# Feasibility of Implementing Tech Centers in Miami-Dade County

*Miami-Dade Metropolitan Planning Organization*

*July 13, 2006*

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CENTER for URBAN TRANSPORTATION RESEARCH

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# Feasibility of Implementing Tech Centers in Miami-Dade County

***Miami-Dade Metropolitan Planning Organization***

This research was conducted pursuant to an interlocal agreement between the Miami-Dade Metropolitan Planning Organization and the Center for Urban Transportation Research

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July 13, 2006

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# Executive Summary

The Miami-Dade Metropolitan Planning Organization (MPO) is responsible for the development of the Long Range Transportation Plan (LRTP) in the Miami-Dade metropolitan area. The existing and approved plan recommends a variety of capital and service transportation improvements to alleviate traffic congestion, including highway and transit projects.

In this context, transportation demand management (TDM) initiatives have been promoted to induce changes in the behavior of solo drivers and attract them to other transportation modes, such as carpooling, vanpooling and bicycling, among others. Across the country, TDM initiatives have also been effective in affecting where and when people work. The extent of efficacy strictly depends on the geographical as well as socio-economic characteristics of the study area in conjunction with the strategy being evaluated.

The objective of this study was to assess the feasibility of implementing technology centers to alleviate traffic congestion as an alternative means of maximizing the efficient use and capacity of limited transportation recourses[1].

At request of the MPO, the Center for Urban Transportation Research (CUTR) conducted an analysis of the Miami-Dade county areas potentially suitable for telework centers implementation. The analysis focused on the SR836 (Dolphin Expressway) corridor, as it represents one of the most congested network areas of the county.

[1] In this report, the definitions of telework center and telecenter are used to define the same transportation demand management (TDM) strategy. Satellite or technology centers are comprised within these acronyms.

The analysis showed that there exist residential clusters potentially suitable for the implementation of a telework center, at the conceptual level. These clusters are located in the areas stretching from the southwest end of SR836, east of Florida Turnpike SR 821 through the Palmetto Expressway, North of 8th Street (Tamiami Trail), and immediately adjacent to SR 836 (highlighted in green).

The analysis concluded that, although the study area has all the feasibility elements that are necessary before a telecenter can be established, other factors must be taken into consideration and analyzed before considering implementing a telecenter.

This study uncovered that, to date, telecommuting centers have found only limited success. The majority of centers opened in the 1990's have ceased to exist or evolved into more competitive concepts (such as urban executive office suites), due to lack of subsidized public and private funding, rising competition from alternative telecommuting strategies, employer resistance, and changes in telecommunication technology.

At present, the majority of the operating telework centers are federally sponsored and used solely by federal workers. These centers are also facing constant scrutiny and funding constraints owing to persistent low usage levels.

The shift has been toward home-based telecommuting, as an inexpensive, productive, alternative. The challenge faced by telework centers is that routine telecommuters still represent a relatively small percentage of the workforce. These individuals tend to prefer making arrangements with the employer to conduct home-based telecommuting, further reducing to a small percentage the potential niche of telecenter users.

In addition, telecenters established for reducing commute lengths typically target populations that travel long distances to work. While residents living in the study area work all over the county, the major center for employment remains the central business district (CBD), which is roughly 13 miles away from these areas. Although there are advantages for the telecenter, employers might not find it feasible to relocate some of their employees to such nearby locations. Further, only a small percentage of workers in the CBD actually reside in the selected southwest clusters. Hence, attempting to reduce commute distances for such a small percentage of employees seems irrelevant, especially if the commute distances for employees residing in other areas are left out of the context.

SR 836 is extremely congested during peak hours. If congestion alleviation is deemed to be the main goal of the telecenter, then simply by establishing a telecenter for housing a few employees will not solve the problem. To achieve this goal, other TDM strategies, such as home-based telecommuting promotion/implementation, must be employed in conjunction with the proposed telecenter feasibility analysis.

While public funding may represent an option to cover some of the required start-up costs, private partnership is considered as essential in successfully operating centers in the long run. Substantial marketing and recruiting efforts are required to target this telecommuters' niche market, with a cost that could offset the benefits provided by the telecenter itself.

Based on the results of this analysis, CUTR does not recommend the implementation of telecenters, rather the pursuit of other TDM strategies, such as home-based telecommuting and flexible working hours.

Currently, there are vanpool groups serving Miami-Dade County that use the SR-836 and adjacent corridors to access the Miami Civic Center and downtown areas. CUTR recommends continuing the promotional effort of such programs.

## Introduction

The definition of telework center stems from an abridged version of the phrase "telecommuting center," which refers to "an alternative place of work" for employees. A telework center is an office facility, remote from the employer's central office, which provides a formal working environment to telecommuters for a fee (1). A telework center can be privately or publicly operated, with most of the facilities receiving limited government funding.

Telecenter locations may include the commuter's home, a satellite work center closer to the commuter's home or a neighborhood work center shared by several employers. The definition of satellite work center refers to a single-employer telecenter, an agency or company-owned or leased facility not assigned as the employee's designated headquarters (e.g., area office, regional office).

*Telecenter locations*

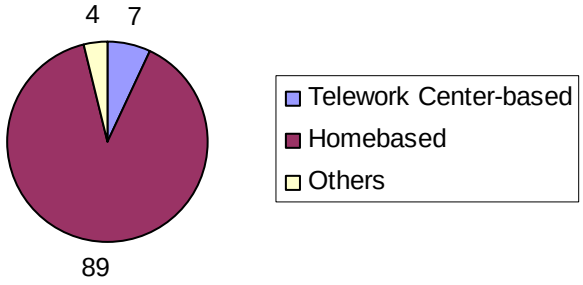
*Commuter's home*
*Satellite work center*
*Neighborhood work enter*

While management of employees at the office location is a defining criterion for central offices, two criteria, namely remote management and commute trip reduction must be met for any remote office location to be termed a telecenter. Employees work out of a conventional office because that is where their job is, regardless of where they live, whereas employees work out of a telecenter because they live in its proximity (2). Telecenters are characterized by the

absence of a self-contained pyramidal organizational structure; telecommuting staff report to off-site managers and telecommuting managers have at least one off- site staff reporting to them.

Telecommuting centers have long been discussed in the TDM literature, even though practical application of the concept begun only in the 1990's. The term "suburban work center" was first used in a 1963 study to describe a location closer to home than the main workplace from which an employee could carry out his tasks using telecommunications technology (3). The study describes the various advantages of telecommuting and potential barriers to the concept. A 1968 study that analyzed the effect of communications on transportation and the work place used the definition of "neighborhood remote work center" to refer to a telecommuting facility within walking distance of one's home (4). A 1977 report conducted a technology assessment that examined the potential impact on energy consumption of working at home or in neighborhood centers close to home (5). The study estimated the potential savings in oil and gas that could be obtained by telecommuting and reducing travel distances. Another 1988 study defined various types of telecenters based on the number of employers hosted, their location and the goal that they aimed to attain (6). This is explained in detail in the next section of this report.

According to a study of the International Telework Association and Council (ITAC), in 2000 there were about 16.5 million teleworkers, 7 percent were solely telework-center based, while 89 percent were home-based teleworkers or telecommuters (7). Statistics also reveal that 45.1 million Americans worked from home last year (according to the 2004-2005 ITAC American Interactive Consumer Survey



conducted by the Dieringer Research Group), a continuing growth trend.

Although telecenters cater to only a small percentage of the telecommuting population, they are still pursued as a TDM strategy, owing to their perceived advantages and convenience that they provide to employees.

## Classifying Telecenters

Telecenters can be classified into two broad categories:

- Single Employer
- Multiple-employer

Within these two categories there are different types of centers, based on location, tenants' characteristics, facilities and amenities provided:

- Government sponsored
- Rural or Urban Fringe Area
- Technology Promotion
- Pay-as-you-go

The broad classification is aimed at providing planners with consistent means to rank telecenters to ascertain the goals, objectives, site location and marketing strategies and facilities that are consistent with each telecenter.

## *Single Employer Centers*

These are centers that typically house employees of one organization. They provide 20 to 25 spaces, which are available on a drop-in basis. They are maintained by the parent organization and funded internally.

Under this category belong the so called satellite work centers. Commonly, they refer to a single-employer telecenter, an agency or company-owned or leased facility not assigned as the employee's designated headquarters (e.g., area office, regional office).

The first single employer telecenter in the US was the Pacific Bell telecenter, set up in San Francisco, California, in 1985. The center housed 22 employees and was part of a successful telecommuting program employed by Pacific Bell. Owing to its success, Pacific Bell opened another telecenter in North Hollywood to encourage more employees to use their telecenters.

Single employer telecenters are difficult to establish and maintain as they are often seen as just another branch of the main office and are overlooked by most employers. Furthermore, they do not represent a cost efficient alternative, as the employee's main office space is still retained, thus forcing the employer to pay at both ends.

### *Multiple-employer Centers*

These are facilities that provide space to employees of more than one organization. Tenants can be employees from both the public and private sectors. The size of these centers depends on expected occupancy and utilization rates. While the typical size is about 20 to 25 spaces, there are some telecenters such as the Riverside County Telecommuting Center, California, designed to cater to the needs of more than 50 employees. Most telecenters also provide extra space for conference and audio/video conferencing rooms.

A relevant share of the operating costs is fixed or independent of usage levels. These include leasing costs, depreciation expenses, and administrative overhead. This suggests that economies of scale must be attained in order to spread fixed costs over a large number of users. On the other hand, larger centers are more difficult to fill, and tend to lose their local area character as they must draw from a much larger commute pool. Understanding this simple dilemma is the key to assessing the market for center-based telecommuting.

The advantage of a multiple-employer facility over a single employee satellite work center is that multiple-employer centers can cater to the surrounding area residents, who drop in at short notice and do not belong to any participating employer. Preference is given to employers or individuals who rent out the facility on a long term basis. Short term, drop-by users are allowed to use the telecenter only if the telecenter facility is free for use and does not interfere with the schedules of the long term tenants.

These centers also work as information technology clearinghouses, in addition to providing commuter trip reduction benefits for regular users. While telecenters primarily target employers and employees for regular use of their facilities, reports from these centers state that most of their revenue is generated by the use of technological services by the general public than the telecommuters themselves, whose costs are greatly subsidized (2).

Multiple-employer telecenters are usually run and maintained by individuals or groups who are not involved with any of the participating employers. While this is advantageous for the planners and developers as they can perform extensive research to provide the best facilities available, most of their time is spent in facing the challenges of recruiting and attracting sufficient employees or employers, so that the telecenters remain economically rewarding. Centers, which are maintained by one of the participating employers, are filled up by the employees of the organization, thus providing the developers with free advertisement, reducing recruiting and marketing costs and improving operating revenue (2).

Setting up a multiple-employer telecenter involves many challenges, such as monitoring employee productivity, security, coordination and logistic issues among all the employers and employees (8). But, they provide advantages that cannot be offered by other forms of telecenters, for example:

- They are best suited for small and mid-size firms, which do not need or cannot afford setting up a satellite work center, but are

willing to use the option of a shared telecenter to satisfy the needs of their employees;

- They are also suited for large firms in the experimental phase of testing a telecommuting program;

- Multiple-employer telecenters provide a low cost, low risk initiative, which can serve as a first step in establishing a company owned and managed program.

The first multiple-employer telecenter in the US was set up in Hawaii in 1989 on the island of Honolulu. There are many other cases of multiple-employer telecenters like the Antelope telecenter, California (1993), the Ballard neighborhood work center, Washington (1990), and the Washington State telecenter (1991), all of which operated with some modicum of success before closing down owing to a wide variety of reasons.

## *Urban Executive Office Suites*

The major competitors to telecenters that provide alternative offsite offices are executive office suites. These suites are found on prime commercial real estate and are not necessarily close to residential areas (4). Executive suites are maintained and operated by private organizations and serve traveling executives, regional sales staff, and small business owners rather than non-supervisory employees (9). Unlike telecenters that provide an alternate place of work for telecommuting employees, executive suites constitute a primary place of business for an extended period of time. Executive suites providers


range from small local companies to major international corporations. The global executive suites organizations help corporations looking to expand abroad (10).

Executive suites provide services such as secretarial, word processing and receptionist support; in essence, an executive suite provides all the support services supplied in the main office. Telecenters provide an alternative work location with few or none of the facilities that are provided in the main office,

and most telecenter users have a parent work location which they can revert to at short notice, something that the clients of executive suite offices do not have.

With an increasingly competitive market, the difference between telecenters and urban executive office suites is beginning to blur. For example, the California Sierra foothills are a popular location for remote, sometimes unmarked, offices for workers of Sacramento and Silicon Valley employers. These successful office spaces have replaced telecommute centers which have closed in recent years (16).

## Past and Current Experiences

The first single employer telecenter was established by Pacific Bell in 1985 and the first multiple-employer center was lunched by the state of Hawaii in 1989 as part of a research study (2). The Hawaii center was primarily state funded, with additional grants from the private sector for equipment, and was located in a sub-urban technology park (called the Mililani Technology Park) on the main island of Honolulu. Established mainly to demonstrate the feasibility of remote working to address traffic congestion, office space constraints and parking constraints associated with the concentration of employment in Honolulu, the study was also motivated by the idea to explore the potential of telecommuting for economic development in remote island areas (12). Although it initially attracted a large number of users and reached its major goals, private companies involved in the experiment did not encourage their employees to telework, often being treated on a case by case basis. Owing to lack of funds, the center closed in 1990.

The Pacific Bell telecenter was established by Pacific Bell, the Bell Operating Company for California in San Francisco. Only employees of Pacific Bell were allowed to use the facility. The telecenter aimed to improve the efficient use of existing office services and was located in the central business district of San Francisco, which was the earlier location of the company's headquarters (13).

California is the state that led the country in piloting telework programs. Telework centers were established as research undertakings between 1991 and 1997 under the Residential Area Based Offices Project (RABO). Under this program, 15 telecenters were set up and maintained as part of a research directive by the California Department of Transportation (CalTrans). Funding for the RABO telecenters ended in 1996. At the end of the funding period, 6 telecenters continued operations purely on public and user generated funds. All these telecenters closed between 1997 and 1999.

In addition, 26 telecenters were setup by private entrepreneurs and firms on a profit making basis. By the end of 1997, only 14 were operational and had diversified into various service centers, such as executive office suites and internet providing centers. These centers ceased to operate as telecommuting centers.

Telecenters were also established by the Federal Government in 1993 in the Washington metropolitan area and served as demonstration programs to encourage telecommuting among Government employees (1). The centers are managed under the General Services Administration (GSA) Federal Telework Center program and are open to both private and public sector teleworkers.

Currently, there are 16 operational telecenters in the region, including 8 centers in Virginia, 7 in Maryland, and one in West Virginia. A 2004 telework

study conducted by the U.S. Office of Personnel Management for all Federal agencies in the region states that over 140,694 employees from different Federal agencies teleworked, representing a 37percent increase from 2003. While this comprises all teleworkers, including home based teleworkers and center based teleworkers, it shows that employees enjoy the flexibility of being able to choose their workplace. These centers continued operating owing to the fact that they are funded by the GSA program, which is the sole source of revenue. Other telecenters in the area have been unable to compete with the low prices of the federal telecenters and have diversified into executive suites. The Preferred Office Club is the most popular among all the executive suites in the area, and has 6 locations in the Greater Washington Metro Area.

The first telecenters suffered from low revenue and inadequate occupancy levels. These telecenters were established to promote alternative forms of telecommuting to businesses and individuals and were financed with Federal or State subsidies or alternate forms of funding. These centers closed immediately after the funding period ended.


Telecenters established after the second half of the 1990's realized the importance of establishing a steady revenue source, other than telecommuter based, to maintain commercial viability. These centers have found limited success due to less than full utilization and limited government funding issues. Several studies summarizing these experiences reiterate that telecommuting revenue should be an incidental, one of many sources of revenue for a telecenter (14).

Non profit telecenters (operated by public enterprises) now gain revenue from a variety of customer services such as video-conferencing, photocopying, conference room usage and computer usage from drop-in users.

For profit centers (operated commercially by private enterprises) focus on a wide variety of business services, such as executive suites and office space rental, and do not rely on telecommuting as a sole source of revenue. These facilities rent offices rather than cubicles, with a variety of services available for a flat rate, such as video conferencing and internet access. They also encourage the growth of ancillary businesses such as coffee shops, bakeries, within premises, to improve profitability.

Offices rented to employers are marketed as secure, private telecommuting sites which can be used by different employees on different days of the week. For example, the Blacksburg Electronic Televillage, Virginia, includes a privately operated business park that caters to high tech start-ups. Internet connectivity is marketed as an amenity. Espresso bars and “cyber cafés” offering computers, rented by the hour, are popular meeting places and improve usage rates.

