Making the Most of What We Have

Edward M. Hall
Deputy City Manager, Phoenix

Because of the demands being placed on available funds, construction of new transportation facilities is rare. It is suggested that a separate Transit Trust Fund be set aside for development of public transit facilities. In the meantime, the solution to the problem is to make the most of what is already in existence. This paper discusses, first, the capacity and demand of highway and transit facilities in Phoenix and, second, how these are being improved with available funds. Programs to balance the expedient with the long term are addressed.

Meaningful long-range transportation planning is becoming increasingly complex in urban America. This is particularly true if the long-range plans include the construction of facilities to serve the public. Further complicating transportation planning and programming are the ever-increasing demands placed on available funds. These demands are not only for additional uses but for an ever-increasing number of refinements and furtherance of this or that well-intended national program.

A separate Transit Trust Fund could provide needed additional funds for urban transportation. Fortunately, efforts are continuing in the Congress by enlightened legislators to provide a separate funding source and program for transit.

From the total city perspective, there are great demands for all kinds of social, general government, and capital programs that compete for limited available funds at the local level. Then there is the taxpayer who pays for all this.

The compounding of all the above, along with the nation's serious inflationary problems, points to the need to develop short-term plans of 8 to 10 years and to implement them by capital programs of 3 to 6 years. Hopefully these short-term plans will be based on long-range plans of about 20 years. The simple conclusion is that we must make the most of what we have.

WHAT HAVE WE?

A brief overview of one very rapidly growing urban area will provide some insight into the opportunities and challenges facing the local transportation administrator.

The 1,200-square-mile Phoenix urban area has a population of 1.2 million people. The city of Phoenix is nearly 270 square miles in area and has a population of more than 750,000. Density in the city is about 2,800 people per square mile. The city's growth rate is demonstrated by the fact that in 1960 there were 439,000 people. This is a growth of more than 300,000 people in 14 years. Another graphic measure is that,

just in the city of Phoenix, the building permits valuation last year was nearly $400 million.

The Council of Governments is made up of 18 cities and towns, Maricopa County, and the Arizona Department of Transportation. One of the key elements of this organization is a continuing, cooperative, and coordinated transportation planning program. This program is based on the comprehensive plans of the several agencies in the Maricopa Association of Governments.

We have had the advantage of high-level urban transportation planning by both top-notch consultants and local staff for more than 2 decades. Additional studies are under way concerning the location of a key segment of Interstate 10 to the west of Black Canyon Freeway (Interstate 17).

Although they have been thoroughly studied, our in-service ground transportation facilities are quite modest. The basic major street system is slowly evolving from a 312-mile system of concrete roads constructed by farsighted farmers in 1919-1920. Most of these were 16 feet wide, a few 18, and most have been widened by force account methods over the years. Some, of course, have been reconstructed to modern standards by the various jurisdictions.

Of the 420 miles of the major street system, 155 miles are critically deficient. Further, there is a demonstrated need for eight railroad grade-separation structures and numerous bridges over rivers and washes that carry sizeable amounts of water when it rains.

Since 1960, the city has built 65.4 miles of major streets and two railroad crossings at a cost of $36.3 million. Under way are an additional 9 miles. This was largely made possible by a bonding program of the city and state legislation in 1963 that provided funds specifically for construction and reconstruction of major streets. These modern major streets provide an opportunity for the city traffic engineer to implement a number of effective techniques for maximizing capacity and safety. The need for traffic engineers to use every possible technique is emphasized by the fact that 41 miles of major streets carry over 30,000 vehicles per day—1 out of each 10 miles—and 1 out of every 4 miles of major streets carries over 20,000 vehicles per day. Traffic volumes are increasing by about 10 percent per year.

There are only 28 miles of freeway open to traffic in the entire urban area. This is the lowest ratio of freeway mileage per capita in an urban area of over 50,000 people. Our transportation plans to date have been based on the assumption that approximately 40 percent of all vehicle-miles would be carried on modern freeways. Just as a modern freeway construction program was about to move forward, it was stopped in May 1973 by an advisory vote on a key segment. In Phoenix, one of the fastest growing cities in America, not 1 inch of new freeway has been constructed since October 1968. Those freeways in operation are already carrying near-capacity volumes.

A bottleneck removal program was initiated by the city traffic engineer in 1958. This program included 262 city-financed projects completed at a total cost of about $2.2 million. In addition to this, the program included seven federal-aid TOPICS projects costing about $1.6 million plus a computerized central corridor signal project funded at $1.5 million.

