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THE CHANGING FACE OF PUBLIC TRANSIT SERVICE STANDARDS: AN IN-DEPTH ASSESSMENT OF THE RHODE ISLAND PUBLIC TRANSIT AUTHORITY

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The Changing Face of Public Transit Service Standards:

An In-Depth Assessment of the Rhode Island Public Transit Authority's

By

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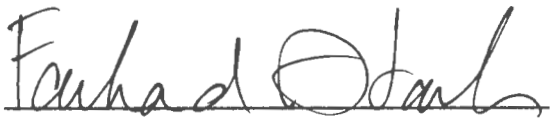
Acknowledged: 

Director **Dr. Marcia Marker Feld, Ph.D**

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Hadassah Naami Morán

Chapter 1: Introduction

Transit authorities across the nation use standards as a foundational blueprint for the delivery of service. These standards give an overall view of the type, quality, and amount of service, as well as logistical information such as processes and procedures. "Even today, with virtually every transit system under public ownership, the need continues for a system for standards. In the most organized and well-run agencies, services and routes exist that are seriously out of conformance with the rest of the system" (Benn 1995:3).

In 1992, Abrams-Cherwony and Associates, a consultant group, conducted an examination of the service standards at the Rhode Island Public Transit Authority (RIPTA). In their evaluation, the consultants discovered that there were no formal service standards that RIPTA was operating under, and decisions were made with no set foundation. There were no guidelines that dictated where bus service was to be assigned, what services should be added or cut, no customer service guides, no protocol for maintenance of buses, and no budget guidelines. Abrams-Cherwony developed standards that were guided by population density and car ownership among targeted neighborhoods. The author was hired by RIPTA to update the Abrams-Cherwony service standards to best reflect the operations and reflect the social changes of Rhode Island.

Problem Statement

The Rhode Island Public Transit Authority (RIPTA) has been using the service standards Abrams-Cherwony created since 1992. RIPTA service standards were developed and changed by using percent of households without automobiles, population density, distance to the nearest bus stop, and activity centers. However, in the recent years, RIPTA has seen the need to incorporate new measurements to reflect Rhode Island's changing demographics, economics, and social trends.

Based on community response and trend observations, RIPTA has developed a planning process to include passengers and potential passenger's needs, and has created a partnership with local city and town planners and community leaders that can specifically address the mobility and transportation needs of their residents.

The challenge is to update these standards, and more importantly, justify why service standards developed by Abrams-Cherwony are no longer applicable to the needs of Rhode Island.

Objectives Of The Study and its Significance

This study will thoroughly analyze the 1992 service standards and particularly make explicit the justification of updating the document. The document will be reviewed by the General Manager of RIPTA, Beverly Scott. This study is significant because it demonstrates the changing socio-economic measures that are vital to public transit service standards.

Method of the Study

This study underwent extensive research and analysis of documents pertaining to public transit operations, service standards design. Census 2000 data such as population trends, density, and economic development were also used in the analysis. Also examined were the newly adopted service standards by the Chicago Transit Authority (CTA). Although CTA is much larger in size than RIPTA and uses rail and commuter trains, their processes, definitions, and layout of their standards gave substantial insight.

The primary method was analyzing the previous RIPTA service standards and performing a comparison with current processes and procedures to measure if the service standards were still applicable. In addition, the Federal Transit Administration (FTA) created many documents explaining in detail the varying operations and procedures that are being implemented around the country (Benn 1995:3). The FTA conducted a survey including approximately 300 transit agencies and evaluated their service standards including route design, schedule design, economic and productivity standards, service delivery, and passenger comfort and safety.

CHAPTER 2: HISTORY OF RIPTA

Mass transportation in Rhode Island began during the Civil War. For the next 100 years, it would be operated as a private-sector enterprise. The first routes established in the state were served by horse-drawn "omnibuses".

In 1865, at the time when more than 2 million passengers were carried annually, a horse-railroad system began operation under the privately owned union railroad. During the next decade, service expanded into the suburbs of Providence.

The electric car was introduced in 1889 and was followed by a bold expansion of this type of trolley service in the 1890's; however, its operation was predominantly in the suburban areas. As patronage continued to rise, a total of 24 million passengers were carried in 1892 climbing to 34 million by 1897.

In 1902, the union railroad, following a reorganization, became the Rhode Island Company and was given the task of linking utility companies with railway operations. Just 4 years later (1906), the company was acquired by the New Haven Railroad.

The system was once again reorganized in 1921, becoming the United Electric Railways (UER) and overseeing the daily operations of the major mass transportation system in Rhode Island. It was at this point that the state became involved and the system qualified for certain tax exemptions; however, it now came under the regulatory authority of the public utilities commission. Two years later, annual ridership was at an all-time high of 154 million passengers.

The New England Power Company purchased the UER in 1926. Subsequently, a holding company-namely, the Rhode Island Service Company-took over the operations of the transit system. Following the onset of the Great Depression in 1930, not only were service reductions and falling revenue and ridership inevitable but also service improvements were abruptly halted.

Mass transportation in Rhode Island was reborn during World War II as a result of gas rationing. In fact, transit patronage rose to a near all-time high of 151.4 million passengers in 1944. However, ridership then decreased due to the availability of gasoline for the private automobile following World War II. As the majority of the public leaned toward personal vehicles, ridership continued to decline despite some major efforts on the system's behalf.

In 1951, mass transit in Rhode Island was again reinvented. The system became known as the United Transit Company (UTC). This would be the last year in which over 100 million passengers were carried. Shortly thereafter, the availability of diesel and gasoline buses brought a new image to the system replacing the trackless trolley, the last of which made its exit in 1955.

While ridership continued to decrease from 100 million to 20 million in only 15 years, the Rhode Island Public Transit Authority (RIPTA) was created by the General Assembly in 1964 and assumed operation on July 1, 1966. As a result, privatization of the transit system came to an end.

1968 saw the highest ridership level of the period-specifically, 21 million annual passengers. This may have been a direct result of RIPTA increasing the number of bus miles traveled by more than 50 percent during its first 15 years in operation so that nearly 70 percent of the state's population could access public transit service by 1979.

As RIPTA continued to increase the number of bus miles traveled and gasoline prices continued to rise due to unavailability, ridership significantly rose in 1980 and 1981.

In 1996, RIPTA welcomed a new general manager, Dr. Beverly A. Scott, to lead the challenge of rebuilding the company. Scott re-organized systems and departments, with a specific emphasis on planning, to better serve the people of Rhode Island

Scott spearheaded the Transit 2000 Service Plan - RIPTA's five-year program to improve service, introduce new technologies and transportation options, and provide convenient

and economic alternatives to single occupancy vehicle trips. Transit 2000 prepares for the future, introducing a quality control program that will Replace RIPTA's aging fleet and introduce passenger amenities such as a reconstructed Kennedy Plaza transit center. Scott's vision has re-shaped RIPTA as it enters the 21st century, with programs like reintroducing the Providence LINK. The LINK made its debut as RIPTA's contribution to the restoration of historic downtown Providence bringing back the vintage style, trackless trolley. These trolleys, serve as the first fleet fueled by Compressed Natural Gas (CNG) in Rhode Island's mass transit history.

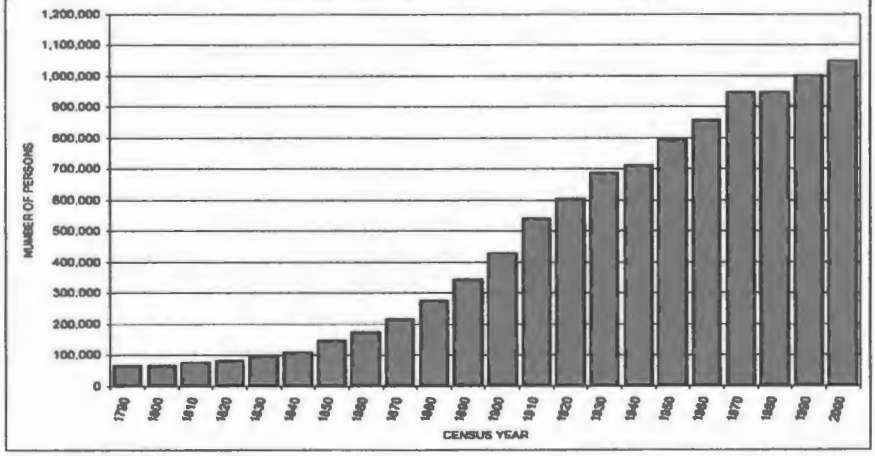
In the spring of 2002, the newly renovated Kennedy Plaza opened to the public. The plaza features a ticket booth with services for RIPTA, Bonanza and Greyhound buses, and Amtrak fast ticketing. It also has comfortable, climate-controlled indoor waiting area with restrooms for passengers, a coffee café, vending machines, bicycle storage, and a City of Providence Police Security Office. RIPTA enters the new millennium continually pursuing excellent quality and service to its patrons.

City Hall, Providence 1906
Source: Detroit Publishing Co

Chapter 3: Rhode Island Profile

This chapter provides a snapshot of Rhode Island's population, land use patterns, and historical street design. Figure 1 shows the population change from the year 1790 to 2000. Rhode Island has shown a steady increase in population over the last 210 years.

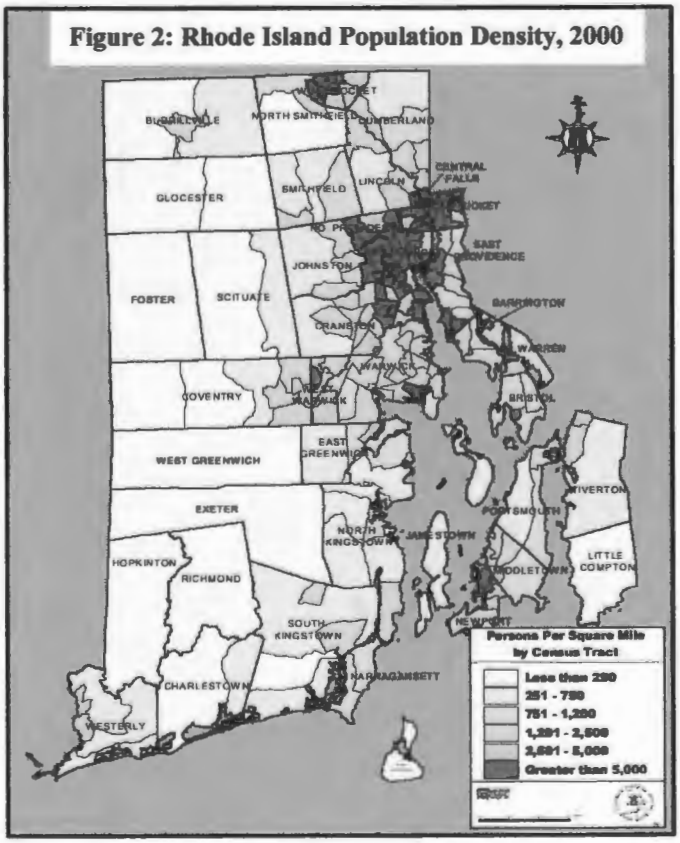
Figure 1: Rhode Island Population from 1790 - 2000



Source: U.S. Census Bureau

Figure 2 shows the population density per square mile throughout the state of Rhode Island in 2000. The U.S. Census Bureau shows Providence having the highest population of 173,618. However, Central Falls has the highest population density at 15,773 persons per square mile.

Figure 2: Rhode Island Population Density, 2000



Source: U.S. Census Bureau

The 2000 United States Census Bureau report shows the State of Rhode Island and Providence Plantations having a land area of 1,045 square miles[1] and a population of 1,048,319. Rhode island is composed of three land use categories: urban, suburban, and rural[2].

Urban

A municipality with a population density of 2,500 or more persons per square mile and 50% or more of the land area within the municipality is classified as developed land under the urban category. Following are the ten communities in Rhode Island that are classified as urban:

- *Central Falls*
- *Cranston*
- *East Providence*
- *Newport*
- *North Providence*
- *Pawtucket*
- *Providence*
- *Warwick*
- *West Warwick*
- *Woonsocket*

Suburban

A municipality with a population density of 500 to 2,499 persons per square mile and 25% or more of the land area is classified as developed. Fourteen communities in Rhode Island correspond to this classification:

- *Barrington*
- *Bristol*
- *Cumberland*
- *East Greenwich*
- *Jamestown*
- *Johnston*
- *Lincoln*
- *Middletown*
- *Narragansett*
- *North Kingstown*
- *Portsmouth*
- *Smithfield*
- *Warren*
- *Westerly*

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[1] *U.S. Census Bureau*

[2] *Urban, suburban, and rural classifications by Statewide Planning Program of Rhode Island.*

Rural

A municipality with a population density of less than 500 persons per square mile or a developed land area of less than 25% is considered rural. Fifteen communities correspond to the rural category:

- *Burriville*
- *Charlestown*
- *Coventry*
- *Exeter*
- *Foster*
- *Glocester*
- *Hopkinton*
- *Little Compton*
- *New Shoreham*
- *North Smithfield*
- *Richmond*
- *Scituate*
- *South Kingston*
- *Tiverton*
- *West Greenwich*

Providence Historical Street Design

Providence's road network is composed of a series of radial streets. This development has proved planning bus routes challenging, and sometimes difficult to navigate along the narrow, windy, or oddly shaped streets.

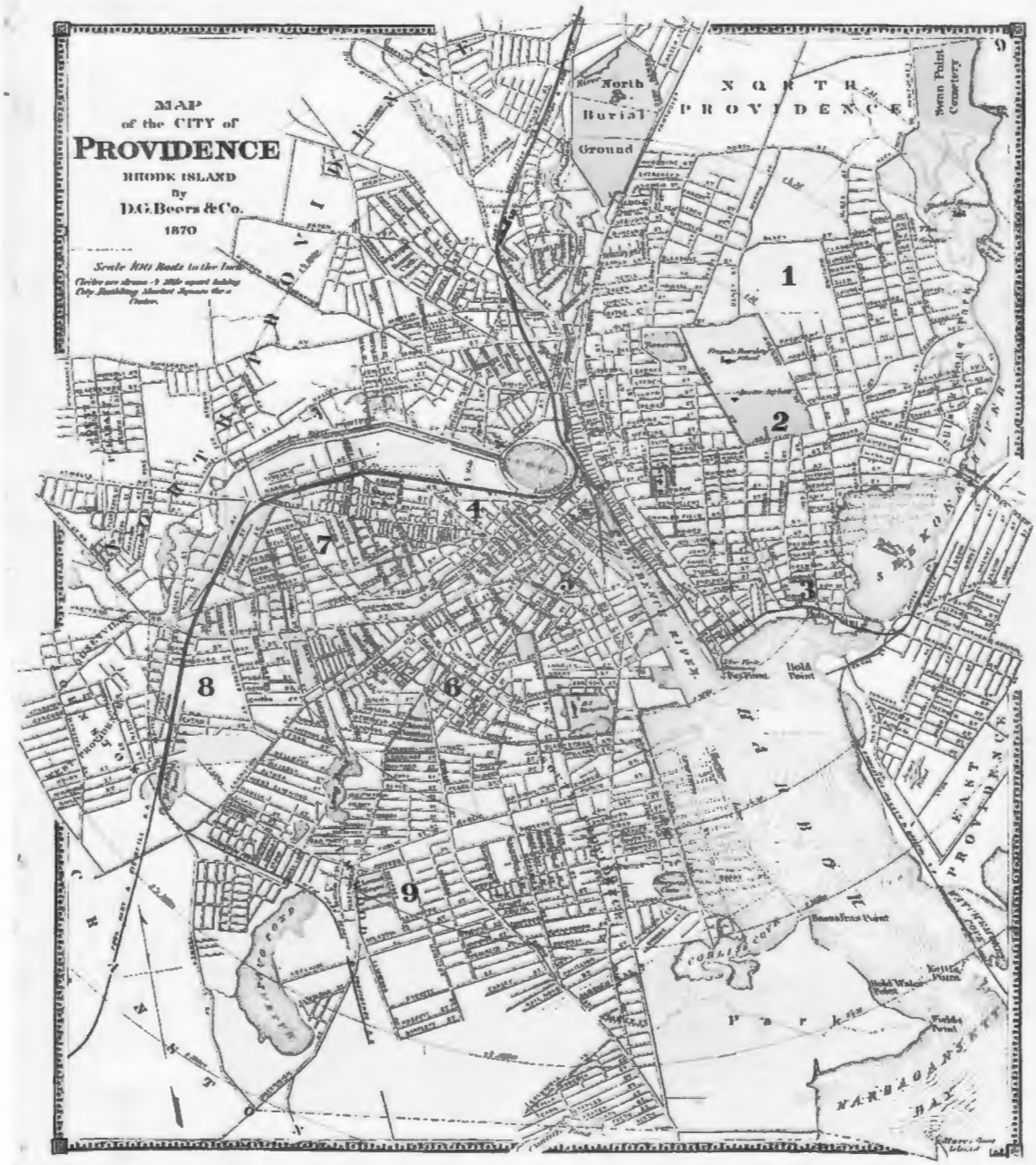
Figure 3: Birds-eye view of Providence,

Figure 3 shows a birds-eye view of Providence. Already apparent are the radial streets emanating throughout what is now known as Capital Center and Downtown Providence.

Figure 4: Street map of Providence, 1870

This 1870's map of Providence provides a detailed look into the street patterns. RIPTA has designed routes based on a grid system, however, it proved challenging. The radial system, the current design, was re-implemented and has proved effective.

Figure 4: Map of Providence 1870



Source: Rhode Island USGen Web

Chapter 4: Goals & Board of Directors of RIPTA

This chapter gives a background of RIPTA's company's goals and the General Laws that govern the Board of Directors.

RIPTA's mission is "To provide safe, reliable and cost effective transit service with a skilled team of professionals responsive to our customers, the environment, and committed to transit excellence." Four overarching goals have been adopted that provide a foundation for the company.

Company Wide Goals

Goal 1: Safe and Reliable Service

This goal involves analyzing the performance of service, including an analysis of service on a month-to-month basis.

Goal 2: Cost Effectiveness

This goal involves showing the value of RIPTA as an operating business, evaluating fiscal performance as well as personnel performance. It also provides a comparison of RIPTA to the National Database and its peers on issues such as increased ridership and farebox recovery.

Goal 3: Employee Development

This goal will provide training and high level of continued performance of drivers. Employee development ensures that employees work to their full potential and maximum amount of days.

Goal 4: Quality of Life

Issues that improve the quality of life for the people of Rhode Island are of importance to RIPTA. Involvement with issues including Smart Growth, air quality, and alternative modes of transportation, are key to the improvement of Rhode Island.

Each goal has sub-goals that RIPTA creates and updates every fiscal year, as well as departmental goals.

Board of Directors

The Board of Directors is comprised under the statutes mandated by the State of Rhode Island General Laws[3], Chapter 39-18-2, where it states that the Authority shall consist of seven members, four of whom are appointed by the governor with consent from the senate.

The Board of Directors provides policy guidelines and direction for all core elements of RIPTA's governance and financial and resource allocation decisions. The Board's actions impact all aspects of the RIPTA's organization from employees to customers and in all the communities served.

Board of Directors as of September 2001:

- Dr. William Ankner
- Mr. Thomas Deller
- Mr. William Kennedy
- Representative Robert Sullivan
- Ms. Anna Prager (chair)
- Senator Charles Walton
- Ms. Sharon Conard-Wells

[3] Source: State of Rhode Island General Laws: 39-18 (see Appendix)

Chapter 5: Operating Budget

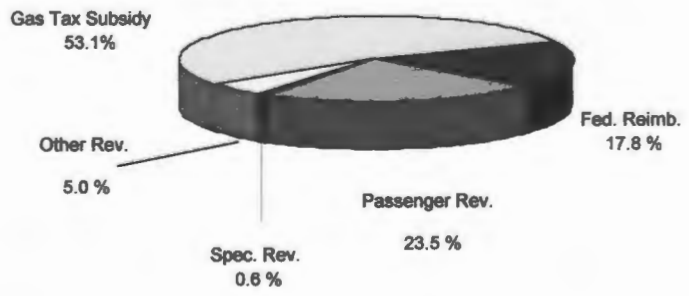
Chapter Five provides a glance of RIPTA's operating budget in fiscal year (FY) 2002 as well as a background on the funding for the 1991-2001 period.

Financial Overview of RIPTA

In 1993, RIPTA was allocated 3 cents of the state's gas tax, and in subsequent years, increasing portions of the gas tax have been dedicated to RIPTA. RIPTA currently receives 6 ¼ cents of the 28-cent gas tax. Increases in the gas tax allocation have been used to compensate for flat revenues from and the lack of other options for financing operations. The last ¼ cent of the gas tax will be dedicated to RIDOT in FY 2003.

Figure 5 shows a breakdown of revenues in fiscal year 2002. Other revenues include parts & equipment, computer expense, marketing/advertising, planning/ training/ consulting services, and posted intermodal information. Special revenues include advertising, charter fees, rental income, ID pass sales and beach bus fares.