Currently operating telecenters have evolved as executive office suites and offer a variety of clientele services to attract potential telecommuters, such as secretarial and receptionist services. Furthermore, these centers often rent out the entire facility to one tenant, thus ensuring a constant flow of revenue. In the process, though, the idea of providing telecommuting options to employees is bypassed. One such example, the Landmark telebusiness center in Anaheim, California. The center reinvented itself as an executive suites office to increase its revenue and now operates as a successful profit-making venture, in spite of having lost its government funding, owing to not complying with the conditions necessary to be deemed as a telecenter.

In summary, telecenters blossomed in the early 1990's because Internet was still a relatively new technology and was not easily accessible to all individuals. Nowadays, with employers ready to pay for high speed broadband internet connection for their employees to work from their homes, home-based telecommuting has gained prominence and has become more wide-spread. Other travel demand management strategies such as vanpooling, carpooling, staggered work hours have also gained importance owing to lower implementation costs and relatively higher success rates.

The majority of centers opened in the 1990's have ceased to exist or evolved into more competitive concepts (such as urban executive office suites). At present, the majority of the operating telework centers are federally sponsored and used solely by federal workers. These centers are also facing constant scrutiny and funding constraints owing to persistent low usage levels.

The shift has been toward home-based telecommuting, as an inexpensive, productive, alternative. The challenged faced by telework centers is that routine telecommuters still represent a relatively small percentage of the workforce. These individuals tend to prefer making arrangements with the employer to conduct home-based telecommuting.

# Characteristics of Telecenters

## *Goals and Objectives*

The first telecenters were initially set up to alleviate local traffic congestion, to serve as a focal point for an integrated access system to the Internet and

information technology services, and to pursue business related purposes. Nowadays, telecenters work differently, aiming to achieve multiple goals and working in conjunction with other agencies to realize mutually desirable targets. The following sections explain in detail the most relevant reasons for establishing telecenters and some of the newer and locally suitable ideas and goals that some telecenters aim to achieve.

## Trip Reduction

Telecenters provide a shorter alternative to the home-work trip commute. It is argued that curbing travel demand reduces traffic congestion, energy consumption, and pollution emissions (2). The driving forces behind some of the early centers planned for trip reduction purposes were the Federal Clean Air Act of 1970 and its 1977 and 1990 amendments (8, 15). Continued funding for these early telecenters, in most states, depended on the mandatory trip reduction achievement evaluation and cost-benefit analysis.

However, with the reduction of many laws (such employer oriented commute trip reduction ordinances and air quality transportation management programs) to voluntary compliance, the initial enthusiasm attached to telecenters has faded (11). The ordinances have been replaced with voluntary programs and other initiatives, such as scrap or improve “gross polluting vehicles” to achieve the desired reduction in emissions. The voluntary programs are difficult to

monitor and the inducement for employers to pursue trip-reduction programs reduced greatly.

One of the defining features of telecenters developed to attain trip reduction standards was that almost all of them were government funded and supported by the local Transportation Management Association (TMA) or Environmental Protection Agency (EPA). These telecenters survived on public subsidies and grants from various agencies. Very few centers that embraced trip reduction as their main objective attained self-sustenance.

The Grass Valley Telecenter, California, was set up as a direct consequence of increasing traffic problems in the Grass Valley. Grass Valley, a rural area experiencing one of the fastest growth rates in California, faced sudden increases in population and traffic movement. With prohibitively high costs to alter the regional highway network, the city was forced to look at alternative means to reduce the traffic congestion problem. The Grass Valley TMA prioritized the idea of addressing the severe parking congestion problem that the city faced. The telecenter did not charge its users for the use of the facilities in the first year of operations. The only cost was for additional services such as phone calls, faxes and stationery. After the first year, when the center approached its users with the proposal to charge rent for using the services, most users backed out and the centers had to be closed.

The first multiple-employer telecenter, set up in Hawaii, was implemented primarily to reduce travel demand. Reports on the telecenter indicated that the average telecommuter who used the center traveled 9,000 fewer miles per year, saved $2,500 per year on travel costs, and saved about 350 gallons of gas per year (16).

## Traffic Congestion Mitigation

The Coronado Telecenter in California, established by the Coronado TMA, was set up to help reduce traffic congestion and to meet air quality and trip reduction requirements. The financing of the project was expected to come from employers who would use the facility to meet their legislative requirements. As the ordinances were reduced to voluntary requirements, the support expected from the local employers never came and the telecenter failed. Other telecenters established for this reason were more successful, as the funding was primarily from government agencies. With increasing urban traffic, most of the current telecenters have been set up to lighten traffic congestion problems, especially in large urban areas. The federal government established telecenters in the Washington D.C. area, and has continued funding for its employees.

## Air Quality Standards Improvement

Telecenters in Chula Vista, California, established through a joint effort of the California Department of Transportation (Caltrans) and San Diego Regional Air Pollution Control District (APCD), were maintained by the city. While the goals of Caltrans and APCD were to reduce the emission standards, the city used these centers as a means to incorporate economic growth and provide universal access to information technology for the general community. As air quality ordinances became voluntary, the emphasis of the telecenter switched

to meet the communication and technology demands of the city. Insufficient funding forced the closure of one of the two telecenters on April 1, 1997. The second telecenter closed shortly afterward, due to insufficient occupancy levels (8).

## Peak Hour Trip Reduction

Telecenters were established as a part of the city's Transportation Systems Management (TSM) Program in Vacaville, California, with the primary objective of reducing peak-period auto traffic by making more efficient use of existing transportation resources and emphasizing ride-sharing alternatives. The city called all major employers to reduce their peak period trips by at least 30 percent. The telecenter was established as a means to encourage more employers to address the issue.

The center was supported by several local businesses and strongly marketed by the local Government as well. Owing to the extensive publicity and extremely high funding, the centers opened to high occupancy levels. After the initial period, the operators charged nominal fees for various services, such as photocopying, fax and telephone. This reduced the number of users. Once a fee structure for the rent was in place, the centers hardly had any users. This center suffered during the transition from a public service enterprise to a private profit making business and had to be closed (8).

## Community Network and Universal Access Goal

Telecenters established in the early 1990's promoted community network goals as one of the major reasons for setting up a center. The early 1990's saw a rapid growth in internet and other modern telecommunications equipment use. Network access costs declined rapidly, and the availability of home based broadband internet connection made telecommuting a more attractive alternative.

In the current scenario, community network goal attained significance in rural and small urban areas, where advanced technology is not available at an individual level. Many studies have been conducted on the feasibility of setting up community network centers. For example a 1999 study conducted in Molalla, Oregon, revealed that about 66 percent of the families had a computer and that 41 percent of the population had Internet connection (17, 18). The study suggested setting up a telecommuting center would impart education to individuals interested in improving their understanding of the internet. The center was subsequently established and performed well.

Most telecenters established as "Universal Access Sites" are either located in public libraries or have been recommended to shift the telecenter to one as most individuals associate libraries with learning centers. Telecenters with such goals have been established in San Diego, California (East County San Diego Telecommuting Center) and Davis, CA (Birch Lane Telecenter) with the conceived idea of promoting them as access points to the Internet and to telecommunications services. The business proposal for both the Telecenters emphasizes the idea of providing "technical […] leadership to both community residents and to employers (14). "

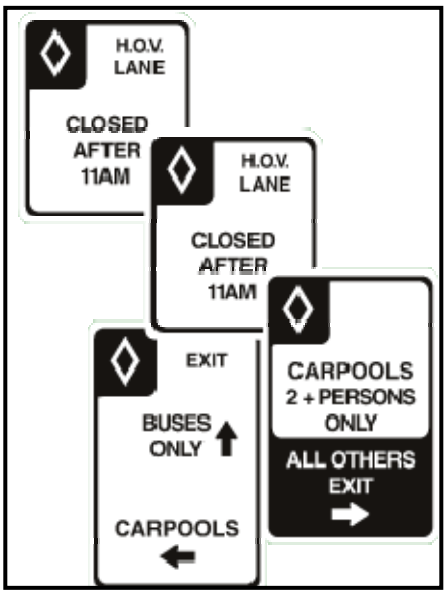
The Santa Clarita telebusiness center in the Valencia Industrial Center, California, has easy access from Interstate 5, as well as convenient local roads. The telecenter offers telecommuting and video conferencing capabilities which are among the best in the United States. Amenities offered include a state of the art networking environment with Internet and internal local area network. Each workstation is customized to suit the needs of the particular user. State of the art networking software enables users to have access to the tools necessary for their own business and has encouraged the telecenter developers to use it as a distance learning center. The Center also offers wide area network connections to local schools, city offices, the hospital and other local services (8).

Distance learning has been one of the most successful of the alternative uses explored by the center directors at the city of Chula Vista Eastern Telecenter (20). Partnerships with the University of Phoenix and National University resulted in classes being conducted at the centers via videoconferencing; San Diego State University followed suit in 2000. In the case of the University of Phoenix, the telecenter director reports that students taking classes at the center would generate an additional 4,080 miles per month if they had to travel to the University's regional campus (20).

## Other Goals

In California, some telecenters were established as a direct consequence of a major earthquake, with the notion that they would enable employees to continue working even in the case of loss of major road and transit corridors.

Telemedical project development has been a major focus of growth potential for some centers. The Los Baños Telecenter, a profit-driven center serving rural central California, developed a roster of physicians and medical centers who participate with their patients in video conferencing diagnostic consultation sessions with the University of California at Irvine (11).




One of the primary objectives of TDM policies, which include telecommuting, is to reduce the number of single occupancy vehicles during the commute trip. While this is true in the case of solutions such as carpooling and vanpooling, the same cannot be expected in the case of telecenters. A case study of the Washington State Telework Center, states that while 57 percent of telecommuters (individuals using the telecenter) drove alone to work in the main office on days when they did not use the telecenter, 83 percent drove alone to the telecenter (21). While these statistics look detrimental, careful study must be carried out to see whether the distance that the employee drives to the telecommuting center is matched by the distance that user travels to reach the carpool or vanpool, before concluding that telecenters increase single- occupancy vehicle commute distances.

In certain cases, however, centers are established both as trip reduction strategies and as engines for economic development. As enforcement of regional commute reduction regulations relaxed, these centers that had been originally established as a trip reduction strategy for air quality attainment programs began to develop different services to ensure economic viability over the long term.

While telecenters have the potential to attain multiple goals, there is also the prospective of complete failure when trying to attain too many goals. There is an understandable tendency for project planners to list as many goals as possible in connection with a telecenter, for initial funding and support. The danger lies in overselling a specific facility for fulfilling a large number of publicly popular but collectively unrealistic goals (2).

### *Benefits*

The benefits of a telecenter are not just restricted to the employers and employees. While these groups profit the most, there is much to gain in terms of transportation impacts and air quality improvements for the society in general. In addition to lower congestion and reduced air pollution, potential benefits include decreased national petroleum use, fewer highway accidents, and eased transportation infrastructure requirements.

## Advantages for Employees

Telecenters encourage telecommuting and improve the quality of life for workers in terms of enhanced productivity and increased job satisfaction (22). In a survey conducted on 3,400 workers in the Washington, D.C. area, 16 percent stated telecommuting as the best perk that could be offered by their employers (23).

Employees, faced with childcare or eldercare constraints, are willing to work from a neighborhood telework center as they remain close to home (5). Additionally, mobility-impaired persons can greatly benefit from telecommuting

by allowing them to be gainfully employed when they would otherwise be excluded from consideration (24). Telecenter users require fewer days of sick leave, gaining increased productive work time, and even requiring less disability leave because of their telecenter experience (22).

Telecenters provide employees with adequate space to work, which may not be available at home (25); also, they are a good alternative to individuals who wish to telecommute, but cannot do so owing to constraints at home. Necessary software and technological support is also provided in a telecenter which cannot always be provided at home by the employer.

With increased awareness of safety at work, employers are concerned about the working environment at home for many employees. These concerns can be mitigated by the use of a telecenter. Employees often work at kitchen tables at home, without ergonomically designed furniture or lighting (1) producing inefficient and low quality work.

Telecommuters save on gas, depreciation, general wear and tear on their vehicles (15), and meals (which are found to be taken at home in many cases) (24). They also spend less time in traffic on congested roadways (22).
Professional and social interaction that is not possible in home-based telecommuting occurs in a telecenter. Since the supervisor is no longer present while work is done, telecommuting often results in greater job autonomy and may change performance evaluation procedures to focus on work output instead of the appearance of working (26).

The added flexibility in a telecommuter's life, as a result of the relaxation of time-space constraints, often leads to positive changes in the travel behavior of not only telecommuters but also their household members (27).

## Advantages for Employers

Employers look at telecenters primarily as an employee benefit, and not as a cost or space saving measure (15). Such policies help employers in retaining employees and gain employee loyalty. Improved retention can also save the organization money spent on the recruitment, relocation, and training of new employees (26).

Increased employee productivity is one of the major gains for both employees and employers. Employers gain from reduced absenteeism (as employees need not take the whole day off to run errands close to home) and turnover due to telecommuting programs (28). Employers state that telecommuters take fewer sick days off and show markedly higher levels of motivation (24).

Many employers state that if a telecommuting program is run properly, it leads to savings in the demand of office space and, as a result, lower costs of acquiring and maintaining office space (15). Managers are assured of the fact that their employees are in an office setting and are provided the same conditions to work as in the main office (22).

Implementing a telecommuting program can fulfill some requirements of clean air mandates that require employers to reduce the pollution caused by its employees during their commutes (29).

For employers who suffer from acute parking shortage, setting up of a successful telecommuting program will help solve their problem (15).

Security issues, which are a problem in home based telecommuting, are easier to monitor in a telecenter (25). Many centers provide employees with keys to private offices and also provided individual computers with passwords for access.


Telecenters provide a more professional image than home- based telecommuting and also offer a more conventional worker and property liability context than does home- based telecommuting (25).

## Transportation Improvements

Telecommuters enjoy reduced commute distance and decreased travel times. Owing to this reduced commute distance, telecenter users tend to traverse the shorter distances after the peak periods, thus, reducing the peak hour congestion (30). With increased commute trip flexibility, commuters tend to modify their activity schedule such that they make trips in those times of the day when there is less congestion. Other indirect transportation costs include accidents and insurance premiums, the degradation or loss of employee productivity, employee turnover, which are all reduced.

Trips to telecommuting centers avoid the congested, urbanized corridors of the region which improves traffic flows and average travel speed, indirectly reducing emissions (15).

"Telecommuters tend to shift activities to destinations closer to home. Interestingly, telecommuters, as well as members of telecommuter households, show a contracted activity space, indicating that they are not making the longer-distance trips formerly engaged in by the telecommuter (31)." This suggests a learning process by which new destinations which are closer to home are discovered and (more or less) permanently adopted (24).

Owing to the short distances that telecenter users have to commute, employees tend to conduct single task trips rather than trip chaining which is characteristic of long distance commutes (27). This increases the number of cold starts and affects air quality standards, but reduced emissions from making shorter commute trips more than balances the potential disadvantage of increased number of cold starts (15).

Studies (32) reveal that telecenter users tend to make more single- person vehicle trips rather than home-based telecommuting employees; while home-based telecommuters make more person trips than center-based telecommuters.

The number of transit trips and trips made by modes, such as carpooling or vanpooling, decreased for center-based users. This is not necessarily a disadvantage as the distance traveled by the carpool users to reach the carpool by their private vehicle might be longer than the trip made to the telecenter. It is only when telecommuting contributes to the disintegration of the entire ridesharing arrangement, so that multiple vehicle trips are made

instead, of one that negative consequences result (24). The number of trips made by bike and walking increases as the number of neighborhood trips increase (32).

## Feasibility Requirements

Successful telework centers share similar characteristics, such as proximity to telecommuters' residences, ability to accommodate multiple users, and flexible work stations allocation. Some of the most important elements and necessary steps involved in the planning phase for establishing a telecenter are discussed below.

### *Location*

The location decision plays a determinant role during the planning and operational phases. In theory, the decision is dictated on the need to locate nearby or within the residential areas where target employees reside, based on the premise that this reduces the need to commute (2). In practice, it is always not possible to locate within residential neighborhoods, due to zoning restrictions. Most residential centers are located in small strip developments adjoining residential neighborhoods. Some centers are located in the downtown central business districts (CBD), while others are located in suburban locations.

Smaller towns choose to establish their telecenters in their downtown area for easy accessibility (8). Examples include telecenters in the small cities of Chula Vista, Anaheim, California and Grass Valley, California.

