Regional Transit Coordination Guidebook

by

Carol Abel Lewis, Ph.D.
Director and Associate Professor
Texas Southern University

Laura Higgins
Associate Research Scientist
Texas Transportation Institute

Judy Perkins, Ph.D.
Professor
Prairie View A&M University

F. Benjamin Zhan, Ph.D.
Professor
Texas State University—San Marcos

XuWei Chen
Research Associate
Texas State University—San Marcos

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GUIDEBOOK OBJECTIVE

Constant growth in rural areas and extensive suburban development have contributed to increasingly more people needing seamless and adequate public transportation into and from nearby cities. Coordinating existing services or determining the need for expanded services tends to require new paradigm thinking for those interested in servicing the growing potential market for inter-regional travel.   Added to the travel pressures in these growing regions is the call from funding agencies and planners to better integrate medical and special trips with more traditional public transportation service.   The purpose of this guidebook is to serve as a resource for jurisdictions and agencies that wish to develop or improve public transportation opportunities for travelers who cross established agency and jurisdictional boundaries.

The guidebook reflects the most recent thinking as reported in literature, surveys, and telephone interviews of communities across America who are addressing provision of better coordinated, seamless public transportation for super regions. The guidebook contains conditions that should trigger consideration to improve coordination between public transportation providers, as well as tools, strategies, and organizational structures that are working in communities across America.

How to Use This Guidebook

Communities thinking about integrating existing public transportation services or creating new service that covers multiple agencies and more than one jurisdiction will see a number of configurations that are working for other regions in the state of Texas and elsewhere in the United States. Conditions are listed that can help with a determination as to whether coordination might be a positive option. The guidebook provides recommendations for beginning and sustaining coordination activities, as well as an overview of coordination types. Examples and recommendations are provided on the use of technologies to facilitate information coordination and analysis.

Links and references to further resources are provided throughout the guidebook. These resources include other published reports and guidelines, online documents and clearinghouses, and websites of transportation providers and other transportation-related organizations.

Finally, evaluation sections are included at the end of each chapter. These sections provide a brief "checklist" of the major points within each chapter and a self-evaluation that may be used as a discussion tool within your organization or region.

Chapter 1. Coordinated Public Transportation and Mobility Management

Increasingly, Texans are commuting from outlying communities to jobs, universities, and for other trip purposes in nearby urban and suburban areas. The current separation of urban and rural public transportation services means that Texans who travel between jurisdictions – from rural or suburban communities into cities or the reverse – often find public transportation a difficult or unviable mode of transportation. The need for regional public transportation is likely to grow, not diminish.

To truly serve the future transportation market, transit service will need to become less stratified and more regional, with seamless connections for passengers traveling between one provider and the next. Coordinating public transportation across traditional agency or jurisdictional boundaries, in many instances, will require new paradigms of service delivery. Benefits of coordinated, seamless transit services include improved accessibility to medical services, jobs and other activities, as well as relief for congested roadways. Potential challenges include relaxing parochial perspectives and yielding long-time service practices.

Considering Coordinated Service for Inter-Regional Travel

Public transit in the United States traditionally takes one of several forms, each operating in a well-defined environment. Fixed-route transit, whether by bus, train, or ferry, operates in areas that are sufficiently populated to support the service. Demand-response services may serve special populations (such as mobility-impaired riders and others with special needs) within an urban area, but are more likely to be found serving rural or suburban populations. Medical or human services transportation, whether provided by a human services agency or a separate transportation provider, serves particular segments of the urban or rural population for particular categories of trips.

The continuing evolution of American communities has necessitated a corresponding evolution in public transit services in recent years. Flex-route services, suburb-to-suburb and reverse-commute transit, and "community circulator" buses are some of the innovations that public transit providers have implemented around the country to accommodate the changing needs of their communities. However, with limited resources, many transit services are increasingly challenged to provide service to everyone who needs it or to attract new ridership.

Recent changes in federal funding and state law are bringing further change to public transit operations in Texas. The Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU) includes provisions for interagency coordination of transit services in several of its transit funding programs. Texas

House Bill (HB) 3588 required the Health and Human Services Commission to contract with the Texas Department of Transportation (TxDOT) to assume management of the Medicaid Medical Transportation Program. The bill also requires transit providers to work together and with other stakeholders to find ways to maximize transportation resources and service coverage and to reduce waste.

While "regional transit coordination" is new as a statewide effort in Texas, many transit providers in the state and elsewhere already have a history of pooling resources and working together to accomplish their mutual service objectives. Reasons for encouraging coordination among the transit providers in a region include the following:

- **Growing area, growing congestion.** While public transit tends to represent only a small percentage of the total travel in any given community, transit trips during the heaviest travel times have the potential to relieve congestion along major travel corridors. In areas where those travel corridors extend beyond the urban transit provider's service boundary, coordination between the urban transit provider and adjacent suburban or rural provider(s) will allow transit to remain or become a viable travel option for more area residents.

- **Some transit, but disparate and uncoordinated.** Small cities, towns, and rural areas, faced with a geographically scattered population, can have trouble stretching transit resources to cover all of the area and potential riders. The result can be "pockets" of transit service that leave significant numbers of potential destinations and riders unserved or underserved.

- **Need for cross-region travel.** Patients who must travel across counties to a medical center, residents of one city that work in another, non-drivers who want to travel to retail or services not available in their own area – these are just some of the people who benefit from transportation services that can travel past the usual county or city boundaries of a single transit provider. Small urban or rural transit providers also benefit when long trips can be shared or linked among neighboring jurisdictions.

- **Many separate transit providers competing for the same funding.** Transportation funds are limited with greater demand for dollars than dollars available. A portion of funds from the Federal Transit Administration is calculated on the basis of a formula, which includes the region's population as one determinant of the amount received. Predetermined coordination arrangements can specify how funding will be allocated, decreasing competition and increasing efficiency resulting in more service within the available funding.

Benefits of Coordinated Regional Transit

The benefits resulting from coordination efforts depend on the type and degree of coordination and on the characteristics of the region. In developing a coordination plan, stakeholders may want to emphasize some benefits as particular goals for their region. Some potential benefits of transit coordination efforts are listed below.

Benefits to transit riders/travelers:

- More travel alternatives for commuters.
- Increased mobility and independence to people who do not or cannot drive.
- Improved availability and convenience of medical trips.

Benefits to transit providers:

- Improved cost-effectiveness and use of resources.
- Expansion of service area and client base.
- Improved visibility of transit service in the community.
- Ability to leverage new funding sources.

Benefits to transportation system:

- Congestion relief on major travel corridors.
- Reduction in vehicle emissions.
- Additional travel capacity without building more lane miles.

Benefits to employers and the workforce:

- Opportunity to attract new workers.
- Reduced need for parking facilities.
- Support for ridesharing and transit use offered by the Internal Revenue Service (see: http://www.bwc.gov/pdf/05_taxbenes_5.pdf).
- Potential element of corporate pollution-reduction programs.

State of the Practice: Coordination in Texas

In response to the Texas Legislature's House Bill 3588, 24 council of governments (COGs) regions in Texas worked with TxDOT to develop regional plans for transit coordination. The website www.regionalserviceplanning.org provides a clearinghouse of information for this planning process. Even before this statewide effort, a number of Texas transit providers and other local agencies were successfully coordinating information and services. A few of Texas' transit coordination efforts and successes are described below.

El Paso Metropolitan Planning Organization (MPO)

Sun Metro, the City of El Paso's transit system, is involved in a coordination effort with the cities of Socorro, Texas, and Sunland Park, New Mexico, via an interlocal agreement. The first meeting of the Multi-Regional Transit and Commuter Committee was held in August 2005. The purpose of the committee is to develop transit connectivity in the regions and corridors around El Paso, Las Cruces, Alamogordo, San Patricio, Sunland Park, Truth or Consequences, Elephant Butte, and (potentially)

Juarez, Mexico, with one of the goals being to develop a multimodal transportation network in the region. A federal government grant funded a study of transit needs for the region. Among the Committee's objectives were to:

- establish a regional transit district in New Mexico in 2006,

- find a legal and financial framework for expanding Sun Metro's boundaries beyond the city limits, and

- increase transit services for special needs passengers under the Federal Transit Administration's New Freedom program (Section 5317) by improving route efficiency and reallocating funding.

North Central Texas COG

The North Central Texas Council of Governments (NCTCOG) formed the Regional Planning and Public Transportation Study Group in January 2005. The Study Group drafted the Regional Public Transportation Coordination Work Plan in October 2005. The plan outlines actions to be taken by the Study Group and the four main stakeholder groups. NCTCOG has also designed a coordination website, which includes the transportation provider inventory for the region, as well as documents related to the development of the regional plan. The website is located at http://www.nctcog.org/trans/transit/ops/.

As of August 2006, the Study Group has produced a detailed "master list" of coordination strategies, a schedule of tasks to be undertaken by each of the stakeholder agencies, and a plan for public outreach and community involvement as the coordination plan is developed.

The Hurst-Euless-Bedford Transit Pilot Project, which began during the summer of 2006, is an early "output" of NCTCOG's transit coordination effort. The United Way of Tarrant County, the Tarrant County Workforce Board, and NCTCOG will cooperate to provide demand-responsive transportation services to those currently not served through an existing transportation provider.

Sherman-Denison MPO/Texoma Area COG

TAPS (Texoma Area Paratransit System) provides public transportation in Sherman-Denison urban and surrounding rural areas. Coordination efforts have included a number of TAPS-operated shuttles connecting the cities of Sherman and Denison with the Dallas Area Rapid Transit (DART) train station in Plano (Texoma Express); TAPS service between the city of Peterbilt and the cities of Nocona, Gainesville, and Bowie; and employment routes for Texas Instruments, Trailblazer, and United America that connect Denison, Sherman, Bonham, McKinney, and Richardson. Another "employment shuttle" connects several Texoma-area communities to the Alliance Airport. TAPS also coordinates extensively with agencies in its seven-county area and with the Rolling Plains Management transit provider (neighboring rural provider) to provide medical trips. Coordination activities range widely, and many are based quite

successfully on informal, even verbal agreements between TAPS and the other agencies.

Corpus Christi/Coastal Bend Council of Governments

A plan was developed in 2000 to coordinate rural transit services operating out of Aransas, Bee, Brooks, Duval, Jim Wells, Kenedy, Kleberg, Live Oak, McMullen, Nueces, Refugio, and San Patricio Counties, as well as the services provided by the Corpus Christi Regional Transportation Authority (RTA). The plan focused on six primary travel corridors in the region, and established a transportation coordinator to facilitate coordination of inter-county transit services. The coordination plan is being reexamined and updated to reflect the requirements of HB 3588.

Harris County Coordinated Transportation Study

The Harris County Coordinated Transportation Study is a pilot program aimed at expanding public transportation services for elderly, disabled and low-income residents of Harris County by coordinating the METRO and METROLift services with social service transportation programs. Scheduling, fares, and funding are coordinated among multiple providers. The program has resulted in ridership growth and more efficient use of transit resources. In June 2007, an interlocal agreement set the parameters for METRO to serve a park and ride from Baytown, a small city not within METRO's boundary.

Gulf Coast Transportation Council

This council, consisting of city and county governments, human services agencies, public and private transportation providers, Houston-Galveston Area Council (H-GAC), and TxDOT, has been meeting since 1996. Activities have centered on "seed groups," each of which has worked to eliminate various barriers to coordination.

Fort Bend County Transit

To help solve the challenges of rapid growth, increasing congestion, and decreasing mobility within Fort Bend County, stakeholders began development of a comprehensive county-wide transit plan in 2003. Planning partners included H-GAC, TxDOT, The Goodman Corporation, A&R Consulting, and Texas Southern University. The project Steering Committee and Advisory Committee identified deficiencies in transit services for people with limited mobility resources and for Fort Bend County commuters. Existing transit service was found to be fragmented among a variety of providers. A feasibility study assessed transit needs related to job, medical, and education access; examined alternatives for organizing and managing a coordinated transit system for the county; and identified cost-effective service and mode options. New capital and operating funding sources were explored with an eye to leveraging local funds against applicable state and federal funding programs. Eleven public meetings and workshops were held in 2003 and 2004 to get public input and buy-in for the plan; additional meetings were held with key stakeholders. The planning

process also included a survey of employees at major Fort Bend employers, and a website (http://www.fortbendtransit.com) to further communicate with the public. The transit plan resulting from the feasibility study is also posted at the website.

Fort Bend County formed a rural transit district in June 2005 to become eligible for state and federal funds from TxDOT.

Killeen-Temple MPO and the Heart of Texas Council of Governments (HOTCOG)

These agencies began coordinating public and medical transportation services in the late 1980s and established the Heart of Texas Regional Transit District in the mid-1990s. Currently, two urban fixed-route systems (in Killeen and Temple), rural transit for the surrounding counties, and medical transportation trips are managed and coordinated through the Hill Country Transit District. Planned capital projects included in the Mobility 2030 Plan include a regional multimodal transportation facility for urban-to-urban and rural-to-urban transit, intercity providers, and other private transportation providers. HOTCOG is acting as the lead agency for the current regional transit planning effort. Appendix 6 details a case study of existing coordination and future potential for this region.

CARTS

The Capital Area Rural Transportation System provides rural, urban, and medical transportation in a nine-county area, in addition to coordinating with other area agencies that provide human services transportation. CARTS has a long history of involvement in regional transit coordination, including three intermodal facilities and service agreements with other public and intercity transit providers.

CARTS has become known for its effective use of advanced public transportation systems (APTS) technologies to improve passenger service, including demand-response transit-scheduling software, voice and data communications, and automatic vehicle location (AVL). One challenge that CARTS faced was communicating with its vehicles across a large, mostly rural area where cell phone service can be unreliable. A partnership with the Lower Colorado River Authority (LCRA) provided a solution; CARTS now uses mobile data terminals that operate on LCRA's radio network.

Transportation Demand Management and Trip Reduction Strategies

In order to improve the efficiency of inter-regional transit travel and to increase the number of travel options (mode choices) for inter-regional travelers, a full range of strategies should be considered, including those that have been traditionally used in the overall management of transportation demand. These strategies include telecommuting and support for pedestrian and bicycle programs. While these activities may seem distant from the concerns of coordinated public transportation services, traditional proponents of these activities seek some of the same goals sought through public transportation advocacy as described in chapter two.

Some of these strategies were borne of metropolitan ridesharing programs designed to reduce the daily demand that commuters place on the overall transportation system, and because public transportation operations are dependent upon the same transportation infrastructure used by commuters; strategies that ease the demand upon the overall system may also improve the efficiency of public transportation operations, including those serving inter-regional travel.

Traditional and emerging travel demand management strategies may also contribute to the genesis and evolution of new public transportation services. For example, a ride matching program may be initially designed to collect and share information to facilitate trip sharing among commuters with common trip origins and destinations; however, after a sufficient number of matches are made along a particular travel corridor (constituted by informal carpools or vanpools), this could signal the need for more formal car or vanpools, or even a commuter bus service.

Recent developments in car-sharing programs may respond to the specific transportation needs of transit rider markets while also contributing to better overall travel demand management. Some of these activities may be described as non-profit, volunteer, or community based, such as Boulder CarShare (http://www.carshare.org). Others are more business-oriented, such as the services offered by FlexCar (http://www.flexcar.com) and Zipcar (http://www.zipcar.com).

When these approaches are applied simultaneously, they work together, not in opposition. For instance, the existence of a shared-car program could serve in supporting the use of public transportation, as a prospective transit rider's perceived inability to access responsive transportation in the case of an individual emergency and the inability to perform errands are both objections to transit use that may be overcome with some form of car sharing. Similar dynamics are in-place when pedestrian and bicycle programs are supported, as these modes serve in increasing the transit catchment area.

Additional Resource

United We Ride's "Framework for Action: Building the Fully Coordinated Transportation System" (http://www.unitedweride.gov/1_81_ENG_HTML.htm) provides information, examples, and self-assessment tools for communities that are considering coordinated transit systems.

Chapter References

House Bill No. 3588, 78th Session, Texas Legislature, text available at http://www.legis.state.tx.us/tlodocs/78R/billtext/doc/HB03588F.doc

Federal Transit Administration, *New Freedom Program*, U.S.C. Section 5317, fact sheet at http://www.fta.dot.gov/documents/FTA_New_Freedom_Fact_Sheet_Sept05.pdf

Hurst-Euless-Bedford Transit Pilot Project; NCTCOG. Information at http://dfwinfo.com/trans/transit/ops/taskforce/Agendas/2006July6_HEB%20Transit%20Presentation%20(TB).ppt#256,1,Hurst-Euless-Bedford Transit Pilot Project

Chapter 1 Evaluation — Coordinated Public Transportation and Mobility Management

- Who are the transit providers in your region? What types of transit service are provided, and where?
    - Urban fixed-route
    - Rural/intercity fixed-route
    - Rural demand-response (general public)
    - Elderly-disabled transportation service
    - Workforce/job access/reverse commute
    - Medicaid non-emergency medical transportation
    - Other specialized service

- Are there geographical areas within your region that are not served or underserved by transit?

- Are there demographic groups in your region that are not served or underserved by transit?

- Is it currently possible to travel between rural and urban areas on transit within the region? Between counties? Between cities? Is there a demand for these types of trips?

- If your region has multiple transit providers, do any of them serve overlapping areas or customer bases?

Assessment of my region — rate the following on a scale of 1 to 5:

1) Adequate transit services for the general public are available in all areas of my region.

    1   2   3   4   5
    Strongly disagree ………………………………………………….Strongly agree

2) Adequate transit services for elderly and disabled riders are available in all areas of my region.

    1   2   3   4   5
    Strongly disagree ………………………………………………….Strongly agree

3) Adequate transit services for non-emergency medical trips are available in all areas of my region.

    1   2   3   4   5
    Strongly disagree ………………………………………………….Strongly agree

4) It is possible for a rider to travel across the entire region using existing transit services.

    1   2   3   4   5
    Strongly disagree ………………………………………………….Strongly agree

5) It is possible for a rider to travel to one or more neighboring regions using transit (either directly or by transferring to a transit provider in the neighboring region).

| 1 | 2 | 3 | 4 | 5 |

Strongly disagree ....Strongly agree

Chapter 2. Strategies and Methods of Organization

Coordinated regional transit service can take many forms, depending on the needs, resources, and characteristics of the region. For some regions, information sharing and informal agreements may accomplish the desired goals. For others, the end goal may be a fully integrated and seamless regional transportation system. Regardless of the type and degree of coordination sought, success will depend on the support of all involved. Key steps to starting the coordination process are described below.

Build a Broad Coalition of Stakeholders

Who are the stakeholders in a regional transportation system? Ultimately, any person or entity that uses, provides, funds, or regulates transportation facilities and services is a stakeholder. Depending on the region, a coalition of transportation stakeholders could include some or all of the following:

- Transportation providers
  - Public transit agencies
  - Medical transportation providers
  - Private transit operators
  - Intercity transit providers
  - School transportation systems

- Human services agencies
  - Local Aging and Disability Services Offices
  - Workforce Development Boards
  - Non-profit organizations such as United Way and American Red Cross
  - Private non-profit organizations
  - Local Department of Assistive & Rehabilitative Services Offices
  - Local Department of State Health Services Offices
  - Faith-based organizations

- Transit Patrons and Other Citizens (the public, employers, etc.)

- State and local government
  - Texas Department of Transportation
  - City traffic engineers
  - State or local public transit coordinators
  - Texas Education Agency
  - Texas Workforce Commission
  - Health and Human Services Commission

Building and maintaining a broad base of stakeholders requires time and ongoing effort. A strong stakeholder coalition, however, will support a regional coordination effort in a number of ways. Information gathering, public outreach, problem solving, and other planning activities can be easier to accomplish when shared among an organized group. Funds and resources can be leveraged to greater benefit. And, perhaps most importantly, the resulting transportation system has a better chance of

surviving and thriving if it has built trust, assembled information, and enlisted support for the coordination effort through as much of its community as possible.

Create a Common Agenda for Transportation Needs

With a broad range of stakeholders, there will be a broad range of objectives and agendas brought to the planning process. Coordination will not be able to address every objective nor will it solve all transportation problems in a region. The challenge, therefore, is to develop a common agenda that balances agreed-upon regional objectives with the special interests of the participant groups.

The following are some strategies for developing this common agenda.

- Identify regional travel needs:
  - Use surveys, focus groups, and interviews to gather information from commuters, agency clients, and transit riders on travel needs.
  - Collect information on the needs and resources of each stakeholder agency pertaining to transportation services.
  - Solicit input from stakeholders regarding observed regional transportation needs. Focus on unmet needs, gaps in service, and overlapping or duplicated services.

- Develop regional transportation strategies:
  - Hold regular meetings and workshops to begin to build consensus on regional transportation goals. Regional coordination strategies should increase the ability of transit providers and agencies to provide transportation, while allowing individual agencies to meet their own agency goals.
  - Begin to develop an overall purpose statement for regional transportation. A later section of this chapter provides additional suggestions regarding the development purpose statements, goals, and operating principles.

Focus on Planning, Flexibility, and Sustainability

Sustaining a regional coordination effort not only through planning and implementation, but also for long-term operation, requires a sound planning process, ongoing and active participation by coordination partners, and a focus on regional transportation objectives. The following suggestions are general "lessons learned" from prior transit coordination efforts.

Planning

- Put effort into travel needs forecasting and strategic planning. Population densities, demographic information, major travel corridors, origins and common destinations of medical-trip passengers are some of the types of information that can help to focus plans for regional transit services.

- Focus on improved service first, then on potential cost savings. Realize and communicate to decision-makers that cost benefits may be long-term rather than immediate.

- Identify sources of funds and other resources for:
  - the activities of the coalition, including meeting space, information dissemination, transportation, etc.;
  - start-up costs of new or expanded programs; and
  - ongoing administrative tasks, staff, and equipment needs.

- Develop accurate cost information for the transportation services provided; in particular, develop methods to compare "apples to apples" when comparing costs as allocated by different agencies.

Flexibility

Think beyond traditional methods of public transit service. Creativity and a willingness to change how service is provided allows transit providers to adapt to service needs, changes in funding, or to other changing circumstances. Brainstorm potential options for serving transportation needs across the region and for supporting participating providers/agencies in their operations. A few topics to explore:

- Rider transfers between providers – across counties, and between rural and urban jurisdictions.

- Shared facilities, vehicles, and staff time.

- Group purchases of vehicles, equipment, or software.

- Shared processes – billing, scheduling, and record keeping.

- Service styles – flex routing, feeder routes, intercity travel, commuter and medical shuttles.

RIDES Mass Transit District

The RIDES Mass Transit District in Illinois contracts with human service agencies to provide transit services for agency clients (in addition to serving general public riders). RIDES also provides accounting and billing services for its client agencies, relieving those agencies of some of the administrative burden of providing transportation services.

