

**THE ELDERLY AND HANDICAPPED POPULATION AND THEIR
POTENTIAL AS A MARKET FOR TREN URBANO**

By

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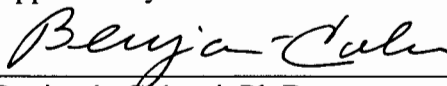
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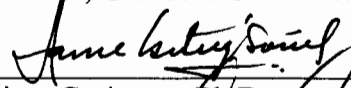
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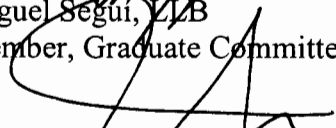
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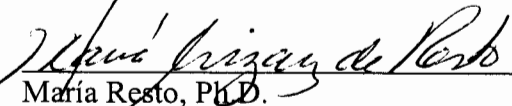
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Abstract

Puerto Rico is preparing for the Tren Urbano (TU), a modern 21st Century system of transportation. Tren Urbano is about to become part of a new era in public transportation on the Island: the “Alternativa de Transporte Integrado” or ATI. Marketing strategies development represents a priority for the TU in order to persuade people’s usage. In this case, this research focuses on the elderly and handicapped population. To suit the selected population needs, TU future facilities will need to ease these people’s access to the different stations, offering them freedom of movement from one place to the others, fulfilling at the same time their sense of independence. Thereby it is imperative for the TU system to become an option for the elderly and handicapped population considering their limited physical mobility.

This investigation has been divided in two stages. The main objective for both stages is to distinguish the potential of the elderly and handicapped population as a ridership market for TU. Stage I identifies valuable ideas used in Saint Louis, Chicago, Boston and Washington, D.C. for attracting elderly and handicapped to use their systems. Communities besides the TU alignment were also studied, identifying Las Lomas, Domenech, Hato Rey and Sagrado Corazón Stations as the stations with the largest concentration of elderly and handicapped. TU system addresses the elements of the ADA requirements; to this regard the system is completely barriers-free. However, to the TU system to be effective it needs to focus attention on the development of effective marketing strategies on this market segment behalf.

Stage II studies the perceptions of the elderly and handicapped population regarding TU. This research shows that the selected population could become future potential users of the system. Updated information is an essential tool for the elderly and handicapped to improve people’s misconceived perception about TU system. It is necessary to promote the use of ATI and TU and only promote Paratransit Service for people with disabilities who are not able to ride fixed-route public transportation due to their physical dependency.

Introducing the ATI and TU transportation system to elderly and handicapped requires the appropriate marketing strategies and implementation plan. Some recommendations in this research are: public involvement, TU facilities improvements, transit staff training, specialized service department, customer database and travel training programs. These recommendations should be considered primarily as a pilot project. The analysis suggests a series of follow up actions for ATI and TU such as continuous and sustained market research efforts.

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List of Abbreviations

ABA – Architectural Barriers Act	MCTP - Maryland Comprehensive Transit Plan
ACTION – Accessible Community Transportation in our Nation	MD – Maryland
ADA – American with Disabilities Act	MDOT – Maryland Department of Transportation
ADAAG – ADA Accessibility Guidelines	MIT – Massachusetts Institute of Technology
AMA – American Marketing Association	MO – Missouri
AMA – Autoridad Metropolitana de Autobuses	MTA – Maryland Mass Transit Administration
AOA – Administration on Aging	OAV – Oficina de Asuntos de la Vejez
APTA – American Public Transportation Association	OTA – Office for Transportation Access
ATI – Alternativa de Transporte Integrado	PR – Puerto Rico
CFSE – Corporación Fondo del Seguro del Estado	SJMA – San Juan Metropolitan Area
CODECI – Comisión de Derechos del Ciudadano	SSA – Social Security Administration
CTA – Chicago Transit Authority	SPSS – Statistical Package for Social Sciences
DC – District of Columbia	STC – Sistema de Transporte Colectivo
DDA – Disability Discrimination Act	TAP – Taxi Access Program
DTPW – Department of Transportation and Public Works	TCRP - Transit Cooperative Research Program
FTA – Federal Transit Authority	TU – Tren Urbano
GA – Georgia	TUO – Tren Urbano Office
HTA – Highway and Transit Authority	UBC – Uniform Building Code
ICIDH - International Classification of Impairments, Disabilities and Handicaps	UFAS - Uniform Federal Accessibility Standards
IL – Illinois	UMET – Universidad Metropolitana
MA – Massachusetts	UN – United Nations
MARTA – Metropolitan Atlanta Rapid Transit Authority	UPR – University of Puerto Rico
MBTA – Massachusetts Bay Transit Authority	USA – United States of America
	USDOT - United States Department of Transportation
	WHO - World Health Organization
	WMATA – Washington Metropolitan Area Transit Authority

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Chapter I: Introduction

Puerto Rico is preparing for the Tren Urbano (TU), a modern 21st Century system of transportation. Tren Urbano is about to become part of a new era in public transportation on the Island: the Integrated Alternative of Transportation (“Alternativa de Transporte Integrado” or ATI). Together with the Metropolitan Bus Authority (AMA) and the ATI Minibuses, TU will take passengers daily to their destinations within the San Juan Metropolitan Area (SJMA). The development of this system is very important for Puerto Rico because it represents a new approach in public transportation within the Island.

Recent statistics and facts confirm the need for implementing public transportation system in the SJMA: (DTPW, et al., 1995)

- 146 vehicles per street mile; the largest density of this type in the World and three times larger than in the United States of America (USA)
- SJMA has 37% of the total population of Puerto Rico (1.3 million) and 63% of the island employment
- at the center of the SJMA there are 4,286 vehicles per street mile
- in 1990 the SJMA generated 3.2 million trips per day
- it is expected that, by the year 2010, the number of trips will increase by 45%.

The success of the system depends in many factors such as safety, security, public education, ridership and the perception of the public on how the government and private sector are effectively addressing these issues. One of the most important factors is that it has the capacity to satisfy the mobility needs of all users. Those users have different characteristics and needs, and for that reason it is important to identify them by market segments. There are many potential market segments for the ATI system and TU, but there is a special one which requires additional attention because it has special needs and requirements and has never been studied before: persons who

are elderly or handicapped.¹ This research intends to make an approach to the transportation needs of the elderly and handicapped and how TU within the ATI system could be a mobility option for them.

1.1 Tren Urbano: Its Characteristics and Market Segments

Over its route of 17.2 kilometers, TU will offer a vital connection between Bayamón, Guaynabo, Río Piedras, Hato Rey and Santurce. There will be a total of 16 stations strategically located to become



Figure 1.1: Tren Urbano Alignment

dynamic centers to which thousands of people will commute (*See Figure 1.1*).

One of the most important areas of interest to many ATI stakeholders is the development of marketing strategies to attract the different segments of the population to the transit system. Engineer José Miguel Izquierdo Encarnación, former Secretary of the Department of Transportation and Public Works (DTPW) and current Secretary of State, stated that the marketing campaign of this system of public transportation will have to target four population segments: elementary school children, high school teenagers, college students and workers and professionals. Mr. Izquierdo's statement reflects how society currently directs major marketing efforts toward work and productivity.

¹ See Terminology section for "market segments", "elderly" and "handicapped".

The high growth elderly population, defined herein as people of 65 years or more, is an important segment in Puerto Rico. At the same time, handicapped people also receive special attention in terms of Federal Government funds. These segments need facilities that allow them to access the places that they frequent and that, in addition, offer an option of mobility to satisfy their needs of independence. A great number of these people lack the operational skills to handle private vehicles, and for that reason we must think about how TU, within the ATI system, could be an option of mobility for them.

Within this framework, it can be understood how sometimes elderly and handicapped are discriminated against if their opinions or necessities are not considered. Sometimes our society forgets that they are a major segment of our population. (Victorio, 2002) Question that arises is whether Engineer Fernando Fagundo, Secretary of the DTPW, emphasize these market segments and provide incentives for developing marketing strategies targeting elderly and handicapped persons?

1.2 Terminology

The purpose of this section is to clarify some terms used in this research. It is very important to define the terms “marketing”, “market segmentation”, “elderly” and “handicapped” in order to understand the scope of this research and its implications. The definitions proposed for this research are described below.

1.2.1 Marketing and Market Segmentation

It is important to generate information about public transportation customers' current and future needs and the factors affecting them. One way is to use market research methods to better understand the current and emerging markets. Market research allows companies or organizations to better understand their customers and

design products and services that meet their needs. According to the American Marketing Association (AMA, 2003), *Marketing* is the process of planning and executing the conception, pricing, promotion, and distribution of ideas, goods, and services to create exchanges that satisfy individual and organizational objectives. Products and services are often thought of in the context of a “marketing mix”, which is composed of the following elements (known as the 4Ps): product, price, placement (or distribution), and promotion. Those elements must be adapted to the customer needs within each particular industry, including public transportation.

It is important to understand that customers for the same product or service can have different characteristics and needs, and for that reason they must be identified by market segment. *Market segmentation* is the process of subdividing a market into distinct subsets of customers that behave in the same way or have similar needs. Each subset may conceivably be chosen as a market target to be reached with a distinct marketing strategy. To be of strategic value, the resulting segments must be measurable, accessible, sufficiently different to justify a meaningful variation in strategy, substantial, and durable (AMA, 2003). An effective market segmentation strategy improves the transit agency’s competitive position and better serves the needs of the public transportation customers. It rewards the agency with increased ridership, improved share of mode split, new customers, better customers, more satisfied customers and, potentially more profitable marketing and service opportunities (Vargas, 2001).

1.2.2 Older or Elderly Person

One important market segment for the ATI system and, therefore, TU is the elderly population. The definition of an older or elderly person is dependent upon a multitude of issues and many definitions can be used. In 1889, Otto Bismarck in Germany, arbitrarily set age 65 as a criteria for receiving benefits from Social Security. Later, in 1935, United States adopted the same age for its Social Security

system. (SSA, 2004) Even today the statistical definition of aging complies with the age of retirement; 65 is used as determining old age when distributing and defining the services and benefits of society. For that reason, the age of 60 or 65, equivalent to retirement ages in most developed countries, is said to be the beginning of old age.

The aging process is a biological reality that has its own dynamic, largely beyond human control. However, it is also subject to the parameters by which each society makes sense of old age. In the United States, the Social Security Administration (2004) established a better delineation to define older persons. They stated the following:

- older population – 55 to 64 years old;
- the elderly – 65 to 74 years old;
- the aged – 75 to 84 years old, and;
- the very old – more than 85 years old.

In Puerto Rico there are different categories to define the elderly population. Such categories are the following: (Sánchez, 1999):

- the young-older – 60 to 70 years old;
- the medium age older – 71 to 80 years old, and;
- the older-older – more than 81 years old.

For this research, 65 years of age and older will be referred herein as the general cut-off age of an elderly person.

1.2.3 Impairment, Disability and Handicap

Another important market segment within this study is the handicapped population. It is usually difficult to differentiate between the terms “disability”, “impairment” and “handicap” and sometimes people use them as if they meant the same thing. For this reason, the World Health Organization (WHO) has a mandate to develop a global common language in the field of health. In 1980, WHO

implemented an international classification of consequences of disorders, called the International Classification of Impairments, Disabilities and Handicaps (ICIDH), which proposed the following definitions: (WHO, 1980)

- *Impairment* – any loss or abnormality of psychological, physiological or anatomical structure or function.
- *Disability* – any restriction or lack (resulting from an impairment) of ability to perform an activity in the manner, or within the range considered normal for a human being.
- *Handicap* – a disadvantage for a given individual, resulting from an impairment or a disability, that limits or prevents the fulfilment of a role that is normal (depending on age, sex, and social and cultural factors) for that individual.

The relationship between impairment, disability and handicap has been defined in the following way: impairment refers to organ level functions or structures; disability refers to person level limitations in physical and psycho-cognitive activities and; handicap refers to social abilities or the relationship between the individual and the society (*See Table 1.1*).

TERMS	IMPAIRMENT	DISABILITY	HANDICAP
Levels	Organ	Person	Society
Disablement	Body structure / function	Activities	Roles
Example	Loss of an eye	Limited depth perception	Unable to obtain driving licence

Table 1.1: ICIDH Classification of Impairments, Disabilities and Handicaps (WHO, 1980)

For this research, the term “handicap” will be used when referring to the market segment of interest, based in the following statement: “*The term*

“handicap” means the loss or limitation of opportunities to take part in the life of the community on an equal level with others. It describes the encounter between the person with a disability and the environment. The purpose of this term is to emphasize the focus on the shortcomings in the environment and in many organized activities in society, for example, information, communication and education, which prevent persons with disabilities from participating on equal terms.” (UN, 1994)

Also, it is important to establish the definitions of the different types of impairments that designate a handicapped person. These definitions are shown below:

- *Cognitive Impairment* – affects the ability to think, concentrate, formulate ideas, reason and remember. It is distinct from a learning disability insofar as it may have been acquired later in life as a result of an accident or illness.
- *Deaf-blind* – refers to sensory impairment, visual impairment and hearing impairment, occurring in combination with each other. Frequently, other disabilities also occur with the combination of visual and hearing impairment. The combination of these disabilities can be difficult to accommodate
- *Dexterity Impairment (Arms / Hands / Fingers)* – reduced function of arms and hands makes activities related to moving, turning or pressing objects difficult or impossible. This does not influence speech communication itself but makes it hard to make a phone call or use a wide range of other equipment.
- *Hearing Impairment* – is a generic term including both deaf and hard of hearing which refers to persons with any type or degree of hearing loss that causes difficulty functioning in a traditional way. It can affect the whole range or only part of the auditory spectrum. The term deaf is used to describe people with profound hearing loss such that cannot benefit from amplification, while hard of hearing is used for those with mild to severe hearing loss but who can benefit from amplification.

- *Mobility Impairment* – reduced function of legs and feet leads to users depending on a wheelchair or artificial aid for movement. In addition to people who are born with a disability, it includes a large number of people whose condition is caused by age or accidents.
- *Speech Impairment* – may influence speech in a general way or be isolated to aspects of it, such as fluency or voice volume.
- *Visual Impairment* – blindness implies a total or near total loss of the ability to perceive form. Low vision implies an ability to utilize some aspects of visual perception, but with a greater dependency on information received from other sources.

1.3 Research Objectives

This investigation is divided in two (2) principal stages. The main objective of both Stages I and II is to assess the potential of the elderly and handicapped population of the SJMA as a ridership market for TU. With this assessment, strategies for TU to satisfy the needs of the elderly and handicapped people will be identified in order to make the service attractive.. The specific objectives for **Stage I** are:

1. To identify strategies and actions used to satisfy the needs of the elderly and handicapped in diverse countries with transportation systems similar to TU.
2. To study the communities within a 500 meter radius of the TU stations in San Juan, Guaynabo and Bayamón to identify those with larger numbers of the elderly and handicapped.
3. To identify the physical facilities and marketing strategies TU proposed to satisfy the needs of this market segment.

The specific objectives for **Stage II** are:

1. To conduct a survey on elderly and handicapped persons at Centro Médico Station to measure their perception of the TU project and their willingness to use the service.
2. To recommend specific strategies to satisfy the particular needs of this market segment taking into consideration age and impairments.

The scope of this research is based upon the population of elderly and handicapped surroundings the TU stations of San Juan, Guaynabo and Bayamón for Stage I and for Centro Médico Station on Stage II, as well as the availability of Census data and other relevant data provided by TU and DTPW staff.

1.4 Thesis Outline

The remainder of this research consist of seven chapters, as outline below:

Chapter II: *Literature Review:* This chapter presents the substantial importance elderly and handicapped population have as a public transportation market using statistics in United States and Puerto Rico. It shows mobility issues for elderly and handicapped, the legal base such as laws and regulations that affects transportation industry and implications in TU system.

Chapter III: *Research Methodology:* This chapter details the methodology for each of the five objectives in this research. The chapter begins with a description of the case studies collection method, use of the Census data, use of other secondary data and, the survey's administration.

Chapter IV: *Mobility and Accessibility Strategies for Elderly and Handicapped in other Countries:* This chapter discusses ten case studies of cities that apply marketing strategies to elderly and handicapped and their applicability to TU system.

Chapter V: *Elderly and Handicapped Demographics along TU Alignment:* This chapter study the communities near TU alignment and identify those with greater numbers of elderly and handicapped people. Each station was analyzed based on the quantity of elderly and handicapped population within 500 meters, facilities in close proximity, and the ones that have been strategically localized to provide access to people destined to points along the alignment.

Chapter VI: *Design and Marketing Strategies for the Elderly and Handicapped at TU:* This chapter identifies the physical facilities proposed by TU to satisfy the needs of elderly and handicapped market segment and the proposed strategies to attract them to the service.

Chapter VII: *Elderly and Handicapped Population Perceptions Regarding TU:* This chapter presents the survey process, questions and motivations and the results of the survey. The chapter presents the survey results organized by descriptive analysis, cross-tabulations and chi-square significance test.

Chapter VIII: *Summary and Recommendations:* The final chapter summarizes the research presented and indicates the most important findings as well as the recommendations for ATI and TU system and an implementation plan for short, medium and long terms. Additionally, this chapter suggest how this research can be expanded.

Chapter II: Literature Review

As the elderly and handicapped become a growing population, access and mobility become increasingly critical needs. There is a growing recognition of the broad-ranging benefits of public transportation for those people, including: greater freedom to live in a variety of settings, more mobility as a result of more travel choices, greater access to varied destinations and enhanced opportunities to lead a full and meaningful life. (APTA, 2002)

2.1 The Demographics

Recent demographic data shows that the population segment composed of 65 year old and older persons, part of them handicapped, will rise considerably during the coming years due to various factors, including: biomedical advances, lifestyles changes, higher rate of longevity, low birth rate, Baby Boomers Generation, and others (*See Figure 2.1*).

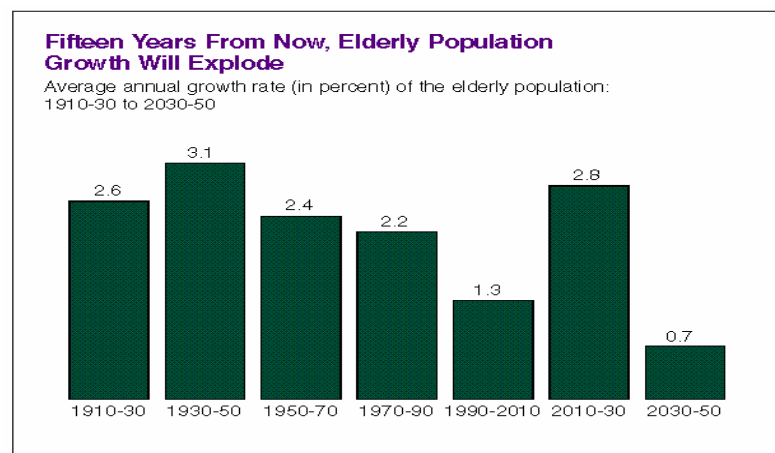


Figure 2.1: Changes in Elderly Population at USA (1910-2050)

Medical progress has enabled people to live longer, enjoying more years of health and activity. However, this growing population also includes an increasing number of people with widely varying health and medical conditions that preclude

driving and dramatically reduce mobility. (APTA, 2002) According to Dr. Joseph F. Coughlin (1999), Director of the “Healthy Aging Laboratory” at Massachusetts Institute of Technology (MIT), there is a great paradox in all this matter briefly explained as follows: *after spending billions to achieve longevity, we have not made equitable investments in the physical infrastructure necessary to ensure healthy independent living in later years.* He also emphasizes that an increase in funding for aging research that relates to disease and physiological problems does not replace the need to stimulate research in re-engineering the physical environment of the aged and handicapped.

2.1.1 Statistics in United States

America’s elderly population is growing at a faster rate than any other U.S. population group, and public transportation system must continue to be expanded and enhanced to meet this group’s needs. (See Figure 2.2)

Statistics on the elderly population in United States are dramatic: (APTA, 2002)

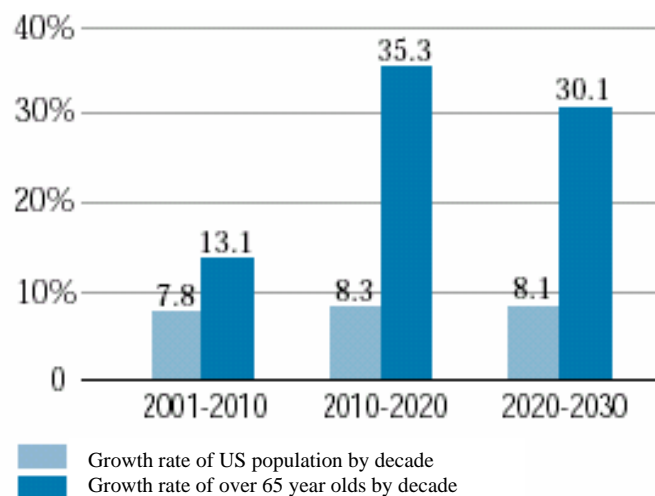


Figure 2.2: Growth Rate of America’s Aging Population (APTA, 2002)

- Today, more than 35 million Americans are 65 or older; 4.2 million are 85 or older.
- By 2010, the numbers will rise in both age groups, with the most striking increase in the 85+ age group, which will expand over 30 percent to 5.8 million.

- As America's "Baby Boomers" age, the over 65 age group will grow at a rate nearly four times higher than the population as a whole in the two decades from 2010 to 2030.
- By 2030 one out of five people in the U.S. will be age 65 or older.
- More older people now live in suburban settings that typically lack transit options.

Consider for example the State of Virginia in the USA: the population of Virginians aged 65 and over will grow from 14.7% of the total population in 1990 to almost 25% by 2025. That is five times higher than the state's total population growth. (State of Virginia, 1999) The states and countries that experience that type of transition will have a growing elderly population, who will continue operating motor vehicles if there are no other mobility alternatives.

One interesting case relates to senior citizens who live alone. This sub-segment represents 31% of the total elderly population in the USA. They are more socially isolated and are at higher risk of depression and mental problems in comparison with the total elderly population. There are also a great number who are functionally disabled. (AOA, 2001)

2.1.2 Statistics in Puerto Rico

Based on Census 2000 data, *Table 2.1* shows the statistics for the elderly and handicapped population in San Juan, Guaynabo and Bayamón:

Municipality	Total Population	Elderly (65+)		Handicapped	
		Quantity	%	Quantity	%
San Juan	434,374	64,721	14.9%	86,874	20%
Guaynabo	100,053	12,806	12.8%	20,010	20%
Bayamón	224,044	28,453	12.7%	44,808	20%

Table 2.1: Elderly and Handicapped Population at San Juan, Guaynabo and Bayamón (Census, 2000)

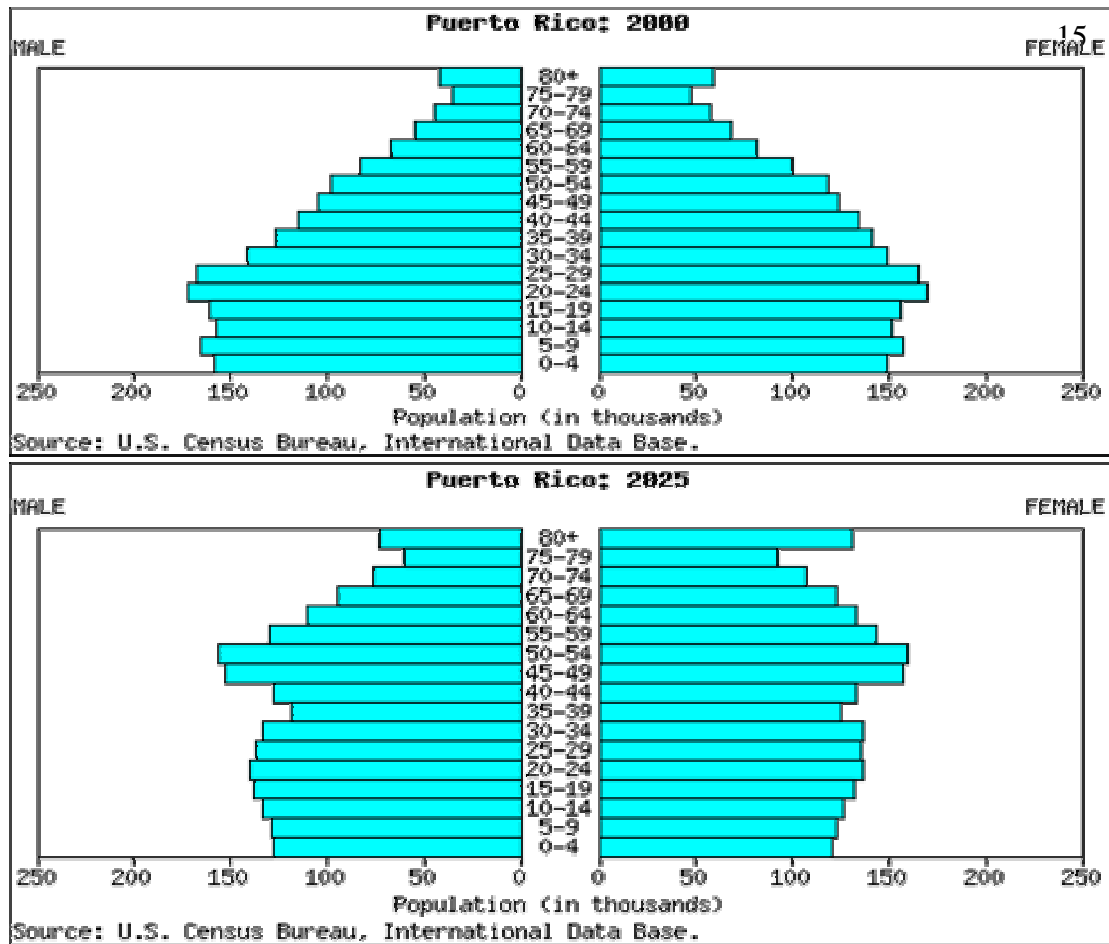
This table reflects how large those segments are within each municipality. Census 2000 data divide handicapped persons into seven (7) categories which are: hearing impairments, growth deficiencies, visual impairments, learning problems, lack of extremities, paralysis and other impairments. The following table (*Table 2.2*) summarizes the data for the handicapped people in San Juan, Guaynabo and Bayamón:

Municipality	Total handicapped population ²	Hearing impairments	Growth deficiencies	Visual impairments	Learning problems	Lack of extremities	Paralysis	Other impairments
San Juan	86,874	15,637	21,719	17,375	13,031	9,991	4,344	23,456
Guaynabo	20,010	3,602	6,003	4,002	3,002	2,301	1,001	5,403
Bayamón	44,808	8,066	11,202	8,962	6,721	5,163	2,240	12,098

Table 2.2: Handicapped Population by Type at San Juan, Guaynabo and Bayamón (Census, 2000)

In Puerto Rico, as in the rest of the world, there is an expected homogeneous growth in the elderly population. Moreover, handicapped people represent an important segment of this population growth. (*See Figure 2.3*) One key factor is the migration of people from the USA. According to Mrs. Rossana López León, Director of “Oficina de Asuntos de la Vejez” (OAV), in the 30’s, a great number of Puerto Rican people emigrated to the USA, who are coming back to the island due to retire (personal communication, 2002). Based on Census 2000, OAV anticipates that for the year 2025, the quantity of Puerto Ricans older than 60 years will increase to almost one million, which representing 23.5% of the total population.

