

## VII. Transportation System Alternatives

The intent of every transportation plan is to sketch a route from where the community is currently (existing conditions) to its desired conditions in the future (vision and goals). Previous sections of this document defined the vision and goals of the Corvallis Metropolitan Planning Area for its future transportation system, provided a description of the existing transportation system and identified its possible shortcomings. This section includes a description of the plausible alternative approaches for achieving the vision and goals, a description of the Travel Demand Forecasting Model that was used to analyze the alternative approaches, and the results of that analysis. Throughout this section the alternative approaches are referred to as “transportation system alternatives.”

### A. Overview of Alternatives

The two major components of a transportation system are travel demand and the supply of transportation services and facilities. The intent of each plan is to respond to the existing and anticipated demand in a manner and to the degree defined by the Plan’s Vision and Goals. Traditional transportation system plans often focus on the supply side of the transportation system by expanding transportation facilities and services to achieve their desired transportation system. Successful transportation system plans, in recent years, have increasingly realized and addressed the role that land use decisions play in affecting travel behavior and the interconnectivity of land use and transportation systems.

Five alternatives were considered as logical approaches to achieve the Plan’s Vision and Goals. The alternatives are:

1. No-Build (sometimes referred to as Status Quo)
2. Transportation Demand Management Emphasis
3. Transportation Capacity Enhancement Emphasis
4. Land Use Management Emphasis
5. Multi-Prong Approach

Following the broad description of alternatives, there is a description of the specific assumptions that were entered into the Corvallis Area Travel Demand Model for quantitative analyses.

#### 1. No-Build Alternative

The No-Build Alternative is sometimes referred to as the status quo alternative. In this scenario the Planning Area will experience its projected growth in population and employment and the demand for transportation facilities and services will increase accordingly. The cities and the county public works departments will continue the annual routine repair and maintenances that they currently provide. However, no new major roadway or transit improvement projects will be implemented. The existing roadway network will be expected to handle the increased traffic. The transit system will maintain its current service level and will not extend its service to the newly developed areas. This approach will also be applied to the improvement of traffic operations, or

development of a state-of-the-art traffic control center. Therefore, the capital improvement cost of this scenario is assumed to be zero and it is used as the comparison basis for other scenarios.

## **2. Transportation Demand Management Alternative**

Transportation Demand Management (TDM) is based on the concept that the supply side of transportation cannot continue expanding to meet the demand, especially when resources are scarce. Therefore, strategies to reduce the need for trips, particularly single occupancy vehicular trips, are preferred to those that expand transportation capacity. This alternative relies heavily on more efficient use of existing transportation resources and avoids implementation of major capacity expansion projects, such as construction of new arterials. Strategies within this framework may include a combination of measures described below:

### **a. Transportation System Management (TSM)**

The premise of Transportation System Management is that the existing transportation system capacity is adequate to accommodate future transportation demands, provided that the system is maintained and preserved carefully and its efficiency is maximized. Some of the most widely used TSM strategies are:

#### **▪ *Operation Improvements***

Synchronization of consecutive traffic lights, reconfiguration and geometric modification of intersections and facilitating the movement of buses are examples of changes that improve flow of traffic and reduce travel time.

#### **▪ *Intelligent Transportation System (ITS)***

ITS is the application of modern technologies to improve traffic flow, safety and communication. Examples of ITS are deployment of traffic monitoring cameras and remote management of green time at intersections, advanced roadway information on roadway conditions, delays and guidance to alternative route, and incident management.

#### **▪ *Congestion Management***

Includes improvements to reduce traffic congestion, mostly during peak hours, such as working with major employers to allow flex time, staggered working hours and/or, telecommuting. Congestion management generally includes other techniques such as traffic operation improvements described above and preferential treatment of buses or other pooling vehicles.

#### **▪ *Access Management***

Access management is an effective way of enhancing roadway capacity. This requires adoption of policies that limit the number of accesses for each class of roadway coupled with combining several adjacent accesses into a single driveway, purchasing property access rights and the construction of access roads and fringe roads.

#### **▪ *Parking Policies***

Parking policies that charge the true cost of parking, reduce the availability of long term parking lots in the core urban area, and favor the use of alternative modes of transportation can be an effective disincentive to driving.

▪ ***Travel Demand Reduction (TDR)***

TDR includes restrictive techniques aimed at reducing travel demands in urban areas. Successful implementation of these techniques generally requires the adoption and enforcement of stringent municipal policies, such as:

○ **Employer Trip Reduction Programs**

Encourages major employers, possibly by providing incentives and disincentives, to reduce the number of auto trips to and from the place of employment. The employer, in return, provides incentives for the use of alternative modes of transportation and may provide disincentives for the use of single occupancy vehicles by its employees. A similar measure could curb student driving to schools.

○ **Adoption of Travel Reduction Ordinances (TROs)**

The city or the county adopts an ordinance requiring all major employers to reduce the number of single occupancy vehicles generated. The ordinance generally requires trip reduction by a certain percentage over a period of time.

○ **Implementation of Exaction Fees/User Fees**

Requires paying per mile or a fixed usage fee for driving a personal vehicle. The most common form of this levy is the federal and state gasoline tax paid at gas stations.

**b. Travel Demand Management**

Strategies to manage travel demand in more efficient ways include:

▪ ***Transit Improvements***

The most common form of TSM is investment in the transit system in an effort to reduce travel demand by shifting trips from single occupancy vehicles to public transit. It requires expansion of the transit system by adding new routes and increasing frequency and the overall quality of transit service. A vital transit service requires high-density land use and a steady source of local funding, in addition to the federal and state funds.

▪ ***Incentives for Use of Alternative Modes of Transportation***

This includes enhancing transit service, enhancing pedestrian and bikeway facilities, improving carpooling and vanpooling, free downtown shuttles and encouraging telecommuting.

▪ ***Provision of Bike and Pedestrian Facilities***

A rich and well-connected network of bikeways and walkways can reduce the number of vehicular trips and vehicle miles of travel. Studies have found a direct relationship between the construction of bikeway facilities and the increase in bicycle use. Other studies support that increase in bicycle use reduces the number of auto trips. Rietveld and Daniel (2004) found that the use of bicycle transportation increases in cities where cycling is relatively easier (fewer hindrances along cycling routes) and safer.

▪ ***Disincentives for Use of Single Occupancy Vehicles***

Policies to restrict the use of parking, particularly, long term parking; preferential treatment of carpooling and vanpooling vehicles, levying exaction and usage fees and higher levels of traffic congestion act as disincentives to SOV use.

▪ ***Park and Ride Facilities***

An effective way of managing travel demand is the development of park and ride facilities in the fringe of the urban area. Park and Ride lots provide opportunities for commuters to park their vehicle and share the ride for the main portion of their trip either in public transit or by carpooling and vanpooling.

