone formulation requires understanding of all HC and NOx emissions within the region and cannot be controlled based on individual projects or facilities.

Transportation hydrocarbons constitute approximately 40% of man made sources. Those emitted from motor vehicles form a colorless, gaseous compound originating from evaporation and the incomplete combustion of fuels. Nitric oxide (NO) and nitrogen dioxide (NO_2) are collectively referred to as oxides of nitrogen (NOx). NO forms during high-temperature combustion processes. NO_2 forms when NO further reacts in the atmosphere.

Ozone nonattainment areas are classified according to the second highest hourly level of ozone in the air on a yearly basis. Ozone levels are measured in *parts per million (ppm)*. As shown in Table I, areas with worse problems are given more time to attain the NAAQS.

Table I
NAAQS CLASSIFICATIONS FOR OZONE

CLASSIFICATION	1-HOUR CONCENTRATION (ppm)	ATTAINMENT DATE
MARGINAL	0.121 up to 0.138	11/15/93
MODERATE	0.138 up to 0.160	11/15/96
SERIOUS	0.160 up to 0.180	11/15/99
SEVERE 1	0.180 up to 0.190	11/15/2005
SEVERE 2	0.190 up to 0.280	11/15/2007
EXTREME	0.280 and above	11/15/2010

The requirements for defining and reducing the ozone precursor emissions problem increase with each worsening classification. These requirements must be included in the *State Implementation Plan (SIP)*, a plan mandated by the CAAA that contains procedures to monitor, control, maintain, and enforce compliance with the NAAQS.

Table II (See page T-1 at back of brochure) explains how areas in different classifications must **define** the emissions problem by revising the SIP to include an *emissions inventory* and an *emissions budget* for HC. An emissions inventory is a complete list of mobile, stationary, and area sources and the amounts of pollutant emissions within a specific area and time interval. An emissions budget, or emission reduction targets, identifies the allowable emissions levels needed to achieve the NAAQS for all sources. The emissions levels are used for meeting emission reduction milestones, attainment, or maintenance demonstrations.

Table III (See page T-2 at back of brochure) explains how these areas must **eliminate** the problem, bringing emissions in line with the emissions budget and into compliance with the NAAQS. States must also ensure that previous commitments in existing SIPs are being met. If a nonattainment area is classified as moderate or above, the State must revise the SIP to include transportation-related measures, as listed in the CAAA, to reduce mobile source emissions by the milestones in the emissions budget.

Transportation Provisions for CO Nonattainment Areas

Carbon monoxide is a colorless, odorless, tasteless gas formed in large part by incomplete combustion of fuel. Fuel combustion activities (i.e., transportation, industrial processes, space heating, etc.) are the major sources of CO. High concentrations of CO can develop near these combustion sources. Therefore, facility specific, or "hotspot" analysis is often used to identify potential CO problems.

Areas designated as nonattainment for CO are classified according to the severity of their CO problem. Pollution concentrations are measured in parts per million (ppm). As shown in Table IV, areas with worse problems are given more time to attain the NAAQS.

Table IV
NAAQS CLASSIFICATIONS FOR CO

CLASSIFICATION	8-HOUR CONCENTRATION (ppm)	ATTAINMENT DATE
MODERATE	9.1 through 16.4	12/31/96
SERIOUS	16.5 and above	12/31/2000

The requirements for defining and reducing the CO emission problem increase with each worsening classification. These requirements must be included in the SIP. Table V (See page T-3 at back of brochure) explains how areas in different classifications must **define** the emissions problem by revising the SIP to include an emissions inventory and an emissions budget, or emission reduction targets, for CO.

Table VI (See page T-3 at back of brochure) shows how these areas must **eliminate** the problem, bringing emissions in line with the emissions budget and into compliance with the NAAQS. States must revise the SIP to include transportation-related measures, as listed in the CAAA, to reduce mobile source emissions by the milestones in the emissions budget.

Transportation Provisions for Small Particulate Matter Nonattainment Areas

Particulate matter (PM) is any material that exists as a solid or liquid in the atmosphere. It may be in the form of fly ash, soot, dust, fumes, etc. The sources of PM are still being defined; however, from a transportation standpoint, particulate matter can be caused by tailpipe emissions, and dust from paved and unpaved roads.

Small particulate matter which is less than 10 microns in size is referred to as PM_{10}. A micron is one millionth of a meter. Particulate matter this size is too small to be filtered by the nose and lungs; thus, allowable concentration levels of PM_{10} are specified for the NAAQS. There is no clear consensus yet as to whether PM_{10} is an areawide or hot spot problem.

Areas designated as nonattainment for PM_{10} are classified according to its weight in the air. Pollution concentrations are measured in micrograms per cubic meter (ug/m3). Initially, all areas with an average 24 hour measure over 150 ug/m3, or an average annual measure over 50 ug/m3 are classified as moderate areas. The EPA may reclassify any of those areas to a serious status if they cannot reach attainment.

The requirements for defining and reducing the PM_{10} problem increase with each worsening classification. Table VII (See page T-4 at back of brochure) shows the requirements for PM_{10} nonattainment areas.

CONFORMITY

What is conformity?

Conformity is a determination made by metropolitan planning organizations (MPOs) and the U.S. DOT that transportation plans and programs in nonattainment areas meet the "purpose" of the SIP, which is reducing pollutant emissions to meet the NAAQS[1].

The transportation program, otherwise known as the *transportation improvement program (TIP)*, is composed of transportation projects drawn from a conforming *transportation plan*. Specifically, the transportation plan and program must contribute to reducing motor vehicle emissions. Only transportation projects that are federally funded or approved must meet the conformity requirements, but all regionally significant projects, including nonfederally funded ones, must be included in the plan and TIP conformity analysis.