In March 1971, the Phoenix City Council accepted the responsibility for ensuring the continuation of transit service for the Phoenix urban area. The city has had a management contract with the American Transit Corporation to provide service since that time. This has been a highly successful arrangement. There are 586 route-miles of service providing transit service within one-quarter mile of about 470,000 people. However, only about 15,000 to 16,000 passengers per day use the entire system; 18,000 rode during the gasoline shortage. On April 29, 1974, express service on the freeway was inaugurated from a major regional shopping center. The Roadrunner Express now carries nearly 500 passengers per day.

In short, we are hurting. We will continue to experience rapidly increasing congestion. Only a token number of people use public transit: approximately 0.5 percent of about 3 million person-trips each day. Long-range plans for a modern high-capacity

highway system are basically stalled in study and controversy. It is hoped that we will begin to make progress in this area when an ongoing study is completed within a year or so.

The level of traffic service measured by the average regional travel speed during the peak period is decreasing. About 10 years ago, the average peak-period speed was about 29 mph. It has now decreased to 21 mph and is forecast to decline to about 15 mph by 1980.

An important step toward progress was made during the 1974 state legislative session. The legislature increased, placed all in one pot, and redistributed the State Highway User Revenues. This included a 1-cent increase in the gasoline and diesel tax, increased weight fees, and so on. The redistribution provides much needed assistance to the cities and towns. This forward looking action will enable Phoenix to approximately double the major street construction program to a rate of about 12 miles per year. This construction program will allow the city to correct existing deficiencies in a 20-year period, assuming constant dollars. We are hopeful that this program can be accelerated so that existing deficiencies can be corrected within about 15 years. This goal is important because of the long lead time that now exists before substantial additional miles of modern high-capacity transportation facilities can be anticipated to serve the urban area.

WHAT ARE WE DOING?

The preceding picture is not encouraging. It is presented as an overview of the problems and to emphasize the need for a balanced program to make the most from what we have. The following are highlights of a dozen major transportation programs of the city of Phoenix.

Major Street Construction

The newly accelerated Six-Year Major Street Program will build approximately 12 miles per year. It is anticipated that over the next 6 years approximately $78 million, including federal aid, will be invested in this program to construct 74.5 miles of major streets, one costly railroad grade-separation structure, and several bridges over washes and canals. This program is based on adopted and published street policies that are geared to the adopted Functional Classification Map and adopted Minimum Right-of-Way Standards Map for all streets in the city. These maps were adopted in 1960 and 1961 respectively and are periodically updated. A significant innovation that has expedited the processing of our federal-aid program is the use of the adopted Minimum Right-of-Way Standards Map and corresponding city standards as the basis for standard section requirements.

Public Transit

A fleet of 110 buses provides service on 586 route-miles. During 1974 the operating support was about $830,000. With the assistance of a 1972 $1.9 million UMTA Capital Grant, matched by $0.9 million in city funds, we have purchased 40 new buses, ordered 15 more, equipped the entire fleet with exact-change fare boxes, and built 10 passenger sun shelters. We are now in the final stages of applying for another UMTA Capital Grant for 48 new buses, a downtown off-street transfer station, 70 passenger sun shelters, radio equipping the fleet, and other improvements. This will be a $5.3 million grant if it is approved.

Bottleneck Program

The bottleneck program has completed 262 projects at 160 intersections. Further, seven major costly projects have been included in the federal-aid TOPICS program.

Central Corridor Computerized Traffic Control System

The Central Corridor Computerized Traffic Control System is a part of the TOPICS program. It is a $1.5 million project that will interconnect 258 signalized intersections and be expandable to 410 signalized intersections. This is a traffic-responsive system, and we are hopeful that it will be on line in 1975.

Signal Modernization

This is an effective program for modernizing mast arms, controllers, left-turn arrows, and other traffic engineering equipment.

Resurfacing and Sealing

We must maintain those facilities that have been constructed. Most engineers assign first priority to this function. The city initiated a major resurfacing and sealing maintenance program in the early 1960s. The city has pioneered in the use of asphalt, rubber seal, precoated hot-chip seal to reduce dust, nighttime sealing to minimize traffic interference, and a number of other innovative programs. This program is funded at a range of $550,000 to $750,000 a year and is a primary means by which existing facilities are preserved in order to maximize their use and to keep hand labor maintenance to a minimum.