Some telecenters are located in secondary business districts, especially in larger cities. This stems from the hypothesis that in high density, large employment areas, more companies allow their employees to work from the telecenters, thus reducing travel flow in and out of the CBD.

While most planners choose their site location based on these criteria, some others suggest that the location of the center in the city must be based not on the immediate future, but also by keeping in mind, the continuity of the project. There must be proper time allocated for planning and building a sustainable program, rather than acquiring space, equipment and customers immediately (8), and pursuing the idea on a short span basis.

Other major issues include assuring that telecenters are not located in close proximity to each other to avoid hampering growth. The Ballard Facility in the Puget Sound Area, Washington, suffered from a lack of users as the state run Washington State Telework Center was available only a few miles away and whose rents were much lower (33).

Many reports state that the time available for planning and set up often influences the location of the building (8). For example, the location decision of centers launched in the city of Chula Vista, California, was based on the ready availability of building infrastructure. Some of the conditions that are considered in choosing the location for a telecenter are discussed below.

## *Employee Mix*

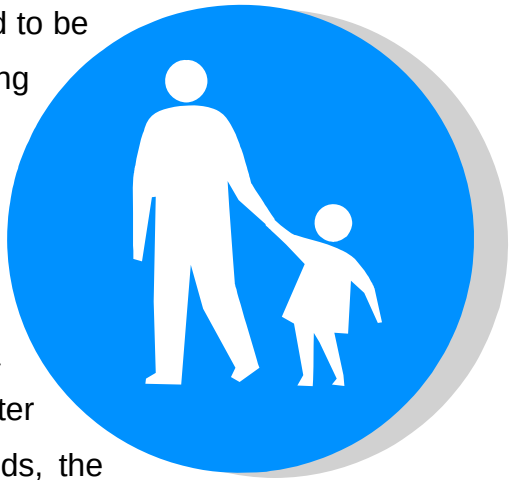
The most important demographic characteristic is the employment mix of the target teleworkers. Certain jobs are more suited to telecommuting than others (1). Data entry, clerical and managerial occupations are expected to be most suited for telecommuting. As an example, it would be illogical to set up a telecenter in an area where most of the employees are factory workers or specialized health care personnel.

The first monthly report from the "Anaheim Landmark TeleBusiness Center" stated that "demographic analysis of the area near the proposed site supported selection based on the type and density of information workers in the area, such as administrative support and managerial workers. Density maps showed a relatively heavy concentration of administrative support workers with commutes in excess of 30 minutes residing within one mile of the proposed center" (8).

## *Employment Density*

Another variable of particular interest is occupational density, that is, the number of workers near the proposed site. This gives an idea of the potential clientele target for the telecenter. This is important when targeting the number of employees that may be housed in the telecenter.

## *Household Size Distribution and Composition*



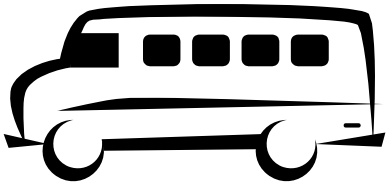
Workers within larger households are assumed to be more likely to telecommute because of having young children or other family responsibilities (2). Single member households are less likely to telecommute from home (because of the need for social interaction fulfilled by the workplace), but may be willing to do so from a center. Studies hypothesized that the greater the need to balance work and family demands, the greater would be the propensity to telecommute. Therefore, single parents are more likely to telecommute or use a telecenter. In addition, the greater the number of full-time workers, the higher is the chance that a worker will telecommute (owing to fewer vehicles in the household, higher responsibilities shared) (17).

Reports state that the lower the ratio of autos to licensed drivers within a household, the greater the incentive for the worker to telecommute. However, vehicle availability is correlated with income, and while the desire to telecommute may be greater among workers in lower-income households, the ability to telecommute falls disproportionately to higher-income workers (2, 11). Other socio-economic variables such as public transit availability are considered relevant.

## *Commute Trip Characteristics*

Telecenter planners must be aware of which commuters are more likely to make a switch to telecommuting. A 2000 study conducted by the International

Telework Association and Council (16) concluded that the one-way commute distance for teleworkers averaged 19.7 miles, versus 13.3 miles for non-teleworkers. The teleworkers' daily round trip commute times averaged 63 minutes versus 45 minutes for non-teleworkers. Other studies (11, 34) also reiterate the fact that commuters with longer travel times and distances show a preference to telecommute. A necessary step in a feasibility assessment is to analyze the commute trip patterns of the target population.



It is suggested that individuals who take transit, carpool, or vanpool to work should be targeted with other innovative ideas such as telecenters. It is expected that since they have a knowledge and understanding of TDM strategies and goals, they would more readily realize the advantages of working from a location closer to home. On the other hand, rideshare and transit users are less likely to rideshare or take transit to the telecenter (possibly with detrimental impacts on existing shared-ride arrangements) (2), which must be studied carefully before implementation. Studies stress the need for pushing solo drivers to use the telecenter as greater congestion and air quality benefits can be achieved.

### *Availability of Amenities*

While part of the solution lays in reducing commute distances, there is also an incentive to reduce trip frequency. The majority of studies concluded that there must be various services available at a short distance from the telecommuting center to capture the essence of telecenters.

Studies show the presence a transit stop very close to the telecenter being one of the major considerations while selecting the site. This indicates the importance of interlinking telecenters with other modes to attain trip reduction goals. Some telecenters, set up in campuses like the Moorpark and Ventura Community College Telecenters, California, (Ventura College is located near the Pacific Coast, north of Los Angeles, while Moorpark is a bedroom community located in the hills separating Ventura County from Los Angeles) had transit stops at the entrance of the telecenters. However, care must be taken in actually evaluating the effectiveness of the transit stop close to the telecenter. In many cases, geographical nearness might not reflect accessibility.

As a particular instance, the Washington State Telework Center was established very close to a transit stop. However, the transit stop was separated from the telework center by a major arterial, which made using transit a highly unattractive proposition for most of the center's users. Furthermore, transit stops at the center must match those at the residences of the center's users (35).

Employees make trips during the lunch hour to restaurants and other eateries. While such trips do not occur in home-based telecommuting, they cannot be avoided by telecenters users. Most of the telecenters considered in this report had restaurants within one mile of the telecenter; grocery stores and supermarkets located within a short distance; to encourage telecenter users to make short trips and reduce overall travel distances.

Other facilities that the telecenters' planners place importance on while designing the center include banks, ATMs, post offices, shopping malls, child care centers, health and fitness centers, drug stores and convenience stores (2, 8).

## *Start-up Funding*

Start-up costs are recognized to include land, parking provision, building lease or purchase, and any interior or exterior tenant improvements to the facility, (including Americans with Disabilities Act (ADA) compliance), and lease or purchase of equipment and furnishings. While costs should be minimized as much as possible, it is desirable to have a range of facility configurations, which might encourage employers to select the telecenter as an alternate work- site for their employees.

There are few sources of public funding for telework center development. Under the goal of reducing commuting federal, funding is available. The federal government also provides grants to establish telework centers that increase employment options for people with disabilities. Also, state departments of transportation provide funding to reduce the negative externalities generated by single occupancy vehicle commuting.

While public funding may represent an option to cover some of the fixed costs, private partnership is considered as essential in successfully operating centers in the long run. Publicly funded telecenters can partner with an anchor tenant. An anchor tenant is any employer supportive of telecommuting who will supply a significant number of telecommuters. It is assumed this should probably be a major employer, such as the state or local government or a technology corporation. Having an anchor tenant ensures occupation of the facility during a highly publicized opening, and enhances the marketability of the telecenter to other prospective employers by removing the potential discomfort of being

the first or only tenant. In other words, the anchor serves as a magnet to attract other employers. Being supported by a large employer with a telecommuting plan in place reduces the burden of scouting for potential users and also serves as a strong advertising campaign.

Other potential sources and types of contributions include donation of equipment by private corporations, service donations and general expertise in the form of business plan designing, and other sources of local marketing or training expertise. All these must be well established in the early planning phase to provide good backbone support for the center.

### *Other Factors*

While primary location, household characteristics, commute trip patterns, funding, and amenities are the major concerns in establishing a telecenter, they do not comprise an exhaustive set of conditions to locate a within a specific area. Political considerations play a major role in the site selection (8). In addition, legal restrictions, such as land use laws and zonal, regulations must be addressed before deciding upon a site location (36). The American Disabilities Act also influences the decision of the kind of building that is chosen to house the telecenter.

In other cases, the preferences of an anchor tenant influence site selection and also site specifications. In return, the center has increased marketability owing to site occupation. In some instances, telecenter planners conducted interviews with employers of potential telecommuters to mutually decide on the location of the site.

Telecenters often work on grants from public and private institutions. In some cases, the grants included providing the telecenter developers with a building free of cost for a certain period of time. Such actions have also been known to influence the location of telecenters. The Ballard Neighborhood Telework Center was located in excess space of a building owned by a private firm (Market Street Computer Systems, Inc.), who made the space available for an indefinite period of time (until the firm needed the space back).

## Challenges to Implementation

Most telecenters established in the US suffered failures and closures in a very short span of time. Between 1991 and 1997, 45 centers opened, 21 closed and one was expected to close in California. (37). Many of the remaining telecenters also became dysfunctional by the end of 1998. While there are many reasons for the possible failures of telecenters, some reasons stand out as being common to most telecenters. These failures are discussed below.

### *Funding Sources*

The primary reason for closure in the 1990's was inadequate funding (8). In 1992, funding became available under a congressional appropriation to the General Services Administration for federal employees' telework center set up and operation in the Washington, DC, area. Subsequently, in 1997 the

appropriation was increased from $5 million to $11 million with funding availability extended to the private sector. In recent years, due to low occupancy levels, cost-benefit assessment, most of the funding has been reduced and used to maintain the telework centers in the Washington metropolitan area.

In the state of California, most of the telecenters were closed after the initial demonstration period. Center users typically did not have to pay any fees during the demonstration period and expected such a structure to exist afterward. At the end of the demonstration phase, centers could not attract users to continue using the facility while having to pay the fee. They were also inadequate in introducing other ways to improve their income, thus facing closure.

### *Poor Site Selection*

Some telecenters were established at the sites of existing offices. The disadvantage with this was that these offices could be closed at any point of time when the parent company needed the space, resulting in immediate closure of the center. The Sonoma County Transit Telecommute Center was opened in December 1994 in the California State University at the Sonoma campus. On June 30, 1996, the center was closed when the university required the space for its own operations.

Sites established after conducting careful research of the neighboring area for potential users were often found to attract fewer users than expected, thereby not being to able to justify their existence and closed down.

The federal government began its telecommuting program in the Washington DC area and intended to study the East coast program before expanding it

across the country. Very limited information was available regarding the number of federal employees living near the three sites selected, how many of those employees would be interested in using the facilities, or which of the federal agencies and managers in those areas would be willing to allow their employees to use the sites. This lack of detailed information in site selection was a significant factor in the eventual closure of some centers (37).

### *Insufficient Demand*

Many telecenters, after the demonstration period, were expected to be self sufficient, but owing to price increases, many telecommuters dropped out of the program leading to the closure of the centers. The Coronado Telecenter was one such telecenter that closed in 1996 owing to lack of funding and insufficient occupancy levels (8). The Antelope Valley Fair Telecommuting Center, in California, was open from August 1, 1994 to the summer of 1996. In April 1996 there was only one telecommuter using the facility on a regular basis. No active recruitment was taking place and subsequently closed down (37).

The Ballard Neighborhood Telecenter, Washington and the Washington State Telework Center were in the vicinity of each other and due to lower rental rates charged by the State Telework Center, the Ballard Telecenter had to close in 1996. In July 1995, two centers that existed in Vacaville (Ulatis and Three Oaks telecenters), California, were consolidated, and the equipment from the Ulatis telecenter was relocated to the Three Oaks/Alamo facility. It was determined that the Ulatis center would have soon been shut due to facility maintenance requirements. However, after considering facility costs, client usage, and other resource variables, the decision to consolidate the two telecenters into one was agreed to as the best course of action (8).

### *Inadequate Marketing and Recruitment Policy*

Most telecenters were set up with minimal marketing and lacked a recruitment policy. The telecenter managers of the RABO project in California stated that with a better marketing and recruitment policy the centers could have attracted more clients (8). Most telecenter developers were just interested in acquiring space and furniture and getting the center operational without conducting a formal analysis.

Marketing for telecenters included distributing flyers to individual households, conducting information sessions to employers, and seeking political help. Most telecenters were well publicized, but the employees of the center complained of too much work and inadequate support from the participating agencies, often causing high employer turnover.

### *Employer Resistance*

Telecenters are still an untried and relatively new concept as opposed to other strategies, such as vanpooling and carpooling, commuter trip reduction, flex-time and telecommuting from home. The project manager for the telecenters in Concord and San Jose, California attributed the low usage rates to the difficulties involved in conveying the concept of telecommuting from centers to employers, and identified one major barrier to the success of telecommuting as lack of trust from employers toward their employees (37).

Many employers support the idea of telecommuting and telecenters, but do not want to support the costs that are associated with them. When the costs of

using the telecenter at the Washington State Telework Center were low (from $0 to $100), employers were ready to allow their employees to use it, but when this center closed owing to discontinued funding, the employers did not allow their employees to use the Ballard Neighborhood Telework Center as they were not ready to pay the actual rental costs of additional office space (33).

In a study of approximately 275 telecommuters at telework centers in California, 50 percent stopped telecommuting within nine months (38). Most reasons were stated to be job related rather than issues that the employees themselves had to face (15). Also, turnover was found to be higher at telecenters than for home-based telecommuters, and some telecenter users found it is just as easy to work at home.

### *Inadequate Staffing and High Turnover*

Many telecenters operated with only one full time manager and at most with two staff members. These individuals were expected to be well versed in various tasks such as marketing, planning, maintenance activities and attending to the needs of the telecommuters. Many managers left the job citing high stress and inadequate compensation (8). The Anaheim Telebusiness Center, in California, closed down due to high turnover rates in the receptionist and administrator positions, as there was a lack of continuity in understanding telecommuting issues and reporting requirements to the University (2).

### *Other Reasons*

Other reasons for failure include incomplete definition of goals and loss of interest. Many managers set very high targets and goals to achieve in the telecenter. This was often done to gain improved funding for the center, but often led to setting unattainable targets for the telecenters (32). Telecenters that were set up by private individuals motivated by profit suffered as the individuals soon lost interest owing to poor income generated by the telecenters.

## Feasibility Matrix

Based on the analysis carried out in the previous section, a summary of the most relevant characteristics that can be used to assess the feasibility of implementing a telecenter are summarized. The matrix described in Table 1 provides a synopsis of the pros and cons associated with this TMD strategy and will be used in the analysis described in the next section.

| FEASIBILITY FACTORS | | CONSTRAINTS |
|---|---|---|
| **PHYSICAL** | | |
| **Location** | Within or in proximity of target residential area | Poor site selection, conflicting goals and short planning phase |
| | Secondary business district | Zoning restrictions |
| **Program Type** | Single and Multiple Employer | Recruiting anchor tenant as major funding and usage level contributor |
| **Space** | Ability to accommodate multiple users | Employer reluctance to pay for double office space |
| | Flexible workstation allocation | Ability to meet Americans with Disability Act requirements |
| **Amenities** | Presence of Transit stops close to the telecenter Interlinkage with other modes | Transit stops separated by major arterials; e.g., nearness does not mean accessibility |
| | Presence of banks, ATMs, post offices, shopping malls, eating places, child care centers, health and fitness centers | Absence or paucity of close by amenities |
| **ECONOMIC** | | |
| **Funding** | Ideal public/private partnership | Inability to obtain public funding, grants from federal and state agencies<br>Low usage level (insufficient demand) that do not allow to cover operating costs |
| **Marketing/Recruiting** | Aggressive, targeted, advertising is necessary to sustain planned usage levels | No marketing strategy, lack of marketing funds |
| **SOCIO-DEMOGRAPHIC** | | |
| **Residential Density** | High density target residential areas with similar commute trip patterns are more likely to telework | Low density, heterogeneous commute trip patterns and worker profile |
| **Household Composition** | Workers within larger households are more likely to telework | Households with young children are less likely to participate in telecenter based telecommuting. |
| | Young, single member households are more likely to participate in the program | |
| **Employee Mix** | High prevalence of:<br>Data entry<br>Clerical/Administrative<br>Managerial | High prevalence of:<br>Specialized health care<br>Retail/Wholesale<br>Recreation services<br>Factory<br>Construction<br>*These positions require commuting at the central office* |
| | Positions that do not require ongoing supervision | Employer resistance due to security reasons, or supervisory issues |
| **COMMUTE PATTERNS** | | |
| **Commute Time/Distance** | The longer the distance the higher the likelihood to use a telecenter | Competition from alternative TDM programs, such as telecommuting, vanpooling, carpooling, car sharing |
| | The longer the commuting time the higher the likelihood to use a telecenter | |

**Table 1 Feasibility Matrix**

# Feasibility Analysis

As part of this study, the Miami-Dade Metropolitan Planning Authority (MPO) was interested in assessing the feasibility of implementing telework centers in Miami-Dade County, in particular around the areas along the SR-836 (Dolphin Expressway) corridor. The analysis is carried out in two main steps. First, areas potentially suitable for telework centers are identified.