According to the CAAA, transportation plans and programs cannot:

- Create new NAAQS violations
- Increase the frequency or severity of existing NAAQS violations
- Delay attainment of the NAAQS

Who makes the conformity determination?

The MPO and U.S. DOT have an affirmative responsibility to ensure that the transportation plan and program within the metropolitan area boundaries conform to the SIP. Conformity determinations for projects within and outside of these boundaries are the responsibility of the U.S. DOT and the project sponsor.

[1] Any Federal activity (funded, approved, permitted, etc.) undertaken by Federal agencies, other than the FHWA and the FTA, are governed by separate conformity regulations, which are presently being developed by the EPA.

How often is the conformity determination made?

Conformity determinations are to be made no less than every 3 years or as changes are made to plans, programs, and projects. Certain events, such as SIP revisions that establish or revise a transportation-related emissions budget, or add or delete *Transportation Control Measures (TCMs)* will also trigger a new conformity determination. This schedule may be subject to change once the conformity regulations are promulgated by the EPA.

What help is available to an MPO to ensure its transportation plan and program conform to the SIP?

The EPA and U.S. DOT are working together to write conformity regulations which lay out the criteria for acceptable transportation plans and programs.

Until these regulations are available, conformity determinations for transportation plans, programs, and projects will be based on the DOT/EPA Interim Conformity Guidance, issued on June 7, 1991, and summarized below:

Transportation Plans and Programs

- The transportation plan and program must use the most recent estimates of mobile source emissions.
- The transportation plan and program must provide for expeditious implementation of TCMs in the SIP.
- The transportation plans and programs of MPOs for areas designated nonattainment for ozone or CO must contribute to annual emissions reductions.

Transportation Projects

- Transportation projects must come from a conforming transportation plan and program.
- CO nonattainment areas must show a reduction in the number and severity of CO

violations in the area substantially affected by the project.

Once the conformity regulations are available, an MPO's transportation plan and program must meet the criteria in the new regulations in order to conform to the SIP. The CAAA's conformity requirements are summarized below:

- Emissions expected to result from the transportation plan and program must be consistent with the scheduled emissions budget in the SIP.
- The transportation program must provide for timely implementation of TCMs consistent with the schedule in the SIP.
- Transportation projects must meet three requirements:
  - –Projects must come from a conforming transportation plan and program.
  - –The design concept and scope of the project that was in place at the time of the conformity finding must be maintained throughout implementation. The design concept and scope refer to the number and types of roadway lanes, degree of access control, etc.
  - –Project design concept and scope had to be sufficiently defined to determine emissions at the time of the conformity determination for the transportation program.

or, if these three criteria cannot be met,

- –Demonstrate that the project emissions, when considered with the emissions projected for the conforming transportation plan and program, do not cause the plans and programs to exceed the emissions budget in the SIP.

Other procedures and criteria that will be addressed by the conformity regulations are:

- Consultation procedures to be undertaken by the MPO, State transportation and air quality agencies, and the DOT before the conformity determination is made;
- Frequency for making conformity determinations;
- How conformity determinations will be made with respect to maintenance plans.

Once the conformity regulations are available, each State has one year to revise its SIP to include conformity procedures and criteria based on those established in the regulations. It will be important for State and local transportation and air quality officials to work together in the development of these procedures.

What happens if a transportation plan, program, or project does not meet the conformity requirements?

If a transportation plan, program, or project does not meet conformity requirements, transportation officials have the following options:

- Modify the plan, program, or project to offset the emissions;
- Work with the appropriate State agency to modify the SIP to offset the plan, program, or project emissions;
- If the above is not accomplished, the plan, program, or project cannot advance. This can affect transit as well as highway projects.

Transportation Planning Procedures

SIP Provisions

The CAAA attempt to integrate transportation and air quality planning through the SIP. The SIP should be a realistic document, with input from those responsible for development as well as implementation.

SIPs are to be prepared by a State-certified organization known as the Lead Planning

Organization (LPO). States may certify organizations that were in place before the CAAA. However, if the State is designating a new LPO, it must include elected officials of local governments, the State air quality and transportation planning agencies, MPOs, and any other organizations responsible for developing or implementing the SIP.

Preparation of the SIP must be coordinated with the continuing, cooperative, and comprehensive urban transportation planning process.

EPA Guidance

The CAAA mandate that the EPA, in consultation with the U.S. DOT, provide guidance to government officials on selected requirements in the act. The following guidance is available:

- Guidance for Vehicle Miles Traveled, Federal Register, Thursday, March 19, 1992, Vol. 57, No. 54;
- Guidance for Transportation Control Measures, Federal Register, Friday, May 29, 1992, Vol. 57, No. 104;
- Transportation/Air Quality Planning Guidelines, EPA document 420/R-92-001, July 1992, NTIS #PB92-201458.

Report to Congress

The U.S. DOT and EPA must submit a report to Congress by January 1, 1993, and every three years thereafter. The report is to contain the results of reviews of State and local air quality-related transportation programs, including the adequacy of funding for transportation projects identified in the SIP. This provision gives Congress the ability to monitor efforts to implement the transportation-related provisions of the CAAA, and to determine if the transportation budgets and programs are meeting the goals and objectives of the Act.

Sanctions

What are sanctions?

Sanctions are measures the EPA can, and in some cases must, enforce upon portions of the State, or the entire State in some circumstances, to ensure that SIP creation and implementation follow requirements of the CAAA. This is important to the transportation sector because there is not necessarily a direct causal relationship between the pollutant source and the sanction that is applied. For example, highway sanctions can be applied for SIP deficiencies for stationary as well as mobile sources.