² This column does not represent the sum of the next columns which contain different kinds of impairments. This is because one person can have more than one impairment at the same time.



2.2 Mobility for the Elderly and Handicapped Population

Isolation is a growing problem that severely affects the ability of America's aging population to take care of basic needs and function as contributing members of society. Studies show that, as people grow older, isolation – in the form of a lack of transportation access and mobility – becomes increasingly acute. (APTA, 2002)

There is a strong relationship between aging and safe motor vehicle operation because time can degrade human capabilities such as vision, mental agility, and physical dexterity. (Skinner & Stearns, 1999) This reduces the ability of the elderly to drive their own vehicles especially in the high traffic areas around the TU

alignment. The handicapped population is another segment that needs special attention in this respect.

One key issue in this discussion is that it is very difficult to establish a specific relationship between age and a medical condition, or a functional impairment, or finally the skills needed to operate a motor vehicle. Not all older persons are handicapped, and not all handicapped people have extreme difficulty driving a car. For that reason, a statistical estimate of the percentage of auto accidents due to the incapacity of older or handicapped people is difficult. There is a need to know how the different types of disabilities affect the skills necessary to drive a motor vehicle, and which feasible transportation alternatives can be provided to those persons whose disability prevents them from driving. Studies suggest a typical, but not universal, chain, stream or cascade of events associated with age-related driving changes. (Burkhardt et al., 2001) (*See Figure 2.4*)

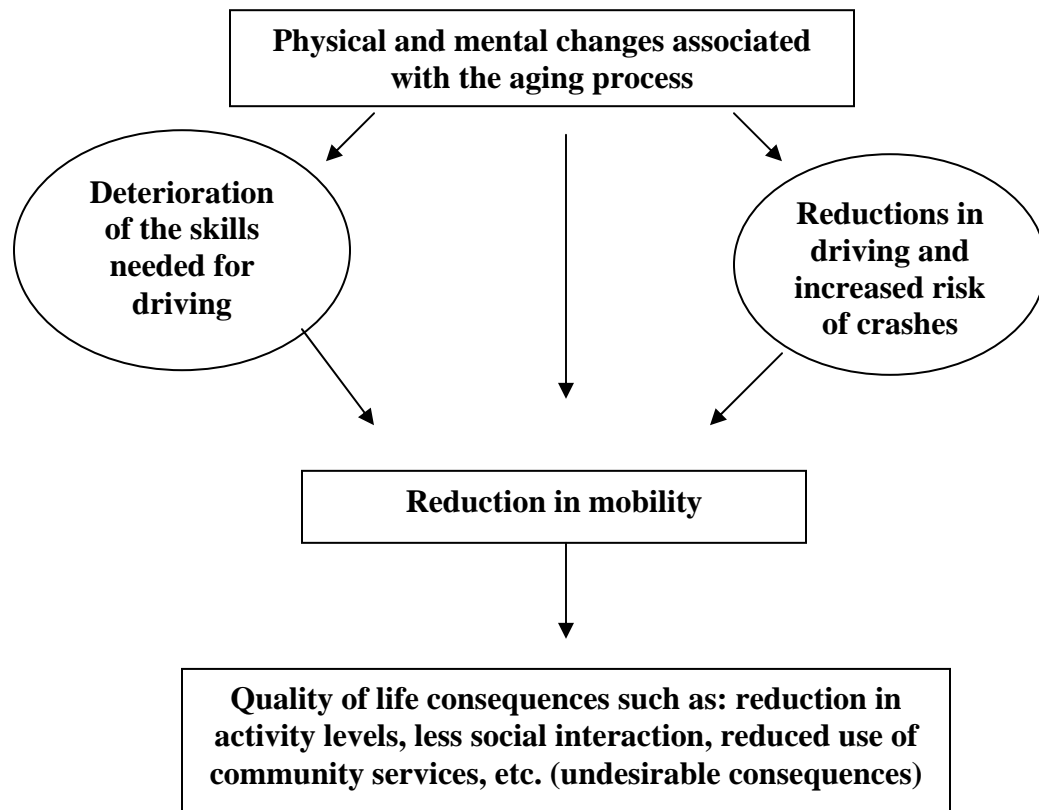


Figure 2.4: “The Mobility Consequences Model”

According to Dr. Coughlin (1999), driving is not an option forever. It is a fact that a lot of older persons will not be able to drive and will need alternate transportation choices. Public transportation should be one of the most used transportation alternatives for the elderly and handicapped population. This would require that the public and private sectors cooperate and use the available technologies. Public transportation in various forms provides the ability to live independently, access medical and social services, maintain contact with the outside world and the feeling of belonging to the community. (APTA, 2002)

Some experts argue that the content and format of discussions about mobility for seniors, which actually are frequently formulated in terms of “taking the keys away”, “giving up their driving”, “quitting”, or “losing independence”, must be

changed. Changing the current negative viewpoint of older drivers will create more opportunities for self-initiated action and responsible choices among them. (Skinners and Stearns, 1999)

2.3 Legal Base

It is important to mention that there are organizations, laws and regulations that seek equal rights for both elderly and handicapped people. In the following sections some of these laws will be briefly discussed with emphasis in applications on USA and Puerto Rico.

2.3.1 Laws and Regulations for the Handicapped People

The Architectural Barriers Act of 1968 requires handicapped access to facilities designed, built, altered, or leased with Federal funds. Passed by Congress, it marks one of the first efforts to ensure access to the built environment. The Access Board develops and maintains accessibility guidelines under this law. These guidelines serve as the basis for the standards used to enforce the law, the Uniform Federal Accessibility Standards (UFAS). (Keddie, 2003)

The signing of the American with Disabilities Act (ADA) in 1990 has had a significant impact on the transportation industry in USA. This law establishes the rights of persons with disabilities to have mobility options that can be easily, conveniently and confidently accessed. (Congress, 1994) The Federal Transit Administration (FTA) has the major responsibility related to the transit aspect. ADA requires that every mass transportation system around the nation, including trains, must be “*barrier free*”. In addition each system must offer supplementary service to those persons who can not access the fixed routes.

The alternative transportation service for people qualified under the Americans with Disabilities Act of 1990 is called *Paratransit Service*. Paratransit is a specialized, shared ride, curb-to-curb service for people with disabilities who are not able to ride fixed-route public transportation, including lift-equipped buses. It is also available for people who cannot get to boarding/alighting locations due to a disability.

Improvements in the accessibility of public transport have been mostly brought by a series of requirements which were set following the Disability Discrimination Act of 1995. The DDA became law in 1995 and it made illegal to discriminate against disabled people on the grounds of their disability. Since 1999 service providers, including those who run airports, ports, train and bus stations, have had to make “reasonable adjustments” to make them accessible. From October 2004 all physical obstacles will have to have been removed or a means found of avoiding them in all places. Transport vehicles are covered in a different way, because the DDA gave the Government powers to set standards of accessibility for different types of transport. The regulations set out minimum requirements. Buses, coaches and trains that meet the regulations are known as being “DDA compliant”. Many buses, coaches and trains built before the regulations came in can also be used by people in wheelchairs, although the standard may not be quite as high. Those are known as “pre-DDA”. (Keddie, 2003)

Trains, light railways and trams come under the Rail Vehicle Accessibility Regulations 1998 and the Rail Vehicle Accessibility (Amendment) Regulations 2000. Broadly, new trains have had to meet these regulations since 1999 and all trains should be accessible by 2040. Buses which carry more than 22 passengers come under the Public Service Vehicles Accessibility Regulations 2000 (Congress, 2000). Broadly, since 2001 all new buses used on local and scheduled services have had to meet these regulations, except for smaller single deck buses which don’t have to be wheelchair accessible until 2005. However all single decker buses will be accessible by 2016 and all double deckers will be accessible a year later. (Keddie, 2003)

Puerto Rico has the “Oficina del Procurador de las Personas con Impedimentos” under the jurisdiction of the “Comisión de Derechos del Ciudadano” (CODECI). This Agency verifies that every law regarding handicapped people is enforced, and it has a great deal of influence over the development of new services for handicapped people on the Island.

2.3.2 Laws and Regulations for the Elderly People

The Law for the USA Aging People of 1965 established the Administration on Aging (AOA), which is the principal vehicle to organize, coordinate and provide services and opportunities for the elderly and their families. (AOA, 2001) This Agency includes essential programs for connecting the elderly with necessary services such as transportation.

The Agency in charge of promoting the establishment of developments that benefit the elderly population in PR is the “Oficina de Asuntos de la Vejez”, under the jurisdiction of CODECI. It was created by the Law of the 11th of July of 1988 and its mission is to maximize the quality of life of elderly people in PR, protecting their physical, mental and social security. This Agency is responsible for the implementation of Law #121 of 1986, denominated as “Carta de Derechos de las Personas de Mayor Edad” which protects the rights of this population sector. (Mejías, 2002)

If we consider the rationale behind the laws and regulations that established these organizations and how they have been applied in PR, we can then ask ourselves: in which way can those Agencies influence the construction of transportation systems, including TU, to the benefit of the elderly and the handicapped?

2.4 Implications for the Tren Urbano System

The previous sections have provided the structure that supports the *motivation*



Figure 2.5: Centro Médico Station Location

behind this research. Places such as Centro Médico (Medical Center), where one of the TU stations is located, are visited by hundreds of seniors and handicapped people who go there to access medical services (See Figure 2.5). The needs of the growing number of elderly and handicapped people will demand the

expansion of community services, such as the transportation, in order to facilitate their independence. In fact, AMA offers a special transportation service for registered elderly and handicapped people. This represents a feasible intermodal option for elderly and handicapped people that will provide access to TU.

Based on these facts, how is TU within the ATI system, a mobility option for the thousands of elderly and handicapped people on the Island and how does that service resolve the issues discussed herein? In addition, there are retired persons, who live in communities near TU stations, whose principal entertainment activity might be shopping, or simply walking in the shopping malls. Even though the TU alignment doesn't have direct access to the shopping malls, elderly and handicapped people could have access through an intermodal connection to AMA, ATI Minibuses, or other services.

Blackman (1998) recommends the development of convenient systems on TU for elderly users. She emphasizes:

Tren Urbano has the unique opportunity of attracting choice senior riders from the start by making the system feel secure and portraying a culture where the workers, from the bus drivers to the fare collectors, are helpful and friendly to seniors. Besides making TU safe, convenience aspects must be implemented to attract senior ridership. By educating senior as to

how TU can improve their quality of life and by enabling them to get to places that they could not conveniently access before, TU will be able to attract more of the elderly population. (Blackman, 1998)

Being healthy at an older age is an important goal for many people. The government must begin to assure that one of its greatest aspirations, longevity, doesn't become one of its biggest problems. Furthermore, services must continue to be developed for all those people with handicaps that need a barrier free system to improve their sense of independence. If society expects the elderly and handicapped to make rational decisions between driving or not driving, we must provide them with rational alternative. One of TU's challenges seems to be how to maintain the mobility of these people using the available resources and, at the same time, satisfy their need for independence.

The following chapters are explain the methodology used for this research and some interesting findings, among them, strategies used in other countries' transportation systems that benefit the elderly and handicapped population.

Chapter III: Research Methodology

This section discusses the methodology used for this research. *Figure 3.1* shows the methodology used for the Pre-stages, Stage I, Stage II and Post-stages. Stages I and II will be discussed in more detail in the following pages.

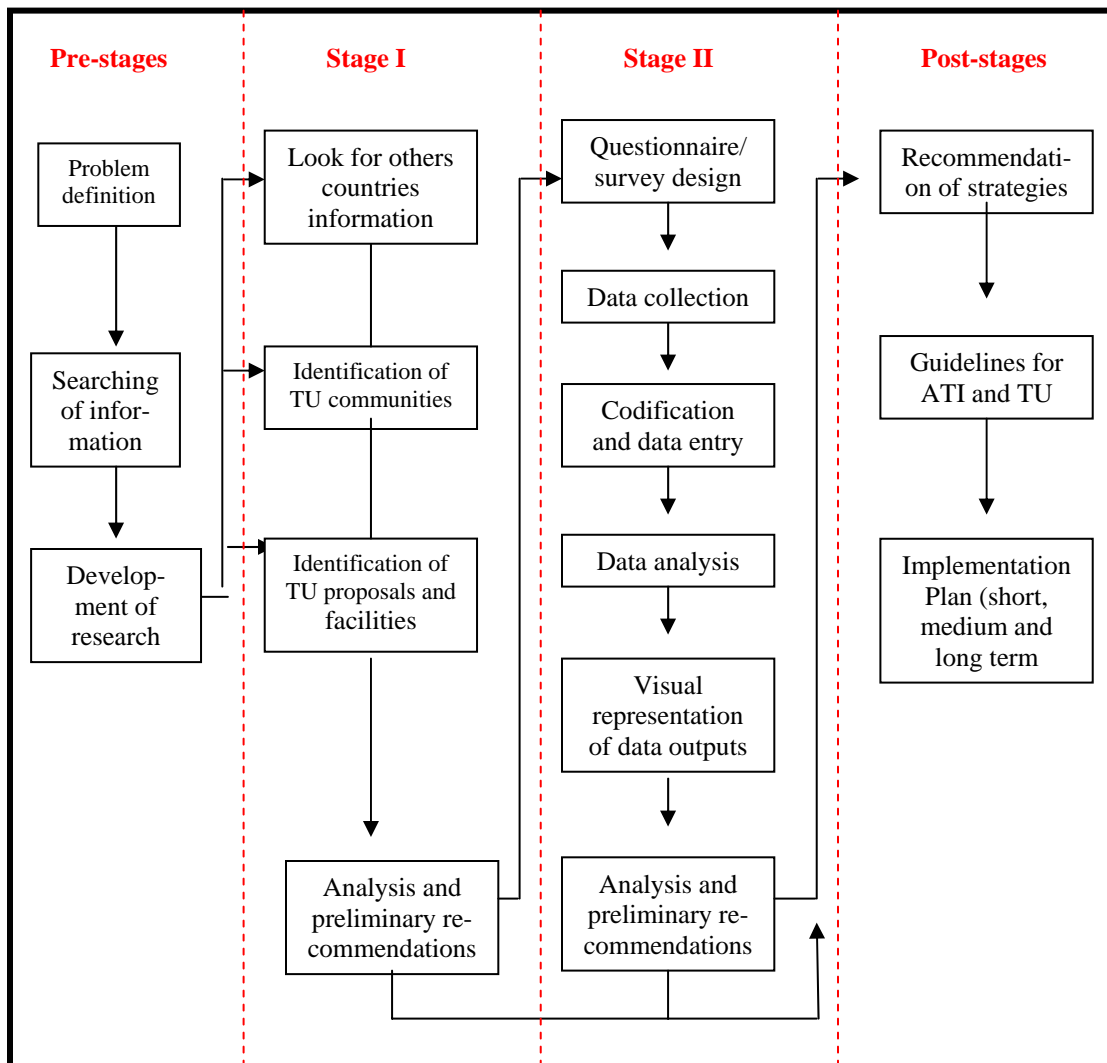


Figure 3.1: Research Methodology

3.1 Stage I

This stage outlines the search for information and data related to elderly and handicapped in Puerto Rico and other developed countries in the World. Internet searches, local and international news, journals, papers, books, Census 2000 and government statistics, are examples of the sources of information. In addition, direct contacts were made with professionals who were part of the UPR/MIT/TU Professional Development Program and who have conducted research related to TU.

3.1.1 Objective 1: Mobility and Accessibility Strategies for Elderly and Handicapped in Other Countries

This first objective of Stage I was addressed using information contained on the Internet. Field visits were made to Boston, Baltimore and Washington, D.C., that allowed interviews with transit staff. For this objective systems were evaluated in the following countries and cities that have transportation systems similar to the proposed TU in PR:

- North America
 - Saint Louis, MO.
 - Chicago, IL.
 - Boston, MA.
 - Atlanta, GA
 - Baltimore, MD
 - Washington, D.C.
 - Mexico City, Mexico
- South America
 - Medellín, Colombia
 - Buenos Aires, Argentina
- Europe
 - Bilbao, Spain

3.1.2 Objective 2: Elderly and Handicapped Demographics along TU Alignment

The work towards this objective focused on searching data from the Bureau of the Census 2000 at the Census Office in the Minillas Governmental Center. Census maps for Bayamón, Guaynabo and San Juan were used. Data collection efforts concentrated on the Censal Sectors, Block Groups, and Blocks. The collection process is described below:

1. Locate TU station on a Puerto Rico Road Map.
2. Search the streets near the stations on the Census maps corresponding to Bayamón, Guaynabo and San Juan (each city had at least 10 consecutive maps)
3. Draw a circle with a 500 meter radius around each station to establish the study area.
4. Identify the Census Tract included in that TU station area and the identification code.
5. If the Census Tract is not covered within the 500 meter radius around the TU station, identify the Block Groups within it and the identification code.
6. If one or more Block Groups are not covered by the 500 meter radius, identify the specific Blocks within it and the identification code.
7. Using the Internet census site (www.census.gov), search for the census data using the identification codes identified in Steps 4, 5 and 6, for the TU station.
8. Print the data tables for the TU station.
9. Add the data provided by each identification code for the TU station.
10. Repeat the process for each particular TU station.

Since data tables for people with handicaps were not provided for specific Blocks of the population, it was necessary to make some adjustments in order to

obtain more accurate data for each station. The adjustment process for each TU station is described below:

1. Count the total Blocks within each Block Group.
2. Count the total Blocks within the 500 meter radius for each particular Block Group.
3. Identify the Block Group percentage within the 500 meter radius.
4. Apply that percentage to the data tables collected for each identification code multiplying it by the total population in each Block Group.

Census 2000 provided data tables based on a sample of 1 out of 5 households, and therefore the findings related to this objective are approximations of the total elderly and handicapped population.

3.1.3 Objective 3: Design and Marketing Strategies for Elderly and Handicapped at TU

For this objective there interviews of Tren Urbano Office (TUO) personnel were necessary. The interviews emphasized what TUO propose in order to address the individual needs of elderly and handicapped people in accordance with the type of disability as:

- visual impairment
- hearing and/or speaking impairment
- mobility impairment

Other data were collected by observing stations such as Centro Médico Station, which is close to a significant elderly and handicapped population. Recommendations will be made and discussed based in the findings of Stage I.

3.2 Stage II

Stage II seeks to assess the perception of elderly and handicapped persons regarding the use of TU as a transportation mode.

3.2.1 Objective 1: Elderly and Handicapped Perception Regarding TU

For this objective there were many areas within Centro Médico that could be used for the survey including the Central Plaza, the San Juan Municipal Hospital, the Industrial Hospital, the State Medical Emergencies area, the Adult University Hospital, the Pediatric Hospital, the Cardiovascular Hospital and the Veterans Hospital. Those places were evaluated to determine which ones would best meet the needs of the investigation.

For this research, a sample of 400 people was used based on an infinite population at the 5% precision and 95% confidence interval. The survey was designed using a convenience sample because the participants were chosen depending upon their availability. It is important to note that the participants were chosen based on the judgement of the interviewer, who had the responsibility to observe the apparent age and visible impairments of the persons. Some limitations could be associated with this process. It can be difficult to estimate the age of a person based on their appearance because not everybody has the same aging process. On the other hand and using visual impairments as an example, not all persons who use corrective lenses have a level of impairment that would be classified as a handicap. Therefore the interviewers had the responsibility of choosing the acceptable persons for the survey. Training on that issue was provided for the interviewers.

The questionnaire was divided into five main sections:

1. Transportation choices, trip purpose and frequency of use;
2. Physical and mental health;
3. Knowledge of TU and willingness to use the system;

4. Exposure to communications media; and
5. Demographic information

A copy of the questionnaire is included in the *Appendix I*. To compliment the first objective of Stage II, the analysis of the survey required using various descriptive statistics: counts, averages, cross-tabulations, etc. In addition, chi-square significance testing was performed. The computer program used for this task was the Statistical Package for Social Sciences (SPSS).

3.2.2 Objective 2: Recommend Strategies for Elderly and Handicapped at TU and Implementation Plan

For this objective, findings of all the previous objectives were useful in order to make recommendations with a scientific basis and to design an implementation plan for short, medium and long term horizons.

Chapter IV: Mobility and Accessibility Strategies for Elderly and Handicapped in other Countries

Stage I identified TU strategies suitable to address the needs of the elderly and the handicapped and compared them with the strategies used in other developed countries. *Objective 1 of stage I* was to identify strategies and actions used to satisfy the needs of the elderly and handicapped in diverse countries with transportation systems similar to TU. The findings for objective #1 of Stage I follow:

4.1 Case Studies

In the following sections, ten (10) case studies are discussed that apply to elderly and handicapped marketing strategies and their applicability to the TU system.

4.1.1 Saint Louis, MO. – Metro Link (Bi-State Development Agency)³

On July 31, 1993, Saint Louis area residents were introduced to MetroLink and a redesigned bus system that provided a convenient way to reach work and recreation destinations. The MetroLink alignment stretches 34.4 miles from Lambert International Airport in St. Louis, Missouri to Southwestern Illinois College in Belleville, Illinois. MetroLink services for the elderly and handicapped are an integral part of the system.

The base fare for MetroLink is \$1.25, but a reduced fare is available for elderly and handicapped. A transfer to a connecting MetroBus is \$0.10 for able-bodied passengers, but only \$0.05 for the elderly and customers with disabilities. The following table (*Table 4.1*) summarizes fares at MetroLink:

³ Information available from <http://www.bi-state.org>

Tickets and Passes	Adults (12+)	Elderly and Handicapped
Tickets		
Single ride	\$1.25	\$.60
Single ride with transfer	\$1.35	\$.65
10 ride adult ticket book	\$11.00	
Single ride ticket purchased at Lambert Airport Station	\$3.00	\$1.50
Passes		
One-day pass	\$4.00	n/a
Weekly pass (Monday to Sunday)	\$13.00	\$6.50
Monthly pass	\$40.00	\$20.00

Table 4.1: Fares at MetroLink

Each MetroLink car has four wheelchair-designated positions on board, and its floor is level with the station platform (See Figure 4.1). All stations have high platforms and are equipped with elevators or escalators and ramps (See Figure 4.2) to provide convenient access for passengers with disabilities.



Figure 4.1: MetroLink Platform



Figure 4.2: Accessible Ramp

The stations also feature textured warning strips on platform edges. Ticket vending machines come equipped with audio features and Braille to assist customers with visual impairments.

The Agency provides most of its printed materials in large print (11" x 17") format for customers with limited vision. This includes timetables, brochures and any handouts. Any customer desiring large-print materials can call the Customer Service Department and request the specific



Figure 4.3: Braille Document

materials desired. The Administrative Secretary maintains a database of customers who need bus and MetroLink timetables in large print. This official routinely begins sending updated timetables approximately two weeks prior to each service change.

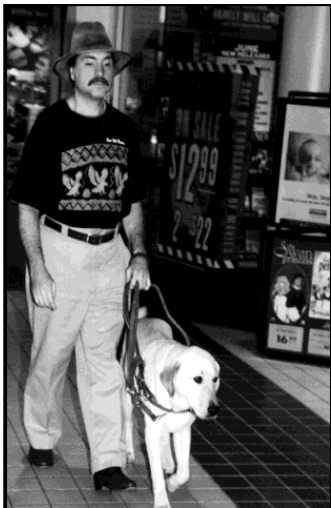


Figure 4.4: Guide Dog

Also, the Agency can provide most of its printed materials in Braille upon request through a working arrangement with an outside Braille service (*See Figure 4.3*). Upon receipt of Braille documents, the customer Service Administrative Secretary repackages and forwards them to customers. This entire process takes from five to ten days to complete.

The Agency's goal is to provide full access to transit vehicles and facilities for use by all, including individuals with disabilities who are accompanied by a Service Animal. The ADA defines a Service Animal as any guide dog, signal dog, or other animal individually trained to provide assistance to an individual with a disability. If they meet this definition, animals are considered Service Animals under the ADA regardless of whether they have been licensed or certified by a state or local government. The three types of Assistance Dogs are Guide Dogs for the blind and the visually impaired (*See Figure 4.4*), Hearing Dogs for the deaf and hard of hearing and Service Dogs for the physically disabled and/or mobility impaired (*See Figure 4.5*). The Agency allows customers who use service animals to travel freely on transit



Figure 4.5: Service Dog

vehicles. Service dogs need not be muzzled. Drivers serving customers with service animals may ask customers to keep the animal close to them during their trip, out of the aisle, and in a position where they will cause minimal inconvenience to other customers. The wheelchair area is usually a good location if it is not occupied.

