

Improving Relationships Between  
Public Transit Authorities and Medical Centers:  
Case Studies and Applications to the Illinois Medical District  
(Chicago, Illinois) and Centro Medico (San Juan, Puerto Rico)

by

Lillian C. Shuey

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Wellesley College, 1999

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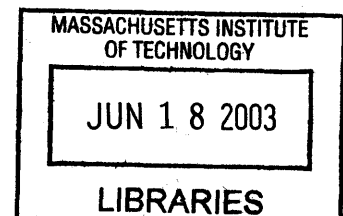
Certified by \_\_\_\_\_

Professor Ralph Gakenheimer  
Department of Urban Studies and Planning  
Thesis Supervisor

Accepted by \_\_\_\_\_

Professor Langley Keyes  
Chair, MCP Committee  
Department of Urban Studies and Planning

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Submitted to the Department of Urban Studies on May 22, 2003 in partial Fulfillment of  
the Requirements for the Degree of Master of City Planning

**ABSTRACT**

This thesis addresses transportation and mobility at urban medical centers, concluding that prioritizing transit access at medical centers has the potential to fundamentally transform the hospital experience by reducing congestion, increasing efficiency, improving the built environment, avoiding the deadening effect of parking garages, and improving quality of care. The thesis considers the implications of improved public transportation on medical centers, as well as the impact of hospital ridership on transit authorities via a softened peak service period, increased off-peak ridership, and the availability of origin-destination data.

The institutional structure and physical design of four major medical research centers are examined for successes and flaws, as are the policies and service of the associated transit authority. Observations from these case studies are then applied to Chicago's Illinois Medical District and San Juan's Centro Medico, areas currently undergoing major capital investments in transportation infrastructure.

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**Table of Contents**

**ABSTRACT.....2**

**NOTES .....5**

Sponsorship .....5

Biography .....5

Note of thanks.....5

**EXECUTIVE SUMMARY .....6**

**A. INTRODUCTION .....8**

Medical Centers .....10

**B. BENEFITS TO MEDICAL CENTERS OF IMPROVED PUBLIC  
TRANSPORTATION .....14**

Decreased Congestion ..... 14

Improved Emergency Access ..... 15

Parking Costs ..... 15

Real Estate Efficiency..... 16

Improved Medical Practice Efficiency ..... 18

Improved quality of care..... 18

Equity ..... 18

**C. BENEFITS TO TRANSIT AUTHORITIES TO IMPROVING MEDICAL CENTER  
SERVICE.....20**

Potential Ridership..... 20

Planning, Design & Architecture Services ..... 21

Development..... 22

Innovation..... 22

Health ..... 23

**D. CASE STUDIES .....24**

Texas Medical Center (TMC)..... 24

Baltimore: Johns Hopkins Medicine (JHM) ..... 30

Boston: Longwood Medical and Academic Area (LMA) Mass General Hospital Campus (MGH)..... 36

Massachusetts Bay Transportation Authority (MBTA)..... 37

Longwood Medical and Academic Area (LMA)..... 37

Massachusetts General Hospital (MGH) ..... 42

**E. ILLINOIS MEDICAL DISTRICT (WEST SIDE MEDICAL CENTER), CHICAGO, IL  
.....44**

Analysis ..... 53

Chicago Recommendations .....54

**F. CENTRO MEDICO, SAN JUAN, PR.....56**

    Analysis .....57

    Tren Urbano Recommendations .....58

**G. CONCLUSION.....59**

**H. APPENDIX.....60**

    Peak Period Parking Accumulations at Texas Medical Center, Houston, TX .....61

    Endnotes .....61

    Endnotes .....62

## **Notes**

### **Sponsorship**

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### **Biography**

Lillian Shuey graduated from Wellesley College with a BA in English in 1999, cum laude and with honors in English. During two years at the Rhode Island Department of Environmental Management she purchased land for the state park system. In 1998 she spent five months living in Nepal, researching transportation infrastructure and policy. In 1994 she was awarded the Nynex Science and Technology Award for water quality restoration work.

### **Note of thanks**

Thank you to Cecily Way for her great work and spirit; to Ginny Siggia, for her patience and administrative efforts; to Jeff Sriver, for his advice; to the Scovilles, for their hospitality; and to Mark Maloney, who oversaw my work at CTA during Summer 2002. Somehow Mark convinced the powers that be that I ought to be certified for track work, and because of him I will always be able to say that I got to cross the third rail.

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And as always to my family, including the new addition.

## Executive Summary

This thesis addresses transportation and mobility at urban medical centers. Previous research suggests that improving access to hospitals is important to public health. This research considers the implications of congestion on patient care, hospital costs, and medical center efficiency, concluding that hospitals have much to gain from better public transportation.

This research also addresses hospital accessibility from the point of view of public transportation authorities. The potential benefits to public transportation authorities are impressive: medical centers are large trip generators and their planning groups can be rich sources of origin-destination data. Medical centers also have significant control over factors that influence transit use but are out of a transit authority's control, such as land use and parking ratios. The barriers to improved relationships between these two types of institutions are also considered.

The institutional structure and physical design of four major medical research centers are examined for successes and flaws, as are the policies and service of the associated transit authority. Observations from these case studies are then applied to Chicago's Illinois Medical District and San Juan's Centro Medico, areas currently undergoing major capital investments in transportation infrastructure.

The thesis illustrates ways in which medical center mobility might be improved by reviewing the cases of Johns Hopkins Medicine in Baltimore, Texas Medical Center in Houston, and two Boston medical centers, MGH and Longwood. It concludes with an analysis of current mobility conditions at Illinois Medical District and Centro Medico, as well as the following recommendations for improving public transportation to medical centers:

### Transit Authorities should....

- ... Treat institutions like important customers by assigning a dedicated unit to institutional relations. Transit authority personnel should coordinate between relevant departments such as marketing, pass sales, bus scheduling and capital construction.
- ... Develop an H-Pass program for hospital employees based on the U-Pass model of bulk purchase of transit passes by universities for their students.
- ... Push for institutional zoning regulations that address air quality standards
- ... Look for opportunities to cultivate ridership, such as campus shuttles.
- ... Collaborate with hospital mobility councils.
- ... Partner with medical center on capital improvements.

### Medical Centers should....

- ... Recognize the importance of transit to operating a manageable campus at the densities hospitals require.
- ... Coordinate public transportation improvements with those for emergency vehicle access.
- ... Encourage transit use among employees.
- ... Prioritize visitor parking over employee parking by moving employee parking to peripheral lots.
- ... Prohibit above-ground parking structures and limit on-campus parking to underground structures.
- ... Educate members about the cost effectiveness of transit pass subsidies and market-rate parking.
- ... Design for transit use: increase densities around transit stations, create pedestrian-friendly streets, add bicycle amenities, and improve signage.
- ... Zone for uses that will allow employees to spend the day on campus without needing their car.

### City Planning/Mayor's Office should...

- ... Make hospital accessibility a policy priority.
- ... Use hospital transportation issues to address air quality compliance.
- ... Establish a transit element in the institutional zoning regulations that is subject to review.

Transit element might include: parking ratio maximums; requirements for medical institutions to coordinate with transit authorities on bulk transit pass purchases and employee trip-making data; periodic review by the zoning commission, transit authority, city transportation planners and clean air administrators; limits to campus expansion; and pedestrian amenities.

Prioritizing transit access at medical centers has the potential to fundamentally transform the hospital experience by reducing congestion, increasing efficiency, improving the built environment, avoiding the deadening effect of parking garages, and improving the quality of care. Improvements are currently blocked by an inability to move beyond institutional boundaries, but the potential for change is there.

## A. Introduction

This research demonstrates that public transportation improvements can help transform intimidating, congested urban hospitals into stimulating, secure and attractive environments. Many of the nation's most renowned medical centers, often their regions' biggest employers, are difficult to access and navigate. This situation burdens patients, wastes employee time, and creates barriers to patient care. Working together, hospitals and transit authorities can make decisions that will address these issues by reducing congestion, increasing communication, and transforming campus aesthetics.

This research discusses ways in which transit authorities and medical centers have worked together to improve medical center mobility at Johns Hopkins Medicine, Texas Medical Center and two Boston medical centers, Mass General Hospital and Longwood. It then looks at the current mobility issues facing Centro Medico in San Juan, PR, and West Side Medical District in Chicago.

Hospitals are not easy to serve via public transportation. They are logistically complex, with multiple user groups, high densities, and extensive emergency access requirements. Their planning staffs are geared toward attracting prestigious faculty and staff, whose benefits may come at the expense of amenities that would better serve the bulk of their employees. Their history as charitable institutions often means they are located in older, depressed neighborhoods, which brings issues of safety, community relations, and congestion. Finally, hospitals must be committed to making their own significant investments in transit-friendly design in order for transit improvements to be effective.

Even if these issues are addressed, public transportation only reduces congestion when service is reliable, safe, and allows riders to move quickly to their final destination. No medical center can expect its employees or patients to choose public transportation if they cannot rely on the authority to be responsive to their needs, and not all riders can reasonably be served by public transportation.

Despite these barriers, there is every reason to expect that cooperation between medical centers and transit authorities will result in reduced congestion, cost savings, and improved quality of experience for both employees and visitors. There have been impressive results in Boston, Houston and Baltimore. The hospitals in these cities have not been damaged by shifting employees to public transportation. Instead, ridership increases have reduced congestion, while new infrastructure has transformed campuses.

Advances occur because hospitals can help ameliorate some of the key weaknesses that affect public transportation service. Major issues for transit that can be better addressed by medical centers include:

- **Lack of data:** Access to human resources data allows transit agencies to understand origin-destination patterns, and to proactively anticipate service needs.



- **Inability to control key exogenous factors:** Medical centers have control over factors that have a large effect on ridership but are out of the hands of transit authorities, such as land-use, parking availability and urban density. By making decisions that are supportive to transit, hospitals will see greater intensity of use yet decreased congestion.
- **Access to customers:** The medical centers under discussion here are the size of small cities, and serving them well can create an impressive jump in ridership. Furthermore, marketing tends to be one of transit's weaker skills, in part because as money-losing enterprises, authorities have trouble justifying non service-related expenses. In contrast, medical centers have direct access to employees and often have strong marketing departments. They can take on the burden of direct marketing to potential users.
- **Annual appropriation funding:** Services subject to annual appropriations (such as maintenance and service planning) are passively discouraged from engaging in long-range planning. This causes important service areas to be structurally weaker than capital projects, which are funded outright. Guaranteed long-term service agreements with medical centers can justify better long-term planning.
- **Access to high-quality design:** To accompany medical advances, hospitals are constantly expanding and building new facilities. They tend to have strong building programs as well as a direct stake in the design of their local stations.

In turn, transit authorities can address some of the most intractable mobility issues facing hospitals.

Major issues for medical centers include:

- **Congestion:** Medical centers are large traffic generators. Associated problems include traffic, emergency vehicle access delays, and lost efficiency as employees and visitors struggle to find parking spaces. Hospitals lose patients and employees who are unwilling to fight congestion. Transit can address these issues by effectively and inexpensively reducing the number of single occupancy vehicles on the roads.
- **Cost:** Parking garages are expensive, with annual amortized costs of \$800 to \$2,000 per garaged space. A convenient garage could be a convenient location for an alternative use; garages are often centrally located on valuable real estate. They are inflexible and so can hinder future development. Transit, in concert with certain design principles, can help address all of these issues.
- **Quality of Care:** Patients who are unwilling or unable to access a hospital are subject to greater numbers of missed appointments or incomplete follow-up care. Better transportation reduces this problem.
- **Campus Environment:** Late nineteenth century medical centers were typically envisioned as campus-like settings. Expansions cost them their retreat-like atmosphere, but not the close

proximity between great institutions and intellects. Better transit allows the densities that contribute to an academic atmosphere, while decreasing the cars and congestion that detract.

- **Emergency Preparedness:** The need for hospitals to be operational during large-scale emergencies means they must be accessible. Developing housing on campus as a congestion mitigation technique also assures availability of staff during weather and security emergencies.

In sum, there are excellent reasons to create a strong working relationship between transit authorities and medical centers. There are also a variety of reasons why this rarely happens. Understanding these failures requires a closer look at how medical centers work.

## **Medical Centers**

Certain characteristics set medical centers apart from other institutions. These characteristics can both help and hinder efforts to improve public transportation.

### **1. Large Trip Generators**

Teaching hospitals tend to be large facilities. Texas Medical Center and Johns Hopkins Medicine, for example, are the largest employers in their respective regions. With a twenty-four hour operation and shifts that are offset from other workplaces, addressing hospital transportation captures a large market without unduly burdening peak travel times.

### **2. Multiple Institutions**

Medical centers are conglomerations of multiple health care institutions. Within one medical center, some institutions may be private, either for-profit or not-for-profit; others may be public hospitals run by city or county governments. This brings a host of financing and planning issues.

### **3. Centralized Planning**

The confusion of multiple institutions is often offset by central planning organizations. Most medical centers have some sort of planning group to address “tragedy of the commons” situations, in which an institution only benefits if every member joins in the effort.

Some shared concerns include:

- **Utility systems.** Hospitals must have guarantees against loss of power and water. Many medical centers invest jointly in utilities such as shared power plants to create redundancy in utility systems.
- **Technology.** Hospitals often share expensive technologies, especially diagnostic services like MRIs or blood labs.

- Institutional zoning. Many urban areas offer Institutional Zoning options within their zoning regulations. In order to benefit from the flexible zoning provisions offered, member institutions must work together to meet municipal requirements.
- Emergency Contingency Planning. Medical centers are on the front line of natural disasters and terrorism. Preparatory planning helps solidify these connections.

Central planning organizations help address these issues, and the six groups investigated here have developed certain common characteristics. However, due to different historical backgrounds, two highly-evolved medical center planning organizations may actually operate quite differently. This issue is revisited in the case studies.

#### **4. High Density**

The link between density and transit has been well-documented elsewhere. For the purpose of this research, it is enough to note that medical centers tend to have higher density requirements than other institutional uses. Despite early excitement over technological advances in off-site care, medical services continue to be delivered at the institution, and high densities result from the fact that a variety of services must be available in one area.

Teaching hospitals compound the density demands. As reported in an article praising a new healthcare facility, “Physicians can see patients in their offices, zip over to the hospital, make rounds, and get back to their offices to see more patients.”<sup>1</sup> Such a schedule is common among physicians and other medical staff who interact with bed-ridden patients (in contrast, out-patients do the traveling while the physicians remain at the office). In order to accommodate this schedule, the various buildings must either be within walking distance of each other or have convenient parking. The walking option is not possible if much of the medical center is devoted to parking garages or highways. Such is the case without viable transit.

#### **5. Tax-Exempt Status**

Many medical center member institutions are tax-exempt due to non-profit or governmental status. The tax-exemptions mean that they can hold unused property for long periods of time without feeling the pressure to recoup the cost of taxes. The tendency to hold land as an investment is known as land banking.