The CAAA require the EPA to make a determination of SIP deficiency well in advance of possible sanctions. The CAAA authorize two types of mandatory sanctions, one affecting mobile sources of air pollution and one affecting stationary sources. They are:

- Withholding of Federal highway funds except for exempted projects listed in the CAAA, including those that EPA finds would improve air quality and discourage single occupancy vehicles, and safety projects whose principal purpose is to improve safety by significantly reducing or avoiding accidents.
- Two-to-one emissions offsets for major stationary sources (i.e., if an area is under sanctions, each ton of emissions created by a new stationary source must be offset by a 2 ton reduction through additional control measures on existing stationary sources).

In addition, there are several types of discretionary sanctions that the EPA has the authority to impose, such as withholding grants for air pollution planning.

What are the reasons for which the EPA can enforce sanctions?

Sanctions may be implemented by the EPA for these deficiencies:

- Failure to submit a SIP or a portion of a SIP;
- Disapproval of a SIP by the EPA;
- Failure to implement the provisions in an approved SIP;
- Failure to submit any other provisions required by the CAAA.

How are the sanctions applied?

If, 18 months after the EPA's determination, a deficiency has not been corrected, one of the two mandatory sanctions must be applied. Both types of sanctions can be applied if the EPA determines a lack of good faith by the State in correcting the problem. There is no rule to determine which sanction should be used at any one time. However, it is likely that highway sanctions will be heavily relied upon at this stage to implement the CAAA. **If, after 6 additional months, the deficiency is still not corrected, both of the mandatory sanctions must be applied.** At this point, the EPA is required to create a Federal Implementation Plan (FIP) which replaces the SIP.

Sanctions are essentially limited to nonattainment areas when failures occur, but can be applied statewide in certain circumstances. However, if a deficiency is the responsibility of one or more political subdivisions, sanctions cannot be applied on a statewide basis during the first 24 months following an EPA finding to the State of the respective SIP deficiency. The EPA must issue a rule that establishes the criteria that must be considered when making these determinations.

How are sanctions removed?

The State or local agency responsible for a deficiency must correct that deficiency before sanctions can be removed by the EPA.

TITLE II

TRANSPORTATION PROVISIONS FOR MOBILE SOURCE EMISSIONS

Title II of the CAAA identifies actions to be taken for reducing emissions from mobile sources. Only a portion of the measures contained in the CAAA are presented in this brochure, and even these are not necessarily the responsibility of State or local officials. The requirements are for automobile and gasoline manufacturers, but are mentioned so that State and local officials will be familiar with some of the transportation-related measures being taken to reduce emissions.

Vehicle Emissions Standards

Cars and Light-Duty Trucks Under 6,000 Gross Vehicle Weight Rating (GVWR)

Tailpipe emission standards will become stricter, affecting 40% of new vehicles sold nationwide in 1994, increasing to 100% of new vehicles sold by 1996. The EPA has the authority to require additional reductions if needed. Figures I, II, and III show the reductions in mobile source emissions for light-duty vehicles and trucks attained since 1967, and those anticipated in 1994.

FIGURE I

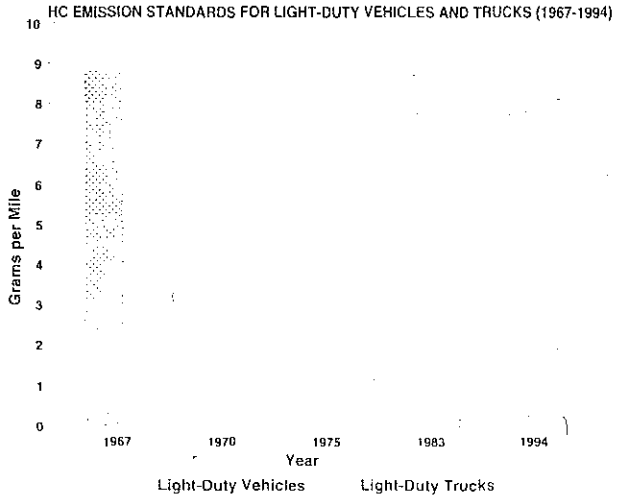


FIGURE II

CO EMISSION STANDARDS FOR LIGHT-DUTY VEHICLES AND TRUCKS (1967-1994)

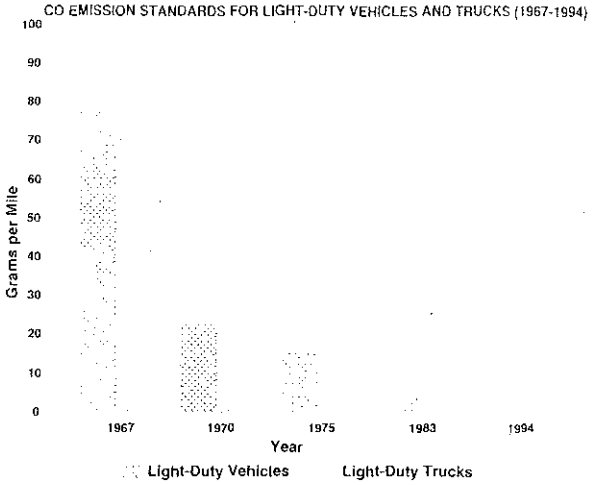
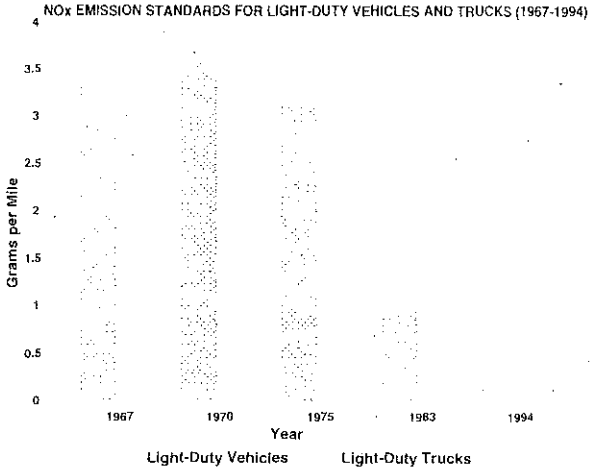


FIGURE III

NOx EMISSION STANDARDS FOR LIGHT-DUTY VEHICLES AND TRUCKS (1967-1994)



Heavy-Duty Trucks

The EPA may revise any existing standards concerning air pollutants emitted from heavy-duty vehicles, taking costs into account. In addition, for model year 1998 and after, NOx emissions may not exceed 4.0 grams per brake horse power hour (gbh).