The Call-A-Ride service provides curb-to-curb van service in St. Louis and County with advance reservation. The person must be registered and have a Call-A-Ride Plus ID Card to use the Call-A-Ride Plus Service which is for people with disabilities. Service in the City Call-A-Ride Plus area is available Monday to Sunday and is restricted to persons with disabilities who have registered to use the service.

4.1.2 Chicago, IL. – Metra (Chicago Transit Authority - CTA)⁴

The CTA operates the nation's second largest public transportation system and covers the City of Chicago and 38 surrounding suburbs. On an average weekday, 1.5 million rides are taken on the CTA. CTA trains, including the Metra System, make about 1,452 trips each day and serve 143 stations.

All 12 train lines in the Metra system are fully accessible to customers with disabilities, according to the provisions of ADA. Metra has modified rail cars and made accessible most of its busiest train stations along the lines to accommodate people with hearing, vision, and mobility disabilities. Train service for customers with disabilities spans all six counties in the metropolitan area.

The high liner cars on the Electric District are equipped with roll-on bridge plates that cover the gap between the vestibule and the high level platforms. The

⁴ Information available from <http://www.metrarail.com>

diesel-powered lines have at least one lift-equipped car per train to provide access from low level platforms. The number of customers utilizing this accessible equipment continues to increase. Every accessible diesel Metra train can be identified with the "access" symbol. Non-downtown platforms have an "accessible boarding area(s)" where the lift-equipped train car will stop for boarding. Each accessible car has three wheelchair areas for riders who prefer to remain in their chairs. Customers can also transfer to standard seats. An example of an accessible station is shown in *Figure 4.6*.



Figure 4.6: Metra Station

Metra currently has 116 fully accessible stations and 39 partially accessible stations which meet some, but not all, of the ADA requirements. These represent the busiest stations, used by 91% of the

customer base. Customers who use wheelchairs at partially accessible stations will be able to access train platforms from the street. However, ramps, ticket windows, and/or buildings and shelters may not fully conform to ADA guidelines. These stations are designated as partially accessible so as not to deter customers from facilities which may be useable. Customers should call ahead to check the level of accessibility at stations they plan to use.

Since May, 1998, when all twelve lines in the Metra system were made fully accessible to customers with disabilities, according to the ADA provisions, all key stations, and at least one car per train, are accessible to people with disabilities, including to those who use wheelchairs. (*See Figure 4.7*)

As a service to the customers who are disabled, Metra has developed a system wide "large print" accessibility map. The map is divided into three sectors: North, West, and South. Each sector map includes the area's rail lines and stations. The

station names are larger and easier to read. Every station in the system is color-coded to identify it as accessible, partially accessible, or inaccessible.



Figure 4.7: New Barrier Gate and Elevator

Metra has a 13-minute video to acquaint new customers to the Metra system. The video, "All Aboard," provides an overview of the changes that have been made to rail cars and stations in order to accommodate individuals with hearing, vision,

and mobility impairments. The video is available to organizations that work on behalf of the disabled and can be obtained by calling Metra's Marketing Department.

The Chicago Transit Authority offers a service called CTA Paratransit Service, which is a curb-to-curb transportation service for people, who as a result of their disabilities are unable to use conventional fixed-route bus or rail services. (*See Figure 4.8*) Actually, the CTA operates two Paratransit programs: Special Services and the Chicago Taxi Access Program (TAP).

The CTA contracts with private carriers to operate its Special Services program. The customer is required to phone the carrier of their choice to schedule service a day in advance of their trip, since the number of daily trips is limited. The certification process for individuals identifies any need for a personal attendant in order to travel on the system. The attendant is not charged a Special Services fare when travelling with a customer. Subscription service may be available to customers making the same trip at least three



Figure 4.8: Curb-to-Curb Bus Service with Lift Platform

times a week at the same times. Certified Paratransit customers are eligible to participate in the TAP program. Customers can purchase taxi vouchers for up to \$10.00 of the metered cab fare for \$1.50 each. The ADA Paratransit ID Card allows the customer to ride at a reduced fare on CTA's fixed-route bus and rail systems. Travel training is available for anyone who needs assistance in learning how to use CTA's fixed route buses and trains.

4.1.3 Boston, MA. – Massachusetts Bay Transportation Authority (MBTA)⁵

The MBTA is the nation's 4th largest mass transit system. It serves a population of 2,608,638 in 175 cities and towns with an area of 1,038 square miles. From its earliest beginnings to the present, it can be proud of its long, continuous tradition of innovation and progress, while claiming to be America's oldest system. Approximately 819,700 one-way passenger trips per day are taken on the MBTA's bus, Paratransit, light rail, commuter rail and water ferry. The number of boardings is greater than the 819,700 trips per day because many people transfer between bus or rail lines to make a complete trip. (*See Figure 4.9*)



Figure 4.9: Light Rail at MBTA

The MBTA's mission is to make transportation easy and accessible for all travelers. That is why the system provides so many options for persons with disabilities. The MBTA's Office for Transportation Access (OTA), oversees programs and services for people with disabilities and senior

citizens. OTA manages the MBTA's Paratransit program, The Ride, the Call-A-Lift Bus Program, the Senior and Access Program, and the Travel Training Program.

⁵ Information available from <http://www.mbta.com>

The Ride is the MBTA's Paratransit program, which provides transportation to people who cannot use general public transportation because of a physical, cognitive or mental disability. Lift equipped vans are used to serve persons with disabilities, including those who use wheelchairs. In order to use the Ride, the customer must complete an application and be eligible.

Persons with disabilities, who live in Massachusetts, may qualify for a State Transportation Access Pass. The Pass entitles the bearer to reduced fares on all fixed route services across the state, including buses, trains, rapid transit, tractless trolleys, commuter rail, and commuter boat. The program provides photo identification card to eligible persons with impairments which allows the bearer free travel on fixed route services. Depending on the nature of the disability, the customer will be issued either a one-year or a five-year pass.

In order to pay a reduced senior fare on MBTA buses, trains, rapid transit, tractless trolleys, commuter rail, and commuter boat, the customer must obtain an MBTA's Senior Pass. All persons 65 and over are eligible for the Senior Pass.

4.1.4 Atlanta, GA. – Metropolitan Atlanta Rapid Transit Authority (MARTA)⁶



Figure 4.10: MARTA Rail Service

Currently, MARTA transports an average of 580,000 passengers daily within the City of Atlanta, Fulton and DeKalb counties. Since the implementation of MARTA's bus service in 1972 and rail service in 1979, the system has transported approximately 3.5 billion customers or ten times the entire population of the

⁶ Information available from <http://www.itsmarta.com>

U.S. (See Figure 4.10) MARTA's adopted philosophy of excellence is a "back to basics" strategy which focuses on their core business of on-time, safe and reliable operation of buses, trains and Paratransit vans.

MARTA provides ADA Complementary Paratransit Service to eligible persons with disabilities who are, because of their disability, unable to board, ride or disembark from an accessible vehicle in MARTA's regular bus or rail service. Service is provided with special lift-equipped vans on a curb-to-curb, shared ride basis. Certified individuals have a MARTA ADA Photo Identification Card. Paratransit Service requires advanced reservations. The one-way fare is \$3.50 per person. Personal Care Attendant who have been authorized by a medical professional may travel with the disabled patron free.

All MARTA's rail cars and stations, along with most buses are designed with special features to accommodate both elderly and handicapped passengers. There are Half-Fare Passes for senior citizens and handicapped riders. The card allows them to travel at half the regular fare at all times. The half fare is \$.85 on single trips or \$1.25 out of districts.

MARTA's Commitment Buses equipped with wheelchair-lifts (See Figure 4.11) are available on more than 100 of the 150 routes operating each weekday. Priority seating is provided for senior citizens and persons with disabilities at the front of every bus. Each rail station is 100% accessible with special, wide faregates for persons with disabilities. Escalators and elevators are located between the rail, bus and street levels at each station. Each train has a special wheelchair space at one end of each rail car.



Figure 4.11: Wheelchair-Lift

4.1.5 Mexico City, Mexico – “Sistema de Transporte Colectivo” (STC)⁷

Mexico City is one of the biggest cities in the world with a population of 20 million, and has a public transport subway network with 10 lines. In July, 1998, the Government recognized that the community of people with disabilities forms an important social group that must be considered. Since then, STC has implemented tools to improve the service to seniors and handicapped in their metro system, providing benefits to more than 200,000 users per month.



Figure 4.12: Wheelchair Accessible Station at Medical Center

In the first stage, they equipped 5 stations with accessible doors, access ramps to the stations, and escalators. They also equipped the staircases with special equipment for wheelchairs (*See Figure 4.12*). In most of the stations there are textured warning strips on platform edges and the Braille system for those with visual impairment.

The procedure to operate the special equipment for wheelchairs is as follows: the handicapped user activates a red button that calls the Station Manager who has the keys and the remote control unit to operate the system. That person has the obligation to assist the system user. The following figure (*See Figure 4.13*) shows the operation of the system:

⁷ Information available from <http://www.metro.df.gob.mx>

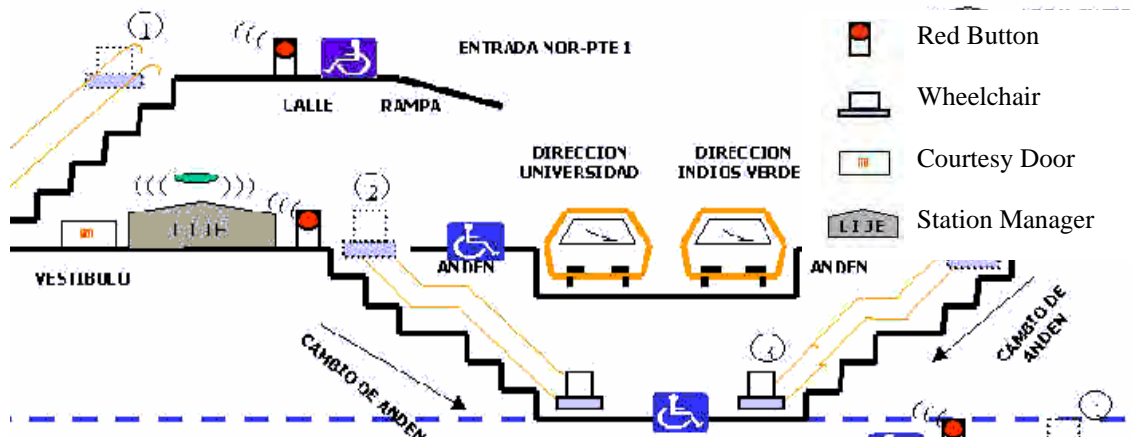


Figure 4.13: Accessibility System Model

4.1.6 Bilbao, Spain – Metro Bilbao⁸

Metro Bilbao started operations on the 11th of November, 1995. From the beginning, Metro Bilbao was constructed without access barriers to their customers with disabilities. The design of the cars is “boa” type, permitting the free access of passengers between cars. There are reserved areas for customers in wheelchairs equipped with seat belts and a buttons to make the driver aware of the presence of a handicapped. The driver, using internal cameras, can see that person during the trip. Also, the cars have a visual notification of when the doors will close or the arrival at the station.

The mezzanines are the main concourses linked by stairways and lifts to the street, and to platforms and trains. Ticket dispensers and offices are also located



Figure 4.14: Station Ample Spaces

⁸ Information available from <http://www.metrobilbao.com>

at this level. The visual impression is one of extraordinary spaciousness where the commuter does not feel trapped and can avail of all services close at hand. The stations have ample space with large signs, which also have very contrasted colors (*See Figure 4.14*). Also, there is a sound warning system for the operation of the train. The stations have textured warning strips on platform edges and near escalators, and the Braille system on elevators for those with visual impairment. All the stations are totally accessible due to the combination of two levels of elevators, one between the street and the lobbies, and the other from the lobbies to the platforms. The stations that have upper levels have access ramps with adequate slope for the use of wheelchairs. In the fare collection areas, there are broader spaces for handicapped people.

Senior citizens and people with disabilities have at least a 40% fare discount. Ticket holders also have a Plus Card, which can be purchased by people over 65 years of age, totally disabled people, or handicapped people with a 65% or greater disability.

4.1.7 Medellín, Colombia – Metro de Medellín⁹



Figure 4.15: Metro de Medellín Station

Medellín's Metro System started operations in 1995. Its infrastructure (escalators, elevators, etc.) can accommodate persons with disabilities (*See Figure 4.15*). The government is concerned about those needs and are looking for adequate resources in order to accomplish a barrier-free system. Presently, their employees have the responsibility to assist people in accordance with established procedures. Additionally, they notify

⁹ Information available from <http://www.metrodemedellin.org>

operations staff with a special code “Clave M” to assist any handicapped person accessing the station.

4.1.8 Buenos Aires, Argentina – Metrovías¹⁰

Metrovías adapted some of their stations to provide access to physically challenged people. This work consisted of:

- Opening a direct access from street to platform level by installing a hydraulic panoramic elevator with an intercom and audio system and Braille push button panels



Figure 4.16: Station Entrance

- (See Figure 4.16).
- Installing safety and orientations aids for those with impaired or no vision, such as signals on build-in walls, placement of guides on the floor, subway entrance indication on the sidewalks of streets, indications in the turnstile approach areas using different colors and textures on the paving, highlighted of the first step on staircases, Braille indications on staircase handrails, turnstiles, system maps, etc, and warnings of the moving direction of escalators (See Figure 4.17).
- Refurbishing restrooms to meet existing regulations: handrails, access to wheelchairs, etc.
- Reconditioning rest areas: seats with arm rests and supports.
- Installing new flooring with yellow, textured ceramics.

¹⁰ Information available from <http://www.metrovias.com>

- Warnings on floors comprising white textured ceramics at: landings, prominent areas, beginning and end of staircases, entrances and turnstiles, etc.
- Guides on floors using ceramics: white, slotted ceramics along the platform, extension of banisters, and yellow plastic bumpers.
- Signs in Braille, which indicate: train direction, escalator direction and number of steps.
- Cars with reserved space for wheelchairs and furnished with an inertial roll-in safety belt.



Figure 4.17: Tactile Braille Signage

4.1.9 Baltimore, Maryland – MTA (Maryland Mass Transit Administration) MARC¹¹

The MTA, an agency of the Maryland Department of Transportation (MDOT), provides a network of bus, commuter bus, subway, light rail, rail freight, commuter trains, and Paratransit services, either through direct operation or as contracted service. This network serves the Baltimore and Washington, D.C. metropolitan region and surrounding areas.

The MTA provides services to the elderly and handicapped based on the ADA guidelines, but fails to make a major effort to attract that segment of the population to the system. Senior citizens, 65 years and older, and people with disabilities with a valid MTA photo identification (ID) card, can ride for one-third the regular fare on bus, Light Rail and Metro subway and one-half the regular fare on MARC service. A

¹¹ Information available from <http://www.mta.com>

reduced fare day pass is available. This pass allows customers to ride all day for \$1.00. Express and premium charges may apply. Reduced fare monthly passes are also available for \$14.00. The passes must be used with a valid MTA photo ID.

MTA offers many services that make it easier for elderly and handicapped to ride public transportation. Lift-equipped buses are designed for passengers who use wheelchairs or are unable to board or alight the bus. Approximately 60% of the MTA bus fleet is lift equipped. Lift service varies on each bus line and may only be available at certain times of the day. The Call-A-Lift service provides lift-equipped buses on any route that does not have scheduled accessible buses. The Metro subway is fully accessible to people with disabilities. Elevators and escalators at station entrances transport passengers to the mezzanine and platform levels. Station attendants are available to answer questions and provide assistance. Braille station guides are installed at all Metro subway station entrances. Also, all Light Rail trains are accessible to customers with disabilities. High-block boarding ramps are available at each stop and can be used by customers who are not able to use the steps to board the train. There are seats in the front of each bus, as well as on the Light Rail or Metro subway that are designated as priority seats for seniors and people with disabilities. Bus and train operators are required to announce all transfer points, major intersections and points of interest. If a passenger is unable to recognize their stop due to a visual or cognitive impairment, they may request that the operator announce their stop.



Figure 4.18: Paratransit Service

The MTA's Paratransit service is available for customers who are not able to use fixed-route, accessible services. (See Figure 4.18) Passengers are eligible for this curb-to-curb service if the nature of their disability prevents them from boarding a scheduled bus or train. Paratransit service is provided within $\frac{3}{4}$ of a mile of any fixed-route service in Baltimore City and Baltimore and Anne

Arundel counties. The term "fixed-route service" refers to any bus, Metro subway or Light Rail route operated by the MTA. Paratransit service is not offered within $\frac{3}{4}$ of a mile of any commuter bus route or MARC rail commuter route. The MTA's Paratransit program is not intended to serve citizens who must adhere to strict guidelines for medical treatment. Individuals who are required to receive medication or treatment within a prescribed time frame should use a private taxi service or a professional ambulance service. Paratransit is designed to transport as many people as possible on every trip, and it is not always possible to fulfill the needs each one person. The one-way cash fare on Paratransit service is \$1.55. Many area employers and health care providers sell pre-paid books of 20 Paratransit ride tickets for \$31.00. The tickets have no expiration date and may be used any time.

In December 2000 MTA developed the Maryland Comprehensive Transit Plan (MCTP) which is a needs-based plan that identifies services, projects, programs, and other improvements to increase transit ridership in Maryland. Using interviews and forums, they studied public viewpoints where one of the recommendations was *to increase services to outlying areas and areas with high concentrations of elderly and handicapped people*. In response to that public petition, MTA proposed adding complementary Paratransit service that would meet ADA requirements in conjunction with the increased hours of bus service. They also recommended providing

complementary ADA Paratransit service whenever bus service is introduced to a new area.

Furthermore, the MTA does not advertise to the elderly and handicapped; efforts are focused on giving the services necessary to comply with ADA guidelines and to improve the Paratransit Service. That philosophy recognizes the potential high cost to attract that market segment to the transportation system.

4.1.10 Washington, D.C. – Metro – Washington Metropolitan Area Transit Authority (WMATA)¹²

The Washington Metropolitan Area Transit Authority operates the second largest rail transit system and the fifth largest bus network in the United States. Safe, clean and reliable, “America’s Transit System” transports more than a third of the federal government to work and millions of tourists to the landmarks in the Nation’s Capital. (See Figure 4.19)



Figure 4.19: Metrorail and Metrobus

The WMATA is pleased to offer accessible Metrorail and Metrobus transit service to seniors and people with disabilities. Both systems have many built in features that allow those people to experience safe, convenient, and efficient travel throughout the Washington Metropolitan area. Metro is user-friendly for senior citizens and persons with disabilities by offering reduced fares, the Metro Senior ID and Metro Disabled ID cards and the MetroAccess application information page.

¹² Information available from <http://www.wmata.com>

➤ It has the following general accessibility features:

- All bus and train operators and station managers receive training on the special needs of people with disabilities.
- Metro operates 165 elevators at its Metrorail stations.
- All elevators have video cameras and emergency intercoms.
- If an elevator is out of service, there will be an announcement in all stations.
- Metro Mobility Link provides information on elevators out of service, or information helpful to people with disabilities.
- Elevator service status is available online.

➤ For the blind or people with impaired vision:

- There are Braille signs throughout Metrorail stations
 - by elevator buttons.
 - on one farecard vending machine, usually the first on the left, explaining the farecard system.
 - on emergency callboxes on platform pylons and the end of each railcar.
 - on many Metro station entrance pylons giving station information.
 - on many platform pylons giving the station name and other stations on the route.
- Synthesized voice enunciators are being added to elevators giving the station name and level of each stop.
- An external Page Announce system on some trains identifies the train.
- On-board announcements identify the stops.
- Door chimes and audio messages signal the opening and closing of the rail car doors.
- Consistent access patterns within most Metro stations simplify "learning" the stations.
- Bright flashing lights at the platform edge announce a train is approaching.

- Bus operators announce major intersections or transfer points. Operators will announce all stops upon request.
- For the mobility-impaired:
- One farecard vendor per mezzanine, the first one on the left, is lower for easy access.
 - Each mezzanine has at least one entrance and exit gate wide enough for a wheelchair. These gates return the farecard through the entry slot.
 - Lift-equipped and kneeling buses make up more than 70 percent of the fleet.
 - Half the public telephones in the stations are at wheelchair height.
- For the deaf or hearing-impaired:
- Flashing lights at the platform edge signal the arrival of trains.
 - Text telephones (TDYs) are in every Metro station.
 - Metro's consumer and transit information lines include TDY service.

MetroAccess is the name of the ADA Paratransit service for the Washington D.C. metropolitan area. MetroAccess is sponsored by the WMATA, local governments, and the other local fixed-route transit systems in the metropolitan area. Only riders who meet the criteria specified by the ADA and who have been certified as eligible can use MetroAccess. People do not qualify automatically just because they have a disability or on the basis of age. Eligibility is based on a person's functional limitations. MetroAccess provides curb-to-curb transportation service for eligible riders. Since MetroAccess "complements" regular fixed-route service, MetroAccess operates throughout the metropolitan area where there is regular bus and rail service. *Appendix 2* shows an ADA Eligibility Worksheet that every person must complete in order to establish their eligibility for MetroAccess.

4.1.10.1 Easter Seal Project ACTION

Easter Seals Project ACTION is a national technical assistance program funded by the United States Department of Transportation (USDOT), Federal Transit Administration (FTA) and administered by Easter Seals. Easter Seals Project ACTION (Accessible Community Transportation in our Nation) was established by Congress to improve access to transportation services for people with disabilities, assist transit providers in implementing ADA requirements and to promote cooperation between the disabled community and the transit industry. Congress created Easter Seals Project ACTION as a national research and demonstration project in 1988. Funding for Easter Seals Project ACTION activities was established through a cooperative agreement between the USDOT, FTA and Easter Seals. The project's goals were to encourage and facilitate cooperation between the transit industry and disabled communities to improve their access to transportation. Congress had five objectives for Easter Seals Project ACTION:

- Identify people with disabilities in the community and assess their transportation needs.
- **Develop outreach-marketing activities to encourage people with disabilities to use public transportation, particularly fixed route systems.**
- Provide training to transportation providers to increase their sensitivity to the needs of people with disabilities and their proficiency in meeting those needs.
- Provide training to people with disabilities regarding access to and use of public transportation.
- Encourage the elimination of technological barriers to accessible transportation services and facilities and the development of new technologies to facilitate accessibility.

The mission of Easter Seals Project ACTION is: *“Encourage and facilitate cooperation between the disability and transportation communities with the goal of achieving universal access through transportation for persons with disabilities*

nationwide.” (USDOT et al., 2002) This restated mission reflects Easter Seals Project ACTION’s continuing commitment to accessible transportation, as well as its renewed emphasis on excellence in the community, and recognizes the importance of connecting and interfacing modes of transport in developing accessible transportation for all individuals. *Appendix 3* shows some examples of the advertisement campaign for elderly and handicapped people by Project ACTION.

4.2 Conclusions

In conclusion, treatment of the elderly and handicapped seems to be a very important issue in countries all over the World, regardless of the existence of laws related to that segment. Among those USA cities that were reviewed, there are regulations for public places designed ensure compliance with the ADA, in order to avoid penalties. Transportation facilities have to be in accordance with ADA regulations, and new constructions must be completely barrier-free.

On the other hand, cities in South America and Europe have the responsibility of satisfying the needs of the elderly and handicapped, and in many cases they do not have any laws to require those services. For that reason, cities like Medellín lack barrier-free facilities, but it is in the process of providing them. Although Medellín stations have the necessary personnel to attend to people with handicaps, the system doesn’t satisfy the necessity for those people to be independent in their use of the system.

Puerto Rico is a USA territory, and for that reason, ADA regulations must be followed for new construction. In the case of TU, all the necessary services must be provided that elderly and handicapped people require to be independent. All the stations must be completely barrier-free similar to USA systems. In that way TU will satisfy that market segment. In order to take advantage of practices in use elsewhere,

this report includes a review of facilities and strategies in other cities that could be taken into consideration..

The Metro Link System in Saint Louis provides a good example of the extra services for the elderly and handicapped that could make TU more attractive to that market segment. The transit agency maintains a database of customers who need bus and Metro Link timetables, handouts or brochures in large print or Braille. They receive updated timetables approximately two weeks prior to each service change. In the case of TU, large print documents could be made available and updated through the ATI Web Page to provide information to people with partial visual impairments. The users' database could be also useful in the case of the people who need information in Braille. An individualized service for those people, sending the Braille material to their homes, could be a worthwhile.

Another good example of marketing strategies is used by the CTA in the Metra System. A video called "All Aboard" is available to organizations that work on behalf of the disabled which shows the facilities and services that are available. TU must clearly communicate to all segments of the population that it is a barrier-free system and a video can be an option to meet that requirement.

The MBTA in Boston provides the most dramatic of the examples of accessible services in a transportation system. They have a separate office within the Agency that deals with the transportation issues for elderly and handicapped people, called the MBTA's Office for Transportation Access (OTA). In Puerto Rico, a similar could be developed within the ATI Office to deal more efficiently with the programs and services for the elderly and handicapped.

It is observed that there are two different "philosophies" regarding transportation services for elderly and handicapped people: one tends to attract that market segment to the mass transportation system, and the other supports the use of Paratransit service. This can be observed in Baltimore, Maryland, where the MTA

does not advertise elderly or handicapped services, as opposed to Washington, D.C., where WMATA in conjunction with Easter Seals Project ACTION has a marketing campaign to encourage them to use the system.

The cities in North American that have been studied have complementary intermodal transportation systems which offer specialized services to both elderly and handicapped people. In each case, the users of those services must be registered and certified by the transit agency and have an identification card. ATI should study the possibility of making that kind of service available through the AMA buses, taxis or independent carriers by establishing pre-scheduled service for those people. In fact AMA currently offers special services for handicapped people by a Paratransit program called “Llame y Viaje”, but they have to take into consideration the possibility of having to extend those services to future ATI users.

The review of other cities indicated that fare strategy is one of the most important factors in attracting elderly and handicapped riders. For example, the MARTA system in Atlanta provides a 50% discount. It is very important that a study developed for ATI to establish the feasibility of reduced fares. Also, the necessity for an ID card for people who are eligible to pay those fares has to be studied to identify procedures before the opening of ATI.