A suitability analysis is then carried out, based on an assessment of the socio-economic characteristics, and is checked against the feasibility matrix developed in the previous section. The second and final step deals with commenting on the merits of establish telecenters in the identified areas.

Assuming that commute trip reduction or trip duration reduction remains the primary goal of the telecenter, the analysis consists of:

- Assessing potential site locations based on SR 836 commute trip patterns;
- Analyzing employee commute trip origin-destination patterns for different residential areas in the vicinity of the suggested sites;
- Classifying commuters by job position held; and,
- Assessing the presence and characteristics of amenities to establish convenience factors.

The analysis utilizes many different applications, such as Geographic Information Systems (GIS), the Florida Geographical Data Library (FGDL), and the U.S. Census Bureau Local Employment Dynamics (LED) tool. A discussion of the various databases and modeling packages is presented in Appendix A of this report.

## *Site Description and Existing Traffic Conditions*

Congestion levels in Miami are among the highest in the country. According to the Texas Transportation Institute Urban Mobility Report 2005, Miami-Dade County is ranked 13th in the US in congestion levels, with an average delay of 51 hours per traveler per year.

State Road 836, locally known as the Dolphin Expressway, is a 55-mile-per-hour, 13-mile-long six-line divided tollway, extending from US 1 (SR 5) and SR A1A in Miami westward past Miami International Airport to the Homestead Extension of Florida's Turnpike (SR 821) in Sweetwater. It is maintained and operated by the Miami-Dade Expressway Authority.

As shown in Figure1, SR 836 (also known as the Dolphin Expressway) runs through the north and northwest planning areas of Miami-Dade County, connecting some of the major trip attracting areas such as Downtown Miami, Doral and Coral Gables (high employment areas), with major trip production sites such as Central Miami (residential areas) in the East-West direction. There are major highways, which run in the North-South direction (Palmetto Expressway (SR 826), I- 95), but SR 836 is the only East-Westbound expressway. Because of its unique direction and the areas that it connects, the road is affected by near capacity flows in the peak periods of 6 to 9 a.m., and 4 to 7 p.m., most commonly in the stretch between LeJeune Road (SR 953) and the Palmetto Expressway.

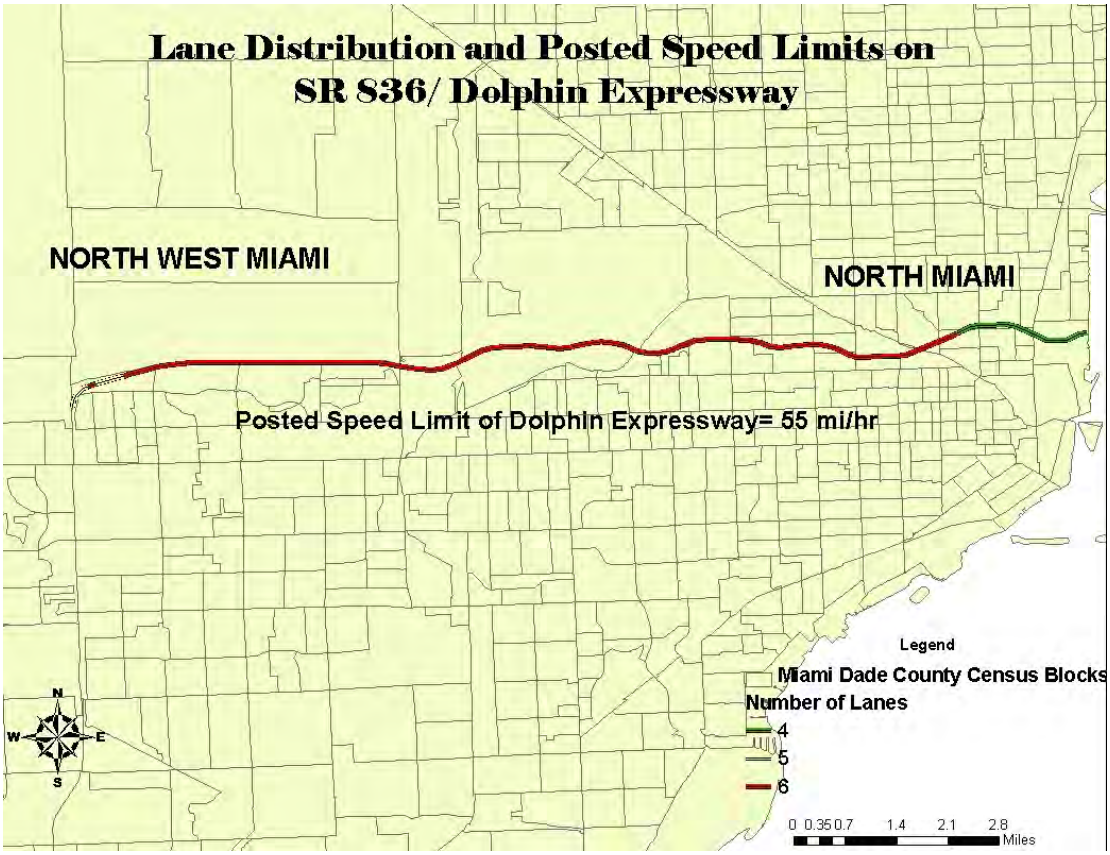



**Figure 1 Dolphin Expressway**

Figure 1 reports the Annual Average Daily Traffic (AADT) count volumes for both directions, as well as two-way volumes[2]. AADT on SR 836 varies from 95,000 vehicles per day on the first 1.2 miles of the roadway from the western side, to about 207,000 vehicles per day on the widest portion of the expressway.

[2] AADT is the total volume of traffic on a highway segment for one year, divided by the number of days in the year and represents a measure of congestion. AADT for SR 836 are obtained from the FGDL shape files. Separate counts are made for every non-homogenous segment of the roadway. Non- homogeneity occurs either due to differing number of lanes, entry or exit ramps, or different speed limits.

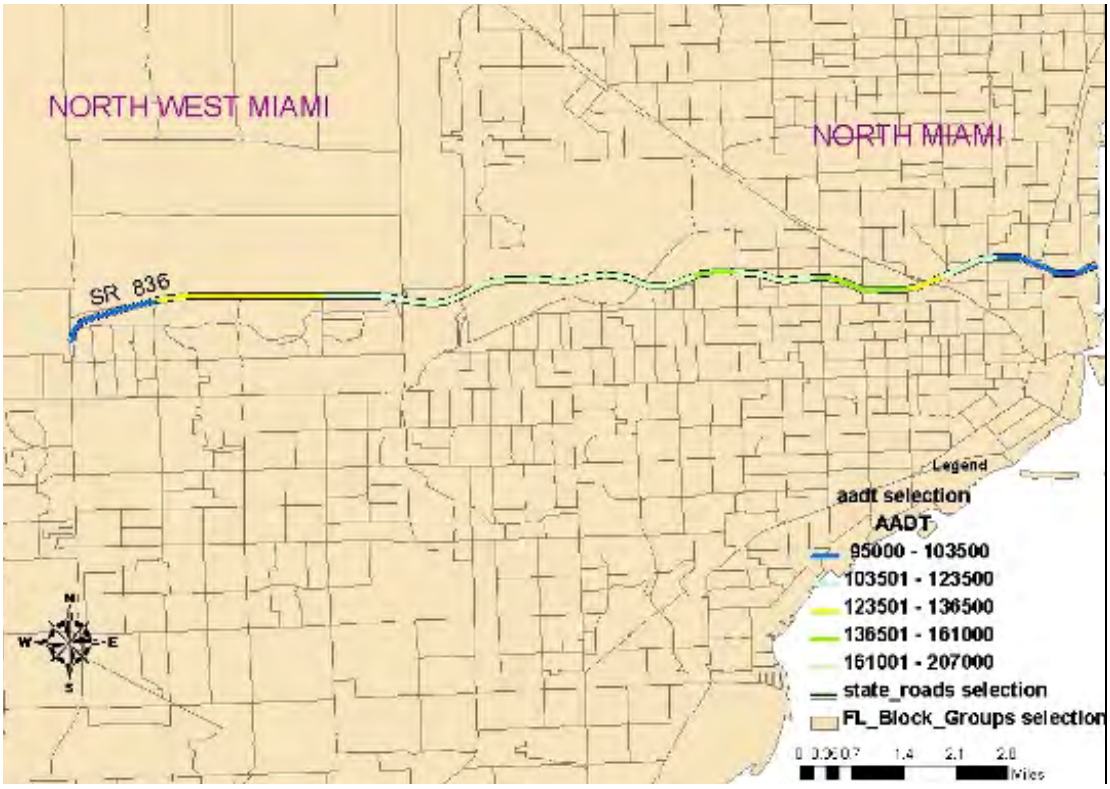



**Figure 2 AADT Distribution on Different Segments of SR 836**

Hourly traffic counts for SR 836, obtained from the FDOT Florida Traffic Information CD are used to calculate peak hours for each direction. Peak hour traffic is necessary to determine the performance of the roadway under extreme conditions. These hourly counts are used to determine peak hour traffic for weekdays, and the results are presented in Table 2[3].

The peak hour for the eastern leg is 8-9 am, nearly 72 percent of the days. Most of the traffic passes in the eastbound direction in the morning peak period of 7-10 am (nearly 25 percent) of the overall traffic. The peak hour for the western leg is 5-6 pm for 88percent of the study period. Such a peak distribution is pretty common, owing to the location of the highly employment-centric CBD in the eastern end of SR 836 and the residential locations in the westbound areas.

[3] Data for 193 weekdays of 2003 are used to compile Table 3.

| Eastbound | | | | Westbound | | | |
|---|---|---|---|---|---|---|---|
| *Peak Hour* | *No. of Days* | *Percent* | *Cumulative Percent* | *Peak Hour* | *No. of Days* | *Percent* | *Cumulative Percent* |
| 7-8 am | 44 | 22.8 | 22.8 | 3-4 pm | 2 | 1 | 1 |
| 8 -9 am | *138* | *71.5* | *94.3* | 4 -5pm | 14 | 7.3 | 8.3 |
| 9 -10 am | 3 | 1.6 | 95.9 | 5 -6pm | *169* | *87.6* | *95.9* |
| 11 -12 pm | 1 | 0.5 | 96.4 | 6 -7pm | 6 | 3.1 | 99 |
| 3 -4 pm | 6 | 3.1 | 99.5 | 7 -8pm | 2 | 1 | 100 |
| 11-12 am | 1 | 0.5 | 100 | - | - | - | - |
| *Total* | *193* | *100* | | *Total* | *193* | *100* | |

**Table 2 Peak Hour SR 836 Telemeter Site**

Table 3 reports another measure of congestion, the Level of Service (LOS). LOS provides a measure of effectiveness in maintaining low levels of congestion for freeways and multi-lane urban highways (HCM, 2000)[4].

| *Beginning Length (miles)* | *Ending Length (miles)* | *Segment Length (miles)* | *Eastbound AADT (veh/day)* | *Eastbound No. of Lanes* | *LOS Eastbound* | *Westbound AADT (veh/day)* | *Westbound No. of Lanes* | *LOS Westbound* |
|---|---|---|---|---|---|---|---|---|
| - | 0.4 | 0.4 | 47,500 | 2 | E | 47,500 | 3 | D |
| 0.4 | 0.5 | 0.1 | 47,500 | 3 | D | 47,500 | 3 | D |
| 0.5 | 0.8 | 0.4 | 47,500 | 3 | D | 47,500 | 2 | E |
| 0.8 | 1.2 | 0.4 | 47,500 | 3 | D | 47,500 | 3 | D |
| 1.2 | 3.3 | 2.0 | 67,653 | 3 | E | 67,653 | 3 | E |
| 3.3 | 4.2 | 1.0 | 56,750 | 3 | D | 56,750 | 3 | D |
| 4.2 | 4.8 | 0.5 | 98,500 | 3 | E | 98,500 | 3 | E |
| 4.8 | 6.3 | 1.6 | 98,500 | 3 | E | 98,500 | 3 | E |
| 6.3 | 7.9 | 1.6 | 103,500 | 3 | F | 103,500 | 3 | F |
| 7.9 | 8.4 | 0.5 | 77,500 | 3 | D | 77,500 | 3 | D |
| 8.4 | 9.4 | 1.0 | 91,750 | 3 | E | 91,750 | 3 | E |
| 9.4 | 10.6 | 1.1 | 80,500 | 3 | D | 80,500 | 3 | D |
| 10.6 | 11.0 | 0.5 | 68,250 | 3 | E | 68,250 | 3 | D |
| 11.0 | 11.4 | 0.3 | 61,750 | 3 | D | 61,750 | 3 | D |
| 11.4 | 11.8 | 0.4 | 61,750 | 2 | E | 61,750 | 2 | E |
| 11.8 | 13.0 | 1.3 | 51,750 | 2 | F | 51,750 | 2 | F |

**Table 3 SR 836 Level of Service**

The analysis suggests that SR 836 experiences extremely high volume flows, almost near capacity flows, in peak hours. Furthermore, poor LOS values exist during the peak hours, with some segments having a LOS of E,

[4] Roadway level of service (LOS) is a stratification of travelers' perceptions of the quality of service provided by a facility. Much like a student's report card, LOS is represented by the letters "A" through "F", with "A" generally representing the most favorable driving conditions and "F" representing the least favorable (FDOT website).

indicating high congestion. Two portions of the roadway have LOS F, indicating inadequate capacity to satisfy demand. Clearly, congestion relieving measures are necessary to ease peak hour traffic.

## *Site Identification*

The traffic analysis shows that SR 836 congestion is characterized by a commute trip pattern that generates a.m. peak hour traffic congestion with a predominant east-west flow. The next step is to spatially assess the trip generation and attraction zones.

Assuming a monocentric approach, that is that commuters mostly travel from residential areas across the county to the Miami central business district (CBD), the first step is to ascertain where the workers employed at the CBD reside.

To correlate CBD workers to their residences, and thus establish commute trip patterns, CUTR employed the US Census Bureau's Local Employment Dynamics (LED), a prototype GIS-based tool that allows mapping origin-destination trip patterns. LED employs the Census Bureau's demographic and economic databases to spatially correlate workers' homes to their place of work. For a detailed description of LED, please see Appendix A of this report.

Figure 3 shows a 3-mile radius buffered selection around Miami's CBD, highlighted in yellow. This buffer represents the employment area, which comprises 7,476 employers hosting 191,960 jobs (private and public sectors). The blue dots represent the places where workers live and are located in the middle of each census block. Larger dots indicate that more of the workers

from the employment area live within a given block. Full size figures are reported in Appendix B.

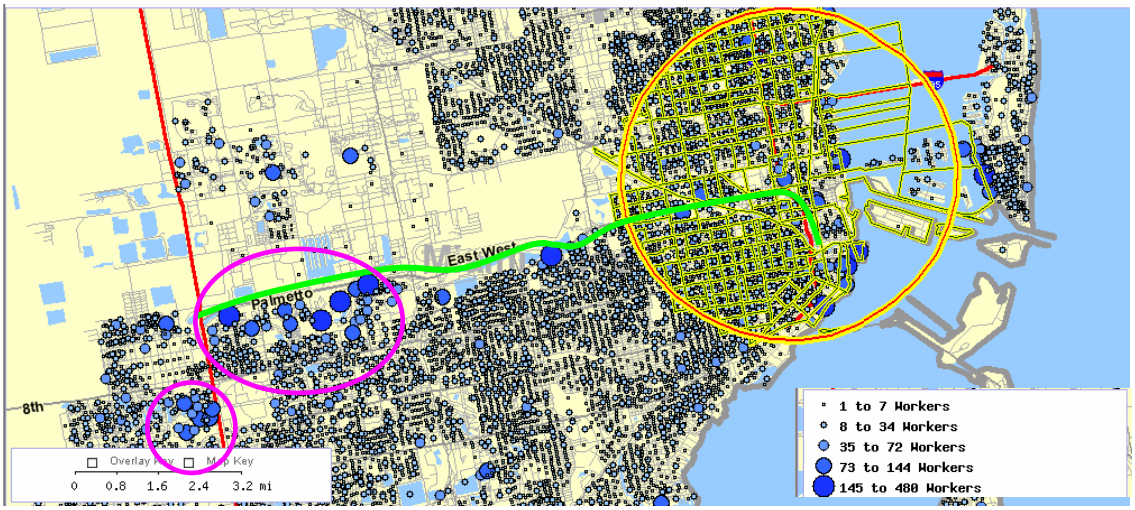



**Figure 3 Commute Trip Patterns to Miami CBD**

Figure 3 shows that although workers employed in the 3-mile buffer reside all over the county, two clusters can be identified. These clusters are characterized by the largest dots, indicating a density of 145 to 480 workers per census block, all traveling to the CBD. The near proximity to the western leg of the expressway indicates that these individuals are highly likely to use the facility to commute in the morning hours.