Sustainability

- Create a broad base of support in the community. Target a broad rider market; make sure that as many groups as possible can use the transportation services that will be provided.

- Establish a legal or institutional framework for the coordination effort. Several administrative and management strategies are described later in this chapter.

- Use a phased or incremental approach when implementing services. For example:

- While RIDES Mass Transit District has continued to expand its public transportation services in Illinois, it does so only where travel patterns indicate a need for service, and only as resources permit.
- Capital Area Rural Transit System has implemented a number of advanced technology systems to improve aspects of their passenger service. CARTS credits the success of its technology program to its "baby steps" approach to adding new systems; the transit system makes sure that each new technological element is working smoothly before adding the next element.

Administration and Management Strategies

Policy direction, daily management, and areas of authority must be clearly described for all transportation entities and services included in the coordination and service integration. Decisions to be made include clear lines of responsibility and authority, designation of financial arrangements and transportation service parameters. A number of configurations are used for coordinating services across jurisdictional and agency boundaries. Organizations can maintain their independence working principally through coordination agreements or new organizations can be established encompassing all the initial entities. Combinations of the above approaches exist as well. Careful attention will be required to assure adherence to state guidelines for setting up and financing transit bodies, which will vary across jurisdictions. Configurations for coordination are described below with examples of communities that employ each method.

Configurations

An examination of regional coordination showed variations of three basic configurations: *creation of new entities, umbrella agencies, and joint or coordination agreements.*

New Entity Established for Multi-jurisdictional Coordination

Recognition of the need for regional public transit service led to creation of new agencies in some areas of the country. The new agency is established to encompass a broad reaching geographic area including multiple counties, cities, and meshing transit service that may originally have been provided by one or more transit entities. Regions using this configuration include Denver Regional Transit District.

- *Denver Regional Transit District.* Denver Regional Transit District (RTD) provides virtually all service within an area of approximately 2330 square miles that encompasses most of the Denver-Boulder-Aurora metropolitan area, including all or parts of eight counties. The District began by action of the Colorado General Assembly in 1969. In addition to the service provided by RTD, a demonstration project is underway termed Front Range Express (FREX). FREX buses serve areas outside the RTD district boundaries operating between Colorado Springs and downtown Denver generally within one single corridor, the Interstate Highway (IH)-25 corridor. Through agreement with RTD, FREX serves selected RTD stops. Local entities that FREX serves have been asked for

operating funds in order to make FREX a viable service in 2007. Operating funds from local entities along the Front Range are required on an annual basis to allow FREX to continue beyond 2007. In August 2006, an ad-hoc group of the Colorado Transportation Commission recommended approval of an $8 million proposal to expand and solidify the ongoing operation of FREX. The Colorado Department of Transportation (CDOT) would pay $6.32 million for the FREX service with the balance of $1.68 million coming from the Pikes Peak Rural Transportation Authority (PPRTA.) More information on FREX is available on its website, http://www.frontrangeexpress.com/.

Umbrella Agency

Some regions create an entity that is a layer above existing transit operators. These "umbrella agencies" are responsible for coordination of the member agencies. Members contribute financially to the coordination entity by formula or agreed proportional amounts. Governance is shared; most often a representative is named from each member agency. Examples are the Seattle and Phoenix areas. The Atlanta region is considering an umbrella organization and is in the beginning exploratory stages to establish such an entity.

- *Seattle.*   Sound Transit was created to develop a high-capacity regional transit system as an overlay on top of the four separate local bus systems in the Central Puget Sound area, which include Everett Transit, Community Transit, King County Metro Transit, and Pierce Transit. In 1995, voters approved a tri-county agency to develop commuter rail, long-distance bus. There is a contract with existing agencies to provide the long-distance service. A fare agreement allows transfers between systems; the fare script can be used anywhere in the three counties. "Good Neighbor Agreements" enable entities to share a facility. Some facilities may be jointly built, in which case operating and maintenance costs are shared. A regional trip planner, available on the Sound Transit website, enables a user to plan a trip itinerary based on the trip origin and destination locations and other user-selected parameters; the planner returns a trip plan that includes one or more of the transit providers in the Central Puget Sound area, plus walking directions and transfer information.

  There is a Transit Integration Group made up of the Assistant General Manager level (2nd in command level), with a representative from each district, which focuses on service, marketing, and security. The cooperative relationship between the counties on this subject is reviewed by the state legislature.

- *Phoenix.*   The Regional Phoenix Transit Authority (RPTA) partners with Pima County and Arizona Department of Transportation to provide service between rural Ajo and Phoenix. Also included in the coordination initiative are Valley Metro, Valley Rail, and Tempe Transit. Each agency brings funding to the consortium. The authority operates under a governing board comprised of area mayors, who meet monthly for policy decision making. A unified fare structure is in place. Service appears seamless to the users, although the buses display a stencil that indicates the providing agency.

  When service first began one difficulty that had to be overcome was variances in frequencies and hours of service, sometimes on the same route across

jurisdictions, since historically each entity operated its own service. Operating funds are provided through Proposition 400, a ½ cent tax which covers freeway, arterial and transit funding; funds from member cities; and Federal Transit Administration (FTA) rural transit program (Section 5311). Capital funds are provided through Proposition 400, member cities, FTA urban transit program (Section 5307), FTA discretionary program (Section 5309), FTA rural transit program (Section 5311), and the Congestion Mitigation and Air Quality (CMAQ) program (see Appendix 1).

- *Atlanta Transit Planning Board.* An entity is under evaluation in Atlanta that would create a regional institutional structure to facilitate regional cooperation with respect to planning, implementing, and financing transit service in metropolitan Atlanta.

  The Board is comprised of the following entities:
    o Atlanta Regional Commission (the metropolitan planning organization),
    o Greater Atlanta Regional Transportation Authority,
    o Georgia Department of Transportation,
    o Metropolitan Atlanta Transit Authority,
    o City of Atlanta, and
    o more than 10 counties including and contiguous to Fulton County, which houses Atlanta.

  Member agencies maintain autonomy and contribute individuals to serve on a governing body for the purposes of coordination; member agencies may or may not have an independent source of funding beyond member contributions. A main objective is to seek more federal and state funding. In the first phase, fares, customer service, and information would be coordinated, a regional plan developed, and coordination of regional service would be improved. In the next phase, more extensive improvements would be implemented once an independent funding source is identified. A predecessor to the Atlanta Transit Planning Board is the Greater Regional Transportation Authority, which provides the same type of coordination for multimodal transportation.

  The board is comprised of elected officials including County Commissioners, the Mayor of Atlanta, other agency chief executive officers, and three gubernatorial appointees (see Appendix 2).

Joint or Coordination Agreement

Member agencies are all autonomous but accept agreements on fare levels, script and transfers, and may coordinate routes to facilitate linkages and transfers. Southern California's Regional Rail Authority (METROLINK) has five member agencies operating in the Los Angeles area. Appendix 3 shows a prototypical intergovernmental agreement.

- *Los Angeles.* METROLINK Commuter Rail provides seven commuter rail lines, six of which travel to downtown Los Angeles. The agency operates with a joint powers authority, which was established in 1990 with rail bonds. Rail bonds supplied the capital funds to purchase and upgrade tracks. Member agencies provide operating dollars, primarily on a train mile basis. Six of the seven lines travel through more than one county; the other is in a single county. Four of the members use sales tax for commuter rail operation; one uses federal money that it swaps for local dollars. The MERTOLINK ticket is accepted as a transfer by 20 different agencies through an EASY TRANSIT PASS agreement. The board is formed of elected officials, generally county commissioners.

- *The Houston-Galveston Metropolitan Area.* A number of formal and informal agreements serve as the tools for coordination in the Houston Metropolitan Area. Brazos Transit and Houston METRO allow transfers from riders destined to area medical facilities. Harris County Rides administers contracts with the American Red Cross and taxi services to coordinate rides for designated populations. An agreement recently was signed between METRO and Harris County for a park-and-ride service to begin from Baytown into the METRO service area. Discussion is underway for a similar agreement with Fort Bend County Transit. Although perhaps unintentional, the joint agreement model is the management structure unfolding in the Houston-Galveston metropolitan area (see Appendix 7).

Delineate Decision-Making Process

Parameters framing daily operations must be instituted as a foundation of any coordination configuration. A document setting forth guidelines, expectations, financial conditions, schedules, and pertinent information for smooth operations is signed by all agencies. State statutes and enabling legislation provide the starting point and statutory basis on which the coordination entity will be ordered. Initial tasks are as follows:

- Establish Legal Framework
  - Determine accountability practices—outline reporting requirements and schedule for submittals
  - Describe duration of agreement and conditions for renewal
  - In the event of disagreement, parameters for mediation or arbitration
  - Include any contingent clauses
  - Include indemnity conditions

> Texas statutes for each transportation authority incorporate provisions for adding territory. In general, that new territory is acquired either through annexation by the jurisdictions in the authority or by election. Check the enabling legislation for the transit agency in your area for guidelines governing expansion. Texas statutes for Metropolitan Transit Authorities (MTA's) can be found at http://www.txdot.gov/services/public_transportation/ptn_rules.htm.

- Establish Financial Agreements
  - Confirm services to be paid by which entity or whether non-remunerated courtesies will be extended

- Determine how farebox revenues will be distributed
- Prepare initial year and subsequent year agreements, determine invoicing requirements, or other billing that triggers payment
- Designate administrative and other fees
- Prepare multi-year budgeting
- Consider cost-effectiveness in coordinating services
- Include long-term financial strategies, e.g.,
  o Denver (RTD) passed a 1% sales tax, with federal funding received for various capital projects;
  o Phoenix (RPTA) passed Proposition 300 and Proposition 400 granting taxing authority;
  o Seattle (Sound Transit) passed a sales tax of 4/10 of 1%, 3/10 of 1% of the value of each vehicle, and a car rental fee of 8/10 of the cost of each rental fee. Those fees support construction costs of capital items. Operating dollars are from tax revenue and fare revenue; and
  o Determine how individuals will pay fare across agencies and what level of fare will be recognized by each agency.

Pima County

Transportation Coordination for Pima County in the Phoenix, Arizona, area is governed by an agreement termed **Partner Ground Rules.** The agreement notes the amount of money provided by FTA and other grant sources, along with the local match. Farebox revenue will be suspended for the first three years; thereafter, farebox distribution will be negotiated by the partners. The rules stipulate who will operate contract service and where. See Appendix 4.

Establish a Purpose Statement and Operating Concepts

An important starting point for stakeholders working toward inter-jurisdictional, interagency regional public transportation is to define their common understanding of the outputs, goals, and general direction of the consortium. A vision statement should be established and several key goals agreed on early in the process. Thereafter, more specific operating guidelines and concepts, along with measurable objectives, can be developed.

Establish a Purpose Statement

A purpose statement could take several forms and be termed *Purpose, Vision,* or *Mission.* Its role is to create a unified function and frame every action that occurs for the joint body, thereafter. A generic example: The Southern Region Transit Authority (SRTA) recognizes that regional and local public transportation needs throughout their 10-county area require a response that acknowledges the interrelationship of the nature of travel and subsequent economic life of the region. The SRTA commits to a regional response that places the user first and supports the economic well-being of the area.

Establish Operating Concepts

Service options may be inclusive of all area services whether local or express or may focus on a single service, such as a link from and to a commuter rail service. Examples of full service option in the Regional Phoenix Transit Authority include:

- freeway express bus,

- bus rapid transit service,

- supergrid bus service (a series of fixed bus routes, operating on east-west/north-south arterials, providing consistent levels of service across jurisdiction),

- local fixed-route service,

- neighborhood circulators,

- business district shuttles,

- rural transit service, and

- commuter vanpool service.

In many communities, the administration and management agreement will reflect the anticipated and agreed upon operating concepts. Covenants for fully integrated services will reflect unimpeded transfers of patrons from other providers in the region with prearrangements for route integration and fare acceptance.

Seattle Sound Transit

Sound Transit owns or is a tenant at multimodal stations in Everett, Seattle, Tacoma, and other locations. At these stations, Sound Transit services connect with Amtrak trains, intercity buses and other transit authority buses that serve communities outside of the Sound Transit district. Sound Transit's master plan, *Sound Move*, calls for a coordinated system of transit centers and stations, where many transportation services come together for convenient connections. Transit planners from the member entities work together to minimize connection times and optimize system linkages. A Smart Card fare medium is in process to be used on all carriers.

Overcoming Barriers

Many coordination attempts are hindered by real or perceived incompatibilities among transportation providers and other stakeholder agencies. Differences in operations, client base, regulatory requirements, or funding mechanisms create barriers that can disrupt, delay, or discourage coordination planning. Many barriers, however, can be overcome. Appendix 5 provides Barrier and Constraint forms, which may assist in winnowing and describing specific issues.

Communicate

Exchange information and perceptions about potential barriers. As part of the Regional Service Planning effort in Texas, TxDOT has collected "barrier" and "constraint" survey forms from participating stakeholders, in order to assemble information about real or perceived barriers to transit coordination in the 24 planning regions. These forms are shown in Appendix 5 and can be found online at http://www.regionalserviceplanning.org/clearinghouse/barriers_constraints/.

Distinguish "Actual" versus "Perceived" Barriers

Many perceived barriers to coordination efforts (called "constraints" in the TxDOT survey) are based on custom, agency policy, or misunderstanding of state or federal laws. Even barriers rooted in legislation can sometimes be addressed in future legislative sessions; constraints that exist because of historical or preferred practice can usually be eliminated if participating agencies see the benefits of changing that practice.

Address Actual Barriers

Address issues such as funding and grant eligibility or regulatory requirements with the state department of transportation (DOT) or other appropriate agency, both to clarify information and to explore ways to resolve the barrier.

Many states and local governments wish to better merge paratransit and the general riding public. Independent research is underway in Texas to reduce constraints caused by funding streams, patron eligibility, and other constraints. Advances have been made in several communities toward greater integration of demand-responsive transportation with more traditionally scheduled service.

- The *Regional Transportation Program (RTP)* in Cumberland County, Maine serves the elderly, passengers with disabilities, social service agency clients, and economically disadvantaged passengers. Rider's Choice originated in response to RTP's need to provide 24-hour, 365-day service availability for clients of the state's Department of Mental Health (DMH). Direct phone connections to the other transit providers in the area allowed the RTP to serve that need at a feasible cost.

- The *Rides Mass Transit District* had its beginnings in 1974, with one operator providing demand-response transportation for older adults in two counties in southeastern Illinois. While the initial service struggled, a federal demonstration grant in 1976 re-launched the effort, and four vans began providing demand-response transportation for both elderly passengers and the general public. The service expanded into five counties by 1989, and in 1990 RIDES became a Mass Transit District for the region. The District grew to encompass nine counties by 1998 and 11 counties in 2005.

- The *Suburban Mobility Authority for Regional Transportation (SMART)* provides fixed-route, flex-route, and demand-response service in southeastern Michigan. SMART's "Job Express" routes provide reverse-commute service from the city of

Detroit to job sites in surrounding suburbs. Additional suburban-to-urban service is provided via SMART Park-and-Ride routes. SMART coordinates with local businesses and chambers of commerce to plan its commuter services around the needs of businesses and their employees. SMART also offers free one-month bus passes to newly hired employees of registered businesses.

Additional Examples of Regional Approaches

More examples of regional approaches to transit services can be found at these websites:

- http://www.fta.dot.gov/1595_2568_ENG_printable.htm
- http://www.smartbus.org/Smart/Ride+SmART/Employment+programs
- http://www.rtprides.org/about.html
- http://www.gomaine.org/faqs/index.html
- http://www.gomaine.org/bus_ferry_rail/index.html
- http://www.unitedweride.gov

Interlining and Intercity Bus Services: Greyhound's Rural Service Feeder Program

Reduced ridership over the past several years resulted in the need for Greyhound to streamline its service. Between 2004 and 2006, this intercity bus company re-focused its routes to a "core" network that still covers a substantial portion of the country, but no longer stops in many of the smaller rural communities. As part of this restructuring process, Greyhound has increased its efforts to partner with rural public transit providers.

Federal funding for rural intercity bus service is provided through the FTA Intercity Bus Program (Section 5311(f)), first established by the Intermodal Surface Transportation Efficiency Act in 1991. The Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU) further defined states' obligations to consider intercity bus service needs; under earlier funding rules, 5311(f) money could more easily be diverted from intercity transit to other rural transit service. Connecting intercity bus service with rural transit services can benefit both groups of providers: rural transit providers restore some of the local "network" lost by Greyhound's downsizing, and Greyhound's intercity routes answer some of the long-distance transportation needs of rural transit passengers.

Rural transit coordination with Greyhound can take several forms, ranging from a formal interlining arrangement to informal connection service. Interlining offers revenue potential for the rural transit provider and easier trip planning for intercity riders; a rural provider that is interlined with Greyhound can sell Greyhound tickets (and vice versa), and trip schedules are coordinated between the two carriers. A rider boarding an interlined rural transit vehicle and connecting to an intercity bus can purchase a single ticket for the trip. Interlined rural transit providers must comply

with Federal Motor Carrier Safety Administration (FMCSA) authority, including rules for insurance and vehicle safety standards. Even without an interlining agreement, rural transit providers can set up connecting service, either fixed-route or demand-response, to feed riders or packages to Greyhound's intercity routes for travel outside the rural provider's service area.

Greyhound is currently developing a website for the Rural Feeder Service Program. The site will include a handbook, standard forms, and resource information for rural transit providers.

Intercity Bus Service with CARTS

The Capital Area Rural Transportation System has a long history of working with intercity bus companies, sharing transit stations with Greyhound (San Marcos station), Arrow Trailways (Round Rock station), and Kerrville Bus Lines (Bastrop station). As part of CARTS' own service restructuring, routes are being developed to connect customers from the Bertram area to Round Rock and from Austin to Round Rock, restoring vital links to the intercity network.

Chapter References

Federal Highway Administration, *A Summary of Highway Provisions in SAFETEA-LU.* Available at http://www.fhwa.dot.gov/safetealu/summary.htm

Chapter 2 Evaluation — Strategies and Methods for Organization

Create a Broad Coalition of Stakeholders – Think in terms of beginning with a long list of potential stakeholders. People and agencies can opt out later, if they choose.

- Who are the individuals indicating an interest in coordinated transportation?

- For those individuals, who needs a spokesperson, but seems to not have one, what persons or agencies might represent these individuals?

- What other state or local officials should participate in the planning, organizational decisions, implementation, and program evaluation?

Create a Common Agenda; Maintain Planning, Flexibility, and Sustainability – Focus on the areas of consensus between stakeholders with an eye to the future and long-term viability of a coordination initiative.

- What are the elements of agreement regarding coordination expressed by stakeholders?

- Are there personnel, facility, and financial resources that can serve as a foundation to begin regionally coordinated service? What options are available to support the coordinated services long-term?

- Do the agencies currently providing public transportation services show a willingness to alter existing routes and times to facilitate greater regional connectivity?

Administration and Management Strategies – Consider existing agencies, their functioning and legislative and other parameters to determine the most appropriate organizational configuration.

- Are the agencies at a point where they might consider recreating themselves under a new agency with a broader agenda? Have there been key personnel or other changes in policy personnel that may indicate the time is right for a new agency?

- Are all the agencies strong and performing at a high level? Would an administrative change, such as creating a new agency cost more in inefficiency and losses than might be gained by efficiencies of an organization change? In these cases, the interlocal agreement between existing agencies might be most appropriate.

- Is there consensus that regional coordination would be better achieved if all the agencies had a common mission? Are agencies willing to pool financial and staff resources? In these cases, an umbrella agency layered above the existing entities might be most appropriate.

- How should decision making occur? What legal agreements are appropriate? What short-term and long-term accounting practices, payment options, and cash allocations should be decided?

Establish a Purpose Statement, Goals, and Operating Principles – Agree on the purpose for implementing coordinated transit, gain consensus on regional goals and delineate standard operating practices.

- What is our agreed on primary purpose for the long-term? Is that long-term purpose described in such a way as to clearly guide short-term goals?

- Is there an understanding of key public transportation service needs? Where should routes be coordinated and transfers facilitated? Are there fares that can be made more compatible? How can information more effectively be communicated to the public?

- Can we describe the elements that are making it more difficult to coordinate service? Is there a non-traditional or novel way to approach the difficulties? Are any of these difficulties a result of long-term perception as compared to a legislative boundary?

Interlining and Intercity Bus Services – Better service options may be available by creating a liaison with Greyhound intercity bus services.

- Does our region have a formal or informal arrangement with Greyhound? Are rural transit providers devising schedules to coordinate with nearby Greyhound stops and schedules?

****

Assessment of my region — rate the following on a scale of 1 to 5:

1) I/we have a comprehensive list of stakeholders important to a regional coordination initiative.
   | 1 | 2 | 3 | 4 | 5 |
   Strongly disagree ....Strongly agree

2) There is a high degree of agreement about the need for regional coordination.
   | 1 | 2 | 3 | 4 | 5 |
   Strongly disagree ....Strongly agree

3) Our region has delineated potential opportunities for coordinated services under existing legislative, agency, and geographic parameters.
   | 1 | 2 | 3 | 4 | 5 |
   Strongly disagree ....Strongly agree

4) The public and private transportation providers in our region are all relatively high-performing.
   | 1 | 2 | 3 | 4 | 5 |
   Strongly disagree ....Strongly agree

5) Public transportation providers in my region have a written, consensus purpose statement, as well as goals.

1	2	3	4	5

Strongly disagree ....Strongly agree

6) Initiatives are underway to coordinate routes and schedules, transfers and fares
between public transportation agencies in my region.

1	2	3	4	5

Strongly disagree ....Strongly agree

7) A formal interlocal agreement is in place with Greyhound to coordinate with my area's rural transit providers.

1	2	3	4	5

Strongly disagree ....Strongly agree

All assessment sentences, except number 4, are designed as value-oriented with "strongly agree" as the notation indicating solid coordination. Responses of "strongly disagree" indicate areas where work tasks can be concentrated. Number 4 provides a point of knowledge for consideration of management types.

Chapter 3. Providing Transit Information

A person taking a trip using public transit, intercity transit, or passenger rail needs information on the transit service's routes, schedules or headways, and fares to successfully arrive at the desired destination. A passenger using demand-response transportation services must know how to reserve a trip. A human services agency arranging transportation for its clients must be able to schedule trips and arrange billing. If the trip involves more than one transportation provider, trip planning becomes much more complicated.

