

Transit Element Guidelines

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Introduction

These Guidelines are designed to assist local governments in the process of preparing a Transit Element of the Regional Transportation Plan (RTP). The Transit Element is intended to be a component of the Regional Transportation Plan. These Guidelines are also a supplement to the Regional Transportation Planning Guidebook.

The Guidelines are meant to provide specific information related to transit planning and the incorporation of transit planning into the statewide transportation planning process.

In the past, transit planning has been accomplished through the preparation of Transportation Development Programs (TDPs). After 2004, the requirement for a TDP by the Colorado Department of Transportation (CDOT) will be phased out, but the detailed operational planning typical of a TDP will be an option of the local transit operator.

In order to better understand the transition to Transit Elements, one should first have a perspective of their history and roots—in Transit Development Plans. TDPs have been the mainstay of Colorado transit planning since the mid-1970s.



In the initial years of what are now known as FTA Section 5310 and Section 5311 funding, the FTA (then called the Urban Mass Transportation Administration—UMTA) required that applicants for its new funding programs develop a short-term planning document as a prerequisite to receiving grant funds. In response, CDOT required its applicants to develop five-year (later six-year), locally-adopted TDPs that set forth their area's transit plan. Although it was not long before FTA dropped this requirement, CDOT saw much value in the TDPs and continued to require them. For years CDOT required that all projects

proposed for FTA Section 5310 and Section 5311 funding be included within, and consistent with, a locally adopted TDP.

The need for maintaining and updating TDPs was based on CDOT's observation that while there were planning processes for highway projects, there was limited planning for transit projects outside of Colorado's urbanized areas. By requiring the TDPs, some level of local transit planning was created and maintained. The local TDP was a valuable tool to:

- set transit goals and objectives;
- provide an overview of existing transit services;
- estimate transit needs and demand;
- examine institutional and service alternatives for providing transit services;
- coordinate existing services; and,
- design and develop new services.

In short, the TDP was used locally as a short-term business plan that assessed capital needs, administrative services, operational needs, financial needs, and institutional or management issues.

Cities or counties, or combinations thereof, set the geographic boundaries for the TDPs themselves. The boundaries usually corresponded to the service area of a transit operator that was seeking FTA funds from CDOT. It was usually a consulting firm that developed and wrote the TDP, with input from a Transit Advisory Committee (TAC) and the final approval by the appropriate local elected body. FTA Section 5313(b) funds were provided to assist localities in developing the local TDP.

There were three primary drawbacks to the TDPs:

- \$ The local Transit Advisory Committee was not always widely representative of its area. It was often those who benefited from the service, or those connected with the transit agency receiving the FTA funds, that participated. Some transit operators who were not grant recipients may have perceived it was difficult to be included in the local TDP or may have

decided not to participate in the planning process because they perceived no direct benefit to their agency.

- Because the TDP boundaries were often just for one city or one county, they often did not address **regional** transit issues. Because they were six-year plans, they did not look far into the future.
- The TDP was a stand-alone document and didn't necessarily relate to other transportation modes or other transportation plans.

The transition from TDPs to Transit Elements of Regional Transportation Plans (RTPs) is a natural one and one that responds to many of the drawbacks of the TDP. The Transit Elements will contain both a short-term (six-year) transit plan and a long-term (twenty-year) transit plan. The Transit Elements will be part of the RTP and will have a wider advisory representation. It is anticipated that the Transit Elements will be as successful in the future as the TDPs have been in the past.

The Transit Elements of the Regional Transportation Plans (RTPs) will become the transit planning documents for the Regional Planning Commissions (RPCs) and the transit service providers within the region. CDOT will use the Transit Elements in evaluating and approving grant applications for capital and operating funds from the Federal Transit Administration as well as other available transit funds. The RPCs will use the Transit Elements for allocating FTA, other available transit funds, and Other Regional Priority Funds for transit projects and local governments may rely on the Transit Elements for prioritization of all transit funds.

Colorado initiated a statewide transportation planning process following passage of the Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA) and legislation by the Colorado General Assembly which created CDOT. Both pieces of legislation required the development of a statewide transportation plan and the state legislation required the statewide plan to be based on RTPs. The process which has been established is a grassroots approach. Each of the 15 Transportation Planning Regions develops a RTP. The RTP is meant to be multimodal and to identify all of the long-range transportation needs for the region. The RPC adopts the RTP and CDOT then uses the priorities within the

15 RTPs to develop the statewide plan. Projects which are contained in the RTPs are eligible for inclusion in the statewide plan and subsequently the Statewide Transportation Improvement Program (STIP) which identifies federal and state funding. This comprehensive planning approach is the best way to address the transportation needs of Colorado in a context where competing needs and rapidly growing demand are outpacing the growth in resources.

The Guidelines are meant to provide assistance and are not regulatory in nature. Recommendations are provided for methodologies to use, but latitude is provided for local planners to use the best methodology for their particular region.

The first section of the Guidelines provides a description of the steps to be taken. The following sections describe the procedures for each component of the Transit Element. Detailed information is provided in several appendices.

Steps for Preparing a Transit Element

This section provides an overview of the steps to be taken to prepare a Transit Element of the Regional Transportation Plan (RTP). The steps are presented in more detail in the following sections of the Guidelines.

Form a Transit Committee

An important step in preparing the Transit Element is for the Regional Planning Commission (RPC) to form a Transit Committee. This could be an advisory group, a subcommittee of the RPC or the RPC itself. The Transit Element should result from a cooperative effort of local citizens, elected officials, transit operators, and planning staff so that it will be adopted and incorporated as part of the Regional Transportation Plan. The Transit Committee provides a forum for obtaining input and direction for the development of the Transit Element. Representation on the Transit Committee should include two members of the RPC, a private transportation provider, one or two public transportation providers, planning staff from one or two of the communities within the Planning Region, agencies which rely on transportation service, and private citizens with an interest in transit. The size of the Transit Committee should be limited to a reasonable number of no more than 15 people. Larger committees tend to be unmanageable and it is difficult to obtain good input. It may also be important to establish a Transportation Providers Subcommittee or to include all transportation providers as ex-officio members to provide specific input and coordination among the providers. It may also be advantageous to form other subcommittees to deal with specific issues.



Responsibilities of the Transit Committee should be clearly defined when the committee is formed. Potential members should be informed of the time commitment before they accept the responsibility. Involvement will range from

monthly or more frequent meetings during the plan preparation to infrequent meetings once the plan is completed. Typical responsibilities of the Transit Committee will include:

- \$ Identify public transportation issues to be addressed in the Transit Element.
- \$ Identify all transportation providers within the Transportation Planning Region to be incorporated in the Transit Element.
- \$ Develop the transit vision, goals, and strategies for the Transportation Planning Region which support the Region's transportation planning vision.
- \$ Provide input to the Regional Planning Commission regarding transit issues.
- \$ Provide input and address intermodal and multimodal transportation issues.
- \$ Provide technical and community input at each stage of the planning process.
- \$ Review each component of the Transit Element as it is prepared.
- \$ Assist in identifying transit system alternatives to be considered in the Transit Element.
- \$ Prioritize the transit system improvements and make recommendations to the Regional Planning Commission.

In order to have meetings of the Transit Committee run smoothly, the Committee should elect a chair and co-chair. Someone should be designated to keep minutes of the meetings. This could be either a member or the planning staff.

Inventory of Existing Conditions

Baseline data will be required regarding the characteristics of the region and the transportation services which are provided within the region. Much of the data will be available from the Regional Transportation Plan, the CDOT Transportation Planning Data Set, the transit operators, the CDOT Transit Unit, and local governments. The Inventory of Existing Conditions is described beginning on page 9.

Socioeconomic and Environmental Profile

This portion of the Transit Element, discussed beginning on page 14, will be part of the overall Regional Transportation Plan. Specific characteristics such as the transit-dependent population should be included in the profile. Much of the information will be available from the Transportation Planning Data Set, the State Demographer, and local governments.