Street Improvement Districts

The Neighborhood Street Improvement District Program and the Petition Street Improvement District Program have been actively pursued. More than 256 miles of modern local and collector streets have been built by these programs since 1960, and 21 miles are under construction. New subdivisions are now constructed to proper standards.

Fall 1973 Accelerated Program for Moving Traffic

In fall of 1973 the City Council, recognizing the need and importance of accelerating programs for moving traffic, requested that the city traffic engineer develop a 60- to 90-day accelerated program. The program that was recommended to City Council, adopted, and carried to completion consisted of the following key elements:

1. Parking restrictions—Along with the already 124.4 miles of restrictions, additional peak-period and all-day parking restrictions were recommended.
2. Turn restrictions—Along with the 25 intersections with prohibitions on left turns, four additional intersections were recommended for this treatment.
3. Bottleneck removal program—Five additional projects were recommended costing $217,000.
4. Traffic signal installations—This program included installation of 26 additional traffic signals and the Central Corridor Computerized Traffic Control System currently under construction.
5. Traffic safety improvements—The new Traffic Safety Division in the Traffic Engineering Department has completed 68 projects that show a 45 percent decrease in total accidents, a 49 percent decrease in injuries, and a 12 percent increase in traffic volumes at the studied intersections. This program included 19 traffic safety projects.
6. Reversible lanes—The city has 1.3 miles of reversible lanes in operation. A study to determine whether reversible lanes could be installed on additional streets showed that one of the most promising major streets for reversible lane treatment could be widened within existing rights-of-way for less money. This was the action recommended by the traffic engineer.

7. Medians—Along with the existing 19 miles of concrete and 65 miles of painted medians, 3 additional miles of painted medians on major streets were completed. Without having the full improved modern street to work with, this improvement would not have been possible.

8. A third lane in the outbound peak traffic direction—A third lane was provided on 12.5 miles of major streets with parking restrictions. The recommended streets required resurfacing to satisfactorily block out the existing striping and marking before the new pattern was painted. This program has proved effective in moving the outbound peaks on congested major streets.

9. Street lighting—Phoenix now has more than 25,300 lights in the city. The accelerated street lighting program included installation of more than 600 high-intensity lights to provide an additional 33 miles of continuous street lighting and 700 residential lights. Also, some incandescent lighting was upgraded to mercury vapor lighting.

10. Staggered work hours, car pooling, and construction traffic control—Publicity to further the use of staggered work hours was an important part of the program. During last winter's fuel shortage, major emphasis was placed on car pooling. This effort produced good results that appear to be continuing. The city traffic engineer for many years has made major efforts to minimize delay in construction zones. A construction traffic control manual has been kept up to date and is widely distributed.

Citizen Committees

The Citizens Streets Advisory Committee has provided farsighted recommendations on street matters to the City Council since 1960. The sustained interest and enthusiasm of the committee are quite remarkable.

Recently the Mayor and City Council appointed a Citizens Advisory Transportation Committee to reappraise the broad transportation program. It is hoped that this committee will assist in the development of public support of key principles and programs so that progress can again be made in total transportation for the city and the urban area.

Restudy of Interstate Location

As a result of the advisory vote held in May 1973 and subsequent actions by various policy agencies, a restudy is under way of the Interstate 10 location to the west of existing Interstate 17 in Phoenix. It is hoped that this restudy will lead to the completion of I-10.

Advance Transportation Planning Team and Public Transit Administrator

Phoenix has had a multidisciplinary, full-time team of urban planning, traffic engineering, and public transit professionals in operation since January 1, 1961. In addition to these disciplines, other supportive disciplines such as economics and architecture have input. In 1972 the City Council authorized the new position of Public Transit Administrator. This team provides a management arm for obtaining answers ranging from immediate-action problems related to major new developments to long-range plans in which key emphasis is shifting to short-range planning. One of the most recent products of the team was the 1980 Transit Capital Program for the Urban Area, which was submitted to the Maricopa Association of Governments. The team previously did the 1972 National Transportation Needs Study transit element and of course has conducted many freeway location and area transportation studies as well as airport master planning work over the years.

Cooperation

A most important ingredient in the program is the cooperation that exists among the city of Phoenix, the Arizona DOT, and the local division of the Federal Highway Administration. We have also had excellent cooperation from UMTA in the Capital Grant and Technical Studies Programs.