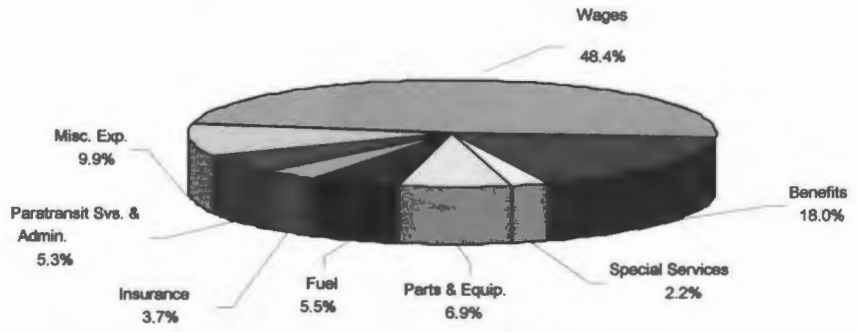
Figure 5: FY 2002 Revenues



Source: RIPTA Finance

Figure 6 shows a breakdown of expenses in the fiscal year 2002. Special services include professional and consulting services such as legal counsel, audit, actuarial, architectural, and engineering services.

Figure 6: FY 2002 Expenses



Source: RIPTA Finance

Federal and State Assistance: 1991-2001

The following bullets summarize the changes in the availability and use of federal operating assistance.

- Elimination of federal operating assistance in the Urbanized Area Formula Program with the sunset of ISTEA in 1997.

- Loss of the additional operating assistance received from 1991-1997 under Senator Chafee's provisions in text of ISTEA.

- TEA-21 provision allows transit providers to use Federal Transit Administration (FTA) capital funds for preventive maintenance activities—essentially an operating subsidy.

- RIPTA has increased its FTA capital funds programmed in the preventive maintenance category since 1998 in order to address operating deficits.

- Preventive maintenance has reduced the funds available for other capital program activities such as bus replacement.

- Since 1999, RIPTA has supplemented service with operating funding from FTA's Jobs Access/Reverse Commute Program. This program is likely to be formularized or eliminated, resulting in a significant decrease in the remaining federal operating assistance available to RIPTA.

These bullets summarize the factors related to overall FTA funding.

- RIPTA has received significant amounts of federal discretionary capital funding since 1999, which has allowed RIPTA to utilize formula capital funds for preventive maintenance expenses.

- Federal capital funding available to RIPTA has increased under TEA-21; these funding levels are not guaranteed after FFY 2003.

- The flexible funding provisions of TEA-21 have been of great benefit to RIPTA. RIPTA has successfully competed for a significant amount of Congestion Mitigation and Air Quality (CMAQ) funding under TEA-21. A large portion of this funding has been utilized to pilot new service initiatives such as the Providence Link (downtown trolley system). The cost of providing these new services must be absorbed by RIPTA if service is to continue after grant funds are utilized. Due to this situation, RIPTA has shifted its philosophy relative to the CMAQ program and currently focuses on capital projects.

- The ability to leverage federal funding is dependent on the availability of sufficient local match, especially in the discretionary category, in which it is critical to move projects forward expeditiously in order to continue to receive funding.

Other considerations:

- The majority of FTA funding is allocated not by state but by urbanized area. For this reason, RIPTA must split a large portion of its FTA formula funding with Southeastern Massachusetts. This split has been negotiated in concept through 2006, and will result in Southeastern Massachusetts (GATRA) receiving a greater share of the overall funding available.

- Rhode Island is fortunate to have Senator Reed chairing the Senate Banking and Finance Committee's subcommittee on transit.

- In addition to funding bus transit, FTA also makes funding available for rail transit projects.

Chapter 6: Key Service Indicators

This chapter documents the service standards that were created by a consultant group, and explains how the service standards have changed and in what ways.

A Review of The Abrams-Cherwony Standards

In 1992, a consultant group, Abrams-Cherwony and Associates, was commissioned to develop service standards for RIPTA. Three years later in 1995, the Board of Directors approved and adopted standards which were based on several key factors including:

- *Suitability to the characteristics of the service territory and requirement*
- *Consideration of the cost implications of each standard*
- *Ease of use in that the parameters defined in each standard permit a straightforward evaluation of actual system performance and set forth clear guidelines for evaluating service alternatives*
- *Prevailing practice in the transit industry*

Guided by these key factors, five major indicators of service were chosen as the basis for the assessment of RIPTA service standards. These indicators are: *availability, service level, patron convenience, fiscal condition, and passenger comfort.* Service was developed or changed by using technical data such as: percent of households without automobiles by population density, distance to the nearest bus stop or fixed route, and activity centers. A listing of sixteen sub-indicators within the five major indicators was also developed. These sub-indicators were determined by population density and car ownership among neighborhoods. The complete list of indicators and their sub-indicators are:

Availability

- *Production End*
- *Attraction End*

Service Level

- *Frequency*
- *Span*
- *Directness*

Patron Convenience

- *Speed*
- *Loading*
- *Bus Stop Spacing*
- *Dependability*

Fiscal Condition

- *Fare Structure*
- *Farebox Recovery*

Passenger Comfort

- *Waiting Shelters*
- *Bus Stop Signs*
- *Revenue Equipment*
- *Public Information*

How The Service Standards Have Changed

How Social Change Has Affected Service Standards

RIPTA is currently operating under the same five key indicators as measures of current transit service. In the past ten years, passenger's changing needs have strongly influenced the way RIPTA looks at these attraction ends (as stated by Abrams-Cherwony), also known as "trip generators." In the recent years, RIPTA has incorporated new trip generators to reflect the changing needs of the Rhode Island population including an in-depth analysis at mobility trends for poverty, mobility needs for targeted riders and clients such as the disabled, elderly and student populations, as well as work hour patterns of the people of Rhode Island. These trends give insights as to where people are

and where they are going. It also projects the number of people needed to move from one specific place to another. RIPTA is now more aware and observant of how social trends impact mobility needs and transit allocation.

Based on community responses and trend observations, RIPTA has included the Abrams-Cherwony trip generators and expanded them to respond and forecast passenger's needs. Some of these needs expressed have included but are not limited to: the need for more buses to operate in the early-sunrise hours, increased frequency between buses, re-routing of buses, and more accurate and detailed bus schedule information.

RIPTA has also created partnerships with local city and town planners and community leaders that can specifically address the mobility and transportation needs of their residents. Trip generators set planning parameters for a community's mobility and destination. These generators show how many people are traveling to and from these areas and at what times of day and are used to create, change, and/or delete service.

Trip Generators

Trip generators are specific destinations or areas of concentration that attract people on a regular basis. Following is a listing of the trip generators set by Abrams-Cherwony, as well as the additional generators added by RIPTA. Also, the generators that have changed since the previous service standards are explained below.

Activity Centers

Activity centers are places that attract a significant number of transit trips are what make up an attraction end. Five key activity centers, or indicators, are designated as follows:

- Colleges/schools with enrollment of at least 1,000 students
- Employers with 300 or more employees
- Hospital/Nursing Homes of 100 beds or more
- Shopping Center with more than 100,000 square feet of leased retail space
- Social Service/Government Center serving at least 100 clients daily

- **Colleges/schools with enrollment of at least 1,000 students *(Abrams-Cherwony)***
  Rhode Island is host to major educational institutions such as Brown University, Johnson and Wales University, University of Rhode Island, Rhode Island College, and Rhode Island School of Design. Typically, students use public transportation because limited budgets impacts their transportation options.

- **Employers with 300 or more employees *(Abrams-Cherwony) and* Employers with high parking costs* *(RIPTA)***
  RIPTA does not simply look for companies with over 300 employees and use that as a sole criterion. There is a definite distinction in service need between companies in the Downtown area with over 300 employees, and companies in the suburban/rural areas with over 300 employees.

  - Employees working in Downtown have a key incentive for using public transportation: high parking costs. There is a decrease of parking spaces available that create a need for more parking spaces. However, space is at a premium in Downtown, resulting parking costs to rise faster than inflation. Therefore, in order to save an estimated $125 per month in parking costs, employees look to public transportation as an alternative to automobile.

  - Employees working in a suburban/rural company have disincentives for using public transportation. Being in a suburban/rural environment, typically companies absorb parking costs. Also, in order to avoid overcrowded parking lots, employers arrange staggered work hours, which in turn, makes it difficult to provide public transportation because of the vast differences in work schedules.

RIPTA now differentiates between Downtown and suburban/rural companies. These types of companies may have the same amount of employees, however have different needs of service. This type of distinction would not have been as strong a consideration five years ago because parking costs to employers was not as high or parking spaces were not as much in demand as they are now.

- **Hospital/ Nursing Homes of 100 beds or more *(Abrams-Cherwony) and* Housing Developments *(RIPTA)***

Then. . .

The Abrams-Cherwony standards list hospitals and nursing homes having 100 beds or more as a trip generator. Ten years ago and beyond, senior citizens were dispersed among family, and nursing homes were not as much in demand. Locating seniors was relatively easy for planners because service would be provided to the nursing homes where the seniors were. The disabled populations were institutionalized, also making it easy to target this group and provide service.

Now . . .

In the past ten years, a social shift has occurred among the senior citizen population and the disabled population. Nursing homes are no longer the primary location where seniors are residing. "Warehousing" of seniors has become more and more prominent. In other words, large apartment complexes are now providing seniors with residences. Therefore, RIPTA has seen the need to include ***housing developments*** among their generators – a generator not foreseen by the previous standards. These housing developments have also become home for large numbers of low-income residents that are transit dependent.

In contrast, the disabled community has become more mainstreamed into society and has been residing among neighborhoods *as well* as institutions. Their transit needs have also changed, and with programs like RIde and Flex, their transit needs are being addressed.

- **Intermodal Facilities *(RIPTA)***

Then. . .

Abrams-Cherwony makes no mention of the need to establish transit hubs or intermodal facilities, despite the fact that the Intermodal Surface Transportation Efficiency Act (ISTEA) was enacted in 1991, before the Abrams-Cherwony standards were finalized.

Now . .

Intermodal facilities are now an important component in planning. Since the introduction of the new General Manager in 1996, Dr. Beverly Scott, one of her goals has been to establish more intermodal facilities throughout Rhode Island. Title V- Section 5001 of ISTEA states the guidelines in establishing intermodal facilities.

RIPTA has established several intermodal facilities including T.F. Green Airport in Warwick, Galillee Ferry in Narragansett, Providence MBTA in Providence, and Kingston Rail Road Station. There are plans for several more intermodal facilities in the near future.

- **Shopping Center with more than 100,000 square feet of leased retail space *(Abrams-Cherwony)***

  Large shopping centers continually attract large volumes of people at various times of the day, which is why RIPTA has continued to use this generator.

- **Social Service/Government Center serving at least 100 clients daily *(Abrams-Cherwony)***

  Many social/government centers provide programs aimed to the low-income, disabled, or special needs population, and a large majority of these populations use public transit. RIPTA has included this generator in their planning process.

Indicators

Following is a listing of indicators and sub indicators set by Abrams-Cherwony as listed on page 16. The indicators that have changed since the previous standards are explained.

- ***Availability:*** This standard was divided into two separate components that reflect travel concentrations, trip purpose, and the need for bus service. The two components are production end and attraction end.

➢ Production End: Residential areas that should be candidates for service is determined by a reasonable walking distance, which is one-quarter mile, or a five-minute walk.

This 'reasonable walking distance' is combined with data regarding auto ownership and population density of an area in order to determine optimum spacing of bus routes (Abrams-Cherwony 1992:4).

➢ Attraction End: Activity centers deserve transit service if they are large enough to attract an adequate number of transit trips. To assist in this determination, "threshold levels" have been established for different categories of activity centers. These threshold levels which are based on past experience and judgment, should serve as guidelines in determining which centers in each category should be given consideration for service (Abrams-Cherwony 1992:6)

- ***Service level***: This standard deals with how transit routes are scheduled, including frequency, span, and directness.

Then. . .

➢ *Frequency:* The time intervals between buses from a specific route describes a frequency, or "headway." Headways suggested by Abrams-Cherwony are summed up in the following table:

Figure 7: Abrams-Cherwony Proposed Headways

LOCAL: PROVIDENCE	Every 20 min	Every 30 min	Every 60 min	Every 60 min	Every 60 min
LOCAL: OTHER	Every 30 min	Every 60 min	Every 60 min	Every 60 min	Every 60 min
EXPRESS	*Two trips each peak period*				
CROSSTOWN/LOOP	----------	60	----------	----------	----------

The table is suggesting that a local route at peak time should have a *minimum* headway of every 20 minutes.

Currently the top three heaviest routes average a headway of every 12.3 minutes[4]. Below is a chart showing these routes and their headways during weekday peak hours.

Now . . .

Figure 8: Top 3 headways for FY 2000

Route #	Average Frequency During Weekday Peak Hours
99: Providence/Pawtucket	Every 10 min
11: Broad Street	Every 12 min
31: Cranston Street	Every 15 min

The Abrams-Cherwony model provides a good starting point, however, some of the urban routes cannot use the model with a suggested headway of 20 minutes because overcrowding would occur. For example, during the morning peak hour, 7am to 9am, Route 99 inbound to Providence carries an average of 25.3 passengers per trip[5]. This is with a headway of every 10 minutes. If Route 99 were to run every 20 minutes as suggested by Abrams-Cherwony, the ridership would double, carrying approximately 51 passengers per trip during morning peak hours. Since the 40-foot vehicles carry approximately 40 passengers, overcrowding with standing passengers would occur in almost every leg of this route, causing significant discomfort for passengers and possibly discouraging ridership.

[4] Based on RIPTA's 2000 Route Diagnostics
[5] Based on RIPTA Survey Trip Sheets January 2000

Recommendation:

Urban, suburban, and rural neighborhoods all present different transit needs. Headways can be set as a starting point for these different types of land uses. The author of this study is proposing these headways for weekday peak and weekday non peak:

Figure 9: Suggested headways – Proposed Weekday Peak

Land Use Type	Frequency During Weekday Peak Hours
Urban	Between every 10 to 15 min
Suburban	Between every 15 to 25 min
Rural	Between every 25 to 45 min

Figure 10: Suggested headways – Proposed Weekday NON Peak

Land Use Type	Frequency During Weekday NON Peak Hours
Urban	Between every 10 to 20 min
Suburban	Between every 20 to 30 min
Rural	Between every 30 to 60 min

These two charts provide clearer headway boundaries for routes in urban, suburban, and rural areas. Each route should undergo an evaluation to determine what type of land use it primarily serves, based on the criteria described in Chapter 1, Rhode Island Profile.

Then . .

- ***Span:*** This standard measures the duration of time each bus route is operating during the day. Abrams-Cherwony suggested the following for span:

Figure 11: Weekday Span Guide

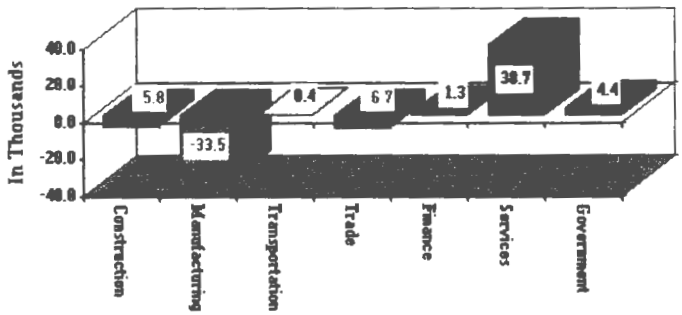
ROUTE TYPE	BEGIN	END	HOURS
Local	6:00 AM	9:00 PM	15
Express	***	As Needed ***	
Cross-town/Loops	9:00 AM	4:00 PM	7

Now . .

In the past few years, RIPTA has been examining at how span has been planned according to the Rhode Island economy and therfore changing work hours among Rhode Islanders. Providing bus service that begins at 6am and ends at 9pm, as recommended by Abrams-Cherwony, does not meet the needs of Rhode Island's working population. The main reason is because there has been an increase in the service industry which require "non-traditional" hours, which are not 9am to 5pm, but rather spans between 6am to second and third shifts.

In Rhode Island, employment in the service industries is the largest sector of the state's economy with health services, business services and educational services as the most important groups[6]. Observations have shown that people will use bus service as early as 5:00 am, if not, earlier.

Figure 12: Rhode Island Employment Change By Division, 1988 to 1998



Source: Rhode Island Economic Development

Figure 12 shows the increase of employement spanning ten years. While the manufacturing industry decreased by 33.5%, the service industry increased by almost 39%.

Currently, RIPTA's earliest route begins at 5:45am and the latest route ends at 12:45pm – a 19 hour day. Abrams-Cherwony do state, however, that "for weekday routes oriented to commuter travel, service should begin early enough to permit workers and students to make their morning start times and should end late enough to provide return trips home for second shift workers" (Abrams-Cherwony 8).

- ***Patron Convenience***: Four criteria under this heading: speed, loading, bus stop spacing, and dependability.

[6] Source: "Rhode Island Annual Economic Trends/Graphs" from RIEDC

Then. . .

- *Bus stop spacing*: Abrams-Cherwony recommends bus stops should be spaced according to the density of the area and charactersitics of the land use.

Figure 13: Bus Stop Spacing

Population Density (persons per square mi)	Bus Stop Spacing
Under 2,000	Flag stop
2,000 – 5,000	5 to 7 per mile
Over 5,000	Every other block

This chart explains that bus stops should be every other block for population densities of over 5,000. However, there are more factors to consider when planning bus stops apart from population density.

Now . . .

There are several areas in Rhode Island that have similar densities to each other, however their transit needs may vary. The east side of Providence has the same density per square mile as the west side, however, their needs are dramatically different. The East Side has households with higher incomes and higher car ownerships, and based on decreased bus ridership, do not require as much service as the West Side, where there are populations with average to below average incomes. The West Side has shown an incease in bus ridership and demand for more service. Car ownership is lower on the West Side than the East Side. In addition to car ownership, income and density levels, trip generators must be included in the planning process. With all of these criteria included, a more accurate picture of the community begins to unfold.

According to Abrams-Cherwony, RIPTA's ***fiscal condition*** is shaped by three standards, which are fare structure, farebox recovery, and productivity. These standards are still applicable and relevant. ***Passenger comfort*** also has standards that are relevant and at the forefront of RIPTA, including bus shelters, bus stop signs, revenue equipment, and public information.

Inter-Agency Partnerships

Inter-agency partnerships should be added to service planning because of the value they add to the planning process. These partnerships assist in determining what trip generators RIPTA should target. Such key people include:

- *Town and City Planners:* Planners help identify senior housing sites and other key generators
- *Elected Officials:* Facilitate relationships with target market constituencies
- *Department of Human Services:* Coordinate job training, day care, and other programs location decisions with transit services
- *Community Development Corporations:*
- *Neighborhood Community Centers/Groups:*
- *Academic Institutions:*

These three assist in providing an inside look into the communities/students they serve and their needs.

Public Participation

In the past, the Abrams-Cherwony standards provide a measurement of bus outcomes. However, due to changing social conditions, many of the indicators and sub-indicators need to expand to include more data analysis and scenarios, which have just not been available for in the Abrams-Cherwony standards.

Since the Abrams-Cherwony standards, RIPTA has seen the need to involve public input into the planning process – a process that is not mentioned in the Abrams-Cherwony standards. Constant public input and participation have become key components in service planning for many transit agencies across the country, and should be strongly considered in the RIPTA planning process.

Excerpt[7] from the Puget Sound Transit Implemenation Plan, August 2001

C. Public Comment

"To assist in finalizing the proposals, including those in the MIP program, an extensive public outreach effort sought comments and suggestions from citizens,

[7] Source: Puget Sound Transit online publications

transit planners, elected officials, community leaders and bus riders in the areas affected by these changes. A publication called Regional Transit News, which contained all the proposed changes and options, was handed out at all outreach events, and was mailed to more than 40,000 people.

Twelve formal public meetings/open houses were held in Everett (two), Sumner, Parkland, Tacoma, Redmond, Renton, Mercer Island, downtown Seattle, Eastgate, Issaquah and Northgate. Two other open houses, in Auburn and Bellevue, were cancelled due to the February 28 earthquake. In addition, riders were met where they ride and live with 14 early morning visits to park-and-rides lots and Sounder commuter rail stations, and another round of 11 visits to malls and stores in the affected areas. The public could mail in the survey in the Transit News, or go online to share their comments and suggestions."

Excerpt[8] from the MIAMI-DADE Transt Office Of Public Involvement

Public Involvement Policy - May 7, 2001

"Intent

The purpose of this policy is to establish public involvement procedures for Miami-Dade Transit (MDT). Through a proactive public outreach process which seeks to involve citizens in transit planning through relationships within the community which fosters public input

Procedure

MDT will implement a proactive program that solicits input from citizens on transit issues, seeks to involve the public in transit planning and educates the public on local and national transit issues."

Exerpt[9] from Transportation Research Board's Committee on Public Involvement in Transportation

"Virtually all public works projects require a substantial planning effort to identify impacts, costs and alternatives. Federal and state laws and regulations

[8] Source: Office of Public Involvement work plan for Miami-Dade Transit

[9] Source: Transportation Research Board's Committee on Public Involvement in Transportation

call for certain levels of public involvement during planning, but meaningful, collaborative public involvement entails doing more than the minimum requirements. This is particularly true when there appears to be an imbalance in public input where one viewpoint is heard above others. The San Diego Metropolitan Transit Development Board (MTDB) has undertaken efforts on two different corridor projects to expand its public involvement in ways that maximize the range of community views, enhance project design and build support for the project. In addition to the traditional public meetings, newsletters and open houses, MTDB has used public relations firms, neutral facilitators and staff outreach to achieve expanded public involvement goals. MTDB has found that, while there are risks and costs associated with these approaches, they ultimately result in better projects that receive more widespread public and political acceptance."