Transit Needs Analysis

This is a very important part of the process. During this step, the passenger transportation needs for the next 20 years will be identified as part of the Mobility Demand Analysis for the Regional Transportation Plan. Transit needs will be quantified using appropriate methodologies as described beginning on page 18. In addition to the quantified needs, subjective needs will be identified through input from the community and the Transit Committee.

Alternatives Analysis

In this portion of the process, transit system alternatives will be identified and evaluated as described on pages 26 and 27. Criteria will be established by the Transit Committee and used to evaluate the various alternatives. Those alternatives which are effective and supportive of the region's transit goals will be incorporated into the preferred transit plan.

Long-Range Element

The Long-Range Transit Element will present the preferred transit plan, the 20-year financial plan, and a 20-year financially-constrained plan as discussed beginning on page 28. An important part of this process will be the prioritization of transit system projects. The projects will be prioritized using an approach based on the performance criteria established by the region. Examples of criteria might include the number of passengers per hour, the percentage of the population service, or the cost per passenger.

Short-Range Element

The Short-Range Transit Element, as discussed beginning on page 30, will identify those services to be provided in the first six years of the Regional Transit Element. The plan will include a detailed financial plan, an institutional/management component, and operating characteristics of the planned services. The Short-Range Transit Element will be a financially-constrained plan based on the best estimates of available funding.

Planning Process

The development of the Transit Element is one step in the implementation of public transportation services. The Transit Element is adopted as part of the Regional Transportation Plan by the Regional Planning Commission, either as a portion of the RTP or as an amendment to the RTP. The Long-Range Transit Element is then incorporated into the Statewide Transportation Plan as that plan is updated. Projects from the Short-Range Transit Element will become part of the State Transportation Improvement Program (STIP) or the local Transportation Improvement Program (TIP) in the metropolitan areas. Projects must be part of the RTP to be eligible for funding and the STIP or TIP identifies the allocated funding for each project.

Inventory of Existing Transportation Systems

In preparing the Transit Element, it is important to have an inventory of the existing transit providers which operate within the region. This inventory will range from identification of some providers to detailed information about public transit providers. The inventory should include information about the services provided as well as the facilities and equipment available to each provider.

The inventory of transportation providers should be incorporated into the Inventory of Existing Transportation Systems. These guidelines provide specific information which should be included for transit providers. The inventory will identify the type of transportation services in the region, the type of passengers who are served, characteristics of the service, and available resources. The information will be used later to estimate unmet transit needs, gaps in service, and providers who should be included in the short-range transit element.

Public Transit Providers

Public transit providers are defined as those entities which provide general public transportation services or specialized transportation services to a broad clientele using public funding. A detailed inventory should be completed for these providers. Appendix C provides an example of a transit provider inventory form. The following key information should be included in the inventory:

- \$ Name of operation and type of ownership. – Ownership is important in determining potential funding sources.
- \$ A description of the type of operation. – Indicate whether the operation provides fixed-route or demand-response service or some other combination. If the service is fixed-route, does it operate on a grid or radial pattern?
- \$ Service area. – Describe the geographic area served by the transportation provider.

- \$ Population served. – Provide a description of the type of clients served and quantify the number of annual passenger-trips for each passenger group. Typical groups which should be identified include passengers under 16 years old, passengers 60 years and older, and passengers with disabilities. Provide an estimate of the percentage of the population within the region which is served by the transit provider. The population served may be determined by estimating the population which lives within the geographic service area of the provider.
- \$ Operating statistics. – These statistics provide an understanding of the efficiency and effectiveness of the transportation programs. The information can be used to calculate performance measures and evaluate the capability of the transit systems to meet transportation needs within the region. These statistics should be compiled for the most recent year and for four prior years:
 1. Ridership
 2. Route-miles
 3. Annual vehicle-miles
 4. Annual vehicle-hours
 5. Annual operating cost (separated as operating, maintenance, and administrative components)
- \$ Vehicles. – An inventory of the vehicles should be included for each provider. The inventory should include vehicle description, passenger capacity, whether the vehicle is wheelchair accessible, the number of tie-down positions, year of manufacture, year acquired by the agency, mileage, and a general assessment of the vehicle’s condition. An inventory form is included as Appendix D.
- \$ Facilities. – The facilities owned by each provider should be described in the inventory. Major facilities such as maintenance facilities and transfer centers should be described with information on the size, age, and condition. Minor facilities such as bus shelters should be included as a total number. Locations and descriptions of park-and-ride lots served by transit should be included as part of the facility inventory. Appendix E provides a sample inventory sheet for facility information.



Other Transit Providers

Other transit providers within the region should be included in the inventory because they may meet a significant portion of the passenger transportation

demand. However, for these other providers a detailed inventory is not required. The providers should be identified with a brief description of the services they provide, the types of passengers, and the geographic area they serve. Examples of these providers are school districts, intercity bus lines, passenger rail services, shuttle vans, taxi operators, specialized providers serving only their own clients, and any other private transportation services. The inventory should identify linkages between these other providers and the public transportation services.



Performance Measures

Performance measures are an important part of understanding the operation of a transit system. There are several common performance measures which should be calculated for each of the public transit operators and for the aggregate services within the region. These measures provide an assessment of how well resources are being used and whether the services are cost-effective. The inventory data will provide input for calculating these performance measures. The following are the performance measures which should be included in the inventory and evaluation of the existing services:

- \$ Cost per operating hour. This measure should be calculated individually for each operator. The cost is the total annual operating and administrative costs divided by the annual revenue-hours.
- \$ Passengers per operating hour. This is a measure to be calculated for individual operators. The number of passengers per hour indicates the

productivity of the operation. This is calculated by dividing the annual number of passenger-trips by the annual revenue-hours.

- \$ Cost per passenger-trip. This measure is calculated for individual operators by dividing the total annual operating and administrative costs by the annual number of passenger-trips.
- \$ Subsidy per passenger-trip. This measure indicates the level of public subsidy for each passenger. The measure is calculated by subtracting the farebox revenue from the total operating cost and then dividing the result by the number of passenger-trips.
- \$ Farebox recovery. This measure is calculated by dividing the farebox revenues by the total operating cost. The measure is typically expressed as a percent. The farebox revenue could include any contract revenues or other revenues which are contributed in lieu of fares.
- \$ Percent of estimated need being met. This performance measure can be calculated by dividing the total annual passenger-trips by the estimated annual need. This is a regional measure of transit service and will require the calculation of the transit needs.
- \$ Vehicles per capita. This is a regional measure of the transit capacity within the region. The total number of operational vehicles within the region is divided by the total population.
- \$ Ridership per capita. This regional measure provides an indication of the use of the transit services.
- \$ Cost per capita. The total operating and administrative costs for the region is divided by the population.

Transportation Right-of-Way Acquisition and Preservation

The inventory should identify any corridors which are being preserved for transportation services or are being considered for preservation. An example would be a railroad corridor that is being abandoned but may be considered for preservation and future use as a transportation corridor. Information on specific corridors may come from Corridor Optimization Studies, Major Investment Studies, or Rail Corridors of Statewide Significance.

Sources of Information

Much of the transportation provider information should be readily available. There are several sources of the information which should be included in the Transit Element.

Grant recipients of Federal Transit Administration funds for rural and specialized transit services must submit regular reports to CDOT. For general public transit systems, these reports are submitted monthly. Recipients of capital grants for specialized transit vehicles must submit an annual report. Transit systems in urbanized areas must submit annual reports to the Federal Transit Administration. Much of the basic information for public transit operators is included in these reports.

Another source of information is the Transportation Planning Database provided by CDOT. Basic inventory information is included as part of the database. However, operating statistics should be updated to include the most recent five years of operating data. In addition to the Transportation Planning Database, the Transit Unit of CDOT compiles a transit operator inventory which is updated annually. This database has information on operating characteristics and financial information.

The transit operators themselves are the best source of the inventory information. As much of the data must be collected to satisfy other reporting requirements, the operators should have ready access to the inventory information.