### **3. Transportation Capacity Enhancement Alternative**

In this scenario investments are directed to enhance the supply of transportation facilities and services, mainly through increasing the capacity of roadways. Additional transportation infrastructure will be provided to address the growing transportation needs of the area. The 2000 US Census indicates that more than 85 percent of all trips in the nation are by a single occupancy vehicle. Similarly, today in the Planning Area, the automobile is the predominant mode for a great majority of trips. No drastic reduction in the use of the automobile can be reasonably anticipated in the near future. Increasing the supply of transportation facilities also includes the enhancement of the transit system as well as the rail system. Included in this alternative are:

**a. Roadway Expansion**

Roadway expansion includes construction of new roadways or the widening of the existing roadways. In either form it provides additional capacity for almost all modes of transportation, as roads are used not only by the automobile but also by transit, bikes, pedestrians and freight. Roadway expansion is a direct response to mitigate roadway congestion. Increasing capacity reduces the ratio of vehicles to the capacity on a roadway (V/C Ratio) and thus improves the Level of Service (LOS).

**b. Roadway Extension**

Roadway extension is extending an existing roadway to a logical terminus point. It disperses traffic and in some cases provides additional connectivity resulting in reduced VMT.

**c. Intersection Capacity Improvements**

Intersection capacity improvement is generally adding another lane to the existing configuration of the intersection. In most cases, adding an exclusive left turn or right turn lane significantly reduces congestion. Intersection capacity improvement is an efficient way of reducing travel time.

**d. Transit Expansion**

Transit expansion includes operating new bus routes, increasing frequency of bus service and extending bus routes. Although the results of transit expansion are drastically different from the results of roadway expansion, both are investments on the supply side of transportation.

**e. Rail Expansion**

The railroad plays a significant role in the movement of freight through the Planning Area. Any improvements to the railroad system would help reduce demand for additional roadway capacity.

**4. Land Use Management Alternative**

In recent years the effectiveness of coordinating land use and transportation decisions as a means of reducing travel demand has been increasingly realized. In this scenario a substantial amount of transportation need will be addressed through better management of land use patterns and urban design. This concept is referred to by a variety of names such as *Neo Traditionalism*, *New Urbanism*, *Smart Growth Design*, *Livable Community*, or *Sustainable Community*. In the core of this concept is an urban design that harkens back to more-traditional neighborhoods before the automobile dominated the American urban landscape. The design aims at preventing urban sprawl and reducing travel demands. The most effective form of this alternative is the one that is supplemented by Transportation Demand Management techniques. Generally, land use management techniques are applied to future developments in urban area as they occur, and as such, the realization of its benefits is gradual.

While there is a broad array of strategies that could be part of a land use management alternative, the following were selected as most appropriate, given the characteristics of the Planning Area:

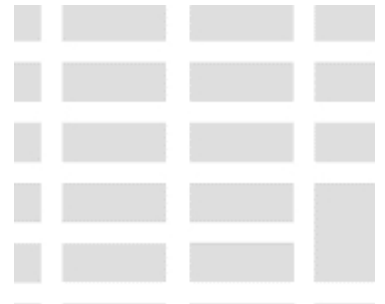
**a. Increase Residential Density**

Higher residential densities reduce demand for infrastructures and particularly transportation facilities. Studies show that a vital transit system requires urban density of 8-10 residential units per acre.



**b. Grid Street System**

An interconnected grid street system provides many routes to a single destination. Therefore, it provides a higher level of intra urban connectivity and disperses traffic. It also facilitates walking and bicycling. In contrast, a suburban pattern of winding streets with cul-de-sacs increases VMT and travel time.



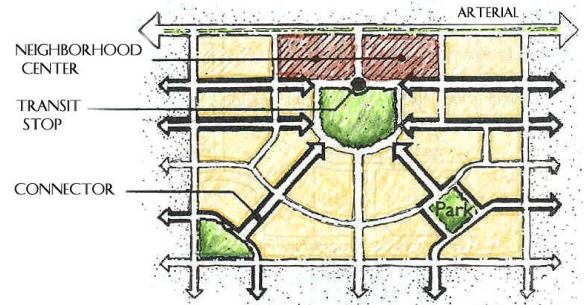
**c. Mixed Use Developments**

Prevailing land use practice segregates residential areas and employment centers, which increases the need for vehicular trips and travel time. A higher level of accessibility is provided in mixed use developments whereby the jobs, shops and residences are within walking or biking distance of each other, or even within the same building or building complex.



#### **d. Transit-Oriented Development (TOD)**

A TOD is a land use development around a transit center designed to increase the use of alternative modes of transportation, particularly the use of public transportation. The development generally includes a regional node containing a mixture of uses in close proximity to residences. It is a compact urban development with a network of sidewalks and bikeways that reduces the need for the use of single occupancy vehicles. Transit Oriented Development generally requires at least six residential units per acre in residential areas and 25 employees per acre in commercial centers.



#### **e. Neighborhood Centers**

Neighborhood centers are compact developments with relatively high density that include commercial, retail, restaurant and possibly office uses in the core and a mixture of housing around the core. The development features a rich network of walkway and bikeway facilities.

### **5. Multi-Prong Alternative**

This approach was developed subsequent to the evaluation of the other alternatives. It is based on the assumption that none of the above alternatives can singularly address the multifaceted transportation needs of the Planning Area. The diverse life styles and land use pattern of the area require diverse solutions to its transportation needs. As such, a multi-prong approach employing an appropriate share of each alternative was formulated to be closely aligned with this plan's goals. The Multi-prong Approach includes a combination of:

- Transportation Demand Management strategies.
- Land Use Management and policies to coordinate transportation and land use decisions
- Capacity Expansion projects on arterials and collectors to respond to the demand.

## **B. Transportation System Alternatives Assumptions and Projects**

This section describes transportation improvement projects, activities, policies and techniques that were assumed under each Transportation System Alternative for the purpose of evaluation. These projects and assumptions are only to form a hypothetical transportation system scenario and are not recommendations of the Plan. Each Transportation System Alternative includes short term (2010 Network), intermediate term (2020 Network) and long-term (2030 Network) improvement projects and activities. Tables VII-1 and VII-2 show the projects and activities in a matrix format for each alternative. It also indicates whether the assumption is related to the short-term, intermediate, or long-term network.

### **1. No-Build Alternative**

Although the No-Build Alternative does not include any new improvement project, there are a few projects in the FY2006-2009 Corvallis Area MPO Transportation Improvement Program and

the Statewide Transportation Improvement Program for which funding has been secured. These projects will be implemented over the next 3-4 years. Also, the No-Build Alternative assumes that additional streets and roads will be extended with funds from developments as developments occur.

## **2. Transportation Demand Management (TDM) Alternative**

Assumptions for the TDM alternative includes mainly transit improvement projects; park and ride lots and program enhancements aimed at reducing reliance on single occupancy vehicles.

## **3. Transportation Capacity Expansion Alternative**

The Capacity Expansion Alternative network includes mainly roadway projects, as well as some transit projects. The roadway projects for this alternative were derived from the local Transportation System Plans (TSPs).

## **4. Land Use Management Alternative**

The assumptions for the Land Use Management Alternative include several policies and municipal requirements that could reasonably be adopted and implemented by the local governments from now until 2030. To quantify the impacts of land use management alternative, the following assumptions were made:

- The built area will not be retrofitted. New land use policies will be applied only to the future residential developments.
- Current zoning designations will mainly be maintained. Current zoning was used to determine the amount of vacant land available for residential development.
- The land use management policies will be applied to new residential areas that are of adequate size and are conducive to the implementation of all aspects of land use management techniques.
- Only 50 percent or 3,187 of the projected 6,374 new residential units will be part of a mixed use and/or high-density development with access to alternative modes of transportation.
- Transportation Demand Management measures will be vigorously pursued.
- The combination of all land use policies (mixed use, high density, access to transit, etc.) and TDM measures will reduce travel demand by 15 percent in the newly developed residential areas.