The need for more comprehensive and analytical service standards, including public participation and input, is a crucial component for a manual that will serve as a solid foundation for RIPTA.

Chapter 7: Planning Service

This chapter was developed in cooperation with RIPTA's Planning Manager, Tim McCormick. Listed below are the "unofficial" processes and procedures for planning new service and for changing or deleting service.

New Service

Creating new service is an extensive process that can be best described in two Phases:

- *Phase I: Data Gathering*
- *Phase II: Planning for Service*

Phase I: Data Gathering

Information and resources must be gathered to best view the mobility and transportation needs of a community. The information gathered is analyzed from a city, tract, and block group level using the most recent census data. Following are the steps involved in the Phase I data gathering process.

Step 1: Statistical, Trend, and Data Analysis

Statistical and trend information on demographics, poverty levels, and car ownership is compiled and a comparison is performed to see which, if any, neighborhoods show any changes using the last two censuses.

An analysis of passenger points of origin and destination is performed of the target audience. Existing ridership data is gathered and geographic zones are compared to larger zones to determine trends.

Step 2: Target Markets

Detailed lists and maps are created, pinpointing targeted complexes/facilities that would generate ridership, such as schools, colleges, and universities. Meetings with the town/city planner are scheduled to discuss location of targeted areas and the mobility and transportation needs of the community. Included among these needs is an in-depth look at the needs and pedestrian safety and access.

Step 3: High Schools

High schools are contacted to determine their walking radius regulations. Graduated licensing is also examined since the level of the student's license will determine the student's need for public transportation.

Step 4: Colleges/Universities

An analysis is performed to determine if the college/university has its own transit and if RIPTA's services duplicate or overlap that service and therefore, coordinate service. The specifications to determine if the bus has sufficient room at the institution for pull-ins and pull-outs is also determined.

Step 5: Trip Generators[10]

Trip generators are defined and mapped to determine proximity and location to current and potential ridership.

Step 6: System-wide Goals

System-wide goals are introduced to navigate the purpose of the planning process and for whom the process is created. These goals are also used to serve as a foundation and checkpoint during the process.

Phase II: Planning for Service

Once all of the data has been collected and analyzed, the planning process begins to take shape. Following are the steps in Phase II, the Planning for Service.

Step 1: Scenarios and Feedback

Drafts of different scenarios of routes and services are created and distributed internally within RIPTA (planning, safety, operations, etc.) and externally to key participating partners.[11] Changes are then made and drafts continue to circulate until there is an acceptable plan.

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[10] See Key Service Indicators: Trip Generators, Chapter 6

[11] See Key Service Indicators: Inter-Agency Partnerships, chapter 6

Step 2: Public Input

RIPTA performs customer outreach and informational charrettes and discussions regarding new or altered service. If a route or service is altered by a minimum of 15% or more, RIPTA is required to conduct public hearings to collect feedback and comments from the consumers affected. Information collected is reviewed in Phase II. (Altered meaning change in route, deletion of route, deviation of route, etc.)

Step 3: The Board Approval

The RIPTA Board of Directors examines the plans for new service. During this process, they will question and make suggestions, adding, changing or deleting components of the service being reviewed. Once it is acceptable to the Board, they accept the plan, and then the implementation process begins.

Change and Deletion of Service

Changing or deleting service is dependent on four key indicators. These are evaluated separately as well as together to best judge performance of the service. Here are the indicators:

1. Passenger per hour
2. Passenger per mile
3. Farebox recovery
4. Passenger per trip

The service will be examined if any of these indicators fall below 50% of RIPTA system's average. It is possible that a change in frequency or location may be the problem and an adjustment to the route will be made. However, if two or more indicators are producing poor results, deletion of the service will be considered.

Chapter 8: Types Of Service

Chapter eight gives explanations of the types of service RIPTA provides.

Fixed Route Service

Fixed Route bus service is a planned series of streets and turns connecting to one or more transit centers. It provides predictable service on set routes at scheduled time points.

Express Service

Express Service provides non-stop, point-to-point service from a single, pick-up point to a designated drop-off destination.

Example of a fixed route map:

Figure 14: Route 99 Providence/Pawtucket: Inbound

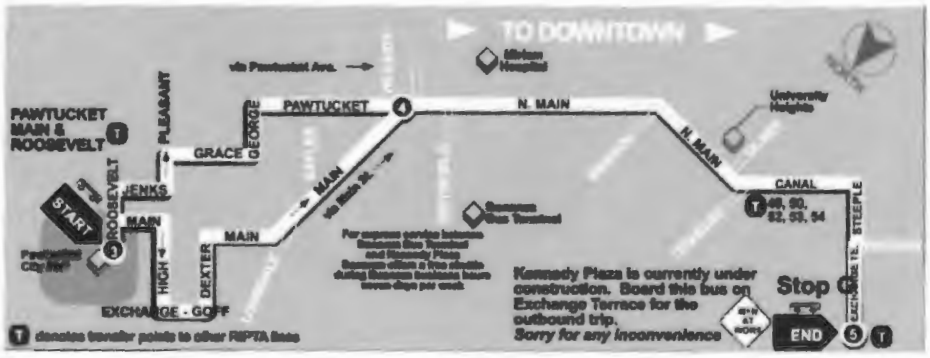
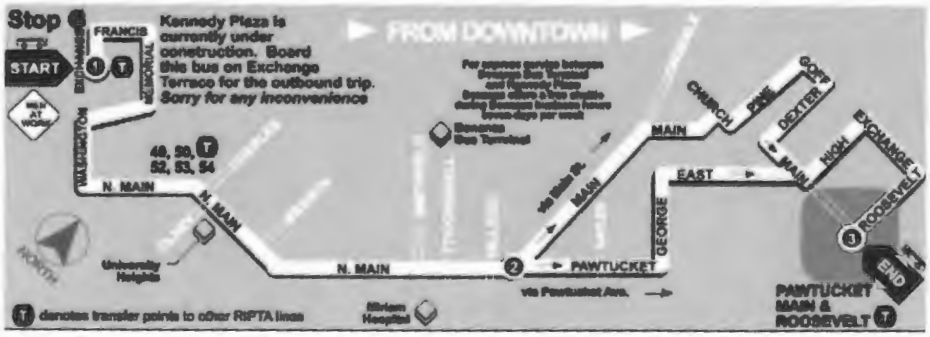


Figure 15: Route 99 Providence/Pawtucket: Outbound



FLEX Service

Flex Service is a RIPTA program designed to help serve the unmet mobility needs of communities across Rhode Island. Flex Service, which is short for Flexible Service, offers passengers the option of calling a ride or picking up the Flex Vehicle at one of its regularly scheduled Flex Stops. The Flex Vehicle, typically a 16-passenger vehicle with space for two wheelchairs, travels within a geographically limited zone known as a Flex Zone. Each Flex Zone represents a suburban or rural area that has little or no fixed-route bus service. The Flex Vehicle travels within the Flex Zone, picking up and dropping passengers off within the zone and connecting them to fixed-route bus service for travel outside the zone.

To use Flex Service, passengers either make a reservation 48 hours in advance or pick up the Flex Vehicle at any of the scheduled Flex Stops within the Flex Zone. Flex Service operates Monday through Friday. The fare structure for Flex is the same as RIPTA's regular bus service.

Flex Service expands the menu of mobility options for state residents, providing them with convenient, affordable transportation within their communities and an opportunity to make seamless connections to other locations in the State.

Flex Service is a demand-response public transportation service that also makes scheduled stops where passengers may board without a reservation. This service is intended to provide public transportation in areas during times of day when and where fixed route service is not feasible. Flex Service is also meant to support and supplement fixed route service by connecting Flex passengers with the fixed route system.

Figure 16: Example of FLEX Zone: Tiverton, RI

Paratransit Service

Specialized Paratransit services address the special mobility needs of disabled residents and senior citizens that cannot be effectively met by more economical transportation alternatives. These specialized statewide paratransit services are available to virtually all Rhode Island communities. Specific program eligibility and funding for this coordinated service is provided by the Department of Elderly Affairs, Department of Mental Health, Retardation, and Hospitals, Department of Human Services, Rhode Island Department of Transportation, and RIPTA.

RIte Care Program

The State of Rhode Island has a health care program called RIte Care. This Program improves access to health care services for those people in need who meet the eligibility guidelines. The goal of the transportation portion of this program is to provide the RIte Care population with good dependable transportation and gain access to preventative health care in the State of Rhode Island.

RIde Program

RIde is a modified curb-to-curb Paratransit Service that is comparable to existing RIPTA bus routes operated within the designated service area. This service is for individuals with disabilities unable to use regular bus service.

Ferry Service

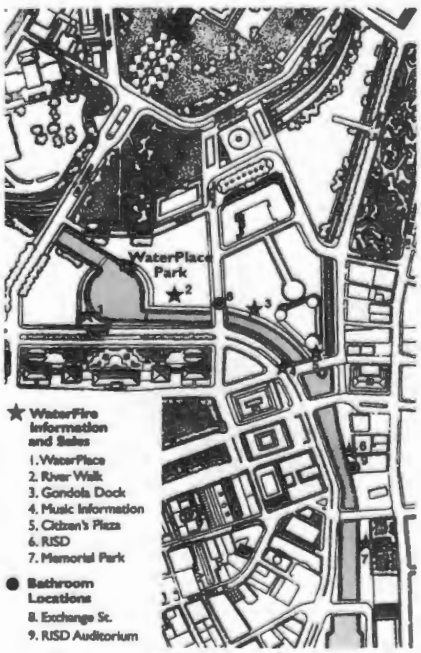
Ferry service is operated by Ocean State Express, and provides service from Providence to Newport, including stops at Providence's Point Street Landing and Newport's Perrotti Park.

Special Events

Waterfire

WaterFire Link Service picks-up passengers from specific designated locations to the Department of Transportation parking lot across from the State House and at Davol Square on Point Street.

Figure 17: Parking Map of Waterfire



First Night

RIPTA provides free Park N' Ride and regular and late night bus service for all First Night button-wearers on December 31. Designated bus lines operate late-night hours, leaving Kennedy Plaza at 12:30am.

Transfers

Fixed Routes and Flex

In order for a passenger to ride different buses, passengers pay the regular fare on the first bus and obtain a transfer slip to be used on the second bus vehicle. Following are some procedural points regarding fixed route transfers:

- Transfers can be used to change from any RIPTA bus or Ride vehicle to any other RIPTA bus or Ride vehicle anywhere along a route in order to complete a one way trip.
- Transfers are not to be used for return trips or stopovers in the same direction on the same route.
- Transfers are not required for passengers who remain on a bus when it changes routes.
- Transfers are not required for passengers who wish to remain on a bus for the return trip **if** the return trip takes a different route than the previous trip.
- Transfers may not be accepted if torn or mutilated. They are good only until the date shown.
- When a route travels two different ways, transfers may be used to access different legs of the same route. For example, a passenger boarding the inbound route number 3 bus on West Shore Road, may ask for a transfer to catch an outbound route number 3 bus to Oakland Beach.

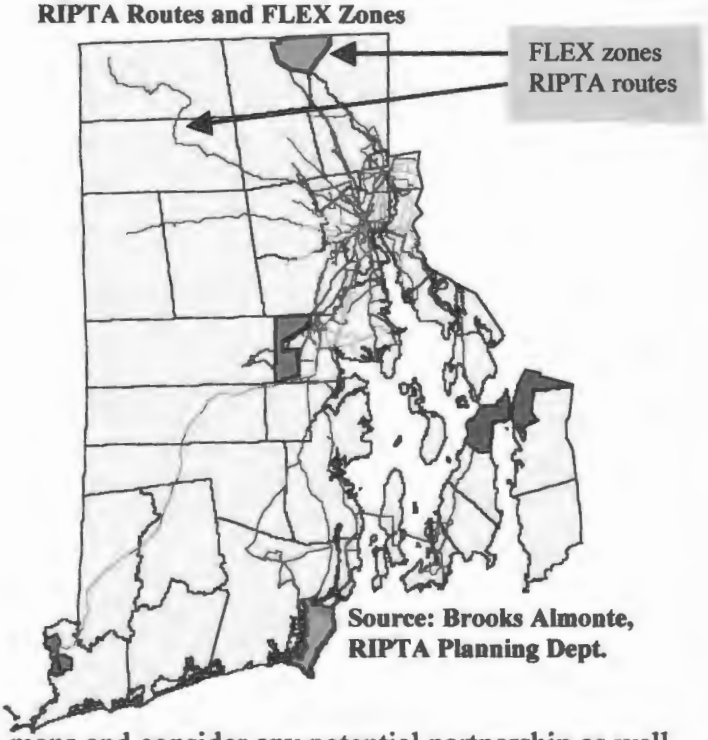
Chapter 9: Coverage & Land Use

This chapter provides a snapshot of Rhode Island and Providence. The land use maps serve as valuable tools in route planning for RIPTA.

Base Map

Figure 18 show bus service in State of Rhode Island. The colored lines represent the numerous routes, and the colored blocks represent the FLEX zone areas of service. Figure 19 illustrates the various City services, roads, protected areas and ponds throughout the city of Providence. Figure 20 illustrates the varying land use classifications throughout the city of Providence. Both of these maps are integral to the planning process in route design. Planners methodically study these maps and consider any potential partnership as well as obstacles dictated bv land

Figure 18: State of Rhode Island with RIPTA Routes and FLEX Zones



Source: Brooks Almonte, RIPTA Planning Dept.

Figure 19: City Overview, Providence

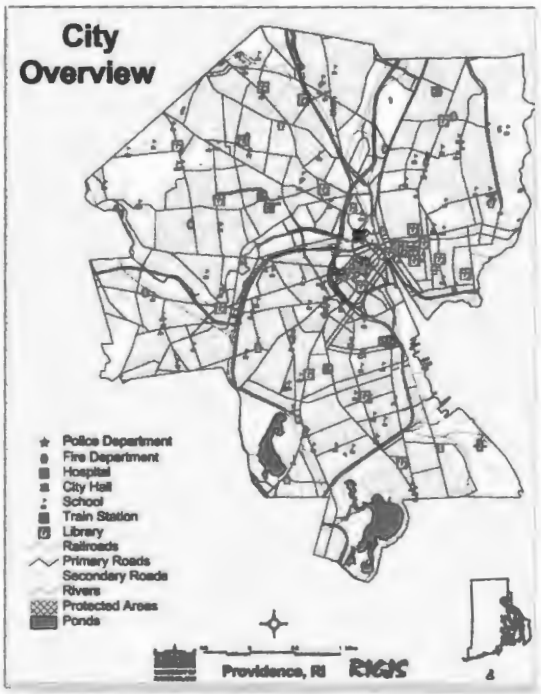


Figure 20: Land Use Classifications, Providence

Chapter 10: Transit Centers

This chapter primarily gives an overview of Kennedy Plaza.

Kennedy Plaza

Kennedy Plaza is the main terminal for all fixed route buses, trolleys, and commercial buses in Rhode Island. The Plaza provides passengers a comfortable, climate-controlled indoor waiting area with restrooms for passengers, a coffee café, vending machines, bicycle storage, and a City of Providence Police Security Office. Other transit hubs include Downtown Pawtucket, Olneyville Square, Newport, and Woonsocket. Future Projects will include the cities of East Providence and Warwick Below are maps showing the plans for the structure as well as a bus route map.

Figure 21: Schematic of Kennedy Plaza

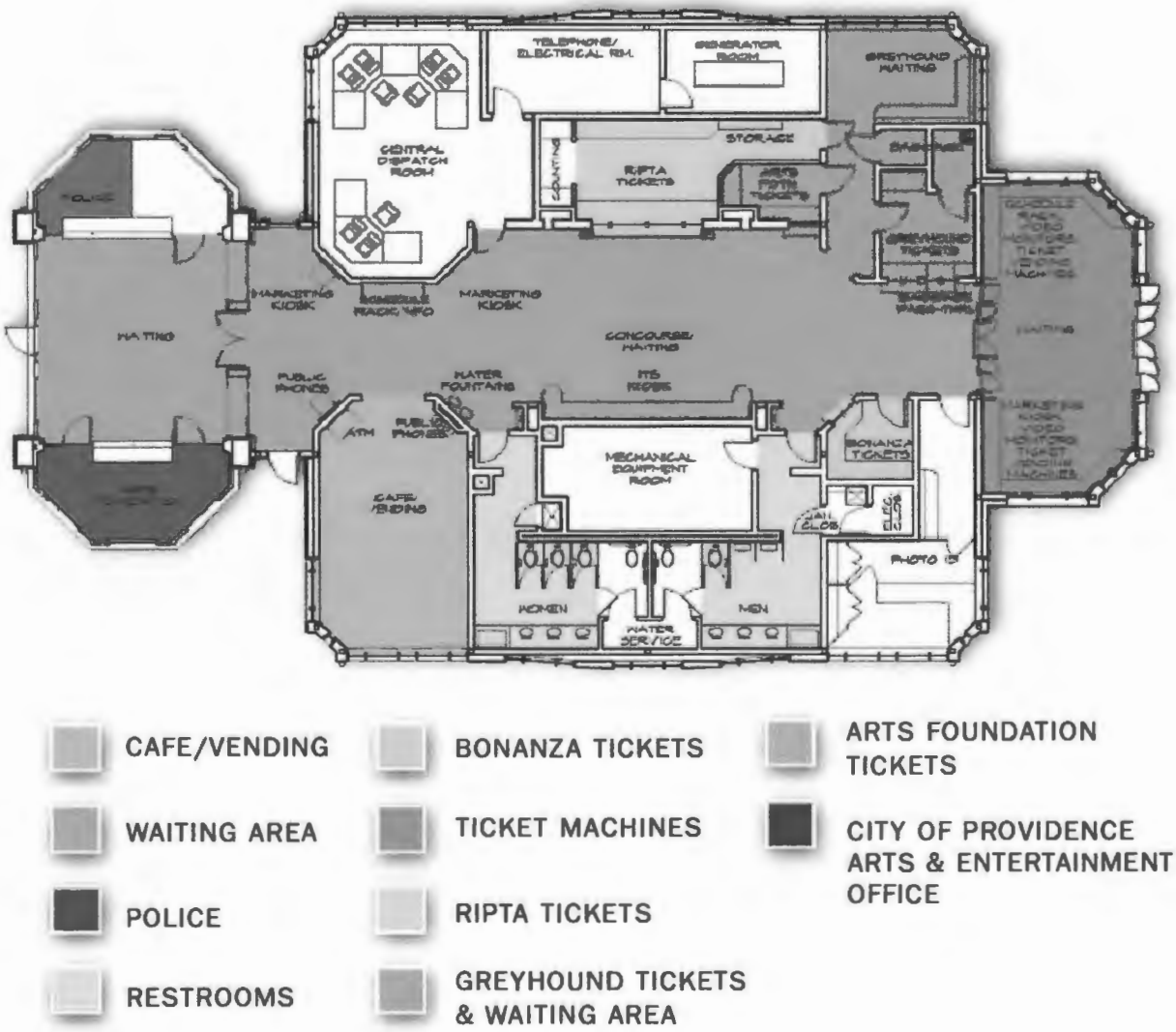


Figure 22 show the Kennedy Plaza Bus Stop Map that is available to the public via the Internet or at the Customer Service Office in Providence.

Figure 22: Kennedy Plaza Bus Stop Map

How to Find Your New Bus Stop in the New Kennedy Plaza

Effective April 29, 2002

To learn where your bus stops in the Plaza, look up your route and the matching bus stop letter in the "Key to New Bus Stops" section. Then locate your bus stop letter on the map above.

Buses will only pick up and drop off passengers at the bus stop designated for that route. Bus operators are not permitted to stop at other locations as the bus passes through Kennedy Plaza. For your safety, please form a line parallel to your bus when waiting to board.

KEY TO NEW BUS STOPS
You'll have a new bus stop letter in Kennedy Plaza.

Route	New Stop
1 Eddy/Gaspee	H
3 Warwick Ave.	G
8 Jefferson Blvd.	C
9 Pascoag/Walkum Lake	I
11 Broad Street	F
12 Airport/East Greenwich	C
13 Arctic/Washington	C
14 Wickford/Narragansett	D
15 North Central Industrial Park	L
17 Dyer/Pocasset	B
18 Union Ave.	E
19 Plainfield	B
20 Elmwood Ave.	A
21 - See 22	
22 Reservoir/Pontiac Ave.	A
26 Atwells/Academy	I
27 Broadway/Manton	P
28 Broadway/Hartford	P
31 Cranston St.	E
32 West Barrington	N
33 Riverside	N
34 East Providence	N
35 Rumford	M
40 Butler/Elmgrove/Tunnel	M
42 Hope St.	K
49 Camp St.	K
50 Douglas Ave.	I
52 Branch Ave.	Q
53 Smithfield Ave.	Q
54 Lincoln/Woonsocket	L
56 Chalkstone/Mt. Pleasant	O
57 Smith St.	O
60 Newport/Providence	D
66 Providence/URI	D
99 Providence/Pawtucket	J
Ride Paratransit Connections	I

10 & 90 Park N' Rides
(bus pavilion on Exchange Terrace)

Providence LINK Trolleys: Exchange Terrace
(until new trolley pavilion opens)

Bonanza opening later in 2002
Greyhound opening later in 2002

Chapter 11: Fleet

The author met with the Assistance Maintenance Director who provided logistical and operations information regarding RIPTA's fleet.