Finally, as stated by Blackman (1998), the elderly have a greater need to have a sense of safety. The security buttons and cameras used in the train cars in Bilbao are good example of the systems that make the elderly feel secure. It is very important for TU to train employees, specially train operators, in how to react to situations that involve handicapped people. The alert buttons and cameras can help operators identify those situations.

In conclusion, the TU design meets all basic ADA requirements for elderly and handicapped people, but there is an additional necessity to create effective marketing strategies that can be based on successful programs in other cities (*See Table 4.2*).

Case Study	Strategies for elderly and handicapped								
	Reduced fares	Barrier-free facilities	Printed materials for limited vision	Database of customers with visual impairments (mailing service)	Paratransit Service	ID Card	Educational video	Separate office	Buttons system for help
Saint Louis, MO	X	X	X	X	X	X			
Chicago, IL	X	partially	X		X	X	X		
Boston, MA	X	X			X	X		X	
Atlanta, GA	X	X			X	X			
Mexico City, Mexico		partially							
Bilbao, Spain	X	X				X			X
Medellin, Colombia		partially							
Buenos Aires, Argentina		partially							
Baltimore, Maryland	X	X			X	X			
Washington, D.C.	X	X			X	X			

Table 4.2: Case Studies of Marketing Strategies for the Elderly and Handicapped

Chapter V: Elderly and Handicapped Demographics along TU Alignment

Objective #2 of Stage I was to study the communities near the TU alignment and identify those with greater numbers of elderly and handicapped people. This objective was primarily focused on searching data from the Bureau of the Census 2000. It is important to note that the data represents approximations of the elderly and handicapped population within 500 meters of each station based on a sample of 1 of 5 households (*See Chapter III – Methodology*).

5.1 TU Stations Analysis

Each station was analyzed based on three main factors: the elderly and handicapped population within 500 meters, facilities in close proximity that could be useful for elderly and handicapped people, and the stations that have been strategically located to provide access to people destined to points along the alignment. This chapter makes reference to sixteen (16) tables which are located in *Appendix 4*. Those tables summarize the data for the elderly and handicapped for each TU station.

5.1.1 Bayamón Station

Bayamón is the first station on the west end of the Tren Urbano alignment. It is located west of PR-5, between Dr. Veve and Betances Streets. There will be two entrances, one north of Betances Street and one to the south of Dr. Veve Street. This elevated, center platform station will be linked with ATI Minibuses and the AMA terminal and it is expected to serve as an important transfer stop for público users from the surrounding area. The station will have a “Kiss & Ride” area for passenger pick-up or drop-off, and a 488 parking lot facility. It is near Canton Mall. Concession stands and commercial activity will provide a more secure environment

for pedestrians in the vicinity. That is important for elderly and handicapped people who are typically concerned with security.

Bayamón Station has an estimated population of 106 elderly and 153 handicapped (See Table 5.1 – Appendix 4). This station could be very important for the elderly and handicapped people residing in the entire western and central part of the island. Many elderly and handicapped people from those parts of the island travel daily to places such as the Medical Center for services. For that reason, this station is one of the most important to develop on behalf of those users. Figures 5.1 and 5.2 illustrate the station location and a preliminary concept of Bayamón Station.



Figure 5.1: Bayamón Station Location



Figure 5.2: Bayamón Station Concept

5.1.2 Deportivo Station

After passing between Juan Ramón Loubriel Municipal Stadium and Rubén Rodríguez Coliseum, Tren Urbano will stop at Deportivo Station, located between PR-2 and PR-174. The station entrance will be northeast of Lolín Miranda Street. Deportivo Station has parking for 451 vehicles and facilities for passenger drop-off and pick-up for private vehicles and for ATI Minibuses. The station is near Santa Rosa Shopping Center and San Pablo Medical Complex.

Deportivo Station has an estimated population of 429 elderly and 774 handicapped (See Table 5.2 – Appendix 4). This particular station may be used by elderly or handicapped people to visit Santa Rosa Shopping Center for shopping or

entertainment. Given the fact that the station is not in front of the mall, there will be a pick-up area at the station for ATI Minibuses and a trolley that will bring TU passengers to Santa Rosa. *Figures 5.3 and 5.4* illustrate the station location and a preliminary concept of Deportivo Station.



Figure 5.3: Deportivo Station Location



Figure 5.4: Deportivo Station Concept

5.1.3 Jardines Station

Jardines Station is located on the former highway right of way of PR-21. The station is in a residential area and the entrance to the station is east of Colectora Central Avenue, adjacent the entrance to the Jardines de Caparra residential development. Jardines Station will be below grade with a central platform. It will provide service to people that live in Jardines de Caparra and the future Río Bayamón development. Users will arrive at the station mainly by walking or by public transportation. A drop-off area has been designed for this purpose. The station will also have 125 parking spaces, which will in time be expanded to 450.

Jardines Station has an estimated population of 319 elderly and 311 handicapped (See Table 5.3 – Appendix 4). Jardines is an important station in terms of connections for all the residents of Guaynabo to the other TU stations. *Figures 5.5 and 5.6* show its location and a preliminary concept of the station area.



Figure 5.5: Jardines Station Location



Figure 5.6: Jardines Station Concept

5.1.4 Torrimar Station

Torrimar Station will be located on the former PR-21 right-of-way, west of Ramírez de Arellano Avenue. This station will primarily serve the Torrimar and Garden Hills communities. The station will be accessed via Ramírez de Arellano Avenue. It will have a 50-vehicle parking lot, drop-off and pick-up areas on both of sides of Ramírez de Arellano Avenue, and a crosswalk for pedestrian access.

Torrimar Station has an estimated population of 325 elderly and 231 handicapped (See Table 5.4 – Appendix 4). Figures 5.7 and 5.8 illustrate the station location and a preliminary concept.



Figure 5.7: Torrimar Station Location



Figure 5.8: Torrimar Station Concept

5.1.5 Martínez Nadal Station

Martínez Nadal Station will be located east of the Martínez Nadal expressway, in the vicinity of the Metropolitan Hospital. The station's main access will be north of PR-21. This station will be below-grade with a center platform. It will mainly serve the areas north and south of PR-20 and east of PR-21 and is expected to become an important transfer stop. Therefore, the station will have designated drop-off and pick-up areas and a 450-vehicle parking lot with potential for expansion.

Martínez Nadal Station has an estimated population of 318 elderly and 430 handicapped (See Table 5.5 – Appendix 4). It is important place as a transfer station because it is near a hospital. Those features should make the station an activity center for elderly and handicapped people in the area. Figures 5.9 and 5.10 illustrate its location and preliminary concept.



Figure 5.9: Martínez Nadal Station Location



Figure 5.10: Martínez Nadal Station Concept

5.1.6 Las Lomas Station

Las Lomas Station will be at the intersection of PR-21 and San Alfonso Street. The station entrance will be east of San Alfonso Street. This will be an elevated station with side platforms. Las Lomas Station will be used primarily by pedestrians from the surrounding neighbourhoods and passengers from the San Alfonso Street bus route.

Las Lomas Station has an estimated population of 756 elderly and 1166 handicapped (See Table 5.6 - Appendix 4). It has a significant concentration of elderly and handicapped residents within 500 meters and could be another center of activity for elderly people. Figures 5.11 and 5.12 show its location and the concept for the station.



Figure 5.11: Las Lomas Station Location



Figure 5.12: Las Lomas Station Concept

5.1.7 San Francisco Station

San Francisco Station will be located at the intersection of De Diego Avenue and PR-21, south of Corporación Fondo del Seguro del Estado (CFSE). The station's entrance will be east of De Diego Avenue. The station will be elevated with a center platform and will provide service to surrounding neighbourhoods as well as to the nearby commercial establishments. San Francisco Station will have a kiss-and-ride area, and parking lot for 460 vehicles. Also, it has been designed so that AMA buses and ATI Minibuses have access to the station via De Diego Avenue as well as from PR-21.

San Francisco Station has an estimated population of 365 elderly and 672 handicapped (See Table 5.7 – Appendix 4). The importance of San Francisco Station is based on its location near CFSE, an activity center for people with handicaps resulting from on-the-job accidents. The station is therefore important for the elderly

and handicapped market segment. *Figures 5.13 and 5.14* show the location and concept for Francisco Station.



Figure 5.13: San Francisco Station Location



Figure 5.14: San Francisco Station Concept

5.1.8 Centro Médico Station

Centro Médico is presently one of the biggest employment centers in the Metropolitan Area. It is expected that Centro Médico Station will attract a large number of passengers and will be an important point for transfers from AMA buses and ATI Minibuses. The entrance to the station will be located at the intersection of Maga Street and 9 SE Street.

Centro Médico Station has an estimated population of 282 elderly and 328 handicapped (See Table 5.8 – Appendix 4). It is one of the most important stations for this research because it will attract a large volume of elderly and handicapped people who use the surrounding hospitals for their medical appointments. *Figures 5.15 and 5.16* show the location and concept for Centro Médico Station.



Figure 5.15: Centro Médico Station Location



Figure 5.16: Centro Médico Station Concept

5.1.9 Cupey Station

Cupey Station will be located at the intersection of PR-21 and PR-176. This station will serve the Villa Nevárez neighbourhood, the Botanical Gardens, Universidad Metropolitana (UMET) and the San José Shopping Center. Cupey Station will have two entrances: one located west of PR-1 towards Río Piedras and the other east of PR-1 next to the San José Shopping Center. The station will consist of elevated side platforms and will include facilities for transferring from AMA and ATI Minibuses. There will also be a designated "Kiss & Ride" area.

Cupey Station has an estimated population of 531 elderly and 438 handicapped (See Table 5.9 – Appendix 4). It could experience considerable use by elderly and handicapped people due to its proximity to the San José Shopping Center, an activity center for shopping and entertainment. Figures 5.17 and 5.18 show the location and concept for Cupey Station.



Figure 5.17: Cupey Station Location



Figure 5.18: Cupey Station Concept

5.1.10 Río Piedras Station

At Río Piedras Station, one of the station entrances will be in front of the Plaza de Recreo, at the intersection of Arzuaga Street and Ponce de León Avenue. The second entrance will be located at the corner of Ponce de León and Robles Street. Río Piedras Station will be underground. The entrances will be located on the first of three station levels. The mezzanine, or second level, will serve as transition between the two entrances and the platform. The boarding platform will be located on the lowest level.

Río Piedras station has an estimated population of 337 elderly and 1023 handicapped (See Table 5.10 – Appendix 4). Elderly people shop there and so the expected number of people using that station is very high. Figures 5.19 and 5.20 show the location and concept for Río Piedras Station.



Figure 5.19: Río Piedras Station Location



Figure 5.20: Río Piedras Station Concept

5.1.11 Universidad Station

Universidad Station is the second underground station in Phase I of Tren Urbano. This station will serve the University of Puerto Rico, Río Piedras campus. The station will have three entrances along Ponce de León Avenue. The main entrance will be located at the pedestrian crossing in front of the University Museum. The second will connect the station with the proposed development project Plaza Universitaria, to be constructed adjacent the University of Puerto Rico (UPR). The third entrance will be located at the intersection of Mariana Bracetti Street and Ponce de León Avenue, providing access to people in the northernmost area of the university's campus, and the residential and commercial areas along Ponce de León.

Universidad Station has an estimated population of 122 elderly and 118 handicapped (See Table 5.11 – Appendix 4). This station may be used by handicapped students of the UPR. Elderly people will use the station for access to facilities on the UPR Campus, including the Museum for entertainment and the Auxilio Mutuo Hospital. Figures 5.21 and 5.22 show the location and concept for Universidad Station.



Figure 5.21: Universidad Station Location



Figure 5.22: Universidad Station Concept

5.1.12 Piñero Station

Piñero Station will be located southeast of the Judicial Center in San Juan. The station entrance will be located on Coll y Toste Avenue. This will be an elevated station with side platforms, and will provide service to the Judicial Center, Auxilio Mutuo Hospital as well as surrounding residential and commercial complexes such as El Monte Mall and El Monte Condominium.

Piñero Station has an estimated population of 482 elderly and 455 handicapped (See Table 5.12 – Appendix 4). This station will attract a large quantity of elderly and handicapped people due to its location near a mall, a hospital and a tribunal. Figures 5.23 and 5.24 show the location and concept for Piñero Station.



Figure 5.23: Piñero Station Location



Figure 5.24: Piñero Station Concept

5.1.13 Domenech Station

Domenech Station will be located in Hato Rey, near the intersection of Muñoz Rivera Avenue and Domenech and Guayama Streets. The station entrance will be located just southwest of the Department of Labor and Human Resources, at Guayama Street. Domenech Station will have a large open air plaza and concession stand area. Since the station is elevated, passengers will board trains on a second floor accessible by stairs, escalators and elevators. The station will serve the employees and visitors of the Department of Labor and Human Resources,

educational institutions, commercial and residential complexes in the area. Next to the station and in front of the Department of Labor and Human Resources building, a recreational park will be built in accordance with the urban character of the area.

Domenech Station has an estimated population of 791 elderly and 1012 handicapped (See Table 5.13 – Appendix 4). It is one of the most important stations for this research, due to two factors that will make it attractive to elderly and handicapped people: its location near activity centers and a densely populated surroundings area. *Figures 5.25 and 5.26 show the location and concept for Domenech Station.*



Figure 5.25: Domenech Station Location



Figure 5.26: Domenech Station Concept

5.1.14 Roosevelt Station

The north Hato Rey area will be served by two elevated stations. One is Roosevelt Station located west of Muñoz Rivera Avenue in the heart of the banking district (known as the "Milla de Oro", or Gold Mile). This station will provide service to the Huyke Neighbourhood and surrounding commercial establishments. The station will have two entrances, located at the corner of F.D. Roosevelt and Muñoz Rivera Avenues. The station will be elevated and will have side platforms. There will be concession stands designated to promote pedestrian activity in the surrounding area.

Roosevelt Station has an estimated population of 563 elderly and 629 handicapped (See Table 5.14 – Appendix 4). Figures 5.27 and 5.28 show the location and concept for Roosevelt Station.



Figure 5.27: Roosevelt Station Location



Figure 5.28: Roosevelt Station Concept

5.1.15 Hato Rey Station

Hato Rey Station, located near the Aqua Expreso terminal, is the second of the two stations that will serve the northern part of Hato Rey. The station has two entrances: one near the Aqua Expreso terminal and the José Martí Lineal Park, and another near the new Coliseum of Puerto Rico. Improvements to Arterial Avenue B will include wider sidewalks making the station more accessible to pedestrians coming from the Nuevo Centro residential area. The station will be elevated with side platforms.

Hato Rey Station has an estimated population of 675 elderly and 1102 handicapped (See Table 5.15 – Appendix 4). Its location near Aqua Expreso will enhance its attraction. Figures 5.29 and 5.30 show the location and concept for Hato Rey Station.



Figure 5.29: Hato Rey Station Location



Figure 5.30: Hato Rey Station Concept

4.1.16 Sagrado Corazón Station

Sagrado Corazón Station will be an important access point to TU service. It will connect Santurce with the southern part of the metropolitan area, including Hato Rey and Río Piedras and with the municipalities of Guaynabo and Bayamón. This station will be located west of Ponce de León Avenue, towards Santurce. It will have two entrances, one north of the AMA and AMA Minibuses terminal and another at the corner of Fernández Juncos and Borinquen Avenues. It will be the last station on the Phase I alignment. Sagrado Corazón Station will also have an intermodal transfer area for buses and públicos, thereby maximizing its effectiveness as a transfer point.

Sagrado Corazón Station has an estimated population of 576 elderly and 890 handicapped (See Table 5.16 – Appendix). The elderly and handicapped people of the entire San Juan area could use this last station for access to places of interest at the station or along the alignment. Figures 5.31 and 5.32 show the location and the concept for Sagrado Corazón Station.



Figure 5.31: Sagrado Corazón Station Location



Figure 5.32: Sagrado Corazón Station Concept

5.2 Conclusions

This TU station analysis was completed with the purpose of having a more clear understanding of the stations that must be considered for any future surveys on research. It is important to note the five stations that have the largest concentration of elderly people which are: Las Lomas, Domenech, Roosevelt, Hato Rey and Sagrado Corazón. The five stations that have the largest concentration of handicapped people are: Las Lomas, Río Piedras, Domenech, Hato Rey and Sagrado Corazón. These stations have more than 500 elderly or handicapped persons living within 500 meters. In addition the station analysis has characterized those that can be classified as transfer stops for TU and those near points of interest for the elderly and handicapped population. The following *Table 5.17* summarizes the findings in this objective:

Station	Elderly Population	Handicapped Population	Transfer Stop	Interest Places
Bayamón	Low*	Low	Yes	Yes
Deportivo	Low	Moderate	No	Yes
Jardines	Low	Low	Yes	Yes
Torrimar	Low	Low	No	Yes
Martínez Nadal	Low	Low	Yes	Yes
Las Lomas	Moderate*	High*	No	Yes
San Francisco	Low	Moderate	Yes	Yes
Centro Médico	Low	Low	Yes	Yes
Cupey	Moderate	Low	Yes	Yes
Rio Piedras	Low	High	No	Yes
Universidad	Low	Low	No	Yes
Piñero	Low	Low	No	Yes
Domenech	Moderate	High	No	Yes
Roosevelt	Moderate	Moderate	No	Yes
Hato Rey	Moderate	High	Yes	Yes
Sagrado Corazón	Moderate	High	Yes	Yes

*Low = 0 – 500 people; *Moderate = 501 – 810 people; *High = 811 people - over

Table 5.17: Summary of Elderly and Handicapped Population Potential Ridership Grouped by Tren Urbano Station

Chapter VI: Design and Marketing Strategies for the Elderly and Handicapped at TU

Objective 3 of Stage I was to identify the physical facilities proposed by TU to satisfy the needs of elderly and handicapped market segment and the proposed strategies to attract them to the service.

This objective was divided into two areas: the physical facilities that the design criteria for TU require on behalf of the elderly and disabled population, and the marketing strategies that TU is considering to attract this market segment. The preliminary findings are as follows:

6.1 Physical Facilities

The design requirements make the TU system accessible to individuals with disabilities regardless of their age or the impairments. According to the ADA, all TU facilities used by the general public shall comply with all the applicable requirements for New Construction based on the ADA Accessibility Guidelines (ADAAG, 1991). Related regulatory provisions of government agencies with jurisdiction must also be applied to ensure barrier-free transportation for elderly or handicapped people. This includes Planning Regulation No. 7 (Uniform Building Code or UBC of PR). The “Tren Urbano Design Criteria” (DTOP, 1996) document specifies the following:

“Design specific provisions shall be made by the designers for the reduction and elimination of barriers in all TU public facilities and vehicles that impede the mobility of elderly and disabled patrons. All TU public facilities and vehicles shall be usable by individuals with disabilities, such as the inability to walk, difficulty in walking, reliance of walking aids, sight and hearing impairments, lack of stamina, difficulty interpreting and reacting to sensory information, and extremes of physical size. Provisions shall allow accessibility of TU public facilities and vehicles to

individuals with disabilities and will allow them an opportunity to travel in safety and comfort equal to that afforded to other persons.”

In an interview with Mrs. Teresa Sifre Estarellas (personal communication, 2002), Architect at the TUO, we obtained the complete design criteria for TU regarding facilities for elderly and handicapped people. The description of the physical facilities for visual, hearing/speaking and mobility impairments follows.

6.1.1 Visual Impairments

TU facilities will be appropriated for use by people with any kind of visual impairments. The design criteria for TU specify every aspect as follows:

Every sign with letters or numerals shall be accompanied with Grade 2 Braille, and the characters and backgrounds of signs shall be eggshell, matte, or other non-glare finish such that the letters shall contrast with the background. A minimum of one Braille sign identifying the station shall be provided on each platform or in the boarding area. Illumination levels in the areas where signage is located shall be uniform and shall minimize glare on these signs.

Audible emergency alarms shall produce a sound that exceeds any other sound in the room or space. In addition, audible signals shall sound at elevators to indicate call answering. All control buttons shall be in Braille and feature raised standard alphabet characters for letters, Arabic characters for numerals, or standard symbols.

Ramps and landings at TU stations shall have curbs, walls, railings, or projecting surfaces that prevent people from slipping off the ramp. Curb ramps will have detectable warnings which shall extend the full width and depth of the curb ramp. Platform edges bordering a drop-off and not protected by platform screens or guard rails shall have a detectable warnings with a texture and color in contrast with the surrounding floor surface. The continuous light over the platform edge paver

must provide enough light to satisfy the 70 percent contrast requirements of ADAAG. The material used to provide contrast shall be an integral part of the walking surface.

If the vertical clearance in an area along an accessible route is reduced, a barrier to warn blind or visually-impaired people shall be provided. As an example, the diagram illustrates the underside of a stair descending and crossing a pathway (See Figure 6.1). Where the headroom is less than 80 inches, protection can be offered by a railing (2030 mm) which can be no

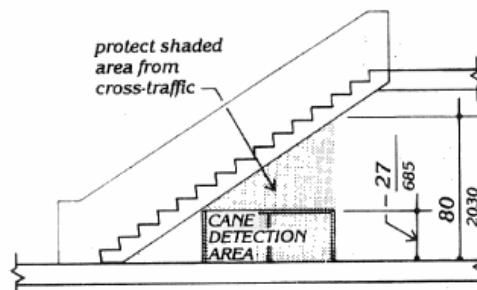


Figure 6.1: Overhead Hazards

higher than 27 inches (685 mm) to ensure detectability. The edge of both sides of an escalator shall be marked by a strip of clear contrasting color. Also, the edge of the tread shall be apparent from both ascending and descending directions.

TU fare collection equipment shall include instructions for the visually impaired in Braille. Where clocks are provided for use by the general public, the clock face shall be uncluttered so that its elements are clearly visible. Hands, numerals, and/or digits shall contrast with the background either light-on-dark or dark-on-light.

Train cars shall be equipped with auditory warning signals to alert passengers of closing doors. Each vehicle shall be equipped with a public address system permitting messages from personnel, or recorded or digitized messages, announcing stations and other passenger information.

6.1.2 Hearing and/or Speaking Impairments

TU facilities will be appropriated for use by people with any kind of hearing and/or speaking impairments. The design criteria for TU include the following:

Signage shall be installed in all TU stations to notify patrons of the availability of a listening system (*See Figure 6.2*). Telephones shall be hearing aid compatible and are required to have a volume control. Text telephones shall be provided and identified by the international TDD symbol (*See Figure 6.3*). If an interior public pay telephone is provided in a transit facility, at least one interior public text telephone shall be provided at the station. Where four or more public pay telephones serve a particular entrance to a rail station and at least one is in an interior location, at least one interior public text telephone shall be provided at the entrance. It is anticipated that one text telephone shall be provided at each station fare payment area, near other public telephones at the location.



Figure 6.2:
International
Symbol of Access
for Hearing Loss



Figure 6.3:
International
TDD Symbol

Visual alarms systems shall be integrated into the TU stations. Where the public address system is provided to convey information to the public a means of conveying the same or equivalent information to persons with hearing loss or who are deaf shall also be provided.

A visible signage shall be provided at each elevator entrance to indicate when it is answering a call. A visual elevator position indicator shall be provide above the elevator control panel or over the door to show the position of the elevator in the hoistway. If a person has a speaking impairment, his/her activation of a push-to-talk button in the elevator would signal the regional Control Center of an attempted of communication. The Control Center operator can then dispatch assistance to the elevator.

6.1.3 Mobility Impairments

Finally, TU facilities are going to be accessible for every person who has any kind of mobility impairments. This includes features for persons with visual impairments, who would also have mobility impairments. The design criteria for TU are as follows:



Figure 6.4: Display Conditions
International Symbol of Accessibility

Facilities and elements at TU are required to be identified as accessible through use of the international symbol of accessibility (*See Figure 6.4*). All accessible entrances of TU stations shall, to the maximum extent practicable, coincide with those used by the majority of the general public. Signage shall be provided to indicate direction to, and identify the accessible entrances and accessible routes.

Some portions of the platform seating shall be designed with backs and full-length armrests to facilitate use by individuals with disabilities. Facilities such as ramps, elevators or other circulation devices, as well as fare vending or other ticketing areas, shall be designed to minimize the distance which wheelchair users and other persons who cannot negotiate steps have to travel compared to the general public. Curb ramps shall be provided for transitions and shall be free of abrupt elevation changes. The least possible slope shall be used for any ramp. In cases where handrails are necessary, they shall be provided along both sides of ramps segments.

Automated fare vending and collection systems shall be completely accessible. All equipment at TU stations is required to be accessible and positioned and mounted in such a way that wheelchair occupants can use the controls. Clear floor space that allows a forward or a parallel approach by a person using a wheelchair shall be provided at controls, dispensers' receptacle, bathrooms and other operable equipment. *Figure 6.5* shows two approaches to wheelchair transfers in bathrooms.