Socioeconomic and Environmental Profile

This section will normally be included as part of the Socioeconomic and Environmental Profile in the Regional Transportation Plan. The section should include those characteristics which relate directly to transit demand such as transit-dependent populations, visitors, and commuters. Typical transit-dependent population segments include the elderly, persons with mobility limitations, zero-vehicle households, and youth. Visitor populations should be quantified by seasonal population levels.

Demographic Information

Demographic information will be included as part of the regional socioeconomic profile in the Regional Transportation Plan. However, it is important to ensure that demographic information on transit-dependent populations are addressed. Many population characteristics will be included in the Transportation Planning Database, but specific information for the transit-dependent population segments must be obtained from other sources. The primary source of this information is directly from the U.S. Bureau of the Census. The information is available on CD-ROM for census tracts, block groups, and counties. This information may be extracted and linked to geographic boundaries using a Geographic Information System (GIS).

The specific population groups which should be identified are:

- \$ Zero-vehicle households
- \$ Mobility-impaired population
- \$ Senior (60 and over) population
- \$ Below poverty population
- \$ Population under 16

These data will provide information to address Environmental Justice issues. Project evaluation must ensure that minority population groups are not disproportionately impacted by proposed actions.

Demographic data should be presented in tables showing the population segments by census tract or some other appropriate grouping. The information should also be presented in maps showing the population density by geographic area.

A specific population group which is important in Colorado is the seasonal or visitor population. In resort communities, this population segment can be a major factor in the need for transit services. The seasonal variation in population should be identified. The seasonal population may be related to the number of lodging units, pillows, or bed spaces in the community. Although the seasonal population may be difficult to quantify, it is an important factor in assessing seasonal variations in transit needs.

In some areas of the state commuter populations are important and should be identified. Similarly, campus populations may be a significant factor in transit demand and should be identified by geographic location.



In many areas of the state, welfare recipients are a segment of the population which depend on transit service. Many welfare recipients lack dependable

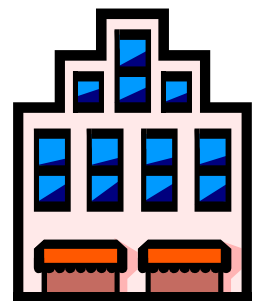
transportation and are therefore unable to stay gainfully employed. Transportation can be a significant factor in removing individuals from the welfare program. It is useful to map the residential locations of persons eligible for employment programs. This must be recognized as a sensitive issue, and the precise residential location should not be identified. The information can be mapped as a density of welfare recipients or by using scaled symbols which do not identify any individuals.

An important aspect of the demographic profile is to obtain future population projections and to identify areas of anticipated growth. These should cover the 20-year planning horizon. Population estimates should be available for six years and 20 years in the future from the Planning Dataset or local planning agencies. The estimates of future population will be required to determine the future transit needs of the region. Unfortunately, population projections will not be available for several of the transit-dependent population segments. Typically, projections will be available by age group, but the other segments will have to be estimated using current percentages of the total population and applying those percentages to the future total population. As examples, mobility-limited population and zero-vehicle household data are updated only every 10 years.

Economic Profile

There are two specific pieces of information related to transit which should be included. The first is the location of employment and the number of jobs. Major employers or employment centers should be identified and shown on a map of the region. The approximate number of employees or potential employment should be shown for each location.

Second, certain types of facilities tend to attract those who are more likely to use transit and serve as major transit destinations. These transit destinations should be identified and shown on a map of the region. Examples of such transit destinations include retail centers, medical facilities, social service agencies, senior centers, senior housing, low income housing, and intermodal transportation centers.



Identification of the employment centers and transit destinations will help in planning transit services to provide access to these locations.

Sources of Information

Demographic data are available on the Transportation Planning Data Set and from the State Demographer. Detailed information can be obtained from data published by the Bureau of the Census. Population projections will be found on the Planning Data Set and from the State Demographer. Local planning departments may have additional demographic information and may be able to provide information on seasonal populations. Seasonal population information may also be available from the local Chamber of Commerce.

Information on employment may be obtained from the local Chamber of Commerce, the economic development group, or local planning departments. Local planning departments can provide information on major transit destinations.

Transit Needs Assessment

This section describes the approach to quantify short-range and long-range transit needs and demand within the region. Transit service alternatives developed later in the process will be based on the identified transit need. There are numerous methodologies which may be used to estimate transit demand. Recommended approaches are described here, but planners are not limited to these methodologies.



In planning transit services, particularly in smaller communities and rural areas, there is frequently a question of what the true transit needs are. People often speak in terms of need and demand interchangeably, when, in fact, the two are different. Demand is related to need, but the two cannot be equated. The difference between transit need and demand must be understood. The need for transit is defined as the number of trips that would be taken without any constraints caused by the level of available service. This is related to the concept that all households have the same need to travel, but for those with access to automobiles, the amount of travel reflects their need. Households without automobiles are constrained by access to other transportation services and therefore their amount of travel is less than their needs. There is an underlying assumption that every trip is a needed trip for some legitimate purpose. Demand, however, is defined as the number of passenger-trips that will be taken when a given level of passenger transportation service is available. Observed transit trip rates indicate the demand rather than the need for transit service. As transit service increases or becomes less expensive, there is a corresponding increase in the demand, but the need would remain at the same level. Ultimately, improving the service would cause the level of demand to approach the level of need.

Typically, some type of mathematical model is used to determine the need and demand for transit service. The models may be applied for different population segments and types of service. There are different models for fixed-route service and demand-response service, as well as models for rural and urban areas. Many urbanized areas have developed their own transit demand models as part of their transportation modeling process.

In addition to the quantitative assessment of demand, there are qualitative needs which should be incorporated. Input from the community should be used to obtain a subjective indication of the need for transit services. This input may be obtained through public meetings and community surveys. Surveys may be conducted using a scientific sampling approach or through a broad approach such as publishing a questionnaire in the local newspaper.

It may be useful to use both approaches described here as one will give an assessment of the overall transit need within the region and the other will give an estimate of the demand for particular services.

Community Input

Community input may be obtained through several approaches. One of the most direct is to conduct a simple survey. The approach to be used depends on the population segment to be surveyed and the available budget. A scientific random sample of the community can be very expensive, but it provides results which can be quantified and reflect the views of the community.

A non-scientific sample may be obtained by printing questionnaires in the local newspapers or distributing them with utility bills. Questionnaires may also be distributed at senior centers, social service agency offices, retail businesses, motels, and other community activity centers. The results of these surveys should be used with caution as they are not a scientific survey, but they can provide an opportunity for significant community input to the planning process.

Questionnaires may be distributed on buses to obtain input from current transit users. An onboard survey may be conducted using random sampling techniques to obtain a representative, scientific sample. These surveys can

provide input on transit needs, transit trip rates, demographic characteristics of transit users, and passengers' assessment of quality of service.

Quantitative Methodologies

Two methodologies are presented in these guidelines. The first methodology is from the Transit Cooperative Research Program Report 3 "Workbook for Estimating Demand for Rural Passenger Transportation." This is a demand methodology and incorporates the amount of service provided within the area. The second is the Mobility Gap which was developed for the Colorado Transit Needs and Benefits Study. This approach determines the level of need within an area, but does not estimate the demand for a particular service.

Urbanized Area Demand

No methodology has been included for urbanized areas as the urbanized areas in Colorado have developed their own methodologies for transit demand within their respective urbanized areas.

TCRP Rural Demand

An important source of information and the most recent research regarding demand for transit services in rural areas and for persons who are elderly or disabled is the Transit Cooperative Research Program Report 3 "Workbook for Estimating Demand for Rural Passenger Transportation." This study, completed by SG Associates, Inc. and LSC, represents the first substantial research into demand for transit service in rural areas and small communities since the early 1980s. It may be useful for planners to obtain a copy of the workbook which is available through the Transportation Research Board (TRB), the Community Transportation Association of America (CTAA), and CDOT.