Land banking has many implications for the neighboring community. If a large institution does not feel the pressure to maintain the property for income, the existing buildings may fall into disrepair. Public safety, or simply falling property values due to neglected property, can be a catalyst for neighborhood opposition. In some cases, neglect can pull the community into the decision-making process and spark new planning initiatives. In others, it simply results in deteriorating safety and quality.

Imposing limits to expansion can help address neighborhood tension. It can also spur transit-

friendly development patterns. When non-profit institutions hold large pieces of land, it can seem more attractive to build new infrastructure in low-density, car-dependent patterns, increasing total congestion and the damaging the viability of transit. One way to prevent a hospital from taking over a neighborhood is to have institutions establish growth boundaries when they apply for Institutional Zoning.

## **6. Standing Building Programs**

Part of attracting patients, physicians and grant monies to a medical center is the continual investment in new programs and technology. Successful hospitals have standing building programs that allow them to invest in new buildings to house cutting-edge programs.

The architectural and design expertise that comes with standing building programs makes hospitals a good resource for innovative mobility ideas. It is in the interest of transit authorities to recognize this strength and capitalize on it. Allow medical centers to lead the design of new transit stations and as well as create master plans that shape improved on-campus mobility.

## **7. Accessibility – Markets and Emergency Access**

Industry guidelines for how to properly locate a new hospital emphasize the importance of access to the patient and physician markets.<sup>2</sup> Transit may or may not play a key role in this equation, depending on the modes of travel used in the municipality. Factors weighed vary with the population being targeted, but include quality of roads, quality of public transportation, emergency vehicle access, and mobility within the medical center.

Investments in emergency vehicle access can also support improved general mobility. Exclusive lanes, for example, can be less cost-prohibitive by being used for buses and paratransit vehicles.

## **8. Equity Issues**

Hospitals need to be accessible to the poor, the elderly and the disabled. Urban hospitals in particular tend to serve a significant population of low-income individuals who are more likely than others to rely on public transportation.

Some users are better served by paratransit than by improved mainline service. As noted in a May 2003 hearing between the US House of Representatives' Committee on Transportation and Infrastructure with the Committee on Education and the Workforce, the population being served by auxiliary services is growing rapidly.<sup>3</sup> Between the 1990 and 2000 Censuses there was a 12 percent increase in those aged 65 or older and a 7 percent increase in those below the poverty line. Services supporting these populations need to be incorporated into campus mobility plans. As the federal government considers ways to streamline transportation programs, it would be wise for hospitals to consider what role they might have in coordinating these services.

## **9. University Connections**

World-class medical centers have hospitals with teaching affiliations. As noted in literature on U-Pass programs, universities offer a unique opportunity to test innovative transportation policies. Two aspects are particularly salient: 1) University student populations turn over regularly, allowing the administration to phase in new policies with a new class. This tends to allow more controversial experiments to meet less resistance. 2) Students are what Fred Salvucci, lecturer at MIT's Center for Transportation and Logistics, calls "the temporarily poor." University students are particularly budget-conscious while in school. Later, they are likely to be among the more affluent Americans, putting them in the position to purchase automobiles. Students with a favorable introduction to public transportation are in a position to become choice riders.

## **10. Innovation**

A less tangible but interesting aspect of medical centers is their tendency toward innovation. As Andy Icken, Executive Vice President of Texas Medical Center put it, "We are innovators by nature." He recounts a clash with the City of Houston over increased densities for TMC and Rice University: "Malcolm Gills of Rice expressed it: Why is Harvard all together, and not separate spread out areas? Why are we great, and not any other institution? Because concentration is what allows the collaboration of research that makes us great."<sup>4</sup>

The desire for excellence, and the conviction that collaboration is the way to achieve it, is the force that ultimately drives these institutions to maintain their density. The only way to combine density with an attractive campus is through high quality public transportation. Ultimately, transit authorities and medical centers need to work together to enable these institutions to keep expanding while maintaining their spirit of collaboration and achievement.

## **B. Benefits to Medical Centers of Improved Public Transportation**

Understanding the nature of medical centers is one aspect of improving campus mobility. A second aspect is convincing the parties involved that public transportation is an important investment. This chapter focuses on the benefits that can accrue to medical centers through collaboration with public transportation authorities.

### **Decreased Congestion**

The issue at the heart of hospital mobility issues is congestion. Congestion delays emergency vehicles, wastes employee time, disrupts movement of goods and services, and frustrates visitors. The typical policy response to congestion is dilution. An additional traffic lane, a new parking garage, a new building on a peripheral parcel; these are intuitive, but usually mistaken, reactions to congestion. Such fixes are expensive, so that while congestion wastes time, its alleviation requires expensive solutions. Furthermore, increased street width does not complement the campus-like atmosphere favored by hospitals. Automobile infrastructure may also conflict with the internal mobility of the campus.

A more appropriate solution for medical centers is improved public transportation service. Transit is an important tool for combating congestion. One bus has the potential to displace forty to sixty vehicles, dramatically reducing the number of automobiles on the road. Trains and subways can be even more effective because they do not contribute to existing automotive traffic (unless they reduce an existing right-of-way).

Public transportation has the potential to be quite competitive at medical centers. Transit typically works best among commuter trips to dense areas such as central business districts. The reasons for this were illustrated in a recent survey by the Chicago Transit Authority, which found that the most important reasons people chose CTA service were lack of parking, high cost of parking and traffic delays.<sup>5</sup> In a dense environment like a hospital, parking prices can be high and peak-hour congestion takes some of the pleasure out of driving. Medical centers with at least these baseline characteristics should find transit to be a viable alternative.

If employees are a good target market, first-time patients or visitors are not. Patients are sick. They may be agitated, unfamiliar with their surroundings, or need special transportation. Visitors share some of these characteristics, and they often arrive in groups, and so require fewer parking spaces per person than similar numbers of employees. Finally, the advertising and public information needed to convince a person to use public transportation would be better spent on an employee who travels to campus repeatedly rather than a one-time visitor. The real benefit of improved transit to hospitals lies in public transportation's ability to provide low-cost and efficient service for hospital employees and students.

## Improved Emergency Access

Decreased congestion helps ease the passage of emergency vehicles in mixed traffic. Whether or not this is a significant improvement, the perception that it *might* be is an important tool for reducing congestion for all its other benefits. The fear of losing a life due to delays in traffic is a powerful incentive for change.

Medical centers can combine transit improvements with those aimed at emergency vehicles.<sup>6</sup> Investments in transit amenities such as dedicated lanes/contra-flow lanes, signal prioritization and improved ITS can be useful for EMS, taxis and paratransit as well. The investments that would be difficult to justify for only one type of trip can become more fiscally sound when used for transit, police and EMS together. Detailed analysis of this issue is beyond the scope of this research, but the policy decisions to put such a framework in place are not. Partnerships between EMS, hospital communications staff, traffic engineers and public transportation staff have the potential to create mutually beneficial improvements.

## Parking Costs

By making public transportation a viable option, medical centers can decrease the pressure to build new parking lots. Parking involves considerable costs. Spaces can cost between \$3,000/space for a surface lot to \$20,000/space in a parking structure. The LMA in Boston reports spending \$60,000 per space for an underground parking lot.<sup>7</sup>

A quick financial analysis indicates why preventing the need for new parking spaces is so essential. The table below shows a range of annual costs for a parking space, considering capital costs and amortization:

|                | Surface Lot     |              | Parking Structure |               |
|----------------|-----------------|--------------|-------------------|---------------|
|                | Middle Estimate | Low Estimate | Middle Estimate   | High Estimate |
| Cost per Space | \$ 3,000        | \$ 10,000    | \$ 15,000         | \$ 20,000     |
| Interest Rate  | 6.00%           | 5.00%        | 6.00%             | 8.00%         |
| Period (yr)    | 20              | 20           | 20                | 20            |
| Annual Cost    | \$ 262          | \$ 802       | \$ 1,308          | \$ 2,037      |

From TCRP No. 37 Transportation on College and University Campuses 2001

**Figure 1. Range of values for annual costs of parking.**

The annual costs, which vary from \$262 to \$2037, do not incorporate operation costs or the losses accrued when surface lot spaces are lost to a new parking structure built in the same location. User fees need to be quite high in order to cover the capital costs alone. Surface lots, while less expensive, are likely to include the additional costs of shuttles that are often necessary to support satellite parking. In

short, any company giving free parking to its employees is offering a significant subsidy. When companies also neglect to offer free transit passes, it further punishes public transportation users.

Parking ratios vary by context. At Longwood Medical Center in Boston, for example, home of Beth Israel/Deaconess hospitals, the parking ratio is 3 employees: 1 space. Many employees arrive via public transportation and so do not need their own parking space. In suburban locations, however, the parking ratio might be reversed, with more than one space required for each employee simply because the only transportation option is the automobile. A one employee: one space ratio would be impossible during shift changes.

Unfortunately for many suburban medical centers, suburban hospitals retain the densities associated with public transportation-friendly environments but not the context to provide it. Suburban hospitals, like urban ones, have employees moving from an office to lab to patient quarters throughout the day. They typically have floor area ratios (FARs) that are higher than their surroundings. However, their employees, visitors and patients are culled from suburban environments poorly served by public transportation. Such medical centers spend large amounts of money on parking infrastructure despite having less space to do so than their neighbors. This results in either large surface parking lots at a distance from the hospital entrance or expensive parking garages.

## **Real Estate Efficiency**

Financial losses are not limited to the outlay of funds for parking garages. Losses are incurred because real estate is used for parking – a supportive use -- that could be otherwise occupied by a productive use. Every time a parking garage is located a convenient distance to employment, the parcel would also be a convenient location for something else. Providing convenient parking means setting aside huge portions of centrally-located land for an unproductive use.

Not all users are the same, and their different driving patterns require different parking priorities. Visitors, for example, may be coming for only one or two visits and may be in a state of heightened stress. Their parking must be clearly marked and convenient to the hospital entrance. Visitors also need fewer spaces per capita than other drivers because they have high turnover rates. For example, the parking demand table below from Longwood Medical and Academic Community indicates that each parking space used in a visitor lot (called “Non Work”) sees 3.3 vehicles per day, compared to 1 vehicle in lots serving employees (called “Work(non inpatient)”.<sup>8</sup> Thus hospitals can provide fewer spaces than there are daily visitors.



|                     | Vehicles | Vehicles/<br>Space/Day | Parking<br>Demand |
|---------------------|----------|------------------------|-------------------|
| Work(non inpatient) | 984      | 1                      | 984               |
| Work(inpatient)     | 24       | 2.8                    | 9                 |
| Non Work            | 999      | 3.3                    | 303               |

Source: Vanasse Hangen Brustlin, Inc. "Technical Memorandum 2: Five Year Growth Horizon." Longwood Medical Area Transportation Study. April 1988. Comissioned by Medical Area Service Corporation (MASCO)

**Figure 2. Parking Demand and Turnover at Longwood Medical Area (circa 1988)**

In contrast to visitors, employees arrive daily and remain parked for long periods of time. Depending on their occupation, they may not need their cars during the day. To accommodate the necessary overlay at shift changes requires more than one parking space per employee automobile. Hospitals can further minimize the need for employee access to cars by providing retail space for services that spur chain trips such as lunch counters and dry cleaning. Further design ideas are covered extensively by other authors.<sup>9</sup> The key point is that it is wasteful to use centrally-located property to warehouse employee vehicles. As repeat visitors, they can be shifted to less obvious locations.

Another aspect of real estate efficiency is that parking structures are difficult to convert once built. As a space-saving measure, many garages are built with parking on a slope that serves to access the next level. These slope-built parking garages are difficult to convert into any other sort of use. Even regular garages often have low ceilings and structural issues that make them difficult to reuse.

Permanent structures are particularly inappropriate in the healthcare industry, whose campuses are continually undergoing change as they build new facilities and update older ones. As reported in Miller and Swenson's new book *Hospital and Healthcare Facility Design*, hospitals today are moving away from specialization:

More and more, architects are asked to create "womb to tomb" environmental solutions – structures and facilities that serve a multiplicity of users and that are capable of evolving with maturing needs.<sup>10</sup>

Hospital buildings need to be flexible, ready to adapt to changing technology and innovation. A centrally-located slope-built parking structure does not fit this profile.

The result is a pattern of cheaply-built parking structures with a short life-span.<sup>11</sup> In financial terms, they must be inexpensive enough so that they can be torn down when new construction requires some sort of alteration. In design terms, such garages tend to be squat and squeezed into small spaces or, alternatively, truly enormous, dwarfing the people who use them. They often lack the softening elements that can improve garages, such as finished surfaces, bright lighting, plants and decorations.<sup>12</sup>

They create an intimidating atmosphere for the pedestrian, which is a key part of attracting increased transit ridership. This only fuels a cycle of fewer transit riders and greater demand for parking.

### **Improved Medical Practice Efficiency**

Missed medical appointments are another aspect of cost savings where transportation comes to bear. Missed appointments continually challenge the healthcare industry, especially among outpatients scheduling follow-up visits. In order to manage the high percentages of missed appointments, health care professionals overbook patient appointments. Because there is no guarantee that a particular double-booked slot will be the one missed, there is a tendency toward lumpy patient scheduling (and thus long in-office wait times).

One reason patients miss appointments is due to transportation issues – either lack of a ride or inconvenience associated with the length of the ride.<sup>13</sup> In Cheng et al's 1997 study of ways to ensure that tuberculosis tests receive proper follow-up, the authors report that "The most common reasons for failing to return included forgetfulness, transportation, and time constraints."<sup>14</sup> This study found that transportation is an issue at this hospital despite being located in Brooklyn, NY, one of the better-served locations in the US. It is a reminder that quality transportation does not simply mean being able to reach a destination. It also means being able to reach a destination quickly, reliably, and with few transfers.

### **Improved quality of care**

Transportation issues may also contribute to decreased quality of care, as illustrated by a study at Johns Hopkins looking at factors contributing to receiving rehabilitation services for hand injuries.<sup>15</sup> What sets this study apart from others is that it notes the differential effect of disability compensation and injury severity on the amount of therapy services received. It can do this because injury severity is categorized according to specific traits (in the manner of first, second and third-degree burns). In this case, they found that of the 30 subjects who reported not receiving enough therapy, 1/3 cited the inconvenience of therapy hours or difficulty in getting to therapy as reasons.<sup>16</sup> Transportation issues and inconvenient hours are linked because mid-day appointments are subject to lower-frequency service, and because a direct ride by automobile might save time, preventing missed work. This data supports the intuitive conclusion that follow-up care among outpatients ought to be improved with better public transportation.

### **Equity**

It is clear that those without access to health care will suffer from lack of treatment. More specifically, however, studies have concluded that transportation issues affect the quality of treatment and care. A study by the Dept of Health and Kinesiology, Texas A & M University (1997) concluded "patients, particularly minorities, may opt to forgo needed care in the absence of available and affordable means of transportation to treatment facilities." Distance, access to an automobile, and availability of someone to

drive them to the treatment center were potential major problems.<sup>17</sup> Note that the study sorted for race and not for income, meaning it is possible that the racial categories are a proxy for income barriers. In either case, transportation access is an equity issue.