"One-stop" regional information centers for transit information are an answer to the traveler's dilemma of finding and interpreting route, schedule, fare, and other necessary information from several transportation providers across an area. Regional information systems are also a valuable tool for transportation providers who are trying to pool resources, facilitate transfers, or identify gaps in service. Some regions in the United States have implemented regional public transit information as part of either "511" (travel/transportation information) or "211" (human services information) telephone services.

Multi-provider transit information systems can be as simple as in-house databases or can incorporate automated itinerary building, demand-responsive scheduling, billing functions, and/or real-time information such as automatic vehicle location. While the information systems described in this chapter include websites and other user-operated devices such as kiosks and personal data assistants (PDAs), customer service personnel cannot and should not be eliminated from the process. Many transit customers may need or prefer to telephone for information and trip-planning assistance, even if a website is available.

Coordinate Information

The success of a long-term regional transit information system begins with the quality of the information provided. A transit directory that contains numerous out-of-date telephone numbers or website links will attract fewer and fewer customers, as will a trip planner that provides itineraries that prove to be impossible to follow. Providing correct and complete transit information, particularly over the long-term, requires planning and cooperation from a number of stakeholders.

Encourage Participation

While simple information systems (such as a regional transit directory) can be a single-person or single-agency effort, involving other stakeholders in planning and development will tend to increase "buy-in" for the system. Transit providers, agency representatives, and other end users of the system can also help identify useful system features and potential problems early in the design process.   For a system

that includes more extensive information, such as bus routes and schedules, ongoing participation by transit providers will be necessary.

Picture the End Result

As with any planning effort, developing a regional transit information system should begin with the end goal in mind. What are the hoped-for results of a regional transportation information system? Depending on the region, goals might include:

- greater exposure for all area transit services, leading to higher transit ridership in the region;

- quicker, easier identification of transit providers that can serve a particular need (e.g., human services or reverse-commute trips); and

- future coordination efforts, such as centralized dispatch or scheduling.

Who are the anticipated users of the information system?

- general public,

- transit management or customer service centers, and

- human services agencies.

Plan for Data Coordination and Maintenance

To ensure accurate information is available to users, a central person or entity should lead the task of maintaining and updating information for the system. Even if each agency has the ability to perform updates to its own section of the database, experience has shown that updates may not be made regularly without reminders.

Data sharing and maintenance agreements are discussed further in the sections on regional transit directories and trip planners.

Use Information Technologies

Technologies for storing, organizing, accessing, and sharing regional transit information are available in a wide range of capabilities and costs. Some considerations for selecting and implementing technology packages for regional transit information are described in this section. Further information on transit-related technologies, including transit information systems, is available in the publications listed at the end of this chapter.

ITS Architecture

An intelligent transportation systems (ITS) architecture defines the functional elements of the planned system and how information will travel between those elements, and ultimately describes how technologies will be used in order to satisfy the transportation system's objectives.

The National ITS Architecture, established in 1994, provides a model for defining the functions, structure, information and communication requirements within an ITS system. The National Architecture (available at www.iteris.com/itsarch) also helps to define standards for technology interfaces and information exchange requirements. Texas Department of Transportation's Regional ITS Architectures, based on the National Architecture and developed for each of the TxDOT districts, include transit ITS architectures for all but the major metropolitan areas. The documents describing these regional architectures can be found at www.consystec.com/texas/default.htm.

Figure 3.1 shows an ITS architecture developed for the Hill Country Transit District in the Central Texas Region, describing the elements of a single-provider transit information system.
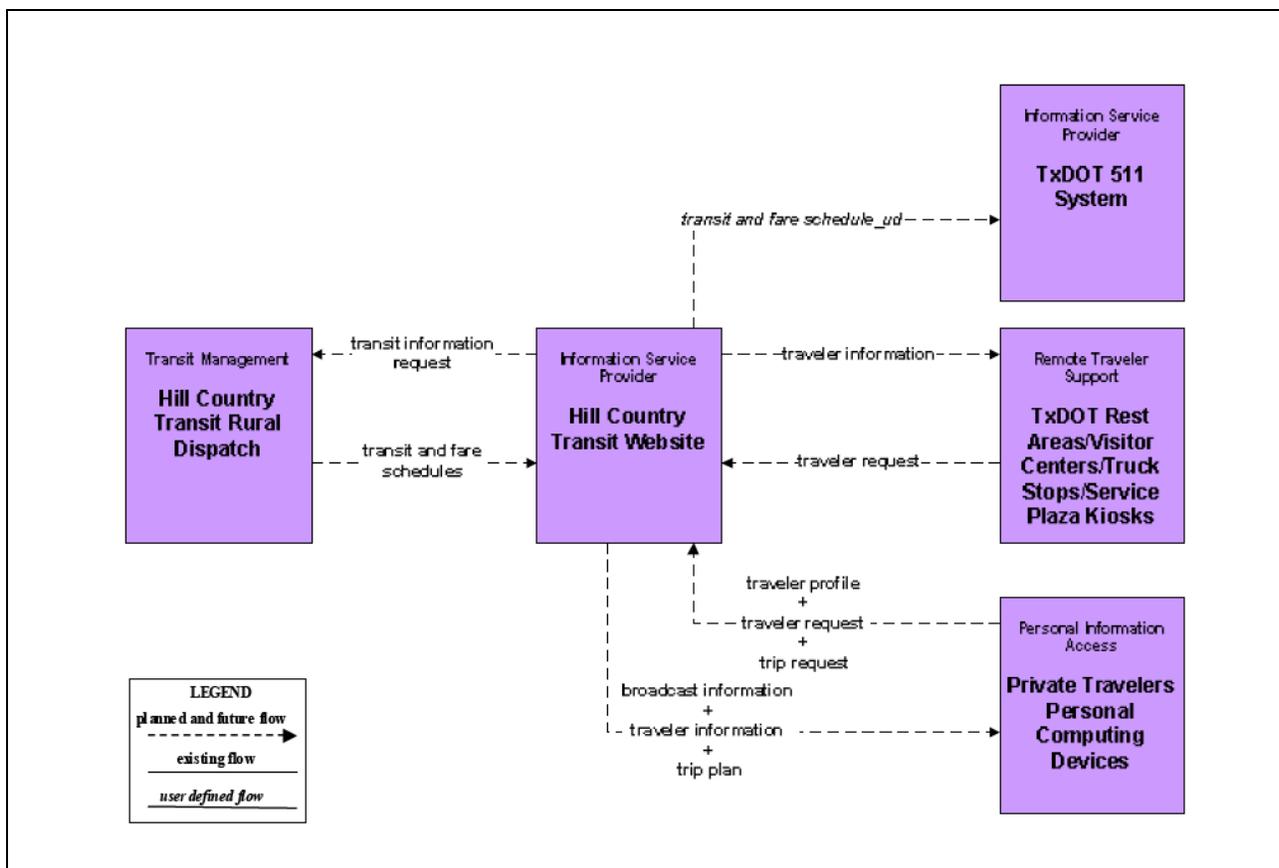
Figure 3.1. Example ITS Architecture: Transit Traveler Information for Hill Country Transit District. (TxDOT, Regional ITS Architecture Report, Waco Region, p. A-65.)

A multi-provider transit information system might have an architecture similar to the one shown in Figure 3.2.
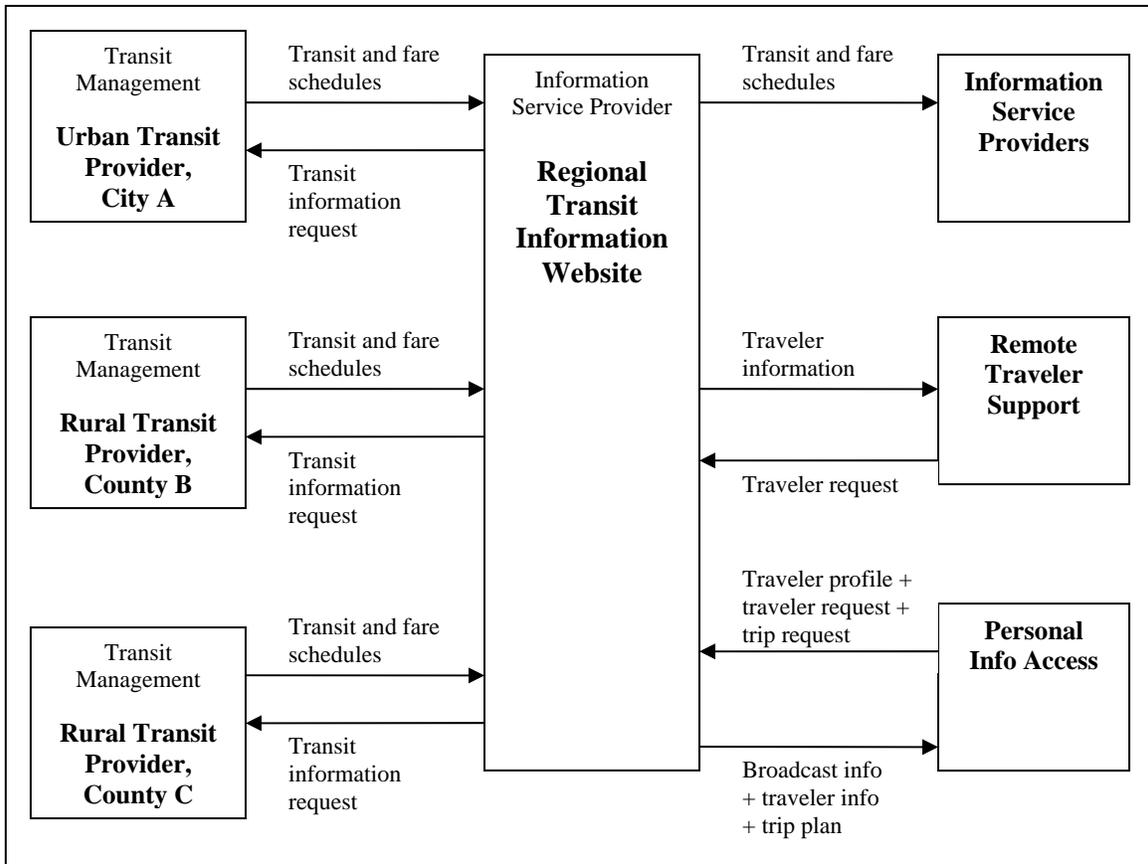
Figure 3.2. Sample ITS Architecture for a Multi-Provider Information System.

Selecting technologies with open or standardized architectures will help to ensure that they will be compatible with other commercial software and hardware systems. Some custom-designed systems may become obsolete quickly if they require a specialized system in which to operate.

Lessons Learned – Product Selection and Implementation

The following are suggestions from transit providers and ITS product vendors on selecting and implementing transit technology packages.

- **Consider how the technology will work with current transit business practices.** Is it possible and desirable to alter certain business practices (such as scheduling methods) to benefit from the product's capabilities? How much training will be needed for staff to be able to use the technology?

- **Consider the costs associated with the technology.** Understand how the purchase price of a technology system is tallied; is it priced by the number of transit providers, by the number of computer workstations, by the number of routes or vehicles (mainly applicable to trip planning, scheduling, and automatic vehicle locating applications)? Other cost elements to keep in mind include the following:

- Agency staff time for procurement, training, data entry, and ongoing operation of technical systems.
- Maintenance and technical support.
- Usage fees for communications.

- **Consider future expansion.** As far as possible, select technology systems that can be expanded later—for example, to add capacity or to perform additional functions—without the need for a complete overhaul of the system. Will the technology grow to meet future business? What are licensing and upgrade requirements? Will the system/providers be coordinating with additional organizations in the future?

- **Introduce new technologies gradually**. Make sure that each new system is working before adding the next technology or function. Test an information system for missing information, missing links between web pages, or operational errors before making it available to the public.

- **Promote and market the regional information system.** When possible, incorporate a marketing component into the development process of the regional information system. Low public awareness of a new regional information system will greatly limit the system's benefits. Print the website and/or phone number for regional transit information on bus stop signs, city or transit agency maps, and city and agency websites.

- **Evaluate the system.** Collecting user feedback from the general public and from agency representatives can help to identify problems and to guide future upgrades. A feedback mechanism should be included on the web interface (if any) to collect user comments and questions on the interface design, the usefulness and accuracy of the transit information provided, and other aspects of the information system.

Regional Transit Directories

A regional transit information directory provides transit riders (and customer service representatives for transit and rideshare) with a single source of information about transit services in an area. While this approach does not provide customized travel information such as itinerary planning, it is a lower-cost way to coordinate transit information, and can serve as a foundation for more complex functions.

Data Needs and Agreements

Directory information should include each transit provider's service area (preferably searchable by city and county), type of service provided (fixed-route, paratransit complement to fixed-route, demand-response), any ridership restrictions, fares, hours of service, and contact information (including links to the providers' websites, if any).

Besides transit providers, a regional directory may provide information on other transportation programs and services such as carpool/vanpool programs or delivery services. Similar information (contacts, area served, fees) should be included.

Formal data-sharing arrangements may not be necessary for a regional transit directory. An informal agreement from agencies included in the directory will likely be sufficient, though it will be in the agencies' own interest to provide updated information as needed. To allow transit providers to access and update their own information in the database, the system can include automated tools for importing data, and/or web-based access that allows providers to log on and make changes manually. Either option will reduce the amount of maintenance labor that must be performed by the central/lead agency.

User Interfaces

Although complete trip planning across multiple providers is not provided with a clearinghouse format, a web or telephone interface should allow users to select transit providers by region of travel, or by other category such as fixed-route, paratransit, or rideshare coordination. An interactive map interface and drop-down selection menus are two options to help web-based users select the appropriate provider or providers for their trip. Customer service representatives at each of the transit agencies should also be able to access database information on all providers in the area in order to provide information and assistance to callers.

Examples

NCTCOG Transportation Provider Inventory

North Central Texas Council of Government's searchable web-accessible database provides transit provider contact information, including provider websites. The website allows users to search for transit options by county, by type of transit service, or by the name of the transit provider. The website includes a "clickable" map of area counties as one search option for finding the transit providers that operate in each county (www.nctcog.org/trans/data/tpi/index.asp).

Cross County Transit, North Carolina.

This web-accessible database (www.cctransit.org) allows human services agencies (or the general public) to enter requests for non-emergency out-of-county medical trips. Transit providers also enter information on upcoming out-of-county trips. Trip coordinators match trip requests manually with upcoming trips, forwarding potential trip matches to the transit providers. Transit providers then make trip arrangements with passengers *(Transystems Corporation, et al.)*.

211 InfoLink, Orange County

Orange County's 211 InfoLink is available as a website and as a toll-free telephone number, providing centralized information on all human services agencies in Orange County, California. Transportation options for older adults, persons with disabilities, and other county residents are listed in the 211 online directory, with contact

information given for each of the transit providers.
(http://www.211oc.org/default.asp)

"Go Maine" Commuter Connections Website

Go Maine (www.gomaine.org/bus_ferry_rail/index.html) provides a directory of public transit providers, vanpool and carpool programs, and park-and-ride lots across the state, as well as information on bicycle and pedestrian commuting. Commuters have the option of registering with the site and entering their commute information into a database to receive recommendations on commute travel options. Commute information is also available via Go Maine's toll-free telephone number. Go Maine is sponsored by the Maine Department of Transportation and the Maine Turnpike Authority, and administered by the Greater Portland Council of Governments.

Commuter Information

This website is a directory of transit services serving Charlottesville, Virginia, and the surrounding counties. The website provides brief descriptions, phone numbers, and website links for four transit providers and for a carpool/vanpool matching service. Information is also available via a toll-free telephone number.
(www.commuterinformation.com)

"Find a Ride" Website

The online directory to transportation services in the Puget Sound region of Washington includes an interactive search engine that helps a customer find transit services, including demand-response providers that fit the customer's accessibility, eligibility, and trip needs. Another search engine on the site finds agencies that deliver meals, packages, medical supplies, groceries, or other items to customer homes, also based on the customer's eligibility and need for those services.
(www.findaride.org)

Regional Trip Planning (Fixed-Route Transit)

Automated trip planning reduces or removes the rider's need to decipher route maps and timetables and, in the case of a trip involving multiple transit providers, to determine when and where to transfer from one form of transit to another. A regional transit trip planner can be an asset for regions with two or more fixed-route transit providers that share at least one transfer point.

Interactive trip-planning software accepts trip origin and destination inputs from the user (usually in the form of a street address or intersection, or a selection from a list of landmarks) and uses data from the transit information database and from the GIS map to develop an itinerary. The itinerary should specify, in trip order, the following information:

- transit modes/providers,

- route numbers,

- boarding and disembarking locations,

- fares and transfer information, and

- walking instructions that take the rider from the trip origin to the first transit boarding, from one transit "leg" to the next, and from the final transit stop to the trip destination.

For a regional, multi-provider system, the itinerary generated must provide any additional information the rider will need to transfer from one provider or mode to another. Additional features/criteria for trip-planning software may include:

- User-specified constraints or preferences such as:
  - minimum walking distance,
  - minimum travel time,
  - minimum number of transfers,
  - minimum cost, and/or
  - bicycle-accessible routes; and

- Trip route maps with transfers marked.

Data Needs and Agreements

Each transit provider must define the locations (by street address or intersection, or by geographic coordinates) and scheduled times of all route stops. The format of route and schedule data will depend on the trip-planning system being used.

As with a directory database, participating agencies will need a way to update their own service information, including schedule changes. Often the lead agency in the region (or, as in the case of GoogleTransit, the software provider/webhost) will establish the protocols, including the data format, for participating agencies to input updates to the system. Since the usefulness of a regional transit trip-planning system depends on the accuracy of route and schedule information provided, it is advisable to require updates or confirmation of existing data from all participating agencies on an agreed-upon schedule or frequency.

Intercity carriers such as Greyhound (and other intercity buses), Amtrak, and airlines must maintain separate databases and scheduling/reservation systems. To be able to provide customers with these longer-distance transportation options, the regional transit information system can direct customers to the carrier's website for scheduling/reservations or by interfacing with the trip-planning software of the long-distance carrier to access available schedules.

User Interfaces

The web-based interface for travelers/customers will have more interactive features than the interface for a clearinghouse-type website, accepting user inputs as described above. Inputs will be a combination of text entries and menu choices.

To serve customers without internet access or that need additional assistance to plan trips, many trip-planning systems provide a separate interface for transit call-center operators. This interface accesses the same trip-planning software, but it allows the operator additional options and inputs to generate a more complex or specialized itinerary than the customer can construct via the web interface.

Examples

Transtar, Los Angeles

This transit trip planner was one of the earliest systems to allow a transit passenger to plan a full transit trip itinerary using multiple transit providers within a geographic region. The system was first developed in 1988 and custom-programmed to accommodate data from multiple transit providers *(Higgins and Gilliland, 2002).* The system has been updated several times over the years to accommodate advances in computer operating systems.

San Francisco's 511

This web- and telephone-accessible travel information system brings together the separately developed "TravInfo" and "TransitInfo" services, providing extensive information on roadway, rideshare, bicycle, and transit travel in the nine-county San Francisco Bay Area. Transit and other travel information are provided via 511.org's website and the toll-free 511 telephone number. For transit riders, the website offers an online trip planner that provides a personalized itinerary connecting a user-input origin and destination, including transfer locations and instructions from one transit provider to another where necessary. The site also provides real-time train arrival information for the Municipal rail system. The original website, www.transitinfo.org, became part of the Bay Area's 511 website in October 2003.

For transit riders without web access, the 511 telephone service provides route, schedule, and fare information for the 40 transit providers that are part of the system. Callers can also be transferred, toll-free, from the 511 call center to the customer service center of any participating transit provider.

A planned feature of the website is PDA-downloadable 511 information, including trip itineraries.

Find a Ride, Puget Sound Area, Washington

A trip planner, part of the Find a Ride Website described above, provides itineraries using route and schedule information from eight bus, rail, and ferry providers in King, Pierce, and Snohomish Counties.

Google™ Transit Trip Planner

In December 2005, the Internet search engine Google™ announced its own transit trip planner website. As of January, 2009, Google™ Transit Trip Planner includes transit information for around 100 U.S. cities including Austin, Dallas, and Lubbock, Texas. As more transit providers join Google Transit, the potential for multi-provider trip planning may be realized for numerous regions in the United States.

Enhancements to Regional Transit Information Systems

Online Reservations for Demand-Response Transit

In regions that implement centralized trip reservations and scheduling for multiple demand-response transit providers, a web-based interface for human services agencies or transit call centers can permit agency or call center representatives to enter specific trip requests for their clients. If trip reservations/scheduling are not centralized, a "one-stop" telephone number for customers is still possible; the Rider's Choice information system described below provides an example of centralized information services without centralized scheduling.

Suburban Mobility Authority for Regional Transportation (SMART)

Michigan's SMART system uses an Internet-accessible real-time demand-response scheduling system. The system is accessible by local social service agencies and other community partners, who can schedule rides for their clients on SMART *(Ripplinger and Peterson, 2005)*.

Rider's Choice

The Regional Transportation Program in Cumberland County, Maine, operates the Rider's Choice telephone information system, which provides centralized information for the transit services that operate in the county. RTP is itself a transit provider, serving the elderly, passengers with disabilities, social service agency clients, and economically disadvantaged passengers. Rider's Choice originated in response to RTP's need to provide 24-hour, 365-day service availability for clients of the state's Department of Mental Health. Direct phone connections to the other transit providers in the area allowed the RTP to serve that need at a feasible cost.

Callers to Rider's Choice speak to an RTP operator, who will provide information on RTP's services, arrange for an RTP-provided trip if applicable, or connect the caller to

the transit provider(s) in the county that can serve the caller's travel needs *(KFH Group, Inc.)*.

Real-Time Transit Information

One possible application of automatic vehicle location technologies is providing real-time transit vehicle locations to customers. For demand-response transit systems, this information can be provided by telephone from the transit provider's customer service center to an individual rider, either on request or as an automated notification prior to pick-up. For fixed-route transit systems, real-time vehicle locations can be translated to expected arrival times at a transit stop and posted to an electronic message sign at the stop and/or provided online. San Francisco's 511 system, mentioned above, uses AVL to provide real-time arrival information for its Municipal rail system.

Puget Sound Mobile Data Communications Project

This demonstration project tested an AVL system that included bus and rail vehicles from multiple transit agencies in the Puget Sound region of Washington. The system used a combination of GPS-based and dead-reckoning AVL technologies, and provided real-time location data to Busview, a web-based display accessible by transit agencies and the general public *(Sound Transit Research and Technology)*.

Additional Resources

The following publications and websites offer further guidance on regional transit information coordination, systems, and/or technologies.

"ITS Decision: A Guide to Understanding and Applying Intelligent Transportation Systems." This website, maintained by California Center for Innovative Transportation at the University of California at Berkeley, provides information and case studies about ITS systems, including some of the technologies specifically suitable to transit. The website is located at http://www.calccit.org/itsdecision/.