## **5. Multi-prong Alternative**

The assumed projects and activities for the Multi-prong Alternative are a combination of projects and activities from all of the other alternatives.

**Table VII-1: Roadway Projects Assumed to Occur Under Each Alternative**

	No-build (Committed projects)	TDM	Capacity Expansion	Land Use Mgmt	Multi-prong
<b>Roadway System Projects</b>					
US 20: Philomath Couplet - Convert Applegate and Main Streets to one way east bound and west bound, respectively, with a westbound connection between the existing highway and College Street, expand Main Street to five lanes from Newton Creek to 15th Street	2010	2010	2010	2010	2010
Reservoir Road - 53rd Street to one third of a mile west – Improve with sidewalk and bikeway.	2010	2010	2010	2010	2010
19th Street - OR 34 to Chapel Street – Adding bike lanes and turn lanes.	2010	2010	2010	2010	2010
53rd Street - Railroad Overpass – Eliminate the railroad overpass, realign intercepting roadways.	2010	2010	2010	2010	2010
53 <sup>rd</sup> Street - US 20/OR 34 to Country Club Road– Adding bike lanes and turn lanes at intersections	2010	2010	2010	2010	2010
Circle Blvd. at 9th Street – add right-turn lane eastbound to 9th Street			2010		
35th Street, US 20/OR 34 to Orchard – widen, realign and add bike lanes (partially completed)			2010		2010
53 <sup>rd</sup> Street and Philomath Blvd. (US 20/OR 34) intersection – add turning lane					2010
College Street, 20th Street to 12th Street - widen with intersection curb extensions, bike paths and sidewalks (Done)			2010		
Applegate Street, 20th Street to 15th Street – widen with intersection curb extensions, bike paths and sidewalks			2010		
Applegate Street, between 23rd Street and 24th Street – extend over Newton Creek (Done)			2010		
South 19th Street, College Street to Chapel Drive – add bike lanes ‘signed and striped’			2010		
Circle Boulevard – Extend Circle Boulevard to Harrison Boulevard		2020	2020		2020
Kings Boulevard – Extend to NW James Avenue		2020	2020		
Kings Boulevard – Extend to Lester Avenue	2010				2010
NW James Avenue – Extend from new Kings Boulevard extension to OR 99W		2020	2020		
Van Buren Avenue Bridge – replace Van Buren Bridge (preliminary engineering)					2010
Van Buren Avenue Bridge – replace Van Buren Bridge			2020		2020
OR 99W, Rivergreen Avenue to Airport – widen Hwy 99 from 2 lanes to 4 with left turn lanes at major intersections to 500 ft. south of Airport			2020		
Country Club Dr, Barley Hill Dr. to Hwy 20/34 - widen to provide 6-foot multi-use paths in each direction.			2020		
Country Club Dr, Barley Hill Dr. to Hwy 20/34 – widen to add bike lanes, sidewalks, improve alignment					2020
Crystal Lake Dr. - widen and reconstruct street to standard with bike lane			2020		2020
Reservoir Road/ SW 53rd St. – install traffic signal, construct at-grade rail crossing - same number of lanes; same as existing speed limits			2020		
Airport Ave. Improvement – improve to urban standard			2020		
Airport Ave., OR 99W to Airport Place – upgrade to urban standards					2020
Independence US 20 – install traffic signal			2020		
Junction US 20 at OR 34 – install traffic signal			2020		
US 20/OR 34 at OR 99W – reconstruct to increase turning radii, add sidewalk, etc			2020		
West Hills Rd. at 53rd St. – install traffic signal			2020		
US 20/OR 34, Newton Creek to 53rd Street - reconstruct to four lanes with left-turn refuges and bike lanes			2020		
US 20/OR 34, Newton Creek to 53rd Street – complete final design, acquire ROW (preliminary engineering only)					2020
US 20, 53rd Street to Western Boulevard - widen			2020		
OR 99W, railroad overcrossing to north of Lewisburg Rd. - widen to four lanes with left turn refuges			2020		
OR 99W, railroad overcrossing to Circle Blvd. - widen to four lanes with left turn refuges					2020
US 20/OR 34, 53rd Street to Western - complete final design and acquire right-of-way					2020
US 20/OR 34, Western Blvd. to OR 99W - widen to four lanes with left turn refuges			2020		
US 20/OR 34 and OR 99W interchange - provide ramps for south to west and west to south movements. – Two lanes each			2020		
US 20 at Western Boulevard – install traffic signal			2020		
OR 99W at either Goodnight or Rivergreen Avenue – install traffic signal			2020		
OR 99W at both Goodnight and Rivergreen Avenue – install traffic signal when warranted					2020
Country Club Dr., 35th to 53rd – widen to add bike lanes sidewalks, improve alignment			2020		2020
West Hills Road, 35th Street /Western Boulevard to 53rd Street – widen to add bike lanes			2020		
West Hills Road, 35th Street /Western Boulevard to 53rd Street – enhance to urban standards					2020
Grant Avenue, Highland to 9th Street – widen to add bike lanes sidewalks, improve alignment			2020		2020
Crystal Lake, Alexander to Park – widen to add bike lanes sidewalks, improve alignment			2020		
Buchanan at 9th Street– construct left turn lanes on Buchanan			2020		2020
Witham Hill Dr., Grant Avenue to Walnut Blvd – widen/improve bike lanes			2020		2020
Plumley Street, - extend Plumley from Airport Ave to extension of Rivergreen			2020		2020
Newton Street, between dead end and 26th Street – extend to 26th Street			2020		