Description of Fleet

RIPTA has a growing fleet with diverse models, makes, and sizes. Because of this diversity, the RIPTA maintenance garage must be well stocked and equipped to handle to various needs, as well as RIPTA mechanics be well versed.

The average revenue service fleet is 230 fixed route and 14 Flex vehicles. The Fleet is composed of the following types of buses:

- 40 foot buses
- 30 foot buses
- 26 foot buses
- Compressed natural gas trolleys
- Compressed natural gas buses

Figure 23: View of a bus being serviced in RIPTA Elmwood Garage. Photo taken by the author.

Life Span of Fleet

The life span of the fleet breaks down in the following manner:

- 40 foot buses: *12 year lifespan*
- 30 foot buses: *6 year lifespan*
- 26 foot buses: *6 year lifespan*
- Trolley vehicles: *10 year lifespan*

Maintenance

The fleet is regularly and carefully maintained, undergoing RIPTA's quality check standards. The maintenance program is divided into two sections: scheduled maintenance and unscheduled maintenance.

Scheduled Maintenance

Vehicles are scheduled for inspection based on the number of miles, generally every 3,000 miles. RIPTA's goal is to achieve a 98% on time inspection rate of the vehicles.

Unscheduled Maintenance

Vehicles that suffer road failures, breakdowns, problem found after inspection, or an accident/body damage, are brought into the garage for repairs. Unscheduled maintenance also includes special campaigns, in which a particular month is highlighted to focus on a maintenance issue. For example, a special campaign may focus on heat in November, where buses will be inspected for proper working conditions of the heat, or June might focus on air conditioners.

Amenities

All RIPTA buses are 100% wheelchair accessible, providing lifts and wheelchair space. Bike racks are on the majority of the buses, and any new bus shall have bike racks installed.

Figure 24: View of buses being serviced at the RIPTA Elmwood garage. Photo taken by the author.

Figures 25: Inside view of RIPTA Garage. Photo taken by the author.

Figure 26: View of the inside of a RIPTA Trolley. Photo taken by the author

Chapter 12: Public Information

This chapter provides an overview of the two departments most engaged in direct public contact, the Marketing Department and Customer Service.

Marketing

The Marketing Department has a key role in providing public information and input. They are responsible for distributing updated materials such as bus schedules, changes in service, and addition and deletion of service. RIPTA publications are channeled through marketing, providing information in various languages.

Marketing also provides outreach to the community, specifically when there has been a change in the system that will affect the public. Part of this outreach includes the distribution of flyers ten days before the change is to occur. Press releases, schedules, and flyers are given out to the public.

Other marketing responsibilities, include:

- Involved in governmental affairs
- Organization of public hearings
- Oversee regulations of ADA for compliance
- Management of Express Travel
- Community Q&A
- Manage complaint letters
- Manage Ferry Service
- Organize and manage special events such as waterfire

Customer Service

The Customer Service Department handles and processes complaints and comments from the public and operates the Telephone Information Service. Once a call is received, it is documented and will be responded to within five days.

Chapter 14: Conclusion

Public transit is on a continuance of change, some for the better, and some for the worse. As social conditions and trends change, transportation needs to also evolve to meet these changes. The Rhode Island Public Transit Authority (RIPTA) has recognized this change. What was once an appropriate level of bus service, is now a foundation to further meet Rhode Islander's needs. Social change is the pinnacle reason for this evolution.

The main causes attributed to changing transit needs are due to the rise in non-traditional work hours of employment amongst low-income people, the warehousing of senior and low-income people, and the disbursement of the disabled population. These populations have been the priority of public transit for years, and it is crucial for Authorities to be aware and respond to their needs.

It is the hope of the author that RIPTA takes this study to the next phase, examining the contents, thoroughly analyzing and implementing service standards that best reflect the needs of Rhode Island's changing social trends. As Rhode Island progresses into the 21st century, so does RIPTA service. RIPTA is following the lead of many Authorities to include the public in planning processes. Although there is a ways to go, there is a definite recognition of how the public guides the core reason the Authority is in existence in the first place, which is to serve the community.

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Appendix

- **State of Rhode Island General Law, Chapter 39-18-2**
- **Title V: Section 5001**
- **Abrams-Cherwony 1992 Service Standards**
- **Chicago Transit Authority Service Standards**

State of Rhode Island General Law, Chapter 39-18-2

(a) There is hereby created a body corporate and politic to be known as the "Rhode Island public transit authority".

(b) The authority shall consist of seven (7) members, four (4) of whom shall be appointed by the governor with the advice and consent of the senate; one shall be a member of the senate ex officio appointed by the majority leader of the senate, one shall be a member of the house of representatives ex officio appointed by the speaker of the house of representatives and one of whom shall be the director of the department of transportation who shall serve as an ex officio member. Forthwith, upon the enactment of this chapter, the governor, with the advice and consent of the senate, shall appoint one member to serve until the first day of April, 1965, one member to serve until the first day of April, 1966, and one member to serve until the first day of April, 1967, and until their respective successors shall be duly appointed and qualified. Ex officio members shall serve during their respective terms of office.

(c) In the month of March 1965, and in the months of March annually thereafter, the governor, with the advice and consent of the senate, shall appoint one member of the authority to serve for a term of three (3) years to succeed the member whose term will then next expire. On or before July 1, 1979, the governor with the advice and consent of the senate, shall appoint the seventh member to serve until the first day of April, 1982 and until his or her respective successor shall be duly appointed and qualified. In the event of a vacancy occurring in the membership, the governor, with the advice and consent of the senate, shall appoint a member for the unexpired term. Any member of the authority shall be eligible for reappointment.

(d) Each member of the authority, before entering upon his or her duties, shall take an oath to administer the duties of his or her office faithfully and impartially, and the oath shall be filed in the office of the secretary of state.

(e) The authority shall elect one of its members as chairperson, and shall also elect a secretary.

(f) Four (4) members of the authority shall constitute a quorum and the vote of four (4) members shall be necessary for any action taken by the authority. No vacancy in the membership of the authority shall impair the right of a quorum to exercise all the rights and perform all the duties of the authority.

(g) The members of the authority appointed by the governor with the advice and consent of the senate shall receive twenty-five dollars ($25.00) per day as compensation for attendance at meetings of the authority, but not to exceed the sum of twenty-five hundred dollars ($2,500) annually as compensation of each member, such amounts to be payable from the revenue of the authority. Ex officio members shall receive no compensation, but all members of the authority shall be reimbursed for their actual expenses necessarily incurred in the performance of their duties.

(h) No member of the authority shall be in the employ of, or own any stock in, or be in any way directly or indirectly pecuniarily interested in any railroad corporation, bus, or street railway company, nor shall any member of the authority personally or through a partner or agent render any professional service or make or perform any business contract with or for any company; nor shall any member of the authority, directly or indirectly, receive a commission, bonus, discount, present, or reward from any company.

TITLE V: Section 5001

"The purpose of Title V is to promote intermodal transportation. The focus of the intermodal effort will be a new Office of Intermodalism, established within the Office of the Secretary of Transportation. The office will maintain and disseminate intermodal transportation data, and coordinate Federal research on intermodal transportation. The Secretary is authorized to make available $3 million in grants to States to develop model intermodal transportation plans. These plans must include systems for collecting data. The Act establishes a National Commission on Intermodal Transportation to study the status of intermodal standardization, intermodal impacts on public works infrastructure, legal impediments to efficient intermodal transportation, financial issues, new technologies, problems in documenting intermodal transfers of freight, research and development needs, and the relationship of intermodal transportation to productivity. The report is due to Congress by September 30, 1993."

Rhode Island Public Transit Authority

Service Standards

Draft

For Discussion Only

September 25, 1995

This document will serve as our Standard for Service Evaluation of existing and future Bus Operations for the people of the state of Rhode Island. The original suggested Service Standards Policy was prepared by Abrams-Cherwony & Associates in a November 1992 Document for the Generation of this policy.

The development of service standards for RIPTA is based on several key factors including:

1. Suitably to the characteristics of the service territory and requirements.
2. Consideration of the cost implications of each standard.
3. Ease of use in that the parameters defined in each standard permit a straightforward evaluation of actual system performance and set forth clear guidelines for evaluating service alternatives.
4. Prevailing practice in the transit industry.

Several points should be made with respect to the development and subsequent application of the service standards. First, reasonable judgement must be utilized in applying the service standards to assess current RIPTA service. While the standards are quantitative for the most part, unusual situations may arise which warrant special consideration. Second, the service standards may conflict with one another since some yardsticks relate to the derived costs. Nonetheless, the standards permit the trade-offs to be delineated and an informed decision made to resolve differences. Third, the comparison of actual performance with the standards should not be made on a "pass-fail" basis. Instead, results should be viewed in terms of the proportion o of the standard that is met or the level of attainment, Fourth, the standards have been set at reasonable values to reflect current and prospective operating condition.

In developing service standards, it is important to distinguish among the various types of routes operated by RIPTA. These route types are defined below:

Local: These are routes which provide regular service in the State and are focused on one of four major downtown areas: Newport, Pawtucket, Providence, and Woonsocket.

Express: Service oriented to commuters and where a significant portion of the route is operated on a non-stop basis.

Cross-town/Loops: Routes operated in a cross-town orientation and not focused on a downtown center.

Table 1

SERVICE STANDARDS APPLICABILITY

Standard	System-wide	Route Level
Availability		
Production End	✓	
Attraction End	✓	
Service Level		
Frequency		✓
Span		✓
Directness		
Transfers	✓	✓
Alignment		✓
Patron Convenience		
Speed		
Loading		✓
Bus Stop Spacing		✓
Dependability	✓	✓
Fiscal Condition		
Fare Structure	✓	
Farebox Recovery	✓	✓
Productivity	✓	✓
Passenger Comfort		
Waiting Shelters	✓	
Bus Stop Signs	✓	
Revenue Equipment	✓	
Public Information	✓	

Several service standard categories will have different requirements depending on route type.

This set of service standards appropriate for RIPTA includes five major aspects of service:

- *Availability*
- *Service Level*
- *Patron Convenience*
- *Fiscal Condition*
- *Passenger Comfort*

A listing of the 16 separate service standards within the five broad categories and the level which each is applied, (i.e. systematize and/or route) is summarized in Table 1 and presented in the following sections.

Availability

A transit operator inevitable receives many requests for service from citizens who are not within walking distance of any route, or who desire that buses operating in their neighborhoods serve different destinations. Since transit resources are limited, it is unlikely that everyone will be accommodated to a satisfactory degree. Therefore, it is necessary to determine how to allocate the available resources to provide the best possible service.

In developing measures for RIPTA service, this standard has been divided into two separate components that reflect travel concentrations, trip purpose and the need for bus service. Availability standards are developed for the residential trip end that produces travel and the nonwhite end that attracts travel. A description of each of these two is presented below.

Production End: Determination of which residential neighborhoods should be candidates for service is a function of reasonable walking distance. Numerous studies have indicated that the maximum distance an average person can reside from a bus route and still be

considered to "have service" is approximately one-quarter mile, which is roughly equivalent to a five-minute walk. However, this rule of thumb must be applied in conjunction with data regarding auto ownership and population density of an area in order to determine the optimum spacing of bus routes. Table 2 indicated the route coverage standards suggested for RIPTA based on auto ownership and population density, and Figure 1 illustrates their application to the RIPTA service area. The former criterion reflects the need for public transportation service while the latter measures the concentration of development necessary to support reasonable utilization levels. The suggested standard would mandate 1,000 feet (about 3/16 of a mile) walking distance between home and closest route in high density and low auto ownership areas. In contrast, for those areas where residential density is relatively low and auto ownership relatively high, walking distance can be as much as one-half of a mile to a route and still meet the standard. These standards apply where the percentage of households without autos and the population density are sufficient to justify such "specified" transit coverage.

In areas that do not exhibit characteristics associates with need or propensity to use transit, the standard permits service to be provided in a "targeted manner" toward specific population concentrations as deemed justified.

The Route coverage guide is just that-- a guide. It is not an exact measurement. In some areas, the street pattern is not uniform or major generators are further apart than the guide indicates. RIPTA service may not and should not conform to the guide in all areas. Service should, however, meet the intent of the guide-- areas with more people need more transit service than sparsely populated areas. Another element of this standard related to the extension of service to outlying areas. For example, some portions of the State may be several miles from the terminal point of the closest RIPTA route. The standard designed below for extension of RIPTA service to outlying areas indicates that the closer the area is to a route terminal point, the

POPULATION OF OUTLYING AREA

Cycle Time Minutes	Population Served
15	2,400
30	4,800
45	7,200
60	9,600

smaller the population hat would be needed to justify service. For example, an extension of a route requiring a 60 minute cycle time (i.e. time to make a complete round trip) is appropriate for an area that has about 9,600 people. The development of the values contained in the above table are based on 60 minute service and achieving productivity levels, measured in terms of passengers per hours, that are about two-thirds of the RIPTA system average. Past survey experience and professional judgement have led to the estimate that people in outlying areas typically make about two trips each weekday, with one percent of these trips made using public transit. While different values could be applied, the suggested values appear reasonable for a service assessment.

Besides route extensions, transit operators often make slight route deviations requiring out-of direction (OOD) travel to serve residential neighborhoods or major activity centers. These Out-of-direction route segments may cause inconvenience to riders that are through riders on the route. The decision on whether such deviations should continue and/or be initiated depends on the number of riders served by making the deviation. An OOD factor would be computed as the ratio of through riders to total riders, times the number of minutes required to make the complete deviation. If the OOD factor is 5 or less, the deviation should continue. If the OOD factor is 15 or higher, the deviation should be discontinued. OOD segments with a factor between 5 and 15 exhibit some impact on through ridership and should be reviewed based on other factors (e.g.,

cost of making the deviation, scheduling considerations such as frequency, disruptions, ridership types, ease of understanding) to make the service decision.

Attraction End- Activity centers deserve transit service if they are large enough to attract An adequate number of transit trips. To assist in this determination, threshold levels have been established for different categories of activity centers. These threshold levels, which are based on past experience and judgement, should serve as guidelines in determining which centers in each category should be given consideration for service. It should also be noted that other factors, such as the proximity of the center to existing routes, should be considered before providing new service to a major activity center.

Employers- Employers with 300 or more employees are large enough to warrant consideration for service. This standard applies to both individual employers and groups of employers in a concentrated area (e.g., industrial or office park).

Hospitals/Nursing Homes- These usually do not attract a large number of trips. These facilities do, however, often serve those who depend on transit. Therefore, institutions of 100 or more beds may be considered candidates for RIPTA service.

Colleges/Schools- Students often comprise a major segment of the transportation dependent population in a community. For this reason, colleges and post-secondary schools have been included in the availability standard. Those institutions with an enrollment of at least 1,000 students warrant consideration for service.

Shopping Centers- Shopping trips constitute a major reason for transit travel. Shopping centers with more than 100,000 square feet of leased retail space are large enough to warrant consideration for RIPTA service. Mixed-use retail and office complexes can also be included within this category.

Social Service/Government Centers- Public Agencies, government centers and community facilities attract some volume of traffic. While the nature and size of these

facilities varies greatly, it can be generally stated that those serving at least 100 clients daily warrant public transit service.

The categories of generators listed above represent the "destination" end of the transit trip. Combined with the availability standards for the other trip end (production), they provide a comprehensive view of service requirements within the State of Rhode Island.

SERVICE LEVEL

This category deals with how transit routes are scheduled and includes standards related to frequency, span and directness.

Frequency- This standard is one on the commonly applied measures of transit adequacy, particularly from the patron's point of view. Consequently, it is one service, characteristic which is typically the course of patron dissatisfaction.

In general, frequencies or "headways" (i.e., the time from one bus to the next at the same location) are established to provide enough vehicles past the maximum load point(s) on a route to accommodate the passenger volume and stay within the recommended loading standards which are discussed later. If passenger loads are so light that an excessive time is needed between vehicles to meet loading standards, then headways should be set on the basis of policy considerations. For periods in which service is operated, the following minimum headways are suggested:

MINIMUM POLICY SERVICE FREQUENCIES (MINUTES)

		WEEKDAY		SAT.	SUN.
ROUTE TYPE	PEAK	BASE	EVENING/NIGHT	BASE	BASE
LOCAL					
Providence	20	30	60	60	60
Other	30	60	60	60	60
Express	****	Two Trips Each Peak Period		****	
Cross-town/Loop	--	60	--	--	--

It should be noted that, for certain routes serving outlying areas of the state, service areas may be reduced to maintain satisfactory Farebox recovery ratios. In this analysis, the cross-town/ loop route standard has been set at one hour which reflects the current nature of the routes. In the event cross-town routes were established to accommodate transfer activity, more frequent service would be required.

As with all standards, this headway matrix should be considered a guide, not an absolute measure. Further, Headways should be designed, whenever possible, to conform to regularly occurring clockwork intervals. In some cases, headways may be established at the cycle time to minimize costs.

Span- This measure is the duration of time each bus route is made available or operated during the day. Desires of the transit constituency and financial capability of the operator are key considerations in setting not only weekday service spans, but also which routes are operated on Saturdays and Sundays. For weekday routes orientated to permit workers and students to make their morning start times and should end late enough to provide return trips home for second shift workers. Service oriented to non-work travel can start later and end sooner:

WEEKDAY SPAN GUIDE

ROUTE TYPE	BEGIN	END	HOURS
Local	6:00 AM	9:00 PM	15
Express	***	As Needed ***	
Cross-town/Loops	9:00 AM	4:00 PM	7

As noted above, the implementation of true cross-town service, a more lengthy span would be appropriate. Reduced spans are suggested for weekends, particularly Sundays, when less work related travel occurs. In fact, Sunday service may not be necessary on many routes. The weekend span of service suggested for RIPTA are summarized below.

WEEKEND SPAN GUIDE

	SATURDAY			SUNDAY		
ROUTE TYPE	BEGIN	END	HOURS	BEGIN	END	HOURS
Local	7:00 AM	7:00 PM	12	9:00 AM	5:00 PM	8
Express	***	No Service	***	***	No Service	***
Cross-town/ Loops	***	No Service	***	***	No Service	***

The span, like other standards, is a guide. Specific routes can start earlier or later than the suggested span depending on the need for service in a specific area, the generators served and the type of trip purposes.

Directness- This standard addresses the need for system co-ordination, coherence, and accessibility. Complicated circuitous routs and inordinate trip travel times discourage transit use. It must be recognized, however, that RIPTA cannot provide door-to-door bus service, or even a single ride trip for every passenger.

Two components are involved in measuring the directness of RIPTA's bus routes. First, the ratio of the actual route path distance to the straight line mileage between route terminals should be no more than 1.50. That is, the distance the distance from one terminal to the other should be no more than fifty percent greater than the straightest (airline) distance between the routes termini. This allows for deviation caused by both road alignment and route circulation, and would apply to cross-town/loop routes as well as those serving downtown areas. Routes with ratios that exceed 1.50 should be subjected to examination for cause, and modified if practical. As mentioned earlier, service standards permit trade-offs regarding service to be identified. For example, if a particular route displays a directness ratio of 2.0, perhaps the route is trying to serve too many places. In order to straighten out this alignment, depletion of services to certain generators may be necessary. If RIPTA wishes to continue serving these locations, development of a new route may be in order. The trade-off appears when weighing the

costs of the new route versus the expected ridership gain from offering a more direct and swift service.

The second component of the directness standard states that no more than 25% of the system's patrons should need to transfer between vehicles in order to complete their trips. However, if specific transfer activity between two bus lines exceeds 25% of the total ridership on each of them, the standard recommends that interlining or some similar form of link should be considered. Also, transfer connections should be scheduled as closely as possible in order to minimize waiting times. Passengers should be required to wait no more than 15 minutes and preferably ten minutes or less.

PATRON CONVENIENCE

The next four standards-- speed, loading, bust stop spacing and dependability--- are concerned primarily with patron convenience in using the system, but also influence system operating costs.

Speed – Buses face certain avoidable constraints that all vehicles, in the absence of any preferential treatments, will not exceed the speed of traffic in general. Passenger boarding and alighting volumes, route alignments, stop spacing and fare collection methods are factors under the operator's control which influence operating speed.

While there are several measures of speed which may be employed in the evaluation of this criterion, the most meaningful to the patron is running speed-- route miles/running time (excluding layover). As the RIPTA system operates in a variety of settings, different running speeds are appropriate as listed below:

SPEED GUIDE

Type/Area	Running Speed (MPH)
Local	
- City	10-12
- Suburban	12-16
- Rural	16-24
Express	20-30
Cross-town/Loops	12-16

As might be expected, traffic and safety conditions will influence running speed.

Loading- To ensure that most passengers will be able to obtain a seat on a RIPTA vehicle for at least a major portion of the trip, loading standards must be establishes and schedules devised that reflect passenger volumes. This standard is measured as the ratio of passengers on board to the seated bus capacity expressed as a percent. Values of 100 percent or less indicate all riders are provided a seated ride while values above 100 percent indicate standees. Loading standards indicate the degree of crowding (i.e., standees) which is acceptable, with consideration given to both the type of service and the operating period.