The TCRP study documents present a series of formulas relating the number of participants in various types of programs in 185 transit agencies across the country. The TCRP analytical technique uses a logit model approach to the estimation of transit demand, similar to that commonly used in urban transportation models. This model incorporates an exponential equation, which relates the quantity of service and the demographics of the area.

This analysis procedure considers transit demand in two major categories:

- \$ “*program demand*” which is generated by transit ridership to and from specific social service programs, and
- \$ “*non-program demand*” generated by other mobility needs of elderly persons, persons with disabilities, and the general public, including youth. Examples of non-program trips may include shopping, employment, and medical trips.

Non-Program Trip Demand

As with any other product or service, the demand for transit services is a function of the level of supply provided. To use the TCRP methodology to identify a feasible maximum demand, it is necessary to assume a high supply level, as measured in vehicle-miles per square mile per year. The high supply level is the upper-bound “density” of similar rural services provided in this country. This assessment of demand for the rural areas, therefore, could be considered to be the maximum potential ridership if a high level of rural service were made available throughout study area. The TCRP methodology is based on the permanent population.

The calculation for estimating non-program demand is provided in Appendix F. The necessary data for using this methodology are the senior population, the mobility-impaired population, and the below poverty population. The measure of the level of transit service is the number of vehicle-miles per square mile per year. These data should be compiled in the earlier steps of the process. Although the formulas are provided in Appendix F, the calculations may be easily completed using the worksheets provided in TCRP Report 3 or a spreadsheet available from the CDOT Transit Unit.



In areas where there are no existing services, it is necessary to estimate the number of vehicle-miles per square mile. A typical value for a relatively high level of rural transit service is 2,400 vehicle-miles per square mile per year. This

should be used as a starting point to estimate the level of demand. As alternatives are considered, the demand for each alternative may then be calculated using the projected amount of service for that alternative.

Program Trip Demand

In many rural regions it will be necessary to estimate the demand for program-related trips. Often, rural transit services are provided to the general public as part of transportation services provided for human services programs. For example, a senior center may operate transit service to provide access to senior programs and to the general public in the community. The trips which are provided are a mix of program trips and non-program trips. To provide a fair assessment of the needs in the community and the level of unmet need, it is necessary to identify both the program and non-program trips.

The methodology for forecasting demand for program-related trips involves two factors:

- \$ Determining the number of participants in each program.
- \$ Applying a trip rate per participant using TCRP demand methodology.

The trip rates and formulas for calculating program trip demand are provided in Appendix F.

Mobility Gap

A measure of transit need was necessary for the Colorado Transit Needs and Benefits Study. The objective was to estimate the level of transit needs within the state rather than an estimate of demand with existing services. This was particularly important in areas with little or no service. The approach which was developed for Colorado and has since been applied in other states is the mobility gap.

The mobility gap is defined as the difference in the household (HH) trip rate between households with automobiles and households without automobiles. This gap reflects the amount of additional travel that would be taken by households without vehicles if they had access to transportation. The amount

of service which would be needed can then be estimated to provide equal mobility to households without a vehicle as for those households with vehicles.

The calculation of the mobility gap as an interim step is defined as:

$$\text{Mobility Gap} = \text{Trip Rate (HH w/ Auto)} - \text{Trip Rate (HH w/out Auto)}$$

To calculate the mobility gap, it is necessary to have household (HH) trip rates. The number of households with and without vehicles is provided in the 1990 census data and can be easily accessed on the Bureau of the Census CD-ROM for the STF-3A file. These files report age of householder by vehicle availability in terms of age 15-64 and age 65 and over and vehicles available in terms of zero, one, two, and three or more.

Household trip rates have been determined for Colorado using the 1995 National Personal Transportation Survey (NPTS). The trip rates have been weighted for household size to eliminate any differences due to differences in household size and are shown in Table 1.

Table 1		
Weighted Household Trip Rates		
Category	Zero-Vehicle Households	Households with Vehicles
Age 65 +		
MSA Urban	3.55	5.20
MSA Non-urban	2.10	4.27
Not MSA	1.54	4.19
Age 15-64		
MSA Urban	4.95	8.70
MSA Non-urban	6.36	8.17
Not MSA	6.90	9.07
<i>Source: 1995 NPTS, LSC 1998.</i>		

The mobility gap is then calculated by taking the difference between the trip rates for households with and without vehicles. The mobility gap for each demographic segment is shown in Table 2. The calculated mobility gap ranges from 1.65 to 3.75 daily trips per household.

Table 2			
Mobility Gap Calculation			
Category	Zero-Vehicle Households	Households with Vehicles	Mobility Gap
Age 65 +			
MSA Urban	3.55	5.20	1.65
MSA Non-urban	2.10	4.27	2.17
Not MSA	1.54	4.19	2.65
Age 15-64			
MSA Urban	4.95	8.70	3.75
MSA Non-urban	6.36	8.17	1.81
Not MSA	6.90	9.07	2.17

The mobility gap is multiplied by the number of zero-vehicle households in each geographic area to determine the total transit need for that area. This is typically calculated by census tract, block group, or some other small area to determine the geographic distribution and magnitude of the need. The level of need within each small area can then be depicted on a map of the region using GIS software.

Other Methodologies

There are several other methodologies which may be used and in some cases may be essential to determine the total demand within a region. Tourism demand is not reflected in either of these methodologies. In many cases this demand must be estimated using recent trends and a projection based on those trends.

In some cases it may be necessary to determine the transit trip rate per capita and use this rate with population projections to estimate future demand based on changes in the population.

Urbanized areas may choose to use the transit component of their transportation modeling process. This may be a mode split or mode choice model. These models should provide a good estimate of demand based on the selected transit alternative. It may be desirable to estimate the total level of need within the urban area to calculate the percent of need which is being met and the level of unmet needs.

Whichever methodologies are selected should be documented in the regional transit element. The methodology should be described sufficiently to support the calculations of need and demand.

Unmet Needs

Unmet transit need is the difference between the total need and the amount of transit service that is being provided within the region by all transit providers. The need is calculated using a methodology to estimate transit needs, and the total ridership is subtracted from the total need to determine the unmet need.

$$\text{Unmet Needs} = \text{Total Estimated Annual Need} - \text{Annual Trips Provided}$$

It is useful to present the unmet needs by market segment. It is possible that all of the program trip needs are being met while there is a high level of unmet need for non-program trips. Certain segments of the population may have good service, but others may have little service. Identifying the unmet needs by population group will assist in developing service alternatives to meet those needs.

The identification of unmet needs is a very important part of the planning process as resources may be allocated to meet these needs in the future.

Alternatives Analysis and Evaluation

Methodology

As the needs are identified, both through the quantitative analysis and the subjective community input, service alternatives will be identified. These alternatives may be identified by members of the community, transit operators, planning staff, and elected officials. Each alternative must be developed so that it can be described in terms of operating characteristics to provide information for evaluation of the alternative.

Service alternatives should be described in terms of geographic area, type of service (i.e. fixed-route bus, service routes, demand-response, rail), projected capital and operating costs, and estimated ridership. Information should be available on each alternative based on the selected evaluation criteria.

Evaluation Criteria

Each region should select transit evaluation criteria. The criteria should reflect the transit performance measures and the transit goals and policies for the region. As part of the overall planning process, each RPC will develop a vision for the region and transportation goals and policies. These goals and policies should direct the development of specific transit goals and objectives. Criteria for evaluating transit alternatives should then reflect these objectives for passenger transportation services.

A simple approach to evaluation is to create a matrix which lists each alternative and then the estimated performance measures. An example of transit evaluation criteria is shown in Table 3. Each region should select criteria which reflect those characteristics of transit service which are important to that region. In some cases it may be appropriate to provide a range for selected performance measures rather than a single value.