The largest cluster is located in the areas stretching from the southwest end of SR 836, east of Florida Turnpike SR 821 through the Palmetto Expressway, North of 8th Street (Tamiami Trail), and immediately adjacent to SR 836 (highlighted in green). A smaller cluster is located between at the intersection of SR 821, south of 8th Street. Assuming that the residents of this area are most likely to utilize SR 836 to commute to the CBD, the ensuing analysis focuses on these clusters, which are combined and defined as the southwest cluster. Figure 4 provides a close-up of the southwest cluster.

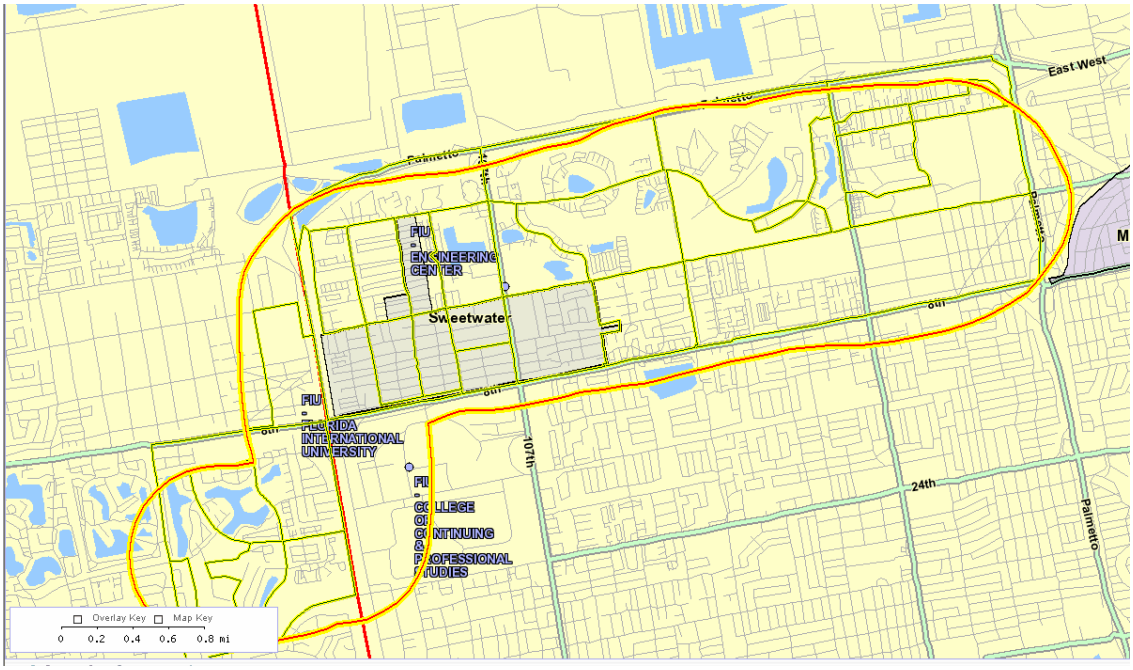



**Figure 4 Southwest Cluster**

To complete the commute trip pattern analysis of the southwest cluster, all of the cluster residents' trips to the CBD must be taken into consideration. This is accomplished by isolating the southwest cluster residents who work within the 3-mile radius around the CBD and analyze the industry sectors where they are employed. This allows checking for suitability of positions that are most likely to be impacted by a local telework center intending to alleviate traffic conditions on SR 836.

Figure 5 shows the two poles of attraction, depicting the southwest cluster commute pattern flow to the CBD. There are 5,291 cluster residents working within the downtown 3-mile buffer, representing 14 percent of the southwest cluster residents, and 2.8 percent of all CBD workers.

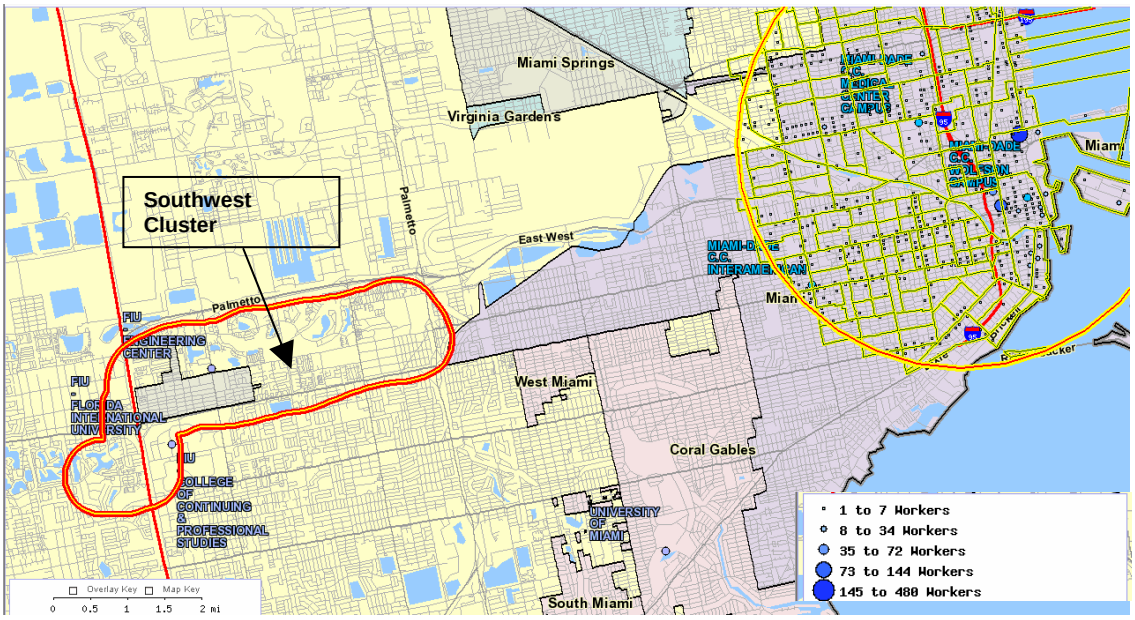



**Figure 5 Work-Trip Origin-Destination**

Figure 5 shows that, within the CBD buffer, there are few major employment sites with a number of workers ranging from 73 to 480 employees. A close up of the CBD buffer is shown in Figure 6.

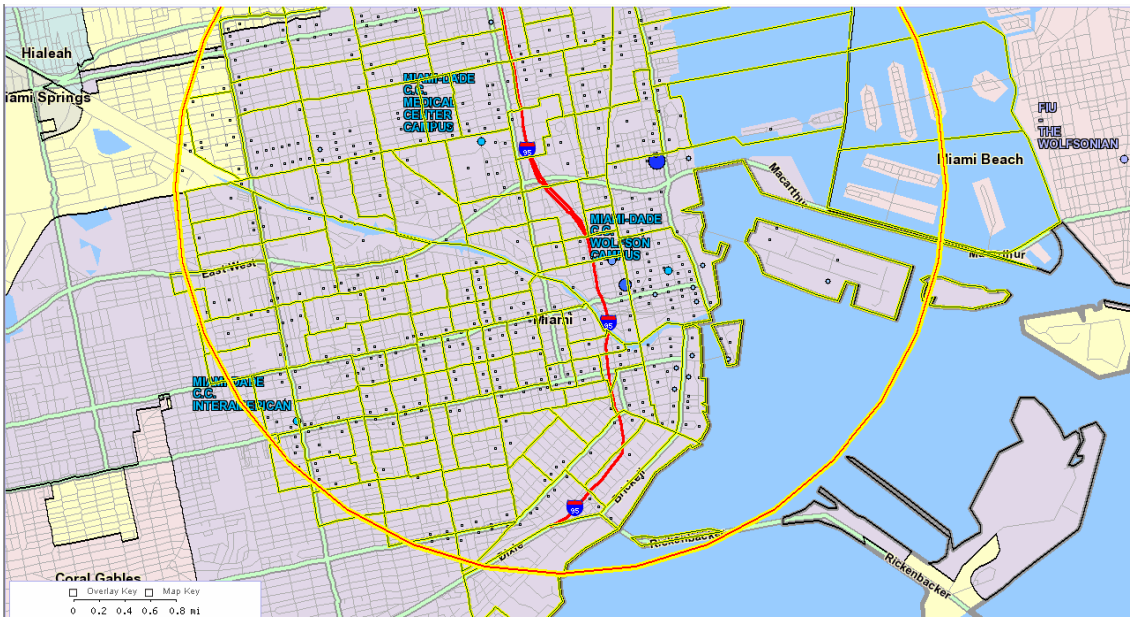



**Figure 6 Workers of Southwest Clusters Working at CBD**

## *Employee Mix*

Certain jobs are more suited to telecenter usage than others. Jobs which require physical presence on job site, such as specialized healthcare assistance, legal counsel, construction and factory workers all are unsuitable for telecenter attraction, as they require presence at the job location. Other sectors include direct wholesale and retail trade, arts, entertainment, and food services. Jobs like office and administrative support, management and other such jobs are more suited for telecommuting and telecenter use. While the data set does not provide individual employee job descriptions, it is a reasonable assumption that larger firms have employees who are specifically employed for administrative, support, management positions.

Table 4 shows the workers' characteristics of the southwest cluster. Of the 37,953 workers residing within the cluster, about 15 percent are employed in the city of Miami, and about 50 percent are scattered throughout the unincorporated areas of the County.

| Resident Held Jobs | 2003 | |
|---|---|---|
| | Count | Share |
| Number of Jobs | 37,953 | |
| **Cities/Towns Where Residents are Employed** | | |
| Unincorporated Areas | 18,673 | 49.2% |
| Miami | 5,807 | 15.3% |
| Coral Gables | 1,860 | 4.9% |
| Hialeah | 1,594 | 4.2% |
| Miami Beach | 873 | 2.3% |
| All Other Locations | 9,147 | 24.1% |
| **Counties Where Residents are Employed** | | |
| Miami-Dade | 29,489 | 77.70% |
| Broward | 2,733 | 7.20% |
| Palm Beach | 1,101 | 2.90% |
| All Other Locations | 4,592 | 12.10% |

**Table 4 Southwest Cluster Places of Employment**

Table 5 shows the workers profile by industry sector. By eliminating all unsuitable sectors, about 35 percent or 13,250 of the 37,953 southwest cluster residents can be considered as potential target telework users.

| Industry | Count | Share |
|---|---|---|
| Agriculture, Forestry, Fishing and Hunting | 152 | 0.4% |
| Utilities | 76 | 0.2% |
| Construction | 1,746 | 4.6% |
| Manufacturing | 2,353 | 6.2% |
| Wholesale Trade | 3,378 | 8.9% |
| Retail Trade | 5,655 | 14.9% |
| Transportation and Warehousing | 3,226 | 8.5% |
| Information | 1,328 | 3.5% |
| Finance and Insurance | 1,898 | 5.0% |
| Real Estate and Rental and Leasing | 1,025 | 2.7% |
| Professional, Scientific, and Technical Services | 2,429 | 6.4% |
| Management of Companies and Enterprises | 417 | 1.1% |
| Administration & Support, Waste Management and Remediation | 4,137 | 10.9% |
| Educational Services | 569 | 1.5% |
| Health Care and Social Assistance | 3,719 | 9.8% |
| Arts, Entertainment, and Recreation | 417 | 1.1% |
| Accommodation and Food Services | 4,061 | 10.7% |
| Other Services | 1,366 | 3.6% |
| *Total* | *37,953* | *100.0%* |

**Table 5 Southwest Cluster Employment by Sector**

## *Residential Population Density*

Figure 7 depicts a (16 to 64) density map residential population of working age for the southwest cluster. The following inferences can be made:

- There is extensive residential development close to SR 836, with high density development located within the cluster;
- These areas have pockets of high population densities, of the order of 4,315 to 16,209 persons per census tract.

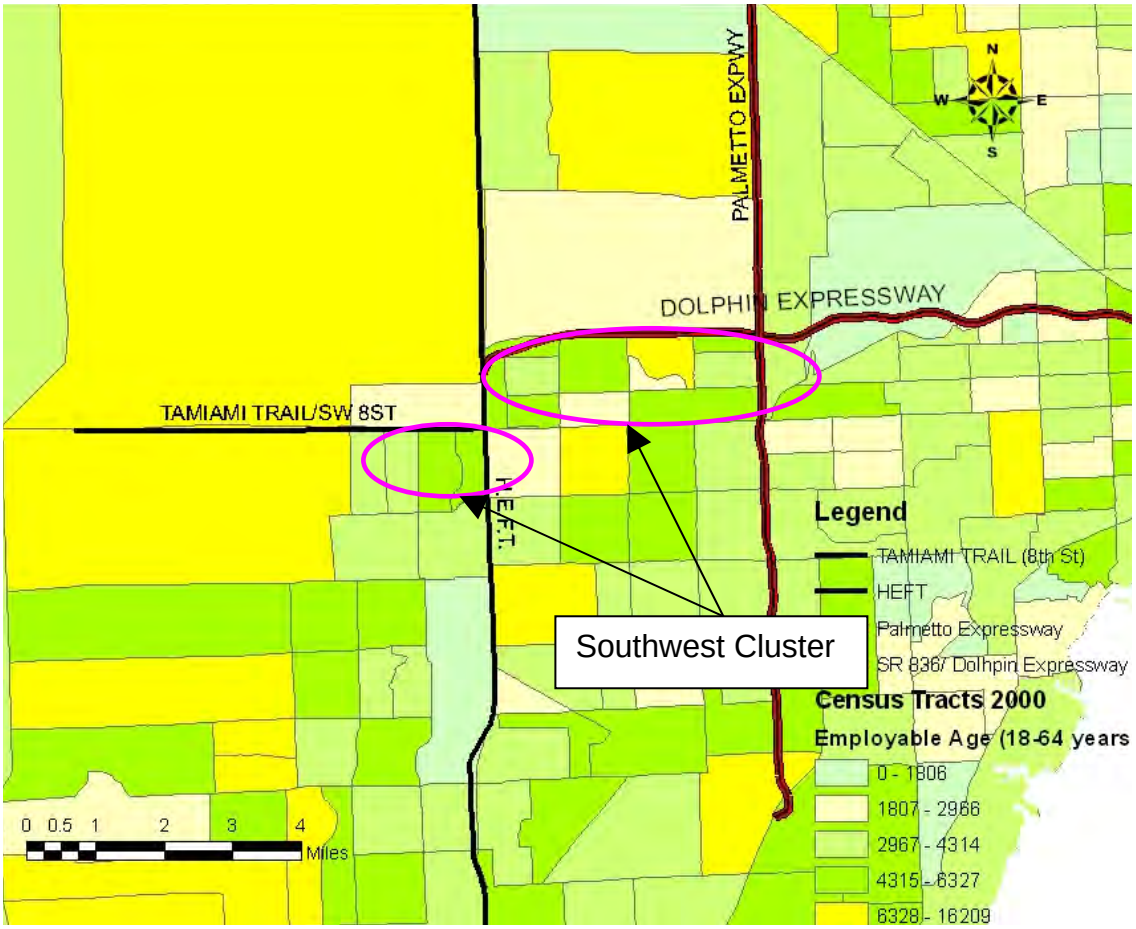



**Figure 7 Density of Residents of Working Age (18 to 64)**

## *Household Size Distribution*

According to various studies, household size is an important variable in estimating potential telecommuters. Families with children prefer home-based telecommuting, as opposed to center-based telecommuting for young individuals who are either single or married. Figures 8 and 9 show density maps of households with no children and average household size, respectively. Households with large number of members are expected to encourage different forms of telecommuting to ease their responsibilities. Both figures indicate that the southwest cluster possess household characteristics suited for telecenter usage.