Acceptable load factors are:

LOADING GUIDE

Type/Period	Load Factor (Percent)
Local	
Peak	150
Off-Peak	125
Express	125
Cross-town/Loops	125

As noted above, for peak period express trips, every rider should have a seat available. Also, for peak period local trips, no rider should be expected to stand for more than 15 minutes.

Bus Stop Spacing- While route alignments are the primary determinants of transit availability, a second influence on the proximity of transit is the bus stop spacing along these routes. Obviously, stops at every intersection provide the shortest walking distance to the bus. Therefore, a bus stop spacing standard must consider the density of the service area and the characteristics of the land uses served. The bus stop spacing standard suggested for RIPTA is summarized below:

STOP SPACING GUIDE

Population Density (Persons/square mile)	Stop Spacing
Over 5,000	Every other block
2,000-5,000	5 to 7 per mile
Under 2,000	Flag Stop

The differences between the over 5,000 and 2,000-5,000 persons per square mile may be more in measurement technique than in the actual spacing of bus stops. Urban area with regular street patterns can be more effectively considered on a block-by-block basis than would less densely developed suburban corridors. It should be noted that in some instances, the bus stop spacing standard should be discarded in favor of simply considering the location of patron concentration. This is especially true for stops that serve major activity centers.

The exact placement of a bus stop in the area of a signalized intersection is also a matter of concern. Site specific traffic and street conditions should ultimately determine stop locations, and the exact placement of a stop should always be a matter for individual traffic engineering analysis. Overall, a consistent policy should be pursued with respect to location.

Dependability- Published timetables must provide the transit patron with a reasonable guarantee that the scheduled service will operate, and will operate on time. The dependability of RIPTA is important to people who typically plan trips around the availability of bus service. Moreover, riders associate a time penalty with unreliable bus service which reduces the attractiveness of public transportation.

There are several ways to measure RIPTA's dependability. The first is whether service operates at all. Measures of actual versus scheduled service are expeeressed as the percentage of scheduled trips and percentage of scheduled bus pull-outs which are actually made. For RIPTA, the missed trip standard is established at 99.5 percent.

Therefore, only one trip in 200 can be misses and still meet the standard. Since it is easier to recover from service disruptions at the garage than it is out in the field, an even more stringent standard of 99.8 percent is appropriate for missed pull-outs. This permits one missed pull out in 500. RIPTA drivers should have sufficient spare buses and extra board bus drivers to assure that the pullout standard is met.

Dependability is also examined interims of schedule adherence, which means the difference between scheduled time and the time the bus actually passes a particular location. The schedule adherence standard consists of two parts: 1) the definition of on-time, and 2) the proportion of buses that operate within the on-time range. For purposes of establishing RIPTA dependability, "on-time" is established at zero minutes early to 5 minutes late. This allows the bus reasonable latitude for encountering general delays, without unduly inconveniencing the waiting patron. For most patrons, a wait of up to five additional minutes would not be regarded as excessive. Buses should never be early, for this would cause the patron to miss the bus entirely and subject many riders to an even longer wait for the next scheduled bus.

The standard for RIPTA schedule adherence is established at 90% during peak service periods and 95% during off-peak hours. Therefore 18 out of 20 peak bus trips and 19 out of 20 peak bus trips should be considered "on-time" according to the standard.

The final measure of dependability is the number of miles operated between service disruption road calls. A general guide for RIPTA should be 4,000 miles between road calls.

FISCAL CONDITION:

RIPTA's financial situation can be defined, both for the system and individual routes, in terms of three standards: 1) fare structures, 2) Farebox recovery, and 3) productivity.

Fare Structure: A transit fare structure should be easy to understand, easy to remember, and easy to administer. There is a trade-off, however, between simplicity and equity. For example, a zone structure would charge people more equitably by having those who ride

farther pay more, but the zones add another dimension to the fare structure. On the other hand, a flat fare is simple to understand and administer, but those who ride short distances pay just as much as long distance travelers. Another facet of fares to consider is special fares for certain ridership groups, such as senior citizens or the handicapped.

Fare structure is a subjective element for which no quantitative standard is established for RIPTA. Rather, judgment and or local policy must be used to establish or change the fare structure. Four qualitative criteria should guide that process:

- How equitable is the fare structure?
- How easily is the fare structure administered?
- How easy is the fare structure for people to understand?
- Will the fare structure provide a reasonable level of revenue?

Farebox Recovery- One of RIPTA's primary objectives is to provide area residents with the best possible services within a reasonable budget constraint. To achieve this, each route should be examined individually to determine if any bus line is placing an inordinate financial burden on the entire system. Routes should periodically be compared to systematize averages so that operating deficit is controlled and equipment is deployed productively.

To accomplish this, two Farebox recovery measures are suggested. The first relates to system-wide performance and recognizes RIPTA's recent performance and the effect of the last fare change. A system-wide Farebox recovery standard of 24% is suggested.

In addition to the system-wide calculation, each route's revenue/cost ratio should be calculated. System costs must be computed for each route, and the route's revenue compared to its calculated cost. The individual route performance standard described below is stated relative to the system-wide average and recognizes that some routes will be below that benchmark.

FAREBOX RECOVERY GUIDE

Relative to Average for RIPTA (Percent)	Suggested Activity
Above 66-2/3	Acceptable, modify as required
50 to 66 2/3	Review, Modify Service
Below 50	Unacceptable, consider major change or elimination

For the individual route standard, routes above 66-2/3 percent of the system average, or a Farebox recovery of 16%, are considered acceptable. Similarly, routes from 50 to 66 2/3% need modification, and routes below 50% (Farebox recovery of 12%) are unacceptable. Application of the route level standard will help control the operating deficit and insure that transit resources are used in an efficient manner.

Productivity- Productivity is measured in terms of how many passengers a transit system carries for each unit of service. The two most common measures are passengers per hour and passengers per mile. Of the two, passengers per hour is more commonly used. It should be recognized that because average fare varies by route, productivity is a useful performance measure to supplement Farebox recovery results.

Similar to Farebox recovery, minimum threshold values are specified for both the system and individual routes. Overall, the productivity standard suggested for RIPTA is 25 passengers per hour.

As with the route Farebox recovery, the route productivity standard is based on the system-wide average and could be applied at the route level:

ROUTE PRODUCTIVITY GUIDE

Relative to Average for RIPTA (Percent)	Suggested Actions
Above 66 2/3	Acceptable, modify as required
50 to 66 2/3	Review, modify service
Below 50	Unacceptable, consider major change or elimination

Neither the Farebox recovery nor the passengers per hour guide can be applied to a new route or route extension. Any new service takes time to build its ridership base. In many cases, new services are not fully productive for a year or more. Therefore, 75% of the values presented previously should be considered acceptable at the end of the first year. New service should be monitored closely during the first few weeks of operation. A trial period extending three months should be adequate to help determine whether or not the service change should be made permanent.

Passenger Comfort-

The final set of standards deals with increasing system utilization by providing a comfortable and functional environment. Standards in this category deal primarily with RIPTA's equipment and facilities.

Waiting Shelters- A major concern of transit riders, especially regarding inclement weather, is the amount of time spent on the street exposed to the elements. The abundance of cold and windy conditions is of particular concern in Rhode Island.

The placement of shelters and the development of a priority location program will be based on the number of boarding and/or transferring passengers at a specific stop. Shelters should be provided at all stops which serve 100 or more boarding and/or transferring passengers or which serve concentrations of elderly or handicapped residents.

Shelters should include a minimum of 50 square feet of area and be enclosed on all sides except for entrances. Service information including route numbers and schedules which serve the stop should be displayed.

Bus Stop Signs- All bus stops in the system should be identified by a bus stop sign bearing a symbol denoting RIPTA as well as the information phone number. All bus stop signs should be of uniform style and also include the route numbers that stop at each location.

Revenue Equipment- In order to maximize the pleasure and comfort of the bus rider, and thereby spur demand, RIPTA should provide attractive and comfortable vehicles. This standard is primarily a matter of maintenance: seats should not be loose or ripped, floor covering should be in good repair, lighting should be operational and the interior should be clean. Of particular importance is the riding environment for the patron which would include operating air conditioning (where applicable), ventilation and heating systems.

Buses should also be attractive for the community in general-- noise, odor and smoke should be kept to as low a level as possible through use of the latest equipment and strict maintenance procedures. Bus exteriors should be washed at least every other day, preferably daily, and body damage and loose panels/doors should be scheduled for immediate repair.

Buses should be clearly marked as to route. Traditionally, buses have a route destination sign overhead in front and also on the side. This signage should display route number and destination information that is easily understood by the patron.

Public Information- A transit system should develop and maintain a public information program which not only provides information to those who ask for it, but aggressively educates the public about the system and how to use it.

Route timetables should include all the information necessary for a non-0user to make a trip on the bus, including route maps, schedules which show intermediate time points,

fare information and transfer information. Specific timetables should be available and prominently displayed on all buses. Appropriate sets of timetables should be available in major activity centers. A route map of the area, showing all of RIPTA's routes, should be available at no cost.

Information should be available by phone during service hours. A complaint handling and processing procedure should also be in place. It should include the mechanism to take action to assure that the complaint is satisfactorily resolved. As stated earlier, all shelters should display detailed route information. Route numbers should be posted at bus stops, along with a prominent RIPTA logo, and the phone information number.

Chicago Transit Authority

Service Standards

Transit Operations Division
Planning & Development
Service Planning
PSP-x01005
July, 2001

Table of Contents

EXECUTIVE SUMMARY

The CTA's mission is to deliver quality, affordable transit services that link people, jobs, and communities. The *Service Standards* lay out a framework for achieving our mission.

The Chicago Transit Authority's (CTA's) service area is vast - 262 square miles - and its resources are limited. The *Service Standards* document provides a framework for guiding decisions on which services will best serve our customers' varied travel needs while allowing the CTA to remain within its budgetary limits.

The service standards provide a framework for a consistent and fair evaluation of both existing and proposed services. Because markets, customer expectations and CTA's resources change over time, service standards are evolutionary by nature. CTA must be responsive to these changes in order to retain current customers and achieve and sustain ridership growth.

This document discusses the details of the standards and how they are used in decision-making at the CTA.

THE STANDARDS

The dynamic nature of development and changing travel markets in the service area requires constant review of new service, service expansion, or service reduction options. CTA must be able to rationally evaluate service changes and make adjustments to service within the constraints of budget and equipment availability. The Service standards are guidelines for resource allocation decisions. Five key measures that have the greatest influence on service design are discussed: coverage, span of service, frequency of service, customer flow, and minimum productivity. Each standard is summarized below, and the minimum or maximum limits for each feature are cited.

CTA's *service coverage* policy determines the average customer walk to get to a CTA bus stop or rail station at certain times of the day. CTA's service coverage standard is to provide a maximum walk distance of ½ mile to the nearest route during most time periods.

Span of service, the hours and days a route operates, is based on a balance of market demand and service coverage. For key routes, services are offered seven days a week, generally a minimum of 16 hours. Support routes are market-driven.

Service frequency governs how long customers wait for service. The maximum interval between buses and trains is 30 minutes.

Passenger flow determines how crowded the vehicle will be when it arrives at the busiest location on a route. On the most crowded bus routes, an average of 60 customers per bus at

the busiest locations will be scheduled during peak periods. For rail services, an average of 90 customers per car will be the maximum planned load.

For bus service that runs every 30 minutes, the *minimum productivity* is 30 boarding passengers per hour. Services that do not meet the minimum become candidates for elimination.

The *Service Standards* document also contains guidelines for 1) stop spacing, 2) the distribution of facilities and customer amenities at rail stations and bus stops, 3) calculating service costs, and 4) the public participation process.

THE PROCESS

In support of the annual budget process, the Annual Service Budget Proposal is developed that proposes major, moderate, and minor service changes, in accordance with CTA goals, for the next year. Service proposals can only be implemented if they comply with the budget.

Minor service changes are routine small changes to better align services with demand. These include adjustments to intervals between buses or trains and running time, span of service changes of ½ hour or less, and changes to bus stop locations.

Moderate changes are small changes to service with limited impact and modest costs. This change type includes special event services, reroutes of less than one mile, and route extensions of up to one mile.

Major service changes have a significant impact on customers and resources. These include route changes affecting more than 25% of a route's passengers, route miles or vehicle miles and changes requiring new facilities and/or capital expenditures of a cost level that requires board approval.

Service proposals are received, screened, and evaluated throughout the year. Minor service changes and most moderate changes are implemented throughout the year as schedules are revised. Major changes and moderate changes that require Board approval are subject to a semi-annual review where they are ranked in terms of financial performance against other proposals. These changes are presented to the Board twice per year.

Chapter 1: Overview

A brief overview of the Chicago Transit Authority will illustrate the breadth of services provided and the importance of having a set of tools to guide service decisions.

- *Nearly 2,000 buses average 200,000 miles per day.*
- *139 routes cover 1,900 miles with over 12,000 bus stops.*
- *1,190 rail cars traverse 170,000 miles per day over 289 miles of track.*
- *7 rail lines include 12 branches and 142 stations.*

CTA In Brief

The Chicago Transit Authority (CTA) is the second largest transit system in the country, providing 450 million rides each year. The CTA service area consists of the City of Chicago and 38 surrounding suburbs, which have a total population of approximately 3.7 million persons. CTA provides approximately 1.5 million rides on an average weekday and plays an important part in keeping the regional economy running by providing about 560,000 work trips every weekday.

Because many Chicagoans live within ¼ mile of CTA service, they have easy access to a service that provides extensive coverage to neighborhoods and many major attractions in the region. In fact, over half of all trips taken on CTA are for school, shopping, socializing or entertainment. Eighty percent of transit trips in the region are taken on CTA.

Link to Our Mission

CTA's mission is to deliver quality, affordable transit services that link people, jobs, and communities. It reflects issues that are important to our customers, as expressed in the CTA's Customer Satisfaction Surveys. Service standards guide the planning and design of transit service in support of the CTA's mission.

Affordability, for our customers and for the CTA, is always a concern. We must provide services that are attractive enough to fill seats and meet productivity needs. At the same time, we must keep fares affordable. From a corporate standpoint, externally imposed funding constraints affect the amount of service that we provide.

The Need for Service Standards

The major goal of the service standards is to provide a framework for a consistent and fair evaluation of both existing and proposed services.

Because markets, customer expectations and CTA's resources change over time, service standards are evolutionary by nature. CTA must be responsive to these changes in order to retain current customers and achieve and sustain ridership growth.

The relationship between our service standards and our budget is dynamic. The level of service CTA provides to our customers has a direct effect on our operating and capital budgets. In turn, our service standards affect the amount of service that we put on the street. Furthermore, the amount of service must be provided within the bounds of limited financial resources.

Balancing customer expectations and budget constraints is a difficult challenge. CTA's existing services must be monitored and modified continually to match service levels to demand and respond to opportunities for new or improved services. Since the first *Service Standards* document was issued in 1990, it has formed the basis of the service adjustments the CTA has made in response to changing ridership trends.

The dynamic nature of development and changing travel markets in the service area requires constant review of new service, service expansion, or service reduction options. CTA must be able to rationally evaluate service changes and make adjustments to service within the constraints of budget and equipment availability.

This *Service Standards* document has been developed to provide a rational and consistent basis for the provision of CTA service by directing the technical analyses of service productivity and the evaluation of the merits of proposed services.

The remainder of the document is organized as follows:

- The goals and objectives of the *Service Standards,* in Chapter 2;
- A description of the service standards, in Chapter 3;
- The service change process, in Chapter 4;
- The methods for monitoring and reporting on service in Chapter 5
- A description of the public participation process, in Chapter 6.

The Appendices provide more discussion on selected policies and standards presented in the body of the document.

Service Standards:

- *Offer a level of objectivity in decisions for distribution of CTA resources throughout our service area;*
- *Communicate the key attributes of CTA service policy to the public; and*
- *Describe the process for considering service changes.*

Chapter 2: Goals and Objectives

The purpose of the Service Standards is to ensure that service meets customers' needs and that CTA service is provided in a cost-effective manner.

The following fundamental goals and their objectives provide context for the service guidelines:

1. Ensure the design of effective, efficient, and equitable transit service.

   OBJECTIVES

   - Design cost-effective transit service that supports both existing and emergent origin-destination patterns.
   - Enhance the key bus and rail networks to ensure critical regional mobility and to ensure that all neighborhoods have access to CTA service.
   - Apply a cost-effectiveness standard while recognizing the special needs of various customer groups.
   - Distribute services and customer amenities based on ridership, equity, and geographic balance.

2. Provide a uniform and consistent methodology for planning, designing, and evaluating transit services and proposals within applicable laws and regulations.

   OBJECTIVES

   - Develop a consistent, regular process for improving service in those areas with demonstrated or potential demand.
   - Address customer and community service needs and requests in a consistent, fair and thorough manner by better engaging local communities in the service planning and delivery process.
   - Formulate a firm service evaluation process that addresses reviewing, proposing, receiving, screening, evaluating, recommending, and approving service changes.
   - Evaluate and implement services consistent with Title VI and the Americans with Disabilities Act (ADA) requirements.

3. Provide mobility to our customers by responding to changing travel patterns and new market opportunities.

OBJECTIVES

- Encourage intermodal services and connections that maximize the trip-making options available to customers.

- Monitor the results of customer service and satisfaction surveys to support service changes that will improve CTA's overall performance.

- Develop sustainable service that supports the City's and region's development plans and initiatives.

Chapter 3: Service Delivery Guidelines

The Service Delivery Guidelines section describes service design guidelines and procedures for service allocation, and customer amenities.

TYPES OF CTA SERVICE

The CTA operates an integrated transit system designed to provide both maximum access to the downtown and comprehensive local service throughout the service area.

The following types of CTA services are offered:

- Bus
- Rail (Rapid Transit)
- Paratransit Service
- Special Events Services
- Niche Market Service
- Flexible Services

Bus

The flat geography of Chicago has led to a grid arterial street pattern and bus service that follows this arterial street pattern with a network of long north-south and east-west routes. During most service periods, this grid configuration is the most efficient means of supplying convenient bus service between the diverse origins and destinations throughout our service area. It provides the maximum number of route combination choices for the customer. The network relies on being able to transfer between routes and services reliably and conveniently.

Two-thirds of all CTA rides are taken on bus. Key bus routes carry almost half of all CTA customers and are the primary focus for service changes on the bus system.

"Key" routes and "support" routes define the bus system. Key routes provide the backbone of CTA service. They include the most productive bus routes, plus additional routes to provide basic geographic coverage. Support routes are the remaining routes. They support the rail and key bus network by serving a variety of important specialized functions that enhance the quality of service and improve market share. Two-thirds of all CTA rides are taken on the bus system. Key bus routes provide nearly half (47%) of all CTA rides.

Rail (Rapid Transit)

Rail lines developed radially, aiming at the concentrated needs of the downtown. With its high speed, rail is the preferred mode of travel to the downtown, but also provides regional mobility.

The rail system consists of seven routes, with 12 branches, that operate over track on largely grade-separated private right-of-way. Rail offers

speedy service to persons generally needing to make longer trips in the service area. About one-third of all CTA rides are taken on rail. About 50% of rail passengers also use a bus for part of their journey.

Paratransit Services

CTA's paratransit program was initiated in 1981. The CTA currently contracts with three carriers and many taxicab companies to provide door-to-door service for customers with disabilities and their companions. Special Services programs are highly regulated.

The Americans with Disabilities Act defines the standards for paratransit. Service coverage is defined by the ADA as within 3/4 mile of fixed route service. Span of service is the same as fixed route. Frequency is on demand.

Special Events Services

CTA provides additional bus and/or rail service on regularly scheduled routes for the City's many special events to help reduce traffic congestion. Because these services are temporary, and have atypical operating characteristics, they may not follow regular service guidelines.

Niche Market Services

Niche market services are developed in response to a demonstrated need for specialized transit services. These services are open to the public and can include modifications to existing bus routes or new routes for shift changes and other work purposes. Services can also be tailored for large employment centers, universities, high schools, medical centers, sports venues, industrial parks and other large traffic generators.

In some instances, CTA will enter into a financial partnership with organizations, such as museums, not-for-profit agencies, local governments and businesses to provide these niche market services. In these agreements, the partnering organization provides subsidy that, in combination with the projected customer revenue, meets variable cost for a particular service. (See *Appendix D: Niche Market Services* for more detail.)

Flexible Services

Flexible service was proposed in the 1997 study[1] by Booz-Allen and Hamilton, a management-consulting firm, as a means to balance customer needs with productivity goals. The routes proposed by Booz-

[1] *Chicago Transit Authority Service Restructuring Proposal*, Booz-Allen and Hamilton, May 1997. This proposal provided the underlying analysis for the Service Restructuring adopted by the Board in July 1997 and the underlying basis for this work was the Service Standards document of 1990.

Allen for replacement with flexible service were poor performers, and the consultants believed the service should be eliminated. However, doing so would abandon all service in certain neighborhoods. Booz-Allen recommended a compromise to service abandonment by suggesting implementation of non-traditional, or flexible service.

Flexible services, generally provided by smaller vehicles than standard buses, would supplement the key and support bus network and rail systems. CTA and a consultant are currently studying the viability of flexible service options in four demonstration areas. If found viable, service standards and policies for flexible services will be added to the *Service Standards* after the conclusion of the study.

SERVICE DESIGN MEASURES

There are five key measures that influence fixed route service design:

- Service Coverage,
- Span of Service,
- Frequency of Service,
- Passenger Flow, and
- Minimum Productivity.