Table 3			
Project Evaluation Criteria			
Criteria	Rating	Weight	Possible Points
1. Is the project included in the Regional Transportation Plan?	0-1	10	10
2. Does the project maintain or improve transportation system continuity?	0-3	3	9
3. Does the project serve rural residents of the region?	0-3	3	9
4. Are there other organizations/ groups that could provide this service?	0-3	2	6
5. Does the project provide service for the transportation disadvantaged (low-income, elderly, mobility-limited populations)?	0-3	2	6
6. Can this agency provide the most cost effective and efficient service?	0-3	2	6
7. Does the project have public support?	0-3	2	6
8. What is the relative cost per passenger-trip to provide the service?	0-2	4	8
9. What is the relative cost per hour to operate the service?	0-2	3	6
TOTAL POSSIBLE POINTS			66

Alternatives

Alternatives will be identified from a number of sources. Transit system improvements from the previous Regional Transportation Plan will likely be the first source of possible alternatives. Other alternatives may come from Major Investment Studies, the unmet needs analysis, qualitative public input, and needs identified by local communities and passenger transportation providers. Specific alternatives should be included to fill gaps in the existing services.

For evaluation of the alternatives and prioritization, capital and operating costs should be developed. These costs should be projected for 20 years using constant dollars.

Long-Range Transit Element

Vision for Transit

As part of the regional transportation planning process each region will develop a vision for the quality of life and transportation goals to support that vision. As part of this effort, a vision for transit service within the region should also be developed. The transit vision should provide a long-range look at what transit should accomplish within the region. This vision for transit should be stated in the long-range transit element.

There should also be goals established for transit services within the region which support the overall vision for transit and the vision statement for the region.



Transit Strategies

To implement the vision, it will be necessary to establish strategies related to transit service. Some of these strategies may be exclusive to transit service and others may be connected to other modes. As the transportation plan will be multimodal, many strategies may be common to several modes of transportation. These strategies should be stated and the relationship to transit service identified. Examples of transit strategies might be that transit will be used to meet the mobility needs of specific population segments or that transit will be implemented to reduce congestion in a specific corridor.

Preferred Transit Plan

This section of the long-range transit element will describe the transit system improvement to be implemented to meet the transit vision and the strategies. Alternatives which have been evaluated and which are found to be effective in support of the goals and strategies for transit will be included as part of the preferred long-range transit plan.

Revenue Projections

A 20-year financial plan must be developed. The financial plan should provide a realistic estimate of the projected funding for transit. Funding sources and the estimated level of funding should be identified. Potential funding sources include Federal Transit Administration funds, local governments, private support, dedicated taxes, Other Regional Priority funds, other grants, contracts, and fares. The projected revenues should be identified for the initial six years and the remaining 14 years of the plan.

Financially-Constrained Transit Element

As with any transportation plan, identified needs typically exceed the available funding. Therefore, it is essential to prioritize the needs and identify those alternatives which should be given the highest priority. The region will need to follow a prioritization process to determine the highest priority transit improvements. The Regional Planning Commission may prioritize projects across all modes to allocate transportation funds to the greatest needs. The prioritization process also includes prioritization among Transportation Planning Regions by the CDOT Regions. At this level, transit projects may compete for Other Regional Priority funds.

The Regional Transportation Planning Guidebook has provided a recommended prioritization process which can easily be adopted to transit projects. The evaluation criteria should be those used to evaluate the transit system improvements and should reflect the regional goals and strategies. The criteria presented as an example in Table 3 could easily be incorporated into this process.

Once the projects have been prioritized, the financially-constrained transit element will be identified. Those projects which may be implemented within the available funding will make up the financially-constrained long-range transit element. The financially-constrained long-range transit element will form the basis for developing the short-range transit element.

Short-Range Transit Element

The short-range transit element is the basis for operational plans for each transit provider within the region. Each operator will be responsible for developing their own operational plans to implement the short-range transit element.

The short-range transit element will be used by CDOT in the evaluation of transit grant applications and can assist the Regional Planning Commission in understanding passenger transportation services in their area and allocating Other Regional Priority funds. Therefore, it is important that the short-range element contain the information necessary for review and evaluation of the grant applications.

Six-Year Service Plan

The service plan should show the services to be provided within the first six years of the plan. This should include continuation of existing services and any new services which will be implemented. All of the services in the six-year plan must be part of the long-range financially-constrained transit plan.

Each transit service in the six-year plan should be described with the following characteristics:

- \$ Agency which will operate the service
- \$ Geographic service area
- \$ Type of service
- \$ Vehicles
- \$ Costs and projected revenues
- \$ Projected performance measures

The services to be provided by each provider should be presented to include maps of the service area, route maps, and descriptions of the type of service.

Any phasing for implementation of new services should be described with target dates for the various implementation steps.

The appropriate level of detail in this plan is for the information to be sufficient that the local officials, citizens, the RPC, and CDOT have a clear understanding of the services which will be provided during the upcoming six years. The performance measures will give an indication of how well the service meets the objectives established in the Transit Element. The Short-Range Element is not meant to be a detailed operations plan. Each transit agency may develop a more detailed operations plan to meet their specific needs. In some cases, TDPs included information such as designating individual bus stops and proposed schedules. This level of detail is appropriate for an operations plan for the individual transportation provider, but is beyond what is expected in the Transit Element. The Transit Element is meant to serve as a planning document for the region and not a detailed operations or business plan for the specific transit agency.

Financial Plan

A detailed financial plan should be included as part of the short-range transit element which shows the projected revenues by source and the expenditures for each of the six years. The financial plan should specify capital expenditures and operating expenses separately with revenues associated with each. The short-range transit element must be financially-constrained. The operating and capital expense should be shown for each individual transit provider which is included in the plan. Projected revenues should also be shown for each individual agency with each providers services shown as financially-constrained.

APPENDIX A

BIBLIOGRAPHY

Regional Transportation Planning Guidebook, Colorado Department of Transportation, 1998

Colorado Transit Needs and Benefits Study, LSC Transportation Consultants, Inc., 1999

Workbook for Estimating Demand for Rural Passenger Transportation, TCRP Report 3, Transportation Research Board, 1995

Transit Capacity and Quality of Service Manual, TCRP Web Document 6, Transportation Research Board, 1999

APPENDIX B

GLOSSARY

Accessibility – Accessibility is a concept used in transportation planning to describe the ease with which an individual has an opportunity to participate in an activity. The more accessible the activity is, the fewer travel barriers and less travel friction need be overcome to reach the activity. In common usage, accessibility is often used to mean the ability of the physically disabled to use transit or transportation facilities.

Availability of Service – For fixed-route systems, this factor can be expressed as frequency (the number of times per day or per week that a particular route is served); for demand-responsive systems, it is the reservation time (the number of hours or days between a call for a ride and the pickup). Also see **Fixed-Route** and **Demand-Responsive**.

Client Population – This measure consists of those persons who participate in or benefit from an agency's program. Some of these will use their transportation system; some may not.

Corridor Investment Study – An element of the transportation planning process that considers a full range of mobility alternatives where the need for a major transportation investment has been identified in a corridor or subarea outside a metropolitan area and determines the most appropriate transportation investment(s) therein.

Cost per Passenger-Trip (One-Way) – Total system costs (all operating expenses plus administrative costs plus capital costs on a depreciation schedule) divided by the number of passenger-trips. Costs and trips must be recorded over the same period of time.

Cost per Vehicle-Hour – Total system costs divided by the sum of the number of hours that each vehicle is operated in service.

Cost per Vehicle-Mile – Total system costs divided by the total distance traveled by all vehicles in the system when they are in service.

Deadhead Miles – Mileage driven when no passenger or package service is being provided. For demand-responsive systems, this is the total of all mileage at times when there is no reasonable expectation of carrying a passenger or package. This includes travel between the dispatch point and passenger pick-up or drop-off. For fixed-route systems, it is the mileage between the vehicle storage location and the start of the route (and vice versa at the end of the day). It does not cover mileage on the route.

Demand-Responsive – Demand-responsive refers to any mode of transportation in which passengers are picked up upon their request. This is opposed to fixed-route, fixed-schedule transportation in which vehicles

run fixed routes and schedules. Demand-responsive service will provide transportation for the traveler when and where he wants to go (within certain limits). Also see **Fixed-Route**.