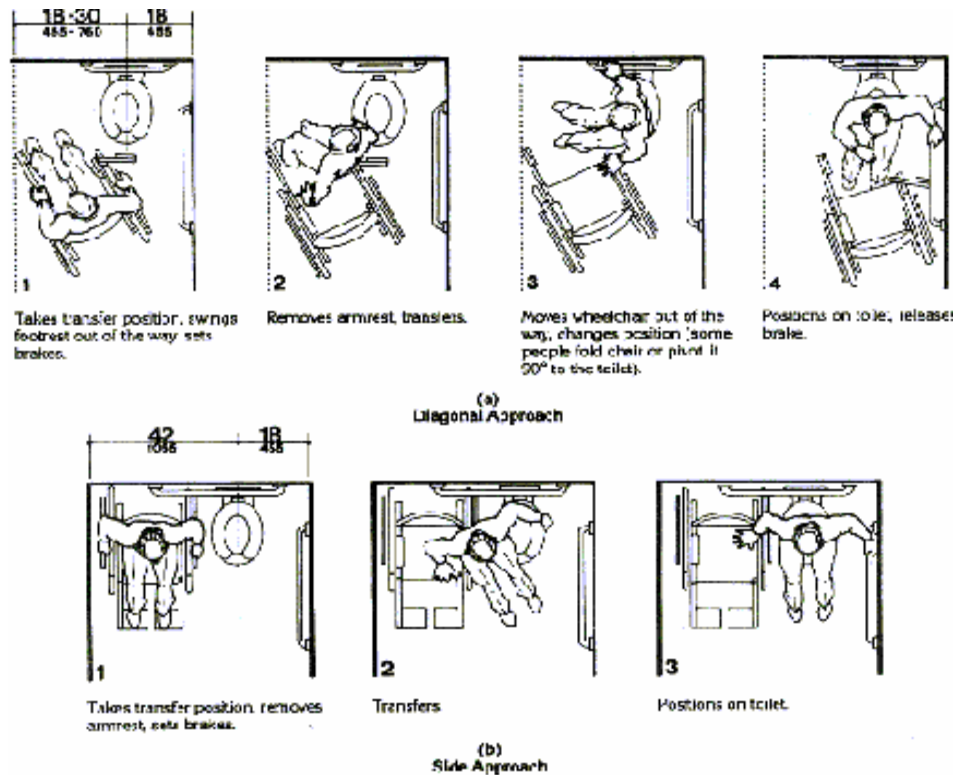


Figure 6.5: Wheelchair Transfers

Accessible elevators shall be on barrier-free. The floor area of elevator cars shall provide space for wheelchair users to enter, maneuver and exit. Elevators in TU stations shall have glazed panels for visibility in case of an emergency. Handles, pulls, latches, locks, and other operating devices on accessible doors shall have a shape that is easy to grasp with one hand and does not require a tight grip, tight pinching, or twisting of the wrist to operate.

All walks, halls, corridors, aisles, tunnels, and other spaces shall be accessible. Direct connections to commercial, retail, or residential facilities

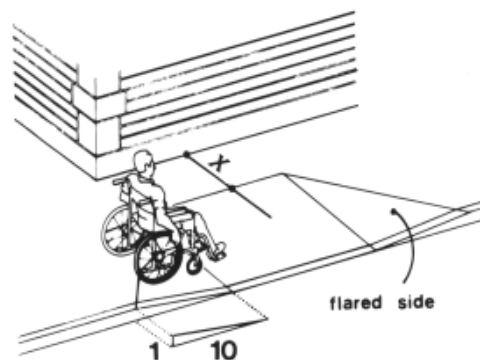


Figure 6.6: Curb Ramp

shall be accessible from the point of connection to boarding platforms and to all transportation systems elements used by the public. *Figure 6.6* shows a typical curb ramp, cut into a walkway perpendicular to the curb face, with flared sides having a maximum slope of 1:10. At least one accessible route shall be provided from public transportation stops, accessible parking, and accessible passenger loading spaces, and public streets or sidewalks to the stations they serve. The accessible route shall follow the route for the general public.

Rail platform height at TU stations shall match the vehicle floor height. Also, rail stations with parking will have accessible parking spaces. Accessible parking spaces shall be located as near as practical to a primary station entrance. Accessible parking shall be located so that a handicapped person does not have to wheel or walk behind parked cars other than his/her own. Pedestrian access shall include an accessible pathway from each accessible parking space to the station. Van-accessible parking spaces shall be provided in conformance with ADAAG.

Each train car shall contain sign(s) which indicate priority seating for persons with disabilities, and that other passengers should make such seats available to the handicapped. (*See Figure 6.7*) Handrails and stanchions shall be providing to allow safe boarding, on-board circulation, seating and standing assistance, and allow alighting by people with disabilities. Floor surfaces on aisles, standing areas, and areas where wheelchair and mobility aid users are to be accommodated shall be slip-resistant.

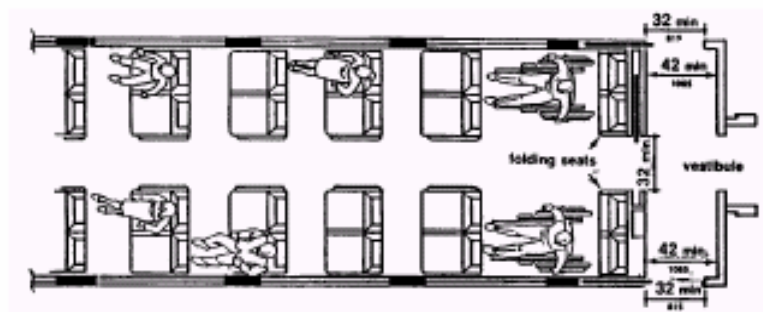


Figure 6.7: Rail Car with Designated Wheelchair Spaces

6.2 Marketing Strategies

The TU marketing strategies for elderly and handicapped people is important for attracting them to the system. Many marketing campaigns for various market segments have been developed, but there are not specific programs for the elderly and handicapped. The Community Relations Department at TU and the Communications Office at HTA are responsible for the educational efforts related to the ATI system. Those offices have outsourced the marketing campaign to companies including Arteaga and Arteaga Agency, who are developing the exhibits, tv commercials, billboards and newsletters. In a phone interview with Mrs. Liggy Bermúdez (personal communication, 2003), General Manager for Arteaga and Arteaga, she explained that there are plans for a campaign to reach the elderly and handicapped population.

During 2003, ATI presentations, videos, field visits and other educational activities were developed although few for elderly or handicapped groups. On September 2003, Representative Victor García San Inocencio proposed special TU fares for students, elderly and the handicapped. He proposed a 50% discount for students and elderly people, and free travel for the handicapped and people over 70 years old (Garzón, 2003). The tariff and fare system developed for ATI does include discounts for the elderly and handicapped population. The discounts are applicable to any journey made on TU at 50% of the adult fare (\$1.50). A person that is over 75 years of age can travel free on TU. Elderly and handicapped people transferring between TU and other modes within the ATI system (excluding públicos), and paying with a TU farecard, will receive a discount on the first transfer only as follows (*Table 6.1*).

First Trip	Tariff	Transfer to:	Tariff	Total Cost
TU	\$0.75	AMA	No charge	\$0.75
TU	\$0.75	Metrobus	No charge	\$0.75
AMA	\$0.10	TU	\$0.65	\$0.75
Metrobus	\$0.25	TU	\$0.50	\$0.75

Table 6.1: TU Tariffs

6.3 Conclusions

Based on this research we can conclude that the design criteria for TU are complete with respect to facilities for elderly and handicapped people. The system addresses the elements of the ADA requirements, and in that respect the design is superior to the systems in other cities described in Chapter IV. The transit system will be in compliance with ADA regulations, which could very well provide the opportunity to scale back the Paratransit Service. However, because of the nature of their impairments, many individuals are unable to utilize public transit, regardless of the infrastructure modifications. To remove Paratransit Service entirely would severely curtail or even eliminate many people's access to society and would create a tremendous political firestorm. (Davis, 2002) Therefore, the need for some Paratransit service will remain.

To be effective as an alternative Paratransit Service TU needs to focus attention on the development of effective marketing strategies on behalf of that market segment. The conclusions in Chapter IV outline some possible marketing strategies based on those in use in other cities with similar systems. With both, barrier-free facilities and good marketing strategies, we can maximize the attractiveness of the TU system for use by the elderly and handicapped population.

Chapter VII: Elderly and Handicapped Population Perception Regarding TU

Stage II had involved the assessment elderly and handicapped perceptions regarding the use of TU as a transportation mode. *Objective 1 of Stage II* was to survey elderly and handicapped people at Centro Médico Station in order to better understand their perceptions of the TU system and their disposition to the service. The preliminary findings for objective 1 of Stage II follow:

7.1 The Survey

Before the survey was conducted, it was necessary to review the Centro Médico area to evaluate possible survey locations. These observations were made in February 20, 2002 and are summarized in *Table 7.1*.

Area	Advantages	Disadvantages	Other Observations
Central Plaza	<ul style="list-style-type: none"> - green areas and benches - traffic of 30 or more elderly and handicapped people in one hour periods from 6am to 9am and midday - cafeterias in the area - in the center of a “kiss and ride” area 	<ul style="list-style-type: none"> - traffic of 10 or less elderly and handicapped people in one hour periods after 9am, excluding midday - people just visit the cafeterias and do not stay at the plaza - no protection such as shelters for bad weather conditions - facilities with barriers for handicapped persons 	<p>There were adults, most of them elderly resting on benches, waiting for their medical appointments or their rides. Others were observing their children or grandchildren playing in the plaza. This location was reasonable for interviewing people before 9:00am or at midday hours.</p>

Table 7.1: Survey Areas (cont.)

Area	Advantages	Disadvantages	Other Observations
San Juan Municipal Hospital	<ul style="list-style-type: none"> - in front of “publicos” area - “kiss and ride” area - barriers-free facilities for handicapped people 	<ul style="list-style-type: none"> - traffic of 10 or less elderly or handicapped people in one hour periods during all hours - no benches for “publico” users - survey has to take place on the buses resulting in an uncomfortable situation for users - interviews could remain incomplete - no protection such as shelters for bad weather 	<p>Most of the people using the “publico” system during the day were not elderly neither handicapped. When an interview was conducted in a bus, the interviewer occupied a seat and need to keep moving to allow passengers to sit, resulting in an uncomfortable situation for other users. The interviewer has to be very quick, because once the bus is full, it would leave and the interview remain incomplete. This place was not reasonable for the survey.</p>
State Medical Emergencies	<ul style="list-style-type: none"> - “kiss and ride” area - traffic of special transportation services for elderly and handicapped people from diverse areas - exterior waiting area with benches - traffic of 30 or more elderly and handicapped people in one hour periods during all hours - protection such as shelters for bad weather - barriers-free facilities for handicapped people 	<ul style="list-style-type: none"> - noise which makes the interview process difficult 	<p>Elderly and handicapped people waiting for their rides or for the time to see medical staff at all times This location was reasonable for interviews at all times.</p>
Industrial Hospital	<ul style="list-style-type: none"> - “kiss and ride” area - traffic of 30 or more handicapped people in one hour periods during all hours - external waiting corridor with benches - in front of the bus stop for DAV Program (Disabled American Veterans) - barriers-free facilities for handicapped people 	<ul style="list-style-type: none"> - no protection such as shelters for bad weather 	<p>Handicapped people, especially those who are disabled because of a work-related accident, at all times. Those disabilities can be temporary or permanent. This location was reasonable for the interviews process at all times.</p>

Table 7.1: Survey Areas (cont.)

Area	Advantages	Disadvantages	Other Observations
Adults University Hospital	<ul style="list-style-type: none"> - “kiss and ride” area - traffic of 30 or more elderly and handicapped people during one hour periods at all times - external waiting area with benches - protection such as shelters for bad weather - barriers-free facilities for handicapped people 	<ul style="list-style-type: none"> - noise which makes the interviews process difficult 	Elderly and handicapped people waiting for medical appointments, rides or to visit medical staff at all times. Accessibility for handicapped people to this hospital from the “publicos” area was barriers-free, but not from the AMA stops. It was a reasonable place for the interviews during some time intervals.
Pediatric Hospital	<ul style="list-style-type: none"> - “kiss and ride” area - protection in bad weather - barriers-free facilities for handicapped people 	<ul style="list-style-type: none"> - traffic of 10 or less elderly and handicapped people in one hour periods during all times - no benches or exterior waiting area 	No presence of elderly or handicapped people at all times. It was not a reasonable place for the interviews .
Cardiovascular Hospital	<ul style="list-style-type: none"> - traffic of 20 or more of elderly people in one hour periods at all times - “kiss and ride” area - exterior waiting area with benches - protection such as shelters for bad weather 	<ul style="list-style-type: none"> - not barriers-free facilities, poor accessibility for elderly and handicapped people 	Elderly people waiting for medical appointments before 9am. The level of accessibility for handicapped people to this hospital from the “publicos” and from AMA stops was not barriers-free. It was a reasonable place for interviews during certain times.
Veterans Hospital	<ul style="list-style-type: none"> - traffic of 30 or more elderly and handicapped people in one hour periods during all times - “kiss barriers-free facilities for handicapped people -traffic of special transportation services - exterior waiting areas with benches - protection such as shelters for bad weather 	<ul style="list-style-type: none"> - federal building with security restrictions - permission needed to do the interviews 	This was a reasonable place for do the interviews, but on the observation day the administration requires a special procedure to allow access. Since the Sept. 11 incidents, there is a maximum security alert and therefore very difficult to get the required permissions. For that reason, we decided not to interview in this location .

Table 7.1: Survey Areas

Based on the previous table, the locations at the Centro Medico area chosen for the interviews were the Central Plaza, the Industrial Hospital, the State Medical Emergencies area, the Adult University Hospital and the Cardiovascular Hospital. The interviews took place from 5:30 to 9:00am to take advantage of the high traffic (30 or more elderly and handicapped people in one hour periods) during those hours.

7.1.1 The Questionnaire

The survey questionnaire was designed primarily to obtain a complete understanding of the transit habits of elderly and handicapped people who visit Centro Médico, including their transportation mode choice, their knowledge and perception of TU and which communication media they prefer (*See Appendix 1*). Each question had a particular purpose.

7.1.1.1 Questions and Motivations

Table 7.2 is a list of the questions and the basis for asking each one.

Question	Motivation
1. Do you drive regularly now?	<ul style="list-style-type: none"> - To determine the degree of mode choice that the respondent has in terms of alternatives to public transportation. - To determine if the willingness for using TU is related to the driving frequency of the respondent.
2. What type of public transportation is within walking distance of your home?	- To determine if the person can take public transportation on a regular basis
3. What transportation mode do you use more frequently?	- To determine what transportation mode the person uses and the use of public transportation.

Table 7.2: Questions and Motivations (cont.)

Question	Motivation
4. How often do you use this type of transportation?	<ul style="list-style-type: none"> - To determine the frequency of use by mode. - To see how many trips elderly and handicapped people generate.
5. What are the three most important factors that help you decide whether or not to use public transportation?	<ul style="list-style-type: none"> - To determine factors that affect elderly and handicapped ridership. - To see the extent to which the availability of alternate modes of transportation affects their decisions.
6. What is (was) the main reason of your ride on public transportation?	<ul style="list-style-type: none"> - To see the main uses of public transportation for elderly and handicapped people
7. Which of the following activities (walking, climbing stairs, hearing, etc.) are difficult for you?	<ul style="list-style-type: none"> - A way to measure the ability to travel - To determine if a lack of ridership may be a result of physical limitations. - To determine if a physical limitation is a factor affecting their frequency of driving.
8. Have you ever received special transportation service for elderly or handicapped people?	<ul style="list-style-type: none"> - To determine another choices that the respondent has in terms of alternatives to public mass transportation.
9. What do you know about the TU project in the San Juan Metropolitan Area?	<ul style="list-style-type: none"> - To measure the general knowledge of TU
10. Are you willing to use TU in the future?	<ul style="list-style-type: none"> - To measure the willingness to use the system. - To determine the perception that elderly and handicapped people have of TU
11. Is there any TU station construction near your home?	<ul style="list-style-type: none"> - To determine if the person can take TU on a regular basis in the future. - To determine if the location of their home is a factor affecting their willingness to use the system. - To determine if the location of their home is a factor affecting their knowledge of TU.

Table 7.2: Questions and Motivations (cont.)

Question	Motivation
12. If your home is not near a TU station, which one is the easiest for you to reach?	<ul style="list-style-type: none"> - To identify those stations that are important to people destined to Centro Médico. - To determine the geographical area of the respondent.
13. Choose among the following transportation modes that you anticipate using in the future (Paratransit service, intermodal transportation including private/public transportation and TU, etc.)	<ul style="list-style-type: none"> - To determine the perception of transportation modes in the future. - To determine the degree to which the respondents perceive themselves without use of a private cars in the future.
14. What is your opinion about the need to have a card to identify you as an elderly or handicapped person for the use of public transportation?	<ul style="list-style-type: none"> - To measure the degree of knowledge of the benefits of having an ID card. - To determine if an ID card can be used as a future marketing strategy for elderly and handicapped people on TU.
15. Which of these activities do you do most of the time? (watch TV, hear radio, etc.)	<ul style="list-style-type: none"> - To identify the communication media used by the respondent. - To determine which media can be most effective for a future marketing campaign.
16. How frequently do you watch, hear or read the news?	<ul style="list-style-type: none"> - To determine the level of exposure to the press and if that is a factor affecting the knowledge about TU.
17. Which local newspaper do you prefer?	<ul style="list-style-type: none"> - To determine how the type of newspaper the respondents use may affect their knowledge of TU - To identify the newspaper used most by the respondents.
18. Which magazine do you read most frequently?	<ul style="list-style-type: none"> - To identify magazines that could be used for a marketing campaign for elderly and handicapped people.

Table 7.2: Questions and Motivations (cont.)

Question	Motivation
19-23. Demographic questions	<ul style="list-style-type: none"> - To be able to compare this sample of respondents to other samples - To determine if certain types of people have different perceptions about TU and different media exposition.

Table 7.2: Questions and Motivations

7.1.2 Frequency Tables and Graphics

In this section, findings are reported for each of the 23 questions in the survey at Centro Médico. The tables summarize the information gathered and show graphically the most important questions and answers.

7.1.2.1 Frequency of Driving

Table 7.3 shows us that 49.3% of the respondents don't drive and 39.8% of them drive every day, representing 90% of the sample.

Alternative	Valid Percentage
Daily	39.8
Weekly	5.3
Few times	5.8
Never	<u>49.3</u>
	n=400

Table 7.3: Frequency of Driving

7.1.2.2 Public Transportation Walking Distance From Home

Responses to this question show us that 37% of the respondents do not have any transportation mode within walking distance of their homes, followed by those that have a bus stop (27%) or a "terminal" (24.8%). *Table 7.4* summarizes the data.

Alternative	Valid Percentage
Bus / público terminal	24.8
Bus stop	27.0
AMA	10.5
Metrobús	.8
Nothing	<u>37.0</u>
	n=400

Table 7.4: Transportation Walking Distance

7.1.2.3 Transportation Mode More Frequently Used

Table 7.5 shows that 51.0% of the respondents (more than the percent of persons who answered that they drive in question 1) use their own cars most frequently. That answer was followed by people who said that they ride with other people (18.5%) or a “público” (17.8%). *Figure 7.1* summarizes the findings.

Alternative	Valid Percentage
Private car	51.0
Público	17.8
Taxi	1.3
Ride of a related	18.5
AMA	10.3
Metrobús	1.0
Walking	<u>.3</u>
	n=400

Table 7.5: Transportation Modes Used More Frequently

7.1.2.4 Use of Transportation Mode

In this question the data showed that 68.5% of the respondents make a trip daily, followed by 14.3% who travel weekly. *Table 7.6* summarizes the answers to this question.

Alternative	Valid Percentage
Daily	68.5
Weekly	14.3
Every 2 to 3 weeks	13.0
Monthly	3.8
Didn't answered	<u>.5</u>
	n=400

Table 7.6: Frequency of Use of Transportation Mode

7.1.2.5 Most Important Factors when Using Public Transportation

Tables 7.7 - 7.12 show the number of persons who marked each factor as important or not. The three highest scores were “convenience” (59%), “there is no other choice” (57.3%) and “routes” (49%).

Alternative	Valid Percentage
No	54.0
Yes	<u>46.0</u>
	n=400

Table 7.7: Schedule

Alternative	Valid Percentage
No	51.0
Yes	<u>49.0</u>
	n=400

Table 7.8: Routes

Alternative	Valid Percentage
No	65.3
Yes	<u>34.8</u>
	n=400

Table 7.9: Cost

Alternative	Valid Percentage
No	41.0
Yes	<u>59.0</u>
	n=400

Table 7.10: Convenience

Alternative	Valid Percentage
No	56.5
Yes	<u>43.5</u>
	n=400

Table 7.11: Security

Alternative	Valid Percentage
No	42.8
Yes	<u>57.3</u>
	n=400

Table 7.12: Lack of Other Transportation Choices

7.1.2.6 Purpose of Ride on Public Transportation

In this question, most of the respondents use public transportation for medical visits (36.8%), followed by 24% with other purposes not mentioned in the alternatives including “only when the car is damage” (8.5%), “necessities” (3.5%), “all of the above” (4%) or “I have never used it” (7%). Table 7.13 summarizes the data for this question.

Alternative	Valid Percentage
Visit friends	1.5
Go shopping	15.8
Medical appointments	36.8
Entertainment	.5
Study	5.3
Work	16.3
Other	<u>24.0</u>
	n=400

Table 7.13: Transportation Purpose

7.1.2.7 Presence of Physical or Mental Difficulties

Tables 7.14 - 7.21 show us the number of persons who marked each factor. The highest frequencies were “see clearly” (67%), “climbing stairs” (40%) and “walk normally or rapidly” (36%), followed by “stand up/ sit down” (27.5%), “hold with force” (19.8%), “hear clearly” (11.8%), “remember clearly” (9%) and “speak clearly” (1.5%).

Alternative	Valid Percentage
No	33.0
Yes	<u>67.0</u>
	n=400

Table 7.14: Presence of Visual Difficulties

Alternative	Valid Percentage
No	60.0
Yes	<u>40.0</u>
	n=400

Table 7.15: Presence of Difficulties Climbing Stairs

Alternative	Valid Percentage
No	80.3
Yes	<u>19.8</u>
	n=400

Table 7.16: Presence of Difficulties Holding with Force

Alternative	Valid Percentage
No	63.5
Yes	<u>36.5</u>
	n=400

Table 7.17: Presence of Difficulties Walking

Alternative	Valid Percentage
No	88.3
Yes	<u>11.8</u>
	n=400

Table 7.18: Presence of Difficulties
Hearing

Alternative	Valid Percentage
No	98.5
Yes	<u>1.5</u>
	n=400

Table 7.19: Presence of Difficulties
Speaking

Alternative	Valid Percentage
No	72.5
Yes	<u>27.5</u>
	n=400

Table 7.20: Presence of Difficulties
Standing-Up/Sitting-Down

Alternative	Valid Percentage
No	91.0
Yes	<u>9.0</u>
	n=400

Table 7.21: Presence of Difficulties
Remembering

7.1.2.8 Use of Special Transportation Service

Table 7.22 summarizes the data for this question. It shows that only 13% of the respondents have received some type of special transportation service for elderly and/or handicapped people.

Alternative	Valid Percentage
Yes	13.0
No	<u>87.0</u>
	n=400

Table 7.22: Special Transportation Service

7.1.2.9 TU Project Knowledge

In this question, the majority of the respondents said that they “know something about TU, but not everything” (64.8%), followed by the persons who “don’t know anything about TU” (22%) and those who said that they “know everything about TU” (13.3%). *Table 7.23* and *Figure 7.2* illustrate the findings.

Alternative	Valid Percentage
Know everything	13.3
Know something	64.8
Don't know anything	<u>22.0</u>
	n=400

Table 7.23: TU Knowledge

7.1.2.10 Willingness to Use TU in the Future

Table 7.24 shows us that the majority of the respondents (54.8%) are willing to use TU in the future, followed by the ones who are not willing to use it (13%) and the ones who said they are undecided (13%). 19.3% of the respondents didn't answer the question since they don't know anything about TU.

Alternative	Valid Percentage
Didn't answer	19.3
Yes	54.8
No	13.0
Depends, I can't decide now	<u>13.0</u>
	n=400

Table 7.24: Willingness to Use TU

7.1.2.11 Construction of TU Station Near Home

The majority of the respondents (42.8%) said that they are from outside the SJMA, followed by those who are near SJMA but not near any TU station (16.8%) and those who live 5 – 10 minutes by car from a TU station (11.8%) See Table 7.25:

Alternative	Valid Percentage
Didn't answer	21.3
Yes, walking distance	3.8
Yes, less than 5 minutes by car	3.8
Yes, 5 to 10 minutes by car	11.8
No, but live in a near town	16.8
No, not live at SJMA or near town	<u>42.8</u>
	n=400

Table 7.25: Proximity to a TU Station

7.1.2.12 Nearest TU Station to Arrive

Table 7.26 shows that 34.3% of the respondents don't know which station is the easiest for them to reach. 12.3% chose Bayamón Station, 1.8% Sagrado Corazón Station and 12.5% others such as Río Piedras Station.

Alternative	Valid Percentage
Didn't answer	39.3
Bayamón Station	12.3
Sagrado Corazón Station	1.8
Other	12.5
Don't know	<u>34.3</u>
	n=400

Table 7.26: Nearest TU Station

7.1.2.13 Transportation Modes Choices in the Future

Most of the respondents (40%) preferred the Paratransit service, followed by those who chose “públicos” and TU (33.3%). *Table 7.27* summarizes the data for this question.

Alternative	Valid Percentage
Paratransit service	40.0
Público to TU	33.3
Private transportation to TU	15.5
Don't see me without car	<u>11.3</u>
	n=400

Table 7.27: Transportation Preferences

7.1.2.14 Identification Card Choice

Table 7.28 shows that the majority of the respondents (96.3%) have a positive opinion about using an identification card as an elderly or handicapped person. Only 3.8% have a negative opinion about it.

Alternative	Valid Percentage
Excellent idea if it bring benefits	96.3
Bad idea, I don't like to be classified	<u>3.8</u>
	n=400

Table 7.28: ID Card Choice

7.1.2.15 More Frequent Media Exposition

Table 7.29 and *Figure 7.3* shows that 52.8% of the respondents chose “watch TV” as the activity they do the most, followed by “hear radio” (20%) and “read newspapers” (18.3%)

Alternative	Valid Percentage
Watch tv	52.8
Hear radio	20.8
Read newspaper	18.3
Read magazine	6.0
Use internet	<u>2.3</u>
	n=400

Table 7.29: More Frequent Media Exposition

7.1.2.16 Frequency of News Exposition

In this question, the majority (83.5%) of the respondents said that they watch, hear or read the news every day, followed by those who do it weekly (12%). See *Table 7.30*:

Alternative	Valid Percentage
Daily	83.5
Weekly	12.0
Few times	<u>4.5</u>
	n=400

Table 7.30: News Exposition

7.1.2.17 More Frequent Newspaper Exposition

Table 7.31 and *Figure 7.4* shows that 36.3% of the respondents preferred “El Nuevo Día”, the same number who preferred “El Vocero”.

