CITY OF PHOENIX

Comprehensive Land Use Plan

ENERGY CONSERVATION

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SECTION IX

ENERGY CONSERVATION

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SECTION IX

ENERGY CONSERVATION

INTRODUCTION

Oregon and the Northwest in general have enjoyed readily available and relatively low-cost energy over the past several decades. We have almost taken for granted its availability. However, in the 1980s we are more aware of increasing energy costs, finite supplies of resources, and are actively seeking ways to conserve energy and develop energy alternatives.

The availability of energy resources, and the ways we utilize the energy we have, will become increasingly important to Oregon and to Phoenix in the future. Oregon might be described as an "energy deficient" state. We have no major oil reserves, no capacity for refining petroleum products, and can produce only about 55 percent of our own electricity. Nearly all of our natural gas is imported from Canada or the Rocky Mountain states. Overall, we are dependent upon outside sources for about 87 percent of all the energy we use in Oregon.

Although the utility companies that provide the energy we use are continuing to seek ways to meet our growing energy needs, there are indication that all future needs will not be met, unless we become more conservative an innovative in our energy consumption.

This section of the Phoenix Comprehensive Plan is intended to provide basic information pertaining to energy, to describe the major source of both "conventional" and "alternate" energy, and to point out some programs or activities the City of Phoenix may utilize and policies we may follow to guide planning and development in the future to ensure that we will be making the best use of our energy resources.

Statewide Planning Goal #13 (Energy Conservation) is:

> *"TO CONSERVE ENERGY."*
>
> *"Land and uses developed on the land shall be managed and controlled so as to maximize the conservation of all forms of energy, based upon sound economic principles."*

This section of the Comprehensive Plan will provide an inventory of the major energy resources available at this time and also provide a summary of alternative sources that are either becoming more popular, or are currently under study for possible future use. Following this discussion is a set of policies to direct the City's future land use planning and development actions.

INVENTORY OF CONVENTIONAL ENERGY SOURCES

The most common "conventional" methods of producing energy include coal, nuclear, hydroelectric and petroleum. These are the major energy-producing resources in use today. As previously stated, Oregon is an energy importing state without major fossil fuel reserves. We do have many rivers with hydroelectric facilities, but this source accounts for a relatively small portion of the total energy demand.

ELECTRICITY:

Oregon's electricity is supplied thorough a complex network of facilities that includes the Columbia River power system via the Bonneville Power Administration (BPA), and generating facilities operated by Portland General Electric (PGE), Pacific Power and Light (PP&L), Idaho Power Company, and the Eugene Water and Electric Board (EWEB).

Pacific Power and Light Company (PP&L) is the exclusive distributor of electricity in Jackson County, and serves electricity customers in six states. Approximately 78 percent of PP&L's generating capacity comes from thermal facilities, located primarily in Washington and Wyoming, and the remaining 22 percent from hydroelectric facilities. The company has 33 hydroelectric plants throughout the Northwest and seven steam-electric plants. During 1979, the hydro plants produced only about 13 percent of the total system load, due in part to low river flows. The steam-electric plants produced about 66 percent of the total. The remaining 21 percent of the load was purchased from other systems under long-term exchange agreements and contracts. Through such agreements, the company is able to sell excess summer energy to warm localities such as Sothern California, then purchase additional energy to meet peak winter demands in colder areas.

PP&L is also involved in the production of fossil fuels used in generation of energy. NERCO, Inc. (Northern Energy Resources Company), a wholly-owned subsidiary of PP&L, controls coal reserves of 1.3 billion tons in Montana, Wyoming and Alabama. PP&L also owns a 50 percent interest in a coal mine in Centralia, Washington, near the location of one of its plants. Its vast coal reserves appear to be adequate for at least the next two decades. A major problem, however, is in the production of electricity from the resources and transmitting it to the users. Although there is a growing awareness of the need for more electricity, there is also a growing concern for the environment and related air and water quality concerns that often pose major obstacles to the development of new major facilities and transmission lines.