Destination – Terminal end of a trip or the zone in which a trip terminates.

Dynamic Routing – The process of constantly modifying vehicle routes to accommodate service requests received after the vehicle began operations, as distinguished from predetermined routes assigned to a vehicle.

Effectiveness – For a **transportation system**, the effect is that people are moved from one place to another (i.e., trips). Measures of the effectiveness of a transportation system are, for example, the number of trips taken on it, or the number of individual persons that it serves. Or, a transportation system can be evaluated in terms of its effectiveness toward a social goal; for example, the number of persons who can take advantage of a particular social service because of the transportation system.

Efficiency – The efficiency of a transportation system will be some measure of the relationship of system inputs to system outputs. Transit planning has generally expressed this efficiency measure in terms of the ability to minimize an input (i.e., costs) to produce a unit of output. The most often used measures are cost per passenger or cost per vehicle-mile.

Elderly – The elderly are generally defined as those persons of 60 years or older; however, among the many federal statutes (and supporting regulations) which are concerned with the needs of the elderly, there are variations in the age specified for eligibility ranging from no specific age designated to age 65 and older: Older Americans Act, Title VII – eligibility requires 60 or over; Older Americans Act, Title III – no age-related eligibility requirements; Older Americans Act, Title IX – eligibility specified as 55 or over, etc.

Fare Recovery Ratio (Farebox Recovery) – The ratio of fare revenue to direct operating expenses. See **Operating Ratio**.

Feeder Services – Those services which provide access to already existing public transportation systems.

Fiscally Constrained – The financial limitation on transportation plans based on the projection of federal, state, local, and other revenues reasonably expected to be available over the 20-year planning period as adopted by the State Transportation Commission each six years prior to updating regional and statewide plans.

Fixed Costs – Typically those costs that are less (or not at all) sensitive to changes in service. They include such items as general supervision, overhead and administration, rents, debt service, etc. Fixed costs are differentiated from variable costs because they represent those costs that

must be met whether the service operates or not. If the project runs into operating problems (e.g., loss of traffic), fixed costs will continue.

Fixed-Route – Fixed-route systems operate over the same route according to a pre-established schedule. The riders of such a system must schedule their activities around the times when the service is being provided. This is in contrast to a demand-responsive system. Also see **Demand-Responsive**.

Headway – The time interval between transit revenue vehicles moving in the same direction passing a specified location.

Hours of Service – The number of hours during the day between the start and end of service on a transit route, also known as the service span.

Intermodal – Those issues, facilities, or activities which involve or affect more than one mode of transportation, including transportation connections, choices, cooperation, and coordination of various modes.

Level of Service – In transportation literature, level of service is generally defined as a measure of the convenience, comfort, safety, and utility of a system or system component (vehicle, facility, etc.) from the passenger's point of view. A variety of measures can be used to determine a particular component's level of service. In transit, level of service measures incorporate such factors as availability, frequency, etc. Level of service is typically designated in six ranges from A (best) to F (worst) for a particular service measure based on the passenger's perception of a particular aspect of the transit service.

Linked Trip – A trip from the point of origin to the final destination, regardless of the number of modes or vehicles used. See also **Unlinked Trip**.

Major Investment Study (MIS) – An element of the metropolitan transportation planning process that considers a full range of mobility alternatives where the need for a major transportation investment has been identified in a metropolitan area and determines the most appropriate transportation investment(s) therein.

Major Transportation Investment – A high-type highway or transit improvement of substantial cost that is expected to have a significant effect on capacity, traffic flow, level of service, or mode share at the transportation corridor or subarea scale.

Measures of Operating Costs – For the measurement of operating costs, there are four major unit cost measures that can be used (either separately or together) in determining cost effectiveness: 1) cost per vehicle-hour, 2) cost per vehicle-mile, 3) cost per passenger-trip, and 4) cost per passenger-mile. See also **Vehicle-Hour, Vehicle-Mile, Passenger**.

Metropolitan Planning Organization (MPO) -- An organization within the State of Colorado designated by agreement among the units of general

purpose local government and the Governor, charged to develop the transportation plans and programs in a metropolitan area.

Mobility – Access to a transportation service; mobility represents the supply function of transportation services facing an individual (or group) when using transportation services. If two people have access to the same transportation services at the same price, then they have equal mobility.

Mobility Gap – The difference in household trip rate between households with vehicles and households without vehicles.

Mobility-Impaired/Limited – This term is used to refer to those with specific categories of physical or mental limitations to travel.

Multimodal – Refers to: (1) all transportation modes individually; or (2) a comprehensive or integrated transportation model approach, often used interchangeably with **intermodal**.

Non-Program Related Trips – Non-program related trips are those trips made for various purposes by individuals. The trips are not associated with a specific social service program, but are generated by the mobility needs of individuals including the elderly, people with disabilities, students, and the general public. Trips may be for any purpose other than travel directly to and from a social service program.

Non-Revenue Hours – Hours which reflect time spent waiting between pickups, deadheading, and carrying out some administrative task.

Off-Peak – Off-peak refers to those portions of a day in which demand for transportation service is comparatively low.

One-Way Passenger-Trips – Refers to the total number of boarding passengers carried on all routes.

Operating Ratio – The ratio of operating expenses to operating revenue. Thus, operating ratio indicates the financial efficiency of a system.

Origin – The beginning point of a trip or the zone in which a trip begins.

Other Regional Priority Funds – The Colorado Transportation Commission allocates the state and federal revenues it receives into three primary categories:

- * Strategic Project Program (also referred to as the “7th Pot”);
- * Statewide Programs, such as Surface Treatment, Bridge, Maintenance, Safety, Operations, Noise Barriers, Rest Areas, ITS, and Small Urban programs; and,
- * Regional Programs, which include Other Regional Priorities, available for funding a variety of projects such as reconstruction, capacity improvements, safety improvements, etc. These funds are “flexible”—meaning they can be used for non-highway capital projects such as new or replacement buses, intermodal facilities, etc.

Paratransit – Paratransit is defined as those forms of passenger transportation which are distinct from conventional transit (scheduled bus and rail), and can operate over the highway and street systems. Types of paratransit include dial-a-ride, shared taxicab service, jitneys, subscription bus, carpools, vanpools, and short-term carpools, either company-owned or rental, each of which has characteristics suitable for different types of urban travel.

Paratransit, complementary – Service provided within a certain distance of fixed-route transit service to accommodate disabled passengers unable to use the fixed-route service as required by the Americans with Disabilities Act.

Passenger-Miles – The sum of the trip distances traveled by all passengers.

Passenger-Trips – The number of one-way trips by persons using the system. Each passenger counts as an individual trip even if there is group boarding and alighting at common points.

Passengers per Vehicle-Hour – The number of passenger-trips divided by the sum of the number of hours that each vehicle is operated.

Passengers per Vehicle-Mile – The number of passenger-trips divided by the number of vehicle-miles provided by all vehicles.

Passengers per Service Area Population (Annual) – The number of passenger-trips taken during a year's time divided by the population of the service area.

Peak Hour – That hour period during which the maximum amount of travel occurs. Generally, there is a morning peak and an afternoon peak. Peak hour refers to that hour of the day in which a transportation system experiences its greatest demand.

Point Deviation – A hybrid of fixed-route and demand-response service, sometimes referred to as checkpoint service. The vehicle travels from point to point under a pre-arranged and published schedule. The route which the vehicle takes to get from one point to the next varies according to the calls for service received. Thus, this system operates on a fixed schedule, but the route is demand-responsive. Also see **Route Deviation**.

Productivity – The basic performance parameter that describes transit and paratransit service, defined as the number of passenger-trips per vehicle-hour of operation. Also see **Trip**. It is possible to also define productivity in terms of revenue-hours once the utilization ratio is known. Also see **Utilization Ratio**.

$$\text{Productivity} = \frac{\text{Passenger-Trips}}{\text{Vehicle Service -Hours}}$$

Program Related Trip – Program related trips are those that would not occur but for the existence and operation of a specific social service program. These trips are associated with travel to or from a specific social service program and program activities. Travel is generally restricted to program participants traveling for program purposes.