The study mentioned above of patients receiving hand surgery at Johns Hopkins did normalize for race and income. It concluded:

“[n]onwhite subjects were significantly more likely to report unmet need compared with subjects who were white. This finding could not be explained by adjusting for other characteristics such as severity of injury, insurance status, or receipt of disability compensation. When reasons for unmet need were examined by racial group, however, nonwhites more frequently reported transportation problems or inconvenient office hours compared with whites.”<sup>18</sup>

In short, the study makes a credible link between transportation access and racial equity.

The general perception of public transportation is that it serves those without other choices. It is quite true that public transportation to hospitals ought to be good if only to allow equal access by all who need them. However, public transportation improvements at medical centers are only partly about the poor. Despite the findings above, few hospitals can hope to capture a large part of patient visits by public transportation. Public transportation’s strengths lie in capturing repeat visitors taking the same routes each day. The largest benefits to hospitals lie in public transportation’s ability to provide better, less expensive, more efficient service for their employees.

Improved transportation for employees is especially important for the lower-wage employees who might have less access to personal transportation. It is also important for administrative employees, whose shifts overlap with the majority of work-travel trips. Finally, it is important for allowing a pedestrian-friendly campus, and thus allows even those employees at the top of the wage scale to travel around campus without private vehicles.

Low quality transportation is not enough. Reliability is at a premium among commuters, and so any real attempts to shift employees out of single-occupancy vehicles must be accompanied by real improvements in public transportation service. Happily, medical centers have proven that they can use their innovation, energy and high standards to help transit authorities improve service quality. While public transit authorities can create the impetus for change, it is often powerful institutions around them that demand excellence. This is a powerful prescription for change.

## C. Benefits to Transit Authorities to Improving Medical Center Service

### Potential Ridership

For transit authorities, improving service to medical centers means fulfilling their mission to serve the public. It also means accessing a large pool of potential riders. Johns Hopkins Medicine has been the largest employer in Baltimore since the demise of Bethlehem Steel. The combined employees of the forty-two institutions that make up the Texas Medical Center total at least 62,000,<sup>19</sup> making TMC the largest employer in Houston. Longwood Medical and Academic Community employs over 30,000 people. The West Side Medical District in Chicago employs over 42,000 people and is growing. Even moderate investment in these destinations means large ridership increases.

Successful capture of the medical center market affords transit authorities a longer peak period and increased off-peak ridership. This is because different medical center employees work different shifts. Medical staff, for example, are likely to have a five-day schedule starting at 7am, 3pm or 11 pm. More recently, some medical centers have moved to three-day schedules of 12 hour days. Physicians, meanwhile, arrive for surgery at 5 am. Administrative staff work 8 am to 5 pm. The combination of shifts means that transit authorities benefit from a rounder, longer peak. At Texas Medical Center, for example, the morning peak begins at 5 am. Parking accumulation tables show that 60% of parked cars have already arrived by 8:00 am.<sup>20</sup>

**Physicians.** Service issues are complicated by the fact that while most staff remain at one location, physicians may start surgery quite early, leave to teach class, and then move to an office or laboratory in the afternoon. They typically demand centrally-located facilities and/or convenient parking. The only way to feasibly serve this type of rider by public transportation is by having the various offices within walking distance along with frequent shuttle service.

**Students.** Medical centers attract more than just employees. Teaching hospitals attract students, a valuable transit population because they often travel during off-peak hours. U-Pass programs, whereby transit passes are purchased in bulk by the university, stimulate ridership increases, especially during off peak hours. Students are also “future choice riders,” because they are likely to have above-average incomes after they finish school. If their initial exposure to transit is positive, they are more likely than people who have never experienced public transportation to continue using it.

**Patients.** Patients are another constituency, although first-time patients are unlikely candidates for transit. In emergencies, patients are likely to be under stress or physically incapable of making the trip via public transportation. As non-routine visitors, they are less able to adapt to transit use. Visitors are a

poor target for the same reasons. In addition, visitors often travel in groups, arriving by carpool and thus creating less of a load to the system.

**Outpatients** are patients who receive medical treatments without overnight stays. They may be subject to physical constraints, but they tend to return for follow-up visits over multiple days. Initial investigations reveal no record of a marketing campaign targeting outpatients, but it would be an interesting experiment.

## **Planning, Design & Architecture Services**

An important benefit of working with medical centers is that they often have a centralized planning and development staff that can help coordinate multiple institutions. Medical Centers often benefit from shared services and facilities. The extent of the cooperation varies, but there are common themes. Perhaps the cost of particular diagnostic equipment is prohibitive, so two hospitals share the equipment. Member institutions might invest in joint power generators because they are concerned about losing power during a natural disaster. Perhaps the center of campus is becoming crowded, and a group of hospitals decides to build a joint parking garage or create a master plan. Whatever the cause, medical centers often stand to benefit from a standing administrative organization that oversees joint needs. In turn, transit authorities can benefit from having one point of contact.

The medical centers discussed in this paper all have different levels of standing administrative oversight. The Texas Medical Center grants admission to new facilities, manages parking, and engages in planning. MASCO manages the Longwood institutions' parking, engages in planning, oversees transit demand management, runs shuttles, and develops property. ASEM runs joint utilities for the Centro Medico institutions, but parking, planning and new construction are undertaken individually. In short, the umbrella organization has varying amounts of authority, something that is very much a question of its history. However, each organization has at least the potential to engage in area planning.

A key additional benefit is the ability of the planning organization to negotiate bulk purchases of transit passes. Such programs are popular at universities. Called U-Pass programs, they have resulted in impressive increases in trips per rider and off-peak use. An H-Pass program could be run through medical centers.

Another benefit to improving relationships with medical center planning groups is the ability to obtain specific trip information about potential customers. Typically, transit authorities can only guess about what are likely to be popular services. They might look at existing routes, take surveys, or make guesses based on socio-economic information that tends to correlate with ridership. Hospital Human Resources departments, however, can provide zip-code and shift information. This allows transit authorities to see accurate origin-destination patterns at no additional cost.

Transit authorities can also benefit from the expertise of hospital building programs. Hospitals concerned with innovation make a continual investment in facilities, working to update laboratories,

offices and patient care centers. Between smaller changes (office renovations, new equipment) and larger projects (a new hospital wing or research institute), many hospitals find it efficient to have standing planning and development offices. In the Johns Hopkins, Texas Medical Center and MGH examples, the architecture teams at the hospitals worked alongside the transit authority to improve the design criteria for major transportation infrastructure. At MGH, they sponsored an Ideas Competition and contributed to the station expenses. The Transit Authority gained design and planning expertise, which results in improved infrastructure.

## **Development**

Medical planning organizations have an important influence on land uses in their districts, either through zoning, master plans, or their own development. Transit authorities can benefit from transit-friendly policies or suffer under negative ones.

Land use is a major exogenous factor in public transit's success. An easy walk, a shaded street and high density all have an important effect on the viability of transit. Typically, however, transit authorities have little ability to engage in development. Transit Authority real estate offices are concerned with acquiring rights-of-ways for service, negotiating utility easements or overseeing lease agreements. Among the case studies, there is little structural support for joint development projects except at MTA in Maryland, which has a Transit Oriented Development office. New capital projects are sometimes planned with accompanying development, but most transit authorities see themselves as service agencies and not developers. This is as it should be. However, the fact remains that transit is heavily influenced by – and influential on – land-use and development patterns.

The constantly-changing landscape of medical centers invites the opportunity to allow an institution that is much more skilled at development to develop transit-friendly environments. Their standing building programs can incorporate transit-friendly design.

This opportunity is offset by the fact that hospitals are dominated by the needs of physicians and top research scientists, whose space requirements may come at the expense of campus mobility needs.

## **Innovation**

The best teaching hospitals are constantly competing for the highest caliber medical professionals. In marketing literature we see such institutions touting their high-quality facilities, cutting-edge research and excellent quality of care. This competition can be an opportunity for transit authorities.

The competition for quality care is a way of measuring a hospital's success in curing disease and saving lives. It is important for transit authorities to articulate their ability to improve patient care by improving rates of follow-up care.

A focus on cutting-edge research compels these hospitals to hire professional designers. The focus on quality of care means that they have some basic concerns about the patient environment.

Innovative research facilities, however, do not always translate into successful urban environments. The investment in expensive building and equipment can actually have a negative effect on medical campus design, because expensive equipment and signature buildings can be difficult to tear down. What emerges is the classic pattern of urban hospitals: a patchwork of connected structures with multiple activity centers. First-time visitors are inevitably disoriented.

Hospitals wisely decline to destroy their investments and disrupt ongoing service. Better to create a gateway entrance that helps orient the visitor. Better to tie it to transit. The potential to create a signature gateway to a medical center via transit construction is high. Johns Hopkins Medical has done it, and MGH is in the process. Both Centro Medico and Illinois Medical District are at a turning point, where they can choose to do the same.

## **Health**

The employee populations of medical centers are likely to be particularly well-versed in the role of exercise in a healthy lifestyle. Campus improvements that benefit transit also benefit general health: such improvements decrease pollution emissions, encourage short walks, and can even facilitate bike path development.

Biking has been shown to be particularly well-received at MGH, which has the highest number of biking employees in the City of Boston (although it is also the largest single employer in Boston). Generally, design that facilitates bicycle and pedestrian movements can work in tandem with public transportation.

## **D. Case Studies**

The case studies presented here offer an opportunity to observe how different medical centers have responded to mobility concerns, in the hope that they can provide lessons for the Illinois Medical District and Centro Medico.

Both medical centers are ignoring and even acting in ways that work against public transportation. As the Illinois Medical District transforms itself from a hospital and social service compound to a leader in research and technology, it appears to be turning its back on public transit. The older part of campus is associated with the Elevated, while IMDC is modeling new development after a Palo Alto research compound, with tree-lined boulevards, office parks, and vast new parking garages.

Centro Medico, meanwhile, is receiving a brand new heavy rail station with no accompanying institutional response. Despite lanes choked in traffic, no institution has an employee bus pass program, nor is there yet movement by PRHTA to market such a pass for Tren Urbano. Visitors are placed in distant lots, while employees park adjacent to the entrances. There is no internal shuttle system. A rail system with the potential to alleviate so many pressures seems to be arriving without fanfare.

This does not have to be the case. Medical centers in Houston, Baltimore and Boston illustrate specific successes that have been accomplished in redesigning a campus around transit. They also provide some warnings about possible pitfalls.

The cases were chosen less for specific physical criteria than for their reputations. The intent is to determine whether urban medical centers have been able to combine campus modernization with increasing reliance on public transportation. With so much focus among hospitals on reputation, it seems wise to look at some of the most renowned medical centers and see if they were successful.

### **Texas Medical Center (TMC)**

Texas Medical Center holds key lessons for how to manage a working relationship between a transit authority and a medical center. It illustrates how service improvements can transform a limited relationship into one of trust and mutual dependence, resulting in large physical infrastructure improvements and long-term planning.

TMC is a collection of 42 non-profit healthcare institutions located on a 750-acre campus in Houston, Texas. Together, the institutions are the largest employer in the region, with more than 62,000 employees. The local public transit authority, Houston METRO, runs nine bus routes and shuttles through the area, and will open a new light-rail system with multiple TMC stops in January 2004.

One factor that sets Houston apart from other cities is its low level of government regulation. Houston has no zoning and voter approval is required for most public works projects. Because of its need for infrastructure investments, METRO works particularly hard at maintaining strong public support.



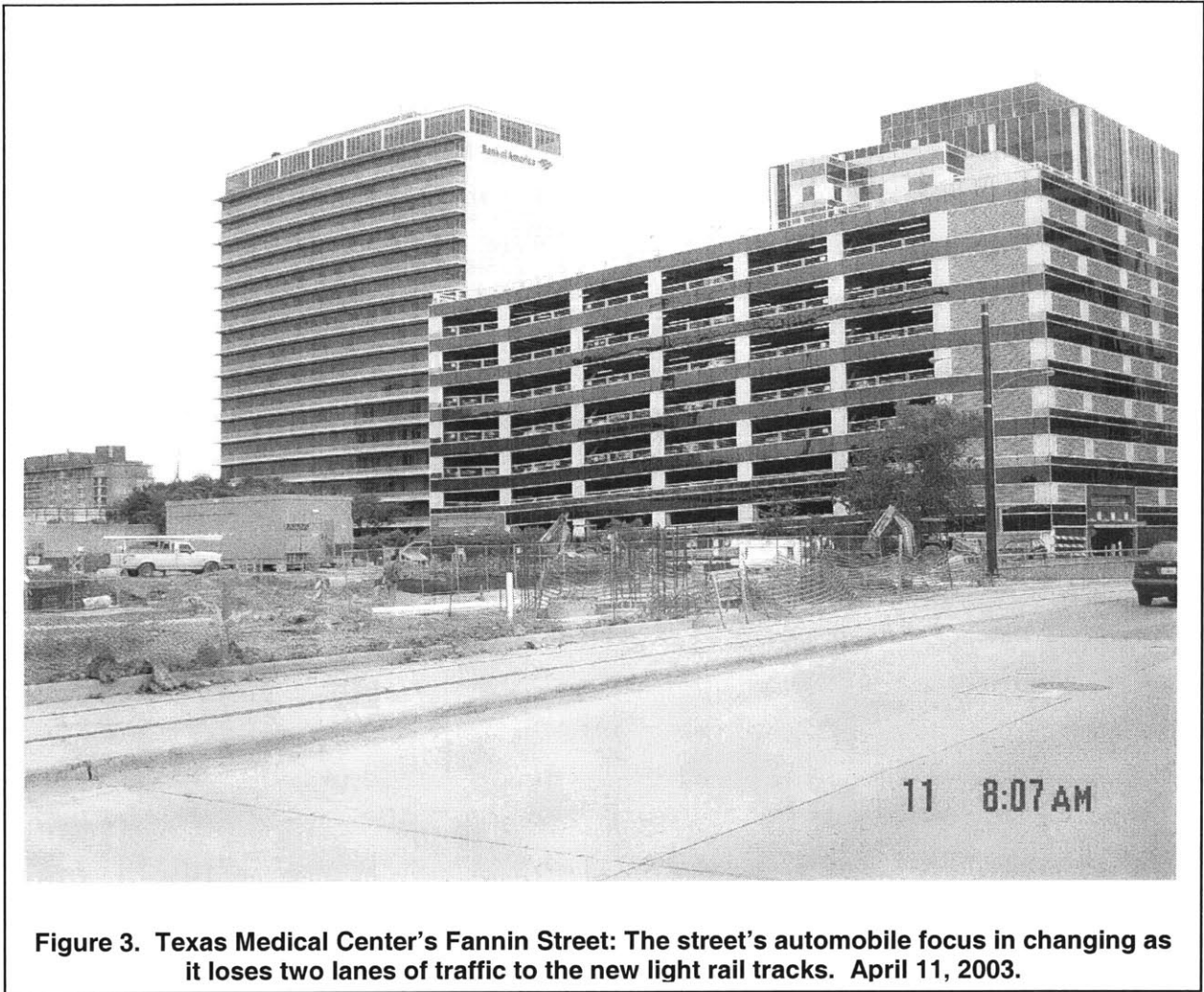
In its work with Texas Medical Center, this means dedicating a member of the staff to the relationship. The staffperson manages everything from tracking down a late shuttle to implementation of a new fare policy. The two institutions share appointments to a TMC Mobility Committee, which addresses shared concerns. In a testament to the success of the relationship, the medical center is working hard to incorporate transit into its present and its future, aiming to increase transit's modal share from its current 8% to 30% even as the medical center doubles in square footage.