The largest coal operation is the Decker Coal Company in Montana, which has reserves estimated at 522 million tons of strippable low-sulfur, low-ash coal, of which 307 million tons are committed to delivery through 2003. Although the coal appears to be available, the generation facilities do not have the capacity to meet future needs. Without new or expanded facilities or extraordinary conservation efforts, PP&L could experience an electrical energy shortage of as much as 34 percent by 1990. As a result, PP&L is looking at all possible alternatives, including hydroelectric, wind and geothermal facilities. Even with the development of alternative energy supplies and a major conservation effort, we could see a 15 percent deficit by 1990.

PETROLEUM:

Petroleum products are available primarily in the forms of residual oil, distillate oil, gasoline, and diesel fuel. Unlike other forms of energy that are supplied by utility companies, these are provided through many private distributors and retail outlets.

Residual oil is used primarily for large-scale heat generation, such as commercial and institutional space heating and industrial process heat. Distillate oil is used primarily for heat generation also, but usually for smaller applications. The main uses are for residential space heating and orchard heating.

Gasoline and diesel fuels are used almost exclusively for vehicular applications. The primary use is for highway transportation, although a smaller proportion is consumed in off-road use such as for agricultural and timber operations and for industrial machinery.

The future supply and availability of petroleum products is uncertain. The Country's partial reliance on foreign oil, combined with rising costs of imported and domestic oil and continuing political unrest in the middle-eastern oil producing countries, has led to increased pressure to conserve gas and oil, turn to other energy source whenever possible, and increase domestic production. The major oil companies claim to be affected by many of the same obstacles experienced by PP&L and other utilities. Increasing environmental regulations, public attitudes caused in part by rising prices, regulatory delays, and rising production costs are hampering efforts to produce additional energy. Given these factors, it is expected that gas and oil prices will continue to increase in the near future, although we are currently (1984) experiencing a leveling-off of prices and the retail prices of regular gasoline in Jackson County have actually dipped below a dollar per gallon. Because of the many factors and uncertainties, it is impossible to predict future supply at this time. It will be to the City's advantage to seek ways to reduce community reliance on petroleum and to ensure that future development is especially energy-0efficient in the transportation sector, which is the area most vulnerable to fuel shortages.

NATURAL GAS:

Natural gas is distributed in Jackson exclusively by C P National, a private utility. C P National is also a distributor of electricity, water, natural gas, and telephone service in small urban and rural areas of Oregon, California, Nevada, Utah, and Arizona.

Approximately 62 percent of the natural gas supplies coming into our local area originate in Canada with the balance coming from domestic sources in the Rocky Mountain States, according to the Medford office of C P National. Northwest Pipeline Corporation transports the natural gas from the sources of supply in Canada and the Rockies to the Northwest. This company is aggressively exploring for new reserves and now has proven reserves that are equivalent to 16.7 times their 1979 production.

C P National also has an interest in major storage facilities. There are two liquefied natural gas (LNG) facilities at Plymount, Washington; each capable of holding LNG convertible to 1.2 billion cubic feet of natural gas. Another storage facility is located at Centralia, Washington. This is a "salt-dome aquifer" into which natural gas is pumped during times of low demand and held under pressure until needed.

C P National owns a peak shaving plant in Medford which is capable of making pipeline quality gas and sending it into the distribution system anytime there is a shortfall in supply during critical periods or in the event of a major disruption of the transmission line.

C P National serves over 50,000 natural gas consumers, most of whom are located in Southern Oregon. Residential customers use gas primarily for heating and water heating. Also, most of the mills in the Rogue Valley use natural gas for drying and steam processing.

The natural gas supplies for this area are foreseen by C P National as being adequate now and sufficient to meet demands well into the future. The price has risen dramatically over the past few years, primarily due to the Canadian export pricing policies and the deregulation of domestic natural gas. It is expected that natural gas prices in the future will continue to track the world price of imported crude oil insofar as that percentage which comes from Canada is concerned. Those in the gas industry are continuing their efforts to reduce our dependence on Canadian natural gas through such projects as the Alaskan gas pipeline, research into "geopressure" gas in the Gulf Coast area, and new local resources. There are some indications that limited natural gas resources may exist in Jackson County and these too will be explored.

NUCLEAR POWER:

Although nuclear power plants are now operating and providing electricity, the possibility of decreasing the 34 percent projected electrical energy shortage in 1990 through expanded nuclear facilities is considered unlikely. According to PP&L, nuclear plants contain financial risks, uncertainties related to fuel and waste disposal, and long time periods for development of the facilities. A new nuclear power plant today would not be producing until well into the 1990s. Another obstacle that cannot be overlooked is the growing opposition to nuclear power on the part of the public, probably heightened somewhat by accidents, mismanagement, uncertainties of waste disposal methods and locations, and the financial and planning problems, such as those related to the WPPSS project in Washington State.