Alternative	Valid Percentage
Didn't answer	.5
El Nuevo Día El Vocero	36.3
Primera Hora	36.3
San Juan Star	16.0
other	2.0
	<u>9.0</u>
	n=400

Table 7.31: Newspapers Exposition

7.1.2.18 Demographic Questions

Tables 7.32 – 7.35 and *Figure 7.5* show the frequencies for each demographic question: 85% of the respondents live with their families; 78.5% live in private houses; 35.5% completed high school, 53.8% were male and 33.5% were between 51 and 60 years old.

Alternative	Valid Percentage
Related persons	85.0
Not related persons	3.0
Alone	<u>12.0</u>
	n=400

Table 7.32: Housing Arrangement

Alternative	Valid Percentage
Private house	78.5
Rented apartment	19.8
Condominium	1.0
Special center	<u>.8</u>
	n=400

Table 7.33: Household Type

Alternative	Valid Percentage
6 th grade or less	19.8
7 th to 9 th grade	17.8
High school	35.5
University, not completed	12.5
Bachelor degree	10.3
Graduated studies	<u>4.3</u>
	n=400

Table 7.34: Education

Alternative	Valid Percentage
Female	46.3
Male	<u>53.8</u>
	n=400

Table 7.35: Gender

Alternative	Valid Percentage
21 to 30	2.0
31 to 40	6.3
41 to 50	16.8
51 to 60	33.5
61 to 70	26.3
71 to 80	12.5
More than 80	<u>2.8</u>
	n=400

Table 7.36: Age

7.1.3 Cross-Tabulations

This section shows findings for cross-tabulations applied to some of the most relevant questions in the survey. *Cross-tabulation* is a method of reporting responses to one or more variables based on the responses to other variables. Some cross-tabulations are discussed next:

7.1.3.1 Driving Frequency by Willingness to Use TU

The following cross-tabulation (*See Table 7.37*) shows that 94 persons out of 159 who use to drive everyday, are willing to use TU in the future, which represents

59% into that category. On the other hand 107 persons out of 197 who don't drive, are willing to use TU, which represents 54% into that category. The same data were obtained on the other categories so, it seems that the willingness for using TU in the future is the same and unrelated to the driving frequency of the respondent.

Count		Willingness to use TU				Total
		Didn't answered	yes	no	depends, I can't choose right now	
Drive	daily	33	94	18	14	159
	weekly	6	8	0	7	21
	few times	6	10	0	7	23
	never	32	107	34	24	197
Total		77	219	52	52	400

Table 7.37: Frequency of Driving by Willingness to Use TU

7.1.3.2 Proximity of TU Station by Willingness to Use TU

The following cross-tabulation (*See Table 7.38*) shows that most of the persons (50% or more) within each category are willing to use TU in the future. It seems that the willingness for using TU in the future is unrelated to the construction of a TU station near their homes.

Count		Willingness to use TU				Total
		Didn't answered	yes	no	Depends, I can't choose right now	
Construction of TU station near home	Didn't answ.	76	0	0	9	85
	Yes, walking distance	0	12	0	3	15
	Yes, less than 5 minutes by car	0	7	3	5	15
	Yes, 5 to 10 minutes by car	0	34	10	3	47
	No, but I live in a near town	0	40	20	7	67
	no, not live at SJMA or near town	1	126	19	25	171
Total		77	219	52	52	400

Table 7.38: Proximity of TU Station by Willingness to use TU

7.1.3.3 Proximity of TU Station by TU Project Knowledge

The following cross-tabulation (*See Table 7.39*) shows that 17 of the 53 persons who response that they know everything about TU, curiously doesn't know to which station is easier for them to go. That fact demonstrates us that actually there is not enough information for the future TU users.

Count		TU Project Knowledge			Total
		know everything	Know something, but not everything	Don't know anything	
Nearest TU station	Didn't answ.	18	59	80	157
	Bayamónn Station	12	36	1	49
	Sagrado Corazón Station	0	7	0	7
	other	6	41	3	50
	I don't know	17	116	4	137
Total		53	259	88	400

Table 7.39: Proximity of TU Station by TU Project Knowledge

7.1.3.4 Age by Willingness to Use TU

The following cross-tabulation (*See Table 7.40*) shows that 88% of the respondents between 21 and 30 years old and 81% of the respondents between 71 and 80 years old are willing to use TU in the future. The other age categories are less willing to use TU in the future but, there are mostly the persons who told that they can't decide at that the moment of the survey.

Count		Willingness to use TU				Total
Age		Didn't answered	yes	no	Depends, I can't choose right now	
21 to 30		1	7	0	0	8
31 to 40		4	12	6	3	25
41 to 50		15	33	10	9	67
51 to 60		26	81	11	16	134
61 to 70		22	53	15	15	105
71 to 80		8	24	10	8	50
More than 80		1	9	0	1	11
Total		77	219	52	52	400

Table 7.40: Age by Willingness to Use TU

7.1.3.5 Age by More Frequent Media Exposition

The following cross-tabulation (*See Table 7.41*) shows that persons in almost all age categories are more exposed to television media. Respondents older than 80 years old are more used to hear radio and the youngest persons (age 21 to 30) are more used to Internet. Also the data shows that more persons between 31 and 80 read compared to the other categories.

Count		More frequent media exposition					Total
		Watch tv	Hear radio	Read newspaper	Read magazines	Use Internet	
Age	21 to 30	5	0	0	0	3	8
	31 to 40	15	0	5	2	3	25
	41 to 50	37	15	10	4	1	67
	51 to 60	71	27	31	5	0	134
	61 to 70	55	26	15	7	2	105
	71 to 80	24	8	12	6	0	50
	More than 80	4	7	0	0	0	11
Total		211	83	73	24	9	400

Table 7.41: Age by More Frequent Media Exposition

7.1.3.6 Age by News Exposition

The following cross-tabulation (*See Table 7.42*) shows that persons in almost all age categories are exposed in the same way to news. The category which presents less interest for news is the ones between 21 and 30 years old.

Count		News exposition			Total
		daily	weekly	few times	
Age	21 to 30	1	5	2	8
	31 to 40	25	0	0	25
	41 to 50	55	8	4	67
	51 to 60	115	14	5	134
	61 to 70	92	9	4	105
	71 to 80	38	9	3	50
	More than 80	8	3	0	11
Total		334	48	18	400

Table 7.42: Age by News Exposition

7.1.4 Chi-Square Significance Tests

It is very difficult to establish a relation between two variables using only a cross-tabulation analysis. For that reason a chi-square analysis is necessary most of times. This section shows findings for chi-square significance tests applied to some of the most relevant questions in the survey. *Chi-square significance test* is used to test the hypothesis of no association of columns and rows in tabular data. It is more likely to find significance to the extent that the relationship is strong, the sample size is large and/or, the number of values of the two associated variables is large. A chi-square probability of .05 or less is commonly interpreted by social scientist as a justification for rejecting the null hypothesis that the row variable is unrelated (that is, only randomly related) to the column variable. Some chi-square significance tests are discussed next:

7.1.4.1 Frequency of Driving by Presence of Vision Difficulties

Count		Visual Difficulties		
		no	yes	Total
Drive	daily	57	102	159
	weekly	1	20	21
	few times	9	14	23
	never	65	132	197
Total		132	268	400

Table 7.43: Frequency of Driving by Presence of Visual Difficulties

Hypothesis:

Ho: Frequency of driving variable is unrelated to presence of visual difficulties variable.

Ha: Frequency of driving variable is related to presence of visual difficulties variable.

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	8.548 ^a	3	.036
Likelihood Ratio	11.152	3	.011
Linear-by-Linear Association	.055	1	.814
N of Valid Cases	400		

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 6.93.

Table 7.44: Frequency of Driving by Presence of Visual Difficulties
Chi-Square Test

Chi-square* 8.548 > Chi-square alpha 7.82

Conclusion: (reject Ho, accept Ha)

There is sufficient evidence to conclude that the frequency of driving of the respondents is affected by or is related to the presence of visual difficulties.

7.1.4.2 Frequency of Driving by Presence of Difficulties Climbing Stairs

Count		Difficulty climbing stairs		Total
		no	yes	
Drive	Daily	111	48	159
	weekly	14	7	21
	few times	13	10	23
	never	102	95	197
Total		240	160	400

Table 7.45: Frequency of Driving by Presence of Difficulties Climbing Stairs

Hypothesis:

Ho: Frequency of driving variable is unrelated to presence of difficulties of climbing stairs variable.

Ha: Frequency of driving variable is related to presence of difficulties of climbing stairs variable.

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	12.433 ^a	3	.006
Likelihood Ratio	12.572	3	.006
Linear-by-Linear Association	12.317	1	.000
N of Valid Cases	400		

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 8.40.

Table 7.46: Frequency of Driving by Presence of Difficulties Climbing Stairs
Chi-Square Test

Chi-square* 12.433 > Chi-square alpha 7.82

Conclusion: (reject Ho, accept Ha)

There is sufficient evidence to conclude that the frequency of driving of the respondents is affected by or is related to the presence of difficulties of climbing stairs.

7.1.4.3 Frequency of Driving by Presence of Difficulties Walking

Count		Difficulty walking		
		no	yes	Total
Drive	daily	117	42	159
	weekly	15	6	21
	few times	15	8	23
	never	107	90	197
Total		254	146	400

Table 7.47: Frequency of Driving by Presence of Difficulties Walking

Hypothesis:

Ho: Frequency of driving variable is unrelated to presence of difficulties in walking variable.

Ha: Frequency of driving variable is related to presence of difficulties in walking variable.

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	14.747 ^a	3	.002
Likelihood Ratio	14.915	3	.002
Linear-by-Linear Association	14.387	1	.000
N of Valid Cases	400		

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 7.67.

Table 7.48: Frequency of Driving by Presence of Difficulties Walking
Chi-Square Test

Chi-square* 14.747 > Chi-square alpha 7.82

Conclusion: (reject Ho, accept Ha)

There is sufficient evidence to conclude that the frequency of driving of the respondents is affected by or is related to the presence of difficulties in walking.

7.1.4.4 Frequency of Driving by Presence of Difficulties Standing up and/or Sitting Down

Count		Difficulty standing up or sitting down		Total
		no	sí	
Drive	daily	115	44	159
	weekly	16	5	21
	few times	15	8	23
	never	144	53	197
Total		290	110	400

Table 7.49: Frequency of Driving by Presence of Difficulties Standing-Up / Sitting-Down

Hypothesis:

Ho: Frequency of driving variable is unrelated to presence of difficulties of standing up or sitting down variable.

Ha: Frequency of driving variable is related to presence of difficulties of standing up or sitting down variable.

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	.793 ^a	3	.851
Likelihood Ratio	.769	3	.857
Linear-by-Linear Association	.006	1	.940
N of Valid Cases	400		

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 5.78.

Table 7.50: Frequency of Driving by Presence of Difficulties Standing-Up / Sitting-Down Chi-Square Test

Chi-square* .793 < Chi-square alpha 7.82

Conclusion: (do not reject Ho, do not accept Ha)

There is not sufficient evidence to conclude that the frequency of driving of the respondents is affected by or is related to the presence of difficulties of standing up or sitting down.

7.2 Conclusions

Based on the descriptive analysis of the questionnaire, cross-tabulations and chi-square significance tests, in terms of transportation choices we can conclude that most of the elderly and/or handicapped don't drive, so this fact makes them a more potential market for public transportation. The ones who actually drive, do it every day so it means that they are used to depend on their own cars and almost don't use public transportation. This sub-segment of the elderly and handicapped population needs special attention in order to attract them to TU. Although most of the elderly and handicapped have different alternatives of public transportation walking distance from their homes, they prefer to use their own cars or the ride of a related; only 1/3 of the sample uses public transportation more frequently. In terms of which factors can attract the elderly and handicapped to use public transportation, convenience and routes are the most important ones in order to decide whether or not to use public transportation. The "lack of others alternatives" as a response too drives us to think in which way we can change that response in order to make public transportation their first choice for trip.

Regarding trip purpose, most of the elderly and handicapped use public transportation for medical appointments; that conclusion can be influenced by the fact that the survey took place at Medical Center. In terms of physical and mental health, the most common difficulty or impairment within the elderly and handicapped are visual impairments, followed by mobility impairments as climb stairs, walk and stand up / sit down movements. Most of those persons have never received any kind of special transportation service. There is sufficient evidence for conclude that the frequency of driving of the respondents is affected by or related to the presence of some physical difficulties.

In terms of knowledge of TU and willingness to use the system, more than 3/4 of the elderly and handicapped don't have the complete and accurate information about TU, or simply don't know anything about the project. Some of the persons

who response that they know everything about TU, curiously doesn't know to which station is easier for them to go. That fact demonstrates us that actually there is not enough information for the future TU users. There is good disposition to use TU system in the future among the persons that know something about the project. Only 1/4 of those persons expressed that they are not going to use it or that they can't take that decision today. A marketing strategy has to take into consideration the persons who have a bad perception about TU. The willingness for using TU in the future is unrelated to the driving frequency of the respondents or to the construction of a TU station near their homes. Finally, respondents between 21 and 30 years old and those between 71 and 80 years old are more willing to use TU in the future.

Most of the elderly and handicapped who visit Centro Médico aren't from the SJMA, so a marketing strategy has to take into consideration, also, that sub-segment of the population. They are going to use mostly the transfer stop as Bayamón and Sagrado Corazón. Although most of the elderly and handicapped preferred a Paratransit Service instead of use intermodal public transportation, we have to think that not every person of this market really need it, and the unnecessary use off that service can result on highest cost for the Government. Instead of that, it is necessary to promote the use of TU and other public transportation and only promote Paratransit Service for those persons who really need it because their dependency condition. It is necessary to inform the elderly and handicapped population the benefits of an ID card for using in public transportation because it can increase ridership significantly.

In terms of exposure to communications media, a marketing strategy for elderly and handicapped may be more effective through the use of TV, radio and newspaper advertising, since those are the three media that they are exposed most of the time. Also magazines, Internet and outdoor advertising must be use as complementary media. Respondents older than 80 years old are more used to hear radio and the youngest persons are more used to Internet. Most of the elderly and handicapped watch, read or hears news every day, so that means that the information

about TU that the informative media are bringing to those persons is not complete. The Government has to drive their attention to use the news media for public relations regarding TU and change the negative perception some people have about it. Since “El Nuevo Día” is the newspaper elderly and handicapped read most of the time, it can be a good source to begin an advertising or positive public relations campaign regarding TU and public transportation. Apparently, magazines is not a media significantly used by elderly and handicapped persons, but can be important as a complementary resource in an advertising campaign.

Demographic questions show that most of the elderly and handicapped live with their families in a private house, so that fact may affect their need of public transportation. Almost 1/2 of the elderly and handicapped persons only complete studies between 1st grade and 9th grade. It demonstrates that most of this market segment has low education level. Almost a 1/3 of the respondents within the sample were from 61 years old or more. That fact can be viewed from two different points: the sample was more influenced by handicapped persons or the respondents tend to lie when they have to talk about their age.

Chapter VIII: Summary and Recommendations

8.1 Summary of Research Findings

Objective 1 of Stage I was to identify strategies and actions used to satisfy the needs of the elderly and handicapped in diverse countries with transportation systems similar to TU. Summarizing findings, treatment of the elderly and handicapped seems to be a very important issue in countries all over the World, regardless of the existence of laws related to that segment. Among those USA cities that were reviewed, there are regulations for public places designed ensure compliance with the ADA, in order to avoid penalties. Transportation facilities have to be in accordance with ADA regulations, and new constructions must be completely barrier-free. On the other hand, cities in South America and Europe have the responsibility of satisfying the needs of the elderly and handicapped, and in many cases they do not have any laws to require those services. For that reason, cities like Medellín lack barrier-free facilities, but it is in the process of providing them. Some valuable ideas for marketing public transportation to elderly and handicapped were presented in several cities investigated in this research.

The Metro Link System in Saint Louis provides a good example of the extra services for the elderly and handicapped that could make TU more attractive to that market segment. The transit agency maintains a database of customers who need bus and Metro Link timetables, handouts or brochures in large print or Braille. They receive updated timetables approximately two weeks prior to each service change. Another good example of marketing strategies is used by the CTA in the Metra System. A video called “All Aboard” is available to organizations that work on behalf of the disabled which shows the facilities and services that are available. The MBTA in Boston provides the most dramatic of the examples of accessible services in a transportation system. They have a separate office within the Agency that deals

with the transportation issues for elderly and handicapped, called the MBTA's Office for Transportation Access (OTA).

It is observed that there are two different "philosophies" regarding transportation services for elderly and handicapped people: one tends to attract that market segment to the mass transportation system, and the other supports the use of Paratransit service. This can be observed in Baltimore, Maryland, where the MTA does not advertise elderly or handicapped services, as opposed to Washington, D.C., where WMATA in conjunction with Easter Seals Project ACTION has a marketing campaign to encourage them to use the system.

Findings on *Objective 2 of Stage I*, to study the communities near the TU alignment and identify those with greater numbers of elderly and handicapped people, supported the idea that TU has a large population of elderly and handicapped living within 500 meters around each of the 16 stations. This TU station analysis was completed with the purpose of having a more clear understanding of the stations that must be considered for any future surveys on research. It is important to note the five stations that have the largest concentration of elderly people which are: Las Lomas, Domenech, Roosevelt, Hato Rey and Sagrado Corazón. The five stations that have the largest concentration of handicapped people are: Las Lomas, Rio Piedras, Domenech, Hato Rey and Sagrado Corazón. Once the concentration of elderly and handicapped population near TU stations was identified, it was necessary to study TU in terms of design criteria, facilities and marketing strategies for elderly and handicapped.

Based on the findings of *Objective 3 of Stage I*, to identify the physical facilities proposed by TU to satisfy the needs of elderly and handicapped market segment and the proposed strategies to attract them to the service, it is clear that the design criteria for TU are complete with respect to facilities for elderly and handicapped people. The transit system will be in compliance with ADA regulations, which could very well provide the opportunity to scale back the Paratransit Service.

However, because of the nature of their impairments, many individuals are unable to utilize public transit, regardless of the infrastructure modifications. Therefore, the need for some Paratransit service will remain. To be effective as an alternative Paratransit Service TU needs to focus attention on the development of effective marketing strategies on behalf of that market segment. With both, barrier-free facilities and good marketing strategies, we can maximize the attractiveness of the TU system for use by the elderly and handicapped population.

Once case studies around the world were made, elderly and handicapped population near TU stations were identified and TU design and marketing strategies were studied, it was necessary to know the perception of the elderly and handicapped market regarding TU system. Based on findings of *Objective 1 of Stage II*, some important conclusions were made and also applied to the population studied on Objective 2 of Stage I. First, most of the elderly and/or handicapped don't drive, so this fact makes them a more potential market for public transportation. Although most of the elderly and handicapped have different alternatives of public transportation walking distance from their homes, they prefer to use their own cars or the ride of a friend or related. In terms of factors they look for when using public transportation, convenience and routes are the most important ones. Regarding physical and mental health, there is sufficient evidence for conclude that the frequency of driving is affected by or related to the presence of some physical difficulties.

In terms of knowledge of TU, more than 3/4 of the elderly and handicapped surveyed don't have the complete and accurate information about TU, or simply don't know anything about the project. Regarding willingness to use the system, there is good disposition to use TU system in the future among the sample. Although most of the elderly and handicapped preferred a Paratransit Service instead of use intermodal public transportation, we have to think that not every person of this market really need it, and the unnecessary use of that service can result on highest cost for the

Government. In terms of exposure to communication media, a marketing strategy for elderly and handicapped may be more effective through the use of TV, radio and newspaper advertising.

Objective 2 of Stage II, to recommend specific strategies to satisfy the particular needs of the elderly and handicapped population market segment taking into consideration age and impairments, is going to be discussed in the following sections.

8.2 Recommendations for ATI and TU system

Elderly and handicapped do not ride accessible, fixed-route services for a variety of reasons, including, but not necessarily limited to: lack of knowledge about the availability of accessible fixed-route service, the need to cross wide roads to use the service, ineffective policies on the part of the transit system, inadequate training of drivers regarding deal with their need, the need to make transfers between modes or among vehicles, inadequate seating, lack of large, covered shelters at bus stops and, the perceived lack of security. All those reasons can be potentially harmful if they are applied to the ATI system and, specifically, TU. Therefore, it is important to design marketing strategies to attract those potential riders to use the system and make a well-design implementation plan.

The following sections contain specific recommendations regarding public involvement, TU facilities improvements, transit staff training and marketing strategies.

8.2.1 Public Involvement

It is important to involve the public early in any new service development, particularly something which may serve particular needs of a population such as elderly and handicapped ones. There are numerous methods of public involvement, such as the creation of an advisory committee and open workshops.

An advisory committee can perform as a task force to discuss approaches, make recommendations and help in the process of taking important decisions regarding policies and services. Also, the committee can deal with accessibility, Paratransit, or eligibility issues. It is important to include diverse groups so that the recommendations represent a broad spectrum of interest and are not overly influenced by one or two groups. The advisory committee must be compound of diverse groups who represent elderly and handicapped interest and, also, other groups who may be affected by the decisions of the committee. Groups to invite to participate on an advisory committee include the following:

- groups representing people with various disabilities, including organizations representing people with vision impairments, people who use wheelchairs, people with hearing impairments, people with developmental and mental disabilities, and other groups;
- agencies which provide service to older citizens;
- the Chamber of Commerce and other local business organizations;
- the local tourist bureau or organizations with interest related to particular attractions in the area;
- representatives of educational institutions such as trade schools, community colleges, and universities; and
- transportation professionals.

An advisory committee must meets regularly, keeps a record of comment and points of view, seeks consensus on issues and plays an important role in decision making. Following the work of the advisory committee, TU must schedule al least

one open, public meeting or workshop. The purpose of the workshop is to present information on the program and current thinking on its implementation and to receive input from participants. The workshop could be a structured, seminar type of meeting, or it could be a less formal, open house type of gathering. At various important decision points, it is necessary to share the results of the workshop with the advisory committee at their regular meetings.

8.2.2 TU Facilities Improvements

Before recommending marketing strategies for elderly and handicapped, it is important to assure that TU has the necessary features to make stations completely barriers-free. On the other hand, there is no doubt that TU stations have the basic features to serve the needs of the elderly and handicapped, but system feeders as AMA buses and ATI Minibuses are going to work together to have an intermodal transportation service and, therefore, they must be considered. In this section some recommendations are included regarding transit stops, internal security system and stations area improvements.

8.2.2.1 Locating Transit Stops Close to Passengers

Actually AMA buses pass along a lot of bus stops on the SJMA, but how many of them are adequate for elderly and handicapped riders? Are the adequate ones near places of high elderly and handicapped traffic?

ATI system must evaluate the current stops of AMA buses and improve those ones which have physical barriers. Also, new stops must be developed near places of interest for elderly and handicapped. To locate transit stops close to passengers, ATI staff must learn to identify where the elderly and handicapped people are located and where they want to go. Particular areas may be more in need of specialized services for passengers who travel to and from them. ATI can develop a catalog of bus stops requiring accessibility improvements, collect information from riders, drivers, and

others about bus stops, through public outreach and market research. Survey is a powerful technique to make an approach to elderly and handicapped transportation needs regarding bus stops.

Another great tool for ATI is to ask the local complementary Paratransit service, in this case, AMA “Llame y Viaje” program, to identify locations where elderly and handicapped travel. Then, ATI can compare those locations against the bus stop accessibility catalog to identify AMA stops close to frequent Paratransit patron origins and destinations.

In addition, when placing advertising regarding accessibility or other topics, ATI can include a clip-out coupon with questions about what stops to make accessible. Coupons could offer cents off a transit ride and drivers can collect the coupons and return them to the transit system. *Appendix 5* shows an example of a possible ATI advertising with a clip-out coupon with questions.

8.2.2.2 Internal Buttons and Cameras System on Trains

Bilbao, Spain Metro case study showed a good idea of how improve service to elderly and handicapped. Their internal buttons and cameras system assure security for that segment and add confidence levels on users. TU can implement that system in its trains and educate people on how to use it. Once an elderly or handicapped gets into the system, that person can push the button to aware the operator of their presence. In that way, the operator can observe that person using internal cameras and be aware of any problem that person can afford. It is very useful when a wheelchair user is on the train, because the operator can see if the person wants to make a stop in one station and the train needs a little more time with the doors open to facilitate the process, especially if the wheelchair is secure or is the train is very crowded.

8.2.2.3 Station Area Improvement

Actually TU has an improvement program for areas surrounding system stations. It comprehends areas in a 500 meters radius and includes improvements to sidewalks, crosswalks, light systems, signage, landscaping, and others. It is important for TU to assure that, for example, ramps for wheelchairs are in accordance with ADA actual guidelines. Also TU must establish policies for vehicles inside the 500 meters radius and encourage laws to severely punish those drivers who park their cars on sidewalks creating barriers to handicapped. If engineers and architects want to make those areas safe for walking, acceptable speed limits on cars must be established to assure pedestrians, elderly and handicapped security. In a personal communication, Dr. Benjamín Colucci, transportation professor at UPR, expressed that in Puerto Rico, pedestrians represent 30 to 35% of the total fatalities associated with highways (personal communication, 2004). It is important to mention that there are conflictive policies regarding the construction of highways and the construction of walking areas; the standards used in both cases are completely opposites. For that reason, TU must improve station areas taking into consideration a balance between both standards. Although those areas will be improved mostly for pedestrian use, private cars, AMA and ATI Minibuses are going to be in transit bringing people multimodal transportation alternatives. Amendments to vehicles and traffic laws in Puerto Rico, such as Law 22, must be performed taking into consideration the potential increase of pedestrian in the vicinities of TU stations. Educational campaigns must be also developed to involve the public into the process and support the efforts.