Corvallis Area Metropolitan Transportation Plan: Destination 2030

College/Main/Applegate Streets – construct Phase II of the Philomath Couplet with additional capacity, include bike lanes			2020		
Main Street at 9th Street – install traffic signal			2020		
13th Street, Chapel Drive to Main Street – improve for truck route with bike lane			2020		
13th Street, Chapel Drive to Main Street – reconstruct to urban standards to accommodate truck traffic, add bike lanes, “signed and striped.”					2020
Chapel Drive, Bellfountain Road to 13th Street - add 6 foot multi-use paths			2020		
Chapel Drive, Bellfountain Road to 13 <sup>th</sup> Street – upgrade to urban standards					2030
South 13th Street, Main Street to Chapel Drive – add bike lanes ‘signed and striped’			2020		
US 20, Conifer Avenue to N. Albany Road – widen US 20 from 2 lanes to 4 lanes			2030		
US 20/OR 34, between OR 99W and US 20/OR 34 junction – add two more lanes			2030		
US 20, US 20/OR 34 junction to Woods Creek Road – widen to provide continuous left turn lane on US 20			2030		
OR 99W between railroad over crossing and Walnut Blvd. – widen Highway OR 99W to 4 lanes with left turn lanes at Circle Blvd. and Walnut Blvd.			2030		
Arnold Avenue and OR 99W – install traffic signal			2030		
Chapel Dr. between 19th St. and Bellfountain Rd. – widen this rural section to provide 6-foot multi-use paths in each direction.			2030		
US 20, Circle Blvd. to Albany - widen to four lanes with left turn refuges			2030		
19th St. between US 20/OR 34 and Chapel Dr. – urban section with 6-foot bike lanes in each direction			2030		
Bellfountain Rd. between Airport Rd. and Greenberry Rd. - widen this rural section to provide 6-foot multi-use paths in each direction and extend the existing county bikeway system to Invale Elementary School			2030		
Granger Ave.: Pettibone to US 20 - Widen this rural section to provide 6-foot multi-use paths in each direction and extend the existing county bikeway system to US 20.			2030		
West Hills Road at Reservoir Rd. – install traffic signal			2030		
Harrison Blvd., Kings to 36th, widen (has been partially completed)			2030		
Harrison Blvd., 29 <sup>th</sup> to 36 <sup>th</sup> , - widen to add bike lanes and urban section.					2030
Brooklane Dr., Chintimini to US 20/OR 34 – widen to add bike lanes sidewalks, improve alignment			2030		
Brooklane Dr., Chintimini to US 20/OR 34 – reconstruct and realignment, bring to urban standards					2030
Ponderosa Ave, Glennidge to Skyline – widen to add bike lanes sidewalks, improve alignment			2030		
Alexander from 3rd to Crystal Lake – widen to add bike lanes, sidewalks, improve alignment			2030		2030
OR 99W at Kiger Island Drive – install traffic signal			2030		2030
53rd Street, Philomath Blvd to Nash – widen			2030		
US 20, Downtown Corvallis to Circle Boulevard – widen to 4 lanes			2030		
Circle Boulevard, Hewlett-Packard campus to US 20 – widen to 4 lanes			2030		2030
Clemens Mill Road - relocate road across from 26th Street (Clemens Mill Rd. and 26th Street and Hwy 20/34 to improve access)			2030		2030
US 20 at Highway 34 – install traffic signal			2030		2030
Main Street at 26th Street – install traffic signal			2030		2030
West Hills Road, Wyatt Lane to N. 19th Street – add bike lanes ‘signed and striped’			2030		2030
Lester Ave. – extend to OR 99W					2030
Satinwood Drive – extend to Lester Ave.					2030

**Table VII-2: Transit, TDM and Land Use Management Projects, Activities and Policies Assumed to Occur Under Each Alternative**

	No-build (Committed projects)	TDM	Capacity Expansion	Land Use Mgmt	Multi-prong	
<b>Transit Improvements</b>						
Purchase/replace 2 buses <sup>1</sup>	•					
The number of buses will increase from 8 to 12.		2010				
The number of buses will increase from 8 to 11.					2010	
The number of buses will increase from 11 to 15.					2020	
The number of buses will increase from 15 to 18.					2030	
Increase the number of buses from 12 to 20		2020				
Construct a new bus maintenance and operation facility					2010	
Route Expansions: <ul style="list-style-type: none"> <li>○ Route #3 will be modified to serve Technology Loop and Research Way.</li> <li>○ Route #7 will be expanded to serve the Hewlett-Packard campus.</li> <li>○ Route #4 will be modified to serve the hospitals and northeast Corvallis.</li> <li>○ Route #2 will be modified to serve 9th Street and the hospital.</li> <li>○ Route #8 will be modified to serve south Corvallis and OSU.</li> </ul> Routes #1, #5, and #6 that CTS current operate will not be modified		2010	2010			
Modify transit routes regularly to serve the highest number of passengers.					2010	
<b>New Routes –</b> <ul style="list-style-type: none"> <li>○ Philomath Circulator, to serve Philomath Blvd and Applegate Street between 19th Street and 26th Street</li> <li>○ Adair Village Commuter Route, from transit Mall to Santiam Lane in Adair Village.</li> <li>○ Philomath/Bellfountain/ Airport Road.</li> <li>○ Downtown Corvallis Circulator</li> <li>○ Reservoir Road to Elliot Circle, West Hills, Reservoir, 53rd, Harrison, Circle, Kings, James and Eliot Circle.</li> <li>○ Downtown Corvallis to Lewisburg</li> </ul>		2010 2020 2020 2020 2030 2030	2010		2020 2030 2020	
Transit service hours will be increased from the current 22,000 hours/yr to 38,000 hours/yr.					2020	
Transit service hours will be increased to 83,000 hours/yr					2030	
Increase number of buses from 20 to 30 and all routes will have 15 minute headway.		2030				
Annual transit operations <sup>3</sup>	•	•	•	•	•	
<b>TDM Improvements and Activities</b>						
<b>New Park and Ride Lots –</b> <ul style="list-style-type: none"> <li>○ Park and Ride lot at S. 15th Street and Applegate Street in Philomath</li> <li>○ Park and Ride lot at Highway 99W and Airport Road</li> <li>○ Park and Ride lot at Highway 99W and NE Elliot Circle</li> <li>○ Park and Ride lot at Harrison Blvd and Walnut/53rd Street</li> <li>○ Park and Ride lot at US 20 and OR 34, west of Philomath (TAZ 327)</li> <li>○ Park and Ride lot at Pettibone Dr. and Granger Road</li> <li>○ Park and Ride lot at Highland Dr. and Lewisburg Ave.</li> <li>○ Park and Ride lot at Santiam Lane and Arnold Avenue</li> <li>○ Park and Ride lot at West Hills Road at 19th Street</li> <li>○ Park and Ride lot at Airport road and Bellfountain Road</li> <li>○ Park and Ride lot at Tyler Avenue at 1st Street</li> <li>○ Park and Ride lot at Adair Village</li> </ul>		2010 2020 2020 2020 2020 2030 2030 2030 2030 2030 2030 2030	2010  2010		2010 2030 2030 2030 2020	
<b>Other TDM Improvements and Activities:</b> <sup>2</sup> <ul style="list-style-type: none"> <li>○ Vigorously increase bikeway and pedestrian facilities throughout the Planning Area.</li> <li>○ Provide incentives for ridesharing by the use of transit, carpooling and vanpooling</li> <li>○ Provide disincentives for the use of single occupancy vehicle</li> <li>○ Maintain and preserve roadway system.</li> <li>○ Encourage HP, the hospitals and OSU to charge the true cost of parking</li> <li>○ Increase parking around these establishments to \$100 per month.</li> <li>○ Formation of Transportation Management Associations</li> <li>○ Promote carpool and vanpool programs</li> <li>○ Develop on-site carpool/vanpool station</li> <li>○ Provide communal bicycle program</li> </ul>		2030 2030 2030 2030 2030 2030			2010  2010 2010 2020 2020	

Land Use Management Component					
o	Higher density residential development				2010
o	Mixed land use developments				2010
o	In-fill developments				2010
o	Access to transit network for new residential developments.				2010
o	Implement a minimum density more conducive to a viable transit service				2010
o	Implement mixed land use				2020
o	Implement grid patterned streets				2020
o	Provide for transit service to the development				2020
<sup>1</sup> Bus purchases under the No-build Alternative are currently programmed. <sup>2</sup> "Other" TDM activities are assumed to be ongoing after they are initiated. <sup>3</sup> Transit operations are assumed to occur on an ongoing basis under all of the alternatives.					