The Federal Transit Administration's *Advanced Public Transportation System State of the Art* report provides information on new and emerging technologies and trends in transit-related ITS systems. The latest version of the report was published in 2006, and is available at http://www.fta.dot.gov/documents/APTS_State_of_the_Art.pdf.

Guidebook for Selecting Appropriate Technology Systems for Small Urban and Rural Public Transportation Operators. TCRP Report 76, Transportation Research Board, Washington, D.C., 2002. Download available at http://onlinepubs.trb.org/onlinepubs/tcrp/tcrp_rpt_76.pdf .

ITS Transit Case Studies: Making a Case for Coordination of Community Transportation Services Using ITS, by David Ripplinger and Del Petersen, Small Urban & Rural Transit Center, Upper Great Plains Transportation Institute, North Dakota State University.

Publication Number FTA-ND-26-7010-05-1, September 2005. Download available at http://www.ugpti.org/pubs/html/dp-171/index.php.

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Higgins, L., and Gilliland, C. *One-Stop Transit Information: Guidelines for Development of Regional Transit Information Systems in Texas.* FHWA/TX-03/4233-1, Texas Transportation Institute, The Texas A&M University System, College Station, Texas, 2002.

KFH Group, Incorporated. *Guidebook for Change and Innovation in Rural and Small Urban Transit Systems.* TCRP Report 70, Transportation Research Board, Washington, D.C., 2001, p. II-58. http://onlinepubs.trb.org/onlinepubs/tcrp/tcrp_rpt_70c.pdf, downloaded November 2005 .

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Transystems Corporation, et al. *Strategies to Increase Coordination of Transportation Services for the Transportation Disadvantaged.* TCRP Report 105, Transportation Research Board, Washington, D.C., 2004, downloaded November 2005.

Chapter 3 Evaluation — Providing Transit Information

Coordinating Information – Involve as many providers and stakeholders as possible. Consider how coordinated transit information could best be used for the region, keeping in mind the requirements for data collection and maintenance.

- Who are the individuals and agencies in your region that should be included in the planning process for a regional transit information system?

- Which agencies have the resources to maintain/manage the resulting system?

- What are some potential regional goals for a regional transit information system? What would be your agency's goals regarding regional transit information?

- Who might be the end users of a regional transit information system in your area?

- What other coordination activities (e.g., coordinated schedules, transfer points, service consolidation) are planned that could influence or be influenced by coordinated transit information?

- What types of transit information would be the most important for your agency and its customers to access?

- What arrangements will be needed among the participating providers/agencies to collect, maintain, and update the information? Is the required information fairly static (e.g., directory information), or will it need regular updates (e.g., routes and schedules)?

Selecting Technologies – Consider how the information will be stored, communicated, and incorporated into transit operations. If technology is purchased, it should be compatible with other existing or planned systems.

- Has an overall ITS architecture been developed for your area? (In Texas, check http://www.consystec.com/texas/default.htm.)

- Does it include an architecture describing the provision of transit information?
  - For the region (multiple providers)
  - For individual transit provider(s)

- What technologies are already in use by transit providers in the region?
  - Spreadsheets and databases
  - Internet connections/browsers
  - GIS maps
  - Fixed-route scheduling software
  - Demand-response scheduling/dispatch software
  - Automatic vehicle location
  - Communication technologies: radios, cell phones, mobile data computers (MDCs)
  - Other (specify)

Assessment of my region — rate the following on a scale of 1 to 5:

1) Agencies in the region have expressed willingness to provide their information to a regional directory or database.

1	2	3	4	5

Strongly disagree ....Strongly agree

2) At least one agency in the region has the resources to collect, organize, and maintain data from other transit providers.

1	2	3	4	5

Strongly disagree ....Strongly agree

3) Agencies in the region have access to the Internet.

1	2	3	4	5

Strongly disagree ....Strongly agree

4) Agreements are in place to collect and update data from transit providers.

1	2	3	4	5

Strongly disagree ....Strongly agree

5) (For automated transit trip-planning capability) Two or more fixed-route transit services in the region share one or more stops/transfer points.

1	2	3	4	5

Strongly disagree ....Strongly agree

Chapter 4. Specialized Transportation: Demand-Responsive, Paratransit Complement to Fixed-Route Service and Client Transportation

By the year 2025, the number of Americans aged 65 and older will expand from 35 million to more than 65 million. According to the United States Census Bureau, more than 21 percent of Americans 65 and older do not drive. Also, individuals in this age group are twice as likely to have a disability as those aged 16 to 65. If this figure remains unchanged, the number of people with disabilities living in the United States will grow to 24 million over the course of the next 20 years *(Tucker, 2005).*

Moreover, it is anticipated that a significant portion of this same population will live outside the boundaries of traditional public transportation providers and will more than likely need to rely on a number of client-based agencies for service to medical appointments. Demand-responsive transportation is currently recognized as a critical "enabler" of access to non-emergency medical care.

Consideration of these types of services is essential to any effort to coordinate public transportation resources on a regional or local basis. This chapter describes these types of services and features a trip modeling tool that has been developed for analysis of one of these service types.

Specialized Transportation

Demand-Responsive Services

Demand-responsive services are transit services in which individual passengers can request transportation from one specific location to another specific location at a certain time. These services do not follow a fixed-route, but rather, travel throughout the community transporting passengers according to their specific requests. These services often include passenger assistance between the vehicle and the door of his/her home and similar passenger assistance upon reaching the destination. Alternately, curb-to-curb service may be provided.

This type of service is the dominant mode offered by providers of rural public transportation in Texas and it is also provided by many small urban transit systems in the state.

Complementary Paratransit Services

Paratransit service is a specific kind of demand-response service. Paratransit service must be provided within ¾ of a mile of any fixed-route service as stipulated by the Americans with Disabilities Act (ADA). This service provides those with qualifying mobility impairments an alternative to fixed-route service should the impairment prevent an individual from reaching the bus stop.

Because of the high cost of providing paratransit service, many public transportation systems have implemented public information and passenger training campaigns designed to encourage paratransit riders to consider using the fixed-route system and to teach these riders how to navigate the fixed-route system.

Client Transportation

There are several agencies under the Texas Health and Human Services Commission umbrella that expend program funds on transportation for their clients. A large portion of these program expenditures is used to directly purchase rides from metropolitan transportation authorities, rural and small urban transportation providers, and taxis. Another significant portion is allocated to local governmental agencies, some of whom are listed in chapter two as essential members of a broad coalition of local stakeholders. These agencies may purchase rides for their clients or provide the transportation services themselves. A third category of expenditure comes in the form of reimbursements in rate-based programs such as skilled nursing facilities, intermediate care facilities, and day activity habilitation services. In these rate-based programs, transportation is an eligible expense that the contractor provides if it is needed by the person receiving services. The service provider must make a business decision on whether to perform client transportation or to contract with a transportation provider for those services *(Texas Health and Human Services Commission, 2002).*

The Elderly Persons and Persons with Disabilities Transportation (E/PwD) Program

The Federal Transit Administration's Elderly Persons and Persons with Disabilities Transportation (E/PwD) program (Section 5310) provides funding for public transportation services to elderly persons and persons with disabilities. While funding is available to a wide range of program applicants, the program has traditionally funded mostly non-profit, community-based programs designed to respond to the needs of specific types of clients, such as those served by nutrition programs, adult day care programs, and other programs that provide for special needs.

The program's goals and objectives promote the development and maintenance of a transportation network for elderly persons and persons with disabilities. This network should be achieved through local stakeholder participation in the selection, planning, and development of eligible projects.

The transportation funding bill, the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users, enacted in 2005, calls for state DOTs to undertake activities to ensure that maximum feasible coordination of transportation programs occurs to optimize Federal grant awards. The state and regional transportation planning process contributes to the goals and objectives of SAFETEA-LU through the development and implementation of the following elements:

- Local Development;

- Comprehensiveness;

- Inclusion of public, private and nonprofit, workforce, human services and public transportation agencies, advocacy groups, passengers, and the general public;

- Identification of needs, including gaps in service, and ways to address them; and

- Sufficient transparency to support cross-jurisdictional project selection processes as needed.

Annually, each district of the Texas Department of Transportation develops a program of projects (POP) that lists the projects selected for funding in a particular fiscal year. The POP:

- indicates whether the proposed subrecipient is a public entity, private nonprofit agency or Indian tribal organization;

- designates whether the project serves urbanized and/or nonurbanized populations;

- identifies the headquarters city of the subrecipient;

- lists specific counties that will benefit from the award of the funds; and

- includes a budget of eligible expenses that will be expended on the project.

Program funds must be used only for the provision of transportation services for the elderly and persons with disabilities. Examples of eligible capital expenses may include, but are not limited to:

- vehicles;

- radios and communication equipment;

- wheelchair lifts and restraints;

- computer hardware and software;

- acquisition of transportation services or mobility management under a contract, lease, or other arrangement (treated as capital); and

- installation costs associated with other eligible expenses.

The following capital expenses are eligible if specific approval is provided by the Texas Department of Transportation:

- vehicle shelters;

- extended warranties that exceed industry standards;

- lease of equipment, provided that the lease is determined to be more cost-effective than the purchase of the equipment per 49 CFR Part 639;

- intelligent transportation systems; and

- new technology *(Texas Department of Transportation, 2006)*.

Medicaid Medical Transportation in the State of Texas

The state of Texas is obligated to provide medical assistance on behalf of needy individuals and to obtain all benefits for such persons authorized under the Social Security Act and other federal legislation. By providing a means of transportation so eligible individuals can make their medical appointments, Texas is fulfilling its obligation to its citizens.

More specifically, Texas' medical transportation program (MTP) is a Title XIX entitlement program. The program arranges non-emergency transportation services to and from health care providers for persons enrolled in Medicaid, Children with Special Health Care Needs (CSHCN), and Transportation for Indigent Cancer Patients (TICP) who have no other means of transportation to access these providers. Additionally, MTP coordinates and arranges transportation-related services with transportation contractors. These contractors provide fixed-route, demand-responsive, and paratransit transportation services for eligible clients needing access to various medical facilities internal and/or external to their community.

Enabling Technology for Basic Spatial Analysis of Texas' Medical Transportation Program

An integrated web-based, geographic information system was developed to better understand:

- the relative proximity of eligible MTP clients to public transit services;

- the relative proximity of medical facilities to public transit services;

- volumes of origin/destination trips; and

- any obvious gaps in transit service.

This information may be used by planners to modify or improve transit routes or develop new services through the use of transit coordination strategies.

This version of the system, designed primarily to describe MTP trips that are inter-regional in nature, is built using MTP trip data obtained from the Texas Electronic Journal of Authorized Services (TEJAS) program that was purged of client names and street addresses. Origin and destination zip codes along with other trip information are used to support spatial and trip purpose analysis. In addition to inter-regional trip analysis, because of the relatively small size of zip code areas, very localized trip analysis may also be performed using the system, as described in the following section.

Enabling technologies developed over the past few years have created unprecedented opportunities to address complex problems facing the transportation community. According to Ziliaskopoulos and Waller *(2000)*, these technologies include the

explosion of the Internet and Internet support tools, terabyte size databases, distributed computing architectures, client server technologies as well as a new generation of transportation tools resulting from the evolution of Intelligent Transportation Systems. Internet-enabled GIS has also attracted a lot of attention in the last few years. Jankowski and Stasik *(1997)* introduced an Internet-based GIS to make possible collaborative spatial decision making via public transportation, and Keisler and Sundell *(1997)* presented an integrated geographic multi-attribute utility system with application to park planning. While many of these technologies have already been adopted and have led to the development of newer models, the opportunity and need have never been greater to continue forging a linkage between all those responsible for implementing and meeting the challenge of guaranteeing access to public transportation services for those needing to obtain medical care.

A demonstration of an integrated web-based GIS system to assess the public transit options of MTP clients is hosted by Prairie View A&M University at the URL http://mtp.pvamu.edu. Any users with an approved account can access the system (see Figure 4.1) by entering http://mtp.pvamu.edu into a web browser.

Figure 4.1. PVAMU GIS MTP System Welcome Screen.

As shown in Figure 4.2, the MTP system architecture displays the components associated with MTP.PVAMU.EDU. Figure 4.3 shows a typical scenario of the data flow in the system. A user interactively builds his/her query expression, which is sent to the MTP web server over the Internet. Upon receiving a user's request, the web server accesses the MTP database to fetch the query results, which are sent to user in text (table) format. These query results are also sent to the GIS server to dynamically

generate a GIS map image (for visualizing the query results), which is in turn transmitted to the user through the web server.
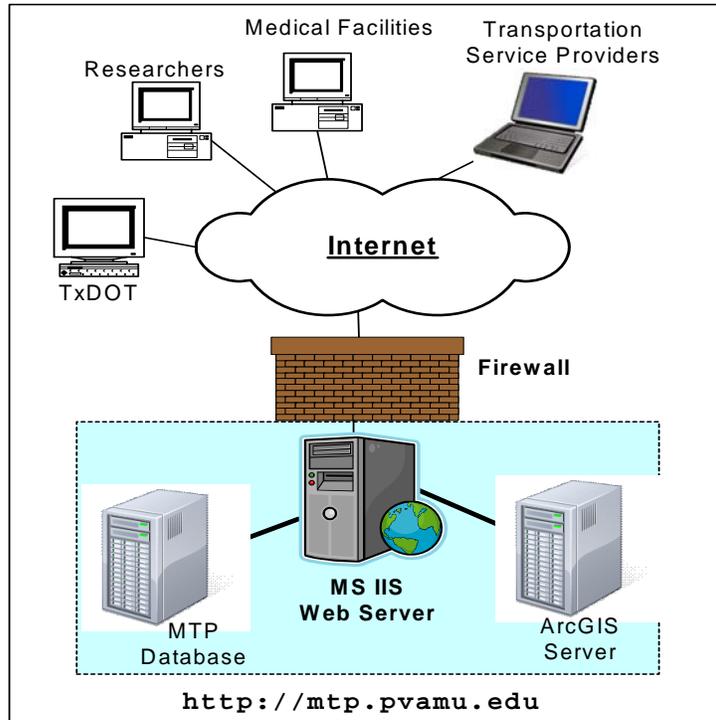
Figure 4.2. MTP System Architecture.
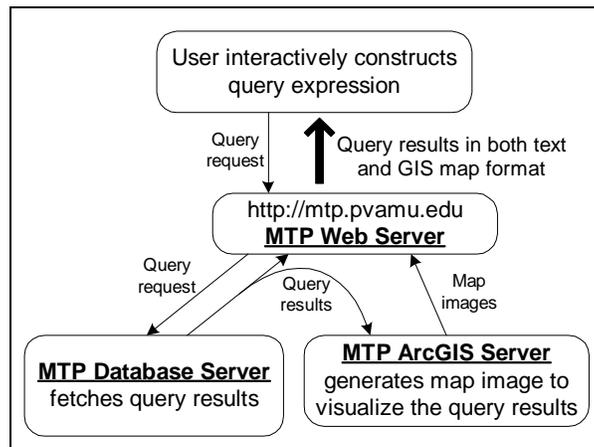
Figure 4.3. Scenario of Data Flow.

Application of Enabling Technology for Basic Spatial Analysis of Texas' Medical Transportation Program

The MTP system is a hybrid of GIS visualization, database, and web application. It typically shows how to maintain and query data, and graphically visualizes the data in a GIS format. In this section, a few examples are provided for the Waco, Texas, study area.

Figure 4.4 is a snapshot showing all the medical facilities (crosses), transit agencies (labeled), zip codes, and the street map of the Waco area. The data on Waco medical facilities and transit agencies were collected and stored in the MTP database system, and the street map and zip code information are stored in the MTP GIS database. Based on the query submitted, this image is dynamically generated by the MTP system after querying the databases. Figure 4.5 shows all Waco's bus routes.
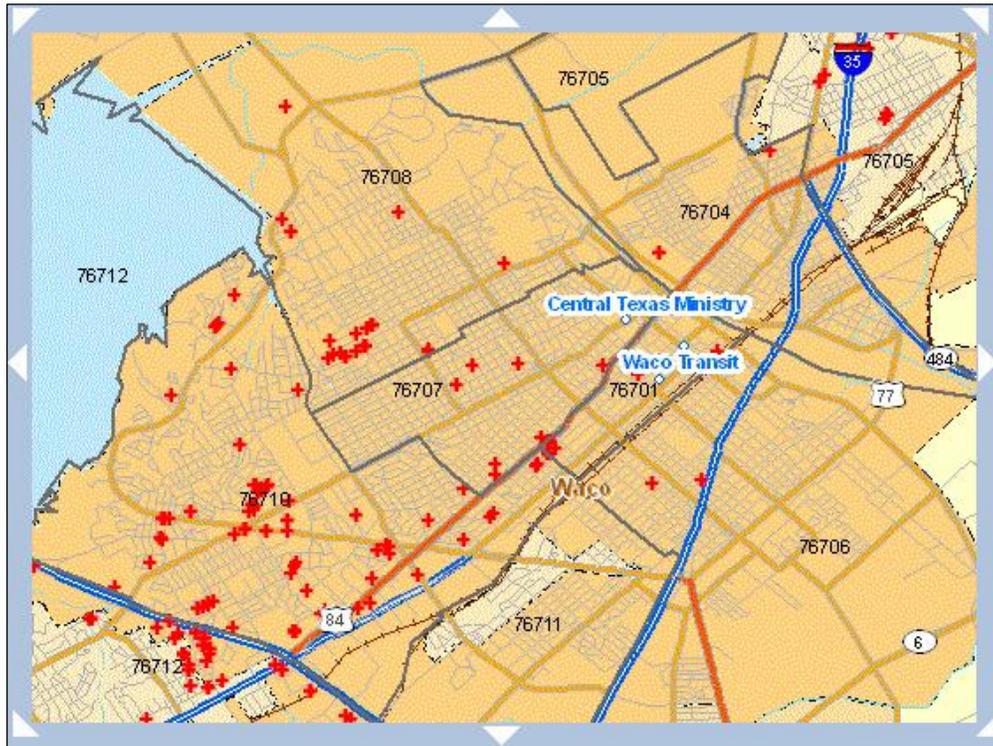
Figure 4.4. Locations of Medical Facilities and Transit Agencies.
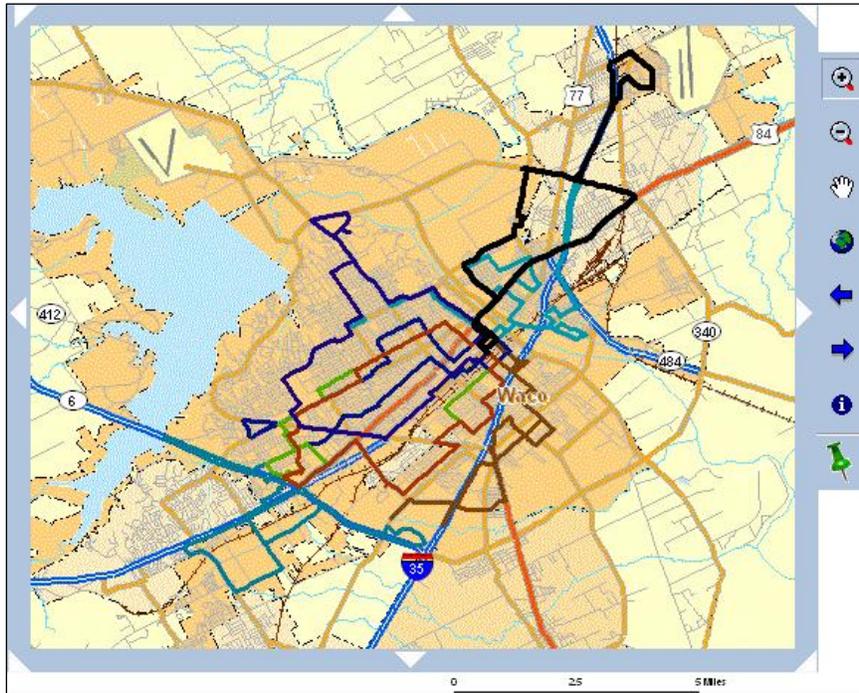
Figure 4.5. Bus Routes in Waco Area.

Figure 4.6 illustrates the steps for finding and visualizing all the medical transportation activities originated from zip code 76701 with trip expenses greater or equal to $50 dollars. The query logic is built interactively and then submitted. The related information is extracted and displayed to the user.

Figure 4.6. Interactively Built Query.

The result is presented as a table (see Figure 4.7). Finally, the results are mapped in the GIS system (see Figure 4.8). The tree structure at the left side of the map allows users to display or hide specific information in order to prevent the map from becoming too crowded. The MTP system also allows users to save queries so that they can reload them in the future for re-examination purpose.

Figure 4.7. Query Results Shown in Text Format.
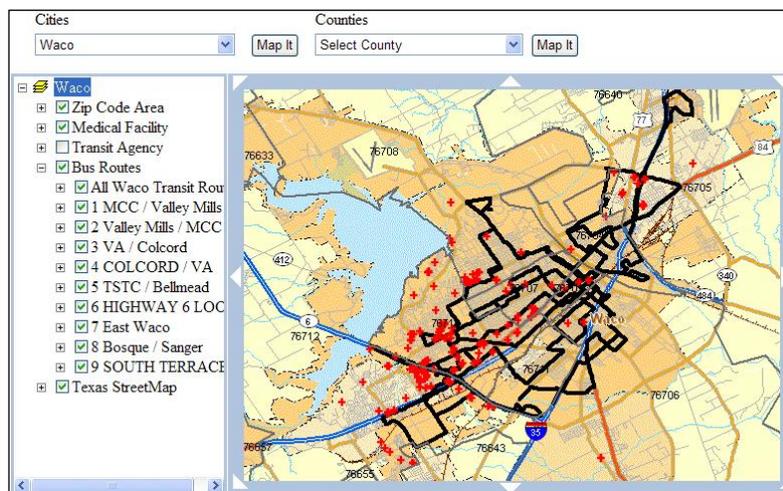
Figure 4.8. Map of Results.

This system is secure and user friendly. Users are capable of entering a simple or complex query using the current interface, and advanced queries may be performed by those who have some knowledge of the data structure. The system provides a powerful tool for planners interested in assessing the degree to which public transportation services may be effectively used to respond to the needs of MTP clients.

Chapter References

Jankowski, P., and Stasik, M. "*Design Considerations for Space and Time Distributed Collaborative Spatial Decision Making.*" Journal of Geographic Information and Decision Analysis 1 (1), pp. 1-8, 1997.

Keisler, J., and Sundell, R. "*Combining Multi-Attribute Utility and Geographic Information for Boundary Decisions: An Application to Park Planning.*" Journal of Geographic Information and Decision Analysis 1 (2), pp. 101-118, 1997.