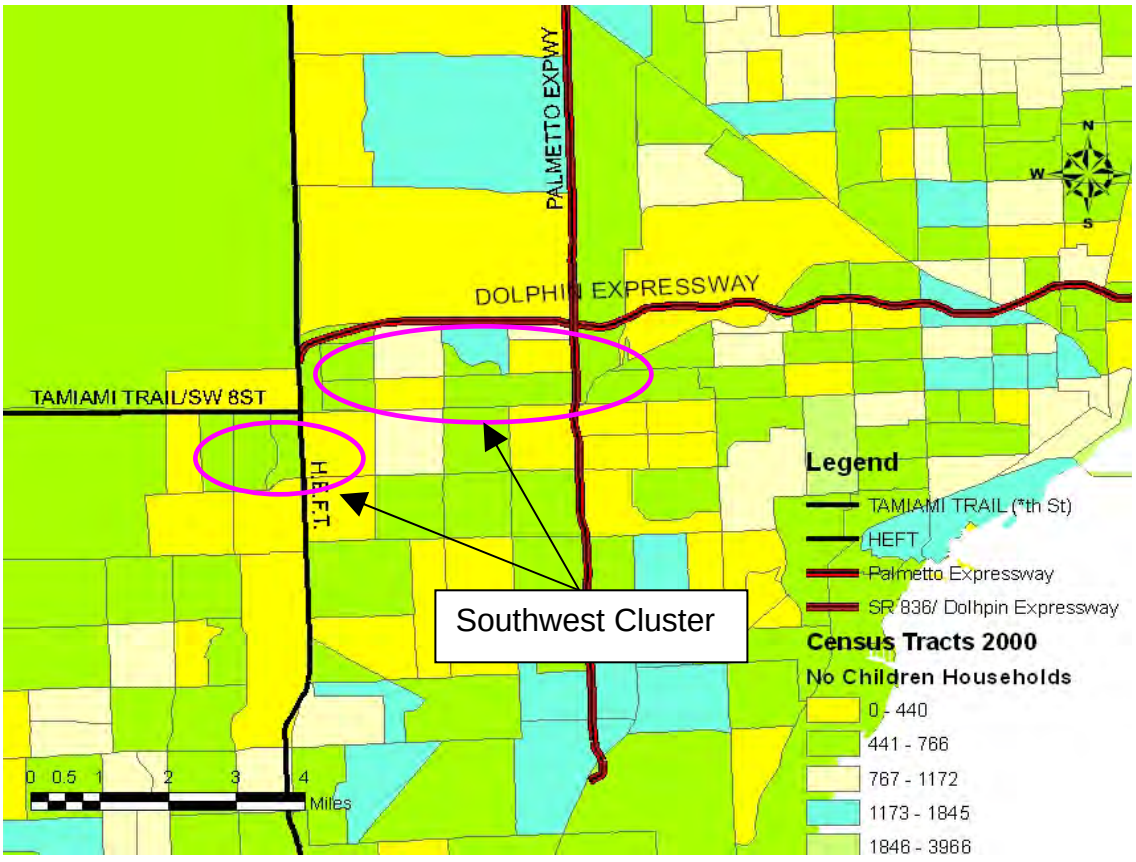



**Figure 8 Density of Households with No Children**

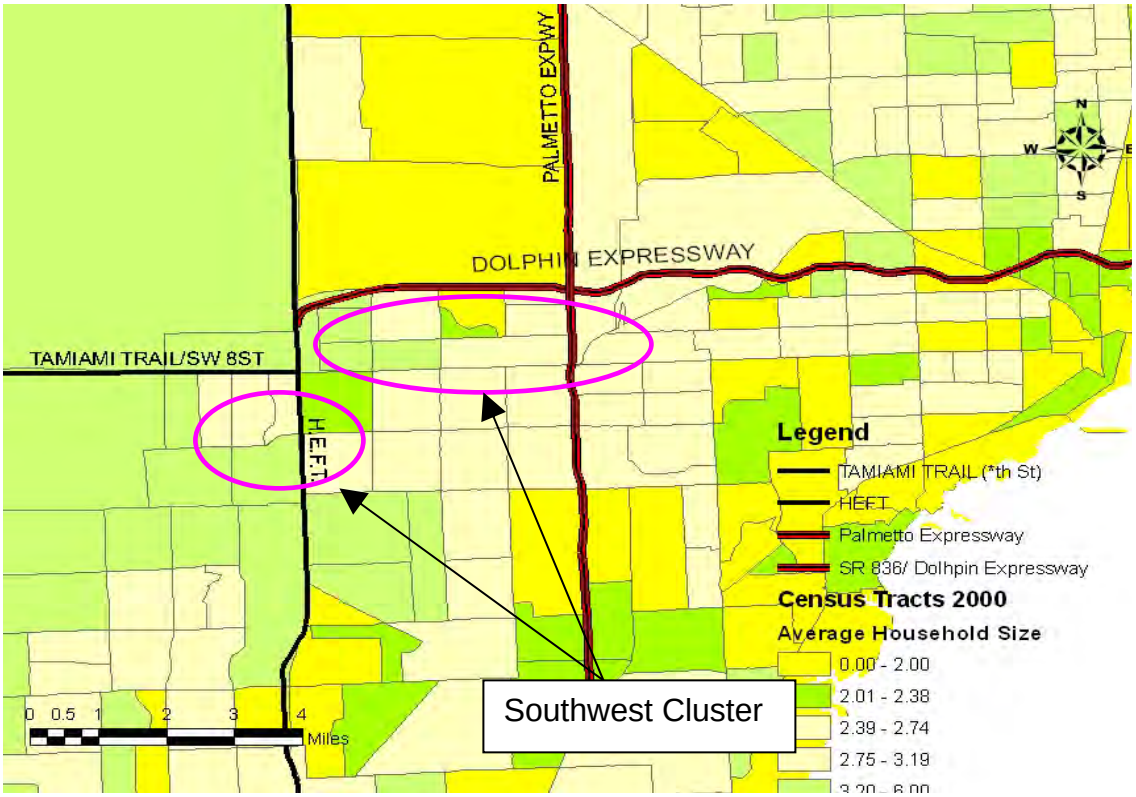



**Figure 9 Average Household Size by Census Tract**

## *Commuter Trip Characteristics*

The Census Transportation Planning Package (CTPP, 2000) profiles the commuter trip characteristics for different districts in the country. The CTPP package describes the mode splits of working commuters in Miami-Dade County. Nearly 74 percent of commuters drive alone, 20 percent carpool or use public modes of transportation to commute to work, and only 3 percent work from home.

Despite the fact that the average travel time for carpools is only about 3.5 minutes greater than the average travel time for single occupancy vehicle

(SOV) travel times, SOV's outweigh all other modes for commuters. While there is no exact data available for the study area, it is reasonable to estimate that the study area shares a similar mode share split. The percentage of SOV commuters is high, and measures to reduce the number of SOV commuters are necessary. While a telecenter cannot reduce the number of SOV commuters, it can reduce the Vehicle Miles Traveled (VMT) by SOV vehicles.

The CTPP package also describes the county average travel time for commuters on the commute trip. With average mean travel time of about 30, minutes and with nearly 22 percent of all commuters having travel times greater than 45 minutes, Miami- Dade has one of the highest average mean travel times to work.

To obtain the average travel time for the commuters residing in the southwest clusters, an analysis using the HCM 2000, based on the LOS of the roadway and the free-flow speed (FFS) of 55 mile-per-hour, was carried out[5].

These values are found to be approximately 15 minutes and 11 miles for individuals residing in the area immediately to the southwest of SR 836, and 17 minutes and 13 miles for those residing in the area close to 8th Street. The total travel times and distances of the commute trip for the employees are much greater, depending on the exact residence and employment location of the employees.

[5] The travel times and the commuter distance traveled are calculated solely on SR 836. Also, travel times and average commute distances of only those commuters who work in the CBD and residing in the southwest cluste are calculated.

## *Amenity Locations*

As part of the evaluation process, the site location is also studied for the existence of various amenities in the neighborhood. The primary aim of the telecenter is to reduce peak hour commute trip lengths and times. Various studies state that the telecenter users must have enough facilities (such as restaurants, libraries, gas stations, schools, day care centers, fitness centers, transit stops etc.) in the vicinity of the proposed site location to encourage participation and to make the traffic impact effect actually noticeable.

SR 836 is a busy part of Miami-Dade city and has many facilities in its near neighborhood. Figure 10 shows a facility count within a 1-mile buffer around SR 836 using FGDL data.

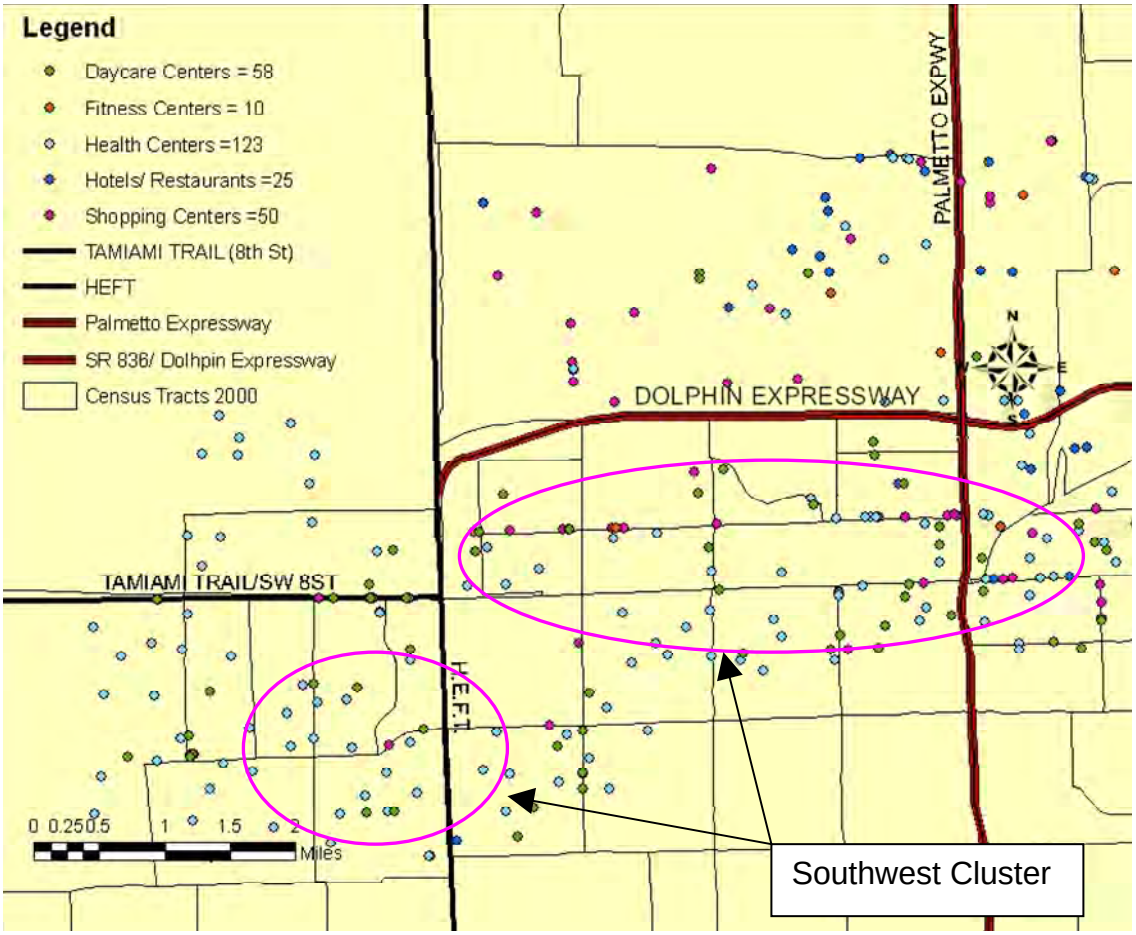



**Figure 10 Amenity Locations**

The figure shows there are a large number of daycare centers, schools and shopping centers and other facilities within and in the immediate surroundings of the cluster. Though there are more establishments in the eastern edge of the expressway, there are still a sufficiently large number of amenities in the other areas of SR 836. Studies on commute behavior report that while personal preferences do play an important role in the ultimate choice of lifestyle (different activities pursued at different places), it is reasonable to estimate that commuters will choose convenience (shorter time of travel, reduced costs) in most situations owing to constraints (50).

A closer look at the southwest cluster revealed the presence of a recently developed business area, the Waterford Business Park. The center is located

on 5201 Blue Lagoon Drive, and hosts executive suites with key facilities and amenities, such as meeting rooms, broadband internet connectivity, video conferencing studios, recreation facilities, and cybercafés. A necessary step, not part of this research endeavor, should be to physically assess the availability of space within this or other nearby business parks for location.

Figure 11 shows the presence of transit stops within or in the proximity of the southwest cluster. The study area is well connected by different transit routes.

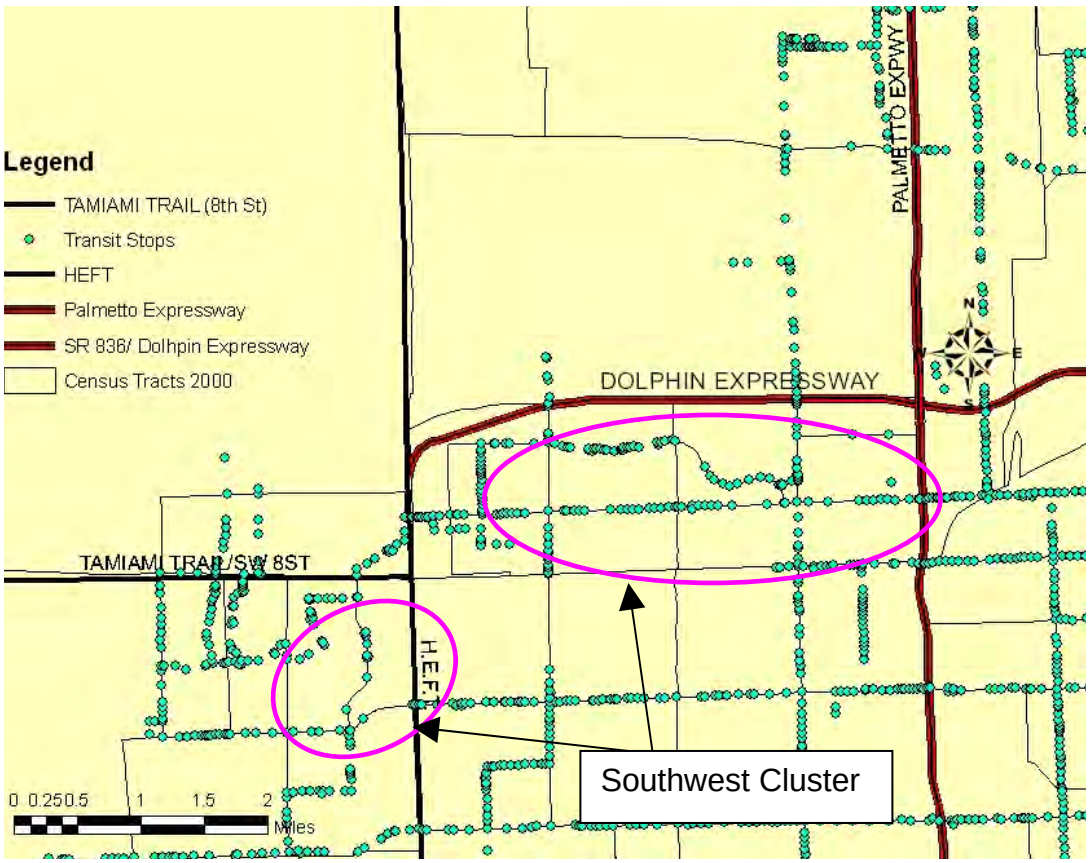



**Figure 11 Transit Stops**

When checked against the feasibility matrix, the analysis shows that the southwest cluster possesses the physical, socio-demographic, and commute trip pattern characteristics for potential implementation of a telework center.

While these represent potential advantages for setting up a telecenter, other challenges, such as those presented in the previous section, must be addressed.

The analysis shows that only a small percentage of workers in the CBD reside in the selected southwest clusters. Employers might not find it feasible to relocate some of their employees to such nearby location. Furthermore, attempting to reduce commute distances for such a small percentage of employees seems irrelevant, especially if the commute distances for employees residing in other areas are left not considered in the context.

SR 836 is extremely congested during peak hours. If congestion alleviation is deemed to be the main goal of the telecenter, then simply by establishing a telecenter for housing a few employees will not solve the problem.

Further analysis, beyond the scope of this study, is required to assess the funding capabilities, and zoning requirements. These are necessary steps that must take place in conjunction with an implementation decision, a process involving both public and private support.

# Conclusions and Recommendations

The analysis shows that the study area has all the feasibility elements that are necessary to be checked before a telecenter is established. Nonetheless, there are other conditions that must be taken into consideration and analyzed before considering implementing a telecenter.