ALTERNATIVE ENERGY SOURCES

Alternative methods of producing energy include the use of such resources as wind, sun (solar), geothermal, wood waste, and biomass. For the most part, these sources are currently in various stages of development, experimentation, or limited use. A brief discussion is contained here to familiarize the reader and user of this document with these newer innovations. As new breakthroughs occur and as more information is developed, this section of the Plan will be updated to reflect those changes.

WIND

Utilizing wind energy is not new and has been used for decades in Oregon for pumping water and small scale generation of electricity. There are two basic opportunities for generating electricity from the wind. These are (1) small local units to supplement other electricity sources and (2) large wind-powered generating units that are capable of contributing to the regional power grid. Small units are currently being used for a variety of purposes in Oregon. The south coast area is an area of high wind that may be suitable for larger scale generators. PP&L is presently constructing and testing such generators near Coos Bay. On a large scale, the costs are considerably higher to produce electricity by this method, according to PP&L. The costs of electricity from the Coos Bay wind turbine is expected to be in the neighborhood of 10¢ per kilowatt-hour, compared to the present average cost of 2.3¢ per kilowatt-hour.

Although small-scale wind generators could be effective in reducing total electrical consumption, the costs will be high for the individual and probably not cost-effective for larger scale application during the next five to ten years.

GEOTHERMAL

Geothermal energy production is a major possibility that is being studied by several utility companies. However, at this time, there are a number of unknown factors, including costs of production, environmental impacts, reliability, and availability of the needed technology. Without these issues solved, geothermal will not be an energy source that a large proportion of the state can rely on over the next ten years. Locally, there are no known geothermal sources. The nearest are in the Klamath Falls area where geothermal wells are being used primarily for heating purposes.

SOLAR

Tapping the resources of our sun may become a major industry in the near future and the development of major-electric generating stations are not beyond the range of possibility. However, because of inadequate technology, the utility companies are reluctant to risk a major investment in this area at this time. Experimentation facilities are in place in some areas where there is an abundance of sunshine, such as Arizona, but not likely in the Rogue Valley.

Solar heating is probably the most feasible use of the sun that is available and adaptable for use in the Rogue Valley. A study conducted by the U.S. Department of Energy in 1978 entitled "Solar Energy for Pacific Northwest Residential Heating" found that, based upon climatic factors, the attractiveness of solar heating is better for most Pacific Northwest locations studied than for other typical northern locations. This study also stated that the most attractive areas in the Pacific Northwest for solar heating applications are the Richland/Prosser area of Washington and the Medford area of Oregon.

The Oregon Department of Energy is actively promoting solar applications, both passive and active, and stated in its document entitled "Community Energy Planning" that, in general, passive solar design for residential and commercial use is cost-effective throughout Oregon. Many communities throughout the country are developing solar energy or solar access ordinances or modifying building codes to include solar considerations. It has been determined by numerous experiments and studies that relatively inexpensive solar applications, preferably included in new construction, can significantly reduce conventional energy utilization, primarily through water and space heating.

Unlike other forms of energy, solar is readily available and solar energy considerations can easily be integrated into existing ordinances and applied to new development. In some cases, retrofitting of older structures can also be cost-effective. Solar energy development is currently gaining in popularity, has little or no negative impacts on the environment, and is an alternative that can be utilized locally. For these reasons, solar alternatives are given major emphasis in this Plan, second only to conservation of energy. Although major developers have been slow in including solar adaptions in their major projects, we are seeing increasing numbers of "solar homes" throughout Southern Oregon, built mostly by individuals or for the custom home market. We will continue to see more solar homes as developers become more convinced that any increase in initial costs can be recovered in a few years through savings in energy costs.