Texas Department of Transportation. *Public Transportation Grants Management Manual, Elderly Persons and Persons with Disabilities Program (Section 5310),* July 1, 2006.

Texas Health and Human Services Commission. *Health and Human Services Transportation Biennial Report & Health and Human Services Transportation Coordination Plan Fiscal Years 2003-2008.* Office of Community Transportation Services, Austin, Texas, September 1, 2002.

Tucker, P. "*Mobility for Tomorrow's Seniors: Public Transit Must Plan Now to Meet the Needs of an Aging Population.*" The Futurist, November-December, 2005.

Ziliaskopoulos, A., and Waller, S. "An Internet-based Geographic Informational System that Integrates Data, Models and Users for Transportation Applications." Transportation Research Part C 8, pp. 427-444, 2000.

Chapter 4 Evaluation – Specialized Transportation: Demand-Responsive, Paratransit Complement to Fixed-Route Service, and Client Transportation

GIS-based MTP Website/System Access

- Can you easily access the Website/System hosted by Prairie View A&M University at URL address http://mtp.pvamu.edu? {Figure 4.1}
- Can you apply for an account, log on to the system, and change your password?

Mapping

- Can you identify zip code boundaries, highways and street roads, city names, medical facilities, and transportation service providers {Figure 4.4}?
- Can you select a city or a county and map it?
- Can you locate/display medical facilities & transit agencies in a study area?
- Can you manipulate the map with the map menu and the tree-structured feature lists?
- Can you easily map medical facilities, transportation service providers, and patients' locations on the map?
- Can you identify bus routes on the map in a selected area {Figure 4.5}?

Query and Mapping

- Can you interactively build a query logic expression and submit it to the system to extract the information you are seeking? (The query result should be displayed as a table and also geographically shown on the map {Figures 4.6, 4.7, and 4.8})
- Does the system execute the query and show the results in a table and on a map?
- Can you save & recall query logic expressions & export query data to external files?
- Can you easily manipulate the map with the tree-structured items at the left panel (turn features on/off, get detailed information behind the facility/location dot on the map, and perform typical e-map operations: navigation, zooming in/out, etc.)?

Assessment of Mobility Options

- Can you use spatial inquiry to assess access to public transportation services?

- Does the system provide you with a tool for understanding specific dimensions of integrating and coordinating options for MTP services relative to policy, planning, and service development?

- Can you use results from the spatial inquiry to classify accessibility to public transit service for MTP clients into four cases: (1) both client origins and destinations are covered by public transit service; (2) client origins are covered by public transit service, but destinations are not; (3) client destinations are covered by public transit service, but origins are not; and (4) both client origins and destinations are uncovered?

Assessment of my region — rate the following on a scale of 1 to 5:

1) I understand how specialized transit services could influence strategies for transit coordination.
   1   2   3   4   5
   Strongly disagree ....Strongly agree

2) I know the conditions that require the provision of paratransit services.
   1   2   3   4   5
   Strongly disagree ....Strongly agree

3) I can identify a method to reduce the number of paratransit trips made on certain public transportation systems.
   1   2   3   4   5
   Strongly disagree ....Strongly agree

4) I can describe the various methods used to administer client service program funds.
   1   2   3   4   5
   Strongly disagree ....Strongly agree

5) I can describe the role of the Texas Department of Transportation district office in the development of projects funded by the Elderly Persons and Persons with Disabilities (E/PwD) Program.
   1   2   3   4   5
   Strongly disagree ....Strongly agree

6) I can identify several types of projects that are eligible for funding under the (E/PwD) Program.
   1   2   3   4   5
   Strongly disagree ....Strongly agree

Chapter 5. Regional Intercity Travel Demand Estimation Methods

The Texas Department of Transportation funded the development of coordinated transportation plans for 24 different regions in Texas as defined by the 24 council of government boundaries (http://www.regionalserviceplanning.org). By the end of 2006, the first set of the coordinated public transportation service plans had been proposed. The goal of this chapter is to develop a method for estimating intercity travel demand in a region that serves as the basis for developing the coordinated public transportation service plans in Texas. To achieve this goal, four representative plans were selected (Alamo Area, Capitol Area, the Panhandle Region, and the West Central Texas Region) from the 24 plans. The methods for estimating regional (intercity) travel demand used in these four plans were examined and compared to the methodology described in the TxDOT technical report 0-5345 R2 (Zhan and Chen, 2006). A synthesized method for estimating regional intercity travel demand based on a review of the methods documented in the four plans and the report mentioned above is provided.

This chapter surveys various methodologies for estimating journey-to-work related travel demand in regions with several counties. Census data are applied to a censual year for travel demand analysis, and no attempt is made to discuss methods for estimating travel demand in inter-censual years. It should also be stated that this chapter is not about developing methods for estimating statewide intercity travel demand, but rather, it describes methods to estimate travel demand on specific intercity corridors and cites demand estimation methodologies employed in the regional transit service planning process in Texas. Readers who are interested in statewide travel demand analysis may refer to a report available through the Federal Highway Administration (FHWA, 1999).

Review of Demand Analysis in Four Texas Regional Plans

As stated earlier, four representative plans (Alamo Area, Capitol Area, Panhandle, and West Central Texas) from the 24 coordinated public transportation service plans were selected for a review to develop methods presented in this chapter. The reason for choosing those four plans is that three of the four plans were prepared by the three consulting firms contracted by TxDOT to develop the plans. The three firms are A&R Consulting for the West Central Texas Region, Goodman Corporation for the Panhandle Region and KFH Group, Incorporated for the Alamo Area. The Capitol Area plan was finished by the Capitol Area Regional Transit Coordination Committee (RTCC). Each of the four plans is briefly reviewed in this section.

The Alamo Area Regional Public Transportation Coordination Study

The KFH Group performed this study in association with Cambridge Systematics and prepared a report about this study (KFH Group, 2006). The study accomplished three tasks:

- a review of existing transit services in the 12-county Alamo Area;
- an examination of travel patterns at the county level based on demographic and land use data in the area; and
- a proposed transportation coordination plan and suggested service alternatives.

The second task is directly related to the materials discussed in this chapter. In determining travel patterns in the area, the study used journey-to-work data from the census to reveal trip origins (home locations) and destinations (work locations).

In addition to the journey-to-work data, the study used land use data (shopping centers, schools, and medical facilities) and other data obtained through outreach efforts (e.g., stakeholder focus groups and meetings) to supplement the analysis. In terms of geographic scale, all results documented in the final report are travel patterns aggregated at the county level.

The Capitol Area Public Transportation Coordination Study

This study was finished by the Capitol Area formed by the Regional Transit Coordination Committee that consisted of 25 agencies and organizations involved in some aspects of public transportation in the Capitol Area. The study reviewed the public transportation planning and coordination practices in the Capitol Area, defined goals of coordinated transportation plans, identified opportunities as well as barriers for a coordinated transportation plan, and suggested a list of 19 action items toward a coordinated transportation plan (Capitol Area Regional Transit Coordination Committee, 2006). This study, however, made no attempt to estimate the exact intercity travel demand in the Capitol Area.

The Panhandle Region Public Transportation Coordination Study

The Panhandle study report was prepared by the Goodman Corporation. This study reviewed the geography, demographics, transit planning partners, and coordinated service planning processes in the region. In addition, the study identified transit gaps and overlaps and discussed strategies to fill these gaps and reduce the overlaps in the region. Furthermore, the study discussed the barriers and constraints for a more coordinated transportation plan for the region. A set of action plans was also proposed.

In the area of travel demand analysis, the study suggested a Transit Need Index for the Panhandle. In determining the Transit Need Index for each county, the study used eight demographic variables to gauge the need for transit service for a population in a county. The eight variables are:

- household income,
- age,
- auto availability,
- education attainment,
- minority status,
- immigrant status, and
- whether a person is mobility-impaired or
- work-impaired.

Each of the 26 counties within the Panhandle was assigned a score for each of the eight variables. The average or median score of a variable among all counties was used as the region's relative scale. A composite score for each county was created by summing up all scores across all variables. The composite score was then weighted by the number of households in a county to determine the Transit Need Index for the county. A higher index value indicates a greater need for transit service. Similar to the Capitol Area study, the Panhandle Region study made no attempt to estimate travel demand among different areas in the Panhandle Region.

The West Central Texas Public Transportation Coordination Study

This study was performed by a team consisting of A&R Consulting and the Goodman Corporation. A&R Consulting prepared the study report. In addition to reviewing the general geographic and demographic characteristics in the 19 counties in this region, the study examined the existing coordination among different transit providers in the region. It identified transportation gaps, barriers and constraints for coordinated transportation in the region, and made recommendations about how to develop a better coordinated public transportation plan.

The study also used Transit Need Index to evaluate the need for public transportation in the region. The study used five demographic indicators to gauge transit need in each of the 19 counties. The five indicators are:
- percentage of household without an automobile,
- median household income,
- percentage persons with a disability,
- percentage of households below poverty line, and
- percentage persons over age 65.

Based on the value of an indicator in a county, a county is assigned a score for that indicator. A higher score indicates a greater need for transit service. A composite score can be obtained for each county by summing up the score across the five indicators. The report about this study did not document a method that can be used to estimate travel demand between different areas in the region.

The TxDOT Project 0-5345 R2 Report

As part of the research efforts in a separate project titled "Regional Public Transportation Solutions for Intercity Commuting Problems" (Project 0-5345) funded by TxDOT, a research team at the Texas Center for Geographic Information Science at Texas State University-San Marcos (Texas State) developed a method for estimating journey-to-work travel demand at the Traffic Analysis Zone (TAZ) level using census data (Zhan and Chen, 2006). The team developed GIS-based methods to analyze the 2000 Census Transportation Planning Package (CTPP) Part 3 Journey–to-Work data. The team used the methods to identify commuting patterns between rural communities and urban areas as well as commuting flows between different counties (cities) in a five-county study area in Central Texas. In addition, the team developed a GIS-based network analysis model for identifying commute routes between different origins and destinations.

The methods can be used to accomplish several tasks in estimating journey-to-work related travel demand in a region on a fine geographic scale. These tasks include:

- the determination of the geographic distribution of journey-to-work trip origins based on place of residence (home location),
- the geographic distribution of trip destinations based on place of work (office location), and
- the commute traffic flows between different geographic areas.

Summary of the Review

The review of the four coordinated public transportation plans and the Project 0-5345 R2 report leads us to suggest a method that can be used to estimate travel demand in a region. This method consists of three components. The first component of the method is the determination of Transit Need Index for geographic area units on a chosen geographic scale (e.g., census tract or block groups) that represents the need for transit service in the geographic areas. The second component is the set of procedures described in the Project 0-5345 R2 report that can be used to estimate journey-to-work related travel demand on a geographic scale at the sub-county level. The third component is a set of analysis procedures that use the locations of attractions (land use data) to estimate non-work (e.g., shopping) related travel demand. This method will be discussed in detail in the next section.

A Method for Estimating Regional Intercity Travel Demand

The method suggested above includes two specific data sources, a set of data preparation steps, and a set of estimation procedures. These are discussed in detail in this section.

Data Sources

Two datasets are necessary for the analyses described in this chapter. These two datasets are: (1) The Census Transportation Planning Package (CTPP) Part 3 Journey–to-Work Data (Bureau of Transportation Statistics, 2000); and (2) the GIS Map Layers of Census Traffic Analysis Zones. Traffic analysis zones are defined by state and regional transportation agencies and are specifically used for traffic analysis. A TAZ consists of one or more Census Bureau designated area units (i.e., block groups or census tracts). CTPP is the only dataset that provides information about journey-to-work at the TAZ level.

CTPP Part 3 Journey-to-Work data.

The CTPP Part 3 data consist of a set of tables containing journey-to-work characteristics aggregated at different geographic area units, including state and county level data, as well as data at the level of TAZs. Each table in the CTPP Part 3 database provides data on a unique variable describing some characteristics of commute trips from home to work in a TAZ. These characteristics include the total number of workers, the socioeconomic characteristics of workers, travel modes, and the average travel time for a given pair of origin and destination. Data from three CTPP Part 3 data tables—Table 001, Table 008, and Table 0010—at the TAZ level are needed for the analyses described in this chapter.

Table 001 of the CTPP Part 3 data gives information about the number of workers for each unique pair of home TAZ and workplace TAZ. Table 008 contains information about workers' average travel time from home to work for different transportation modes at different time periods of a day. Table 0010 provides aggregated information about the number of vehicles leaving home for work at different time periods. Table 5.1 summarizes the different transportation modes and time periods for which data are available in the CTPP Part 3 data tables.

GIS Map Layers of Census Traffic Analysis Zones

The GIS Map Layers of Census Traffic Analysis Zones are mainly used for visualizing data and analysis results. One may download the Census TAZ shapefiles for a study area from the Geography Network Website (www.geographynetwork.com). A shapefile is a specific format of storing a GIS map layer in a computer (ESRI 1998).

Data Preparation

Data Preparation related to TAZ Shapefiles

Shapefiles downloaded from the Geography Network Website are for individual counties only, thus, it is necessary to merge them together to obtain a GIS map layer covering the study area. In addition, in order to link the TAZs in the CTPP Part 3 data tables with their corresponding TAZs in the GIS map layer, it is necessary to create a common identifier for each TAZ in both the tables and the GIS map layer. An analyst

can use the steps described below to merge the shapefiles and link the tables with the map layer.

- Use the merge tool in ArcGIS to merge the TAZ shapefiles of each county in the study area into a single shapefile.

- Project the merged shapefile using the 'North_America_Lambert_Conformal_Conic' projection using the projection tool in ArcGIS.

- Create an ID field named "stfid" in the feature attribute table of the projected TAZ shapefile.

- Assign IDs to "stfid" for each TAZ using "county+taz", i.e., combining the values of two existing fields in the feature attribute table to create the IDs for all TAZs. This task can be accomplished using the 'Calculate' command in ArcGIS.

Data Preparation Related to the CTPP Part 3 Tables

An analyst can use the seven-step procedure stated below to prepare data from the CTPP Part 3 data tables for subsequent analyses with respect to workers' home locations.

1) Extract data associated with home locations from the CTTP Part 3 tables—Table 001, Table 008, and Table 0010—within the study area and save the data into new tables.
2) Create an ID field named "stfid_res" in each of the new tables.
3) Assign/Calculate the value of "stfid_res" for each record as "residence state+residence county+residence TAZ." (Note: These attributes are named as "state3," "county," and "detresgeo" in the Tables.)
4) For each new table, aggregate the records based on "stfid_res" for each TAZ using the 'summarize' function in ArcGIS and save the results in another new table as follows;
   - For data from Table 001, summarize the total number of workers for each home TAZ; the new table can be named as—summarized Table 001;
   - For data from Table 008, summarize the average travel time for each transportation mode (Table 1) for every home TAZ; the new table can be named as—summarized Table 008;
   - For data from Table 0010, summarize the total number of vehicles leaving in each time period (Table 5.1) for every home TAZ; the new table can be named as—summarized Table 0010.
5) Join summarized Table 001 to the TAZ shapefile using field "stfid_res" in summarized Table 001 and field "stfid" in the TAZ shapefile obtained in the previous steps as the 'common key.'
6) Export the TAZ shapefile with the joined attributes from summarized Table 001 to create a new shapefile; now the analyst would have a shapefile containing information about the number of workers in each TAZ.
7) Repeat Steps 5 and 6 to perform similar operations for summarized Tables 008 and 0010; the analyst obtain another two shapefiles containing information about the average travel times corresponding to different transportation modes and the number of vehicles leaving home for work in each time period.

An analyst can use a similar procedure as described above to process the data from the CTPP Part 3 data tables for analyses based on workers' office locations. There are, however, some differences in the procedure as stated below.

1) Extract data based on workplace (rather than home location).
2) Create a unique ID, "stfid_wp," based on workplace.
3) Calculate "stfid_wp" as "workplace state+workplace county+workplace TAZ." (These attributes are defined as "qpowst," "qpowco," and "detworkgeo" in the tables.)
4) Summarize the statistics based on "stfid_wp," and link the data with those in the merged TAZ shapefile using "stfid_wp" in the summarized tables and "stfid" in the TAZ shapefile as the "common key" for linking.

Estimation Procedures

Transit Need Index

A Transit Need Index can be computed for a geographic area at either the census tract or census block group level based on a number of demographic indicators and a score assigned to each of the indicators in a given area. Five indicators are used in the Central Texas Region plan:

- percentage of households without an automobile,

- median household income,

- percentage persons with a disability,

- percentage of households below the poverty line, and

- percentage persons over age 65.

An analyst may use the five-step procedure outlined below as a general guideline to calculate the Transit Need Index for each block group in every county in a given region.

1) Obtain the demographic data for each block group based on the most recent data from the census or a data provider.
2) Compute the value associated with each of the five demographic indicators for each block group in the area in question.
3) Assign a score to each indicator in each block group based on a given scale (e.g., 1-5).
4) Compute the sum of the scores for all five indicators for every block group.
5) Use the sum associated with each block group as determined in Step 4 above as the Transit Need Index representing the need for transit service in a block group.

Geographic Distribution of Trip Origins and Destinations

Based on the prepared data using the steps described above, an analyst can easily calculate the number of workers in each TAZ based on their home and work locations, the number of vehicles leaving home or arriving at work in each TAZ, and the average

commute time for workers leaving a TAZ and arriving at another TAZ. Procedures related to these calculations are summarized in Table 5.1.

Table 5.1. Summary of Methods for Examining the Geographic Distribution of Journey-to-Work Trips and Their Origins and Destinations.

Estimated Values in a TAZ	Estimation based on home locations	Estimation based on work locations
Number of workers	Calculate the number of workers in each TAZ where workers' homes are located.	Calculate the number of workers in each TAZ where workers' offices are located.
TAZs with the largest number of workers	Determine the TAZs with the largest number of workers whose homes are in the TAZs; this task can be easily accomplished by sorting the number of workers in each TAZ where workers' homes are located.	Determine the TAZs with the largest number of workers whose offices are in the TAZs; this task can be easily accomplished by sorting the number of workers in each TAZ where workers' offices are located.
Number of vehicles	Calculate the number of vehicles leaving home for work in each TAZ where their homes are located.	Calculate the number of vehicles arriving at their offices from home in each TAZ where their offices are located.
Average commuting time	Determine the average commuting time of journey-to-work in each TAZ where workers' homes are located.	Determine the average commuting time of journey-to-work in each TAZ where workers' offices are located.

Note: TAZ – Traffic Analysis Zone

Once the values shown in Table 5.1 are estimated for each TAZ, maps can be produced to show:

- the geographic distributions of the number of workers in each TAZ based on their home locations and their work locations,

- the number of commuting vehicles leaving and arriving at each TAZ, and

- the average commute time for workers who live and work in each TAZ.

Estimation of Commute Flows between Different Geographic Areas

To analyze traffic flows between different geographic areas, an analyst can categorize areas in each county in the study area into two general categories—urban areas and rural areas. Based on the United States Census definition, urban areas are areas with a population density of at least 1,000 people per square mile and surrounding census block groups with a density of at least 500 people per square mile. The analyst can then determine commute flows between a possible pair of areas based on the information obtained by following the steps described in the previous section. Based on this classification of areas in a county, there are a total of four sets of commute flow data between a pair of urban and rural areas within a county: (1) Urban-to-

Urban, (2) Urban-to-Rural, (3) Rural-to-Urban, and (4) Rural-to-Rural. Similarly, for each pair of counties in a study area, there are also four sets of inter-county commute flow data: (1) Urban-to-Urban, (2) Urban-to-Rural, (3) Rural-to-Urban, and (4) Rural-to-Rural.

The analysis mentioned above can be easily extended to determine commute flows between different transit service areas. This task can be accomplished in three steps. First, determine the TAZs covered by a transit service area. Second, for each pair of transit service areas A and B, compute the number of trips with origins in service area A and destinations in service area B, and vice versa. Third, repeat the second step until all possible pairs of transit service areas are exhausted.

Estimation of Non-Work Related Travel Demand

Given the wide availability of geospatial data and land use information, it is not difficult to determine the locations of major attractions such as shopping centers, schools, and hospitals in a county. These attractions are the destinations of non-work related travel. The main difficulty here is how to determine the origins of non-work related trips to these destinations. A gravity model may be used to calculate the number of trips originating from each TAZ and ending at one of these facilities. Gravity models have been widely used to compute traffic flows between two different areas in the literature of geographic analysis and transportation planning. This model is very easy to implement.

Assume that there are **M** TAZs and **N** shopping centers in a county. Let d_{ij} denote the distance between the centroid of the ith TAZ and the jth shopping center. An analyst can use Expression (1) given below to proportionally assign the number of people going from the ith TAZ to the jth shopping center based on the relative attractiveness of the jth shopping center and the distance between the ith TAZ and the jth shopping center. This procedure can be repeated many times for all types of attractions in the area in question.

$$P_{ij} = k_{ij} \times P_i; \quad k_{ij} = \frac{\dfrac{F_j}{d_{ij}}}{\sum_j \dfrac{F_j}{d_{ij}}}; \quad \sum_j k_{ij} = 1 \qquad (1)$$

where, P_{ij} is the number of people traveling from the ith TAZ to the jth shopping center;
k_{ij} is a coefficient;
P_i is the population size in the ith TAZ; and
F_j is the relative importance of the jth shopping center with respect to other shopping centers in a county.

A Case Study for Estimating Journey-to-Work Travel Demand

In this section, a five-county area in Central Texas provides an example that illustrates some of the concepts and procedures discussed in previous sections of this chapter. The five counties are Bexar, Comal, Hays, Travis, and Williamson Counties (Figure 5.1). There is significant commute traffic flow between different areas in this five-county area. The goal here is to illustrate how to determine the geographic distribution of origins and destinations of journey-to-work trips as well as commute flows between different areas using the data and procedures described in previous sections of this chapter. Readers who desire to have more information about the case study is referred to TxDOT technical report titled "GIS Models for Analyzing Intercity Commute Patterns: A Case Study of the Austin-San Antonio Corridor in Texas" (0-5345 R2) for a more detailed discussion.

Geographic Distribution of Trip Origins

Based on the 2000 census data and the procedures described in Table 5.1, an analyst can determine that there were a total of 1,229,662 workers in the five-county area in 2000. Figure 5.2 shows the number of workers in each TAZ where these workers' homes were located and the geographic distribution of these workers at the TAZ level. These numbers clearly indicate where the journey-to-work trips were originated. Similarly, an analyst can also determine the number of workers in each TAZ where the workers' offices were located as well as the geographic distribution of the workers based on their office locations. More detailed descriptions about determining the origins and destinations of journey-to-work data can be found in a TxDOT technical report titled "GIS Models for Analyzing Intercity Commute Patterns: A Case Study of the Austin-San Antonio Corridor in Texas" (0-5345 R2) (Zhan and Chen, 2006).