## C. Evaluation Process

The five identified transportation system alternatives were evaluated with a combination of quantitative and qualitative measures. The quantitative measures were analyzed with the Corvallis Area Travel Demand Forecasting Model. This section describes the Travel Demand Forecasting Model and the Evaluation Measures used in this process.

### 1. Travel Demand Forecasting Model

The travel demand model is a computer mathematical program that simulates travel behavior and travel demands for a specific time frame according to the socio-economic characteristics of the area. The most common use of travel demand models is in forecasting future travel volumes and patterns at corridor levels. As such, the models are most useful in projecting the impacts of adding a new roadway or lane or removing a connection at a corridor level (what if scenarios).

Although recent improvements to travel demand models have increased their usefulness as a tool of transportation decision-making, model outputs are still subject to technical interpretations. The most notable shortcoming of the models are in the areas of demonstrating impacts of land use management techniques, micro (small area) analyses, transportation policies, improvements to local roads (non-arterial and collector), and construction of bike lanes, and pedestrian facilities.

A travel demand model is based on data of the number of households and employees for the planning area. It also includes the existing transportation network, the average traffic volume on roadways and data on the transit system. For this input, the planning area is divided into smaller socio-economic units called Traffic Analysis Zones (TAZs). The data input is often enriched by the results of a household travel survey that provides empirical data on the area's travel patterns and behavior.

In general, travel demand models compute the volume of demand for any given time through a four-step process that consists of Trip Generation, Trip Distribution, Modal Choice and Trip Assignment.

- **Trip Generation.** Calculates the total number of trips from and to each TAZ by trip purpose, as a function of land uses and household demographics, and other socio-economic factors.
- **Trip Distribution.** This step matches the origins with destinations to develop a “trip table” that displays the number of trips going from one TAZ to another (inter and intra-zonal trips).
- **Modal Choice.** Calculates the proportion of trips between each origin and destination that use a particular mode of transportation.
- **Trip Assignment.** Allocates trips between an origin and destination by a particular mode to a route, whereby each traveler is assigned to the shortest (travel time) path.

**a. Corvallis Travel Demand Model**

The Corvallis Model was developed by the Transportation Planning Analysis Unit (TPAU) of ODOT and the consulting firm of DKS, on a modified EMME2 platform. The entire Planning Area was divided into 362 TAZs. Using the 2000 US Census data, the population and the number of households for each TAZ were calculated. The Portland State University Certified Population Data was used to develop population projections for each TAZ. Year 2000 was established as the Base Year for the model with future networks built for 2010, 2020 and 2030.

Employment data was obtained from the Oregon Employment Department (OED), Research Center for 2000. The employment data was projected to year 2030 by calculating the historic ratio of employment to population in the area which averaged around 51 percent. This ratio was applied to the projected population to forecast employment. In consultation with the area land use planners and the the adopted land use and zoning maps the projected employment data was allocated to TAZs.

The above methodology produced the following input to the Corvallis Travel Demand Model. It should be noted that Table VII-3 shows the population, number of households, and employment for the 362 TAZs which cover an area slightly larger than the Planning Area.

**Table VII –3: Assumptions used in the Corvallis Travel Demand Model**

	<b>Population</b>	<b>No. of Household</b>	<b>Employment</b>
<b>2000</b>	70,618	27,396	32,586
<b>2010</b>	77,557	29,185	39,297
<b>2020</b>	81850	31,774	42,167
<b>2030</b>	86,638	33,769	44,249

To interpret the outcome of the model, a description of its terminology is provided below:

- **2000 Network:** A baseline transportation network using Census 2000 demographics, used to portray roughly the present conditions.
- **No-Build (Status Quo) Alternative:** A transportation network using year 2030 demographics with no additional improvements other than the ones programmed for the next three years.
- **Link:** A segment of roadway with similar characteristics.
- **Demand/Capacity ratio:** The demand/capacity ratio is a modeling measure used in transportation planning to analyze the performance of a link or corridor. It is different from the traffic engineering Volume to Capacity (V/C) Ratio that is used to analyze the performance of an intersection. The demand/capacity ratio is determined by dividing the traffic volume on a model link by the capacity of that link.
- **Congestion:** A demand/capacity ratio that is higher than the acceptable level for a particular area.
- **Vehicle Miles of Travel (VMT):** Total miles traveled by all vehicles which could be measured for a specified transportation facility and during a specified time period.
- **PM Peak:** A measure of the most congested period of traffic. In Corvallis this is generally an hour between 4:00 to 6:30 PM.
- **Lane Miles:** Length of driving lanes multiplied by the number of driving lanes.
- **Trip:** A one-way travel from an origin (e.g. home) to a destination (e.g. work, shop, daycare). Traveling from work to a store and then to home is considered two trips.
- **Mean Travel Time:** A statistical measure of the average length of time required to complete an average trip during a specified period.

## 2. Evaluation Measures

The evaluation measures developed for weighing and comparing the impacts of the transportation system alternatives are described in this section. These measures were derived from the Plan's Vision and Goals.

### a. Accessibility

Accessibility means reaching destinations by the individual's mode of choice with relative ease and within a relatively short time frame. Accessibility not only is desired for person trips, it is also desired for freight movement. Due to the complexity of this concept, the following quantifiable measures were selected to represent various components of accessibility.

▪ ***Travel Time during PM Peak.***

The amount of time it takes to complete a trip during the PM Peak hours (the most congested time in a 24 hour) is a common measure of traffic flow. The measure could be in terms of the amount of time that it takes to travel certain distances or the mean travel time for the entire transportation system.

▪ ***Demand over Capacity Ratio.***

Demand over Capacity Ratio is a measure of congestion that describes operational conditions of a roadway. This measure is the ratio of vehicles over the capacity of a roadway. The model has the capability of evaluating overall flow of traffic over the length of a given corridor. The measure is similar to the vehicle/capacity (V/C) ratio that is used for analysis of intersections. Similar to V/C ratio, a Demand/Capacity of less than 0.6 indicates a highly convenient flow of traffic with a great deal of maneuverability, whereas, ratios of higher than 0.8 require modification of driving decisions due to the presence of other vehicles. A Demand/Capacity ratio of 1 indicates significant congestion. The Demand over Capacity ratio was measured for the following variables:

- Percent of lane miles by Demand/Capacity ratio for each Transportation System Alternative
- The total Vehicle Miles of Travel (VMT) by Demand/Capacity ratio for each Transportation System Alternative
- Demand/Capacity ratio for nine selected arterials for each Transportation System Alternative.

▪ ***Availability of all Modes of Transportation.***

Automobiles and trucks that are dependent on an efficient system of roadways predominantly handle the movement of people and goods in our present transportation system. There is, however, a segment of the population who is dependent on public transportation and special transportation modes for their daily trips. Additionally, a considerable number of people use bicycles as a primary mode of transportation for their daily work commute. Other modes of transportation such as walking and rail are also common in the Planning Area. All these modes are integral components of the area's transportation system and the availability of all modes of transportation is a goal of the Plan. The availability of other modes of transportation was analyzed quantitatively.

**b. Vehicle Miles of Travel (VMT)**

The Travel Demand Model projects the sum of miles driven by all motor vehicles in the Planning Area. Generally, increased VMT has an inverse relation to the desirability of a transportation scenario. The State Transportation Planning Rule requires Transportation Plans to reduce VMT per capita.