8.2.3 Transit Staff Training

Fixed-route operators and transit staff receive a great deal of training before they provide transit service. For many fixed-route systems, such as TU and AMA buses, assisting elderly and handicapped may be an important component of the service. Training on how to provide appropriate service to elderly and handicapped

helps operators and transit staff to improve their skills and enhances their awareness of that population segment. Such training must be designed to enable employees to assist passengers with disabilities, communicate with them, and offer services necessary for people to use public transit. There may be a need for training on very specific topics, such as the following:

- Operation of the lift on AMA buses and ATI Mini-buses, including assisting standees;
- Operation of the wheelchair securement system if they are developed on TU;
- Securement of various types of mobility devices, such as three-wheeled scooters or unconventional wheelchairs;
- New fares issues or policies;
- Other new policies and procedures, such as identifying service animals, allowing personal care attendants onto the system for special fares, or meeting the needs of riders with travel trainers;
- Policies and procedures regarding bus stop announcements;
- Communication issues; and
- General courtesy and etiquette for working with handicapped people.

The production of a video can be a great tool for transit staff training. The advisory committee recommended before must be a major component of the development of that video. ATI can involve transit staff and operators in planning and developing the training video because it will be directed at them and it can ensure that the final product is relevant and the video can be enthusiastically use in their jobs. It is important to take into consideration that elderly and handicapped people are going to participate in the video and, therefore, the production of a script must be adapted, for example, for those who have visual impairments. For this project, all scripts must be also delivered in print form of letters at least 30 points in size:

ATI must distribute the video through driver and staff training, but also let the community know about it. Public efforts to recognize the achievements of the

drivers and other employees makes can make the video a component of the transit property culture and engenders enthusiasm for the principles it espouses.

Easter Seal Project ACTION (See Chapter 4) can be used as outsource for gather information about transit staff training and different techniques that can be used. The program offers staff training to transportation providers to increase their sensitivity to the needs of people with disabilities and their proficiency in meeting those needs.

8.2.4 Marketing Strategies

Once public involvement, facilities improvements and transit staff training have been developed, the transit system can implement valuable marketing strategies to attract elderly and handicapped users. Some of those marketing strategies can include the creation of a specialized service department, the creation of a customer database and the development of a travel training program. Those approaches are going to be discussed in the following sections.

8.2.4.1 Specialized Service Department

As mentioned in the Boston MBTA case study, ATI can create a specialized division or department for deal with every aspect regarding transit services to elderly and handicapped. That division must manage all related programs, such as special fares, complaint systems, Paratransit services, customer database, special offers, marketing, transit staff training, travel training, public involvement, facilities improvements, federal funding, and others. This department can assure that elderly and handicapped needs are satisfied in every aspect of the system, including TU, AMA buses and ATI Minibuses.

It is very important that AMA “Llame y Viaje” program can be added and implemented in the ATI system and that this Paratransit service can be coordinated by this department.

8.2.4.2 Customers Database

ATI system must create a database of elderly and handicapped users using, first, existing users database of AMA “Llame y Viaje” program and, second, people applications for reduce fares ID Cards if applicable. As the Saint Louis, Missouri Metro Link case study explained, an elderly and handicapped customers database can be very useful to routinely begins sending updated timetables approximately two weeks prior to ATI service changes in large print and Braille for those who need it. Also, brochures and special offers can be mailed directly to elderly and handicapped users of the system, creating more loyalty on them.

8.2.4.3 Travel Training

It is important for ATI and TU system performance to develop a good travel training for elderly and handicapped riders. A great technique on travel training is to prepare informational presentations about the ATI and TU system and how to use it to special groups in the community. Possible locations include elderly residences, apartment complexes in which numerous handicapped people reside and activity centers frequented by elderly and handicapped. If schedules and transit information are mailed to people who request it over the telephone, a brief insert can be included describing planned or existing travel training. *Appendix 6* shows an example of a possible ATI travel training informational insert.

The travel training program should address the following topics:

- Discussion of the community’s transit system

- Discussion of the materials needed to ride TU, AMA buses and ATI Minibuses, such as schedules and route maps.
- Transit fares and special offers
- System facilities and accessibility features
- Wheelchair procedures
- Using the system with a travel trainer or companion and/or individually
- Resources available for future reference or assistance

The production of a video can be a great marketing technique for travel training. The Chicago, Illinois Metra system case study established an example of a 13-minute video to acquaint new elderly and handicapped customers to the Metra system. ATI and TU can develop an informational video and distribute it to organizations that work on behalf of the elderly and handicapped. Also, Easter Seal Project ACTION mentioned before provide training to people with disabilities regarding access to and use of public transportation.

8.3 Implementation Plan

It has been demonstrated in this research the potential of the elderly and handicapped population as a market for ATI system and TU. The survey findings and analysis suggest a series of follow up actions for TU, including implementing all the recommendations mentioned before. However, this implementation should be done in phases. All the recommendations should be adopted as an experimental program first, where it can be implemented and later evaluated and analyzed. If the results are the expected, the recommendations can be developed even further. One possible implementation plan could be described in four phases: pre-opening of the system, short term (year 1), medium term (year 2) and long term (year 3) phases. The following *Table 8.1* shows this possible implementation plan:

Recommendation	Pre-opening	Year 1 (Short-run)	Year 2 (Medium-run)	Year 3 (Long-run)
Public Involvement	<ul style="list-style-type: none"> ➤ Creation of an Advisory Committee <ul style="list-style-type: none"> • meetings every month ➤ Open Workshop 	<ul style="list-style-type: none"> • meetings every 3 months • general recommendations 	<ul style="list-style-type: none"> • Advisory Committee reorganization • meeting every 3 months • year 1 implementations evaluation • new recommendations 	<ul style="list-style-type: none"> • Advisory Committee reorganization • meetings every 3 months • year 2 implementations evaluation • new recommendations
TU Facilities Improvements	<ul style="list-style-type: none"> ➤ “Locating transit stops close to passengers” program <ul style="list-style-type: none"> • creation of catalog of bus stops • accessibility • identify AMA • “Llame y Viaje” frequent stops • Press Conference about program implementation ➤ TU internal buttons and cameras system in trains used during peak-hours 	<ul style="list-style-type: none"> • ATI advertising with clip-out coupons trough newspapers, magazines and mailing • development of new routes with accessible stops • improvements of identified bus stops • program evaluation 	<ul style="list-style-type: none"> • year 1 implementations evaluation • continue with improvements of other bus stops • improved bus stops maintenance 	<ul style="list-style-type: none"> • year 2 implementations evaluation • creation of a new program to know people perceptions about stops accessibility • improved bus stops maintenance
		<ul style="list-style-type: none"> • Advisory Committee evaluation of inputs • ideas implementation 	<ul style="list-style-type: none"> • system maintenance • brochures about security system • include all the trains 	<ul style="list-style-type: none"> • system maintenance • brochures about security system

Table 8.1: Implementation Plan (cont.)

Recommendation	Pre-opening	Year 1 (Short-run)	Year 2 (Medium-run)	Year 3 (Long-run)
Transit Staff Training	➤ Video production <ul style="list-style-type: none"> • Advisory Committee involvement • training all staff 	<ul style="list-style-type: none"> • new staff training 	<ul style="list-style-type: none"> • year 1 training evaluation • public recognition of the achievements of the year 1 staff regarding service 	<ul style="list-style-type: none"> • year 2 training evaluation • public recognition of the achievements of the year 2 staff regarding service
Specialized Service Department	➤ Creation of the department <ul style="list-style-type: none"> • hiring of staff with expertise • training staff • Press Conference about office services 	<ul style="list-style-type: none"> • AMA “Llame y Viaje” program transition to this department • marketing educational campaign through mass media 	<ul style="list-style-type: none"> • year 1 implementations evaluation • brochures about office services 	<ul style="list-style-type: none"> • year 2 implementations evaluation • brochure about office services
Customer Database	➤ Creation of database software <ul style="list-style-type: none"> • use of existing AMA “Llame y Viaje” users 	<ul style="list-style-type: none"> • use of reduce fares ID cards applicants • begins sending updated timetables in large print or Braille if needed • marketing educational campaign through mailing 	<ul style="list-style-type: none"> • continue sending mailing updates and information to users • year 1 implementations evaluation • database updates 	<ul style="list-style-type: none"> • continue sending mailing updates and information to users • year 2 implementations evaluation • database updates

Table 8.1: Implementation Plan (cont.)

Recommendation	Pre-opening	Year 1 (Short-run)	Year 2 (Medium-run)	Year 3 (Long-run)
Travel Training	➤ Creation of the Travel Training program <ul style="list-style-type: none"> • preparation of the material, such as presentations, a video, marketing inserts, and others • hiring of training staff • Advisory Committee involvement 	<ul style="list-style-type: none"> • includes informational inserts with mailing information • marketing educational campaign through newspapers 	<ul style="list-style-type: none"> • new staff hiring and training • year 1 training staff and program evaluation 	<ul style="list-style-type: none"> • year 2 training staff and program evaluation

Table 8.1: Implementation Plan

8.4 Marketing Transit to Elderly and Handicapped

The Transit Cooperative Research Program (TCRP, 1997) sponsored by FTA also talks about some tips on marketing transit to elderly and handicapped people. Those tips can also be used as recommendations for ATI and TU and are explained next:

8.4.1 Recommendations on Marketing to Older Riders

- Sometimes riders who are elderly do not consider themselves as having a disability. Ensure that marketing strategies reflects this.
- Riders who are elderly consist of the “young” old, who view themselves as active individuals capable of independent action, and the “frail” old, who need assistance. The size of both these groups is increasing as the population ages and medical advances prolong life.
- Riders who are elderly respond best to advertisings in which the subjects appear to be slightly younger than themselves.
- More than half of all women 65 years and older live by themselves (Leventhal, 1990). While, wanting to be independent, they cannot provide all their own transportation, so in some ways are captive riders – but are not always captives of fixed-route.
- Riders who are elderly have higher expectations of retirement than did their parents. Riders who are elderly and have a higher income and higher living standards than those previously the norm, have greater service expectations. Riders who are elderly are not simply grateful for a ride – they expect a quality ride too. This trend will increase as Baby Boomers age and expect to be able to continue an active life into retirement.

8.4.2 Recommendations on Marketing to People Who Use Wheelchairs

- Put the person first, not the disability. Treat each person as an individual and work hard to address his or her personal needs with high-quality service in a comfortable environment.
- Avoid language that condescends.
- Remove obstructions and barriers to transit use, such as insufficient numbers of accessible vehicles on routes, lifts that malfunction, bus stops that do not accommodate wheelchairs, bus stops located across busy streets or in locations without sidewalks, drivers who stop too far from the curb, and drivers who do not assist with the lift or securement.
- Feature clear pictures of people in wheelchairs using fixed-route services in advertisings and brochures.

8.4.3 Recommendations on Marketing to People With Visual Impairments

- Do not rely on Braille, although materials should be provided in this format, if requested. Only 5% to 10% of people who are blind can read Braille. Large print and audio formats should also be available.
- Drivers should announce stops and speak to passengers as they board the vehicle. Drivers should remember that there is no reason to raise their voices for people with visual impairments.
- Devices that indicate with sound where the exit is – beepers or some sort of tone – will help people who lack visual impairments to locate the door.
- Use contrasting colors on bus doors so they stand out. Use bright, contrasting colors for brochures and schedules, bus stops, and terminals. They help people recognize the bus system. Use lighter colors on top and darker colors below in vehicles and facilities to help people orient themselves.
- Maintain well-lit buses and facilities. Do not locate stops in dark, poorly lit locations.

8.4.4 Recommendations on Marketing to People With Hearing Impairments

- Have telecommunications devices for people with hearing impairments (TDD) and print the number prominently on all literature and materials.
- In facilities, install smoke alarms and other devices that signal with a flashing light as well as a siren.
- Realize that even accomplished lip readers can only understand about 65% of all that is said to them. Speak slowly and look and look directly at the person's face when talking. Provide training for drivers.
- Have a person fluent in sign language available whenever the bus system is operating and make sure people know that this service is available.
- Use a one-to-one approach when marketing transit service to people with hearing impairments. This community has diverse communication needs.

8.5 Criteria for Success

The cost of curb-to-curb or door-to-door Paratransit services can be and almost always is higher than the cost of accessible, fixed-route services. This cost is necessary if the riders cannot use fixed-route services and, therefore, a well-designed program to determine eligibility and constant evaluation of the program's performance are essential. It is desirable to persuade individuals who are currently not getting around at all, are riding with friends or relatives, or are taking some other mode of transportation to use accessible, fixed-route systems. If this goal is to be achieved, certain attitudes of elderly and handicapped have to be modified, and transit systems such as TU must provide those amenities and characteristics considered important by potential riders.

There are possible methods of determining the criteria for whether a program to attract elderly and handicapped to ATI and TU system has been a success. The

first is to take measurements over time of the same standards and determine if there are changes showing that the program has had an impact. The second is to decide ahead of time what appropriate level of measure constitutes success. Measurements over time are best accomplished if the original, or baseline, measurement can occur before any programs have been implemented. As the measures are taken over time, they will reveal if additional elderly and handicapped have been attracted to TU. Finally, the evaluation program becomes the most important source for future improvements.

8.6 Suggestions for Future Research

This research establishes the potential of the elderly and handicapped population as a market for TU and recommends some strategies to attract that segment to the system. The analysis suggests a series of follow up actions for ATI and TU such as continuing and sustained market research efforts. First, it is recommended to increase the sample size in Stage II to obtain more accurate statistical data. To increase the sample size and scope of the study including other locations in the survey will validate and support findings on this research.

It is also recommended that a cost-benefit study can be developed to know the financial implications of strategies implementation. One limitation in this research is the lack of information about cost and benefits of the recommended actions. Some cost associated with the implementation of strategies to attract elderly and handicapped are those regarding to promotional materials, marketing expenses, physical improvements, softwares, acquisition of equipment for the security system on trains, staff hiring and training, and so on. On the other hand, ATI tariff system for elderly and handicapped is also a cost factor because it is half of the regular tariff for them; elderly over 75 years old will travel for free. For that reason, it is important to study all those direct and indirect cost associated with the implementation plan

recommended in this research, comparing them with the benefits in the short, medium and long-run. On the other hand, benefits must be also studied. This research establishes that a substantial percent of elderly and handicapped people will move to a mass transportation system. That decision will reduce traffic accidents and fatalities associated with them and caused by their limited driving skills. At the same time, it will reduce costs associated with life insurances and others, which could be estimated in millions per year. Finally, one of the most important benefits is the contribution to save lives. Without substantial efforts, it may not be possible to demonstrate to decision makers and funders that efforts for elderly and handicapped on TU are worth the expenditure of resources.

On the other hand, it could be very interesting to investigate if the TU facilities really satisfy the needs of the elderly and handicapped people as the design criteria establish prior to its opening. One method could be using a focus group to determine people perceptions after they use the system. Those kinds of research can be very valuable in the efforts to give the necessary services for elderly and handicapped and satisfy their transportation needs.

ATI and TU is in a unique opportunity of becoming a customer-oriented transit system conducting market research studies before its starts operations. This effort is necessary in order to understand its potential markets and generate effective marketing actions that will attract these markets to use the system, such as the elderly and handicapped population. Once TU starts operations, the market research efforts must continue since new markets will be emerging and current markets needs will be changing over time. This research produced an initial baseline about the elderly and handicapped population as a potential market for TU. However, the methodology presented here should be adapted and improved to obtain an ongoing database that better study this market segment, its needs, preferences and attitudes towards public transportation and identifies users' profiles.

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APPENDIX 1:

Questionnaire (in Spanish)

Estamos interesados en conocer su sentir y sus experiencias acerca de la transportación pública y como esta pueda satisfacer mejor sus necesidades. La participación en esta encuesta es de forma voluntaria. Los hallazgos de la misma serán utilizados única y exclusivamente para propósitos analíticos en la realización de una investigación de tesis. Siéntase en completa confianza de realizar cualquier pregunta en caso de surgir alguna duda.

1. En la actualidad, ¿guía usted regularmente?

☐ todos los días ☐ por lo menos una vez a la semana
☐ muy pocas veces ☐ no guío en la actualidad

2. ¿Cuál de los siguientes modos de transportación pública tiene disponible a una distancia caminable (de 5 a 7 minutos a pie) para usted desde su hogar?

☐ terminal carros/guaguas públicas ☐ parada de guaguas ☐ AMA
☐ Metrobús ☐ ninguno

3. ¿Qué tipo de transporte utiliza usted con mayor frecuencia?

☐ guío un auto privado ☐ carro público ☐ taxi
☐ pon de familiar o amistad ☐ AMA ☐ Metrobús
☐ camino

4. ¿Con cuánta frecuencia utiliza usted ese tipo de transporte?

☐ diario ☐ semanal ☐ cada dos a tres semanas
☐ mensual

5. Si usted utiliza transporte público, escoja los tres factores más importantes que toma en consideración al decidir utilizar transportación pública. (**Hacer uso de tarjetas**)

___horarios ___rutas ___costo ___comodidad ___seguridad
 ___porque no tengo otra alternativa

6. ¿Cuál es el propósito principal de su viaje en transporte público?

___visitar amigos ___ir de compras ___visitas médicas (doctor, hospital etc.)
 ___entretenimiento (cine, parques, etc.) ___comer ___estudiar
 ___trabajar ___otro, explique_____

7. ¿Cuál de las siguientes actividades representa algún tipo de dificultad para usted, si alguna?

___ver claramente	___escuchar claramente
___subir o bajar escaleras	___hablar claramente
___agarrar o aguantar con fuerza	___sentarse o pararse
___caminar normalmente o rápidamente	___recordar con claridad

8. ¿Ha recibido o recibe actualmente algún servicio especial de transporte para envejecientes o incapacitados?

___sí ___no

9. ¿Qué sabe usted sobre el proyecto del Tren Urbano en la Zona Metropolitana?

___conozco todo lo necesario hasta el momento
 ___he oído hablar algo, pero no lo conozco del todo
 ___no se nada al respecto

Si contestó que conoce todo o algo sobre el proyecto del Tren Urbano en la pregunta anterior, pase a la siguiente pregunta. Si contestó que no sabe nada al respecto, pase a la pregunta #13.

10. Si tuviera la oportunidad, ¿utilizaría usted el sistema del Tren Urbano para llegar a Centro Médico o a algún otro destino?

___sí ___no ___depende, no puedo decidir ahora

11. Actualmente, ¿se encuentra en construcción alguna estación del Tren Urbano cerca de donde reside?

___sí, a distancia caminable para mí ___sí, a menos de 5 minutos en carro

___sí, de 5 a 10 minutos en carro ___no, pero vivo en pueblo limítrofe

___no, no vivo en la Zona Metropolitana de San Juan o pueblo limítrofe

Si su contestación a la pregunta anterior fue que no vive en la Zona Metropolitana de San Juan, pase a la pregunta #12. De lo contrario, pase a la pregunta #13.

12. Si su residencia o pueblo no está en la alineación del Tren Urbano, ¿a cuál estación se le haría más cerca llegar?

___Estación Bayamón

___Estación Sagrado Corazón

___otra, ¿cuál?_____

___no sé

13. Asuma que no es viable para usted tener un auto privado en el futuro. Si usted fuera a escoger entre los siguientes medios de transportación al hacer su viaje, ¿qué preferiría?

___servicio especial de transportación que me recoja en mi casa y me lleve justo a mi destino

___sistema de transporte público (carro público, taxi, AMA, etc.) que me lleve a una estación del Tren Urbano y así utilizar el sistema

___llegar utilizando mi propia transportación (carro, familiar, caminando) a una estación del Tren Urbano y así utilizar el sistema

___no me visualizo sin mi carro privado

14. ¿Cuál es su opinión sobre tener su propia tarjeta de identificación como persona envejeciente o incapacitado para uso de cualquier modo de transporte público?

___excelente idea si me trae beneficios reales

___mala idea, no me gusta que me clasifiquen

15. En las últimas 24 horas, ¿cuál de las siguientes actividades ha realizado usted más?

___ver televisión

___oír radio

___leer periódicos

___leer revistas

___utilizar Internet

16. ¿Escucha o lee algún tipo de noticias radiales o televisivas?

___todos los días

___al menos una vez semanal

___raras veces

___nunca

17. ¿Qué periódico local, si alguno, lee usted con mayor frecuencia?

___El Nuevo Día

___El Vocero

___Primera Hora

___San Juan Star

___otro, ¿cuál?_____

18. Mencione las revistas, si alguna, que lee usted con mayor frecuencia.

19. Actualmente usted vive con:

___esposa(o) o familiares

___otras personas no familiares

___solo(a)

20. ¿En qué tipo de vivienda usted reside?

___casa privada

___apartamento rentado

___apartamento comprado en

condominio

___cuarto en égida o centro especial

___otro, ¿cuál?_____

21. Preparación académica:

- ☐ completé hasta sexto grado o menos
- ☐ completé estudios entre séptimo a noveno grado
- ☐ completé estudios entre segundo año a cuarto año escuela superior
- ☐ estudié en universidad pero no terminé un grado
- ☐ complete un grado de bachillerato
- ☐ complete estudios luego de bachillerato

22. Sexo:

- ☐ femenino ☐ masculino

23. ¿En cuál de estas categorías se encuentra su edad?

- ☐ menor de 20 años
- ☐ de 21 a 30 años
- ☐ de 31 a 40 años
- ☐ de 41 a 50 años
- ☐ de 51 a 60 años
- ☐ de 61 a 70 años
- ☐ de 71 a 80 años
- ☐ mayor de 80 años

APPENDIX 2:
ADA Eligibility Worksheet
(Washington, D.C.)

ADA eligibility worksheet:
is MetroAccess right for you?

Your name: _____

This worksheet is for your own use. It will help you understand ADA eligibility and determine if MetroAccess is the appropriate service for you. As explained in [What is ADA? What is MetroAccess?](#) The ADA law states that ADA eligibility is given to persons whose disabilities prevent use of regular accessible fixed-route transit services: an individual's disabilities must be so significant that the individual is not able to use fixed-route transit service.

Read the 5 questions on the left side of the worksheet and then check your answers on the right side. Your answers will help you determine if MetroAccess might be appropriate for you.

Question	Check your answers below.		
	Yes	Sometimes	No, never
1. Are you able to get to and from the bus stop or rail station closest to where you live?			
2. With help from the bus driver, are you able to get on and off a bus which has a lift or ramp?			
3. Are you able to get on and off a bus, that does not have a lift or ramp, by entering by the steps?			
4. With help from the bus driver who announces major bus stops and transfer points, are you able to figure out the right bus stop to get off?			
5. If your trip on the bus or Metrorail involves transferring to another bus or rail line, are you able to make the transfer?			

Look at your answers:

- If you checked "Yes" to all 5 questions, you are probably not ADA eligible. However, there may be specialized services available for you. Please review information in the [Accessible Transit Service Guide](#).
- If you checked "Sometimes" to one or more questions, you might be determined ADA eligible for certain trips under certain circumstances.
- If you answered "No, never" to one or more of the questions, you might be ADA eligible. A complete application and in-person assessment at one of our assessment sites are necessary to formally determine ADA eligibility.

APPENDIX 3:

Project ACTION Advertising



**IF PEOPLE EVER START USING IT FOR THEIR
DAILY COMMUTE,
WE'LL KNOW HOW TO MAKE IT ACCESSIBLE.**

Transportation is rapidly changing. But fortunately for anyone concerned with issues of accessibility, there's Project ACTION. We're a resource that's keeping pace with change, providing cutting-edge solutions to help solve accessibility problems. For example, we can provide interactive personnel training systems, a virtual-reality travel training program and eligibility software. And as transportation continues to evolve, you can count on

us to grow along with it to ensure accessibility.

Project ACTION is also an invaluable networking resource, helping you find the precise assistance you need — whether you're a member of the transit industry or the disability community. Like to learn more? Just call Project ACTION at 1-800-659-6428. Or visit our Web site at www.projectaction.org to download free training publications.

Project ACTION

Breaking down the barriers to accessible transportation.



IF IT EVER BECOMES A REGULAR FORM OF TRANSPORTATION, WE'LL KNOW HOW TO MAKE IT ACCESSIBLE.

Wherever transportation may be headed, you can count on Project ACTION to keep pace with it, helping to meet the needs of both the transit industry and the disability community. And while flying buses aren't a top priority for us at present, we are nonetheless a resource on emerging technology — technology that includes interactive personnel training systems, a virtual-reality travel

training program and eligibility software.


Project ACTION is also an invaluable networking resource, helping you find the assistance you need to address your unique issues of accessibility. Like to learn more? Just call Project ACTION at 1-800-659-6428. Or visit our Web site at www.projectaction.org to download free training publications.

Project ACTION

Breaking down the barriers to accessible transportation.



Assistance derived from the Federal Transit Act, as amended, through a cooperative agreement with the U.S. Department of Transportation, Federal Transit Administration, and Project ACTION of the National Easter Seal Society.

A black and white photograph showing the interior of a bus. A person in a wheelchair is being assisted onto the bus using a ramp. Another person is standing nearby. The bus has large windows and a visible interior structure.

If you need assistance with accessible transportation, you'll be glad to know there's a resource that's here to help: Project ACTION. Take the issue of senior citizens and public transit, for example. We have the know-how to aid seniors in making the transition from paratransit to fixed route — a transition that benefits seniors as well as transportation providers.

How did Project ACTION come to know so much about accessibility? Well, we've been doing it for a decade — since 1988, to be exact. We offer a broad range of support, which includes free training programs and publications, along with technical assistance grants. And with our extensive network of contacts, we can even put you in touch with people who have direct experience in the precise issues you need to address.