Commute Flows between Different Geographic Areas

Based on the procedures described in previous sections, an analyst can determine commute flows between urban and rural areas within a county and between counties in the study area. The commute flows in the case study area in 2000 are summarized in Table 5.2 as shown below. As can be seen in Table 5.2 within Bexar County, there were 397,902 daily one-way journey-to-work trips between urban areas in 2000, 31,221 from urban areas to rural areas, 35,470 from rural areas to urban areas, and 7,201 between rural areas. Between Bexar and Travis Counties, there were 1,782 daily one-way journey-to-work trips between urban areas of the two counties, 308 trips from urban to rural areas, 143 trips from rural to urban areas, and 10 trips between rural areas in the two counties.

The total commute in-flows to each county are the number of daily one-way journey-to-work trips with destinations in that county. For example, in the case study area there were a total of 401,239 trips with destinations in the urban areas of Bexar County from urban areas in the five counties (including Bexar County itself) in 2000, 31,434 trips with destinations in the rural areas of Bexar County from urban areas in all five counties, 43,242 trips with destinations in the urban areas of Bexar County

from rural areas in all five counties, and 7,899 trips with destinations in the rural areas of Bexar County from rural areas in all five counties. The commute in-flows from other counties in Table 5.2 can be understood similarly. This set of numbers only accounts for the number of trips originated in other counties.

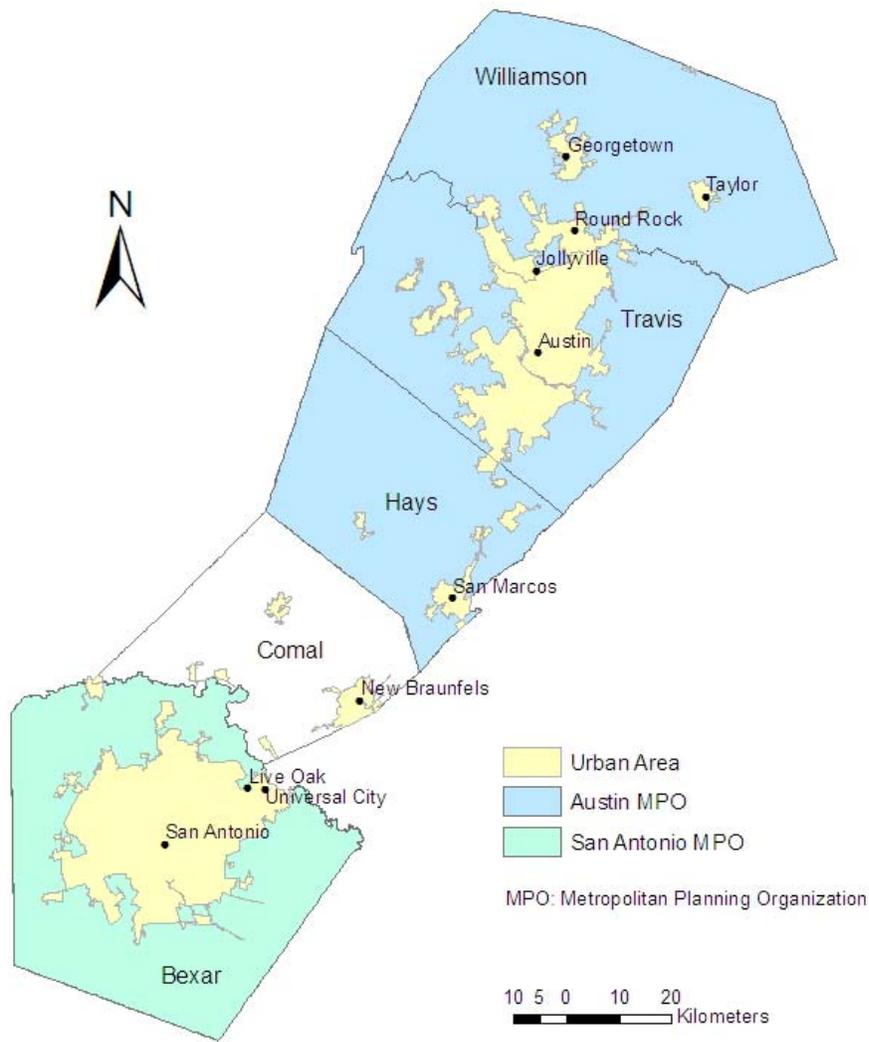**Figure 5.1. Case Study Area – Five Counties in Central Texas.**
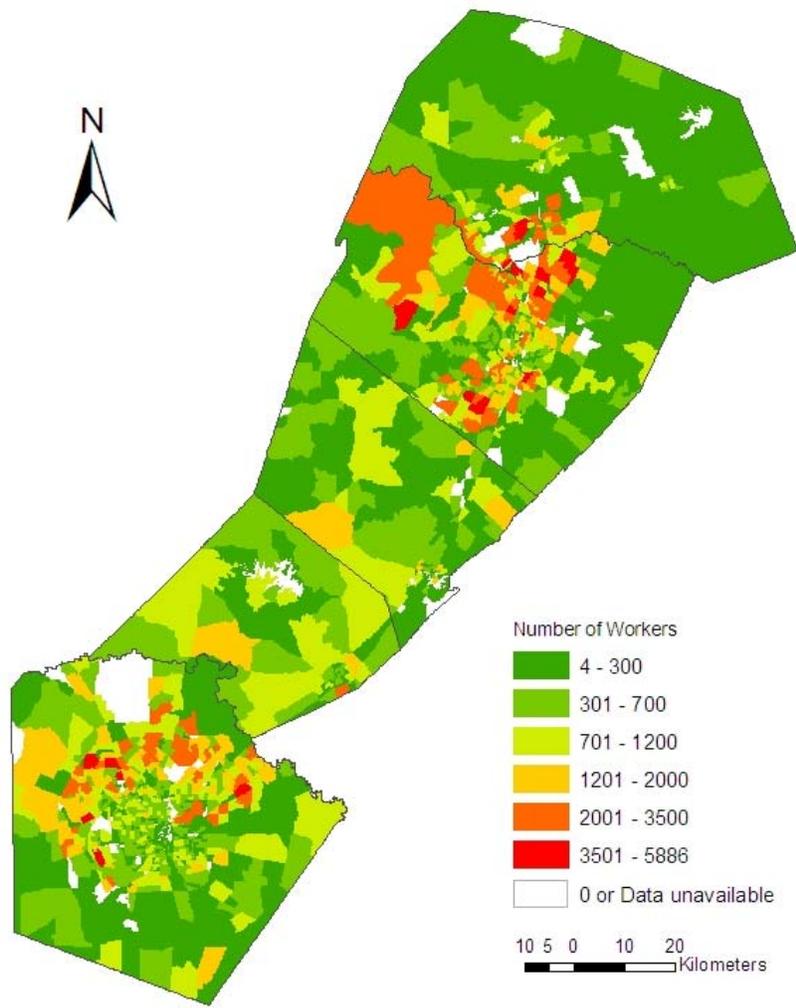
Figure 5.2. Geographic Distribution of Workers Based on Their Home Locations in the Study Area.

Table 5.2. Commute Flows between Different Geographic Areas in Central Texas.

	Bexar County				Comal County				Hays County				Travis County				Williamson County			
	Urban	%	Rural	%	Urban	%	Rural	%	Urban	%	Rural	%	Urban	%	Rural	%	Urban	%	Rural	%
Bexar County																				
Urban	397,902	84%	31,221	7%	1,370	36%	1,894	50%	406	70%	113	19%	1,782	79%	308	14%	131	61%	85	39%
Rural	35,470	8%	7,201	2%	225	6%	316	8%	31	5%	34	6%	143	6%	10	0%	-	0%	-	0%
Comal County																				
Urban	2,176	21%	158	2%	5,823	37%	2,128	13%	389	29%	196	15%	224	26%	47	5%	10	29%	4	12%
Rural	7,303	71%	684	7%	3,543	22%	4,421	28%	515	39%	236	18%	561	64%	42	5%	12	35%	8	24%
Hays County																				
Urban	513	62%	4	0%	335	34%	381	38%	8,692	45%	2,380	12%	5,719	30%	691	4%	173	25%	127	18%
Rural	301	37%	4	0%	164	16%	119	12%	3,955	21%	4,229	22%	10,888	58%	1,514	8%	313	45%	82	12%
Travis County																				
Urban	503	75%	51	8%	72	54%	52	39%	1,217	43%	1,195	43%	253,664	80%	22,963	7%	13,145	60%	4,854	22%
Rural	111	16%	10	1%	-	0%	10	7%	176	6%	215	8%	32,143	10%	6,507	2%	2,728	12%	1,172	5%
Williamson County																				
Urban	145	72%	-	0%	14	64%	-	0%	112	45%	114	46%	44,780	74%	4,615	8%	24,364	53%	8,362	18%
Rural	57	28%	-	0%	4	18%	4	18%	16	6%	8	3%	10,114	17%	1,395	2%	8,182	18%	4,777	10%
Total Commute In-Flows (summation of corresponding cells in the same column)																				
Urban	401,239	83%	31,434	6%	7,614	36%	4,455	21%	10,816	45%	3,998	17%	306,169	77%	28,624	7%	37,823	55%	13,432	20%
Rural	43,242	9%	7,899	2%	3,936	19%	4,870	23%	4,693	19%	4,722	19%	53,849	14%	9,468	2%	11,235	16%	6,039	9%
County total			483,814				20,875				24,229				398,110				68,529	
Commute In-Flows from Other Counties (summation of corresponding cells in the same column)																				
Urban	3,337	28%	213	2%	1,791	36%	2,327	47%	2,124	43%	1,618	33%	52,505	63%	5,661	7%	13,459	59%	5,070	22%
Rural	7,772	65%	698	6%	393	8%	449	9%	738	15%	493	10%	21,706	26%	2,961	4%	3,053	13%	1,262	6%
County total			12,020				4,960				4,973				82,833				22,844	
Overall Summary																				

Total commute flows in the area: 995,557

Urban-to-Urban: 763,661 (77%); Urban-to-Rural: 81,943 (8%)

Rural-to-Urban: 116,955 (12%); Rural-to-Rural: 32,998 (3%)

Total number of inter-county trips: 127,630 (13% of total commute flows)

Note: The percentages are computed using flows in the four related areas either within a county or between a pair of counties.

Urban areas are defined as areas with population desity of at least 1,000 people per sqaure mile and surrounding census block groups with at least 500 people per square mile.

Chapter References

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Chapter 5 Evaluation – Regional Intercity Travel Demand Estimation Methods

Data Sources:

- Where can you find detailed geographic data and socioeconomic data that can be used to calculate Transit Need Index?

- Where can you obtain the Census Transportation Planning Package (CTPP) Part 3 Journey–to-Work data?

- Where can you download the GIS Map Layers of Census Traffic Analysis Zones (TAZs)?

- Where can you obtain land use data showing destinations of non-work related travel?

Data Preparation:

- How can you link the Census Transportation Planning Package (CTPP) Part 3 Journey–to-Work data with the GIS Map Layers of Census Traffic Analysis Zones (TAZs)?

Transit Need Index:

- What indicators would you choose to calculate the Transit Need Index in a small geographic area (e.g., a census tract)?

- How would you weight these indicators?

Estimation of Commute Flows between Different Geographic Areas:

- How would you determine the geographic distribution of the origins and destinations of journey-to-work trips at the Traffic Analysis Zone level?

- How would you determine the journey-to-work traffic flows between different sub-county areas in a given region consisting of several counties?

Estimation of Non-Work Related Travel Demand:

- What are the main destinations of non-work related journeys?

- How would you determine non-work related traffic flows between different sub-county areas in a given region consisting of several counties?

****

Assessment of my region — rate the following on a scale of 1 to 5:

1) We have identified the data sources that are necessary for computing the
    Transit Need Index in sub-county areas.
    1   2   3   4   5
    Strongly disagree ....Strongly agree

2) We are familiar with the data sources needed to analyze the geographic
    distribution of the origins and destinations of journey-to-work trips at the traffic
    analysis zone level.
    1   2   3   4   5
    Strongly disagree ....Strongly agree

3) We know the data sources indicating main destinations of non-work related
    journeys in our region.
    1   2   3   4   5
    Strongly disagree ....Strongly agree

4) We know the steps for computing the Transit Need Index.
    1   2   3   4   5
    Strongly disagree ....Strongly agree

5) We know how to determine the origins and destinations of journey-to-work trips
    at the Traffic Analysis Zone level.
    1   2   3   4   5
    Strongly disagree ....Strongly agree

6) We know the procedure for analyzing journey-to-work traffic flows between
    different areas in a region consisting of several counties.
    1   2   3   4   5
    Strongly disagree ....Strongly agree

7) We understand the process of using a gravity model to estimate non-work
    related travel demand in sub-county areas in a given region.
    1   2   3   4   5
    Strongly disagree ....Strongly agree

Chapter 6. Continuity

Coordination requires committed leaders and a can-do spirit. Although making great strides in improving coordination, service in some of the areas is considered to be fragmented; coordination efforts in one sector of the community are advanced beyond coordination in other sectors. In Phoenix, RTPA hired a scoping consultant to develop a scope of work with the objective of achieving a higher degree of service integration for the paratransit portion of the system.

Regions still grow beyond the boundaries of the agencies created to service the super-sized areas. As an example, although the Denver RTD encompasses more than eight counties, and 16 years after its initiation, service is needed for counties outside the original service area. Determinations of how to grow smoothly are still in process in that community.

The transit centers and stations that serve as the hinge pen for Seattle's system took ten years to construct. Management of the stations involves ongoing negotiations with members and working out varying perspectives about cost sharing and how to handle underperforming sections.

The growth pressures and need for improved regional transit will remain an area of consideration for communities over the next decade. Experiences of other communities and the vast resources available should facilitate decision making.

Resources

The following publications provide further information, guidelines, and examples regarding coordinated transportation services.

Transit Cooperative Research Program (TCRP) Report 101: *Toolkit for Rural Community Coordinated Transportation Services.* Transportation Research Board, Washington, D.C., 2004.

TCRP Report 105: *Strategies to Increase Coordination of Transportation Services for the Transportation Disadvantaged.* Transportation Research Board, Washington, D.C., 2004.

TCRP Report 69: *Embracing Change in a Changing World: Case Studies Applying New Paradigms for Rural and Small Urban Transit Service Delivery.* Transportation Research Board, Washington, D.C., 2004.

TCRP Report 70: *Guidebook for Change and Innovation at Rural and Small Urban Transit Systems.* Transportation Research Board, Washington, D.C., 2001.

A Handbook for Coordinating Transportation Services: An Introduction and Step-by-Step Approach to Coordination. Ohio Department of Transportation, Columbus, Ohio, 1997. Available online at http://www.dot.state.oh.us/ptrans/PDF_FILES/Coord_Prog/ODOT%20Coordinatio n%20Handbook%20Volume%201.pdf

United We Ride: Coordinating Human Services Transportation. http://www.unitedWeride.gov

Chapter 6 Evaluation – Continuity

Recognize that coordination is a long-term initiative that can be achieved with incremental successes along the way. As your region continues the work of coordinating transit services, consider the following:

- Which elements are proceeding well and which are more difficult to get started?

- Where are continuing pressures (e.g., definition of regional boundaries, high dollar capital facilities)?

Appendix 1.
Maricopa County, Arizona: Regional Public Transportation Authority Funding History

In 1985, the Arizona State Legislature passed a law enabling the citizens of Maricopa County to vote on a sales tax increase to fund regional freeway improvements and provide for the creation of the Regional Public Transportation Authority (RPTA). In October of that year, Maricopa County voters approved passage of a proposition that approved a one-half cent sales tax to fund freeway construction with a portion, or $5 million per year (inflated annually), as seed money for regional transit service expansion. The RPTA received this funding through 2005 and was charged with developing a regional transit plan, finding a dedicated funding source for transit, and developing and operating a regional transit system.

In 1988, the residents of the city of Scottsdale passed a transportation tax that allowed funding for transit and transportation projects.

In 1993, the RPTA Board of Directors adopted Valley Metro as the identity for the regional transit system. The Valley Metro name and graphic design were chosen to give all buses a more recognizable identity and to help unify public transit systems in the Valley. The Valley Metro logo and purple and green paint scheme have been incorporated into the region's fleet of bus, vanpool and dial-a-ride vehicles. In addition, a number of cities have adopted this regional identity into their fleet of vehicles.

In 1996, the city of Tempe residents passed a half-cent sales tax dedicated for transit, allowing them to expand their existing bus service and explore future options, such as light rail.

In 1998, the city of Mesa residents passed a quality-of-life half-cent sales tax, which dedicated a small portion for transit, with the remainder going toward parks and recreation, and police and fire departments.

In 2000, the city of Phoenix residents passed a four-tenths of a percent sales tax for improvements to local bus service, Bus Rapid Transit (began in 2003), Light Rail (beginning 2008), Neighborhood Mini-Bus Service, and more.

In 2001, the city of Glendale residents passed a half-cent sales tax dedicated for transit and other transportation improvements. Its transit plan was modeled after the city of Phoenix's plan.

In 2004, Maricopa County residents extended the half-cent county-wide sales tax originally authorized in 1985. The tax allocates over one-third of tax revenues, or $5.8 billion (before inflation) for transit, including light rail.

In 2005, Peoria voters approved a three-tenths cent sales tax increase dedicated to funding transportation projects and services in Peoria. For the next 20 years, this dedicated revenue source will fund more than $200 million in projects that a citizen committee has identified as critical to the city's transportation infrastructure.

(http://www.valleymetro.org/valley_metro/history_and_local_funding/index.htm)

The information below is one of the initiating documents in use by the Regional Transit Planning Board for the Atlanta area and the adjacent 10 counties.

Purpose
The Regional Transit Institutional Analysis (RTIA) will examine how the Atlanta region should be organized to plan, build, fund, and operate public transit service in a way that is seamless and convenient for the user. The project will also recommend a regional fare policy and structure.

The Need for Action
Transit is increasingly important in helping the region manage traffic congestion, reduce air pollution, conserve energy, and promote sustainable development patterns. The prominence of transit in the *Mobility2030* regional transportation plan reflects the region's need for more transit service.

The current regional transit system is composed of six individual fixed-route bus operators and a regional rail operator. Each operator is geographically constrained by its operating boundaries and each has its own fare system. This structure often requires riders to transfer between systems, which means customers often have to maintain more than one fare payment medium. The number of operators and their geographical restrictions make coordinating efficient routes and schedules among all operators challenging. Additionally, this structure puts the region's transit entities in the position of competing against one another for increasingly scarce state and federal transit funding.

[The Atlanta Regional Commission] (ARC) is concerned that the current organizational structure is inadequate to fully implement the transit vision laid out by the RTP. The agency has observed other regions around the country reorganizing their transit planning and delivery structure to improve their transit systems. In order to address these concerns, the ARC Board of Directors adopted a resolution directing staff to conduct the Regional Transit Institutional Analysis.

A Collective Vision
The RTIA is an information and consensus-building effort. Regional leaders, who compose the project's Steering Committee, are looking at the strengths and weaknesses of the current state of transit in the Atlanta region and will study how transit is organized in seven other metro areas of the United States. Together, they will try to reach consensus on an arrangement that will better serve the Atlanta region in the 21st century.

Steering Committee
The Steering Committee is the group that has primary responsibility for guiding the process and outcome of the study. The committee is composed of the following individuals:

STEERING COMMITTEE—Sam Olens, Cobb County Commission Chair; Shirley Franklin, Mayor of the City of Atlanta; Eldrin Bell, Clayton County Commission Chair; Vernon Jones, CEO of DeKalb County; Greg Dunn, Fayette County Commission Chair; Karen Handel, Fulton County Commission Chair; Charles Bannister, Gwinnett County Commission Chair; Michael Walls, MARTA Board Chair; Terry Demeo-King, Office of the Governor; David Doss, Georgia Department of Transportation Board Chair; Sonny Deriso, Georgia Regional Transportation Authority Board Chair; Tommy Williams, Georgia State Senate Transportation Committee Chair; and Vance Smith, Georgia House of Representatives Transportation Committee Chair.

http://www.atlantaregional.com/cps/rde/xbcr/SId-3f57fEE7-d6b100bb/arc/RTIApurpose.pdf
http://www.atlantaregional.com/cps/rde/xbcr/SId-3f57fEE7-4C963110/arc/TSbprop1.pdf

This prototypical coordination agreement is provided for information purposes only and is not intended to be utilized wholly for a transit Intergovernmental Agreement. It is designed so that communities considering coordination may gain an understanding of the elements that could be included in a coordination agreement. Any formal Agreement of this nature would need development under the full guidance of professional legal counsel.

THIS AGREEMENT is entered into this _____ day of _____, 200X, by and between <u>name the eight counties </u>herein collectively called "The SuperMetro" or "Parties" and as may be referred to individually as "Party" or "Independent Entity."

RECITALS

WHEREAS <u>name the eight counties</u> agree that it is in the best interest of the citizens to initiate coordinated transit service within and between the eight-county area; and

WHEREAS, the State through Statutes and Revised Sections and the citizens through a public vote, provided the authority and funding mechanisms for coordinated service; and

WHEREAS, the SuperMetro is authorized to perform the metropolitan public transportation functions across the eight counties according to provisions herein; and

WHEREAS the SuperMetro may contract with any public transportation supplier to benefit the parties of this agreement for the operation of high capacity transportation services or facilities within the eight-county region; and

WHEREAS, the Parties have determined it to be in the best interest of the public to enter into this intergovernmental agreement for the coordination of regional express bus service which crosses county boundaries;

NOW, THEREFORE, in consideration of the mutual terms and obligations contained herein, the Parties agree as follows:

1. The intergovernmental agreement between the eight counties and the Independent Entities to coordinate fixed-route transit service is hereby approved.
2. The Chair of this Board is hereby authorized and directed to sign said intergovernmental agreement for the Board.
3. The various officers and employees of Independent Entities are herby authorized and directed to cooperate with the SuperMetro and perform all acts necessary and desirable to give effect to this Agreement.

Passed, Adopted and Approved:

_____   _____
SuperMetro Chair   Date
_____   _____
Include a Signature Line for a   Date
Representative of each of the eight counties

1.0   PURPOSE AND SCOPE OF AGREEMENT

The purpose of this Agreement is to establish the terms and conditions under which the SuperMetro service area will be operated and coordinated between the eight Parties.

2.0   OPERATING AUTHORITY

Commencing on the effective date of this Agreement and during the term thereof, the Parties mutually consent to and authorize SuperMetro to operate bus service per the boundaries described in "citation."