**c. Energy Consumption**

Energy conservation is a goal of the Plan. Certain transportation system scenarios conserve energy more than others. This criterion assesses the level of energy conservation that could be achieved as a result of the implementation of each transportation system alternative. Although

the model does not directly generate this data, output from the model was used to calculate energy consumption.

**d. Financial Cost**

The financial cost of each alternative is a critical criterion in a time of scarce public funds. Furthermore, federal regulations require that the total costs of recommended projects in this plan not exceed reasonably anticipated revenues. Using the best financial and engineering judgment, the cost of implementing each alternative was estimated. The Financial Plan for this document provides additional details on the balancing of the costs with anticipated revenues.

**e. Environmental Impacts**

Most transportation improvement projects have some level of impact on the natural and built environments. The preservation of the natural environment and its natural resources is a goal of the Plan as is preserving the integrity of neighborhoods. This measure will consider the extent and the type of environmental impacts caused by the implementation of each alternative.

▪ ***Types of Impacts on the Natural Environment.***

**Land** - Transportation developments may adversely impact land in many different ways. Among these are the consumption of open and agricultural land for roads and parking, soil contamination due to spills of petroleum products and the creation of impermeable surface due to paving.

**Air** - Auto exhaust emissions include carbon monoxide (CO), oxides of nitrogen (NO<sub>x</sub>), fine Particulate Matter (PM<sub>2.5</sub>), coarse Particulate Matter (PM<sub>10</sub>), sulfur dioxide (SO<sub>2</sub>), precursors of ozone (O<sub>3</sub>) and Volatile Organic Compounds (VOC). These emissions are harmful to human health and to the environment.

**Water** - The impacts of transportation on water include contamination of ground water by petroleum products and street runoff. Hard surfaces also prevent replenishment of ground water.

**Natural Habitat** - Transportation developments may impact terrestrial and aquatic habitats of plants and animals. New roadway developments may be harmful to rare and endangered species.

▪ ***Types of Impacts on the Built Environment.***

Transportation developments may adversely impact the built environment. This is reviewed in terms of impacts on:

**Neighborhood Integrity** - The physical and social integrity of established neighborhoods as a unit of urban life.

**Historic Sites or Other Significant Structures** - Transportation developments could have an adverse impact on historic or other structures or sites important to the community.

## D. Evaluation Results

The following is a summary of the evaluation of each of the transportation system alternatives for the horizon year of the Plan:

### 1. Accessibility.

The model provided the following data for the components of the Accessibility Measure. It should be noted that the impacts of Land Use Management techniques have not been incorporated into these tables. The impacts of Land Use Management techniques are shown at the end of this section.

#### a. Travel Time.

Table VII-9 shows projected travel time during the most congested time of the day, in this case during the PM Peak hour, and for selected common trips. Mean travel time is also shown for the base year in the tables below. The model travel time does not include the amount of time spent at each intersection along the selected routes. According to the table below, travel time on selected routes is best reduced by the Capacity Enhancement Alternative. The TDM and the Multi-prong approaches have nearly the same impact on reducing travel time.

**Table VII-9: Projected Minutes of Travel Time During PM Peak Hour**

	<b>2000 Base Year</b>	<b>2030 No-Build Total and (% Increase over Base Year)</b>	<b>2030 TDM Total and (% Increase over Base Year)</b>	<b>2030 Capacity Expansion Total and (% Increase over Base Year)</b>	<b>2030 Multi-Prong Total and (% Increase over Base Year)</b>
Downtown Corvallis to Hewlett-Packard Campus	4.9	5.5 (12.24%)	5.4 (10.20%)	5.0 (2.04%)	5.4 (10.20%)
Oregon State University Campus to Hewlett-Packard Campus	6.9	7.8 (13.04%)	7.7 (11.59%)	7.1 (2.90%)	7.7 (11.59%)
Downtown Corvallis to Downtown Philomath	10.5	12.1 (15.24%)	12.0 (14.29%)	10.5 (0.00%)	12.0 (14.29%)
Downtown Corvallis to Adair Village	12.2	16.5 (35.25%)	15.4 (26.23%)	12.6 (3.28%)	15.8 (29.50%)

#### b. Demand to Capacity Ratio.

Tables VII-10 shows the ratio of Demand to Capacity, a measure of congestion, for each of the alternatives in selected corridors during the PM Peak hour. The shaded boxes show the best ratios relative to the base year. (D/C of less than 0.7 indicates no congestion, 0.8 may impose changes in driving decisions, 1.0 or greater indicates significant congestion.)

**Table VII-10: Demand/Capacity Ratio for Selected Corridors During PM Peak Hours**

	<b>2000 Base Year</b>	<b>2030 No-Build</b>	<b>2030 TDM</b>	<b>2030 Capacity Expansion</b>	<b>2030 Multi-Prong</b>
Kings Blvd. Monroe Ave. to Walnut Blvd.	0.71	0.91	0.91	0.85	0.88
9th Street Harrison Blvd. To Walnut Blvd.	0.59	0.94	0.90	0.77	0.86
Walnut Blvd. OR 99W to 29th Street	0.41	0.61	0.50	0.48	0.58
Circle Blvd. OR 99W to 29th Street	0.37	0.46	0.47	0.47	0.49
Western Blvd. Hwy 20/34 to 2nd Street	0.63	1.02	0.99	0.80	0.98
US 20/OR 34 From OR 99W Interchange to US 20/OR 34 Fork	0.88	1.11	1.08	0.84	1.09
OR 99W From S. MPO Boundary to US 20/OR 34/OR 99W Int.	0.44	0.87	0.86	0.75	0.85
OR 99W, From US 20/OR 34/OR 99W Int. to Buchanan Ave.	0.69	1.06	1.02	0.98	1.04
OR 99W Buchanan Ave. to Walnut Blvd.	0.84	1.12	1.09	0.81	0.82

Table VII-11 indicates the number of lane miles that have a D/C ratio of 0.8 or greater during the PM Peak hour. The shading shows the lowest number of congested lane miles.

**Table VII-11: Congestion by Lane Miles During PM Peak Hours**

	<b>2000 Base Year</b>	<b>2030 No-Build</b>	<b>2030 TDM</b>	<b>2030 Capacity Expansion</b>	<b>2030 Multi-Prong</b>
Total of All Lane Miles	401.8	406.4	414.8	457.0	421.4
Total Congested Lane Miles	23.8	82.2	77.4	52.8	75.2
Percentage of Congested Lane Miles	5.9%	20.2%	18.7%	11.6%	17.8%

Table VII-12 shows the levels of congestion by lane mile for each alternative during the PM Peak hour.

**Table VII-12: Percentage of Total Lane Miles by Demand/Capacity Ratio During PM Peak Hour**

Demand to Capacity Ratio Range	2000 Base Year		2030 No-Build		2030 TDM		2030 Capacity Expansion		2030 Multi-Prong	
	Lane Miles	% of Total Lane Miles	Lane Miles	% of Total Lane Miles	Lane Miles	% of Total Lane Miles	Lane Miles	% of Total Lane Miles	Lane Miles	% of Total Lane Miles
0.0 - 0.79	366.7	91.2	40.4	75.9	320.2	77.3	375.6	82.3	324.4	76.9
0.80 - 0.99	18.4	4.6	31.1	7.7	36.4	8.8	46.2	10.1	37.2	8.8
≥1.0	16.7	4.2	66.5	16.4	58.2	14	35.3	7.7	59.9	14.2
Total	401.8	100	406.4	100	414.8	100	457	100	421.4	100

Based on the data shown in Tables VII 10 through VII-12, the Capacity Expansion Alternative is the most effective alternative in reducing congestion. The impacts of the TDM and the Multi-prong approach are mixed, although the Multi-prong approach is slightly more effective.