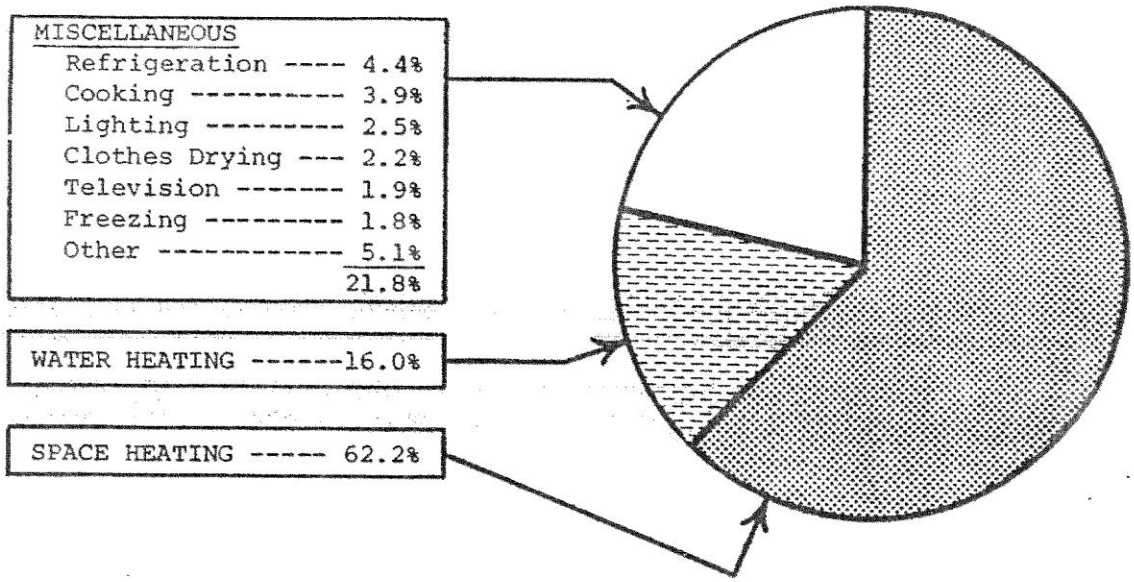
CURRENT ENERGY USAGE IN OREGON

In 1979, the Oregon Department of Energy distributed a handbook entitled "Community Energy Planning", aimed at incorporating energy elements into local comprehensive plans and other land use planning processes. The handbook includes a discussion of energy usage.

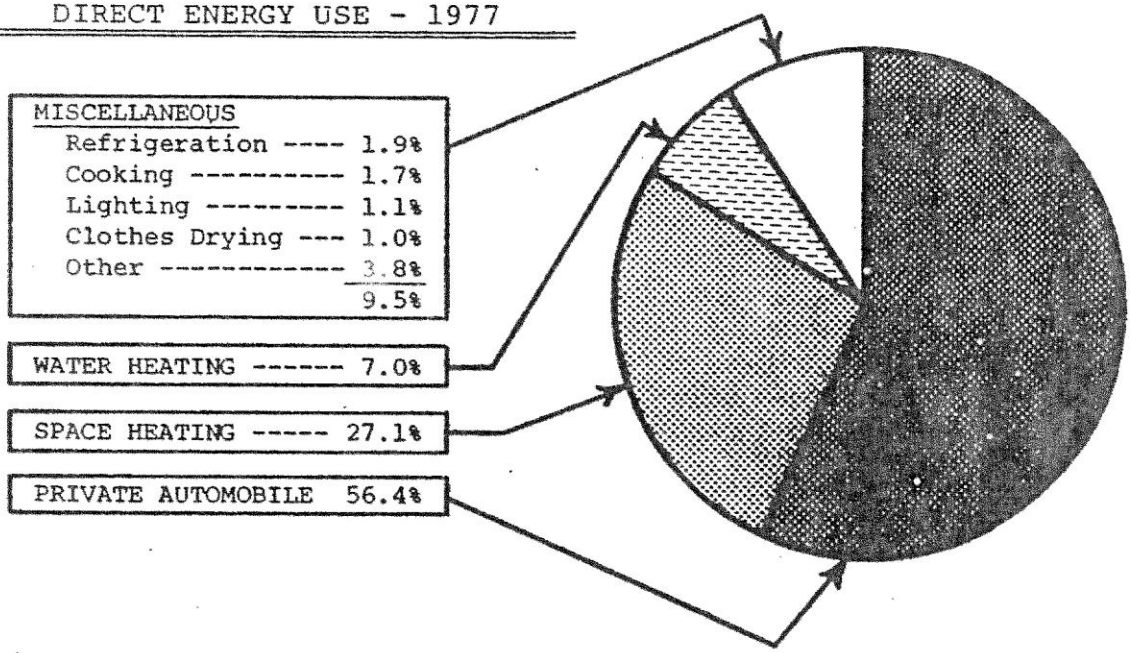
As can be seen in the pie chart on the following page, "space heating" accounts for over 60 percent of residential energy consumption. There are many ways that this percentage can be reduced, since it is due largely to poor insulation, heat loss through windows and doors, infiltration, and housing designs that do not take advantage of the sun for heating. All of these can be improved upon, both through better planning and design of new developments, and through the "tightening-up" of older structures. This applies to commercial and institutional as well as residential structures.