3.0   BUSES AND EQUIPMENT

3.1   Generally
SuperMetro shall use the buses and equipment provided by entities within the eight counties for the purpose of operating the bus service for maintenance, other uses directly associated with the system and for rail*. **Include any other pertinent information relative to specifics of equipment use here.**

3.2   Cross-use of Fleets
The Parties expect that there will be circumstances under which an Individual Entity within this Agreement will need to use its own buses to provide bus service, Independent Entity of the SuperMetro. The Parties also expect that there will be circumstances under which an individual Party may need to use SuperMetro buses or buses owned by another member institution of this Agreement. The cross-use of fleets is expected to be infrequent, for a short-term, and only when necessary. Under such circumstances, the Parties agree to share equipment. If, in the opinion of any Party, the cross-use of fleet becomes more frequent than intended by this Subsection, the Parties shall meet to discuss the reasons for the cross-use and shall agree upon action, if needed. The Parties are allowed to cross-use the buses only if such use of each other's buses does not adversely impact the bus service of the Party providing the buses for cross-use. Cross-use of buses purchased with federal funding shall only be used in conformance with Federal Transit Administration (FTA) restrictions and regulations.

For longer term agreed upon bus usage, the Parties will establish a separate bus use agreement that defines the terms, conditions and the use rates.

3.3   Americans with Disabilities Act
In providing the fixed-route service which is the subject of this Agreement, the SuperMetro agrees to comply with those provisions of Title II of the Americans with Disabilities Act ("ADA"), as amended, 42 U.S.C. 12131, et seq. and 49 CFR Part 37, including Part 37 Appendices, which apply to fixed-route bus service, independent of the SuperMetro. Opportunities may be sought to streamline and integrate service provision of some limited paratransit service, where feasible and where medically related trips are not involved.

4.0   COOPERATION

4.1   Designated Representatives
To ensure effective cooperation, each Party shall designate representatives responsible for communications and coordination between the Parties. Designated Representatives are responsible for the following:
   a) Coordinating input and work of other staff members;
   b) Annual review of the costs;
   c) Revising or preparing exhibits and amendments to this Agreement; and
   d) Identifying and resolving issues.

4.2   Emergency Bus Service
The eight counties will appoint specific personnel to be their respective contacts in handling requests for emergency bus service.

5.0   ROLE OF SUPERMETRO

5.1   Coordination
Independent Entity County transit agencies will work in collaboration with other transit agencies in the region. The Independent Entity providers will consult with the SuperMetro on policy decisions, service development, and planning affecting other service providers. Coordination decisions will be made by the SuperMetro Board of Directors and are addressed in this Agreement. Each County will consult with the SuperMetro concerning changes proposed in regional bus schedules or routes. Each County's comments will be considered in the decision-making process as described above**.**

5.2   SuperMetro Rights and Responsibilities
SuperMetro is responsible for planning and coordinating the bus system and final decision-making authority shall remain with Super Transit.

5.2.1   Planning
SuperMetro will participate with other Independent Entity agencies in planning efforts including, but not necessarily limited to, determining and modifying the following matters consistent with the terms of this Agreement:
   a) Coordinating times of day services are to be rendered;
   b) Coordinating and interlining routes on which buses are to run, where reasonable;

5.2.2   Operations and Management Supervision
SuperMetro will have the following rights with respect to management and financial oversight, and monitoring the performance of the transit service in the eight-county region:
   a) To review and inspect all records, facilities, and equipment developed or used by the Independent Entity providers in performance of this Agreement, as well as schedule adherence and the SuperMetro current fare and data collection procedures;
   b) To review the use of fuel, lubricants, repair parts, and supplies used by the Independent Entity providers in servicing the SuperMetro area, and
   c) To inspect any Independent Entity provider's bus at any time during normal business hours, provided this inspection does not interfere with the ability to fulfill its obligations under this agreement. SuperMetro shall provide sufficient notice prior to inspection to ensure that an inspection does not interfere with a provider's ability to fulfill its obligations under this Agreement.

5.2.3   Passenger Mile Report
SuperMetro will be responsible for the sampling methodology required for determining passenger miles for the National Transit Data and other reports. SuperMetro shall identify and specify the trips to be sampled (dates and times for each sample trip).   SuperMetro shall bear the cost of sampling. SuperMetro reserves the right to conduct sampling using its own employees or a subcontractor.

5.3   Performance Monitoring
SuperMetro is responsible for the ongoing performance management of its employees and/or contractors and will provide copies of its ongoing performance monitoring programs and tools and updates applicable to employees performing work under this Agreement.

5.4   Information Reporting
The reports in this Section shall be attached to the monthly invoice due on the XXth of each month in order for the invoice to be considered complete. Failure to submit these reports may result in delay in payment or reimbursement for services rendered.

5.4.1   National Transit Database Reporting Requirements
SuperMetro shall provide a monthly service data report to the independent entities consistent with the operating data requirements of the National Transit Database (NTD) report by attaching the report to the invoice due on the XXth of each month for service from the previous month. Monthly data reports shall be consistent with the federal reporting requirements that are in effect on the date of the report. The methodology for collecting and reporting service data shall be approved by SuperMetro and any changes made to the methodology made during the term of this Agreement shall be approved by SuperMetro.

5.4.2   Monthly Performance Reports
The SuperMetro shall prepare, maintain, and submit monthly reports regarding the bus and rail service in the form and manner prescribed. Monthly reports shall be submitted to Transportation Services Project Manager or designee at the SuperMetro administrative offices by the XXth of each month for the previous month.

5.5   Civil Rights

5.5.1   Nondiscrimination
In accordance with Title VI of the Civil Rights Act, as amended, 42 U.S.C. § 2000d, Section 303 of the Age Discrimination Act of 1975, as amended, 42 U.S.C. § 6102, Section 202 of the Americans with Disabilities Act of 1990, 42 U.S.C. § 12132, and Federal transit law at 49 U.S.C. § 5332, the SuperMetro agrees that it will not discriminate against any employee, applicant for employment, or customer because of race, color, creed, national original, sex, age, or disability. In addition, the SuperMetro agrees to comply with applicable Federal implementing regulations and other implementing requirements FTA may issue.

5.5.2   Equal Employment Opportunity

5.5.2.1 Race, Color, Creed, National Origin, Sex
In accordance with Title VII of the Civil Rights Act, as amended, 42 U.S.C. § 2000e, and Federal transit laws at 49 U.S.C. § 5332, the SuperMetro agrees to comply with all applicable equal employment opportunity requirements of U.S. Department of Labor (U.S. DOL) regulation, "Office of Federal Contract Compliance Programs,

Equal Employment Opportunity, Department of Labor," 41 C.F.R. Parts 60 et seq., (which implement Executive Order No. 11246, "Equal Employment Opportunity," as amended by Executive Order No. 11375, "Amending Executive Order 11246 Relating to Equal Employment Opportunity," 42 U.S.C. § 2000e note), and with any applicable Federal statutes, executive orders, regulations, and Federal policies that may in the future affect construction activities undertaken in the course of the Project.

The SuperMetro agrees to take affirmative action to ensure that applicants are employed, and that employees are treated during employment without regard to their race, color, creed, national origin, sex, or age. Such action shall include, but not be limited to, the following: employment, upgrading, demotion or transfer, recruitment or recruitment advertising, layoff or termination, rates of pay or other forms of compensation, and selection for training, including apprenticeship. In addition, the SuperMetro agrees to comply with any implementing requirements FTA may issue.

5.5.2.2 Age
In accordance with Section 4 of the Age Discrimination in Employment Act of 1967, as amended, 29 U.S.C. §§ 623 and Federal transit law at 49 U.S.C. § 5332, the SuperMetro agrees to refrain from discrimination against present and prospective employees for reason of age. In addition, the SuperMetro agrees to comply with any implementing requirements FTA may issue.

5.5.2.3 Disabilities
In accordance with Section 102 of the ADA, as amended, 42 U.S.C. § 12112, the SuperMetro agrees that it will comply with the requirements of U.S. Equal Employment Opportunity Commission, "Regulations to Implement the Equal Employment Provisions of the Americans with Disabilities Act," 29 C.F.R. Part 1630, pertaining to employment of persons with disabilities. In addition, the SuperMetro agrees to comply with any implementing requirements FTA may issue.

5.5.3   Subcontracts
SuperMetro also agrees to include these civil rights requirements in each subcontract financed in whole or in part with federal assistance provided by FTA, modified only if necessary to identify the affected parties.

5.6   ROUTE PLANNING/SCHEDULING

5.6.1   General
The Independent Entity is responsible for policy and planning decisions affecting its own routes. SuperMetro will consult with the Independent Entities in a timely manner concerning changes proposed for the bus service affecting local service, schedules, or routes. Independent Entity comments will be considered in the decision-making process.

SuperMetro will be responsible for planning and policy decisions affecting the routes. SuperMetro will consult with the Independent Entities in a timely manner concerning changes proposed for local service affecting bus service, schedules, or routes. The Independent Entity comments will be considered in the decision-making process.

5.6.2   Route Planning
SuperMetro shall provide the Independent Entities with the preliminary route designs for bus service. The route design shall include stop locations, service frequencies, service spans, and

estimated number of vehicle hours by day of operation. SuperMetro shall review draft
service schedules produced by Independent Entities and will communicate authorization in
accordance with SuperMetro's service change timelines.

5.6.3   Service Modifications

Independent Entities will make agreed upon changes at SuperMetro's request (with
coordination of timing). If service is increased, SuperMetro will provide any additional
personnel necessary to implement the increase on its effective date, at SuperMetro's expense.

5.7   Fare Changes

SuperMetro will consult with Independent Entities in a timely manner concerning changes
proposed for fares. Independent Entities' comments will be considered in SuperMetro's decision-
making process. SuperMetro will implement fare changes on bus service as determined by
SuperMetro. Fare changes will occur when determined by SuperMetro. The Parties will agree on
additional costs, if necessary, for changes occurring outside of regular service changes.

5.8   Public Process

SuperMetro is the primary Party responsible for community outreach for bus service.
SuperMetro and the Independent Entities will consult with each other in developing the design of
the public process for upcoming service changes that involve the eight-county service area,
including the nature and content of printed community outreach materials to communicate
information about the changes, and staffing for public events associated with the service changes.
The cost-sharing for producing jointly designed printed media will be determined and agreed
upon in separate agreements prior to the start of work on the project.

6.0   VEHICLE MAINTENANCE

6.1   Maintenance - Extent of Services

The Independent Entities will have duties and responsibilities with respect to SuperMetro bus
maintenance standards as set forth in this Agreement. SuperMetro hereby engages the
Independent Entities to maintain the buses, which SuperMetro may help purchase, according to
specific guidelines, and deliver to the Independent Entity for bus service. SuperMetro will be
responsible for providing the necessary management, technical, and mechanical services for the
maintenance of bus equipment. Services provided by SuperMetro will be consistent and in
accordance with SuperMetro's standard maintenance procedures, based on the manufacturer's
recommended preventative maintenance program for the equipment.

6.2   Buses

SuperMetro intends that all buses will have wheelchair lifts or ramps, air conditioning, front
kneeling capability, fare collection equipment and climate control.

Independent Entities may substitute other buses (including articulated buses) for the operations of
bus service under this Agreement.

6.3   Maintenance Personnel

SuperMetro will provide properly trained and qualified maintenance personnel in a number
sufficient to maintain and repair the buses to the standards as set forth in this Agreement.

6.4   Storage and Maintenance Facilities

The Independent Entities shall provide and maintain vehicle storage and maintenance facilities for securing and maintaining the buses. The Independent Entities shall allow SuperMetro to enter and review their facilities and activities for purposes of monitoring maintenance performance on the buses at any time during regular business hours, with prior notice. SuperMetro shall provide sufficient prior notice to ensure that the visit does not interfere with the Independent Entity's ability to fulfill its obligations under this Agreement.

6.5   Cleaning and Maintenance

The Independent Entities shall maintain all buses used in providing bus service in accordance with SuperMetro's and industry standards.

6.5.1   Cleaning of Buses

The Independent Entities shall clean all buses with the frequency and in the manner specified.

6.5.2   Maintenance of Buses

The Independent Entities shall be responsible for keeping the components of each bus, including its body, frame, furnishings, mechanical, electrical, hydraulic, and accessibility equipment provided pursuant to the ADA or other operating systems maintained in accordance with SuperMetro's standard maintenance procedures, based on the manufacturer's recommended preventative maintenance program for SuperMetro equipment. The Independent Entities shall maintain all buses in accordance with Motor Vehicle Emission requirements.

6.5.3   Major Fleet Defects

In the event that the SuperMetro fleet is found to experience any major fleet defect (i.e., a defect is found in at least 20% of the buses provided to SuperMetro under this Agreement) where the repair falls outside of the manufacturer's warranty provisions, SuperMetro and the Independent Entities will communicate immediately to review the nature of the defect and potential solutions. SuperMetro and the Independent Entities will agree on the repairs to be made. SuperMetro will be responsible for the cost of any repairs. If such defects and repairs compromise SuperMetro's ability to meet daily service requirements, at its discretion, SuperMetro may use any of its ADA compliant inactive fleet to meet the affected daily service requirements. However, if SuperMetro does not provide any or an adequate number of buses, then SuperMetro shall relieve the Independent Entities of the requirement to meet the affected daily service requirements.

SuperMetro reserves the right to conduct a review of any and all SuperMetro buses at any time during normal business hours. SuperMetro shall provide sufficient prior notice to ensure that the visit does not interfere with SuperMetro's ability to fulfill its obligations under this Agreement.

6.5.4   Major Fleet Repairs

The Independent Entities will be responsible for heavy repairs, major overhauls and fleet-wide mechanical repairs and upgrades of buses.

7.0   CUSTOMER SERVICES, MARKETING AND MEDIA RELATIONS

SuperMetro will have duties and responsibilities as set forth in this Agreement and be responsible for providing the necessary management, training, automated information, and telecommunications services used to provide customer services and products for bus service as described in this section. The Parties may choose to coordinate and, at times, when mutually

agreed, work jointly in marketing, advertising, employer communication, route promotion and special services. Those duties and responsibilities not specifically described within shall be deemed the responsibility of SuperMetro.

7.1 Customer Services
SuperMetro shall provide customer services in accordance with the agreed upon procedures. The Parties will update procedures as necessary.

7.2 Schedule Information and Trip Planning
SuperMetro shall provide schedule information and trip planning using customer service representatives and automated systems during the standard hours of service.

7.3 Customer Comments
SuperMetro shall collect and report customer comments for bus service using mutually agreed upon categories similar to the format and manner currently in use and in accordance with the operating procedures.

7.4 Printed Customer Information Distribution
SuperMetro will store and distribute service information, rider alerts and marketing materials at agreed upon locations in the normal course of business and in accordance with the operating procedures.

7.5 Marketing and Advertising
SuperMetro is responsible for all marketing and advertising of service. SuperMetro will include marketing materials about service provided by Independent Entities where it is geographically appropriate and in accordance with the operating procedures. The Parties may choose to collaborate on marketing and advertising and share information as appropriate. If the Parties determine to work jointly, then the Parties will agree upon the scope of work and cost.

7.6 Media Relations
Except as otherwise identified in this Agreement, SuperMetro has the primary responsibility for all communications with the media about bus service.

Special or event bus service information, including media advisories and press releases, will be coordinated between the Independent Entities and SuperMetro. The Parties will develop procedures.

8.0 MAINTENANCE AND OPERATIONS OF FACILITIES

8.1 Passenger Facilities
SuperMetro shall install and maintain bus stops, shelters and signage for the bus service described herein in accordance with the same practices that are applicable to County bus service. Specific amenities desired by SuperMetro but not provided under standard practices may be provided by SuperMetro upon mutual agreement and contingent upon SuperMetro funding the cost of installing and maintaining such amenities.

8.2 Passenger Facilities Use and Maintenance
Bus service may operate in and out of the Independent Entities' park-and-ride lots, transit centers and other passenger facilities, and the Independent Entities shall be responsible for maintaining facilities in their jurisdictions.

8.3   **Signage Maintenance**

SuperMetro will provide quarterly cleaning and maintenance of the regional signage systems hardware in facilities in accordance with the terms of the maintenance agreement that SuperMetro has with its contractor. SuperMetro will manage graffiti removal.

9.0   COMPENSATION AND PAYMENT

9.1   **Compensation**

SuperMetro will compensate the Independent Entities for the Baseline Cost, changes to the Service Implementation Plan, Special and Extra Service costs, emergency bus service, and other costs according to guidelines and specifications noted in the Baseline Cost Agreements, each specifically designed for the Independent Entity.

9.2   **Other Cost Adjustments**

The Parties acknowledge that there may be one-time costs such as emergencies or other material costs that were not anticipated at the time that the Baseline Cost Agreements for the current year were established. The Parties will meet and SuperMetro will provide written documentation of the costs for the Independent Entities' review and approval. SuperMetro may either pay the costs or, if the expense is ongoing, it will be added to the monthly invoice.

10.0   DISPUTE RESOLUTION

In the event of any dispute concerning this Agreement, the Transportation Services Project Manager or designee and the Manager of Service Development for SuperMetro or designee shall confer to resolve the dispute. These individuals shall use their best efforts and exercise good faith to resolve disputes and issues arising out of or related to this Agreement. In the event the Transportation Services Project Manager or designee and the Manager of Service Development for SuperMetro or designee are unable to resolve the dispute, the Transportation Services Director or designee and the General Manager of Transit Division for SuperMetro or designee shall confer and exercise good faith to resolve the dispute.

In the event the Transportation Services Director or designee and the General Manager of the Transit Division for SuperMetro or designee are unable to resolve the dispute, the Chief Executive Officer or designee of SuperMetro and the Director of Transportation for SuperMetro or designee shall engage in good faith negotiations to resolve the dispute.

In the event the Chief Executive Officer of SuperMetro or designee and the Director of Transportation of SuperMetro or designee are unable to resolve the dispute, the Parties may submit the matter to a mutually agreed upon non-binding mediator. The Parties shall share equally in the cost of the mediator.

The Parties agree that they shall have no right to seek relief in a court of law until and unless each of these procedural steps is exhausted.

11.0   INDEMNIFICATION AND DEFENSE

11.1   **General Indemnity**

To the maximum extent permitted by law, each Party shall defend, indemnify and hold harmless the Parties and all of its officials, employees, principals and agents from all claims, demands, suits, actions, and liability of any kind, including injuries to persons or damages to property ("Claims"), which arise out of, are connected with, or are due to the negligent acts or omissions

of the indemnifying Party, its contractors, and/or employees, agents, and representatives in performing its obligations under this Agreement. Each Party's obligation hereunder applies only to the extent of the negligence of such Party or its contractors, employees, agents, or representatives

The Parties acknowledge that this waiver was the subject of mutual negotiation.

12.0   TERMINATION OF AGREEMENT

12.1   Termination for Default
Either Party may terminate this Agreement, in whole, or in part, in writing if the other Party substantially fails to fulfill a material obligation or all of its obligations under this Agreement through no fault of the other Party, provided that insofar as practicable, the Party terminating the Agreement will give:

  a) Written notice of intent to terminate at least 30 days prior to the date of termination stating the manner in which the other Party has failed to perform the obligations under this Agreement; and
  b) Opportunity for the other Party to cure the default within at least 30 days of notice of the intent to terminate. In such case, the notice of termination will state the time period in which cure is permitted and any other appropriate conditions.

12.2   Termination for Convenience
Either Party may terminate this Agreement, in whole or in part, in writing, for its convenience provided that the other Party will be given:

  a) Written notice of intent to terminate no less than 180 days prior to a major service change;
  b) Opportunity for consultation with the Party initiating the termination prior to the termination date; and
  c) Provided, however, SuperMetro's ability to perform the work of this Agreement beyond the current appropriation year is conditional upon appropriation by the King County Council of sufficient funds to support said work. Should such an appropriation not be approved, this Agreement will terminate automatically at the close of the current appropriation year. The appropriation year ends on December 31 of each year.

12.3   Activities upon Termination
Upon termination of this Agreement by expiration of the term or as provided in this Section, SuperMetro and the Independent Entities agree to work together cooperatively to develop a coordinated plan for terminating the services rendered up until the time of termination, determining reasonable contract close-out costs for termination for convenience or termination.

Information for this Prototypical Agreement as derived from Sound Transit (Seattle, Washington Area) and Regional Public Transportation Authority (Phoenix, Arizona area).

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                                                    -- CTR Library Digitization Team

Appendix 4. Partner Ground Rules for Regional Public Transportation Authority, Maricopa County, Arizona

Arizona Department of Transportation (ADOT) Public Transportation Division:
- Annual funding for this program is targeted to be $100,000 FTA Section 5311 grant program/$100,000 match for a total of $200,000.
- For three years only, local match dollars will be provided through an ADOT fund exchange with other transit programs.
- For the first three years of the program, the 17 percent farebox ratio recovery rate required of Section 5311 grantees operating deviated fixed-route service will be suspended. After the third year of operations, an acceptable farebox recovery will be negotiated by the partners.

Maricopa County Human Services:
- Annual funding for this program is targeted at $125,000 Job Access and Reverse Commute (JARC) grant program/$125,000 local match for a total of $250,000.
- JARC grant in the amount of $125,000 will be available, subject to the availability of required match, for three years, FFY 2005, 2006, 2007.
- Application for JARC grants in subsequent years will be submitted, but cannot be guaranteed.
- JARC grant is to assist clients getting to workplace and training for return to work on the corridor from Ajo/Phoenix.
- Maricopa County will use its best efforts to obtain sufficient funds to be used as local match for the JARC grant. A primary source might be Local Transportation Assistance Funds (LTAF II) funds with support to be requested from the communities served.

Regional Public Transportation Authority (RPTA):
- RPTA will arrange for Contract Operator for portion of service from Gila Bend to Desert Sky.
- RPTA will complete and submit Section 5311 Grant Application for operations from Gila Bend to Desert Sky beginning in FFY 2005/06.

Rural Pima County Transit:
- Rural Pima County will arrange for Contract Operator for portion of service from Ajo to Gila Bend.
- Will serve as Grantee for Section 5311 funds from Ajo to Gila Bend.