These measures enable CTA to determine appropriate levels of service to meet current demand, while maximizing use of equipment and manpower. Changes to any one of the guidelines affect the size and cost of services and the attractiveness of the service to existing and potential customers. Therefore each guideline is important and all are used in conjunction to make service decisions. *Appendix A: Bus and Rail Design Guidelines* has more detail about design considerations.

Service Coverage

CTA's service coverage policy is to provide a maximum walk distance of ½ mile to transit service during peak periods within the statutory service area where CTA has franchise agreements in place. In the suburban Cook County portion of the CTA's service area, Pace and Metra services overlap that of CTA. As ***Table 1*** illustrates, the most intense service grid, when routes are closest together, is supported during weekday peak hours. As demand declines, the density of routes thins. Walk distance increases as demand lowers along the fringes of the service area and during low demand time periods.

Table 1.

Guideline for Bus Grid System		
TIME PERIOD	DISTANCE BETWEEN ROUTES	TYPICAL WALK DISTANCES
Weekday peak		
High Density	½ mile	¼ mile
Low Density	1 mile	½ mile
Weekday Midday/Evening	1 mile	½ mile
Saturday and Sunday/Holidays	1 mile	½ mile
Owl	2 miles	1 mile

This coverage policy is tied to the key route bus network. The 46 key routes are primarily spaced 1 mile apart, which means for the minimum 16-hour period that they operate, the typical walk distance through most of the network will be ½ mile.

Standard: CTA's standard for service coverage is to provide a maximum walk of 1/2 mile during most periods.

Due to population and employment shifts in the service area, CTA regularly makes adjustments in its service to reflect changing markets. Population and employment densities for CTA's statutory service area are shown in *Exhibit A,* while *Exhibit B* illustrates the relationship between population and employment density and peak services offered by CTA, Pace and Metra. As this map shows, during the peak, with few exceptions, the City of Chicago is very well served. As densities decline, routes are spaced farther apart.

There are certain instances when the coverage policy cannot be rigidly followed. These instances include the following:

- Topographical and street network restrictions may cause some gaps in service.

- In suburban areas, bus coverage is shared with Pace Suburban Bus. In these areas, the combined CTA/Pace service provides coverage appropriate for the area's density and ridership demand.

- The specific alignment of routes is selected to serve *known* demand and more dense areas of the coverage area. In this case, ideal spacing can be lost.

- It may be infeasible to modify existing routes without hurting established and productive markets.

Routes are designed to operate as directly as possible. However, there are times when a route deviation is recommended to bring service closer to a major trip generator such as an employer. The decision to deviate a route must balance the effect on existing on-board customers with any potential gain in new customers. (See *Appendix A: Bus and Rail Design Guidelines.*)

Service coverage is a consideration for all customers, but especially for persons with disabilities. With both bus routes and rail stations, CTA works with the ADA Advisory Committee to determine routes and stations which will be designated accessible. All new rail stations are built as accessible stations and CTA follows all applicable requirements of the ADA and the Illinois Accessibility Code when renovating or rebuilding stations. It is CTA's policy that when a bus route is designated as accessible, all buses assigned to the route are accessible.

Exhibit A -
Population and Employment Densities - CTA Statutory Service Area

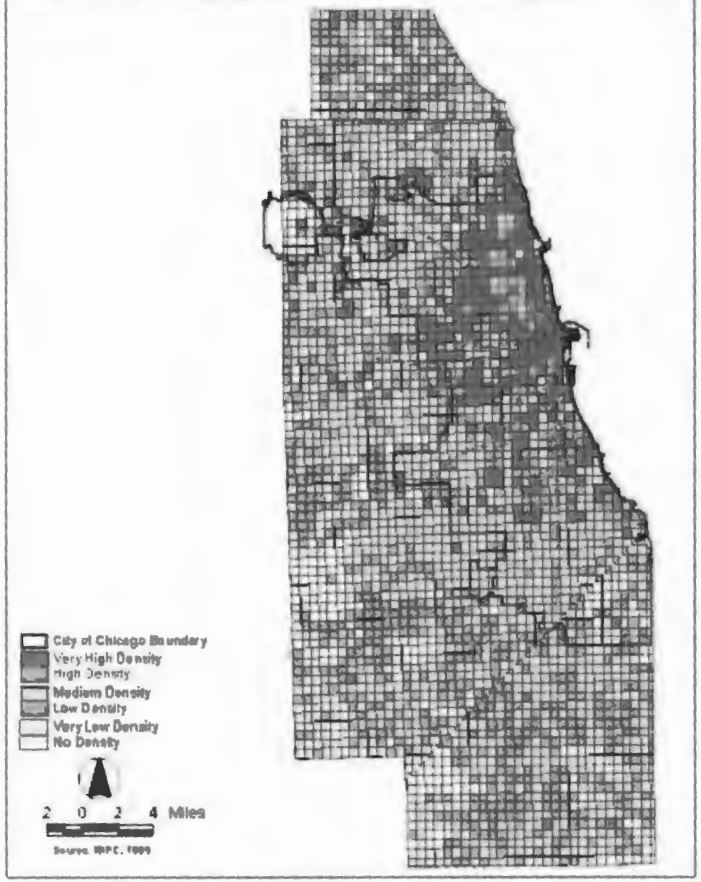
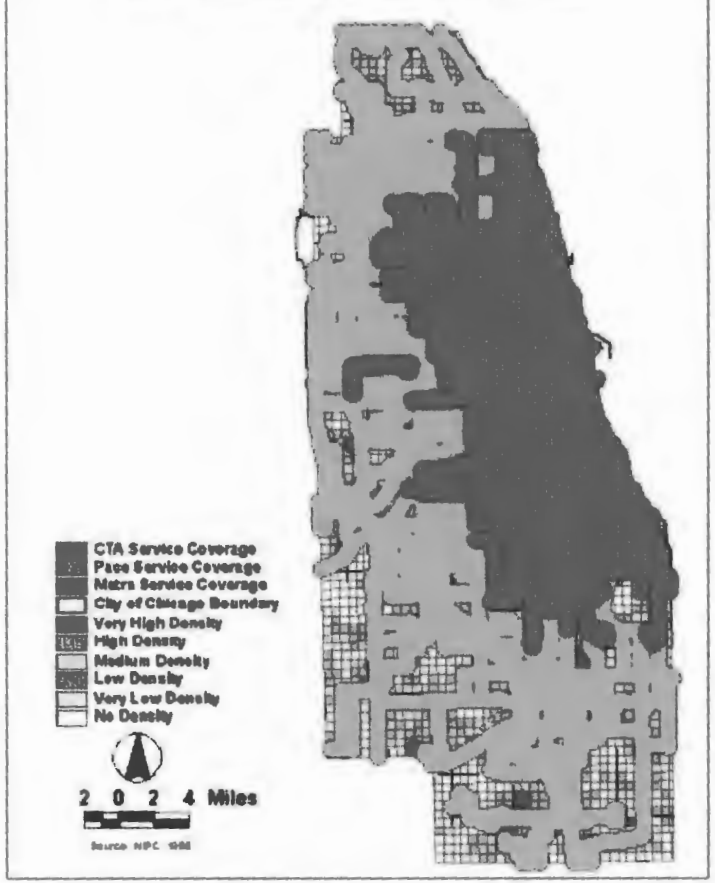


Exhibit B -
Service Coverage - CTA Statutory Service Area



Span of Service

Span of service refers to the hours that service is provided and defines the minimum period of time that service will operate at any point in the system. This provides customers with the confidence that direct and connecting service will be provided during the span hours.

Standard: For the 46 key routes, services are offered seven days a week, generally for a minimum of 16 hours. Support routes are market-driven and justified by demand.

For the 46 key routes, services are offered every day, usually for at least 16 hours. Span of service for support routes is determined by demand. Key and support routes are illustrated in *Exhibit C* and *Exhibit D* and are listed in the ***Tables 2*** and ***3*** below.

Span of service standards govern when service will be operated by time of day and day of week based on passenger boardings for bus and passenger entries for rail stations. Data from automated fare collection (AFC) equipment is used. For existing bus routes, time periods during which the number of boardings per vehicle hour fall below an established minimum would be candidates for elimination in that period, as explained below in *Minimum productivity*.

Table 2.

CTA Key Routes					
3	King Drive	49	Western	77	Belmont
4	Cottage Grove	49B	North Western	79	79th
6	Jeffery	52A	South Kedzie	80	Irving Park
8	Halsted	53	Pulaski	81	Lawrence
9	Ashland	53A	South Pulaski	82	Kimball/Homan
12	Roosevelt	54	Cicero	84	Peterson
20	Madison	54B	South Cicero	85	Central
21	Cermak	55	Garfield	87	87th
22	Clark	60	Blue Island/26th	90	Harlem
28	Stony Island	62	Archer	95E	93rd/95th
29	State	63	63rd	95W	95th
34	South Michigan	66	Chicago	119	119th
35	35th	67	67th/69th/71st	151	Sheridan
36	Broadway	71	71st	155	Devon
39	Pershing	72	North		
47	47th	74	Fullerton		

Table 3.

CTA Support Routes		
1 Indiana/Hyde Park	56 Milwaukee	108 Halsted/95th
2 Hyde Park Express	56A North Milwaukee	111 Pullman 111th/115
3L King Drive Limited	57 Laramie	112 Vincennes/ 111th
N5 South Shore Night	59 59th/61st	120 N. Western/Wacker
7 Harrison	62H Archer/Harlem	121 Union/Wacker
8A South Halsted	63W West 63rd	122 IL Center/N. Wester
11 Lincoln	64 Foster-Canfield	123 IL Center/Union
14 South Lake Shore	65 Grand	125 Water Tower
17 Westchester	68 Northwest Highway	126 Jackson
18 16th/18th	69 Cumberland/ E. Riv	127 NW/Madison
X21 Cermak Express	70 Division	129 W. Loop/So. Loop
24 Wentworth	73 Armitage	135 Wilson/LaSalle
25 West Cermak	75 74th-75th	136 Sheridan/LaSalle
27 South Deering	76 Diversey	145 Wilson/Michigan
30 South Chicago	78 Montrose	146 Marine Michigan
33 Mag Mile Express	81W West Lawrence	147 Outer Drive
37 Sedgwick/Ogden	85A North Central	152 Addison
43 43rd	86 Narragansett/Ridge	156 LaSalle
44 Wallace- Racine	88 Higgins	157 Streeterville
48 South Damen	90N North Harlem	165 W. 65th
49A South Western	91 Austin	169 69th /UPS
X49 Western Express	92 Foster	170 U of C Midway
50 Damen	93 N. California	171 U of C Hyde Park
51 51st	94 S. California	172 U of C Kenwood
52 Kedzie/California	96 Lunt	173 U of C Lakeview
53AL S. Pulaski Limited	97 Skokie	201 Central/Sherman
54A N. Cicero/Skokie	100 Jeffery Manor Exp.	202 Main/Emerson
55A 55th/Austin	103 West 103rd	203 Ridge/Grant
55N 55th/Narragansett	106 East 103rd	204 Dodge
Part Time / Seasonal Routes		
10 Museum of Science	124 Navy Pier Exp.	130 Grant Park Treas.
19 United Center Exp.	128 Soldier Field Exp.	154 Wrigley Field Exp.

Span of service extensions are considered when:

- The hour immediately before the end of the current service or after the beginning of the current service shows productivity greater than the average system productivity (bus or rail) for that hour.

- New or revised employee shift changes or extension of business hours create a demand for service.

Span of service, when provided during the Owl period, is primarily market driven with consideration given to coverage and equitable service distribution. Owl service is provided to protect work trips in the strongest markets and to maintain some coverage in those markets at all times.

Exhibit C

Key
Bus Routes

Exhibit D

Support
Bus Routes

Frequency of Service

Service frequency is established to provide a sufficient number of vehicles to accommodate passenger volume, at the most crowded location(s), during a given time period. On heavily traveled lines and routes, the frequency of service provided is a function of demand and peak period loading levels (described in passenger flow section).

Standard: The maximum interval for the mainline portion of bus and rail service is 30 minutes.

This document establishes minimum levels of service that will dictate the frequency of service. This is intended to maintain basic mobility for the region at all times.

The longest policy interval for buses and for trains is 30 minutes. Because CTA service is interconnected, 30-minute service is considered a minimally usable level of service for bus and rail. This minimum provides service reliability for transferring passengers and is for the mainline portion of services. Where a rail line or bus route splits into branches, there is a possibility that due to low levels of demand, the branches may have service intervals of longer than 30 minutes.

Passenger Flow

Service frequency and passenger flow are very closely related. Above the minimum service levels, service frequency is determined by customer demand. Each bus and rail service is evaluated in terms of passenger flow, which is defined as the number of passengers on buses or rail cars, at the busiest location(s) along the route, called maximum load point(s). ***Table 4*** shows the relationship between passenger flow and service frequency for peak period service.

Standard: **A scheduled capacity of 60 passengers per bus at the busiest locations will be used for scheduling bus frequency during peak periods. For rail, a scheduled capacity of 90 passengers per car will be used.**

Table 4.

Mode	Passenger flow per ½ hr*	Interval between vehicles	Avg. # of passengers per bus/car	Train length
Bus	300-360	5 minutes	50-60	--
Rail	3840-4680	4.5 minutes	75-90	8
Rail	3510-4050	4 minutes	75-90	6

*In one direction.

For the level of service illustrated in the table, the typical bus will have between 50 and 60 passengers on board, which includes 10 to 20 standees. On less well-utilized routes and in non-peak times, shorter intervals between buses are scheduled when justified by demand. For peak period rail services, the typical car will have between 75 and 90 persons on board or 35-50 people standing.

For articulated buses, the maximum scheduled passenger flow is 93 persons, accommodating up to 28 standees. At this level of passenger flow, service frequency for artics is about every five minutes.

Passenger flow standards will be revisited, as needed, particularly when new vehicles with different seating configurations are purchased.

Rail frequency guidelines determine appropriate service levels for a given level of demand (passengers per half-hour at the maximum load point). The level of service is expressed in terms of the number of cars per half-hour and the resultant trips per half-hour and interval for a given maximum train length. The Brown, Purple, and Green Lines operate at a maximum train length of six-cars, while the Yellow Line is a shuttle limited to two-car trains. All other routes operate eight-car trains in the peak.

The guidelines allow for a scheduled load of no more than 90 passengers per rail car.

Table 5, Table 6 and Table 7 show service levels for bus for peak and off peak time periods.

Table 5.

Standard Buses Bus Service Levels for 60 Passenger Maximum Load (Peak Periods)		
Passenger flow per ½ hr	**Service Interval (Minutes)**	**Passengers on Bus (Average for period)**
≤ 30	30	< 30
30-60	20	20-40
60-90	15	30-45
90-125	12	35-50
125-165	10	40-55
165-240	7.5	40-60
240-300	6	45-60
300-360	5	50-60
> 360	< 5	60

Table 6.

Articulated Buses Bus Service Levels for 93 Passenger Maximum Load (Peak Periods)		
Passenger flow per ½ hr	**Service Interval (Minutes)**	**Passengers on Bus (Average for period)**
220-320	7.5	55-80
320-425	6	65-85
430-560	5	70-93
> 560	< 5	93

Table 7.

Bus Service Levels in Off-Peak Periods Standard and Articulated Buses			
	Passenger flow per hour	**Service Interval (Minutes)**	**Passengers on Bus (Average)**
Midday (9:00 a.m.- 3 p.m.), Saturday, and Sunday	≤ 40	30	< 20
	40-60	20	13-20
	60-100	15	15-25
	100-150	12	20-30
	150-210	10	25-35
	>210	< 10	30-40
Evening (Everyday between 7 p.m. and midnight)	≤ 40	30	< 20
	40-60	20	13-20
	60-100	15	15-25
	100-125	12	20-25
	>125	≤ 10	21-30
Owl (Everyday between midnight and 5 a.m.)	< 30	30	< 15
	30-60	20	10-20
	> 60	≤15	15-25

Table 8 and *Table 9* illustrates the rail service levels for peak and off-peak time periods.

Table 8.

CTA RAIL SYSTEM

Peak Period Service (Weekdays 6:00am-9:00am and 3:00pm-7:00pm)

Every Half-Hour at Most Crowded Location		8-Car Trains		6-Car Trains		4-Car Trains		2-Car Trains	
Passengers	Cars	Avg. per Car	Trips	Interval	Trips	Interval	Trips	Interval	Trips	Interval
6,121 - 7,200	80	77 - 90	10.0	3.0						
5,401 - 6,120	68	79 - 90	8.5	3.5						
4,681 - 5,400	60	78 - 90	7.5	4.0						
4,591 - 5,400	60	77 - 90			10.0	3.0				
3,841 - 4,680	52	74 - 90	6.5	4.5						
4,051 - 4,590	51	79 - 90			8.5	3.5				
3,511 - 4,050	45	78 - 90			7.5	4.0				
3,521 - 3,840	48	73 - 80	6.0	5.0						
2,801 - 3,520	44	64 - 80	5.5	5.5						
2,881 - 3,510	39	74 - 90			6.5	4.5				
2,641 - 2,880	36	73 - 80			6.0	5.0				
2,521 - 2,800	40	63 - 70	5.0	6.0						
2,101 - 2,640	33	64 - 80			5.5	5.5				
2,381 - 2,520	36	66 - 70	4.5	6.5						
1,891 - 2,100	30	63 - 70			5.0	6.0				
1,921 - 2,380	34	57 - 70	4.3	7.0						
1,681 - 1,920	32	53 - 60	4.0	7.5			8.0	3.8		
1,751 - 1,890	27	65 - 70			4.5	6.5				
1,441 - 1,680	28	51 - 60	3.5	8.5			7.0	4.3		
1,441 - 1,750	25	58 - 70			4.2	7.0				
1,201 - 1,440	24	50 - 60	3.0	10.0						
1261 - 1440	24	52.5 - 60			4.0	7.5	6.0	5.0		
1081 - 1260	21	51.5 - 60			3.5	8.5				
961 - 1200	20	48.1 - 60					5.0	6.0		
901 - 1080	18	50.1 - 60			3.0	10.0				
841 - 960	16	52.6 - 60					4.0	7.5		
721 - 900	15	48.1 - 60			2.5	12.0				
721 - 840	14	51.5 - 60					3.5	8.6		
551 - 720	12	45.9 - 60			2.0	15.0	3.0	10.0		
441 - 550	10	44.1 - 55					2.5	12.0	5.0	6.0
331 - 440	8	41.4 - 55					2.0	15.0	4.0	7.5
276 - 330	6	46.0 - 55							3.0	10.0
201 - 275	5	40.2 - 55							2.5	12.0
151 - 200	4	37.8 - 50							2.0	15.0

Table 9.

CTA RAIL SYSTEM
Frequency of Service Guidelines
Off-Peak Period Service

Every Hour at Most Crowded Location			8-Car Trains		6-Car Trains		4-Car Trains		2-Car Trains	
Passengers	Cars	Avg. per Car	Trips	Interval	Trips	Interval	Trips	Interval	Trips	Interval
2,561 - 3,200	80	32 - 40	10.0	6.0						
2,401 - 2,560	64	38 - 40	8.0	7.5						
1,921 - 2,400	60	32 - 40	7.5	8.0	10.0	6.0	15.0	4.0		
1,601 - 1,920	48	33 - 40	6.0	10.0	8.0	7.5	12.0	5.0		
1,441 - 1,600	40	36 - 40	5.0	12.0			10.0	6.0		
1,281 - 1,440	36	36 - 40			6.0	10.0				
1,051 - 1,280	32	33 - 40	4.0	15.0			8.0	7.5		
841 - 1,050	30	28 - 35			5.0	12.0	7.5	8.0		
701 - 840	24	29 - 35			4.0	15.0	6.0	10.0	12.0	5.0
561 - 700	20	28 - 35					5.0	12.0	10.0	6.0
421 - 560	16	26 - 35					4.0	15.0	8.0	7.5
301 - 420	12	25 - 35							6.0	10.0
241 - 300	10	24 - 30							5.0	12.0
181 - 240	8	23 - 30							4.0	15.0
121 - 180	6	20 - 30							3.0	20.0
61 - 120	4	15 - 30							2.0	30.0
0 - 60	2	0 - 30							1.0	60.0

Minimum productivity

CTA tracks and regularly reports ridership and productivity. For bus, ridership and productivity are reported by route for Weekday, Saturday and Sunday/holiday service. Bus route productivity is reported in terms of passengers boarding per bus hour. The standard is 30 boardings per bus hour when the service interval is 30 minutes. Services that do not meet the standard become candidates for elimination.

Standard: For bus, minimum productivity is 30 passengers boarding per bus hour, when the service interval is 30 minutes.

Rail station productivity is measured by line and by station. Station productivity is measured by looking at passenger entries per station and costs of operating the station. Line productivity is measured by comparing the total entries at all stations on the line and dividing by the total operating costs of the line.

In its reporting of productivity, staff will provide performance targets, such as productivity requirements for variable cost break-even, system average productivity and others based on the fare structure and cost structure. See *Appendix B: Calculating Service Costs* for more information.

Particular focus is given to the change in ridership and productivity over time for each service. Significant changes are further evaluated for each hour of service in order to identify opportunities to improve service and service productivity.