## **Background**

In the 1930s, M. D. Anderson, a Texas-based philanthropist, set aside funds for medical purposes. His board decided to purchase land for a medical center, and then oversaw distribution of the land for free to institutions that agreed to abide by certain terms. Among those terms were continued non-profit status and a willingness to abide by physical restrictions. Both the area and the administrative group overseeing the area are called the Texas Medical Center.

Generally, Houston is designed for automobile efficiency, with all the difficulties that this entails for pedestrian movement. The streets that residents characterize as "pedestrian-friendly" tend to have three lanes of traffic in each direction. Downtown is characterized by high-rises backed by blocks of parking structures and surface lots. Houston is also home to the infamous Katy highway, twenty-four lanes wide.

Texas Medical Center appears to struggle with this general bias towards ease of auto access. The center of the area has been designed as a campus, with quiet roads and walking paths. However, major roads cutting through the area, such as Holcombe (east-west), Main, and Fannin (both north-south), have three or more lanes each way and are quite intimidating to pedestrians. Without a zoning code, residents rely on restrictive covenants to prevent nuisance uses.<sup>21</sup> The government ensures the quality of basic infrastructure by granting development permits via Municipal Utility Districts, requiring that each subdivision developer to build its share of utilities. This results in low governmental costs but can also result in large-scale inefficiencies, such as subdivisions with a completed section of major arterial that ends in a field.<sup>22</sup>



Without the ability to provide penalties and incentives through zoning, it is very difficult for the government to encourage certain uses. Planners seeking to encourage innovative design must convince a developer such action is worth the risk.<sup>23</sup> TMC, for example, has been trying to address congestion issues by encouraging development of mixed-use buildings. As a developer, it built an apartment complex anchored by first-floor retail, and one of its new parking garages features award-winning design and a top-floor cafeteria. To get this type of development, TMC must create it itself.

#### **Harris County Metropolitan Transit Authority: METRO**

The Texas Medical District is served by Houston METRO, which was established in 1978. It is supported by a one-cent sales tax in its service area of 1,285 square miles. METRO's prime concern is regional mobility. When residents voted against a proposed regional rail system in the early 1980s, METRO decided to combat congestion through a series of HOV lanes. These lanes can be accessed directly from Park and Ride lots that are served by commuter buses.

Houston is known in transportation circles as the city where transit's modal share increased during the 1980s, a period when most US transit authorities lost modal share (though not always absolute numbers of riders). As reported in TCRP report No. 27, *Building Transit Ridership*:

Transit's share of work trips grew between the 1980 and 1990 Censuses of Population in only two of the 31 metropolitan areas that had 1980 populations of over 1 million. The two cities were Houston—where the transit share grew from 2.9 percent in 1980 to 3.7 percent in 1990—and Phoenix, with only a very small change in share from 1.95 percent to 2.00 percent.<sup>24</sup>

Houston's transit share grew from 2.9 to 3.7 percent even as the area continued to expand via low-density development. Typically, low densities are difficult to serve by transit, and METRO's success speaks to a combination of extensive HOV lanes, a booming energy securities economy headquartered downtown, and well-run service. The HOV lanes can be accessed directly from the park and ride lots.

### **Current Context**

"Texas Medical Center" refers both to a physical campus and to the organization overseeing the forty-two non-profit institutions located there. While each institution is separately run and managed, TMC grants real estate to members and oversees shared issues like parking, planning, landscaping, and support services. It is staffed by three hundred employees, most of whom work in the parking or landscaping departments. An administrative staff oversees planning, government relations, mobility issues, and new development. The organization is funded by parking fees collected from its many garages and surface lots

Texas Medical Center is home to 40,000 parking spaces, which, according to its parking director, is more than any other institution in the country. TMC itself oversees 26,000 of these spaces via 11 parking structures, 5 underground garages, and 21 surface lots of varying sizes. Receipts from these parking lots fund TMC's activities.<sup>25</sup>

In theory, an organization funded by parking revenue should favor an increase in parking spaces over time in order to maximize revenue for its management activities. However, Robert Stott, TMC's Executive Vice President of Planning, explains that new parking garages cost more than they generate in return. TMC has thus been unwilling to build more parking garages.<sup>26</sup>

While parking is expensive to build across the country, most developers are willing to accept this cost because 1) it is required by local government or 2) parking increases the value of an accessory property. In TMC's case, the fact that the land can only be used for non-profit activities means there is little pressure to increase property values. The pressure that does exist comes from member institutions. While this is an important consideration, the economic disincentives are strong and have shifted TMC away from providing new parking spaces. Parking has become the purview of the individual institutions, and even here costs are prohibitive because of design guidelines that favor underground parking.

The parking policy is stated explicitly in TMC’s Master Plan. The first section in “Parking Principles and Initiatives” is to “[p]romote public transit in order to reduce overall parking demand.”<sup>27</sup> Furthermore, it requires that “all new development must provide parking spaces in accordance with the Parking Management Area plan in effect (currently 1.8 spaces per 1,000 s.f. of building area.)”<sup>28</sup> This is a remarkably low number, considering that in Puerto Rico, the parking ratios are generally 5 or 6 spaces per 1,000 sq. ft.

Supporting such low parking ratios requires extensive investment in public transportation. METRO partners with TMC on many initiatives, including marketing bulk purchases of transit passes to employers through its RideSponsor program. METRO sells the passes at a 10% discount, and the employers decide how much of the savings to pass on to their employees. In some cases, the institutions completely subsidize the transit pass as an employment benefit. In other cases, they retain the difference as revenue. Employees also save because the purchases are made with pre-tax earnings. METRO has found that the most efficient method to is to market the service directly to human resources departments.<sup>29</sup> Once an employer has enrolled, METRO marketing staff go to cafeteria lobbies at lunch hour with information about bus routes. They sign employees up for monthly passes and vanpools.

| Category               | Relationship   |
|------------------------|--|
| Service Quality        | Daily contact between METRO staff member and TMC parking coordinator |
| Shuttles               | METRO provides three campus shuttles; subsidized by TMC (ID only)    |
| Parking                | METRO provides parking shuttles; TMC is the PMA* authority           |
| Pass Programs          | METRO Marketing; individual member institutions HR departments       |
| Route Planning         | METRO Bus Service Planning (Ops & Planning); TMC parking (?)         |
| TMC Mobility Committee | METRO Bus Service Planning and Planning; TMC member institution reps |
| Capital Planning       | METRO Planning & Engineering; TMC Special Services                   |
| Emergency Services     | METRO Police; TranStar**; TMC member institutions                    |

\* Parking Management Authority (designated by City of Houston)  
 \*\* TranStar is a jointly operated traffic control center

**Figure 4 Houston: Houston METRO and Texas Medical Center Partnerships**

METRO also provides campus shuttle service. This as part of its mission to provide needed service, but it is also is a way to introduce users to public transportation. Another benefit is that funding for the shuttles is subsidized by TMC in return for allowing free rides by its employees. This provides a long-term source of income.

Houston METRO and TMC work together both on long-term planning and day-to-day service issues. METRO has three shuttle routes at TMC that facilitate campus circulation. The service is subsidized by TMC and the subsidy is renegotiated periodically. A single point of contact at METRO answers calls from the TMC parking coordinator regarding service delays and construction re-routing. These two employees also determine the details of service planning agreements worked out by senior staff, such as how to monitor the proof-of-payment system or which spaces to allocate to vanpools.

Capital construction, in contrast, is under the purview of senior staff. Details are worked out between staff of METRO's Planning, Construction and Engineering departments and TMC's Executive Vice Presidents of Special Services and Planning. The presidents and boards of directors of the larger member institutions may also be involved. In the case of Houston's new light rail system, significant time was spent negotiating between METRO, TMC and member institutions over the location of the light rail tracks. Both the director of TMC and the presidents of many of the member institutions felt that the light rail stations should be located on the edge of the campus, on Main Street. METRO felt strongly that the location needed to be closer to the center of campus, on Fannin Street, in order to be within a ¼-mile of a greater percentage of medical center destinations. In order to receive institutional support for the more central location, METRO made a number of concessions. They agreed to allow left-turn lanes across light rail tracks, to pledge support for public infrastructure projects of importance to TMC, and to provide additional shuttle service.<sup>30</sup>

Finally, both METRO police and TMC member institutions are involved with emergency services and traffic control. METRO Police's responsibilities involve both crime prevention and traffic control through TranStar, a joint program of METRO, the City of Houston, Harris County and the State of Texas. TranStar monitors HOV lanes, traffic problems, bus schedule adherence and emergency response.

## **Future**

Currently, staff at Texas Medical Center report that they cannot provide parking spaces at the rate of projected growth while maintaining a campus atmosphere.<sup>31</sup> The parking section of the 1999 TMC Master Plan states the following goal: "Promote public transit in order to reduce overall parking demand."<sup>32</sup> The plan goes on to illustrate what parking demand would be at different levels of public transit ridership, offering projections at 8% (current levels), 16%, and 30%, including the necessary acres of new parking lot.

While the current close working relationship between TMC and Houston METRO has helped increase public transit ridership over the past decade, such a huge jump in ridership will require extensive new service and innovative solutions. As a result, TMC and Houston METRO have an impressive set of joint initiatives that are worth consideration by other such institutions. The most noteworthy is the light rail system, which was financed without federal funding. New planning initiatives include campus housing, better pedestrian connections, fewer parking spaces, and a multi-modal facility at a light rail stop. The U-Pass program, currently supported by a Congestion Mitigation and Air Quality

(CMAQ) grant, may be expanded. METRO also runs a growing vanpool system at many member institutions.

### **Lessons Learned**

- a. Prices for new garages are prohibitive; TMC's new garages do not create net revenue.
- b. Because TMC doesn't make money on real estate investments, parking is not seen as an investment in property values.
- c. Lack of Federal support meant METRO required heavy local support for light rail. This did not prevent the project from happening but meant METRO had to make concessions on key issues.
- d. Master Planning process was very successful here because it was used as a tool to settle conflicts. Master Plan acted as a binding arbitration process.
- e. TMC appears to follow and update its master plan
- f. TMC saves central parking for visitors
- g. Advice from TMC:
  - When building parking structures, include foundations that will support additional stories as needed, and limit structures to the perimeter of campus.
- h. Lower level employees expressed concern that senior staff negotiated deals that will be difficult to implement. This may in part be due to the fact that METRO had weak negotiating power with TMC because they needed remote lot ridership to justify the light rail system.

In closing, Texas Medical Center and Houston METRO have a proactive program that addresses a growing transportation crisis. The lack of leadership from city government should not be interpreted as a causal factor to a strong transit authority, because there could be cities with little government support for transit and no transit authority. A better interpretation would be that because of local interest in transit, the lack of government support forces Houston METRO to act in innovative ways.h

Coordination between TMC and METRO emerged without city government initiative and despite a singularly transit-unfriendly environment. The motivating factors appear to be an innovative transit authority and the fact that parking construction costs have outstripped the ability to recoup these costs in fees.

### **Baltimore: Johns Hopkins Medicine (JHM)**

Johns Hopkins Medicine uses transportation initiatives as a catalyst for improved security and physical transformation. The Johns Hopkins shuttle system is provided by the University in order to improve mobility and security on campus, and illustrates the potential of a well-run private shuttle service. A new

subway station, meanwhile, became the focal point of an attractive new campus center, a reflection of the innovative planning group at JHM.

### **Background<sup>33</sup>**

Johns Hopkins Medicine is an umbrella organization that includes Johns Hopkins University's School of Medicine, Johns Hopkins Hospital, and Johns Hopkins Health System. While its affiliates are located throughout the region, the heart of JHM is located in a 44-acre section of Baltimore, Maryland, where Johns Hopkins Hospital was founded in 1893.

In 1873, Johns Hopkins, a businessman, left \$7 million to found a hospital and university, at the time the largest philanthropic bequest in U.S. history. In keeping with the 19th century medical architecture, the hospital was built with wings arranged along central courtyards. The architect created innovative ventilation and plumbing systems designed to help with sanitation. The hospital became famous for its rigorous application of the scientific method and its intention to serve the poor, two attributes that remain central to its identity. Over the years, the street in front of the hospital became the busy main thoroughfare. Additions to the campus made the entire area confusing and difficult to navigate.

The surrounding neighborhood is low-income; Johns Hopkins has purchased many of the buildings over the years, and many buildings are abandoned. Since the demise of Bethlehem Steel, JHM has been the largest employer in the City, with 17,000 employees and 35,000 trips per day.

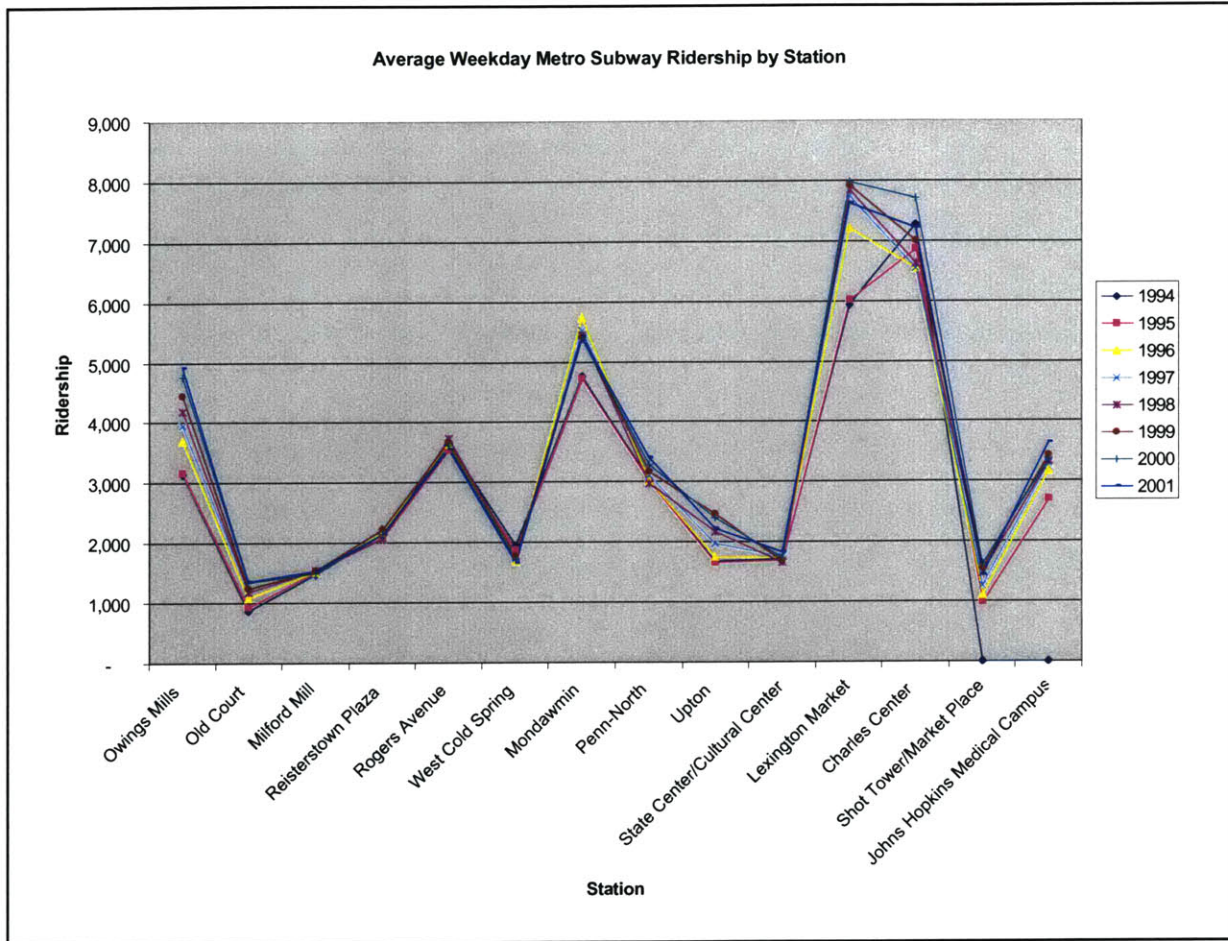
### **Maryland Transit Authority (MTA)**

The Maryland Transit Authority, or MTA, serves the area with multiple bus routes and a single subway stop on its rapid transit line, Metro. MTA public transportation includes a combination of the MARC commuter rail system, a light rail line, the Metro subway, and an extensive network of buses and express busses. Under the previous governor, the MTA was reorganized such that MTA now oversees all of these transit providers. It is funded through a 23 ½ cent gas tax, which is distributed by formula from general revenue. The Metro subway stops directly on campus, and one of its headhouses opens directly into a JHM building.