Appendix 5.
Regional Service Planning Barrier
and Constraint Forms

Barrier

- *Something that obstructs*
- *Structure blocking access; structure intended to prevent access or to keep one program separate from another*

What is a Barrier in the context of coordinated regional service?
- Federal Statute
- Federal Agency Regulation
- Federal Funding Policy
- Texas Statute (Transportation Code, for example)
- Texas Regulation (Administrative Code, for example)
- Texas Agency Policy, especially funding policy
- Regional Government Policy
- Local Agency Policy
- Local Interpretation of Federal/State law

How to recognize a Barrier?
- Written into statute
- Written into code
- Written into regulation
- Written into contract language for funding agreement

Are all Barriers in writing, i.e., real?
- Real Barriers
- Perceived Barriers can be Real Barriers

Region:
Barrier # __
Brief description of the Barrier:

Source of Barrier

____**Is the Barrier officially documented?** If Yes, define specific source of Barrier.

- Federal Statute _____
- Federal Agency Regulation _____
- Federal Funding Policy _____

- Texas Statute (Transportation Code, for example) _____
- Texas Regulation (Administrative Code, for example) _____
- Texas Agency Policy, especially funding policy _____

- Regional Government Policy _____

- Local Agency Policy _____
- Local Interpretation of Federal/State law_____

____**Is the Barrier something you know by reference** but not necessarily documented? If Yes, define
your best understanding of the source of Barrier.

Specifically describe how this Barrier is obstructing coordinated regional service. *Attach additional
pages as required to describe in detail and with supporting facts.*

Person Identifying Barrier:
Name: Phone: Email:
Agency:
Responder:
Name: Phone: Email:
Agency:

Constraint

- *Limiting factor*
- *Something that limits the freedom to act spontaneously*
- *A physical, practice or other force that limits freedom of action*
- *Restriction, limitation*
- *Challenge requiring initiative to resolve*

What is a Constraint in the context of coordinated regional service?
- Historical practice
- Misinformation
- Reaction to perceived Barrier
- Transportation myths
- Excuses
- Assumptions
- Reluctance to tackle challenges
- Institutional conflicts
- Personality conflicts

How to recognize a Constraint?
- Challenge or problem that cannot be tied back to a specific Barrier
  - Not codified, reported but not referenced
  - Usually not written into regulation
  - May be in contract language

Are Constraints Real or Perceived?
- Yes

How does a Region address a Constraint?
- Local initiative to address and resolve constraint

Region:
Constraint # __
Brief description of the Constraint

Source of Constraint

<u>**Specifically**</u> **describe how this Constraint is limiting or restricting coordinated regional service.**
Attach additional pages as required to describe in detail and with supporting facts.

What is your Region doing to take Local initiative to address and resolve constraint?

Do you need additional assistance on how other Regions have tackled and resolved similar Constraints? Would you like to post a request for advice or suggestions from other Regions on the Regional Service Planning (RSP) Website?

Person Identifying Constraint:
Name: Phone: Email:
Agency:
Responder:
Name: Phone: Email:
Agency:

The Waco-Temple-Killeen area comprises two transportation planning regions: the Heart of Texas Council of Governments (HOTCOG) and the Central Texas COG/MPO. In all, the two regions include 15 counties, spanning the I-35 corridor between Austin (the Capitol Area region) and the Dallas-Fort Worth/North Central Texas region.

Central Texas Region

The nine counties (approximately 9,000 square miles) in the Central Texas region are served by the Hill Country Transit District (HCTD), known as "The HOP." HCTD operates three divisions:
- The demand-response Rural Division serves the nine counties of Bell, Coryell, Hamilton, Lampasas, Llano, Mason, Milam, Mills, and San Saba.
- The Killeen Urban Division provides fixed-route and ADA complementary paratransit service to the cities of Copperas Cove, Killeen, and Harker Heights.
- The Temple Urban Division provides fixed-route and ADA complementary service to the city of Temple.

HCTD also provides human services transportation through the TxDOT non-emergency Medical Transportation Program and through three separate Area Agency on Aging contracts for persons 60 and over. HCTD also has an agreement with Hill Country Community Action to provide Head Start transportation services. In all, HCTD provides an average of 500,000 one-way trips per year, with a fleet of 100 vehicles and a staff of 130 people. Many of the HOP riders are elderly, particularly in the rural areas, and a large number of trips are provided for dialysis and other medical appointments.

Existing Coordination

HCTD receives 5307, 5309, 5310, and 5311 federal funds, as well as State Public Transportation funds, and is a direct service provider, with no sub-contractors. Trips are coordinated among its own services – for instance, carrying passengers with disabilities on its Special Transportation Service to connect to one of its fixed-route services. The transit district contracts with three Area Agencies on Aging (Central Texas, Capitol Area, and Concho Valley), and has Memorandums of Understanding with local human services centers, Mental Health/Mental Retardation (MHMR) agencies, workforce centers, and cities to meet the public transportation needs of agency clients as well as the general public.

HCTD's Scott & White Connector provides transportation for patients going to the Scott & White facilities in Killeen and Temple, as well as serving as a route for general public transportation. The Connector is able to carry greater numbers of medical trips than the shuttles previously operated directly by Scott & White, due to the larger number of passengers carried per vehicle.

HCTD participates in a referral program with other providers in Waco, Austin, and beyond, directing callers to the transit provider that best suits the caller's location and transportation needs.

Service Limitations and Challenges

Although HCTD is able to use and blend multiple funding sources to provide its services, there are not enough resources to meet all of the transit needs in the region. Greater service frequency, service to more locations, and evening and weekend service are some of the desired service expansions that require additional funding. HCTD will award a contract in 2007 for the implementation of an automated scheduling and dispatching system, which will help to optimize existing vehicle and staff resources.

Additional funding difficulties are due to the various eligibility requirements for different rider and trip categories. Some types of trips are not funded (or only partially funded) through human services agencies, and the transit district must assume a significant part of the cost of these trips.

Planned Coordination Projects

HCTD will soon be implementing an automated scheduling and dispatch software system to better coordinate its services and vehicles.

HCTD is interested in collaborating with other Texas transit providers on group purchases of vehicles, tires and other vehicle parts, tools and equipment, fuel, and even software programs (such as scheduling and reporting programs).

Heart of Texas Region

The Heart of Texas region consists of six counties (Bosque, Falls, Freestone, Hill, Limestone, and McLennan). The City of Waco is the largest urban area in the region.

Waco Transit provides urban fixed-route service and complementary ADA paratransit within the City of Waco, as well as the Baylor University Shuttle (B.U.S.), a campus circulator. Waco Transit also administrates the MTP/Medicaid transportation in the six counties, via subcontracts with four human services agencies. The Heart of Texas Rural Transit District contracts with the same four human services transportation providers to provide rural transit service to the region's six counties:
- Central Texas Senior Ministries (CTSM) operates rural public transit outside the Waco metropolitan area, elderly/disabled transit services, and Medicaid transportation in Falls, Hill, and McLennan Counties.
- Bosque County Senior Services provides rural transit and Medicaid transportation in Bosque County.
- Freestone County Senior Services provides rural transit and Medicaid transportation in Freestone County.
- Limestone County Senior Services provides rural transit and Medicaid transportation in Limestone County.

Greyhound provides intercity service, with stops in Waco, Temple, and Killeen (via Southwest Coaches). Arrow Trailways provides intercity service out of Killeen to Abilene, Houston, Dallas, Austin, and San Antonio.

The Waco Streak Airport Shuttle provides fixed-route service between Waco and the Dallas-area airports (Dallas-Fort Worth International Airport and Love Field). Four shuttles per day make stops at Baylor University and selected Waco-area hotels as well as both airports.

Existing Coordination

Even prior to the formal regional coordination planning effort in 2005-2006, the transit providers throughout the HOTCOG region were cooperating to extend transit services to new areas and clients. In addition to the transit services described above, these and other coordinated efforts have helped to fill special transportation needs all over the region:

- Central Texas Senior Ministries (McLennan County) and Hill County Transit coordinate with Scott & White to provide medical trips to Scott & White facilities. The trips are scheduled on specific days and are provided to Scott & White patients via a voucher program. This scheduled transportation system allows more riders to be transported and helps to ensure reliable trip schedules for these patients.
- HOTCOG and the McLennan County Youth Collaboration (MCYC) developed an agreement to provide transportation services to young adults participating in the MCYC's employment training programs through a cooperative with HOT Workforce.
- All of the rural transit providers provide transportation for people traveling to the Heart of Texas Workforce Centers for training, employment applications, or employment counseling. The Workforce Board provides vouchers to its clients for the service.

The Waco Intermodal Transportation Center is a hub not only for Waco's public transit services and the Baylor University Shuttle, but also for the intercity Greyhound Trailways and Central Texas Trailways buses.

Service Limitations and Challenges

Additional longer-distance transportation services are needed, including daily routes traveling from rural areas to Waco, and also routes from the Waco area to Temple and Dallas/Fort Worth.

Existing cooperation and referrals between transit providers could be enhanced and extended with more detailed information. A statewide directory of transit services is one of the planned coordination projects described below.

Like the Central Texas region, transit providers in the Heart of Texas region are seeking ways to consolidate purchases and activities among providers and thereby maximize available resources.

Planned Coordination Projects

The regional transit plan for the Heart of Texas region outlined 13 planned coordination projects for potential implementation over the next ten years. Some of these are summarized here.

- Waco Transit's regional maintenance facility and administration building/customer service center was designed as built as a "50-year" facility, sized to accommodate substantially larger fleets and staff than current levels. In other words, the building is designed to accommodate 50 years of future growth in transit service. Waco Transit currently operates approximately 40 vehicles; the facility can accommodate a 100-vehicle fleet. The administrative area is similarly designed to accommodate dispatch operations large enough to serve the entire region. Waco Transit, Heart of Texas Rural Transit, and the subcontractors that they both use are planning a consolidation of vehicle maintenance operations. This will be a significant benefit to the rural providers, who currently must use local mechanics for their transit vehicles; as most local repair shops do not routinely carry specialized parts for transit vehicles, these vehicles are often out of service for days while parts are ordered. In the future, the facility may also house centralized dispatching for the rural and medical transportation services in the HOTCOG region.

- A pilot project, which received funding via a grant from the Job Access and Reverse Commute (JARC) program in July of 2007, will provide selected rural areas in the HOTCOG region with transit service into the City of Waco. The service will provide affordable commute service from lower-income, high-unemployment areas in Falls County to the Workforce Center and selected pilot commercial facilities in Waco. The service utilizes rural transportation to deliver workers to hub locations in Falls County where Waco Transit will provide multiple pick-ups and drop-offs during each workday.

- Additional rural service routes are being examined as a means of providing reliable transportation service to greater numbers of riders in the rural areas. The routes would provide more efficient and reliable service than is possible with a strictly demand-response system and would therefore accommodate more riders.

- HOTCOG is interviewing webpage developers as an initial step toward a statewide directory of transit services. The planned directory would provide contact and service information on transit providers, suppliers, repair centers, and coordination programs. HOTCOG is also looking into the possibility of adding transit information dispatchers to the local 211 telephone information service.

Coordination between the Regions

The providers of the two regions have been coordinating informally for years, and are seeking ways to provide more trips beyond their regional "borders." Part of this coordination is the referral program mentioned previously, directing callers to the correct transit provider for their location and needs. Both regions have expressed interest in group purchasing of vehicles and equipment, and in coordinating more trips across regional boundaries.

Challenges that both regions face include the following:
- **Funding limitations.** Transit providers in the two regions are interested in further coordination, particularly coordination that would facilitate cross-regional trips. However, many coordination activities require additional funding, which is both limited

and difficult to obtain. Both regions are seeking TxDOT assistance in pursuing funds and consolidating purchases for coordination-related technologies and activities.

- **Differences in service requirements.** Increasing coordination of demand-response trips requires a "service-oriented" approach to trip scheduling. Service efficiencies are improved, and more clients can be served when individual trips are consolidated and multiple riders share a transit ride. However, trips provided for clients of human services programs can be difficult to consolidate, due to differences in regulations between the agencies concerning service requirements, vehicle requirements, and riding rules. Standardized regulations for the provision of human-service transportation would help to maximize service coordination and service capacity. Another barrier to consolidating trips is created by individual appointment times for medical visits and varying lengths of medical visits. Passengers on dialysis have very specific schedules and destinations, which often cannot be coordinated with other trips.

- **Differences in reporting requirements.** Each human services agency currently has its own reporting requirements, forms, and formats regarding transportation services for agency clients. Different agencies can also have different reporting requirements at their local, state, and federal levels, further complicating the process. As with service requirements, making reporting requirements consistent across the human services and transit agencies would greatly assist the coordination process and help to make the most of resources.

History of Regional Coordination

Interest in coordinating public transit services in the Houston metropolitan region began in the early 1990s, focusing on non-emergency transportation and general medical trips. A committee, formed with support from the Office of the Harris County Judge, began dialog among the largest and most well-known transportation providers to determine how coordination might occur. Simultaneously, the Texas Department of Health and Human Services issued a request for proposals seeking entities to develop a prototype of coordination in several regions within the state. The American Red Cross Transportation Services responded and received the award to develop a coordination plan for non-emergency trips in Harris County. After the work with Health and Human Services, a number of agencies, who needed transportation for their clients, contracted with the American Red Cross to provide these services. Shortly thereafter, Houston-Galveston Area Council (HGAC-the local metropolitan planning organization) spearheaded a comprehensive study of need, which showed a tremendous unmet and underserved population in the HGAC region. Through the years, even as new people and agencies joined, the core coordination committee formed from the Office of the County Judge remained the nucleus of coordination dialog in Harris County.

Existing Condition and Coordination Initiatives

Houston (Harris County) is the largest city in a population center of more than 5 million people. Adjacent counties of Fort Bend, Montgomery, Brazoria, and Galveston include residents who commute into the urban core for work, medical, and other trips. There are also employment locations in these counties that draw a portion of regional commuters in "reverse-commute" trips. Seven public agencies, along with several private and social service agencies are listed in the HGAC led Regional Coordination Plan as providing transit service in the eight counties comprising the greater Houston metropolitan area (Table 7-1). The largest and most extensive coverage is provided by the Metropolitan Transit Authority of Harris County (METRO). METRO covers roughly the western 2/3 of Harris County with local express bus, park and ride, and light rail; their enabling legislation allows them to collect a 1 percent sales tax in Harris County as authorized by voters in 1978. There is widespread consensus that more public transit service is needed and coordination among the various providers essential for the well-functioning of the region. Individual linkages are underway, but the region would benefit from a structured plan and approach to better coordinate and expand existing services.

Table 7-1.
Public Transit Providers for Eight-County Houston Metropolitan Area.

Transit Agency	Service Area	Eligibility and Type of Service
Metropolitan Transit Authority of Harris County (METRO)	Western ¾ of Harris County, and City of Houston w/in Fort Bend County	General public, elderly and people w/disabilities; local and express bus, park and ride, and light rail
Harris County Coordinated Transportation	Harris County	coupon based program for elderly and disabled individuals that provides transportation to grocery stores, pharmacies and medical appointments
Island Transit	Galveston (city)	public transportation system serving Galveston, Texas; bus, trolley and services for the disabled
Brazos Transit District	Liberty, Montgomery, Walker Counties	General public, elderly and people w/ disabilities. Operate demand-response and paratransit, park 'n ride, park 'n pool, and waterway cruisers.
Fort Bend Transit	Fort Bend County	General public, elderly and people w/disabilities; local and express bus.
Connect Transit	Brazoria, Galveston Counties	General public, elderly and disabled. Demand-response, shared services.
Colorado Valley Transit	Austin, Colorado, Waller, Wharton Counties	General public, elderly and disabled. Demand-Response. Seniors 60yrs+ in Austin and Waller Counties ride free.

Coordination Currently Underway

Transit Agency Initiatives
A number of activities are in process in the greater Houston area that enables greater transit travel options for riders.[1] Many of these are in conjunction with medical transportation services. Harris County's Rides program is the largest and serves as the nucleus of coordination for several entities. Eight subcontractors provide service on the east side of the county, not served by the region's Metropolitan Transit Authority for residents of that portion of the county who are

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1. Interviews were conducted the last two weeks of June 2007 with presidents, executive directors or their designees of five of the seven agencies shown in table 7-1, as well as two executive directors of social service organizations.

elderly, have a disability or meet income requirements. Additional agencies have indicated a desire to participate with Rides, but are unable to satisfy their eligibility guidelines. A service similar to Rides operates in Fort Bend County by the American Red Cross. The essence of coordination for these programs is shared rides offered by the American Red Cross or contracted taxi companies.

Brazos Transit District (BTD), TREK and Fort Bend County Transit have varying degrees of coordination with METRO's routes to core area destinations. BTD patrons travel from Lufkin to the Texas Medical Center, the medical branch of University of Texas at Galveston, Greenway Plaza and downtown Houston. Intergovernmental agreements allow coordinated fares for these services. TREK, the Uptown and Greenway Plaza area Transportation Management Association, contracts for bus service to those two employment centers. The TREK bus serving Greenway Plaza stops at METRO's West Bellfort Park and Ride allowing patrons to transfer to downtown or the Texas Medical Center. Separate fares are required for each link of the trip, so seamless fare is a desired improvement.

Discussions are underway between METRO and Harris County, as well as METRO and Fort Bend Transit, to increase transit options for the east and west portions of the region, respectively. The concept for Harris County is to extend an existing park-and-ride route into nearby Baytown, which is outside of METRO's service area. METRO is preparing a cost model to invoice Harris County for only the marginal costs for the route extension. METRO will collect and retain the fare; Harris County will provide parking, security and shelter. A free transfer will be available to transfer to the rest of the METRO system. The fare charged will be two zones higher than that for the nearest lot, and in accordance with METRO's fare structure for park-and-ride routes. The same concept is being discussed with Fort Bend Transit for service from the Sugar Land area to downtown. Previous dialog with Brazoria County for METRO service from Pearland did not yield a project, but officials are still hopeful that a financially viable option can be identified.

HGAC Coordination Initiative
HGAC created a Regional Public Transportation Coordination Plan Steering Committee to assist with the development of a plan submitted to the Texas Department of Transportation (TxDOT) in December 2006. The Steering Committee members represented a broad spectrum of stakeholders in the region. The Plan can be found at http://hgac.com/HGAC/Departments/Transportation/Regional_Public_Transportation_Coordination/default.htm.

The Regional Public Transportation Plan that addresses potential partnerships with stakeholders such as transportation providers, local governments, public agencies, and others to improve the delivery of public transportation services generates efficiencies in operations leading to increased levels of service, and encourages cooperation and coordination among agencies. The desire is to efficiently improve customer service for patrons.

Since the plan development the Steering Committee has met to receive updates of regional transit planning activities, advance and encourage pilot projects, and discuss potential funding options and opportunities.

Potential Demand for Regional Commute Travel

An important question for communities considering regional public transportation is: to what extent do commute trips made by persons in private vehicles translate to potential transit riders? The Houston-Galveston Area Council staff conducted a cursory level analysis to establish anticipated demand, if certain corridor services were available today. The results of the assessment show a number of corridors with high volume public transit potential. Table 7-2 shows the greatest potential from Galveston IH 45S, including riders from Pasadena into downtown. If the IH 45S corridor patrons heading to Uptown and Greenway are added, approximately 7000 trips are shown from that corridor. Also of note are trips from Richmond and Rosenberg into the Uptown, Greenway and downtown Houston, and trips around the Sam Houston Tollway/Beltway 8 and Montgomery County (Conroe) into inner West Houston (IH 610 and Dacoma). Each of these corridor routes showed more than 1500 trips per peak period, which would allow very frequent service.

Table 7-2.
Estimate of Potential Transit Ridership – Selected Harris, Ft. Bend, Montgomery, Brazoria, and Galveston County Corridors.

Route Description	Number of Daily Home Based Work Trips (assume two directional)
East—West or Circumferential—(Routes Don't Go Downtown)	
FM 1960-SH 6-SH 146 Circulator Counter Clockwise	833
FM 1960-SH 6-SH 146 Circulator Clockwise	906
Cleveland-Kingwood-Greenspoint-Greenway-Uptown	2086
Beltway Loop Clockwise	3096
Beltway Loop Count Clockwise	2141
Greenspoint-Cypress-Eldridge-Missouri City	2371
Conroe-Woodland-Greenspoint-Dacoma	3149
Galveston-Clear Lake-Uptown-Greenway	2810
Katy-Energy Corridor-Westchase-Sharpstown	1335
North	
Cleveland-Conroe	44
Hempstead-US 290/SH 6-Dacoma	2539
South/Southwest	
Rosenberg-Sugar Land-Sharpstown-Uptown-Greenway-Central Business District (CBD)	3264
Freeport-Lake Jackson-Angleton-Pearland-Texas Medical Center-CBD	1204
Galveston-Texas City-Clear Lake-Pasadena-CBD	4197
East/West (Routes Go Downtown)	
Baytown IH 10 East-CBD	1278
Baytown Ship Channel-CBD	1869
Total	**33122**

Possible Direction for Future Coordination

Interviews conducted with individuals from the region's transit agencies showed each agency's interest in improving the network of public transportation services, expanding regional coverage, and easing movement across the region for transit patrons. While much coordination is underway in the greater Houston-Galveston region, it is largely individualized as one agency may coordinate with another agency or two. The most successful and longstanding initiatives are associated with the services provided for medical or other specialized trips working with or

modeled after Harris County's task force or their "Rides" program. METRO is initiating a prototype for park-and-ride service beyond its borders and shows a willingness to extend this arrangement or broker with others if the service is successful. Brazos Transit District works with METRO to provide opportunities for their patrons to access medical and other locations within METRO's jurisdiction. Still, the region has no comprehensive, strategic approach to integrating routes, facilitating transfers, enhancing connections or streamlining fares for regional public transportation patrons, especially for the general riding public.

More than 1 million new residents are predicted to populate the region in the next ten years. Shifting a few trips from auto to transit could absorb some travel pressure that will be placed on the roadway system due to such intense growth. A regional approach to public transportation would more likely encourage increased public transportation use. The computer generated demand run conducted by HGAC shows that more than 33,000 riders could be expected to take public transportation each day (in 2007), if appropriate routes and linkages were in place. Average weekday ridership on the METRO system for 2006 is 335,775. An almost 10 percent increase in the region's daily transit trips could be realized in critically congested corridors with a greater public transportation presence.

One of the often discussed limitations to more transit service in the Houston-Galveston region is the sales tax ceiling that affects every community that surrounds the METRO boundary. The tax ceiling makes it difficult to identify long-term sources that could support public transportation. Raising that limit or other changes required through the Texas Legislature would be time consuming, require additional resources, and are not guaranteed success. The passage of Senate Bill 1089 by the 80th Regular Session of the Legislature, permitting the use of Section 4A or 4B taxes to support public transportation, may help transit in the future. An incremental step to increase coordination in this region in the near term would be to pursue the Joint Agreement/Interlocal Agreement model described in chapter one. This is already the model underway, but benefit would be achieved if the leadership of the seven public agencies and key social service agencies come together to identify the series of agreements needed to cover the region in transit mobility within existing resources. An initial meeting should be held between the chief executive officer or executive director of each agency to affirm the need for a regionalized approach, delineate key coordination elements, and establish an action plan and schedule.