FACILITIES & CUSTOMER AMENITIES MEASURES

Bus

Stop spacing

Bus stops are normally located at major cross-street intersections and/or traffic generators. In most instances, stops will be about ? mile apart (a standard Chicago block), depending on the neighborhood density. For limited-stop service, stops are made at widely spaced stops, with the local route making all stops.

Amenities

Bus customer shelters, benches, future electronic travel information signs and other features make CTA service more comfortable, safe and friendly. These amenities are distributed by factors that consider equity in distribution throughout the service area, the utility of the benefit to the user and site-related constraints. Additionally, high consideration is given to stops on key bus routes due to a generally higher level of demand.

Priority for amenities is given to stops that have:

- Large numbers of passengers who board at the location,
- Lengthy wait times between buses,
- High percentage of transfer passengers, and
- High percentage of seniors or disabled persons using it.

Rail

Investment considerations

Unlike bus stops, stations are major facilities that have their own operating costs (customer assistants, security and maintenance) and are a considerable capital asset to build, maintain and, often, to rebuild.

Station changes are generally considered at the time of investment or reinvestment in the asset. In addition to the physical condition of the station, of great importance to a CTA investment decision is the future customer market for the station, relative to the size of the investment and the associated operating cost. Priority is given to stations where growth is expected to occur.

Investment decisions are based on:

- Passenger entries at that station,
- Station operating cost per passenger,
- Station spacing (described below),
- Land development around the station and

- Ridership on the line and branch that the station will serve.

Station spacing

Station spacing is based on demand and also differs based on the purpose of the rail segment. Line-haul segments should have wider station spacing as competitive speeds are maintained, while collector and distributive segments may have closer station spacing to reduce walk times. Station spacing is considered both for the impact on passengers on trains that may be delayed, and on the impact of the new facility on the markets of adjacent stations.

See *Appendix A: Bus and Rail Design Guidelines* for more information.

Distribution of Revenue Equipment

There are several factors to consider when distributing revenue equipment. When assigning or reallocating revenue equipment, the following criteria are used:

- **Accessibility** - Our first priority is to make all routes accessible. As older, non-accessible buses are retired and new accessible buses replace them, the fleet will eventually become 100% accessible. CTA's Planning and Development Department and ADA Compliance Officer are continuing to work with the ADA Advisory Committee to determine how to deploy new buses until the fleet is 100% accessible.

- **Air Conditioning** - The geographic allocation of air-conditioned buses is a high concern for our customers. When distributing buses, each garage should have roughly the same percentage of air-conditioned buses. Again, as older, non air-conditioned buses are replaced with new air-conditioned buses the fleet will eventually be 100% air-conditioned.

- **Average Age** - There is a wide range of older and newer buses in CTA's fleet. The average age at each garage should be roughly equal. As we acquire new buses our average fleet age will decrease.

- **Number of Bus Types at Each Garage** - In order to maximize maintenance performance and maintain adequate stockroom space for maintenance parts at each garage, the number of bus types at each garage should be kept to a maximum of four, optimally three.

Chapter 4: Service Change Process

The CTA *has a structured process for evaluating services and proposed changes that is tied to the annual budget, yet is responsive to small market changes throughout the year.*

As part of the on-going review of the performance of all routes and services and consideration of service change proposals, moderate and major service changes are to be brought to the Board for approval twice a year. Minor service changes are analyzed on an ongoing basis and can be implemented at each section pick (the occasion when schedules are updated and operators can pick their work).

This process includes the following features:

- Development of an Annual Service Budget Proposal,
- A transparent process for evaluating service changes,
- Accountability and flexibility in minor and major service change decisions, and
- A semi-annual comparative evaluation for major changes.

Annual Service Budget Proposal

In support of the annual budget process, Planning & Development develops an Annual Service Budget Proposal that identifies budget needs for each service change type for the next year's budget. This proposal is based on a review of the performance of all routes and the service change proposals received.

Once adopted, the Annual Service Change Budget guides the service changes that will be evaluated and implemented over the budget year. The Service Change Budget contains allotments for various classifications of service changes such as improvements, reductions and major, moderate, and minor service changes.

Service Change Process Overview

Requests for service changes and new services can be proposed by anyone – private citizens, elected officials, CTA employees, employers, etc. They can also be the result of ongoing monitoring and data collection.

The Bus and Rail Service Committees have an advisory role for service changes. These are internal committees that meet monthly, or as needed, to:

- Identify issues, opportunities and concerns,
- Ensure that proposed service changes can be operated reliably and safely, and
- Identify the actions that may be needed to implement changes.

All proposals must be reviewed and analyzed by Planning and Development staff. In order to efficiently screen, analyze, and evaluate the merits of service change proposals, the Service Change Committee was established within Planning and Development.

The process for evaluating and implementing service change proposals is dependent upon the magnitude of the change. ***Table 10*** defines the different types of service change. ***Table 11*** provides the timeline for the service change process.

Table 10.

Service Change Types		
TYPE	DEFINITION	EXAMPLES
Minor	Routine small changes to better align services with demand	▪ Running time adjustments ▪ Departure time adjustments ▪ Span of service changes of ½ hour or less ▪ Bus reroutes due to street or bridge detours ▪ Service interval changes to match service levels with ridership ▪ Train length changes to match service levels with ridership ▪ Changes to bus stop locations
Moderate	Small changes to routes or service configurations with limited impact & modest costs	▪ Bus reroutes of less than 1 mile ▪ Route extensions of 1 mile or less ▪ Service changes to reflect changes in street patterns
Major	Changes that will have significant impacts on customers and resources.	▪ Route changes that affect more than 25% of a route's passenger route miles or vehicle miles ▪ Changes requiring new facilities and/or capital expenditures at a cost level that requires Board approval

Table 11.

SERVICE CHANGE PROCESS																		
Process Element	**Jul**	**Aug**	**Sept**	**Oct**	**Nov**	**Dec**	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sept**	**Oct**	**Nov**	**Dec**
BUDGET PHASE (prior year)																		
Proposal Intake & Screening																		
Service Change Proposal Submit																		
Budget/Exec Review & Modification																		
President's Approval																		
Board Approval																		
MID-YEAR CHANGE PROGRAM																		
Proposal Screening																		
Proposal Evaluation																		
Executive Review																		
Board Approval																		
Implementation																		
YEAR-END CHANGE PROGRAM																		
Proposal Screening																		
Proposal Evaluation																		
Executive Review																		
Board Approval																		
Implementation																		
MINOR/MODERATE CHANGE PROGRAM																		
Implementation																		

Proposal intake and service monitoring/data collection are continuous throughout the year.

Minor and moderate changes are evaluated within Planning and Development through the Service Change Committee and can be implemented throughout the year, in accordance with section picks, except when Board approval is required. These are generally changes that have little or no impact on the budget or vehicle allocation.

Major service changes must undergo a Semi-annual Review and may be implemented only twice a year. These changes do impact the budget and vehicle requirements. Further, they require Board approval before they can be implemented.

SCREENING

Once the Service Change Committee receives a proposal, it is screened to see if it warrants further study or rejection. This screening requires a brief analysis that includes the criteria listed in ***Table 12***

Table 12.

Screening Criteria
• Urgency
• Ease of implementation
• Readiness for implementation
• Level of interest (internal & external)
• Feasibility
• Capital and/or land acquisition required
• Costs involved (preliminary estimate)

After the committee has determined if the proposal should proceed to the next level of analysis or be declined, the sponsor of the proposal is notified of the decision. This notification may come after approval to do full analysis for those projects that move forward.

EVALUATION PROCESS

Approval for full analysis is required from senior management before proposals can proceed. Depending on the level of complexity, this higher level analysis generally takes up to two months to complete, but may extend to as much as 12 months for some improvements.

For service improvements, the economic factor is cost per new passenger. For service reductions, it is savings per passenger lost.

At this time, the committee also determines what type of service change the proposal is. If it is a minor or moderate change, the full

analysis and implementation can take place any time the resources permit. If it is a major change, it must be deferred until time for the Semi-annual Review (described below). Minor service changes, in effect, tweak the system and require a less rigorous analysis than moderate or major service changes.

Service analyses will be conducted using a consistent set of evaluation criteria (listed in ***Table 13***), based on whether the change is a service improvement or service reduction. The economic factor for service improvements is cost per new passenger. For service reductions, it is savings relative to passengers lost.

Table 13.

Evaluation Criteria	
Service Improvement	*Service Reduction*
Primary ▪ Net cost per new passenger ▪ Available budget ▪ The rationale for the change ▪ Existing and projected ridership ▪ The number of new passengers ▪ Existing and projected operating costs ▪ Existing and projected fare revenue ▪ Implications to service coverage	***Primary*** ▪ Net savings per passenger lost ▪ The rationale for the change ▪ Existing and projected ridership ▪ Existing operating costs ▪ Existing fare revenue ▪ Implications to service coverage
Secondary ▪ Market change, past, present and projected ▪ The change in travel time for existing passengers ▪ Key characteristics and demographics of the market ▪ Contribution to the achievement of policy objectives ▪ Other factors, as appropriate	***Secondary*** ▪ Market change, past, present and projected ▪ The change in travel time for existing passengers ▪ Key characteristics and demographics of the market ▪ Contribution to the achievement of policy objectives ▪ Impact on accessibility ▪ Other factors, as appropriate

Primary evaluation criteria are used to determine the economic viability and sustainability of service changes. The secondary criteria are included to provide a complete picture of the impacts of the change and to determine whether there are special circumstances related to the change. Staff evaluates each project using the worksheets in *Appendix C: Service Proposal Evaluation Worksheets.*

SEMI-ANNUAL REVIEW

Major service changes are evaluated twice a year and may only be implemented two times each year, as the budget allows. For this type of change, the Semi-annual Review is required to determine how best to allocate CTA's limited resources for services.

The Semi-annual Review ranks major qualified service changes accumulated during a six to twelve month period. This ranking determines CTA's best investment, and is used as a starting point in decision-making for the following year's budget preparation.

Once approval of the full analysis is granted, Service Change Committee members divide the work according to their sections' responsibilities within the organization. The committee evaluates the proposal again at the conclusion of the analysis. Proposals are ranked against other proposals and compared to the productivity levels of existing services to determine which proposals should be implemented.

The Board will be provided with the recommended service changes and a ranked list of all other proposals evaluated with their relative rankings. These will be compared to the system average performance. Additionally, the Board will receive a description of the change, its justification, and cost and ridership implications.

Experimental Services

Some service changes may be implemented as experimental services. Experimental services have a six-month evaluation period. During that time the CTA Board may cancel or adjust the service if it becomes apparent that the service is not meeting expectations. If the service is approved by the Board as a permanent route, it will be folded into CTA's regular budget. Status reports will be provided regularly to the CTA Board during the experimental period.

Chapter 5: Service Monitoring & Reporting

Service monitoring and data collection are key elements of the service evaluation process. All services and routes are routinely reviewed to assess their performance and effectiveness.

MONITORING & DATA COLLECTION

The two broad categories of service monitoring activities are ridership monitoring and route/branch performance monitoring.

Ridership monitoring ensures that service frequency is appropriate to passenger demand. Data collection and analysis activities for this type of monitoring include point checks, ride checks, and analysis of AFC data to determine passengers boardings on bus and passenger entries at rail stations. Ridership monitoring permits quick response to demand changes.

Route/branch performance monitoring ensures the effectiveness of existing services with respect to their variable operating costs and usage. Data collection and analysis activities for performance monitoring include running time checks, point checks, bus productivity analysis, and analysis of AFC data.

REPORTING

Planning and Development reports bus ridership and passenger entries at rail stations monthly. Bus routes are ranked using passengers per vehicle hour to highlight productivity. Passenger entries are used to rank performance of rail stations and branches. This ranking gauges the performance of individual routes, stations, and branches and the system as a whole and serves as an initial screening process for investigating service improvements and their costs.

These rankings will be reported to the Board quarterly. The report will include recommended strategies for meeting performance objectives and a summary of the results of service proposal evaluations conducted during the previous quarter.

Chapter 6: Public Participation Process

The focus of the public participation process is an on-going, regular dialogue with communities, citizens and their elected officials regarding service needs. It is also intended to familiarize stakeholders with the CTA service planning process, and to engage them in the process of allocating finite resources in an equitable fashion.

The public participation process is comprised of three integrated steps:

- Outreach to customers
- Outreach to the public, communities and elected officials
- Public meetings and hearings on major changes

Outreach to Customers

Direct feedback from customers is an important part of the public participation process. Regular customer surveys measure levels of satisfaction on a variety of attributes, such as service reliability and cleanliness. Specific market and route-based surveys may also be conducted for a route or service undergoing a major change. Additionally, CTA will sometimes solicit "public comment", involving phone calls and letters, as input for the evaluation process. Customer evaluations received by the CTA are valuable input to the route evaluation process.

The 1995, 1997, and 1999 Customer Satisfaction Surveys are examples of CTA's commitment to learning more about our customers' needs and concerns. These surveys provided invaluable information on perceptions of CTA, gave us some indication of customer loyalty, and told us where improvements were needed. The results of the Customer Satisfaction Surveys feed into decisions made about service changes and other resource allocations.

Outreach to the Public, Communities and Elected Officials

Outreach efforts are intended to provide individuals and groups the opportunity to formally submit service requests to CTA for consideration. CTA is developing a series of documents to describe to the public the service planning process and elicit their proposals. These documents, as well as route performance reports, will be made available on the CTA website, www.transitchicago.com.

PUBLIC MEETINGS AND HEARINGS

Staff attends public meetings on request. These meetings are generally in conjunction with community groups, CAPS (Community Area Policing Strategy) units, or elected officials. Through these meetings, staff learns valuable information regarding changes in the community, customer suggestions, and customer needs. Feedback from these meetings is entered into the minutes of the next Service Change Committee meeting.

Public hearings are an important part of the planning process for major service changes. Improvements to service do not require public hearings. However, route changes that reduce more than 25% of a route's route miles, vehicle miles or ridership require a formal public hearing prior to final Board action. The Board considers the public comments prior to making a final determination on the proposed service reduction. Public hearing requirements are set by ordinance, which may be amended from time to time.

As a public service, customer input and feedback are vital to ensuring that CTA meets the needs of our customers.

Appendix A: Bus and Rail Design Guidelines

The Authority has developed a set of design guidelines that are to be used for both ongoing evaluation and modification of existing bus and rail service, and in preliminary evaluation and design of proposed new services.

BUS SERVICE

In designing routes and making changes to existing routes, a balance is attempted between ease of access and minimizing travel time. A goal is to control and minimize door-to-door travel time for all potential customers as much as possible. Transit travel time components for an individual trip consist of four components:

1) *Walk access* - time from leaving origin to boarding point. This is a function of distance from route, presence of obstacles, and stop spacing.

2) *Wait for service* - time at boarding point, ready to board, until bus departs with customer on board.

3) *On-board* - time traveling on bus, including delays. This is a function of distance, directness of service (lack of deviation), attainable speeds, presence or lack of congestion, number of intervening stops, and number of other passengers boarding/alighting.

4) *Walk distribution* - time from departing transit at alighting point to destination. This is a function of distance from route, presence of obstacles, and stop spacing.

For transfers, steps one through three are repeated. Research has shown that customers are most sensitive to waits for service and delays, followed by time walking to/from service and least sensitive to time on bus or train while moving. Demand for a service can be determined by using these factors plus fares along with coefficients. Most travel time reductions involve tradeoffs. Transit demand gains and losses from changes in travel time can be estimated using pivot-point forecasting methodologies.

Relationship Between Bus and Rail

When planning new bus routes or restructuring existing bus routes, emphasis should be given to feeding rail stations as much as possible. In some cases, there may be apparent geographic overlap of service because a bus route provides local service, while rail service makes widely spaced stops. Additionally, density of demand may be high enough to warrant express bus service in the same corridor as rail. These express bus routes increase market penetration and help reduce overloading on the rail lines.

Duplication of Service

It is the Authority's policy to operate only one local bus route on a major arterial street. However, it may be necessary to duplicate service in certain cases; 1) where routes merge to feed a rail station or a major traffic generator such as downtown, 2) when branches of routes share a common headway on the mainline portion of the route, and 3) when a route provides local service in the same corridor as rail service.

Walking Distance to Service

As was mentioned under *Service Coverage*, it is the Authority's policy to have service available to almost all residents in CTA's service area within a ½ mile walking distance during the weekday peak period, ¼ mile in high density areas. These walking distances expand during the midday, evenings, weekends, and owl periods due to a reduction in the level of passenger demand at these times. Demand generators, such as residential concentrations, shopping centers, factories, and schools that are not within a ½ mile walking distance to a bus route and have streets capable of supporting bus service, will be considered for service if there is potential ridership.

Stop Spacing – Local Service

When locations of stops are being considered for a route, it is necessary to strike a balance among customer convenience, effect on average bus speed, and safety. A stop normally will be located at major cross-street intersections and/or major traffic generators. Other stops are spaced no more than 1,320 feet apart, except where pedestrian access is not provided such as on or under a viaduct. In most instances, stops will be about ? mile apart (a standard Chicago block), depending on the neighborhood density. Because Chicago's bus stop system predominantly uses nearside stops, additional stops also should be nearside for consistency, unless a farside stop is more feasible due to the geometry of the intersection, improvement of traffic flow, or convenience to passengers. Spacing between adjacent stops and implications for service should be considered in requests to move bus stops.

Travel Time

Routes should be designed to minimize on board time, while taking into account customers' overall travel time. Short routes maximize operating efficiency, by allowing a better match of service levels to demand along particular zones of a street, but may result in additional transfers. Long routes, where one-way running time exceeds 75 minutes, are subject to schedule adherence problems, but will reduce the need for customers to transfer.

Route Branch

A branch is a new route that departs from the main route to serve a different market. It shares a common trunk segment; it may or may not have the same route name and number. To keep service intervals even, trunk line buses are generally alternated between branches. This results in the branch interval being twice that of the trunk. When a new branch is created by widening service intervals on a portion of the original route, costs are imposed on passengers on that portion due to a longer wait time for service. The costs to those passengers must be weighed against the gains for the passengers on the new branch in regard to improved access and on-board time.

Bus Route Deviation

Routes will be designed to operate as directly as possible, using major arterial streets. A route deviation brings service closer to a trip generator, reducing walk access travel time for customers to/from the generator, and thus making the route desirable to new customers. The deviation, however, imposes a burden on customers on-board who are not boarding or alighting to/from the generator. Demand gains (new customers) must be weighed against the losses to the existing, through customers in considering a route deviation.

The total additional travel time for all through customers should not exceed five minutes for each rider boarding or alighting along the deviation. This criterion is expressed in the following formula (an example is included):

Benefit Gained			**Must be Greater Than**	**Costs Imposed**		
Existing and New Passengers Boarding/ Alighting on Deviation	X	Walk Time Saved	>	Passengers on Board Bus	X	Added Time on Bus Due to Deviation
10	X	5	>	20	X	2
50 passenger minutes			>	40 passenger minutes		

Express Services

Limited-stop

A limited-stop service is service that stops only at widely spaced stops. It typically operates on the same street with local service, with the local route making all stops. The street must be wide enough to allow buses to pass each other; typically this is, at minimum, a four-lane street. The current service interval is usually shared between the two services. With limited-stop service, longer distance passengers gain with less on-board travel time but have longer service intervals (increased wait for service). Shorter distance customers do not have the same gain with reduction in on-board travel time and also suffer a loss due to longer service intervals. Some passengers may lose additional travel time by having to transfer between limited and local service. The benefits to longer distance customers must be weighed against the losses to shorter distance customers in determining whether or not to implement limited-stop service on a route. Such service generally works best on long crosstown routes that do not have a rail line in close proximity, and thus should generate the most increase in net customers.

Zone Express

Express service is considered where there is a substantial market between segments that are widely separated and travel time savings could be obtained by instituting an express portion to a route. Average vehicle loads should already be high at the beginning of the express portion. When an express service is created from portions of existing service, the express service will draw customers from the local portion and service intervals will be widened. The reduction in on-board travel time for the longer distance customers must be weighed against the increased wait for service for the local customers whose service intervals have been increased.

Facilities Characteristics - Bus

Any roadway segment intended for operations with standard or articulated buses must meet minimum design standards for safe operations:

- minimum turning radius of 50 feet;
- street composition must adequately support a bus' weight;
- minimum lane width of 12 feet;
- no speed bumps; and,
- overhead clearance of 11 feet.

Use of local streets should be avoided, except as part of a terminal routing. Turnarounds and off-street stands should include a range of amenities such as operator washrooms, shelters, seating, landscaping and service information appropriate to customer and operational needs. Partnerships with the primary beneficiary of the service are encouraged for the supply and maintenance of these facilities. Refer to the CTA *Guidelines for Transit-Supportive Development* for facility requirements and characteristics.

RAIL STATIONS

Stations are entry/exit points of the rail system. They also represent, unlike bus stops, a substantial capital investment in items such as station buildings, stairwells and elevators, platforms, fare equipment and other facilities. There are also operational costs involved including maintenance, and Customer Assistant and security guard coverage. Thus, it is important that careful consideration be given stations when balancing the needs for convenient access to and from the rail system with costs of operation, maintenance and construction of stations.