However, Baltimore's rapid transit service suffers from several serious weaknesses. The first is that the rapid transit system is simply not enough of a network to attract large numbers of riders. This is compounded by the fact that the light rail and the subway do not adequately connect downtown, so that what network might exist is compromised. Furthermore, the light rail has only a single track outside the core, resulting in low frequencies.

Service to Johns Hopkins has shown impressive growth over time. The graph below shows average daily ridership on the Metro between 1994, when it opened, and 2001. Note that Johns Hopkins and Shot Tower stations did not open until 1995. Following the completion of the last two stations, growth averaged 1.2% to 3.4% annually, or 27% between 1994 and 2001. Ridership at Johns Hopkins

Station, meanwhile, grew faster, 17% in its first year and 35% over the life of the line. The growth at JHM should not be confused with high actual ridership, however; numbers are average for the line, at about 3,600 average daily ridership. The subway as whole averages 48,000 riders daily.



MTA service covers the early medical shifts but does not serve employees on an adequate frequency. Service begins at 5:15 AM and ends at 12:30 PM. Frequencies are as high as 8 minutes during rush hour but slow to every 20 minutes after 6:45 PM. Saturday and Sunday frequencies are every 15 minutes.<sup>34</sup>

Policies to attract student and employee ridership are in place. An MTA student pass costs \$33/month and is further subsidized by JHM to a monthly cost of \$20/month. Any community member with a subsidized pass cannot receive a parking space. Both the hospital and the university support a pretax plan for commuting costs, which they call the Transit Plus Program.

The best test of success is whether Johns Hopkins commuters use the service. Michael Iati, JHM's primary architect and urban planner, reports that when Metro's Johns Hopkins stop opened in 1995, 270 people surrendered parking spots immediately. There is certainly room for ridership improvement. Currently, the JH subway station captures about 7.5% of daily Metro riders, or 3600. With



35,000 daily trips to Johns Hopkins, this is a little over 10% of riders. JHM estimates that 1400 trips/day of Metro riders are hospital employees, or 4%.<sup>35</sup>

Despite the structural deficiencies, the MTA appears to be taking many positive steps within its power. They have developed an integrated fare structure for the many transit options available in the Maryland/DC/Virginia area. For example, commuters can buy a monthly pass that includes fares on both WMATA metrorail and MTA's MARC commuter rail. MTA is also one of the few transit authorities in the nation with structural support for transit-oriented development. They have been developing a mixed-use cultural facility downtown as well as a 48-acre site at a Metro station called Owings Mills. The MTA owns the 48-acres as a park-n-ride facility, but has hired a developer to create a town center development.

### **Parking & Shuttles**

JHM's parking policy reflects the fact that it is located in a congested urban neighborhood and that employees are worried about personal security. The Parking Operations and Transportation office oversees 10,600 parking spaces, including 2,000 spaces in satellite lots. They also operate 13 shuttle routes. The low-cost surface lots are ultimately quite costly to the university because of the accompanying shuttle service. The Director of Parking Operations and Transportation, Larry Cohen, explains that the shuttles are operated as a school service, in part because of the security issues in the neighborhood. Funding comes from the general budget.

JHM has a standard parking policy, with current on-site parking set at \$105 per month and off-campus parking set at \$55 per month. Parking Operations has programmed the off-site lots with support services such as car washes and oil change shops. Between the price discount, the services and the regular shuttle service, the off-site lots are quite popular, such that many commuters choose off-site parking rather than on.<sup>36</sup>

Various departments subsidize parking in the manner they see fit. The School of Medicine, for example, offers free parking at off-site lots, as available, and subsidizes on-site parking by about 60%. The subsidy results in a long waitlist for on-campus parking. In 2002-3, 509 graduate student parking permits were issued from a student body of 1600 PhD students and 500 M.D.s.<sup>37</sup> Other departmental subsidies are in effect for night shift employees, nurses, and frequent visitors.

In short, parking and shuttles are not a revenue source for Johns Hopkins. The neighborhood is perceived as a safety risk and Johns Hopkins provides these services as a way to address these concerns.



**Figure 6. Johns Hopkins Station, Baltimore, MD.**

### **A new subway**

A key lesson from Johns Hopkins and MTA surrounds the creation of Johns Hopkins station. The project illustrates a series of benefits that stem from a strong transit authority/medical center partnership, including the value of sharing capital construction expertise, using transit to address safety perceptions, and incorporating transit elements in zoning regulations.

When MTA built its subway, it intended to have Johns Hopkins on its line. This generally fit Johns Hopkins goals, because of the parking cost issues addressed above. Less welcome was the fact that MTA's construction plans involved turning the main thoroughfare through campus, Broadway, into an open-cut construction site for four years. Unable to relocate the stop, JHM decided to use the opportunity to redesign the area into a campus gateway.

JHM became heavily involved in the subway line extension, designing the station headhouses, creating new landscaping, trading parcels of land, and spending significant time negotiating with the City of Baltimore over traffic engineering issues on Broadway. Broadway today is the attractive heart of the campus (see photo above).

The designers incorporated headhouses inside Johns Hopkins buildings, but they introduced controlled access points to address security concerns. According to Michael Iati, Johns Hopkins Hospital's Director of Architecture and Planning, this decision led to a successful connection to the hospitals, but a rather unexciting underground concourse that would be better filled with joint development projects.

### **Zoning.**

The project also involved significant cooperation between Johns Hopkins and the City of Baltimore's planners and traffic engineers. According to Mr. Iati, JHM petitioned for its campus to operate under two PUDs (Planned Unit Developments). Under this structure, JHM has greater flexibility with heights and densities than under traditional zoning but must return for Planning Commission approval for all designs. JHM also negotiated extremely low parking ratios of less than one space per 1000 square feet.

The PUD system appears to have been established to encourage innovative designs while protecting for negative effects on the neighborhood. As stated in the Zoning Code, "the regulations established in this title are intended to permit and encourage sound and imaginative development."<sup>38</sup> The code emphasizes on-site parking, compatibility with adopted plans, and maintaining the existing topography. Bonuses are allowed for developments sited near a park, providing amenities for the neighborhood, and innovative design. There is also a 5% density bonus for being located within an 1/8 mile of a rapid transit stop. The Code's language indicates that transit interests and neighborhood interests have shaped it.

Johns Hopkins worked with the City in order to develop regulations that better suited their status as an institution. It is entirely possible for similar provisions to be developed in other cities around the country.

### **Lessons Learned**

- 1) **Strong working relationship resulted in better station design.** MTA benefited by using Johns Hopkins' architectural and design expertise to improve the quality of the station. Johns Hopkins was willing to put in the effort necessary to synchronize the station design with traffic re-engineering and construction of a new out-patient center.
- 2) **Congestion is a mobilizing issue.** Planned Unit Development regulations that focus critically on neighborhood impacts arise as a result of neighborhood concern. This can be an opportunity to push for public transportation improvements
- 3) **Put burden for distributing parking passes on departments.** Johns Hopkins' Parking office gives each department a set number of parking spaces, but leaves distribution of the allotment up to the department. This keeps them away from departmental politics.

Baltimore's Johns Hopkins Station stands as a testament to the City's and the MTA's commitment to do its best to serve an important regional institution. Public transportation investments allowed them to address campus security issues while transforming the campus center.

**Boston: Longwood Medical and Academic Area (LMA)  
Mass General Hospital Campus (MGH)**

Two interesting lessons emerge from Boston-based medical centers. At Mass General Hospital, early involvement with the rebuilding of a rapid transit station significantly improved the physical design process. At Longwood, sustained efforts to shift employee commuters to public transit resulted in a 10% increase in transit's modal share over 20 years.

The two areas have longstanding connections but separate locations. Longwood Medical and Academic Area is a concentration of hospitals and teaching institutions located in Boston's Fenway. It began as the home of Harvard Medical School and now houses a number of well-known hospitals, including Beth Israel/Deaconess and Brigham & Women's. Mass General Hospital is located on its own campus near the Charles River. It shares the campus with affiliated institutions (such as Spaulding Rehabilitation Center) and independent institutions (like Mass Eye and Ear).

Planning in the two areas is overseen by two very different organizations. Partners Healthcare was created in the 1994 merger of Brigham & Women's Hospital and Mass General Hospital. Partners' owns these and other hospitals and so manages finances, group purchases, real estate purchases and shuttle services. The hospitals retain many of the responsibilities at issue here, including parking and construction.

In contrast, institutions located at Longwood Medical and Academic Area are voluntary members of a planning group called MASCO, the Medical, Academic and Scientific Community Organization. MASCO was established to be an agent for the joint needs of the Longwood community. Brigham & Women's, which is owned by Partners' but located at Longwood, works with both organizations.

| <b>Mass General Hospital Campus</b>                   | <b>Longwood Medical Association</b>                   |
|---|---|
| Mass General (Partners)<br>Shriners', Spaulding, etc. | Brigham & Women's (Partners)<br>Beth Israel/Deaconess |
| Campus Planning: MGH                                  | Campus Planning: MASCO                                |

**Figure 7. Boston Hospital Organization**

## **Massachusetts Bay Transportation Authority (MBTA)**

Both campuses are served by buses and rapid transit provided by the MBTA, as well as a variety of internal shuttles. The MBTA's service area includes 1,038 sq miles and provides approximately 1.1 million rides daily, of which about 380,000 are bus trips. Two branches of the MBTA's light rail serve LMA, while MGH is served by an eponymous rapid transit station.

Like many transit authorities, the MBTA faces difficult funding constraints. The long-term financial crisis has made it particularly weak in planning staff. A general structural difficulty with the MBTA is the fact that the commuter rail and rapid transit service are built in a radial structure, meaning that people must transfer before reaching a destination outside of Downtown. MGH is located close to the heart of this area and so arriving there tends to involve few transfers. LMA, however, is a few miles removed from Downtown. Many commuters need to transfer to a bus or to the Green line (the system's most congested) in order to reach LMA.

## **Longwood Medical and Academic Area (LMA)**

The Longwood Medical and Academic Area is particularly interesting as an example of long-term dedication to reducing congestion through public transportation. It is also interesting because it is a voluntary planning structure.

LMA is a 210-acre area of Boston bounded by the Riverway (a road), Huntington Avenue, and the Fenway (a linear park). The area employs over 30,000 people and an additional 10,000 students attend school there. Nineteen of the area's institutions have joined a joint planning organization called MASCO, the Medical Academic and Scientific Community Organization.

**Background.** Longwood emerged in the early twentieth century as the home of Harvard Medical School. Early joint projects included a shared power plant. Oversight by MASCO emerged in the 1970s. Promotional literature explains:

In 1972, representatives from several institutions in the LMA, recognizing their interdependence in this tightly confined district, formed the Medical, Academic and Scientific Community Organization (MASCO) to address issues of common concern. MASCO's mission is to pursue shared programs that promote a sense of community among its members and the citizens who live and work in the LMA, and to lessen the burdens of government with regard to planning, development, and enhancement of the LMA.<sup>39</sup>

MASCO is a voluntary and member-driven organization that has been described as a prototype to the modern Business Improvement District. Its success is contingent on its own continued service to members. Currently, MASCO oversees area planning and a variety of shared services. They own and manage a portion of the area's parking facilities, contract out shuttle service, operate a traffic demand management program, and have a for-profit division that provides telecommunications and other

business services. Due to the voluntary nature of membership, however, they cannot force the adoption of planning initiatives. MASCO's work thus involves a significant amount of education on planning and mobility issues.

**Shifting Employees to Transit.** MASCO approaches space constraints and congestion by emphasizing ways to divert employees from single occupancy vehicles. It is a model for how a planning agency that lacks coercive powers can promote ridership.

Lack of parking was (and is) perceived as a serious issue at LMA. More parking, however, would lead to greater street congestion, which was already at LOS C and D at many intersections in the late 1980s.<sup>40</sup> In response, MASCO began a concerted effort to address congestion issues, starting with a comprehensive transportation study that examined travel patterns, congestion levels, parking and transit service.

It was clear that raising parking rates was the strongest tool for decreasing demand for parking spaces, but this was very difficult to implement. As stated in the study:

Since institutions must compete for qualified staff with suburban medical and educational institutions who offer free or inexpensive parking, subsidized parking is often used as an employee benefit for recruitment and retention of certain categories of employees. Institutions and MASCO each control certain facilities and each organization sets its parking pricing policies according to its individual needs and objectives. The monthly parking rates at each facility depend on a variety of factors, including the amount of the lease payments (if any) for that facility, the cost of providing shuttle service (if any), the types of employees assigned to the facility, and the policies of the organization which controls the facility.<sup>41</sup>

In the end, parking fee increases were so unpopular that MASCO withheld the authors' recommendation to raise fees pending further study. MASCO did proceed with many of the more positive aspects of the plan, such as ride-matching services and shuttles to rapid transit stations. They encouraged members to implement transit pass subsidies. When Children's Hospital introduced a 25% subsidy, the number of employees taking transit increased from 500 to 800. Transit pass subsidies for its entire workforce could be implemented at \$60,000 annually, less than 15% of the cost of parking subsidies.<sup>42</sup> Facts like these helped encourage other institutions to implement similar programs. At this time, transit passes are subsidized by employers in amounts ranging from 30% to 75%.<sup>43</sup>

Over the long term, MASCO also took an educational approach with the parking fee issue. It was determined that employee parking was so heavily subsidized that during the late 1980s, one hospital spent more than \$400,000 annually on subsidies.<sup>44</sup> Eventually, most institutions raised their rates and used much of the profit to subsidize transportation improvements such as subsidized T passes. Parking rates vary by institution, but are higher than most other areas of the country. This is due in part to the parking freeze established by the EPA during the early 1970s, which froze total parking spaces. Costs in Boston are higher than comparable parking elsewhere, which can be seen in the

comparative table in the Appendix. For example, MASCO's on-site parking costs \$3120 annually, while the member colleges charge about \$2000 per year. (This difference is in part a reflection of differing pay scales between specialist physicians and college employees, but also indicates member's desire to provide an amenity to employees.)