Telecenters, as a concept, blossomed in the early 1990's because the Internet was still a relatively new technology and was not easily accessible to all individuals. With employers ready to pay for high speed broadband internet connection for their employees to work from their homes, home-based telecommuting has gained prominence and has become more wide-spread. Other travel demand management strategies such as vanpooling, carpooling, staggered work hours have also gained importance owing to lower costs of implementation and relatively higher success rates.

This study found that, to date, telecommuting centers have found only limited success. The majority of centers opened in the 1990's have ceased to exist or evolved into more competitive concepts (such as urban executive office suites), due to lack of subsidized public and private funding, rising competition from alternative telecommuting strategies, employer resistance, and changes in telecommunication technology.

At present, the majority of the operating telework centers are federally sponsored and used solely by federal workers. These centers are also facing constant scrutiny and funding constraints owing to persistent low usage levels.

The shift has been toward home-based telecommuting, as an inexpensive, productive, alternative. The challenge faced by telework centers is that routine

telecommuters still represent a relatively small percentage of the workforce. These individuals tend to prefer making arrangements with the employer to conduct home-based telecommuting.

In addition, telecenters established for reducing commute lengths typically target populations that travel long distances to work. If commute trip reduction is the major goal for the telecenter, then it must be located in the suburban area with similar characteristics as the study area to actually attain this goal.

While, residents living in the study area work all over the county, the major center for employment remains the Central Business District, which is roughly 13 miles away from these areas. While there are advantages for the telecenter, the employer firms might not find it feasible to relocate some of their employees to such nearby locations.

Further, only a small percentage of workers in the CBD actually reside in the selected southwest clusters. Hence, attempting to reduce commute distances for such a small percentage of employees seems irrelevant, especially if the commute distances for employees residing in other areas are left not considered in the context.

SR 836 is extremely congested during peak hours. If congestion alleviation is deemed to be the main goal of the telecenter, then simply by establishing a telecenter for housing a few employees will not solve the problem. To achieve this goal, other TDM strategies, such as home-based telecommuting promotion/implementation, must be employed in conjunction with the proposed telecenter feasibility analysis.

Based on the results of this analysis, CUTR does not recommend the implementation of telecenters, rather the pursuit of other TDM strategies, such as home-based telecommuting and flexible working hours.

Currently, there are 21 vanpool groups serving about 125 persons in Miami-Dade County that use the SR-836 and adjacent corridors to access the Miami Civic Center and downtown areas[6]. CUTR recommends continuing the promotional effort of such programs.

[6] Additionally, there are 30 vanpool groups (197 persons) coming from Broward county and serving the same areas.

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# Appendix A

## Geographical Information Systems (GIS) Data and Applications

GIS is a technology that manages, analyzes, and disseminates geographic knowledge. GIS links location to information (such as people to addresses, buildings to parcels, or streets within a network) and layers that information to give a better understanding of how it all interrelates. The metadata, which explains the accuracy of the data used, is available as an appendix to the study.

GIS information is chosen from four different data libraries for the study. The data used ranges from layered data used to plot thematic maps, to specialized applications used to obtain extremely specific information for the research.

## Florida Geographical Data Library (FGDL)

The FGDL is a mechanism for distributing satellite imagery, aerial photographs and spatial (GIS) data throughout the state of Florida. The FGDL is compiled from data and images collected from numerous state and federal governmental agencies, as well as some nonprofit organizations and private companies. The Florida Department of Transportation (FDOT) is the lead agency contributing to the development of FGDL. The Florida Department of Environmental Protection (FDEP) has also contributed a great deal to the FGDL.

The FGDL is warehoused and maintained at the University of Florida's GeoPlan Center, a GIS Research and Teaching Facility. Different GeoPlan Center projects have included the development of databases that have subsequently been added to the FGDL. These projects include the Cross

Florida Greenway Project, The Statewide Greenways Planning Effort, The National Pollutant Discharge Elimination System (NPDES), the FDoT (Florida Department of Transportation) Environmental GIS Database Development Project, and the FDOT Efficient Transportation Decision Making Project.

There are currently over 350 layers of GIS data in the FGDL. The data is organized by county, state, and coastal areas. Data for the Miami- Dade County is chosen from the existing data sets. Information freely available from the data library includes road network data, location of various personal and recreational centers, population maps and census blocks in Miami- Dade County.

FDoT GIS resources are obtained from the Florida Department of Transportation (FDoT) maintains GIS data for various traffic features such as highways/ major roads, and annual average daily traffic (AADT's), and maximum speed limits. The data is coded in standard longitude- latitude coordinates, which can be used readily. These layers are used for the traffic report section of the report (reference FDoT GIS downloads). FDoT updates the data sets regularly to maintain an accurate dataset for use in projects.

**US Census Bureau Local Employment Dynamics (LED)**

The Census Bureau has developed a GIS (Geographic Information Systems) based tool to present LED (Local Employment Dynamics) maps. Local Employment Dynamics (LED) is a voluntary partnership between state labor market information agencies and the U.S. Census Bureau to develop new information about local labor market conditions at low cost, with no added respondent burden, and with the same confidentiality protections afforded to census and survey data (refer US Census Bureau LED). The Local Employment Dynamics (LED) recently released a new beta version of the

pilot-mapping tool called “On- The Map”. For the first time in the project, all 14 pilot states (California, Colorado, Florida, Idaho, Illinois, Minnesota, Missouri, North Carolina, Oregon, Pennsylvania, Virginia, Washington, Alabama and Texas) are now included in the application.

This online data library is best suited to represent to show the origin-destination trip patterns for commuters residing in a particular area (reference the LED site). The dataset may also be used for locating the residential location of employees in a particular location.

This dataset is used in the most crucial part of the analysis. The study portrays the high density trip attracting zones (major office locations) for residents living in the vicinity of SR 836. This analysis gives a good understanding of the utilization of SR 836 by commuters.

**Employment Demographics**

Employment information is obtained from the InfoUSA dataset. InfoUSA datasets are the most accurate among the many datasets used to map employer locations. The data for employment location is obtained using the following sources:

- Nearly 5,200 Yellow Page and Business White Page Directories are perused to obtain accurate up-to- date information about the businesses.
- 17 million phone calls are made every year to verify information regarding business location and size. Every business is called anywhere between one to four times a year.
- County Courthouse and Secretary of State Data are also studied to ensure the filtering of misinformation.

- Leading business magazines and newspapers, Annual Reports, 10Ks and other SEC filings are also examined for relevant information.
- New business registration and incorporations are taken notice of, because new businesses must be incorporated into the data set regularly for quality purposes.
- Postal service information including National Change of Address, ZIP+4 carrier route and Delivery Sequence Files are scanned for business location purposes.

This data set has information about different businesses and users can obtain diversified information about the businesses including and not limited to:

- Location - ZIP Code, Neighborhood, City, Metro Area, County, Area Code, State.
- Type of Business - Yellow Page Heading, Major Industry Group, SIC Code or Professionals (doctors, dentists, etc.).
- Business Size - Number of Employees, Sales Volume.
- Credit Rating.
- Location Type - Corporate Headquarters, Headquarters of a Subsidiary, Branch.
- Phone and Fax Numbers.
- Key Decision Makers/Executive Names.

**Highway Capacity Manual 2000 (HCM)**

The Highway Capacity Manual is the most widely distributed publication of the Transportation Research Board (TRB). It presents fundamental information and computational techniques on the quality of service and capacity of highway facilities. The HCM provides a stepwise methodology to analyze a

roadway for different characteristics. An up-to-date compilation of this information is vital to an expanding array of public policy, planning, fiscal, land-use regulation, design, operational, and educational applications. The HCM is employed in this study to estimate the Levels of Service of different segments of the roadway and to obtain an estimate of the extent of congestion on SR 836.

HCM 2000 (U.S. customary units) is a completely revised, updated, and expanded edition that reflects the results of a multiyear, multimillion-dollar research effort by NCHRP (National Cooperative Highway Research Program), FHWA (Federal Highway Administration), TCRP (Transit Cooperative Research Program), and TRB (Transportation Research Board)
.
TRB's Committee on Highway Capacity and Quality of Service were the principal investigators in the development of the manual. The content and format of HCM 2000 incorporate major changes and improvements in analysis methodologies from the previous manuals.

**Florida Traffic Information CD-ROM**

A complete set of current traffic data reports is available on the Florida Traffic Information 2004 CD-ROM. This CD contains information available in the 2003 version along with the following major improvements requested as a result of the 2003 customer survey:

- Multiple synopsis reports
- Historical K30, D30, and Tpercent
- Color-coded volumes for AADT and Truck Flow maps

The CD contains information regarding the traffic levels on major roads in Florida. The Annual Average Daily Traffic and traffic counts by hour at different locations on SR 836 are employed in the study.

**Census Transportation Planning Package 200**

The Census Transportation Planning Package (CTPP) is a set of special tabulations from the decennial census designed for transportation planners. CTPP contains tabulations by place of residence; place of work, and for flows between home and work.

CTPP provides tabulations of households, persons and workers. It summarizes information by place of residence, by place of work, and for worker-flows between home and work.

The data are tabulated from answers to the Census 2000 long form questionnaire, mailed to one in six U.S. households. Because of the large sample size, the data are reliable and accurate. CTPP provides comprehensive and cost-effective data, in a standard format, across the United States.

Transportation planners use CTPP data to:

- Evaluate existing conditions
- Develop or update travel demand models
- Analyze demographic and travel trends

In the present analysis, information of Miami- Dade County is used to obtain ideas of existing commuter travel times and trip length conditions. The information is also used to acquire clear information about the demographic and employment trends of individuals residing in Miami- Dade County.

## Geographic Area: Working in Miami-Dade County, Florida

### TABLE 1. SELECTED CHARACTERISTICS BY PLACE OF WORK, 1990 and 2000

| Selected Characteristics (Universe: All Workers) | 1990 | | 2000 | | Change 1990 to 2000 | |
|---|---|---|---|---|---|---|
| | Number | Percent | Number | Percent | Number | Percent |
| **Workers 16 years or over** | **940,397** | **100** | **956,460** | **100** | **16,063** | **1.7** |
| **Sex** | | | | | | |
| Male | 517,626 | 55.0 | 518,850 | 54.2 | 1,224 | 0.2 |
| Female | 422,771 | 45.0 | 437,605 | 45.8 | 14,834 | 3.5 |
| **Mode to work** | | | | | | |
| Drove alone | 688,343 | 73.2 | 716,235 | 74.9 | 27,892 | 4.1 |
| 2-person carpool | 115,291 | 12.3 | 106,140 | 11.1 | -9,151 | -7.9 |
| 3-or-more-person carpool | 28,943 | 3.1 | 30,055 | 3.1 | 1,112 | 3.8 |
| Bus or trolley bus | 42,291 | 4.5 | 37,365 | 3.9 | -4,926 | -11.6 |
| All other transit[1] | 8,156 | 0.9 | 7,760 | 0.8 | -396 | -4.9 |
| Bicycle or walked | 27,126 | 2.9 | 23,425 | 2.4 | -3,701 | -13.6 |
| Taxicab, motorcycle, or other mode | 12,156 | 1.3 | 11,340 | 1.2 | -816 | -6.7 |
| Worked at home | 18,091 | 1.9 | 24,150 | 2.5 | 6,059 | 33.5 |
| **Travel time to work** (Universe = Workers who did not work at home) | | | | | | |
| Less than 5 | 15,457 | 1.7 | 11,825 | 1.3 | -3,632 | -23.5 |
| 5 to 9 | 60,450 | 6.6 | 50,525 | 5.4 | -9,925 | -16.4 |
| 10 to 14 | 107,167 | 11.6 | 91,260 | 9.8 | -15,907 | -14.8 |
| 15 to 19 | 145,231 | 15.7 | 124,580 | 13.4 | -20,651 | -14.2 |
| 20 to 29 | 203,656 | 22.1 | 182,640 | 19.6 | -21,016 | -10.3 |
| 30 to 44 | 254,229 | 27.6 | 257,555 | 27.6 | 3,326 | 1.3 |
| 45- 59 | 84,115 | 9.1 | 111,525 | 12.0 | 27,410 | 32.6 |
| 60 or more | 52,001 | 5.6 | 102,400 | 11.0 | 50,399 | 96.9 |
| **Mean travel time (minutes)** | 25.5 | (X) | 31.0 | (X) | 5.5 | (X) |
| **Median travel time (minutes)** | 24.5 | (X) | 30.0 | (X) | 5.5 | (X) |

## TABLE 2. MODE TO WORK BY TRAVEL TIME, 2000

(Universe = Workers who did not work at home)

| | Mean travel time (mins.) | Total | Less than 10 minutes | 10 to 19 minutes | 20 to 29 minutes | 30 to 44 minutes | 45 -59 minutes | 60 or more minutes |
|---|---|---|---|---|---|---|---|---|
| **Total** | **31.0** | **932,310** | **62,350** | **215,840** | **182,640** | **257,555** | **111,525** | **102,400** |
| Row percent | | 100 | 6.7 | 23.2 | 19.6 | 27.6 | 12.0 | 11.0 |
| Column percent | | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| **Drove alone** | **29.9** | **716,235** | 43,860 | 167,450 | 148,330 | 203,755 | 86,705 | 66,130 |
| Row percent | | 100 | 6.1 | 23.4 | 20.7 | 28.4 | 12.1 | 9.2 |
| Column percent | | 76.8 | 70.3 | 77.6 | 81.2 | 79.1 | 77.7 | 64.6 |
| **2-person carpool** | **30.9** | **106,140** | 6,080 | 25,180 | 21,125 | 29,780 | 12,870 | 11,105 |
| Row percent | | 100 | 5.7 | 23.7 | 19.9 | 28.1 | 12.1 | 10.5 |
| Column percent | | 11.4 | 9.8 | 11.7 | 11.6 | 11.6 | 11.5 | 10.8 |
| **3+ carpool** | **34.6** | **30,055** | 1,410 | 6,585 | 5,195 | 8,475 | 3,790 | 4,600 |
| Row percent | | 100 | 4.7 | 21.9 | 17.3 | 28.2 | 12.6 | 15.3 |
| Column percent | | 3.2 | 2.3 | 3.1 | 2.8 | 3.3 | 3.4 | 4.5 |
| **Bus or trolley bus** | **52.1** | **37,365** | 645 | 3,815 | 3,600 | 9,345 | 5,325 | 14,630 |
| Row percent | | 100 | 1.7 | 10.2 | 9.6 | 25.0 | 14.3 | 39.2 |
| Column percent | | 4.0 | 1.0 | 1.8 | 2.0 | 3.6 | 4.8 | 14.3 |
| **All other transit[1]** | **51.8** | **7,760** | 40 | 480 | 660 | 1,950 | 1,630 | 3,000 |
| Row percent | | 100 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Column percent | | 0.8 | 0.1 | 0.2 | 0.4 | 0.8 | 1.5 | 2.9 |
| **Bicycle or walked** | **14.4** | **23,425** | 8,900 | 9,425 | 2,170 | 1,975 | 359 | 585 |
| Row percent | | 100 | 38.0 | 40.2 | 9.3 | 8.4 | 1.5 | 2.5 |
| Column percent | | 2.5 | 14.3 | 4.4 | 1.2 | 0.8 | 0.3 | 0.6 |
| **All other modes[1]** | **44.1** | **11,340** | 1,415 | 2,910 | 1,555 | 2,275 | 840 | 2,345 |
| Row percent | | 100 | 12.5 | 25.7 | 13.7 | 20.1 | 7.4 | 20.7 |
| Column percent | | 1.2 | 2.3 | 1.3 | 0.9 | 0.9 | 0.8 | 2.3 |

## TABLE 3. MODE TO WORK BY VEHICLES AVAILABLE IN HOUSEHOLDS

| Mode to Work (Universe = Workers living in households) | Workers living in households… | | | |
|---|---|---|---|---|
| | Total | Without a vehicle | With 1 vehicle | With 2+ vehicles |
| **Total** | **952,850** | **54,280** | **255,630** | **642,935** |
| Drove alone | 715,500 | 20,935 | 174,190 | 520,375 |
| 2-person carpool | 105,995 | 5,385 | 36,420 | 64,190 |
| 3-or-more-person carpool | 29,845 | 2,795 | 10,130 | 16,910 |
| Bus or trolley bus | 37,055 | 14,100 | 13,380 | 9,575 |
| Streetcar, trolley car, subway, or elevated, Railroad or Ferryboat | 7,705 | 840 | 2,715 | 4,150 |
| Bicycle or walked | 21,755 | 6,860 | 8,525 | 6,365 |
| Taxicab, motorcycle or other means | 11,215 | 2,190 | 3,575 | 5,450 |
| Worked at Home | 23,785 | 1,170 | 6,700 | 15,915 |