Operating costs for existing stations are largely independent of station passenger entries. All stations on a given route are typically open all hours that there is train service on that route. For these stations to be properly evaluated, passenger entries, data that is readily available through the Automated Fare Collection (AFC) system, will be employed. Stations are ranked by passenger entries by service day (weekday, Saturday or Sunday) and by service period (peak, base, evening, etc). Further, station use will also be tracked through time to reveal trends. In all these measures, stations will be compared to other stations on a system-wide basis and also compared to other stations on the same branch.

Stations in the top 10% of passenger entries or those experiencing significant increases in passenger entries will be examined to see if they have the capacity to handle current and future flows and, if needed, possible solutions to any identified problems will be proposed. Stations in the lowest 10% of passenger entries or those experiencing significant decreases in passenger entries will also be examined to see if any possible actions can be taken to increase entries and

exits, or reverse the decline. When several stations on the same branch are in the same group (e.g. top or bottom 10%), solutions will be investigated on a branch or route basis.

Capital Investment

Any existing station or secondary station entrance in need of capital investment, any proposed station, or any closed station proposed to be re-opened, must be evaluated to determine if the capital investment required to build or open it will provide commensurate benefits.
The types of stations and station entrances range as follows:

- Opening/closing part-time stations or station entrances that are closed/opened when train service is operating at the station. Cost/savings are typically very modest. The most common changes are changes in Customer Assistant or guard coverage or addition of high barrier entrance turnstile.

- Reopening of closed stations or station entrances where facility is largely in place. Typically these require clean-up, some physical improvement, and installation of fare equipment. For a re-opened station, Customer Assistant and guard coverage may be required. Secondary station entrances can often share coverage with primary entrance.

- Constructing a new or rebuilt station on an existing line. Typical construction needs are to the extent that elevators or ramps are required. Capital costs can range to $10 million or more. Capital decisions apply to new or previous stations and to existing open stations in need of reconstruction.

CTA strives to find a balance for the following criteria used to consider station and station entrance openings, re-openings and closings:

- *Ridership* - Potential passenger use is still, of course, one of the primary concerns. In the case of an existing station, actual passenger entries will be used along with trends. With reopening closed stations, previous passenger entries at that station along with trends for the relevant route or branch will be employed. New stations will use potential passenger entries and trends for the branch the station will be located on.

- *Physical Conditions* - If the station is an existing or closed station, are there any physical conditions that limit the usefulness of the station and can they be remedied, such as curves that limit the line of sight of operators?

- *Station Spacing* - Ideally, most rail stations are located about one-half mile apart. Stations may be further apart or closer together based on demand, density, and connections to the bus system. Any capital investment station must be evaluated as to how it fits in to the surrounding stations, answering the question, is the station spacing appropriate for the demand?

- *Alternative Service* - When considering capital investment in an existing or potential station, a prudent question to ask is if there are other CTA services, most likely bus routes, available. Do these services provide a reasonable alternative to a station? Or do they provide an important connection for the rail system? Will customers be diverted from existing CTA

services by a new station at this location?

- *Community Role* - Every station performs some sort of community role and any potential station can also play a role in the community. The question for each capital investment station is to what degree does a station play in its community? It might be one of the few links to the wider system for a community. It also might play a role as a focus of a community, or it might be isolated from the surrounding area, in which case it plays a very minor role.

Span of Service Adjustments

To analyze reopening an entire rail line or branch at times during which there is no service, ridership analyses similar to those above would be completed. Passenger entry trends for the time period most similar to that being considered for service would be analyzed. For example, for expanded Saturday service, weekday off-peak entries may be analyzed, and for Sundays, Saturday entries may be analyzed. These would be considered in relation to the rest of the system to allow a forecast to be made of the revenue that would be generated by the additional span of service. Analysis of bus boardings within the corridor may also be considered. These would cover the time period during which increased rail service was being analyzed. These analyses would be used to determine a revenue forecast for the expanded service. This figure would be compared against the variable operating costs of such service.

Additional analysis would be made of other issues, including community needs and support for the rail service. Operational considerations such as maintenance work that is being completed during periods when the line is closed would be taken in account.

Customer Assistant Coverage

Customer Assistant (CA) coverage is independent of station evaluation. The purpose of Customer Assistants is to assist passengers in using the CTA system, most often with the fare collection equipment. For instance, to allow reduced fare passengers through turnstiles, a Customer Assistant must insert a card in the turnstile, so it will accept a reduced fare.

At other times, stations are staffed with security guards, whose primary purpose is to protect passengers and fare equipment.

To provide coverage fairly and equitably, CA coverage must be based on a number of factors, including customer entering volumes and characteristics, geographic distribution and any operational considerations. Thus, most outlying stations would need Customer Assistant coverage during the morning rush when the rate of passenger entries is the greatest. O'Hare and Midway stations might need longer coverage due to many first-time or infrequent passengers. A station near a school would need coverage when many students (with reduced fares) enter the station.

Appendix B: Calculating Service Costs

An important component of service planning is factoring in the financial impacts of particular service proposals. An important question to answer will always be "how much will it cost?"

In determining the costs for most service proposals, Planning will calculate the estimated direct operational costs, sometimes called variable costs. For bus this includes operator pay, fuel and light maintenance supplies, which includes wear-and-tear on the tires and fluid replacement. For rail, this includes operator pay, power, light maintenance, and supplies.

If a service proposal is so large that it may impact other company functions, for example, the maintenance and administration of a bus garage, or the closing of a whole rail branch, then clearly a variable cost model does not suffice. Proposals such as those, need to be considered in a different context than the typical Planning cost analysis. This section's purpose is to discuss how Planning will analyze most typical service proposals, not proposals that impact garage or terminal operations.

Variable Cost Estimates

For both bus and rail, a simple variable cost model is used to estimate the overall operational cost impacts of a service proposal. A cost model is an estimating technique that uses past expenditures for particular functions and divides them based on cost drivers, for example pay hours, platform hours or vehicle mileage.

In most cases, the labor rate will be applied to the labor pay hours for a proposed service change. If pay hours are not available, platform hours (also called bus or train hours) can be used as a surrogate. The fuel, power and maintenance supply costs are all applied to the vehicle miles of the service proposal, since those costs are more likely to be impacted by distance traveled and not time traveled.

Operational Costs

In analyzing a service proposal, all aspects of the proposal will be studied to insure that there are no other costs that should be included in addition to the variable costs. For example, will a new bus service require an additional supervisor, or will a particular rail proposal require changes to the staffing of the Customer Assistants? Other administrative costs, for instance marketing, signage and community outreach, need to be itemized for the proposal, too. These additional costs need to be added to the variable cost estimate to produce the overall operational cost estimate of the service proposal.

Special consideration is given to the costs associated with operating rail stations. Customer Assistants and janitorial services are direct operational costs, although they are only indirectly related to the train services being operated. For service changes that require alterations to station staffing, both CA and janitorial pay rates can be applied to the proposal. For estimates of the cost of stations, CA and station maintenance budgets can be calculated by the "station days" to provide an estimate as to the daily cost of a station entrance.

Once the operational costs for a service proposal are estimated, Planning can include potential revenue impacts and can assess whether the proposal fits particular budgetary, service or corporate goals. This process is typically what Planning will use in preparing its

recommendations to the Board, and variable costs will primarily be those presented in all Board reports and other supporting materials.

FULL COST MODELING

At times, Planning will be asked to perform some form of estimation of the full costs. Typically, full cost accounting may be needed to get an idea of what the budgetary impacts of a large service proposal will be before a more thorough analysis is performed. Occasionally, the estimation is needed to perform more "academic" research, like peer comparative analysis or full cost recovery or subsidy analysis.

Full costs include the variable costs, plus fixed costs like the less-direct operational costs, for example supervision, heavy maintenance, legal claims and the wages for other operational staff, like, rail switchmen or garage maintenance laborers. Full costs also include administrative overhead. None of those resources are devoted to any one route or service. In calculating the full costs of a service, fixed costs are prorated across the system.

For example, assume that the previous year's budget had Bus Heavy Maintenance costing $35 million. Since maintenance costs are more likely to be related to the mileage traveled by each bus versus the time, vehicle mileage is used as the cost driver. Continuing the example, suppose that in that year there were 70 million bus miles traveled by the entire bus fleet. Therefore, each vehicle mile costs ($35m/$70m) $0.50 in heavy maintenance costs. Therefore, if a particular service requires 500,000 annual vehicle miles, its total annual cost for heavy maintenance would be $250,000. This process can be calculated for other budget items, like supervision or administration.

It is important to note that this is an estimation technique. In the above example, while heavy maintenance costs are related to the vehicle mileage, in reality they do not drive the overall maintenance cost structure for the bus system. Adding a new service of 500,000 vehicle miles will not increase the Bus Heavy Maintenance budget by exactly $250,000, if anything at all. To answer that question, a more thorough analysis of the possible impacts is needed, for example, how much equipment is required and what are the staffing implications.

To reiterate, the full cost model will only be used for general statements or analyses about the costs of a service. They will not be used to make accurate predictions about the cost savings or additions resulting from a service change. Full cost estimates will not be used in most Board reports and Board recommendations for service proposals.

Appendix C: Service Proposal Evaluation Worksheets

Following this page are two evaluation worksheets. One is for service improvements and the second is for service reductions. These worksheets are intended to assist Planning and Development staff in evaluating service proposals that merit detailed evaluation and assist in preparation of a recommendation report.

Two types of information are sought:

1. *Evaluation Information* - is that which directly affects the recommended decision. This includes expected customer and fare revenue gains or losses, capital/operating cost increases or savings, gains or losses in benefit (e.g. travel time) to customers, and other factors.

2. *Supporting Information* - is that which helps in understanding the data developed for evaluation.

The evaluation work sheets are designed to assist in presenting the needed data for larger scaled proposals, those that affect many customers, or have substantial cost implications. For smaller proposals, the evaluation will be scaled back to those items that are appropriate for the decision.

Service *Improvement* Evaluation Worksheet			
Factor	**Discussion**	**Supportive Value**	**Evaluation Value**
RIDERSHIP			
Existing Ridership	Ridership trends.		
Projected Ridership	Projected ridership in the market of the proposed improvement with and without improvement.		
Projected New Ridership	Projected ridership due to improvement new to CTA after accounting for trips shifted from other services.		
Supporting Factors	Macro-scaled: ▪ Growth in population and employment in market to be served. ▪ Indicators of recent change (e.g. New or rehabilitated housing units, new/more active retail, new employment)		
	Micro-scaled: ▪ Participation in ridership improvement programs ▪ Improvement in travel time ▪ Improvement in convenience ▪ Improvement in reliability		
REVENUES			
Existing Fare Revenue	Existing revenue.		
Projected Fare Revenues	▪ Projected New Ridership times average revenue per unlinked trip. (Normal use.) ▪ Projected New Ridership times other fare estimate. (Exception)		

Service *Improvement* Evaluation Worksheet			
Factor	**Discussion**	**Supportive Value**	**Evaluation Value**
Operating Subsidy (if any)	As negotiated.		
OPERATING COSTS			
Variable Operating Costs	Existing costs.		
Projected Variable Operating Costs	▪ Costs Associated with Improvement		
Supporting Factors	▪ Buses or trains required ▪ Bus or train hours of service added ▪ Bus or car miles of service ▪ Direct station costs ▪ Length of added service ▪ Other cost components ▪ Variable Cost Rates for each element		
CAPITAL COSTS			
Associated Capital Cost	▪ Physical improvements directly associated with service change (e.g.. New station) ▪ Amortized over useful life ▪ Deductions for 3rd party contributions ▪ Net of contributed capital from non-transit source		
TOTAL COST	Operating plus Annual Capital		
CUSTOMER IMPACT			

Service *Improvement* Evaluation Worksheet			
Factor	**Discussion**	**Supportive Value**	**Evaluation Value**
Existing Customers	Number of rides impacted (improved and worsened) factors: - walk time - wait time - riding time - transfers - other		
New Customers	▪ Number of new rides ▪ Same factors		
Weighted Gain or Loss	Gain (Loss) = [(number of rides improved) x (value of improved factors)] - [(number of rides worsened) x (value of factors)]		
OTHER FACTORS			
Rational for Change	▪ Compatibility with CTA objectives ▪ Compatibility with Municipal Objectives		
Equity	▪ Enhances ADA goals ▪ Enhances Title VI goals		
Customer Expectations	Enhances goals for On-Time, Clean, Safe and Friendly		
Customer Flow Standard	Meets standard for service level for day/period		
Productivity	▪ Will meet minimum productivity standard. ▪ Meets average productivity for day type.		
Budget Available			

Service *Improvement* Evaluation Worksheet			
Factor	**Discussion**	**Supportive Value**	**Evaluation Value**
SUMMARY			
Total Cost	Operating plus Annual Capital		
Projected New Fare Revenues	From above		
Subsidy	Total Cost less Projected New Revenues		
New Ridership	From above		
Cost Per New Ride	Total cost divided by new ridership		
Subsidy Per New Ride	Subsidy divided by New Ridership		
Number of Customers Required to Recover Costs	Added Total Cost divided by Average Fare		

Service *Reduction* Evaluation Worksheet			
Factor	**Discussion**	**Supportive Value**	**Evaluation Value**
RIDERSHIP			
Existing Ridership	Existing ridership on services considered for reduction.		
Projected Lost Ridership	Projected ridership loss to CTA due to reduction after accounting for trips shifted to other services.		
Supporting Factors	▪ Increase in travel time ▪ Worsening of convenience ▪ Worsening in reliability ▪ Ridership Trends ▪ Future projections		
REVENUES			
Fare Revenue Losses	Projected Lost Ridership times average revenue per unlinked trip. (Normal use.) • Projected Lost Ridership times other fare estimate. (Exception)		
OPERATING COSTS			
Variable Operating Costs Saved	• Costs Savings Associated with Reduction		
Supporting Factors	▪ Buses or trains saved ▪ Bus or train hours of service reduced ▪ Bus or car miles of service reduced ▪ Direct station costs saved ▪ Length of reduced service ▪ Other cost components ▪ Variable Cost Rates for each element		

Service *Reduction* Evaluation Worksheet			
Factor	**Discussion**	**Supportive Value**	**Evaluation Value**
CAPITAL COST			
Associated Capital Cost Savings	Avoided physical improvements directly associated with service change		
Annual Capital Savings	Amortized over useful life		
TOTAL COST	Operating plus Annual Capital		
CUSTOMER IMPACT			
Existing Customers	Number of rides impacted (improved and worsened) Factors: - walk time - wait time - riding time - transfers - other		
Weighted Gain or Loss	Gain (Loss) = [(number of rides improved) x (value of improved factors)] - [(number of rides worsened) x (value of factors)]		
OTHER FACTORS			
Rational for Change	▪ Compatibility with CTA objectives ▪ Compatibility with Municipal Objectives		
Equity	▪ Minimizes impact on ADA goals ▪ Minimizes impact Title VI goals		
Customer Expectations	Minimizes impact goals for: On-Time, Clean, Safe and Friendly		

Service *Reduction* Evaluation Worksheet			
Factor	**Discussion**	**Supportive Value**	**Evaluation Value**
Ridership Trend	Negative ridership trend for day-type		
Passenger Flow	Below minimum passenger flow for service level for day & period.		
Productivity	Below average productivity for day-type		
SUMMARY			
Savings Goal			
Net Savings	Total Cost less Revenues		
Lost Ridership			
Net Savings per Rider Lost	Net Cost divided by New Ridership		

Appendix D: Niche Market Services

INTRODUCTION

CTA sees a number of benefits in operating more niche market services. These services are a way of entering new markets and strengthening CTA's ties to the business, residential, and institutional communities. Niche market service also helps CTA strengthen its existing bus route network. It thus helps CTA fulfill its larger mission by providing greater mobility and better access to schools, work places, residential neighborhoods, and other major travel demand generators, including tourist attractions. This service would improve the quality of transit in CTA's service area.

DESCRIPTION

A niche market service is service that is open to the public but, targeted to a specific group with common characteristics; such as an employer, residential area, institution or other identifiable travel demand generator. The service is designed with a guaranteed operating cost recovery that is generally negotiated with a sponsor. Certain incentives such as the Transit Benefit Program, U-Pass, subscription services and direct subsidy can be coordinated to support and sustain the niche service.

PROGRAM MISSION

- Serve new markets and increase ridership base.
- Promote CTA as the primary transportation option in the region.
- Establish business relationships with private and not-for-profit businesses and institutions.

NICHE SERVICE GOALS

1. **Expand markets and ridership**
   - Seek services that have growth potential, especially with new customers.
   - Seek services that support mainline transit services.
   - Seek services in markets not already served or only indirectly served by transit.
2. **Seek a positive financial position.**
   - Cover direct operating costs via a combination of farebox revenues or non-RTA subsidy.

- Ensure cost recovery is compatible with CTA's system wide average variable cost recovery.
- Encourage employers to join the RTA/CTA Transit Benefit Program and universities and colleges to join the U-Pass program.

3. **Ensure that the service is justifiable as a publicly operated service.**
   - Recover a higher percentage of variable operating costs on services designed as "premium" services for corporations.
   - Ensure that the anticipated ridership from the niche service change should be worth the public involvement, for instance, the Federal capital expenditures for buses.
   - Ensure that existing services are not negatively impacted by new niche service.

TYPES

There are several types of niche market services that CTA is proposing to operate.

- **Employer services:** new routes or modifications to existing routes for an employer's shift changes and other work purposes.

- **Employment Center Services** - Special adjustments to current bus service or additional service for a group of employers' shift changes outside the downtown area. A particular priority is targeted for low income workers and services tailored for large employment centers, such as industrial parks and medical centers.

- **Downtown Services** - Special additional service to existing routes or new routes implemented from Metra and CTA commuter rail stations to employer sites in the downtown area. Downtown shuttles could be offered with lower fares under subsidy arrangements.

- **Institutional Services** - New routes or modifications to existing routes or new routes for students and employees of institutions including universities and medical centers. Institutional services include special campus and/or shuttle services planned around institutional campuses.

- **Premium Services** - Premium bus service with higher fare charged. Compared to regular, fixed-route service; premium services would be more direct, personalized, faster, with limited stops, guaranteed seating, and possibly coach-type buses. Premium service would generally operate only in the peak periods. This service is attractive

because of its "point to point" service, its single seat rides and its higher comfort buses.

- **Subscription Services -** Bus service provided on a regularly scheduled basis with revenues guaranteed by subscribers. The employer who benefits from the route may sponsor the service.

PROCESS OF RECEIVING AND CHOOSING REQUESTS FOR NICHE SERVICES

1. ***Receive requests*** from employers, employment centers, agencies, or institutions through direct phone calls, letters, or contacts from the Transit Benefit Program.

2. ***Rank requests*** based on ease of implementation, urgency, readiness for implementation, level of interest (internal and external), feasibility, capital and/or land acquisition requirements, predicted productivity compared with other CTA routes, and estimated costs involved (see Service Policy and Standards for details).

3. ***Choose requests for implementation*** based on predicted productivity, compliance with CTA goals, and whether the change is a time-sensitive opportunity.

EXAMPLES

CTA would operate niche services for several types of institutions and employers. The examples below describe how CTA would operate different examples of niche services.

Example 1: University Campus Service

- Provide mobility within campus and major destinations; including CTA bus and rail services in order to provide seamless service.
- Increase CTA ridership base in the market.
- Ask the universities to join the U-Pass program if they are not already members. If a university requests a service improvement, U-Pass could be used to subsidize the request.

Example 2: Major Employers

- Serve employees, including persons transitioning from welfare, more conveniently at times when CTA service is inadequate, inconvenient, and/or too distant, such as in the late evenings.

- Have employer join Transit Benefit Program to guarantee larger ridership base. The program could also be used to subsidize the request for the service improvement.
- Perform social good by providing better access to employees' jobs and increase ridership base in the market.

Example 3: Premium Service

- Serve residents with faster, more direct, and more personalized service typically in the peak periods with higher fares. The service would offer single seat rides.
- Attract new passengers who are sensitive to time, convenience, and comfort.

PRICING SUBSIDIZED BUS SERVICES

When trying to establish a particular niche service, CTA seeks to at least cover direct operating costs via a combination of farebox revenues or non-RTA subsidy. Often CTA will enter into contractual agreement with third parties, such as museums, non-profit institutions, local governments, and businesses. In these agreements, the third party will provide full or partial revenue guarantee to a particular bus service. These services will be open to the public.

In a subsidized service, so long as the service remains open to the general public, CTA is not required to charge the charter rate. In that case, CTA can design its contracts to achieve performance goals based on market development, social equity and revenue-enhancement goals of the CTA.

In pricing these services:

1. Staff will calculate the operational costs of the service, based on the service design and the variable cost model that includes, operator pay, fuel, light maintenance parts, and ongoing costs directly related to the service such as supervision or marketing.

2. Customer revenues plus subsidy should cover the routes' variable costs as determined above. The average bus variable cost recovery is calculated for the entire bus system and is used as a benchmark for niche services.

3. All niche services will be experimental initially to ensure that they meet CTA goals. Services will be analyzed consistent with fixed-route service standards.

IMPLEMENTATION ISSUES

Niche services may be implemented as six-month experiments. The new service will be monitored and evaluated after implementation in order to determine if the service meets ridership and productivity expectations. Special vehicles or special paint or design on vehicles for service may require an additional charge to the person requesting the service. An agreement between CTA and the requesting entity outlines the necessary operating and subsidy arrangements. New niche service proposals and contractual agreements must be reviewed and approved by the CTA Transit Board.

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