Currently, MASCO manages approximately 4,000 parking spaces. Most institutions still retain additional parking. MASCO's director of Area Planning, Sarah Hamilton, reports that MASCO has offered to take over management of these parking lots, which would save the institutions money, but that they have not been fully successful.<sup>45</sup> She explains the issue as one of "power," saying they wish to retain the ability to offer preferential rates.

Less expensive parking is available in satellite lots. Park and Ride lots are located off the major roadways coming into the city, located strategically to catch drivers before they lose time in the congested Boston streets. Most lots are 20 to 25 minutes by shuttle from campus. Every decision of this sort appears to have been carefully considered in terms of employee benefit and congestion reduction.

In addition to supporting policies that encourage transit use, MASCO invests in transportation infrastructure. A program within the campus develops signature bus stops associated with its location. The bus stops are weather-protected, attractive, and well-maintained.

MASCO's traffic demand management policies are quite comprehensive, but the results in terms of overall congestion management are poorly documented. A transportation element update does note the following broad changes:

| Mode Splits    | 1980  | 1999 |
|----------------|-------|------|
| Drive Alone    | 38.3% | 41%  |
| Public Transit | 27.3% | 37%  |
| Carpool        | 15.9% | 9%   |
| Bicycle        | 18%   | 2%   |
| Walk           |       | 6%   |
| Telecommute    | na    | 5%   |

Source: 1980 data Vanasse #1, p. 28. 1999 data from a survey provided by MASCO of employees in area.

**Figure 8. Mode Split Change, LMA, 1980 to 1999**

The good news is that single occupancy vehicle split rose only 3% during an era when single occupancy vehicle use in the region grew significantly. Public transportation mode share grew ten percent to 37%, at a time when public transportation use in the Boston PMSA fell slightly, to 13.9%.<sup>46</sup>

Unfortunately, walking and bicycle use have both fallen. MASCO encourages these uses through its CommuteFit program, which awards prizes based on per foot mileage, but presumably investing in nearby housing would be a more effective option. Increases in these categories would in many ways be a better outcome for LMA, because such uses do not add to MASCO's costs.

### **Shuttles**

MASCO runs shuttles to LMA from its park and ride lots, in-town lots, between Harvard's Cambridge campus, and to two rapid transit stops (Ruggles on the Orange Line and JFK/UMASS on the Red line). Sarah Hamilton explains that MASCO runs the shuttles because the MBTA does not offer the routes or responsiveness LMA requires. The shuttle contracts include performance penalties, and are directly accountable to MASCO's immediate complaints.

The high quality of service is ensured in part by MASCO's annual parking and transportation survey. The survey allows users to rate parking and shuttle service on various performance indicators. The results are made public and are available on their website.

The shuttles do create some conflict with public transportation users. MASCO runs shuttles on similar lines to the MBTA, and public users often wish to take them. Because the tickets do not cover the cost of the rides, MASCO is unwilling to accept the general public on its shuttles. This creates some redundancy in the system. It seems unfortunate that the MBTA cannot take these routes, considering that they are quite popular and seem likely return a higher fare recovery than most routes. So long as they cannot adequately address MASCO's service quality concerns, however, this will not be possible.

### **Development**

MASCO is the developer of 375 Longwood Avenue, a 300,000 sq foot building with 60,000 sq feet of office space, ground floor retail, a child-care facility and an associated parking garage. The revenues from the rent and parking allow MASCO to be a more self-sustaining operation.

Extensive development continues in the LMA at the major facilities. By 2007, 13 institutional & 6 public agency projects will create over four million square feet of new construction. Sarah Hamilton explains that critics who question LMA's ability to be competitive due to space constraints should note that development continues unchecked.

MASCO is also playing a leading role in development of the Urban Ring, an attempt to relieve pressure on the MBTA's downtown core rapid transit service. LMA is located a few miles south of the heart of downtown Boston, and lies directly in the path of the Urban Ring. Early projects such as the Crosstown bus service have directly benefited LMA.

MASCO does not appear to have plans to develop residential units. Considering the loss of pedestrian arrivals over the past twenty years, residential development might be investigated. While office and research space is at a premium, residential uses would not require additional parking spaces, which might offset the losses on office investment.

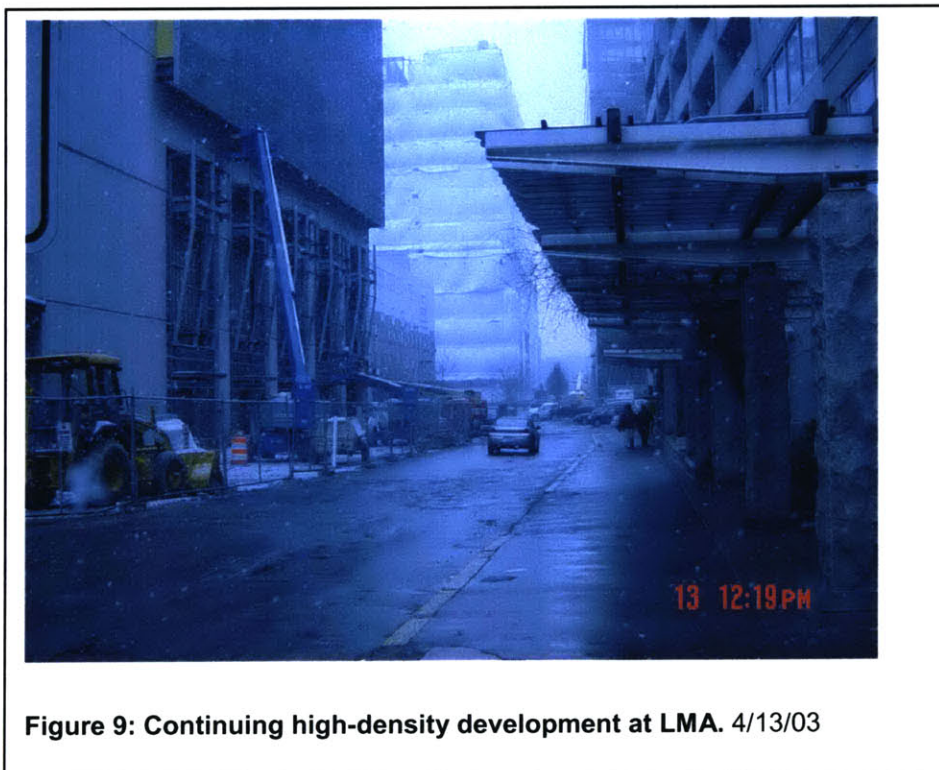


## Lessons Learned

MASCO serves as an example of the success a medical center can have under extreme mobility constraints. The voluntary planning mechanism is effective under this level of constraint. The key lessons are:

1. **Transit's modal share rose despite a lack of transit authority infrastructure improvements.** MASCO made significant investments in shuttle service, increased pass sales and restricted parking, but these were all done without the help of the transit authority. Transit ridership can increase even without transit authority support.
2. **Lead by example:** Demonstration projects helped popularize new policies at member institutions.
3. **MBTA service does not meet LMA's needs.** Improved responsiveness by the transit authority would allow MASCO to cease providing shuttle service. Medical centers that are not adequately served by public transportation can take on this work themselves.
4. **Importance of service indicators.** When medical centers take on transportation management, they should use the opportunity to improve upon transit authority service by using performance indicators.

In short, MASCO has done an impressive amount with very little outside support. Leadership on the issue of improved access to the hospital is not coming from the Mayor's office or MBTA, yet densities are increasing, the campus is modernizing, and an increasing proportion of a growing number of employees are taking public transportation.



**Figure 9: Continuing high-density development at LMA. 4/13/03**

## **Massachusetts General Hospital (MGH)**

Massachusetts General Hospital was founded in 1811. It is the third oldest hospital in the country, and now one of the leading research hospitals in the world. While MGH has satellite locations throughout the region, the hospital is closely identified with its main campus in Boston.

MGH shares many characteristics with the Longwood Medical and Academic Area, such as severe space constraints and a similar zoning and political context. It is the largest single non-governmental employer in Boston, with 16,000 employees, and it attracts students through its affiliation with Harvard Medical School. Unlike LMA, however, MGH shares a campus with institutions that do not coordinate long-term planning. It cannot direct Massachusetts Eye and Ear, for example, to take on the same signage system or parking policies.

MGH is, however, a member of Partners HealthCare System, a financial management group. Partners was the result of the merger between Brigham & Women's and MGH. It oversees departments where consolidation is helpful, such as payroll, real estate, procurement and shuttle systems. It leaves each member to independently oversee departments that benefit from on-site management, such as human resources, research, parking and construction.

The management split makes the planning context at MGH complex. Parking is separate from shuttles. Construction is separate from real estate. MGH is responsible for its campus independent of other institutions located there like Shriners' Hospital and Massachusetts Eye and Ear. Nonetheless, MGH runs a carefully planned mobility system that focuses on serving patients and employees in a very constrained environment. Like Johns Hopkins, it has expanded a transportation infrastructure project into a campus gateway.

### **Background & Context of Campus Mobility**

A key weakness for MGH transportation has been its rapid transit station, Charles/MGH. Although located on a line with frequent service, the station itself is located in the middle of a traffic circle. Reaching the turnstile involves switching levels multiple times via staircase. It is not handicapped-accessible.

The hospital campus is within walking distance of North Station, which is the terminal for commuter rail arriving from the North Shore. Buses arriving from the North empty near campus before continuing on to South Station. MGH also runs a fleet of its own shuttles between campuses and to Park n' Ride lots throughout the city.

### **Relationship between MGH and MBTA**

Mass General Hospital appears to be taking an involved approach to its transportation infrastructure needs. As part of its response to ADA laws, the MBTA is required to identify key stations for handicapped-accessibility, which includes Charles/MGH. The MBTA's initial plans involved a

crosswalk to the center of the island and an elevator to the station; it was an inappropriate solution considering the amount of traffic coming through the intersection, but relatively inexpensive.

John Meserve, Director of Partners' Capital Facilities and Planning, reports that MGH joined the discussion when it discovered that the Charles Station improvements were the last ones planned for the Key Station plan. MGH took a role in the project design in return for pushing forward the schedule. He admits that "the T did not give a sense of interest before MGH"<sup>47</sup> addressed the issue.

Initially, Meserve set up an Ideas competition to improve the tenor of the discussion. This produced plans that addressed a variety of issues, including the handicapped access requirements, proposed street improvements to Cambridge Street, redevelopment of the Charles Street Jail, and new park space available through the Central Artery reconstruction. Later, MGH ran a juried architecture competition. It is also contributing funds to the design and construction of the station. The new design seems likely to be successful. It incorporates connections to the new waterfront park and a revitalized Cambridge Street. The design is dramatic, with lots of glass to provide views of the Charles River. It is handicapped accessible, and ought to provide an appropriate gateway to the area.

Along with these physical contributions, MGH runs a comprehensive program to reduce single-occupancy vehicle use by employees. Parking policy is overseen by the hospital and includes subsidized T-passes and incremental charges for parking based on convenience. The most convenient parking is set aside for patients at market rates (see Appendix for a comparison of rates). MGH also won an award last year for having the highest percentage of employees biking to work. MGH's parent, Partners HealthCare, runs a comprehensive fleet of shuttles that ferry employees and patients among its many campuses. Kathy West of Partners Real Estate office explains that their needs are too specific to be served by the MBTA. The shuttles are free to hospital employees.

Staff characterize relationships with the T as successful in the physical design considerations but less so on service issues. One example is that medical staff arrive too early to be served by the morning commuter rail trains, and conversations with MBTA's Operations department have been unsuccessful. While this is likely due to reasonable issues like track maintenance, MBTA staff did not explain the issues well and MGH staff consider them unresponsive. Another example is MGH's plan to create a multi-modal transportation center. MGH is currently in conversations about designing a parking garage for patients with a bus depot near North Station. MBTA has been reluctant to join the project, although it has the potential to save commuter time wasted travelling to South Station to pick up North Shore-bound commuters. It is not clear whether the MBTA's reluctance to join the project is due to faults in the plans, reluctance to commit funds, or other objections. Without a formal channel for communication, the absence of clarification appears like neglect.

#### **Lessons Learned:**

MGH pursues. The large transportation investments, however, are largely driven by MGH, and service improvements have been less successful.

a. **MGH takes a comprehensive approach.** MGH pursues a multi-layered approach to Traffic Demand Management, including many policies designed to increase use of public transportation.

b. **Quality concerns by MGH have led to better physical design** and higher-quality shuttle service. Service issues remain. While Red line service is frequent, Blue line service is less so and does not reach all the way to the Hospital. A long-standing promise to extend the blue line to MGH goes unfulfilled.

c. **Biking works in congested areas.** It is interesting to note that a hospital in this heavily congested area had the highest number of biking employees in the city. (The fact that MGH is also the largest employer in Boston contributed to its standing.)

MGH's example suggests that medical centers can have successes by taking a proactive approach with reluctant transit authorities. The combination of parking policy, shuttles and capital commitments has allowed them to continue to grow within a heavily constrained space.

## **E. Illinois Medical District (West Side Medical Center), Chicago, IL**

The Illinois Medical District is a collection of medical facilities and public institutions located on 560 acres west of Chicago's Loop. It is home to three major hospitals, the UIC medical institutions, a variety of state and county social service agencies, biotechnology businesses, and non-profits. The Chicago Transit Authority serves the area with a rapid transit line and multiple bus lines.

In the last decade, the Illinois Medical District Commission has expanded its role as planner, developer, and marketer for its powerful client, the Illinois Medical District. IMDC has been slowly transforming the campus from an older, worn landscape (Cook County Hospital is considered the model for the Television show ER) to a modern, tree-lined campus. However, its transportation and congestion initiatives have largely ignored the importance of public transportation. This role is significant: public transportation is the primary mode of transportation for 24% of District employees.<sup>48</sup> Perhaps in an effort to change its image, IMDC has bypassed the public transportation elements established in its Master Plan. Alternatively, this may simply be a function of the fact that IMDC has significant control over other aspects of mobility, such as parking, signage, pedestrian amenities and traffic improvements, but no control over transit. Regardless, IMDC has been remarkably successful at recruiting new business, improving signage, and sprouting parking garages, but it has put no visible effort into public transportation.