Urban Buses

Urban transit buses, traditionally run on diesel fuel, emit soot and other small particulate (PM_{10}) into the air, even when properly tuned. The CAAA establish a much more stringent particulate emissions standard for urban buses. This tailpipe standard is being phased in from 1991 to 1994. The final standard taking effect in 1994 may be relaxed a small degree by the EPA, but there is no question that new diesel buses will be significantly cleaner than pre-1991 models.

The new particulate standard also has been the incentive for bus manufacturers to develop alternative-fueled engines that emit low levels of particulate.

The CAAA also give the EPA the authority to institute an emissions testing program for buses to ensure that the new particulate standard is met over the useful life of the vehicles. If the testing program reveals that buses cannot continue to meet the strict standard, the EPA can mandate that subsequent bus purchases in the larger urban areas (greater than 750,000 population) be alternative-fueled vehicles.

Carbon Monoxide Emissions at Cold Temperatures

At cold temperatures, tail pipe emissions of CO increase significantly. The CAAA identify measures automakers must take to reduce these emissions.

Phase I - The EPA is to promulgate regulations by November 15, 1991 to reduce emissions of CO from light-duty vehicles and light-duty trucks. This will be phased-in gradually for automobiles beginning in 1994.

Phase II - If, as of June 1, 1997, six or more nonattainment areas have a CO design value of 9.5 ppm or greater, emissions for light-duty vehicles and light-duty trucks must be lowered further.

Fuel Requirements

Fuel Volatility

Fuel volatility refers to the rate at which fuel evaporates. Gasoline manufacturers must see

that *Reid Vapor Pressure (RVP)* is lowered to 9.0 pounds per square inch (psi) during the summer months. Lower RVP is required in some warmer areas.

Reformulated Gasoline

Reformulated gasoline is specifically developed to reduce undesirable emissions. It contains a different mix of ingredients than conventional gasoline.

Compared with baseline gasoline, reformulated gasoline must reduce emissions of HC and toxic air pollutants 15% by 1995, and 20-25% by 2000. Oxygen content is increased, benzene content is reduced, and heavy metals such as lead and manganese are eliminated.

Beginning in 1995, reformulated gasoline will be mandated in the worst ozone areas, which include the following nine cities: Baltimore, Chicago, Hartford, Houston, Los Angeles, Milwaukee, New York City, Philadelphia, and San Diego. Officials of any nonattainment area may "opt-in" to the reformulated gasoline program.

Oxygenated Gasoline

In cold weather, gasoline does not vaporize fully and thus burns poorly. *Oxygenated gasoline* is enriched with oxygen-bearing liquids to reduce CO production by permitting more complete combustion. Therefore, beginning November, 1992, gasoline oxygen content is increased during the winter months in the 39 areas with a CO design value above 9.5 ppm having a motor vehicle-related CO problem.

Low-sulfur Diesel Fuel

Diesel fuel sulfur content is now specified in the law. Fuel used in the certification of 1991-1993 model year heavy-duty diesel vehicles will have a sulfur content of .10% by weight and, after October 1, 1993, the maximum sulfur content will drop to .05% by weight.

Clean Fuel and Vehicle Requirements

A clean fuel is defined as any fuel, such as reformulated gasoline, diesel, natural gas, or electricity, that meets the clean fuel requirements and standards.

California Tailpipe Emission Standards

The California Air Resources Board (CARB) may, upon EPA approval, adopt more stringent tailpipe emission standards that can be adopted by other States nationwide.

California Clean Fuel Vehicle Pilot Test Program

The EPA must promulgate regulations by November 15, 1992, establishing requirements for clean-fuel vehicles to be produced, sold, and distributed in California.

Each year, beginning in 1996, automakers must provide 150,000 clean-fuel vehicles for sale in California; by 1999, this number must rise to 300,000. The tighter emission limits can be met with any combination of vehicle technology and cleaner fuels. California is required to revise its SIP by November 15, 1992, to ensure the clean fuels are produced and distributed.

States in nonattainment for ozone and classified as serious and above can opt into the program, with certain restrictions.

Conclusion

The transportation community faces many challenges ahead in providing for a safe and efficient transportation system, reducing congestion levels, and controlling mobile source emissions. To meet these challenges, transportation and air quality officials need to establish new partnerships and cooperative approaches for identifying innovative solutions to transportation and air quality problems.

State and local planning and air quality officials will need to coordinate early in the development of land use plans and transportation alternatives to ensure that air quality concerns are adequately considered. This early coordination is important because local land use decisions will often dictate the transportation systems that are needed in major metropolitan areas. It is also especially important that State and local transportation and air quality officials coordinate early and continuously during the transportation system planning and SIP development processes. It is at this stage in the overall transportation development process that air quality considerations can be most effectively evaluated.

The CAAA place a heavy burden on the transportation community for improving air quality in nonattainment areas. The transportation-related provisions in the legislation will change the processes for developing transportation plans, programs, and projects; and will require greater emphasis on demand management strategies, and operational improvements for the existing transportation infrastructure.

LIST OF CONTACTS

For questions on the provisions summarized in this brochure, or for additional brochures, contact FHWA's Noise and Air Quality Branch or the FHWA Regional Air Quality Specialist for your State.