Quality of Transportation Services – This has to do with the attractiveness or desirability of the service to the users—how well the service meets their needs. Some measures of the quality of service are frequency of service, fares, comfort, etc.

Ramp – Inclined passageway adaptable to mass transportation vehicles and capable of boarding and debarking a wheelchair user.

Regional Planning Commission (RPC) – The planning body formed and designated to prepare a **Regional Transportation Plan (RTP)**.

Regional Transportation Plan (RTP) – A technically-based, 20-year plan designed to meet the future mobility needs for a **Transportation Planning Region** including, but not limited to, anticipated funding, priorities, and implementation plans.

Retrofit – To retrofit is to install some feature in an existing piece of equipment.

Route – That combination of street and freeway sections connecting an origin and destination.

Route Deviation – A hybrid of fixed-route and demand-response service. The vehicle will deviate from a particular route to pick up or discharge a passenger at a requested location and will then go back to the regular route. Deviations are generally small. See **Point Deviation**.

Seat-Miles – The total number of seat-miles for all vehicles used to provide passenger service. This is found by multiplying the number of seats on each vehicle by the number of miles driven by that vehicle and adding all of the products for each vehicle together.

Shared-Ride Taxi – Shared-ride taxi service is demand-responsive group riding where the riders may be traveling between different origins and destinations. A rider does not have exclusive use of the vehicle and fares are lower than conventional taxi service because of the economics associated with joint use of the vehicle. Taxi carpooling refers to a subscription-type shared-ride taxi service.

Special (or Specialized) Transportation Service – This term refers to a transportation service usually provided for or paid for by a social service agency for transportation for disadvantaged people.

Statewide Transportation Improvement Program (STIP) – A staged, financially constrained, multi-year, statewide, intermodal program of transportation projects which is consistent with the statewide transportation

plan and planning processes, and with metropolitan planning area plans, TIPs, and processes.

Statewide Transportation Plan – A 20-year comprehensive, multimodal state-wide transportation plan adopted by the Transportation Commission.

Subscription Service – A bus or van service in which routes and schedules are prearranged to meet the travel needs of riders who sign up for the service in advance.

Target Population – Target population consists of those persons eligible to receive the benefits of the programs of each participating agency, whether in fact they take advantage of this opportunity or not.

Tie-Down – A position which may be used to restrain a wheelchair within the vehicle. Vehicle capacity usually includes the number of wheelchair positions or tie-down positions.

Transit Authority – The transit authority is a local or regional organization with responsibility for planning, funding, and sometimes operating public transportation services in an area.

Transit Dependent – Those who have to rely on transit services instead of the private automobile to meet their travel needs. Also referred to as captive riders and Transportation Disadvantaged.

Transportation Disadvantaged – Are those who for reasons of age, disability, or income lack accessibility to that group of goods and services deemed necessary for at least a minimum standard of living. The transportation disadvantaged include: 1) The elderly and the disabled who are unable to operate their own transportation and are unable to utilize the public transportation system due to steps being too high, etc.; 2) Wheelchair users; 3) The low-income; and 4) Zero-vehicle households.

Transportation Improvement Program (TIP) – A staged, financially constrained, multi-year, intermodal program of projects which is consistent with the metropolitan transportation plan.

Transportation Planning Region (TPR) – One of 15 areas of the state, designated as geographically contiguous areas meeting some, or all, of the criteria for transportation commonality and for which a Regional Transportation Plan is developed.

Travel Time – The time required to travel between two points, not including terminal time.

Trip – A one-direction movement which begins at the origin at the start time, ends at the destination at the arrival time, and is conducted for a specific purpose.

Trip Distance – The distance between origin and destination.

Trip Generation – A general term describing the analysis and application of the relationships which exist between the trip-makers, the urban area, and the trip-making. It relates to the number of trip ends in any part of the urban area.

Trip Priorities – Those trips which must be served, either because of the funding sources or by policy decision, before any optional trip purposes can be served. It is essential to identify these trip priorities because they represent a set of trips that must be considered fixed.

Trip Purpose – The reason for making the trip. Normally, the purpose is associated with the destination such as work, shopping, recreation, medical, or social. The purpose of the return trip to home is defined by the origin. For example, the trips from home to work and work to home are both work trips.

Trip Rates – This is a measure of travel demand. It is usually expressed in terms of the number of trips per person per day for a particular population segment.

Unlinked Trip – A trip segment made in a single vehicle or a single boarding of one transit vehicle in revenue service. See also **Linked Trip**.

Unit Cost – The unit costs of transportation services are the cost of providing a specific unit of service (i.e., cost/trip, cost/vehicle-mile, cost/vehicle-hour). The unit cost is used chiefly to measure efficiency of the system.

Urbanized Area – As defined by the Bureau of the Census, a population concentration of at least 50,000 inhabitants, generally consisting of a central city and the surrounding, closely settled, contiguous territory.

Utilization Ratio – Ratio of revenue-hours to service-hours is denoted as the vehicle utilization ratio. The utilization ratio relates the actual hours billed for service to the total number of hours of vehicle service availability (measured by driver payroll hours).

Variable Costs – Those costs that are sensitive to changes in the actual level of service. They are usually affected by the vehicle-miles, vehicle-hours, or some other measure of level of service. Variable costs typically include such items as fuel, oil, tires and tubes, drivers' wages, and other items of expense that are sensitive to the level of operation. Vehicles and equipment items purchased have life expectancies which require that a depreciation factor be included when figuring costs. Most typically, depreciation is figured on a straight-line basis with a 10% residual salvage value at the end of that time. The length of time depends on the type of vehicle.

Vehicle-Hour – Either the time the engine is running, or the time a driver is assigned to a vehicle; the operating time for a vehicle. Useful in measuring operating costs. Revenue-hours are the hours when the vehicle is operating and available for passenger service.

Vehicle-Miles – The total number of miles driven on all vehicles used to provide passenger service. Revenue-miles are the miles operated by vehicles available for passenger service.

Appendix C

How many days per week do you regularly provide transit service?

Days _____

How many weeks per year do you regularly provide transit service?

Weeks _____

How many people at your agency are involved in transit?

of Full-time employees _____

of Part-time employees _____

How many drivers do you employ?

TYPE OF DRIVER	# Year-round	# Seasonal
Full-time Drivers		
Part-time Drivers		
Volunteer Drivers		

How many vehicles do you have in service on an average day?

of Vehicles _____

How many vehicles do you have in service for peak periods?

of Vehicles _____

What are your peak period hours?

From _____ to _____

From _____ to _____

From _____ to _____

Appendix C

Section 2: Transportation Cost Information

FIXED-ROUTE SERVICE ONLY (Demand-response information goes on the following page.)

Please provide your agency's annual passenger transportation costs for FIXED-ROUTE services. Please provide this information for the most recent five years. Use additional copies of this page and indicate the year _____.

OPERATING COSTS – FIXED-ROUTE (variable/direct)	ANNUAL COST (\$)
Labor	
Driver(s) Salary	\$
Other salaries	\$
Fringe Benefits	\$
Services	
Professional and technical services	\$
Advertising fees	\$
Temporary help	\$
Vehicle maintenance services (including parts)	\$
Custodial services	\$
Other services	\$
Materials & Supplies	
Fuel and lubricants	\$
Tires and tubes	\$
Utilities	\$
Casualty and Liability Costs	\$
Taxes	
Property tax	\$
Vehicle licensing and registration fees	\$
Other taxes	\$
Purchased Transportation Service	\$
Leases and Rentals	
Passenger shelters	\$
Vehicles	\$
Facilities	\$
Miscellaneous Expense	
Dues and subscriptions	\$
Travel and meetings	\$
Other miscellaneous expense	\$
TOTAL OPERATING COSTS	\$

CAPITAL COSTS – FIXED-ROUTE	ANNUAL COST (\$)
Vehicles	\$
Facilities	\$
Equipment	\$
TOTAL CAPITAL COSTS	\$

Appendix C

Section 2: Transportation Cost Information (cont.)