As an agency that oversees a powerful regional district and works under a broad government mandate, IMDC would be a powerful ally as CTA pushes for funding for the Circle Line -- if IMDC staff

were convinced of the viability and importance of transit. Chicago Transit Authority needs to 1) prove its value to the District and 2) prove that it can be a reliable and responsive partner. The following discussion will address the area's history, context, and future, and point to where there may be opportunities for CTA involvement.

**Background.** With three major hospitals (Cook County, Rush, Veterans'), the UIC medical institutions, a variety of state and county social service agencies, biotechnology businesses, and non-profits, the Illinois Medical District employs over 42,000 people. At the time of the Master Plan was compiled, the area drew 5,500 medical students,<sup>49</sup> and had daily trips of 75,000.

The Illinois Medical District Commission was established by Illinois State charter and is operated with State funds, a fact that sets it apart from the other medical planning groups under discussion. The commission was established. Its goals include operating a biotechnology incubator park, redeveloping property to attract economic development, and coordinating activities among institutions in the District. The organization is quite small in comparison to a planning organization like TMC, in part due to the fact that IMDC does not run parking garages or shuttle services. Of the 21 staff, four are in maintenance and the remainder is in administration or business. The small size means that new initiatives tend to be contracted out.

Like LMA, IMDC's power over members is limited. Its authority extends to interactions with zoning officials and its role both as a developer and as an official voice for the District. Many of the lessons learned at LMA also apply here, meaning that IMDC is in a better position to educate members about mobility issues than to force policy changes.

**Urban form, history and current planning efforts.** The early development of the Illinois Medical District helps clarify some of its current development patterns. The fact that IMDC is a state-chartered organization, for example, is reflective of the fact that the land uses have long been associated with government institutions. After the Great Chicago Fire of 1871, large tracts of land became available on the West Side of Chicago. Cook County Hospital was built there in 1876, Rush Medical College in 1877, followed in 1881 by the college that would later become the UIC School of Medicine. The area came to house numerous State human service agencies. The Illinois Medical District Commission was established in the 1930s to manage the area. It received development powers from the state legislature in 1941.<sup>50</sup>

Land use in the area has been affected by land-banking, as addressed in the second chapter. For example, state policies have had an interesting effect on the development of UIC, one of the area's major landholders. Land a mile east of the medical campus was granted to UIC as part of urban renewal efforts,<sup>51</sup> meaning that UIC did not have to factor in the cost of land when obtaining property. However, the State of Illinois withholds grant monies from universities that use State funds to operate parking facilities. Thus universities accepting State grants must have self-sustaining parking.

There is a tension in the effects of these policies. On the one hand, free land encourages land-banking through large parking lots and the possibility of new development over time. On the other hand, once a parking lot is established, the parking office sees this as revenue. Any future development on a parking lot will have to address the issue of lost revenue.

During the early 1990s, the IMDC undertook a master planning process that envisioned the District split into three sections: a core hospital district, the District Development Area, and the Chicago Technology Park. Each area has guidelines appropriate to IMDC's vision for its role, although these guidelines do not always favor existing transit patterns. The Master Plan differentiates uses through densities. The core hospital retains high densities, the District Development Area medium densities, and the Chicago Technology Park was down-zoned to low density. The entire area has also been "greened" and "branded." IMDC focuses on planting street trees, improving crosswalks, and clarifying signage.



**Figure 10. Promotional image from the Illinois Medical District. Note the high density hospital district in the distance, compared to the low-density Chicago Technology Park.**

One particularly inconsistent choice was to locate the Chicago Technology Park (CTP), a low-density setting owned and managed by IMDC, adjacent to the Blue Line’s Western Avenue stop. The walking path from the station is unmarked, even as signs located high on Western Ave direct automobile traffic. Once pedestrians arrive at the CTP, walking is fairly comfortable due to the wide sidewalks and trees. However, the CTP buildings are one to two stories, surrounded by acres of surface lot parking. Walking to any of the biotechnology businesses located there is safe but inconvenient, much like walking across a shopping plaza from a grocery store to an outlet.

Illinois Medical District Commission’s attitude towards density is not consistent with CTA’s interest. It is also not consistent with IMDC’s own concerns for optimal use. For example, before adopting

the 1990s Master Plan, the Floor-Area-Ratio (FAR) of the entire district was 2.2. Full build-out of the 560 acres would have resulted in 37 million square feet of development. The transportation section of the Master Plan reports, “such a high density was not realistic in relation to the overall District traffic and parking capacity and current building and development plans of each institutions.”<sup>52</sup> The master plan instead recommends variable FARs, with an average of 1.79. However, it downgrades the area closest to Western Ave rapid transit stop, the Chicago Technology Park, to a density of 1.00. Thus the plan decreases the densities of the District to accommodate mobility, but decreases the ability of transit to help alleviate congestion.

The anti-transit recommendations continue. The plan calls for the creation of 11,000 new parking spaces, much of it in valuable central parcels. It supports a new 2100 space Cook County Hospital parking garage in the center of the Cook County Hospital, one of the densest parts of the District. It also suggests a 1500 space multi-user garage two blocks from the Expressway, and the Elevated.

Some of this parking is not necessary even by IMDC’s own standards. According to Joe Dunne, Deputy Director of IMDC, there are bureaucratic impediments to better parking coordination. Currently, some garages are below capacity, but cannot sell their spaces to neighboring institutions because of regulations that specify use. The Veterans Hospital, for example, is building a parking garage, but regulations prevent them from charging veterans for its use; nor can Veterans Affairs funds be used to benefit people other than veterans.<sup>53</sup> In the end, the garage being built is larger than projected use, but will not be sharing its spaces with its neighbors.

Two main issues face CTA in this area. The challenge of organizing multiple users has not been entirely avoided through the existence of the IMDC. Also, IMDC has a planning framework that actively works against transit at the Chicago Technology Park area while passively discouraging it elsewhere.

### **Chicago Transit Authority (CTA)**

Public transportation service to the Illinois Medical District is provided by the Chicago Transit Authority, or CTA. Employees who enter the city via commuter rail, which is run by a separate agency, require an additional connection to IMD, so CTA serves a good portion of all 24% of IMD employees who use public transportation. CTA’s service includes buses and rapid transit for the City of Chicago and 40 surrounding suburbs. With 11,000 people and an average daily ridership of 1.5 million, of which 2/3 are bus trips, it is the second largest transit authority in the nation.

CTA receives its operating funds via farebox returns and the Regional Transportation Authority. It receives 85% of the 1 cent sales tax from the City of Chicago (minus 15% for RTA operations), as well as 30% of the 1 cent suburban counties’ sales tax.<sup>54</sup> Additional public funding from the State of Illinois is set at 25% of the RTA funds. This means that both sources are ultimately tied to sales tax receipts, which creates difficulties during a poor economy, when direct revenues from fare collection are already



low.<sup>55</sup> Because these are annual appropriations, CTA has difficulty knowing its long-term funding outlook, and is generally looking for ways to ensure longer-term funding agreements.

CTA's director, Frank Kreusi, was appointed by the Mayor in 1997. There are seven members of the board of directors, four of whom are nominated by the Mayor, and three by the Governor. Before Kreusi's arrival, CTA's ridership had been falling steadily, so that between 1982 and 1997 CTA lost 40 percent of its ridership to an all-time low of 419.2 million rides. Since that time ridership has been increasing, resulting in an increase of 9.1 percent over the 1997 figures. Even in 2002, ridership grew .5%, an impressive achievement during a difficult economy.<sup>56</sup>

The economy continues to impact trip-making, and current ridership is 2.1% below last year at this time.<sup>57</sup> With a declining base, it is key for CTA to continue pursuing ridership increases by opening new markets. Kreusi's arrival signaled a change in the organization's attitude towards riders and service, and this appears to be a good point in CTA's development to pursue innovative improvements.

### **CTA Service to the District**

CTA currently serves the Illinois Medical District through nine bus routes, one of which is an express version of the existing 49 (Western). There are also three Blue Line Elevated rapid transit stops. The Blue line splits just before reaching the campus, so that the frequencies here are half what they are in the Loop.

One of CTA's major capital improvement projects is "Renew the Blue," which involves reconstruction of the Cermak (Douglas) Branch of the Blue line. The first station on the branch, Polk, serves the District. CTA is investing \$483 million dollars in the overhaul, which includes reconstruction of the eight elevated stations, reconstruction of five miles of elevated structure and tracks, and the purchase and installation of new signal/communications equipment.<sup>58</sup>

CTA has been working closely with the IMDC, member institutions, and neighborhood groups on the project, because the construction has required disrupting service on the weekends. Communication with the public seems well-planned. The project and its disruptions are highlighted on CTA's website, and communications continue through press releases, posters, and neighborhood meetings.

Service adjustments have been less successful. Because of the weekend closings, CTA has attempted replacement bus service with X21 Cermak Express. An initial test period shows limited impact. However, the construction website has no mention of the new service, illustrating a lack of integration between the departments handling service initiatives, marketing and capital construction.

The Circle Line is a major new service and infrastructure proposal that would dramatically affect rider convenience to the area. The Circle Line would provide higher-frequency service to Polk, direct connections from Metra stations, and possibly a new station in the District. The Illinois Medical District staff were unfamiliar with the plan until January of this year, when interviews for this research introduced the concept. Currently CTA's Planning Department has scheduled a meeting to present the plan.

### Relationship between CTA and IMDC

In almost every category where CTA and IMDC might benefit from a shared relationship, none such connection exists. Only in large capital projects is the relationship addressed, which is intrinsic to the EIS process. The following section details these missed opportunities.

| Category                  | Relationship  |
|---------------------------|---|
| Service Quality           | None  |
| Shuttles                  | None; CTA does not run shuttles   |
| Parking                   | None; CTA does not run shuttles or impact parking ratio decision            |
| Pass Programs             | CTA Marketing/U-PASS; UIC medical schools                                   |
| Pre-tax Transit           | CTA Marketing; individual institutions                                      |
| Route Planning            | Some CTA contact with Community Advisory Panel due to Blue Line disruptions |
| Transit Demand Management | IMD internal committee only; no contact with CTA                            |
| Capital Planning          | CTA Blue Line Construction team; Neighborhood advisory group                |
| Emergency Services        | CTA works with City of Chicago on emergency response                        |

**Figure 11. Chicago: Connections between CTA and IMDC**

**Service Quality.** IMDC does not appear to have a single point of contact at CTA for service information. General information is updated on the [transitchicago.com](http://transitchicago.com) website, where the general public can check for delays. However, there is no mechanism for informing large employers about service alterations or for employers to alert CTA about changes. This is an important missing link. IMDC is in the best position to report the developments that will impact CTA ridership, such as institutional changes and special events. Changes that impact ridership happen all the time: a new medical facility opens; an office experiments with 12-hour shifts; an individual employee moves across town. Considering the expense and infrequency of bus route monitoring, it is key that IMDC know whom to contact about potential ridership impacts, and that someone at CTA be there to respond.

**Shuttles.** CTA does not provide shuttle service to the District, but it appears as though such an opportunity might be emerging. Currently, some of the larger employers offer their own free shuttles. Cook County Hospital provides a shuttle from the Juvenile garage to its entrances, and volunteers at the Veterans' Hospital escorts visitors to its parking lots. UIC provides a shuttle from Ogilvie Transportation

Center, as well as a shuttle between its East and West Campuses (although funding constraints caused it to cut back service this year.). Neither service is comprehensive.

According to Joseph Dunne, Deputy Director of the Illinois Medical District, IMDC members discussed operating a joint shuttle system about seven years ago. The proposal was sidelined due to difficulty coordinating the funding schedules of the many organizations. IMD contains a particularly varied set of interests, with State, County, City, private business and non-profit institutions all represented. While not mentioned specifically by staff, it might be relevant that there are only 21 people working for IMDC, most of whom are involved in developing new business for the area. Presumably, one of the member institutions would have had to step forward to do the coordination themselves.

The joint shuttle question has re-emerged with the development of a new FBI headquarters. The FBI is moving its main offices from Downtown to the District Development Area (see below). They are concerned about the cost of accommodating parking for the employees who formerly took the L to work. While the FBI is certain to have more employees driving now than to its former offices, it is attempting to pursue public transportation options, and has been pushing for both a new rail station and joint shuttle service.

**Parking.** CTA does not appear to be involved in any way with the planning or siting of new parking garages in the District. IMDC's involvement in parking is limited to its role in drawing up Institutional Zoning regulations, which sets parking ratios for different sections of the District. IMDC has much less control over parking than, for example, Texas Medical Center, because the Chicago members finance their own parking garages. IMDC does build parking for its own developments, including the Chicago Technology Park and a new shopping center.

Generally, IMDC has been supportive of new parking garages. Members are concerned about illegal parking and congestion, and IMDC has supported efforts of institutions financing new garages.

Prices vary but are quite low. Many employees park at the Juvenile Center, which offers parking for \$2/day, and take a shuttle bus to their workplace.

**Pass Programs and Pre-Tax Transit.** CTA has a comprehensive U-Pass program in which students have unlimited access to the CTA system in return for enrollment of all students in the school; however, IMDC is not involved in marketing the program. District schools belonging to the program are UIC School of Pharmacy; UIC College of Public Health; Malcolm X College (strictly speaking, across the Expressway from the medical district). Non-participants include UIC School of Medicine; UIC School of Dentistry; UIC College of Nursing; UIC College of Applied Health Sciences, and the Rush medical colleges.

While the missing schools are a loss, garnering support for unlimited access systems like U-Pass can be difficult. As reported in a TCRP report on university transportation, there are a variety of aspects to selling the program. "[T]he key to gaining administrative support is to document for the

administration what the university has to gain from the plan. Lower parking costs or increased options for future expansion are two key benefits.”<sup>59</sup> It goes on to state that, “a transit system, no matter how capable or interested it is in providing unlimited access transit, cannot generate support for the concept on its own. Nevertheless, the transit system staff can be the technical resource for groups and committees that advance the concept.”

CTA's U-Pass program reflects these recommendations. Administrators market the program by coordinating with the Marketing department on information brochures and by making presentations to school leadership committees.<sup>60</sup> The Planning & Development Division produces reports on the ridership effects of the U-Pass programs, and the U-Pass office makes this information available to prospective participants. The office continues to enroll new members.

U-Pass appears to be quite successful for both CTA and its participants. Ridership impacts are impressive, with 3.8-5.8 million new CTA rides credited to U-Pass over the 2001-2002 school year. U-Pass riders are more likely to use midday service, and only 16% of their rides took place during the morning peak, as opposed to 27% of CTA rides generally.<sup>61</sup> No schools have discontinued the program since joining, which indicates that the general fee for students does not seem too onerous. The effect on parking has not been explicitly documented, but UIC Director of Campus Parking Services Wanda Perry reports that since implementing the program, semester parking pass requests are down.

