Growth boosts transportation costs

By BEN R. LONDEREE
Published Sunday, March 13, 2005

Consider three critical points about road needs and costs caused by growth in Columbia: First, at the current rate of growth, it will be necessary to build the equivalent of about 16 new lane-miles of major collector and arterial roads per year to maintain the status quo. A lane-mile is one lane one mile long. The total yearly cost just to keep up would be at least $14 million. Second, construction costs per new daily afternoon peak flow trip are in excess of $6,700. Third, failure to fund adequate road building will create numerous areas of unreasonable congestion.

Let's set the conditions that exist in Columbia. Growth has exceeded 2 percent per year in nine of the past 10 years. Consultants calculated a growth rate of 2 percent translates into about 2,100 new daily afternoon rush-hour trips per year. That number is derived from 900 single-family homes (909 trips); 300 apartment units (186 trips); and 400,000 square feet of industrial, office, retail and service areas (1,005 trips.) Traffic volume at peak afternoon flow determines the capacity needs of roads. Tables generated by International Traffic Engineers indicate the average single-family home generates about one afternoon peak flow trip and a Wal-Mart Supercenter more than 400 afternoon peak flow trips. Most growth is occurring three to seven miles from downtown. Therefore, it is reasonable to assume the average new one-way trip length will be 4 miles or more.

Projected annual new cost for growth

Cost	Four-lane road
Per running foot	$500
Per running mile	$2,640,000
Per 4 miles, or 16 lane-miles	$10,560,000
Bridge at $500 per square foot	$2,000,000+
Subtotal	**$12,560,000**
Extra cost for urban roads	$1,440,000+
Total	**$14,000,000+**
Capacity, or vehicles per hour	1,600
Number of new trips	2,100
Cost per trip, rounded	**$6,700+**

Source: Columbia Planning Department

Several other assumptions will simplify the calculations and make the subsequent illustration intuitive.

● All travel will be over a newly constructed four-mile arterial road between points A and B with two signalized intersections per mile.

● In the current model, 75 percent of 2,100 trips (1,575) would go from Point A to Point B and the other 25 percent (525) would go from Point B to Point A in the morning. The direction of the flows would be reversed in the afternoon. When modeling road needs, traffic planners typically set opposing flows at about 75 percent and 25 percent during peak periods.

● No turns are permitted at the intersections, but normal delays will occur at the intersections anyway.

● There is no ride-sharing because typically commuters do not have common origins and destinations and are unlikely to share for such short trips.

These assumptions isolate the 2,100 yearly new afternoon peak flow trips on one hypothetical road and thus make the calculations clearer and intuitive. The assumptions should not influence the bottom-line results.

Our task is to determine how many lane-miles of road would be required in each direction to handle the 1,575 new daily peak flow trips in the morning and afternoon. Knowing the number of vehicle trips and the average distance they travel in a particular direction during the afternoon rush hour, the planner selects a road size that theoretically can just accommodate such flow (capacity). Obviously there would be a similar - actually slightly

smaller - demand in the opposite direction during the morning rush hour. Then total road-building costs can be determined and allocated to each trip.

Traffic planners define capacity as the maximum number of vehicles on a roadway just below the volume that creates unreasonable congestion and erratic traffic flow. On a road with a free flow speed of 40 mph, average speed would fall below 13 mph when capacity is exceeded, according to the Transportation Research Board's Highway Capacity Manual, the industry standard.

According to Columbia's street design standards, a four-lane minor arterial has a theoretical capacity of about 600 to 800 vehicles per hour per lane. Thus two lanes in one direction would have a theoretical capacity of fewer than 1,600 vehicles per hour - a number that agrees with the Highway Capacity Manual. This number is close to the 1,575 trips per hour in our model. Therefore, the road would be near theoretical capacity in one direction in the morning and the other direction in the afternoon.

A four-lane minor arterial would cost about $500 per running foot for suburban roads in Columbia, Assistant City Manager Bill Watkins says. It would be reasonable in Columbia to include at least one bridge when building a 4-mile-long road. Because part of the roads actually would be in urban areas, which increases the cost considerably, a cost adjustment was added, making the total cost $14 million, or about $6,700 per afternoon peak flow trip - see the calculations in the accompanying table. As an aside, to accommodate all 2,100 trips in one direction would require two two-lane arterial roads at a cost of $18 million.

Stated another way, each new residence built at the perimeter of Columbia creates a need for arterial roads costing at least $6,700. A new Wal-Mart Supercenter creates a need for arterial roads costing more than $2.7 million. The developers of the site for the new Wal-Mart Supercenter at Broadway and Fairview recognize the necessity of good roads for the success of their new center and have pledged about $6 million for area roadwork. If there were no growth, these costs would not occur.

If Columbia doesn't spend at least $14 million each year for new roads to meet the needs of growth, the level of service for the entire network will decline. As growth eats away at our reserve capacity, congestion will increase. Instead of four or five highly congested areas that we now have - e.g., Interstate 70/Stadium, I-70/63, Stadium/Providence - we're likely to have dozens of highly congested areas in a few years depending on the gap between needs and improvements.

The large sum above does not include the costs of correcting existing deficiencies in the transportation network or maintenance for existing and future roads. The deficiencies include inadequate capacities and substandard roads; consultants say these costs are in the range of $5 million to $6 million per year for the foreseeable future. The cost of maintenance runs about $1.5 million per year but will increase with the addition of roads.

To paraphrase the oil filter ad, you can pay for the roads now or you can pay for them later. One way or another, somebody is going to have to pay these huge costs - either with money to build roads or with a poorly functioning transportation network. The latter scenario probably would put a severe crimp on growth as quality of life deteriorates.

Who should pay these costs? Some say those who create the needs should pay for them with higher development fees. Some developments have created special tax districts, or TDDs, that charge an additional sales tax for purchases in the district - in essence a development fee with a twist. Some have proposed a user tax such as a gasoline tax. Some want taxpayers to pay for the roads with higher property and sales taxes. An advantage of any sales tax is that nonresidents who purchase items in Columbia help pay road costs. Some want to use growth management to reduce the need for new roads, e.g., increased density, mixed-use development, growth boundaries, pedestrian/cycling trails and even a moratorium on development.

The Transportation Advisory Committee has studied a mix of increasing development fees, increasing sales and property taxes, and creating TDDs to "spread the pain." The committee also has considered charging lower development fees for infill development in older neighborhoods and for smaller homes to address the affordability issue.

In summary, growth is creating about 2,100 new afternoon peak flow trips per year. The increased traffic will mean an increased demand for new roads - about 16 new lane-miles per year just to maintain the status quo. The cost of these new roads is at least $14 million per year, or at least

$6,700 per new trip. Current and proposed funding falls far short of meeting these needs and will lead to unreasonable congestion and reduced quality of life.

How would you have the city deal with these massive costs?

Ben R. Londeree is a member of the city's Transportation Advisory Committee and a member of the Boone County Smart Growth Coalition.

COLUMBIA DAILY TRIBUNE

The Columbia Daily Tribune
101 North 4th Street, Columbia, MO 65201