**c. Availability of All Modes.**

Table VII-13 shows the results of evaluating the alternatives by four more evaluation measures. Of particular note is the measure of transit share for each alternative.

**Table VII-13: Additional Evaluation Measures**

	2000 Base Year	2030 No-Build	2030 TDM	2030 Capacity Expansion	2030 Multi-Prong
Mean travel time during the most congested hour of the day in minutes and (% increase over Base Year)	7.8 (NA)	10.2 (30.76%)	10.0 (28.21%)	8.5 (8.97%)	9.9 (26.92%)
Total number of miles people traveled by during the most congested hour of the day.	83,474	136,786	135,185	133,696	133,144 <sup>1</sup>
Total number of hour's people traveled during the most congested hour of the day.	2,409	4,739	4,577	3,907	4,563
Daily percentage of trips made on transit	0.9%	0.8%	2.2%	1.7%	2.1%

<sup>1</sup> Includes the impact of land use management techniques.

**2. Vehicle Miles of Travel.**

Table VII-14 shows the increased VMT during the PM Peak for each of the alternatives. It also indicates that a higher percentage of the VMT will be driven under higher congestion levels

(compared to base year). The smallest increase in VMT will occur with the Capacity Enhancement Alternative while 45.8 percent of the VMT will be driven in conditions where the D/C ratio equals or exceeds 0.80. The TDM and Multi-prong Alternatives show nearly equal increases in VMT, but the TDM Alternative has a slightly lower percentage (59.2 percent) of VMT that are driven in congestion. The No-build Alternative will have the highest increase in VMT and percentage of miles driven under higher D/C ratios. The Multi-prong Alternative in this table does not reflect the impacts of Land Use Management techniques. These techniques will reduce VMT.

**Table VII-14: Vehicle Miles of Travel (VMT)  
by Demand/Capacity Ratio Range during PM Peak Hour**

Demand to Capacity Ratio Range	2000 Base Year		2030 No Build		2030 TDM		2030 Capacity Enhancement		2030 Multi-Prong	
	VMT	% VMT	VMT	% VMT	VMT	% VMT	VMT	% VMT	VMT	% VMT
0.0 -0.79	57,181	68.6	52,768	38.6	55,276	40.9	72,468	54.2	53,756	39.7
0.80 - 0.99	12,122	14.5	19,874	14.5	23,327	17.3	31,136	23.3	24,163	17.8
≥1.0	14,170	17.0	64,142	46.9	56,578	41.9	30,090	22.5	57,487	42.5
<b>Total</b>	<b>83,474</b>	<b>100</b>	<b>136,784</b>	<b>100</b>	<b>135,182</b>	<b>100</b>	<b>133,695</b>	<b>100</b>	<b>135,405</b>	<b>100</b>

### 3. Energy Consumption

The vehicle miles of travel (VMT) was used as a surrogate for the consumption of energy in Table VII-15. The Travel Demand Model produced the following VMT for each alternative:

**Table VII-15: Energy Consumption Represented by VMT**

	2000 Base	2030 No-Build	2030 TDM	2030 Capacity Enhancement	2030 Land Use Management	2030 Multi-Prong <sup>1</sup>
<b>VMT (% increase from Base)</b>	834,740 (NA)	1,367,840 (63.9%)	1,351,820 (61.9%)	1,336,950 (60.2%)	1,353,939 (63.2%)	1,340,149 <sup>2</sup> (60.5%)
<b>Model Assumed Population (% increase from Base)<sup>2</sup></b>	70,286 (NA)	86,638 (23.26%)	86,638 (23.26%)	86,638 (23.26%)	86,638 (23.26%)	86,638 (23.26%)

<sup>1</sup> Includes the impact of land use management techniques. See Table VII-16

<sup>2</sup> The boundaries of the Planning Area in the model are based on the Traffic Analysis Zones. These zones in some cases extend beyond the actual Planning Area boundaries.

According to the VMT numbers, the energy consumption will be the highest with the No-build alternative and the lowest with the Multi-prong Alternative. The Capacity Expansion Alternative ranks as the second lowest energy consumption, followed by the TDM Alternative.

#### **4. Financial Cost.**

The No-Build and the Land Use Management Alternatives require the least amount of public investment in transportation. There may be some administrative costs with the implementation of land use policies. The Capacity Enhancement Alternative requires the highest amount of public dollars (\$555 million), followed by the TDM Alternative. The cost of implementing all TDM measures will amount to \$312 million. It should be noted that the TDM measures would demand a relatively higher portion of local dollars than the Capacity Enhancement Alternative. This is because the federal dollars for transit operation must be matched one to one by local dollars. Also transit capital improvement projects financed through federal funds require a 20 percent local match as opposed to the roadway projects that require 10 percent or less of local dollars.

The total cost of implementing all projects in the Multi-prong Approach is approximately \$366 million over the next 30 years (\$262 million roadways + \$104 million TDM). The reason for the lower cost of the Multi-prong Approach is the placing of high cost projects under the category of Illustrative Projects. Illustrative projects are projects for which no funding sources have been identified, but will be considered if additional funding becomes available.

Sources of funding and project costs are outlined in the Financial Plan included as Appendix F.

#### **5. Environment.**

In general, transportation capacity expansion through roadway construction has greater impacts on the natural and built environment than the implementation of Transportation Demand Management techniques. Roadway construction consumes a considerable amount of land for right of way and parking and creates impermeable surfaces. This conversion adversely affects green space, natural habitats, wetlands, soil, and underground water. Roadway expansions in the built area may require relocation of residents and may damage the integrity of neighborhoods. The motor vehicles using roadways also pollute the ambient air by emitting hazardous pollutants such as, carbon monoxide (CO), oxides of nitrogen (NO<sub>x</sub>), ozone (O<sub>3</sub>), hydro-carbon (HC), sulfur dioxide (SO) and Particulate Matter (PM<sub>10</sub> & 2.5).

TDM techniques, on the other hand, impact land and other natural resources far less. They are mostly designed to work within the context of the existing transportation system. As such, the adverse impacts of the TDM Alternative on air, soil and ground water are almost negligible.

Similar to the TDM Alternative, Land Use Management techniques have the smallest impact on the natural environment. This is due to the fact that these techniques emphasize optimization of existing urban land and prevention of urban sprawl. The Land Use Management Alternative, in most cases, is combined with the implementation of TDM measures. Although some may consider higher density as having a detrimental effect on neighborhoods, land use management techniques in general are designed with respect for the integrity of neighborhoods.

The Multi-prong Approach replaces some of the roadway projects with a host of TDM measures and results in fewer adverse environmental impacts than either the Capacity Expansion or No Build Alternatives.