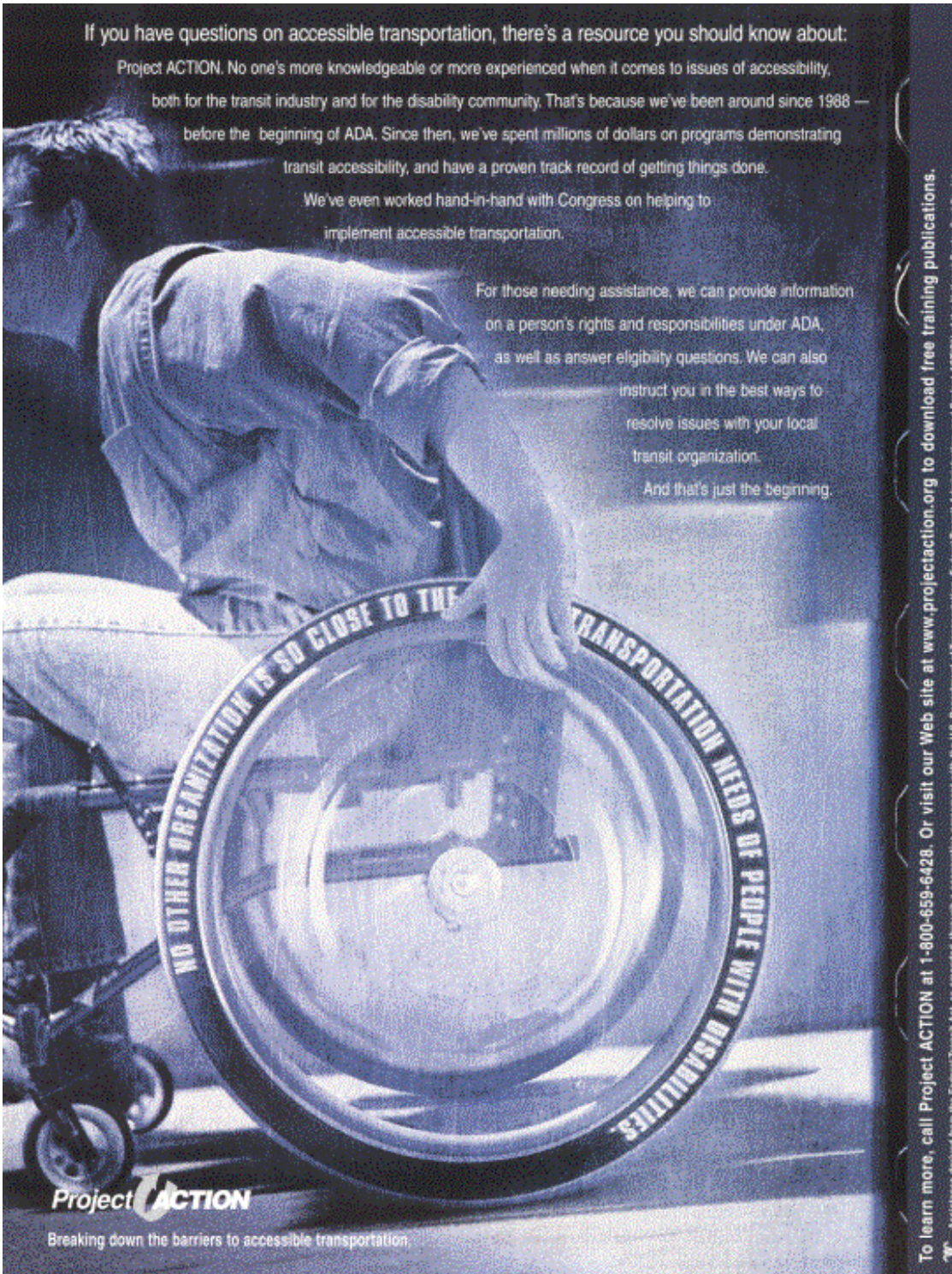
Project ACTION

Breaking down the barriers to accessible transportation.

NO ONE IS
MORE
A PART OF
ACCESSIBLE
TRANSPORTATION
THAN WE ARE.

To learn more, call Project ACTION at 1-800-659-6428. Or visit our Web site at www.projectaction.org to download free training publications.

Assistance derived from the Federal Transit Act, as amended, through a cooperative agreement with the U.S. Department of Transportation, Federal Transit Administration, and Project ACTION of the National Easter Seal Society.

A black and white photograph of a person in a wheelchair. The wheelchair has a large, prominent wheel that features a clock face in the center. The text "NO OTHER ORGANIZATION IS SO CLOSE TO THE TRANSPORTATION NEEDS OF PEOPLE WITH DISABILITIES." is written around the perimeter of this large wheel. The person is wearing a light-colored, short-sleeved button-down shirt and jeans. They are looking down at the wheel. The background is dark and out of focus.

If you have questions on accessible transportation, there's a resource you should know about:

Project ACTION. No one's more knowledgeable or more experienced when it comes to issues of accessibility, both for the transit industry and for the disability community. That's because we've been around since 1988 — before the beginning of ADA. Since then, we've spent millions of dollars on programs demonstrating transit accessibility, and have a proven track record of getting things done.

We've even worked hand-in-hand with Congress on helping to implement accessible transportation.

For those needing assistance, we can provide information on a person's rights and responsibilities under ADA, as well as answer eligibility questions. We can also instruct you in the best ways to resolve issues with your local transit organization.

And that's just the beginning.

Project ACTION

Breaking down the barriers to accessible transportation.

To learn more, call Project ACTION at 1-800-659-6428. Or visit our Web site at www.projectaction.org to download free training publications.

Assistance derived from the Federal Transit Act is authorized through a cooperative agreement with the U.S. Department of Transportation. Federal Transit Administration, and District of Columbia, Eastern, Southern, and Western.

When it comes to issues related to accessible transportation, Project ACTION is your one-stop resource — whether you're from the transit industry or the disability community. After all, no one knows these issues better. Project ACTION has been providing critical solutions to urgent accessibility problems since 1988. In the process, we've made a multitude of resources available at no cost to you.

Now, we're ready to put our experience to work for you. Project ACTION offers a wide range of free training programs and publications, as well as technical assistance grants. And with our extensive network of contacts, we can even put you in touch with people who have direct experience in the precise issues you need to address.

Project ACTION

Breaking down the barriers to accessible transportation.

**NO ONE
GIVES YOU
BETTER ACCESS TO
TRANSPORTATION
FOR PEOPLE WITH
DISABILITIES
THAN WE DO.**



To learn more, call Project ACTION at 1-800-659-6428. Or visit our Web site at www.projectaction.org to download free training publications.

Assistance derived from the Federal Transit Act, as amended, through a cooperative agreement with the U.S. Department of Transportation, Federal Transit Administration, and Project ACTION of the National Easter Seal Society.

APPENDIX 4:
Elderly and Handicapped Population 500
Meters Around TU Stations Tables

Bayamón Station					
Gender & Age	Block Group 4, Census Tract 303		Block Group 5, Census Tract 303		Total
	E ¹³	H ¹⁴	E	H	
Male:					
5-15		0		0	
16-20		0		0	
21-64		46		96	
65-74	63	31	15	5	
75-over	22	7	7	0	
Female:					
5-15		9		0	
16-20		28		6	
21-64		92		18	
65-74	68	40	20	6	
75-over	89	63	32	15	
A) Sub-total	242	316	74	146	
B) % Block Group within 500 meters	35%	35%	29%	29%	
Total elderly (AxB)	85		21		106
Total handicapped (AxB)		111		42	153

Table 5.1: Bayamón Station Census Data

¹³ “E” stands for elderly

¹⁴ “H” stands for handicapped

Deportivo Station									
Gender & Age	Block Group 2, Census Tract 303		Block Group 3, Census Tract 303		Block Group 4, Census Tract 303		Block Group 5, Census Tract 303		Total
	E	H	E	H	E	H	E	H	
Male:									
5-15		10		0		0		0	
16-20		43		0		0		0	
21-64		113		36		46		96	
65-74	29	21	22	16	63	31	15	5	
75-over	23	16	65	59	22	7	7	0	
Female:									
5-15		19		0		9		0	
16-20		26		0		28		6	
21-64		145		37		92		18	
65-74	33	26	87	58	68	40	20	6	
75-over	66	51	67	48	89	63	32	15	
A) Sub-total	151	470	241	254	242	316	74	146	
B) % Block Group within 500 meters	100%	100%	100%	100%	15%	15%	2%	2%	
Total elderly (AxB)	151		241		36		1		429
Total handicapped (AxB)		470		254		47		3	774

Table 5.2: Deportivo Station Census Data

Jardines Station									
Gender & Age	Block Group 2, Census Tract 301.02		Block Group 1, Census Tract 301.03		Block Group 6, Census Tract 403.04		Block Group 9, Census Tract 403.04		Total
	E	H	E	H	E	H	E	H	
Male:									
5-15		9		17		4		0	
16-20		0		0		0		7	
21-64		46		103		65		48	
65-74	91	14	61	22	88	29	64	0	
75-over	70	50	21	13	20	11	65	24	
Female:									
5-15		0		13		13		0	
16-20		0		13		7		7	
21-64		81		140		78		57	
65-74	118	52	67	0	31	0	95	24	
75-over	58	24	14	7	86	67	36	28	
A) Sub-total	337	276	163	328	225	274	260	195	
B) % Block Group within 500 meters	38%	38%	14%	14%	33%	33%	36%	36%	
Total elderly (AxB)	128		23		74		94		319
Total handicapped (AxB)		105		46		90		70	311

Table 5.3: Jardines Station Census Data

Torrimar Station											
Gender & Age	Block Group 6, Census Tract 403.04		Block Group 7, Census Tract 403.04		Block Group 8, Census Tract 403.04		Block Group 9, Census Tract 403.04		Block Group 1, Census Tract 404.11		Total
	E	H	E	H	E	H	E	H			
Male:											
5-15		4		7		5		0		7	
16-20		0		0		0		7		0	
21-64		65		21		5		48		19	
65-74	88	29	35	5	19	6	64	0	81	21	
75-over	20	11	38	19	34	18	65	24	57	31	
Female:											
5-15		13		0		0		0		0	
16-20		7		0		0		7		0	
21-64		78		18		10		57		27	
65-74	31	0	62	0	42	0	95	24	82	7	
75-over	86	67	32	9	34	17	36	28	92	48	
A) Sub-total	225	274	167	79	129	61	260	195	312	160	
B) % Block Group within 500 meters	33%	33%	12%	12%	11%	11%	21%	21%	52%	52%	
Total elderly (AxB)	74		20		14		55		162		325
Total handicapped (AxB)		90		9		7		41		83	231

Table 5.4: Torrimar Station Census Data

Martínez Nadal Station							
Gender & Age	Block Group 4, Census Tract 78		Block Group 4, Census Tract 79		Block Group 1, Census Tract 80.01		Total
	E	H	E	H	E	H	
Male:							
5-15		13		0		6	
16-20		0		0		11	
21-64		60		101		204	
65-74	63	20	59	12	85	28	
75-over	79	57	56	35	34	28	
Female:							
5-15		0		0		6	
16-20		5		0		35	
21-64		70		90		266	
65-74	84	14	131	62	140	65	
75-over	52	46	124	70	78	54	
A) Sub-total	278	285	370	370	337	703	
B) % Block Group within 500 meters	17%	17%	46%	46%	30%	30%	
Total elderly (AxB)	47		170		101		318
Total handicapped (AxB)		48		170		211	430

Table 5.5: Martínez Nadal Station Census Data

Las Lomas Station															
Gender & Age	Block Group 1, Census Tract 78		Block Group 2, Census Tract 78		Block Group 3, Census Tract 78		Block Group 4, Census Tract 78		Block Group 1, Census Tract 80.01		Block Group 1, Census Tract 81		Block Group 1, Census Tract 82.02		Total
	E	H	E	H	E	H	E	H	E	H	E	H	E	H	
Male:															
5-15		5		22		10		13		6		0		0	
16-20		4		7		0		0		11		0		20	
21-64		35		83		59		60		204		31		26	
65-74	31	16	38	15	15	11	63	20	85	28	80	29	29	18	
75-over	19	10	78	66	8	8	79	57	34	28	33	5	9	9	
Female:															
5-15		0		3		0		0		6		0		18	
16-20		0		7		0		5		35		0		4	
21-64		120		142		63		70		266		50		129	
65-74	104	69	58	27	32	13	84	14	140	65	118	36	31	16	
75-over	52	41	111	91	23	13	52	46	78	54	19	14	47	7	
A) Sub-total	206	300	285	463	78	177	278	285	337	703	250	165	116	247	
B) % Block Group within 500 meters	43%	43%	70%	70%	100%	100%	67%	67%	40%	40%	22%	22%	11%	11%	
Total elderly (AxB)	89		200		78		186		135		55		13		756
Total handicapped (AxB)		129		324		177		191		281		36		27	1166

Table 5.6: Las Lomas Station Census Data

San Francisco Station											
Gender & Age	Block Group 1, Census Tract 82.01		Block Group 2, Census Tract 82.02		Block Group 3, Census Tract 82.02		Block Group 2, Census Tract 84		Block Group 2, Census Tract 98		Total
	E	H	E	H	E	H	E	H			
Male:											
5-15		77		0		29		0		0	
16-20		21		15		31		14		13	
21-64		116		84		76		42		27	
65-74	19	19	48	8	4	0	29	12	53	5	
75-over	27	20	12	12	0	0	47	41	60	17	
Female:											
5-15		7		0		0		0		0	
16-20		12		0		19		0		8	
21-64		181		67		103		65		88	
65-74	54	31	47	33	24	5	73	28	38	0	
75-over	38	23	30	18	0	0	66	44	84	47	
A) Sub-total	138	507	137	237	28	263	215	246	235	205	
B) % Block Group within 500 meters	17%	17%	33%	33%	100%	100%	16%	16%	100%	100%	
Total elderly (AxB)	23		45		28		34		235		365
Total handicapped (AxB)		86		78		263		39		205	672

Table 5.7: San Francisco Station Census Data

Centro Médico Station					
Gender & Age	Block Group 1, Census Tract 84		Block Group 2, Census Tract 84		Total
	E	H	E	H	
Male:					
5-15		15		0	
16-20		0		14	
21-64		25		42	
65-74	68	24	29	12	
75-over	39	39	47	41	
Female:					
5-15		0		0	
16-20		0		0	
21-64		76		65	
65-74	90	84	73	28	
75-over	71	65	66	44	
A) Sub-total	268	328	215	246	
B) % Block Group within 500 meters	25%	25%	100%	100%	
Total elderly (AxB)	67		215		282
Total handicapped (AxB)		82		246	328

Table 5.8: Centro Médico Station Census Data

Cupey Station													
Gender & Age	Block Group 2, Census Tract 84		Block Group 3, Census Tract 86.02		Block Group 4, Census Tract 86.02		Block Group 5, Census Tract 86.02		Block Group 2, Census Tract 86.03		Block Group 1, Census Tract 96.01		Total
	E	H	E	H	E	H	E	H	E	H	E	H	
Male:													
5-15		0		0		0		0		0		0	
16-20		14		0		0		0		0		0	
21-64		42		35		5		0		69		7	
65-74	29	12	21	0	18	0	0	0	49	0	6	0	
75-over	47	41	36	10	33	21	0	0	39	19	23	3	
Female:													
5-15		0		0		0		0		0		0	
16-20		0		0		4		0		0		0	
21-64		65		39		36		0		62		38	
65-74	73	28	90	20	38	13	0	0	80	17	7	0	
75-over	66	44	77	48	61	39	0	0	65	55	11	5	
A) Sub-total	215	246	224	152	150	118	0	0	233	222	47	73	
B) % Block Group within 500 meters	14%	14%	100%	100%	100%	100%	54%	54%	45%	45%	46%	46%	
Total elderly (AxB)	30		224		150		0		105		22		531
Total handicapped (AxB)		34		152		152		0		100		34	438

Table 5.9: Cupey Station Census Data

Rio Piedras Station													
Gender & Age	Block Group 3, Census Tract 58		Block Group 1, Census Tract 87		Block Group 3, Census Tract 87		Block Group 2, Census Tract 89		Block Group 3, Census Tract 89		Block Group 3, Census Tract 93		Total
	E	H	E	H	E	H	E	H	E	H	E	H	
Male:													
5-15		6		0		0		0		6		24	
16-20		0		57		8		0		0		0	
21-64		19		123		88		42		89		46	
65-74	28	7	7	0	18	0	23	10	47	24	22	0	
75-over	52	38	5	5	26	20	11	11	12	12	6	0	
Female:													
5-15		0		7		0		0		22		0	
16-20		0		53		12		6		4		7	
21-64		55		87		160		46		87		59	
65-74	42	7	13	6	41	7	13	0	27	10	31	15	
75-over	86	64	31	23	11	11	29	24	21	0	32	21	
A) Sub-total	208	196	56	361	96	306	76	139	107	254	91	172	
B) % Block Group within 500 meters	9%	9%	100%	100%	100%	100%	100%	100%	56%	56%	33%	33%	
Total elderly (AxB)	19		56		96		76		60		30		337
Total handicapped (AxB)		18		361		306		139		142		57	1023

Table 5.10: Rio Piedras Station Census Data

Universidad Station					
Gender & Age	Block Group 3, Census Tract 58		Block Group 3, Census Tract 61.02		Total
	E	H	E	H	
Male:					
5-15		6		0	
16-20		0		7	
21-64		19		58	
65-74	28	7	90	71	
75-over	52	38	51	25	
Female:					
5-15		0		0	
16-20		0		0	
21-64		55		105	
65-74	42	7	62	8	
75-over	86	64	144	93	
A) Sub-total	208	196	347	367	
B) % Block Group within 500 meters	37%	37%	13%	13%	
Total elderly (AxB)	77		45		122
Total handicapped (AxB)		73		45	118

Table 5.11: Universidad Station Census Data

Piñero Station													
Gender & Age	Block Group 3, Census Tract 58		Block Group 3, Census Tract 61.02		Block Group 1, Census Tract 67		Block Group 2, Census Tract 67		Block Group 3, Census Tract 67		Block Group 5, Census Tract 67		Total
	E	H	E	H	E	H	E	H	E	H	E	H	
Male:													
5-15		6		0		0		4		0		0	
16-20		0		7		0		20		0		0	
21-64		19		58		62		45		11		58	
65-74	28	7	90	71	50	13	28	6	43	11	45	17	
75-over	52	38	51	25	48	16	14	9	16	6	18	12	
Female:													
5-15		0		0		0		0		0		7	
16-20		0		0		0		0		31		0	
21-64		55		05		76		86		61		61	
65-74	42	7	62	8	89	12	30	11	45	20	53	15	
75-over	86	64	144	93	129	97	42	25	63	30	59	34	
A) Sub-total	208	196	347	367	316	276	114	206	167	170	175	204	
B) % Block Group within 500 meters	73%	73%	2%	2%	7%	7%	100%	100%	7%	7%	33%	33%	
Total elderly (AxB)	152		7		22		114		12		175		482
Total handicapped (AxB)		143		7		19		206		12		67	455

Table 5.12: Piñero Station Census Data

Domenech Station																			
Gender & Age	Block Group 2, Census Tract 61.02		Block Group 3, Census Tract 61.02		Block Group 4, Census Tract 63		Block Group 53, Census Tract 63		Block Group 1, Census Tract 65		Block Group 2, Census Tract 65		Block Group 3, Census Tract 65		Block Group 1, Census Tract 66		Block Group 1, Census Tract 67		Total
	E	H	E	H	E	H	E	H	E	H	E	H	E	H	E	H	E	H	
Male:																			
5-15		0		0		5		0		7		0		0		0		0	
16-20		0		7		5		0		0		8		0		0		0	
21-64		73		58		27		41		53		56		70		0		62	
65-74	24	17	90	71	16	12	19	19	26	10	12	0	16	0	0	0	50	13	
75-over	15	15	51	25	25	10	28	12	18	0	64	33	8	0	9	9	48	16	
Female:																			
5-15		0		0		0		0		0		0		0		0		0	
16-20		0		0		0		0		0		4		0		0		0	
21-64		98		105		37		82		27		65		57		42		76	
65-74	29	11	62	8	45	26	29	10	35	21	41	6	51	10	0	0	89	12	
75-over	43	32	144	93	42	25	52	46	61	29	119	72	81	81	0	0	129	97	
A) Sub-total	108	246	347	367	128	147	128	210	140	147	236	244	156	218	9	51	316	276	
B) % Block Group within 500 meters	12 %	13%	19%	19%	6%	6%	100 %	100 %	100 %	100 %	100 %	100 %	86%	86%	65 %	65%	29 %	29%	
Total elderly (AxB)	14		66		8		128		140		236		101		6		92		791
Total handicap ped (AxB)		32		70		9		210		147		244		187		33		80	1012

Table 5.13: Domenech Station Census Data

Roosevelt Station													
Gender & Age	Block Group 1, Census Tract 43		Block Group 3, Census Tract 63		Block Group 4, Census Tract 63		Block Group 1, Census Tract 65		Block Group 2, Census Tract 65		Block Group 3, Census Tract 65		Total
	E	H	E	H	E	H	E	H	E	H	E	H	
Male:													
5-15		0		0		5		7		0		0	
16-20		17		4		5		0		8		0	
21-64		89		77		27		53		56		70	
65-74	71	35	19	0	16	12	26	10	12	0	16	0	
75-over	28	18	58	39	25	10	18	0	64	33	8	0	
Female:													
5-15		0		0		0		0		0		0	
16-20		9		0		0		0		4		0	
21-64		97		53		37		27		65		57	
65-74	166	87	60	24	45	26	35	21	41	6	51	10	
75-over	135	83	57	46	42	25	61	29	119	72	81	81	
A) Sub-total	400	435	194	243	128	147	140	147	236	244	156	218	
B) % Block Group within 500 meters	17%	17%	38%	38%	100%	100%	59%	59%	76%	76%	20%	20%	
Total elderly (AxB)	68		74		128		83		179		31		563
Total handicapped (AxB)		74		92		147		87		185		44	629

Table 5.14: Roosevelt Station Census Data

Hato Rey Station											
Gender & Age	Block Group 1, Census Tract 43		Block Group 1, Census Tract 44		Block Group 2, Census Tract 44		Block Group 3, Census Tract 44		Block Group 2, Census Tract 63		Total
	E	H	E	H	E	H	E	H	E	H	
Male:											
5-15		0		0		32		13		0	
16-20		17		24		41		31		0	
21-64		89		102		205		77		81	
65-74	71	35	39	9	29	20	30	16	48	5	
75-over	28	18	30	21	12	12	25	9	21	13	
Female:											
5-15		0		0		22		7		0	
16-20		9		38		69		17		22	
21-64		97		108		372		70		73	
65-74	166	87	0	0	34	28	51	43	90	22	
75-over	135	83	25	19	23	23	71	38	93	49	
A) Sub-total	400	435	94	321	98	824	177	321	252	265	
B) % Block Group within 500 meters	44%	44%	55%	55%	18%	18%	100%	100%	100%	100%	
Total elderly (AxB)	176		52		18		177		252		675
Total handicapped (AxB)		191		177		148		321		265	1102

Table 5.15: Hato Rey Station Census Data

Sagrado Corazón Station															
Gender & Age	Block Group 2, Census Tract 24		Block Group 1, Census Tract 38		Block Group 2, Census Tract 38		Block Group 1, Census Tract 39		Block Group 2, Census Tract 39		Block Group 1, Census Tract 43		Block Group 3, Census Tract 44		Total
	E	H	E	H	E	H	E	H	E	H	E	H	E	H	
Male:															
5-15		0		10		7		26		21		0		13	
16-20		0		0		11		0		0		17		31	
21-64		40		109		88		109		38		89		77	
65-74	13	13	33	7	41	13	19	5	32	9	71	35	30	16	
75-over	0	0	52	36	28	24	59	26	6	6	28	18	25	9	
Female:															
5-15		0		0		0		0		0		0		7	
16-20		0		7		17		5		5		9		17	
21-64		61		156		151		113		95		97		70	
65-74	26	17	95	73	73	36	80	35	0	0	166	87	51	43	
75-over	14	14	37	22	64	55	85	61	27	17	135	83	71	38	
A) Sub-total	53	145	217	420	206	402	243	380	65	191	400	435	177	321	
B) % Block Group within 500 meters	24%	24%	42%	42%	4%	4%	54%	54%	67%	67%	67%	67%	12%	12%	
Total elderly (AxB)	13		91		8		131		44		268		21		576
Total handicapped (AxB)		35		176		16		205		128		291		39	890

Table 5.16: Sagrado Corazón Station Census Data

APPENDIX 5:
Advertising with Clip-Out
Coupon Example (in Spanish)



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Ven a usar nuestras nuevas guaguas, completamente accesibles, limpias y cómodas, en las siguientes rutas:

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• Iturregui • Plaza Carolina • Carolina

B- 27 • San Patricio • Calle Escorial
• Santiago Iglesias
• Muñoz Rivera • Guaynabo



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Ahora queremos mejorar nuestras paradas de guaguas para hacerlas más accesibles con espacios disponibles para sillas de ruedas y otras comodidades a tu disposición.

¿Qué parada debemos mejorar? Devuelve este cupón con tus respuestas la próxima vez que utilices la AMA y

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Escribe las 3 paradas de guaguas que entiendes deben ser mejoradas primero.

1. _____
2. _____
3. _____



ALTERNATIVA DE
TRANSPORTE
INTEGRADO

APPENDIX 6:
Travel Training Informational Insert
(in Spanish)

APRENDE A VIAJAR CON ALTERNATIVA DE TRANSPORTE INTEGRADO



Si tú u otra persona que conoces
 tiene dificultad utilizando ATI
 debido a:

- Impedimento
- Edad avanzada
- Enfermedad
- Otras razones

**¡Existen
 adiestradores
 sin costo alguno
 para hacer tu viaje
 más cómodo!**

El adiestrador provee información general acerca del sistema ATI,
 horarios, asistencia y recomendaciones para planificar tus viajes e información
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Contamos con adiestradores especializados para personas con impedimento.

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Sra. Juana del Pueblo

Coordinadora de Adiestramiento • Alternativa de Transporte Integrado
 Ave. Jesús T. Piñero 398 • Hato Rey P.R. 00918
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