DEMAND-RESPONSIVE SERVICE ONLY

Please provide your agency's annual passenger transportation costs for DEMAND-RESPONSE services. Please provide this information for the most recent five years. Use additional copies of this page and indicate the year _____.

OPERATING COSTS – DEMAND-RESPONSE (variable/direct)	ANNUAL COST (\$)
Labor	
Driver(s) Salary	\$
Other salaries	\$
Fringe Benefits	\$
Services	
Professional and technical services	\$
Advertising fees	\$
Temporary help	\$
Vehicle maintenance services (including parts)	\$
Custodial services	\$
Other services	\$
Materials & Supplies	
Fuel and lubricants	\$
Tires and tubes	\$
Utilities	\$
Casualty and Liability Costs	\$
Taxes	
Property tax	\$
Vehicle licensing and registration fees	\$
Other taxes	\$
Purchased Transportation Service	\$
Leases and Rentals	
Passenger shelters	\$
Vehicles	\$
Facilities	\$
Miscellaneous Expense	
Dues and subscriptions	\$
Travel and meetings	\$
Other miscellaneous expense	\$
TOTAL OPERATING COSTS	\$

CAPITAL COSTS – DEMAND-RESPONSE	ANNUAL COST (\$)
Vehicles	\$
Facilities	\$
Equipment	\$
TOTAL CAPITAL COSTS	\$

Appendix C

Section 3: Revenue Information

Please provide your agency's annual passenger transportation revenues for the most recent five years. Use additional copies of this page and indicate the year _____.

REVENUE SOURCE	AMOUNT (\$)
Fares/Donations	\$
Advertising	\$
Dedicated transit tax	\$
Other Regional Priorities	\$
Grants	
FTA 5307 (urbanized)	\$
FTA 5309 (discretionary capital)	\$
FTA 5310 (elderly & disabled)	\$
FTA 5311 (rural)	\$
Other federal grants (CMAQ, FHWA, etc.)	
Other #1 (name)	\$
Other #2 (name)	\$
Other #3 (name)	\$
Other #4 (name)	\$
Other miscellaneous grants	
Other #1 (name)	\$
Other #2 (name)	\$
TOTAL OF ALL GRANTS	\$
Contracts	
Developmental Services	\$
Head Start	\$
Medicaid	\$
Older Americans	\$
Other #1 (name)	\$
Other #2 (name)	\$
Other #3 (name)	\$
TOTAL OF ALL CONTRACT REVENUE	\$
Other revenue sources	\$
	\$
TOTAL REVENUES	\$

Appendix C

Section 4: Transportation Conditions

The following questions will help measure existing conditions. The information is also needed to determine current deficiencies, future needs, and project costs for the planning horizon. Please be as specific as possible when answering the questions. Since the questions are more descriptive, you may fill in the answers on this sheet or supply us with the answers on sheets generated by your own agency.

What are the major transportation needs of your agency in the short term (1 – 6 years)? Please list specific projects. Some examples include the following: Replacement of 4 large buses at a cost of \$250,000 each; 2 minibuses at \$50,000 each; New service to the shopping mall with 30 minute headways at a cost of \$500,000 annually; 1-day per week demand-response service to the elderly apartments at a cost of \$20,000 annually; 4 new bus shelters at \$1,000 each; New schedules printed, estimated cost with labor and materials \$5,000; Hire 1 dispatcher at \$18,000 annually.

What are the major transportation needs of your agency in the long term (7 – 20 years)? Please list specific projects, such as the above examples.

Appendix C

Section 5: Service Information

Please provide information about general public transit services that your organization provides. Annual trips should be recorded as one-way or unlinked trips.

Service Performance

Service Type	Annual Veh. Miles	Annual Veh. Hours	Annual Pass. Trips
Fixed-Route			
ADA Services			
Demand-Response			
Other			
TOTAL SERVICE			

Passenger Information

Please list the number of rides provided. Record each ride in one category only.

Category	Contracted	Non-contracted
Elderly (60 yrs +)		
Under 60 yrs.		
Disabled		
TOTAL RIDES		

Appendix C

Section 6: Vehicle Fleet Inventory

Please include a vehicle inventory sheet. Information should include vehicle make, model, year, replacement year, seating capacity, wheelchair tiedowns, condition.

Section 7: Facility Inventory

Please include an inventory of the transit facilities which you own or use. The inventory may be provided on the attached form.

Section 8: Service Areas

The final section of the Survey includes service area information. Please provide a written description of your service area. Please specify the approximate boundaries of the service area and location of regular routes.

THANK YOU FOR YOUR HELP!

Appendix E
Public Transportation Facility Inventory

Facility Description	Age	Condition	Remaining Useful Life	Replacement Cost
1				
2				
3				
4				
5				
6				
7				
8				
9				

APPENDIX F

TABLE 1

Recommended Methodology for Estimating Annual Program-Related Rural Passenger Transportation Demand (From TCRP Report 3)

D= Annual One-Way Person-Trips

Program Type

Developmental Services: Adult

Participants < 25; D = 358 x Number of Participants

Participants > = 25; D = 430 x Number of Participants - 1,686

Developmental Services: Case Management

D = 39.2 x Number of Participants

Developmental Services: Pre-School

D = 224 x Number of Participants

Group Home

Participants < 10; D = 2.05 x Number of Participants x Days of Operation
or, if the number of days of operation is not known,
D = 615 x Number of Participants

Participants > = 10; D = (1.42 x number of Participants + 5.94) x Days of Operation
or, if the number of days of operation is not known,
D = 291 x Number of Participants + 3,760

Headstart

D = 263 x Number of Participants

Headstart: Home Base

D = 0.16 x Number of Participants x Days of Operation
or, if the number of days of operation is not known,
D = 30.5 x Number of Participants

TABLE 1

**Recommended Methodology for Estimating Annual Program-Related
Rural Passenger Transportation Demand**
(from TRCP Report 3)

D = Annual One-Way Person-Trips

Program Type

Headstart: Other

D = 1.86 x Number of Participants

Job Training

D = 137 x Number of Participants

Mental Health Services

D = 347 x Number of Participants

Mental Health Services: Case Management

D = 6.35 x Number of Participants

Nursing Home

Participants < 50; D = 9.10 x Number of Participants

Participants > = 50; D = 12.5 x Number of Participants - 173

Senior Nutrition

D = 248 x Number of Participants

Shelter Workshop

D = 1.58 x Number of Participants x Days of Operation
or, if the number of days of operation is not known,
D = 384 x Number of Participants

TABLE 2

**Recommended Methodology for Estimating Annual Non-Program-Related
Rural Passenger Transportation Demand**
(from TRCP Report 3)

$$D = R_e E \left(\frac{1}{1 + k_e e^{-U_e}} \right) + R_m M \left(\frac{1}{1 + k_m e^{-U_m}} \right) + R_p P \left(\frac{1}{1 + k_p e^{-U_p}} \right)$$

where:

D = annual demand for Non-Program-Related passenger transportation.
(One-Way Trips Per Year)

$$R_e = 1,200$$

$$R_m = 1,200$$

$$R_p = 1,200$$

E = number of persons age sixty or over.

M = number of mobility-limited persons age sixteen to sixty-four.

P = number of persons, age sixty-four or less, in families with incomes below the poverty level.
The definition of the poverty level is that used for the 1990 U.S. Census.

$$k_e = e^{6.38}$$

$$k_m = e^{6.41}$$

$$k_p = e^{6.63}$$

$$U_e = 0.000510 \times \frac{\text{Annual Vehicle-Miles Available to Elderly Market}}{\text{Area of the County}}$$

$$U_m = 0.000400 \times \frac{\text{Annual Vehicle-Miles Available to Mobility-Limited Market}}{\text{Area of the County}}$$

$$U_p = 0.000490 \times \frac{\text{Annual Vehicle-Miles Available to Low-Income Market}}{\text{Area of the County}}$$