## TABLE 4. SEX OF WORKER BY INDUSTRY

| (Universe = All Workers) | All Workers | Sex | |
|---|---|---|---|
| | | Male | Female |
| **Workers 16 years and over** | **956,460** | **518,850** | **437,605** |
| **Industry** | | | |
| Agriculture, forestry, fishing and hunting and mining | 6,590 | 4,835 | 1,755 |
| Construction | 61,090 | 55,220 | 5,870 |
| Manufacturing | 67,820 | 41,320 | 26,500 |
| Wholesale trade | 58,390 | 38,110 | 20,285 |
| Retail trade | 112,845 | 61,115 | 51,725 |
| Transportation and warehousing and utilities | 79,050 | 56,405 | 22,650 |
| Information | 31,030 | 18,420 | 12,610 |
| Finance, insurance, real estate and rental and leasing | 75,225 | 35,755 | 39,465 |
| Profess., scientific, management, administrative, waste management | 109,830 | 59,135 | 50,695 |
| Educational, health and social services | 173,715 | 50,205 | 123,510 |
| Arts, entertainment, recreation, accommodation and food services | 83,170 | 45,665 | 37,505 |
| Other services (except public administration) | 51,365 | 25,820 | 25,545 |
| Public administration | 43,930 | 24,765 | 19,165 |
| Armed forces | 2,410 | 2,085 | 325 |

# Appendix B

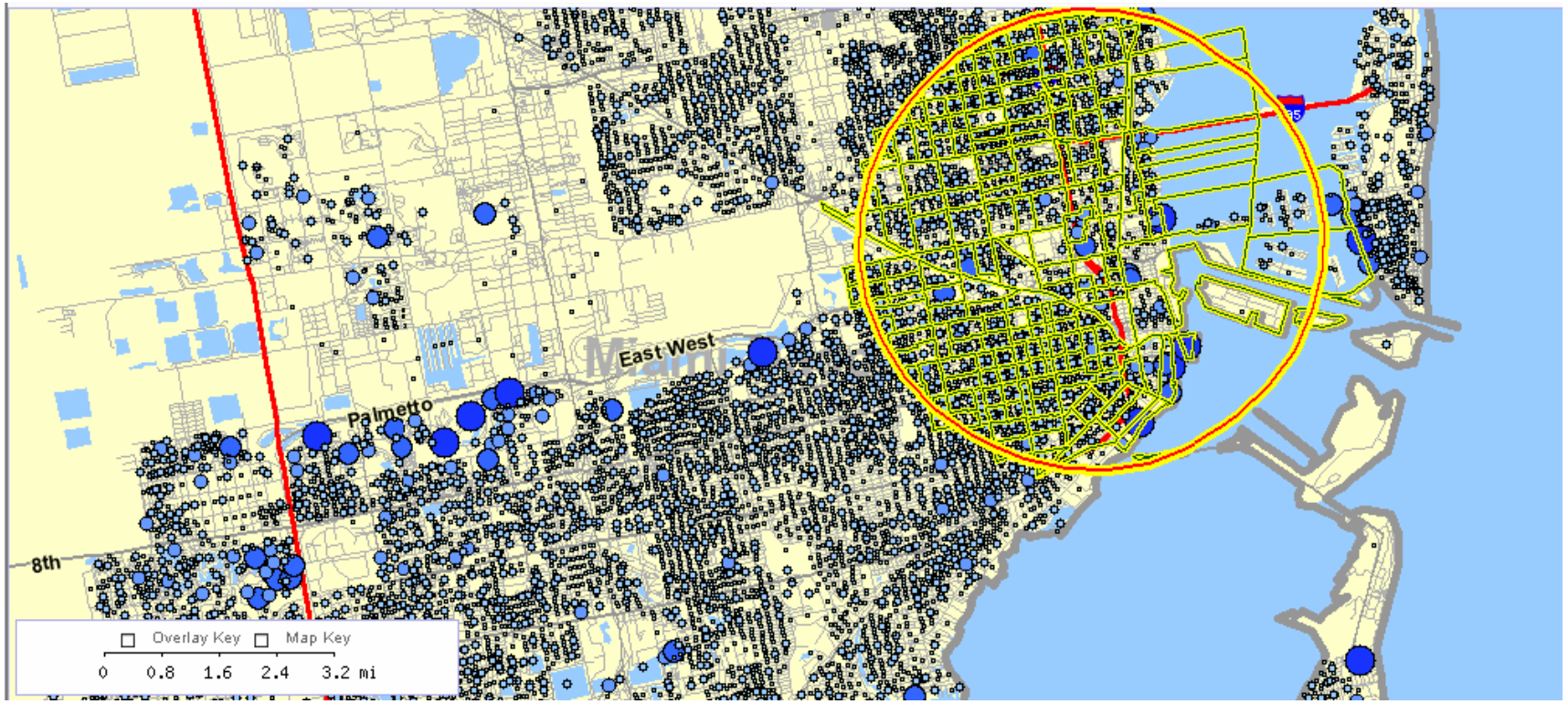


**Figure 3 Commute Trip Patterns to Miami CBD**

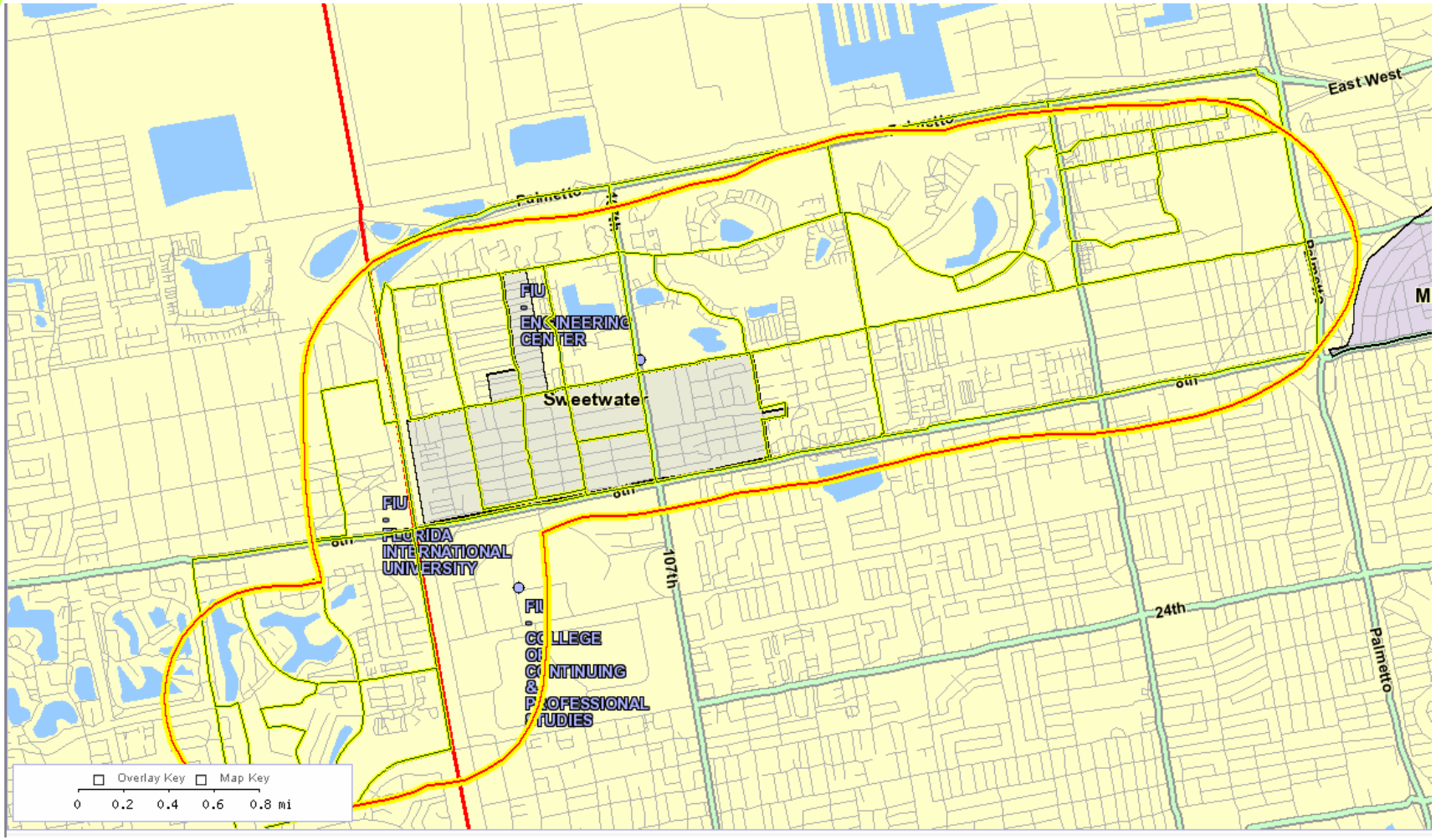


**Figure 4 Southwest Cluster**

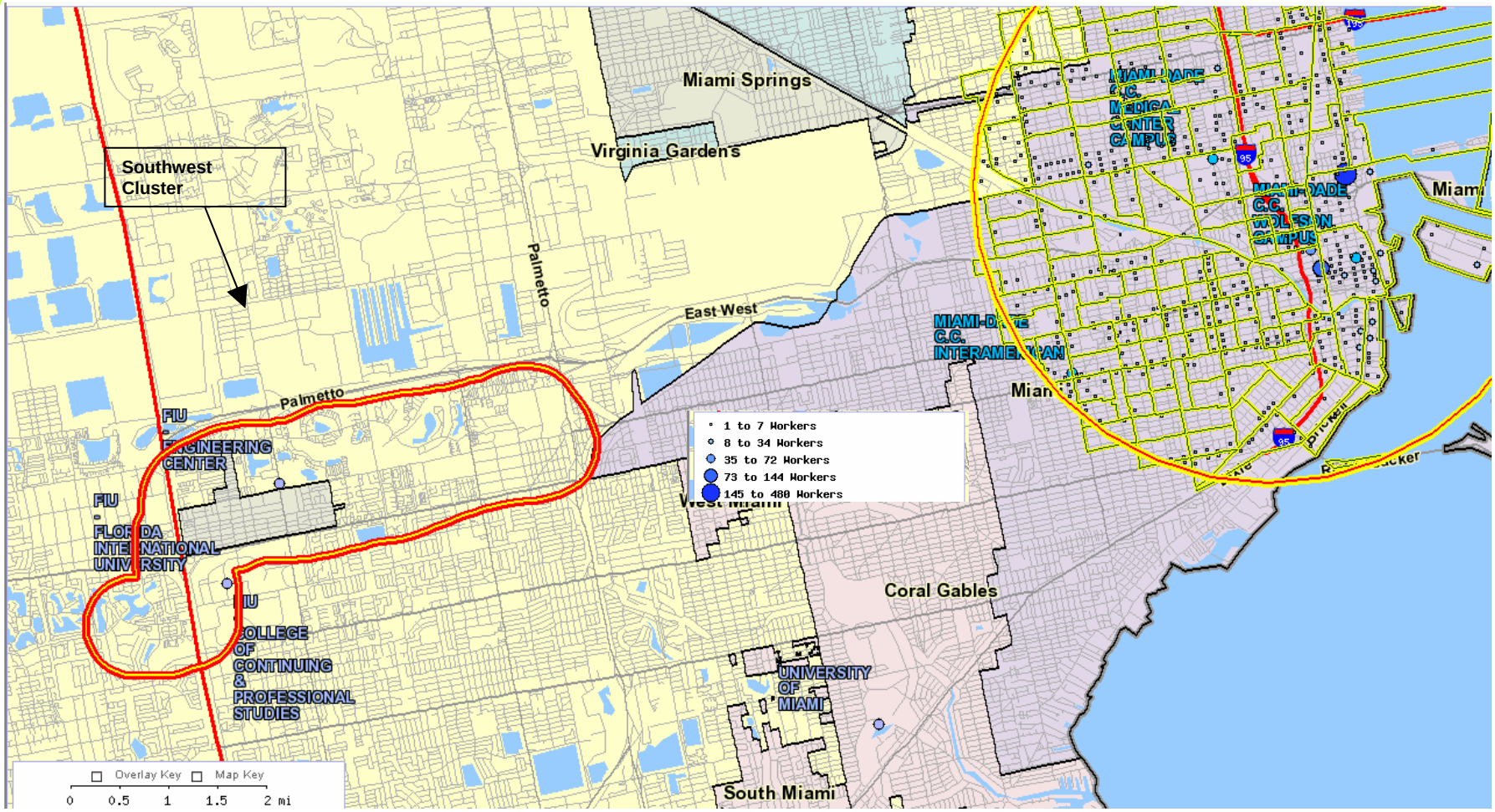


**Figure 5 Work-Trip Origin-Destination**

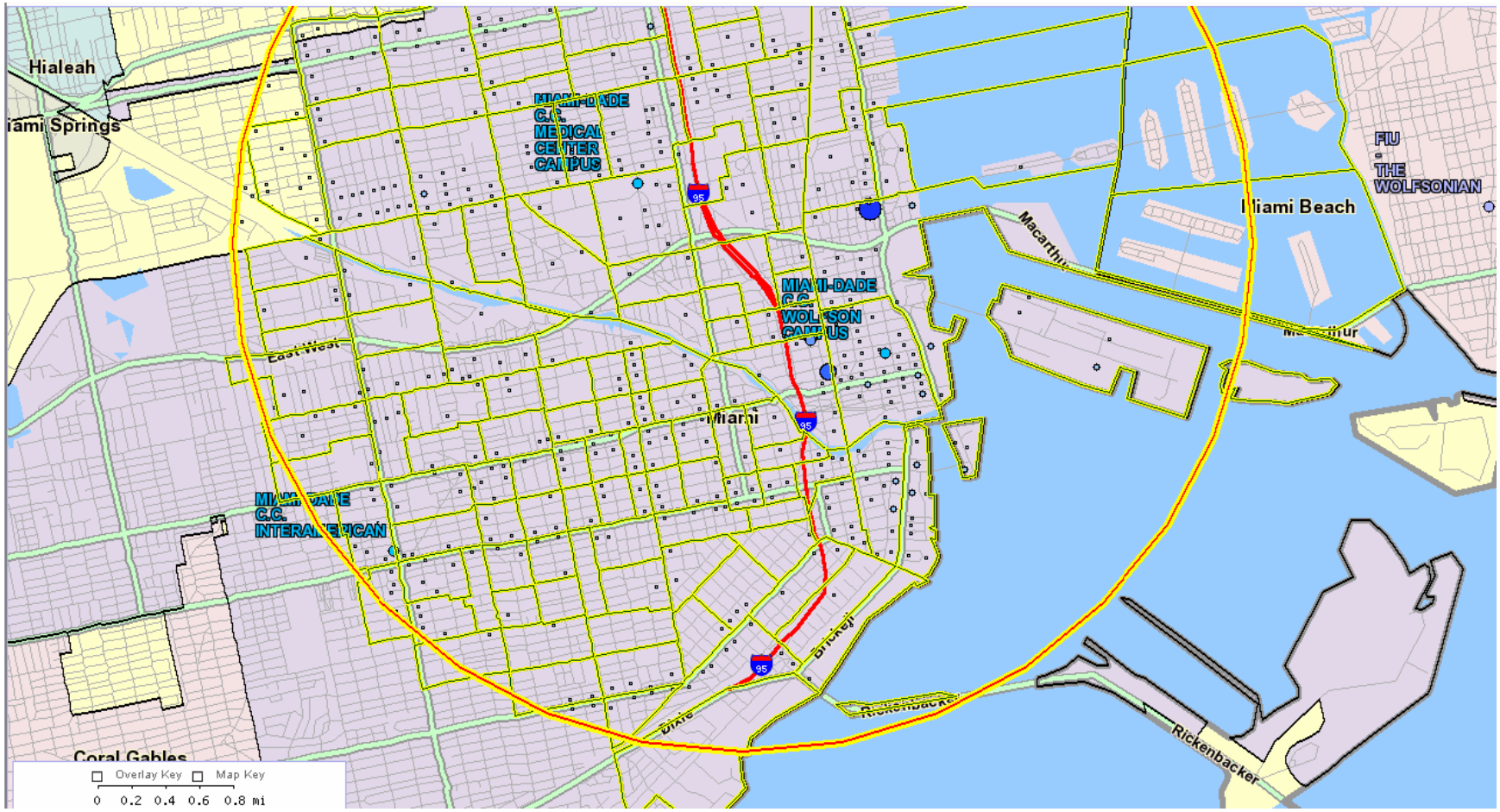


**Figure 6 Workers of Southwest Clusters working at CBD**