FHWA, Noise and Air Quality Branch, Washington, D.C. 202-366-4836

FHWA Regional Air Quality Specialists:

Region I 518-472-4253

Connecticut
Maine
Massachusetts
New Hampshire
New Jersey
New York
Rhode Island
Vermont
Puerto Rico

Region III 410-962-3744

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Maryland
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Virginia
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Missouri
Nebraska

Region VIII 303-969-6712

Colorado
Montana
North Dakota
South Dakota
Utah
Wyoming

Region IX 415-744-3823

Arizona
California
Hawaii
Nevada

Region X 503-326-2061

Alaska
Idaho
Oregon
Washington

GLOSSARY

Area source - Small stationary and non-transportation pollution sources that are too small and/or numerous to be included as point sources but may collectively contribute significantly to air pollution (i.e., dry cleaners).

Inspection and Maintenance Program (I/M) - An emissions testing and inspection program implemented by states in nonattainment areas to ensure that the catalytic or other emissions control devices on in-use vehicles are properly maintained.

Carbon monoxide (CO) - A colorless, odorless, tasteless gas formed in large part by incomplete combustion of fuel. Human activities (i.e., transportation or industrial processes) are largely the source for CO contamination.

Emissions budget - The part of the State Implementation Plan (SIP) that identifies the allowable emissions levels, mandated by the National Ambient Air Quality Standards (NAAQS), for certain pollutants emitted from mobile, stationary, and area sources. The emissions levels are used for meeting emission reduction milestones, attainment, or maintenance demonstrations.

Emissions inventory - A complete list of sources and amounts of pollutant emissions within a specific area and time interval.

Mobile source - Mobile sources include motor vehicles, aircraft, seagoing vessels, and other transportation modes. The mobile source related pollutants are carbon monoxide (CO), hydrocarbons (HC), nitrogen oxides (NOx), and small particulate matter (PM_{10}).

National Ambient Air Quality Standards (NAAQS) - Federal standards that set allowable concentrations and exposure limits for various pollutants. The EPA developed the standard in response to a requirement of the CAAA.

Nonattainment area - A geographic region of the United States that the EPA has designated as not meeting the NAAQS.

Oxygenated gasoline - Gasoline enriched with oxygen bearing liquids to reduce CO production by permitting more complete combustion.

Ozone (O_3) - Ozone is a colorless gas with a sweet odor. Ozone is not a direct emission from transportation sources. It is a secondary pollutant formed when HC and NOx combine in the presence of sunlight. The ozone is associated with smog or haze conditions. Although the ozone in the upper atmosphere protects us from harmful ultraviolet rays, ground level ozone produces an unhealthy environment in which to live. Ozone is created by human and natural sources.

Particulate matter (PM) - Any material that exists as solid or liquid in the atmosphere. Particulate matter may be in the form of fly ash, soot, dust, fog, fumes, etc.

Parts per million (ppm) - A measure of air pollutant concentrations.

Reformulated gasoline - Gasoline specifically developed to reduce undesirable combustion products.

Reid Vapor Pressure (RVP) - A measure of fuel volatility.

Small particulate matter (PM_{10}) - Particulate matter which is less than 10 microns in size. A micron is one millionth of a meter. Particulate matter this size is too small to be filtered by the nose and lungs.

Stage II Vapor Recovery Program - This program is designed to reduce HC emissions during refueling operations.

State Implementation Plan (SIP) - A plan mandated by the CAAA that contains procedures to monitor, control, maintain, and enforce compliance with the NAAQS.

Stationary source - Relatively large, fixed sources of emissions (ie., chemical process industries, petroleum refining and petrochemical operations, or wood processing).

Transportation control measures (TCMs) - Any measure in a SIP directed toward reducing emissions of air pollutants from transportation sources by improving traffic flow, reducing congestion, or reducing vehicle use.

Transportation Hydrocarbons (HC) - Colorless gaseous compounds originating from evaporation and the incomplete combustion of fossil fuels.

Transportation Improvement Program (TIP) - Also known as a transportation program, a TIP is a program of transportation projects drawn from or consistent with the transportation plan and developed pursuant to Title 23, U.S.C. (United States Code) and the Federal Transit Act.

Transportation Plan - This is a long-range plan that identifies facilities that should function as an integrated metropolitan transportation system, and developed pursuant to Title 23 U.S.C. (United States Code) and the Federal Transit Act. It gives emphasis to those facilities that serve important national and regional transportation functions, and includes a financial plan that demonstrates how the long-range plan can be implemented.

Vehicle miles traveled (VMT) - The sum of distances traveled by all motor vehicles in a specified region.

House Special Task Force on Emissions

Rep. Tom Brian, Chair
Rep. Margaret Carter
Rep. Tony Federici
Rep. Bob Tiernan
Rep. Greg Walden

FINDINGS AND RECOMMENDATIONS
3/31/93

MISSION

The House Special Task Force on Emissions (House Special Task Force) was appointed by Speaker Campbell to review recommendations of the State's Task Force on Motor Vehicle Emission Reductions in the Portland Area (State's Task Force). In particular, focus was to be directed to accompanying legislative proposals (HB 2214 relating to improvements in the vehicle inspection program, HB 2419 relating to a motor vehicle emission fee, and HJR 7 relating to broadening permissible use of motor vehicle related fees).

BACKGROUND

The 1990 Federal Clean Air Act establishes a comprehensive and prescriptive approach to bringing the nation into compliance with federal clean air standards. This prescriptive approach requires sanctions to be maintained on industry and potentially imposed on other sources of air pollution if the area does not do two things:

1. Provide empirical evidence that air quality standards are achieved; and

2. Adopt a maintenance plan, which is quantifiable, permanent, and enforceable, showing how the area will continue to meet air quality standards.

In Oregon the Portland Metropolitan area is currently considered as being in "non-attainment" status, or not meeting federal air quality standards for ozone (surface level smog). The Department of Environmental Quality projects that, with current control approaches, the area will achieve attainment with air quality standards this year. Current control approaches will not, however, be sufficient to maintain compliance as required by the Federal Clean Air Act.