Since the adoption of energy conservation standards in the Oregon Uniform

OREGON'S RESIDENTIAL
DIRECT ENERGY USE - 1977



OREGON'S PERSONAL
DIRECT ENERGY USE - 1977



Building Code in 1979, all new housing must be insulated to R-30 in ceilings, R-19 in floors and R-11 in walls. Windows must be double-glazed. These are minimum levels and the State Supreme Court has ruled that local jurisdictions can adopt more stringent standards if they so desire. The following are some very basic solar orientation principles, provided by ODOE, and are provided here only for reference and general guidance. More specific guidelines should be incorporated into the City's zoning ordinance or other development regulations.

1. The largest wall and window areas should face south. The south side of a building at 40 degrees latitude receives three times as much winter sun as the east or west sides.
2. To benefit most from this sunlight/heat, large south-facing windows should serve major living areas, such as the living room and kitchen.
3. A large thermal mass situated to collect heat from the winter sun provides heat storage within the house and tends to moderate day/night temperature swings.
4. Shading will prevent overheating in summer. Shade can be provided by eaves with a sufficient overhang to block the summer sun, shade trees (deciduous if on the south side of the house), or shutters.
5. Window area on the east and west sides of the house should be kept to a minimum. Ideally, there should be no windows on the west side. West-facing windows should be shaded from the late afternoon summer sun.

The second pie chart on page 7 shows that the breakdown of personal energy usage in Oregon. It is clearly seen that the private automobile is a major energy consumer and that the average household uses more than twice as much energy to operate its vehicles than it does to heat its home. This is another area in which the City can take actions that will have a beneficial effect on energy consumption. Vehicle usage and accessibility are major factors in the City's land use plan. With proper planning, we will be able to reduce the numbers of necessary automobile trips and put greater emphasis on more energy-efficient means of travel, such as walking, bicycling, or utilizing the available public transit system. Other considerations of this plan are to encourage a better commercial and industrial balance within the community, so that fewer residents will have to travel outside the community for reasons of shopping, entertainment, employment or other activities. Such considerations are given greater emphasis in other sections of the Plan that deal more directly with the land use plan itself.

ENERGY CONSERVATIONS

Most experts in the field of energy tend to agree that the first and foremost priority should be voluntary energy conservation. This option has the greatest potential for immediate impact and is the direction that we will have to go in the future as we face greater needs and fewer resources.

Oregon's first Alternate Energy Development Commission (AEDC) was appointed by the Governor in 1979 to quantify the realistic potential in each renewable resource area and to recommend measures to develop those resources. As one of six task forces of the AEDC, the Solar Task Force found that the area of conservation is very closely related to solar application and has prepared a document entitled "Solar/Conservation Task Force Report" to outline policy options to be considered. This task force concluded that the Solar/Conservation combination is the best course of action for the state for a number of reasons, including: (1) it is less inflationary and cheaper than other energy sources; (2) it can stimulate the economy by redirecting the saved capital into other investments; (3) it will create more jobs, particularly at the local level; (4) it promotes individual freedoms and reduces dependence on imported resources; (5) it is more reliable; (6) it can be implemented locally; (7) it will have few or no adverse environmental impacts, and (8) it is something that is available to most individuals and businesses without extensive utility infrastructure.

According to the Solar Task Force, widespread conservation applications are the only energy options immediately available. Conservation is the most cost-effective energy option available and the only way to lower rapidly increasing energy costs and demands.