## 6. Impacts of Land Use Management Measures

In spite of recent advancements in linking transportation and land use decision-making, the existing travel demand models are still not quite capable of measuring the impacts of land use management policies and municipal requirements. Therefore, the impacts of the land use management approach were calculated by post-processing the outcome of the model. A summary of the results is shown in Table VII-16.

A review of the land use and zoning maps identified candidate residential land for the implementation of land use management techniques. It was assumed that these areas, when developed according to land use management, would show a 15 percent reduction in travel demand. The impacts of land use management was calculated based on the following assumptions:

- The increase in the number of households from 2006 until 2030 = 6,374.
- Half of the new residences (3,187) will be developed according to the Land Use Management measures of the 3Ds (Design, Density and Diversity).
- Each household on average makes 8.85 personal trips per day or 6.15 vehicle trips (based on a 1996 ODOT study).
- Total number of daily trips (3,187 X 6.15 = 19,600).
- Land Use Management techniques reduce single occupancy vehicle trips by 15 percent (19,600 X 15% = 2,940 total trip reduction).
- The average length of a trip in the Planning Area is 4.73 miles (2,940 X 4.73 = 13,906 total vehicle miles (VMT) saved).
- The peak hour VMT is generally 10 percent of daily VMT. 13,906 X 10% = 1,391 PM Peak VMT saved.
- The above savings was subtracted from the No-Build VMT in the table below.

**Table VII-16: Reduction of Trips and Vehicle Miles of Travel with Land Use Management Techniques (During PM Peak)**

	<b>2030 No-Build</b>	<b>2030 Land Use Management</b>	<b>Percent Change From No-Build</b>
Total Vehicle Miles of Travel	136,784	135,393	1.7%
Total Number of Daily Trips	28,918	25,979	16.5%

The above assumptions and calculations show that the impacts of land use measures in reducing the vehicle miles of travel and the number of daily trips may not be realized unless they are implemented vigorously and hand in hand with TDM techniques.

## **E. Summary Findings of Evaluation**

An overarching issue in the analysis of transportation system alternatives is the dependency of our current transportation system on the availability of crude oil. This dependency and its socioeconomic implications are significant enough to warrant a brief review of the present supply and demand of oil.

Transportation alone consumes about five million more barrels of petroleum daily than are produced domestically<sup>4</sup>. The recent surges in gasoline price have raised serious concerns about the demand and supply equation of crude oil. Most recent studies indicate that with the increased demand by the developing nations, the supply of inexpensive oil is nearly depleted, and we are at the peak of oil supply. The severity of this issue warrants a brief review of the energy outlook.

We are entering a period of uncertainty in oil supply and hence unstable gasoline prices. This will have significant impacts on our way of life, economy, land use, and particularly on our transportation system. Our short term planning must be mindful of higher gasoline prices. The long-term outlook for petroleum supply is much more uncertain, and presents challenges to long range transportation planning. However, there are measures that could be taken to be better prepared for uncertain times. As such, the Policy Section of this document includes recommendations on the use of energy.

### **1. No-Build Alternative**

The Planning Area transportation system will deteriorate under the No-Build Alternative as accessibility decreases due to more frequent and higher levels of congestion, longer travel time and smaller share of transit trips. Congestion will also contribute to higher levels of carbon monoxide emissions. As the arterial roadways become more congested the traffic will spillover into local streets and will begin to disturb the tranquility of neighborhoods. The advantages of this alternative are the minimal financial investment and comparatively little impact on the natural environment. The delivery and movement of goods will be disrupted as well. Finally, this alternative will not help the Planning Area move toward its Vision and Goals.

### **2. TDM Alternative**

The TDM Alternative is friendly to the environment as it produces little pollution and conserves energy, land and other natural resources. Under this scenario, the share of trips made by transit will increase from the current 0.9 percent to 2.2 percent, an increase of 175 percent at the cost of approximately \$312 million. The TDM alternative, however, does little in the way of mitigating congestion. The average travel time will be slightly higher under this scenario. Most importantly, the TDM Alternative does not provide for the movement of goods within, to and from the area, as freight traffic relies heavily on a network of roadways. Although, this alternative provides for the availability of mode choices and addresses environmental concerns, it does not help the region move toward all of its goals.

---

<sup>4</sup> US DOT, Bureau of Transportation Statistics. 2004 Pocket Guide to Transportation.

### **3. Capacity Expansion Alternative**

This alternative is the most effective of all alternatives in reducing congestion, travel time and vehicle hours of travel. It also provides for the movement of commerce through and within the area. However, even with construction of all improvement projects under this alternative, the congestion levels will increase from the 2000 base year levels. Ironically, the vehicle miles of travel will be lower than those projected for the No-build and TDM Alternatives. This is because several of the recommended projects, such as the extension of Circle Blvd to Harrison Blvd and the extension of Kings Blvd to Lester Ave, will reduce the amount of circuitous driving that currently occurs. This alternative has the greatest adverse impact on the natural and built environment. It also requires the highest amount of energy and other natural resources compared to the other alternatives. Given the current technology of the internal combustion engine, this alternative is also detrimental to air quality. The cost of this alternative is approximately \$555 million. Finally, in spite of its congestion reduction benefits, this alternative is associated with heavy environmental and financial costs.

### **4. Land Use Management Alternative**

This alternative showed the lowest positive impacts on most evaluation criteria. The advantages of land use management techniques are low cost, limited environmental impact, and low energy consumption. However, this alternative does not significantly reduce congestion, or provide for the movement of freight. Land use management techniques are more effective when implemented in conjunction with TDM measure than as stand-alone measures. Land use measures can be controversial, as they may be perceived as making changes to people's life styles and choices. Additionally, it will take a long period of time before the impacts of land use measures can be realized. For its slow and steady benefits, this alternative should be used in conjunction with other alternatives.

### **5. Multi-Prong Alternative**

The Multi-prong Alternative represents a combination of necessary roadway projects with an emphasis on a variety of Transportation Demand Management projects and programs and land use management techniques. It provides for a host of transportation needs that were specified in the Plan's Vision and Goals. Due to the shortcoming of the Travel Demand Model, the land use management component of this alternative could not be analyzed. Therefore, the tables above do not truly reflect the impacts of this alternative. However, the qualitative and quantitative analyses of the combined effects of land use management techniques, TDM measures and the construction of most needed roadways showed that this alternative is highly effective in reducing VMT. It is noteworthy that this alternative does not include all the roadway projects included in the capacity expansion alternative.

## **F. Preferred Alternative**

The Multi-prong Alternative for its closest alignment with the Plan's Vision and Goals, its appropriate mixture of projects and the lower VMT was selected as the Preferred Alternative. The Alternative was enhanced with a heavy emphasis on transit, TDM and land use management measures in accordance with the values held by the community and relative to the area's projected financial ability. Some of the findings that led to this selection are listed below:

1. The Planning Area's transportation needs are diverse and therefore, no single alternative is capable of fully delivering the multimodal and multi-faceted transportation system described by the Plan's Vision and Goals.
2. Each alternative has some merits when evaluated by certain measures and negative aspects by other evaluation measures.
3. Achieving the Plan's Vision and Goals requires the optimal use of all transportation system alternatives analyzed.
4. The Multi-prong Approach that uses all techniques described under each transportation system alternative addresses a greater share of the areas transportation needs.