As required by statute (HB 2175 from the 1991 Session), a State Motor Vehicle Task Force was created and required to recommend to this session strategies for maintaining air quality in the Portland area. The House Special Task Force evaluated the report required in HB 2175 and has concluded that the desired goal may be achieved most appropriately by modifying its recommendations.

DELIBERATION PROCESS

The House Special Task Force held three meetings during which the Department of Environmental Quality (DEQ) provided extensive explanation of the basis for recommendations of the State's Task Force. In particular the House Special Task Force had substantial questions relating to:

- The need to reduce motor vehicle emissions;
- The consequences of not adopting emission reduction strategies sufficient to maintain compliance with federal air quality standard over the next 10 years;
- The reasonableness of assumptions affecting the needed emission reductions including assumed population and vehicle travel growth rates;
- The contributions of sources other than motor vehicle to the air pollution problem in the Portland area and the feasibility of reducing their emissions; and
- The flexibility in meeting Clean Air Act requirements.

The House Special Task Force requested and DEQ provided extensive additional information on other options to reduce emissions, particularly options that would reduce emissions from significant sources other than motor vehicles. The House Special Task Force also requested and DEQ provided additional options that would provide emission reductions sufficient to replace the motor vehicle emission fee recommended by the State's Task Force.

FINDINGS

In considering the information reviewed, the House Special Task Force has made several findings. These included:

- Adopting a plan to assure attainment of federal air quality standards is important to protect the health of the public and to insure the vitality of economic growth.
- If attainment is not achieved, potential sanctions to be imposed by the federal government will continue to fall upon industry - currently the most regulated and least contributing factor to the Portland area's air pollution problems. Ultimately federal highway funding could also be sanctioned.
- The greatest threat to the Portland area's air quality comes from population increases and the resulting increases in automobile use, increased use of other petroleum powered engines (construction equipment, ships, outboard motors, lawn and garden equipment), and other activities, which produce air pollutants.

- Assumptions made by the State's Task Force relating to needed emission reductions, particularly population and vehicle use growth rates, are reasonable and appear to be the minimum that would meet EPA criteria for an approvable air quality maintenance plan.

- Under certain conditions the target for an air quality maintenance plan can be moved from 2007 to 2006 which lessens the need for emission reduction strategies.

- Regulatory or fee based emission reduction strategies for major non-motor vehicle contributors, such as recreational boating and off-road diesel construction equipment, are currently either infeasible, ineffective or prohibited by Federal law in addressing future air pollution problems.

- The seven recommendations of the State's Task Force for the base strategy with the exception of the vehicle emission fee appear to be a reasonable and equitable approach to maintain attainment with federal air quality standards.

- The air quality benefit from a vehicle emission fee as recommended by the State's Task Force could be achieved through alternatives the House Special Task Force finds more desirable and less burdensome to the public.

- Funding for certain air quality improvement programs, expanded transit and air quality public information, is critical to success of the air quality maintenance plan.

RECOMMENDATIONS

After considering available information and all options presented, the House Special Task Force recommends to the House Natural Resource Committee and the 67th Legislative Assembly the following elements for a plan to meet minimum federal requirements for attainment of federal air quality standards in the Portland area (See Attachment 1):

- Endorsement of all recommendations of the State's Task Force with the exception of:
  1) The motor vehicle emission fee; and
  2) Tri-County boundary lines for expansion of the vehicle inspection program.

- Excluding the motor vehicle emission fee eliminates a substantial source of potential revenue to fund critical transit needs and emission reduction programs. Adequate funding should be addressed as part of the Oregon Transportation Plan under consideration by the Legislature.

- Expansion of current vehicle inspection boundary to achieve a 1.0% VOC and 0.5% NO_x emission reduction in an equitable way by including more of the urbanized portion of the region but not using county boundaries.

- Continued pursuit by DEQ of new potential control options for non-road motorized vehicle emissions.

- Addition of three emission reduction elements to partially replace the vehicle emission fee which can be credited because of actions already taken or expected to be taken at the federal level. These include a proposed federal energy tax, federal and state adopted alternative fuel fleet vehicle programs, and federal requirements for application of hazardous air pollutant emission control technology on existing industries.

- Addition of three other emission reduction elements to fully replace the vehicle emission fee. The House Special Task Force believes this to be a better alternative than the recommendation of the State's Task Force. These include changing the maintenance plan target from 2007 to 2006, doubling the employer trip reduction program requirements, and directing the DEQ to adopt regional parking ratios for new parking spaces that will reduce the potential vehicle trip generation from future growth by 10%.

- Consideration of two additional measures, additional state fuels taxes and vehicle registration fees, that can provide a safety margin for the air quality strategy while providing funding to meet the future critical transportation needs in the Portland area (see attachment 1). Alternatively, adoption of additional state fuels taxes and/or vehicle registration fees create a "credit" that could be substituted for all or part of another requirement (i.e., reducing the employer trip reduction program requirement).

- Amend and then adopt HB 2214, HB 2419, and HJR 7 to reflect recommendations of the House Special Task Force on emissions.

EXPLANATION OF RECOMMENDATIONS

Following is an explanation of key points relating to the emission reduction credits identified which are associated with recommendations of the House Special Task Force:

Clinton Energy Tax - The gasoline tax portion of this energy tax would, based on elasticity information, provide an emission reduction from market forces resulting in reduction in vehicle miles travelled. A state safety factor would insure the integrity of the air quality maintenance plan if a lesser or no tax is adopted by Congress or if Congress does not increase the tax.

Federal / State Alternative Fuel Fleet Vehicle Program - The credit from these programs is provided by assuming applicable public fleets meet adopted state and federal requirements with CNG (compressed natural gas) conversion kits for new vehicles purchased.