The spirit of cooperation in the highway program has enabled us to move forward in an effective manner. We were able to use all of the new urban system funds allocated to the city of Phoenix last fiscal year ($3.1 million) and in fact were able to move forward on relatively short notice with one additional project costing approximately $1 million. This additional project was made possible by an outstanding effort of the city engineering staff plus the highest possible level of cooperation by the Arizona DOT and the local office of the Federal Highway Administration. The FHWA division engineer notified us on April 1 that the additional funds would be available if we could complete the necessary processing of an additional project by May 24. We did it!

YARDSTICKS AND COMPARISONS

There is a need for yardsticks and comparative measures with which to evaluate the level of transportation service. It is essential that these be simple.

One of the simplest and most effective measures of level of service is peak-period average speed. About 10 years ago, the average peak-hour speed in Phoenix was about 29 mph. It has now decreased to about 21 mph. This is a regional measure that is an effective tool.

Certainly traffic volumes, both daily and peak period, and accidents are important comparative measures. The city traffic engineer uses the number of intersections of extreme congestion as a yardstick. Over the past 10 years this has increased from 32 to 82. The traffic backup during the peak period is over 400 feet long, and the delay requires a motorist to wait more than three signal cycles to pass through the intersection.

Other factors suggested by the traffic engineer are population, vehicle registration, citizen traffic complaints, total traffic accidents, miles of major streets up to modern standards, and deficient miles.

Some feel that these level-of-service yardsticks are too simplistic. Local administrators, however, need simple, understandable, and easily obtainable measures and yardsticks. For example, capacity considerations have become highly sophisticated. In fact, I wonder whether these calculations do not lead to enlarged projects by theoretical calculations, which in turn tend to delay the project because additional funds are needed to meet higher and higher standards. Sometimes these calculations and others almost seem to prove that "it just won't work" or "it can't be done."

Although these comments may be misunderstood, I want to convey the urgent need for research and development of yardsticks, parameters, or comparative measures that can be easily, economically, and rapidly applied by the urban transportation administrator. He has not got the staff nor is he allowed the luxury of the time to develop some of the more sophisticated techniques. Surely he does not want to be provided with information that constantly adds to cost and delays on needed projects, while technicians argue the merits of the various calculations and formulas.

CONCLUSIONS

Major streets in urban areas need to be improved. These improved streets in turn provide the traffic engineer with the basics for other improvements to maximize use of street systems. This means there must be continued efforts to ensure that policy makers are aware of the need for adequate funding at the federal, state, and local levels for construction of modern street facilities.

We must balance the approach of interim betterments with a long-term effort to build

a great city and thus to make possible some of the more effective traffic engineering techniques through the construction of modern street facilities. In short, we need to balance the expedient and the long term. One technique we have developed is to require that no interim bottleneck improvements be made within 3 years of a programmed major street improvement.

It is important to look at the total perspective in the allocation of funds for major street construction and transit improvements. We need to look for a maximum return on the investment; i.e., we must be cost effective. The same is true in the allocation of funds among street maintenance, traffic operations, and transit operations. These are difficult balances to achieve from a common source.

A separate Transit Trust Fund would do much to relieve the problem of trying to spread limited funds to cover ever wider needs and programs. We need to add more funds for urban transportation capital improvements. A Street and Highway Trust Fund plus a separate Transit Trust Fund could go a long way toward achieving that end.

Federal guidelines are tightening. The lag time to final construction of freeways, parkways, and major transit facilities is growing longer. Although we have achieved a high level of cooperation in our local area, it is discouraging and frustrating to see the ever-increasing requirements. Often these start out as simple guidelines but are requirements that then get rigidly interpreted and cause significant delays. Delay obviously costs money because of inflation and, perhaps worst of all, wastes time of staff as months go by while technical questions are argued between various levels of professional engineers at the various levels of government. We have been able to solve some of these problems by the top administration of the city, state, and federal highways communicating quickly with one another when problems are discovered.

The need to achieve the maximum cost effectiveness of the total transportation program was never greater. Part of the difficulty is that we really do not have a good definition of maximum cost effectiveness in terms of the total mobility of persons and goods. Further, it probably varies from urban area to urban area and with the stage of development in any given urban area. The development of relatively simple yardsticks to help achieve maximum cost effectiveness would be beneficial to the local administrator.

On top of all of this is the fact that the final decisions for the allocation of funds and thus the program balance rest with elected officials at the city, county, and state levels.

Perhaps it all boils down to the need for the transportation administrator to make the most effective use of funds appropriated by the policy makers and thus to make the most from the available transportation systems, techniques, and construction programs. It is an important challenge and assignment for all of us.