The task force hopes to achieve its goal of optimum conservation and efficient use of energy in all forms by meeting the following objectives:

1. To phase cut the use of oil by 1990, and natural gas by 2000, except as backup, for direct space and water heat in the residential and commercial sectors. These fuels would be preserved for their more essential transportation and industrial applications.
2. To promote maximal use of electric generating from renewable sources by 2010 through natural market forces and accelerated by the following policy directions:
    a. Use electric resistance space and water heating in all new structures only if used as back-up to high-efficiency heating devices, such as passive and active solar and heat pumps.
    b. Convert all existing electric resistance heating by year 2000 by the same means.
    c. Increased use of more efficient residential and commercial appliances and lightning.
3. To phase out oil and natural gas for low-temperature industrial uses in favor of high efficiency and other renewable heat sources.

ENERGY CONSERVATION PROGRAM

The information presented in this section of the Comprehensive Plan has provided an overview of the major conventional energy sources that Phoenix residents and businesses are presently utilizing. It was concluded that the City and county have very little control over the supply and distribution of the major sources of energy since, in most cases, they originate outside the area or outside the state.

From the conclusion of local and state-wide studies, it appears that the best course of action would be one that combines energy conservation with solar applications. This direction could be the basis for a program that could be implemented at the local level and could be cost-effective. There are also many ways in which both conservation and solar may be integrated into the Comprehensive Plan and implementing ordinances.

The following is a set of energy-related goals and policies which form the City's energy conservation program.

ENERGY EFFICIENT STRUCTURES

Goal #1: *To work toward optimum levels of energy efficiency and conservation in structures of all types throughout the Community.*

Policies:

1. The City shall work toward the weatherization of all public buildings under its jurisdiction, within its economic limitations.

2. The city shall ensure that all new construction will be as energy-efficient as possible and will conform to all applicable Uniform Building Code and state weatherization standards.

3. The City will consider the future development and implementation of solar accessibility and orientation requirements for inclusion in the Zoning Ordinance and other land development regulations.

4. The City shall encourage residents to participate in residential and/or commercial weatherization programs that may be offered through various agencies or utility companies, and shall provide related information on such programs, as available.

QUALITY URBAN DESIGN

Goal #2: *To promote energy efficient design in all new development that maximizes the use of natural environmental features.*

Policies:

1. The City shall encourage innovation in the design of new residential development, such as attached or clustered housing, whenever substantial energy conservation would result without any sacrifice in residential quality.

2. The City shall encourage the retention of trees and natural vegetation when they would be useful in energy conservation, such as providing shade, cooling, windbreaks, or other uses.

3. The city will consider the inclusion of solar access requirements into existing codes and ordinances to protect solar rights.

4. The City will consider the possibility of additional landscaping provisions in the subdivision ordinance and appropriate sections of the zoning ordinance to help ensure energy-efficient development and to ensure attractive and usable open space, particularly in higher density residential developments.

EFFICIENT PATTERNS OF LAND USE

Goal #3: *To ensure, through the Land Use Section and zoning, the most energy-efficient arrangement of land uses.*

Policies: 1. The City will strive for energy-efficient future neighborhoods by providing for all major services at the neighborhood level, as shown on the Comprehensive Plan map.

2. The City will encourage innovation in the design of new subdivisions and planned unit developments that minimize the costs and energy consumed in the provision of urban facilities such as streets, sidewalks, curbs and gutters, etc.

3. The City shall encourage "in-fill" development on vacant lots within the City to maximize the utilization of existing facilities and services.

4. The City shall discourage "urban-sprawl" development that is not consistent with the Comprehensive Plan and that might put a strain on the provision of public facilities and services.

TRANSPORTATION PLANNING

Goal #4: *To minimize transportation-related energy consumption through appropriate land use planning and an emphasis on non-motorized transportation alternatives.*

Policies: 1. Energy efficiency shall be a major criterion in evaluating future modes of transportation, both public and private, as well as major land use proposals.

2. The City shall continue to support carpooling and the use of public transit (RVTD), and will continue to make information on transportation alternatives available to the public.

3. The City will continue to provide industrial sites in locatin that can make maximum use of the railroad and freeway.

4. Whenever possible, the City will encourage non-motorized forms of transportation to lessen dependence on the private auto for short trips as well as commuting.

5. The City shall coordinate its plans for streets, bikeways, truck routes, and other major facilities with the County and State.