Federal MACT Requirements for Existing Industries - This credit assumes application of the Clean Air Act requirements for application of MACT (maximum achievable control technology) on certain industries. These controls, aimed at reducing hazardous air pollutants, will give a side benefit of reducing VOC emissions which contribute to ozone formation. The credit is calculated based on projecting what the federal requirements translate to for sources in the Portland area.

Double Employer Trip Reduction (ETR) Program - This strategy would double the emission reduction credit given to the ETR program recommended by the State's Task Force. It assumes the goals for the program would increase from a 5-10% reduction in trips to a 10-20% reduction in trips. The lower number would be for employers of between 50 and 100 employees and the larger number would be for employers of over 100 employees. Enforcement of this type of program is generally through civil penalty for failure to submit or implement adequate plans.

Parking Ratios - This strategy would direct the DEQ to utilize its authority in regulating "indirect sources" to establish maximum parking space limits for new construction permits DEQ may issue. The ratios would be established to result in 10% less vehicle trips being made for new construction than currently projected. This requirement would provide an incentive for new development to utilize more pedestrian, bike, and transit friendly land use designs in order to meet the mobility demand of the development. In establishing specific parking ratios the interacting effect of the employer trip reduction program would have to be taken into account in order to achieve the identified emission reduction credit.

Change Maintenance Plan Target from 2007 to 2006 - Credit for this action can be given because an implementation mechanism (parking ratios) to meet the requirements of the LCDC transportation rule will have been adopted by DEQ by May 1995, the latest date enforceable strategies must be adopted in order to meet EPA requirements for a 2006 target.

State Gas Tax Increase - Emission reduction credit is given to this element based on linear interpolation of elasticity information indicating there will be a decrease in vehicle miles travelled.

Vehicle Registration - Emission reduction credit is given to this element assuming the revenue is used for programs that reduce motor vehicle emissions. HJR 7 should be amended to allow revenue to be used in the most cost beneficial manner, principally for expanded transit service and air quality public information.

ATTACHMENT 1

Portland Area Air Quality Maintenance Plan
Prepared for the House Special Task Force on Emissions
(Need 35.6% VOC / 20.2% NO_x reduction by 2007)

Endorsed Recommendations of State Motor Vehicle Task Force	Reductions % VOC	Reductions % NO_x	Legislation Needed
New Lawn and Garden Equipment Emission Standards	6.1%	0	
Enhance Vehicle Emission Inspection	17.6%	9.0%	*
Maintain 1974 and Newer Vehicles in Inspection Program	2.4%	0.8%	
Expand Vehicle Inspection Boundary [1]	1.0%	0.5%	
DLCD Land Use / Transportation Rule Credit [2]	5.2%	4.4%	
Mandatory Employer Trip Reduction Program	1.2%	1.1%	
Strategy Overlap	-1.1%	-0.5%	
Total	32.2%	15.3%	
Additional Strategies Identified by the House Special Task Force			
Clinton Energy Tax (7.5¢ per gallon of gasoline) [3]	0.6%	0.6%	*
Existing Fed. / State Public Fleet Alternative Fuel Program	0.1%	0	
Federal MACT Requirement on Existing Industry up to	6.0%	0	
Double Employer Trip Reduction Program	1.2%	1.1%	
Parking Ratios For New Construction (10% Reduction in New Space Utilization - 2006 credit)	0.8%	0.7%	
• Worker	1.5%	1.3%	
• Commercial / Retail			
Maintenance Plan Target Reduced From 2007 to 2006 [4]	1.9%	1.2%	*
Total	12.1%	4.9%	
Grand Total	44.3%	20.2%	
"Safety Margin" - up to	8.7%	0	
Additional Potential Safety Margin or Substitute for above Strategies			
State Gas Tax Increase (4¢ to 16¢ per gallon range)	0.3% to 1.2%	0.3% to 1.2%	*
Vehicle Registration Fee (e.g. $50 annual) with amended HJR 7	0.5%	0.5%	*
Other Strategies Considered but rejected by the House Special Task Force			
Statewide Vehicle Emission Fee			*
• $2, $3, $4 per year by vehicle age (HB 3173)	0.04%	0.04%	
• $2, $4, $6, $8 per year by vehicle age	0.08%	0.08%	
$30 Annual Employee Parking Permit Fee	0.2%	0.2%	*
$3 Boat Launching Fee - Revenue For:			*
• Zero Emission Lawn Mower Subsidy or	0.7%	0	
• Alternative Fuel Vehicle Subsidy or	0.4%	0	
• Transit Improvement	0.03%	0.03%	
Reformulated Gasoline	20.6%	5.6%	
Motor Vehicle Emission Fee ($5 -$125 range , $50 annual avg.)	1.2%	1.4%	*
Worker Parking Permit $3.00 per day	5.4%	4.9%	*

(See back for footnotes)

3/31/93 DEQ

FOOTNOTES

[1] The House Special Task Force on Emission recommended changing the State Task Force recommendation on expanding the boundaries of the vehicle inspection program from the Tri-County boundary to the more urbanized portion of the Region. The boundary change should be made in the most equitable manner and provide at least the same emission reduction.

[2] Credit is only allowed if a significant motor vehicle trip reduction strategy, such as parking ratios, is adopted to insure implementation of the rule objectives. If the Legislature or DEQ does not adopt such a program, then this assumes local governments will adopt such a program by May 1996 as required by the transportation rule. This also assumes the adopted program will meet EPA's criteria of quantifiable, permanent, and enforceable measures.

[3] If this tax is not adopted by Congress, actions or substitutes will be required by local government, the legislature or DEQ to offset the 0.6% VOC and No_x losses.

[4] This credit can be used if an adequate motor vehicle trip reduction program is adopted by the Legislature or DEQ, such as parking ratios, by May 1995. The alternative is for the Legislature to require the deadline in the transportation rule for implementation plan adoption by local governments to be moved up from May 1996 to May 1995 and to direct LCDC to utilize their discretionary authority to require rule provisions to apply directly to jurisdictions' land use decision (ORS 197.646 (3)) if the deadline is not met.

State of Oregon
Department of Environmental Quality Memorandum

Date: April 12, 1993

To: Environmental Quality Commission

From: Fred Hansen

Subject: **Background Information**

Joint Meeting of Transportation Commission, Land Conservation and Development Commission, and Environmental Quality Commission

Following are some thoughts to assist you in preparing the joint meeting between the Oregon Transportation Commission, the Land Conservation and Development Commission, and the Environmental Quality Commission on April 22, 1993. Also attached for background purposes is a report prepared by the House Special Task Force on Emissions. This report puts the Portland air quality problem in perspective and includes the recommendations of the State's Motor Vehicle Task Force and the modifications made by the House Special Task Force on Emissions.

INTERRELATIONSHIP BETWEEN AIR QUALITY, TRANSPORTATION AND LAND USE

There is a distinct and strong relationship between land use, transportation and air quality. This relationship may be summarized as follows.

- Over the latter half of this century, land use has centered on motor vehicle friendly designs.
- In response, the transportation system has been focused on meeting this demand with abundant roadways and parking spaces.
- The resulting high use of motor vehicles has contributed to congestion, high infrastructure costs and nonattainment of federal air quality standards.
- Continuation of this pattern threatens continued negative impacts, particularly in the Portland area where the projected population growth is high.
- Land use changes brought about by new transportation plans and alternative travel

facilities can result in a reduction in future potential traffic congestion and air pollution.

- Addressing the land use, transportation and air quality problems with the same or similar strategy offers the opportunity to accomplish the objectives of all three commissions in the most cost effective manner.

DLCD TRANSPORTATION RULE ISSUES

The DLCD (Department of Land Conservation and Development) Transportation rule, with its objective of reducing VMT (Vehicle Miles Traveled) and parking spaces per capita, offers the opportunity to head in a new, coordinated and positive direction with respect to land use, transportation and air quality. The Rule requires local governments to develop an implementation plan by May 1996. It is generally felt that some form of a market or regulatory program will be necessary as an implementation mechanism to provide a disincentive to driving and that pedestrian, bike and transit infrastructure will need to be significantly expanded. Implementation of the transportation rule presents some difficult challenges and policy issues which are already surfacing. There are primarily three implementation issues that should be discussed by the three Commissions:

Air Quality Strategy as an Implementation Mechanism.

The State's Motor Vehicle Emission Task Force for the Portland area recommended a substantial emission based vehicle fee for the Portland area. While providing a major emission reduction strategy element, this fee could also provide a major regional implementation force in reducing vehicle trips per capita while providing funding of a level that would greatly enhance the transit capacity in the region. This approach was generally supported by the region and could save local governments considerable future debate in developing a consensus approach for an implementation plan to meet the transportation rule requirements.

Issue: The House Special Task Force on Emissions was adamantly opposed to an emission fee. They have recommended an aggressive employer trip reduction program and parking space restrictions on new construction as a substitute. This regulatory approach could also serve as a major regional implementation force in meeting the transportation rule.

Question: Are the three Commissions comfortable with this approach?

Transit Funding

Substantial new revenue will be needed by Tri-Met to provide new service to meet the demand created by the reduction in vehicle trips required by the Transportation Rule.

Issue: The Oregon Transportation Plan funding package was relying on the vehicle emission fee recommended by the State's Task force to provide a substantial portion of the funds needed by Tri-Met to provided needed transit service improvement. The House Special Task Force on Emissions has indicated that a substantial increase in vehicle registration fees should be considered for providing this revenue.

Question: Do the three Commissions feel any further efforts should be made to pursue a vehicle emission fee? A vehicle registration fee that would generate the same revenue as the emission fee would be less effective in reducing actual emissions because it creates no market force for reducing driving.

Local Government Implementation Plans

The Transportation Rule requires local governments to develop a detailed implementation plan by May 1996.

Issue: Some local governments already appear unable to meet the Transportation Rule May 1993 deadline for more minor portions of the implementation plan. The effort required by local governments to meet the May 1996 deadline may not be as difficult and controversial if a state imposed regional air quality strategy is adopted. This strategy would, pursuant to the House Special Task Force on Emissions, have major trip reduction elements such as parking ratio's and employer trip reduction programs.

Question: Should anything further be done to provide greater assurance that an effective implementation program will be in place in a timely manner to meet the transportation rule requirements? Should the option to require individual land use actions to conform to the transportation rule if local governments fail to submit implementation plans be made a firm requirement?

OTHER POTENTIAL ISSUES FOR DISCUSSION

Following are a couple of other issues that could be appropriate to discuss at the joint meeting if time permits:

Water Quality Issues

Discussions to date have focused heavily on the airshed effects of added population in metropolitan areas. Added population also places pressure on the ability to maintain Water Quality Standards. Population growth leads to increased waste loads from municipal sewage treatment facilities and the new and expanded industrial facilities that provide jobs for the expanded population. Runoff from roads and urban areas adds to the non-point source pollution concerns. Expansion of recreational facilities and opportunities also places demands on water quality.

Compliance with Environmental Requirements for Agency Operations

The Department of Transportation has an ongoing effort to insure that their operations comply with environmental requirements at their maintenance shops and at project sites. Examples include underground storage tank compliance, disposal of solid waste and hazardous waste, and insuring that construction and maintenance contracts contain appropriate environmental protection provisions and that contractors abide by those provisions.

FH:1

Enclosure

I. Introduction, MJD Steve Greenwood
II TRB JFK
HLS
Olivia

- Regulate AQ, WQ
- Fund Trans / land use
- Liability

Jurisdiction -
CAA

Reg after fact.