CTA also administers a pre-tax transit program. Money is deducted from an employee paycheck, and a check is written directly to a specified public transit provider for the purchase of a transit pass. Again, IMDC has no relationship with the program. It should be noted that the program, as currently administered, can be ungainly. UIC employees, for example, must pick up the checks from an administrative office rather than receiving the check in the mail.<sup>62</sup> A more streamlined system might involve deducting funds from the paycheck and mailing the pass directly to employees.

**Route Planning** IMDC has indicated that it does not regularly contact CTA about changes that may affect ridership. They do not have a contact at CTA with whom to address such issues. This is hardly surprising, considering that IMDC seems to consider transit a relic of an earlier era that is swiftly being replaced by modern parking garages and tree-lined boulevards. The lack of relationship, however, is a particularly egregious lost opportunity, because IMDC could organize member institutions to provide the zipcode and shift data they hold for all employees. A simple computer program would allow human resources departments to update such information to CTA regularly. After the initial cost, such information would be free.

**Transportation Demand Management.** IMDC's master plan describes transit as a way to address congestion issues, but implementation has focused on traffic control, garages, and pedestrian-friendly environment. IMDC does not appear to address urban design as it relates to transit. Connections to the Expressway median stops are minimal. The signage that is so extensive elsewhere does not appear

near the Douglas Branch stops. There are no maps at the stations of the Medical District to help guide pedestrians.

**Capital Planning.** A moderate success story appears in the Capital Planning program. Employees at CTA's Capital Planning department have regular meetings regarding Blue Line construction impacts with community members. Some attendees are affiliated with medical district institutions. The vehicle for this is the Blue Line Citizens' Advisory Panel, which meets regularly with CTA Capital Construction and CTA Community Relations. The meetings resulted in the introduction of the X21 Cermak Express on weekends as a replacement for Blue Line weekend service.

While encouraging, this trend is in keeping with a tendency to place greater planning resources on capital projects than routine planning issues such as scheduling. Close community contact is often characteristic of large construction projects. For one, construction projects require Environmental Impact Statements, a process that involves community feedback. Secondly, such construction projects tend to be so costly that they demand heightened scrutiny, which in turn makes it more likely that someone has thought to put in place high-quality community relations. Thirdly, some contracts oblige contractors to manage community relations as part of the work. Due to the threat of performance penalties, community relations may receive more attention than if the transit authority managed the relationship itself.

## **Analysis**

The section above highlights a series of missed opportunities. While there are certainly problems with IMDC's planning model, IMDC cannot be blamed for disregarding transit if they do not believe CTA offers a transportation alternative at the levels they require.

A key issue is that CTA does not have a point of contact for its large institutions. There are helpful employees in bus scheduling; others in operations; some in capital construction and others in government relations. But as a single area representing 75,000 daily visits, IMDC should certainly have staff unit responding to its concerns. Senior parking office staff should not need to ask summer interns how to obtain system maps for their office.<sup>63</sup> A model for this might be Houston METRO, which is large part relied upon because they are committed to responding to customer issues. Even at the individual level, a rider can contact the call center about a late bus, and the information gets passed on to the relevant supervisor for follow-up. The supervisor requires an explanation from the driver, and the explanation is then evaluated. This system is intensified for large clients like the Texas Medical Center; TMC can trust METRO employees to respond to calls, to problem-solve, and to evaluate complaint trends to see if there has been improvement.<sup>64</sup>

It is important to recognize that currently, institutional relations are not identified as an issue of concern to CTA. When CTA describes its customer-oriented goals in its 2003 Budget Book, it promises to:

- Improve scheduling practices and reliability, including intervals between buses, via technology

- Expand accessibility to customers with disabilities
- Improve signage and directional guidance and improve customer communications
- Work to become more environmentally friendly<sup>65</sup>

Each of these issues is important in and of itself, and together they will allow individuals to choose transit. But it is important to communicate these initiatives to large institutions, so that they will feel comfortable encouraging their employees to rely on CTA.

After demonstrating its commitment to institutions, CTA needs to reach out to work cooperatively with the market. An appropriate first step would be to send staff to a standing mobility committee. CTA might open by stating their intention to do specialized research into perceived weaknesses in CTA service to the medical center. A whole series of innovations could stem from such a group: sponsored bus stops, support for increased density near transit stops, bicycle-to-work days, etc.

It is not reasonable that a comprehensive approach to improving relationships with large institutions only takes place when transit authorities are trying to obtain approval for large capital projects. Such an approach will not compel IMDC to make decisions that will increase reliance on public transportation. Even if IMDC declares its support for the Circle Line, its land-use decisions will ultimately determine if the project is successful.

Ultimately, Chicago is in a much better position to transform its medical center transportation system than any of the case studies. What Baltimore can do with a limited transit network; what Boston can do without transit authority support; and what Texas can do in a car-dependent culture; their examples make it all the more disappointing that Chicago is not doing better. Illinois Medical District has all the pieces in place: A strong transit network, a powerful and supportive Mayor, and a strong medical center with an active planning organization. Now is the time to step forward with a new vision for the area.

## **Chicago Recommendations**

### **CTA**

#### **Short term**

- Dedicate a staff unit to Illinois Medical District
  - Produce reports on service improvements, be a point of contact for marketing, service issues, long-range plans and general information. Should have a close relationship with CTA garages and bus supervisors.
- Push for U-Pass membership among remaining institutions
- Investigate feasibility of an H-Pass program, a program like U-Pass for hospital employees
- Set up a data upload website for Origin-Destination info from member institution HR offices
- Indicate willingness to send staff to an IMD mobility council (see actions below)

- Might include staff members from Planning, Marketing, Inter-Governmental Relations and Bus Scheduling, as well as Capital Construction and Blue Line as needed
- Indicate interest in bidding on shuttle service

### **Long Term**

- Push for institutional zoning ordinances to include a transit element
- Establish an Institutional Relations department
  - Would develop policies on land-use, joint development, pass sales, Location Efficient Mortgage partnerships, etc.
- Redesign Medical Center station
  - Work with Rush Hospital and Highway Department on a gateway entrance with air rights. Building might include medical offices and information about the District. The station should include weather protection, ADA accessibility, information, H-Pass sales, Bus transfer facility, and integration with District.
- Consider a new station South of Roosevelt serving new development

### **IMDC**

- Parking
  - Discourage any new above-ground parking structures
  - Encourage underground parking or peripheral surface lots with shuttles
  - Create parking maximums
- Improve pedestrian connections to Douglas Branch stations
- Invest in improved bus shelters
- Study policy changes such as employee transit pass subsidies, appropriate parking fees
- Provide Medical District maps at stations
- Consider residential investments in the District
- Consider revised zoning at Chicago Technology Park, especially at periphery

### **New IMD Mobility Council**

- Address parking inconsistencies (shared garages, etc.)
- Support transfer of Human Resources data to CTA by home institutions
- Undertake traffic demand management projects, such as Ride matching, etc.
- Recommend appropriate parking prices
- Address emerging mobility concerns

## **F. Centro Medico, San Juan, PR**

San Juan, Puerto Rico is in the final stages of constructing a new rapid transit system, called Tren Urbano. Included in the initial alignment is a station located at a significant concentration of medical facilities known as Centro Medico, which includes the hospitals generally regarded as the best in the Carribean.

There are many facilities in the area. These include the University of Puerto Rico's Schools of Medicine and Nursing and the associated university hospital; Puerto Rico Department of Health facilities, which includes a psychiatric hospital, a drug rehabilitation center and general administration; federal facilities including the Veteran's Hospital and the Center for Disease Control; the Red Cross; and many other facilities, including the municipal hospital, an industrial hospital, a children's hospital, and a cardiovascular center. Like the other medical centers considered in this research, the area borders a residential neighborhood.

Alone among the facilities discussed in this research, Centro Medico has a weak central planning group. Member institutions share utilities under a group called ASEM. General campus planning work is undertaken by the Department of Health, by an employee of the Department of Health's facilities planning division. Structurally, this is not very effective, because her priorities lie with the Department of Health, which has facilities all across the island. She indicated that she did not have employment data for Centro Medico. In addition, the Census transportation data is not compiled for Puerto Rico, so there is no traffic analysis zone data to help determine origin-destination trips.

Recent planning work at Centro Medico was undertaken as part of the Environmental Impact Statement process for Tren Urbano. This reflects a general pattern, whereby large capital projects create new investments in planning. Unfortunately, the ridership projections were done without modeling induced travel, and so are somewhat unreliable. Without accurate employment numbers, it is difficult to gauge how much of the current employment the train is expected to capture.

### **Land Use**

Centro Medico is extremely congested. It is located off two major highways, with many of the facilities surrounded by a three-lane traffic loop. Vans and cars double park in one of the two general traffic lanes, and vehicles frequently block the emergency vehicle lane. Surrounding the loop are parking lots and scattered health centers.

Just to the south is the new Tren Urbano station, which shares an intersection with the psychiatric hospital and the Red Cross. Nearby is the forensic center and the Veterans' Hospital Complex, which is also served by the next station on the alignment. The area is densely developed with hospitals and parking facilities.

The fact that the new station is somewhat offset from the center of campus may allow the center of campus to shift. Alternatively, the station might be considered too inconvenient for employees of the



central campus. Currently, walking between facilities can be difficult because of the derelict conditions of the sidewalks.

### **Current Service**

Puerto Rico's public transportation is run by the PRHTA, which includes the bus and highway systems. Bus service is run by AMA, while the contract for construction and operation of the train is held by PRHTA. There is also a significant informal transportation network in the form of *publicos*, or jitneys. These are large passenger vans typically run by individual owners through a cooperative system. Owners purchase the right to operate a route. Ridership on Tren Urbano is expected to be driven heavily from connecting *publico* routes.

Current service to Centro Medico includes multiple AMA bus routes and *publicos*. Most employees, however, drive to work. Parking is provided for free in surface lots and one jointly run structure in the center loop. There has been ongoing discussion about providing an open-air trolley to shuttle people around campus from the station.

### **Zoning**

Zoning in Puerto Rico has long been under the control of the island's central government. More recently, zoning powers were decentralized, and now rest in the power of municipal governments. Each municipality is sending a general planning framework to the Puerto Rico planning and development group for approval, and pending approval will oversee its own planning decisions.

All plans on the Tren Urban alignment include special redevelopment zones within a ½ mile of the station areas. *Estudios Technicos*, a planning consultant out of Hato Rey, PR, will produce station area development plans for the San Juan city planning department regarding Centro Medico.<sup>66</sup> This work will incorporate additional planning information, but was not available at the time of this writing.

### **Analysis**

The paucity of information here is in part an indication that Centro Medico is in an early stage of coordinated planning. However, it is clear that Centro Medico has a great deal of potential. ASEM is a good place to start, considering that MASCO began as a shared utility administration. In addition, Centro Medico has a great deal of surface parking lot space that could become high-density expansions. Many simple policies could be enacted, such as parking charges and prioritizing centralized parking for visitors while moving employee parking to the periphery. Furthermore, some of the most egregious pedestrian issues, such as cracked sidewalks, will be addressed by the station area improvement contract.

Leadership in the area is also quite good. The director of the Department of Health has indicated some interest in shifting the center of campus to the new station. The Director of the Red Cross, Carmen Canino, was formerly an administrator at Tren Urbano.

Other issues are more intractable. Improvements to AMA are now falling to the wayside, and the long-term ability of the organization to retain adequate service quality is in doubt. The chain of command for Tren Urbano is complex, and it is difficult to make policy decisions that support transit use such as transit pass programs. An appropriate approach is for the medical district institutions to step forward and demand a responsive public transportation authority, thereby legitimizing TU and helping shape the agenda.

### **Tren Urbano Recommendations**

- Department of Health should call for a meeting between all members to discuss campus planning in relation to the new station
- Trolley system must be solidified
- Create a standing planning group
- Centro Medico institutions should subsidize transit ridership

## **G. Conclusion**

Medical centers have much to gain from improved public transportation: decreased congestion, improved public access, efficiency and cost savings. However, neither Illinois Medical District or Centro Medico are so constrained for space that they will be forced to adopt transit-friendly policies independently, in the manner of Longwood or MGH, from a transit authority that provides inadequate service. As happened at Johns Hopkins and Texas Medical Center, these areas need the impetus of an outside force. Political leadership will be an important aspect to these improvements.

In the meantime, action needs to begin with the institutions in question. In Chicago, the transit authority is a powerful organization about to undertake a significant expenditure of energy trying to improve public transportation via the Circle Line. CTA has a lot to demand of IMD in terms of cooperation and support. CTA needs to step forward and show that this support is worth the District's investment.

In San Juan, transportation issues have been dominated by the highway department. The power of the public transportation authority is untested and to a large extent not yet defined. Tren Urbano does have power over station development, and so needs to think strategically about how to appropriately redevelop the land around the station. This means selling to developers with a compatible vision rather than the highest bidder. The medical district institutions must step forward and demand a responsive public transportation authority, thereby legitimizing Tren Urbano and helping shape the agenda. They can best do this by joining together under a voluntary planning organization that advocates for changes of group benefit.

The case studies presented here indicate that public transportation has the potential to be the centerpiece of medical campus revitalization. Successful change involves a progressive understanding of the relationship between automobiles and congestion, and adopting the policies outlined. With this commitment, public transportation authorities can help medical institutions achieve their ultimate goal: to promote good health.

## **Further Research**

As two major infrastructure investments open at Charles/MGH station and Centro Medico, there is a unique opportunity to examine the ridership effects of these transportation improvements. Combined with the data from Johns Hopkins, additional research might give a quantitative sense of the value of infrastructure improvements to medical centers. More generally, this thesis would benefit from a look at less successful examples of public transportation infrastructure.



# Appendix B

## Peak Period Parking Accumulations at Texas Medical Center, Houston, TX

|                  |          | large lot  |                   | small lot  |                   |
|------------------|----------|------------|-------------------|------------|-------------------|
|                  | hour     | % full     | cumulative totals | % full     | cumulative totals |
| <b>% entered</b> | 5:00 AM  | 8%         |                   | 3%         |                   |
|                  | 6:00 AM  | 35%        | 43%               | 23%        | 26%               |
|                  | 7:00 AM  | 19%        | 62%               | 34%        | 60%               |
|                  | 8:00 AM  | 10%        | 72%               | 21%        | 81%               |
|                  | 9:00 AM  | 3%         | 75%               | 4%         | 85%               |
|                  | 10:00 AM | 3%         | 78%               | 2%         | 87%               |
| <b>total</b>     |          | <b>78%</b> |                   | <b>87%</b> |                   |
| <b>% left</b>    | 3:00 PM  | 19%        |                   | 9%         |                   |
|                  | 4:00 PM  | 17%        | 36%               | 23%        | 32%               |
|                  | 5:00 PM  | 13%        | 49%               | 29%        | 61%               |
|                  | 6:00 PM  | 9%         | 58%               | 11%        | 72%               |
|                  | 7:00 PM  | 13%        | 71%               | 9%         | 81%               |
| <b>total</b>     |          | <b>71%</b> |                   | <b>81%</b> |                   |

## Endnotes

<sup>1</sup> Dubbs, Diana. "In Through the Out Door," *Facilities Design and Management*. Vol 17, Issue 10, p 42-44. New York, October 1998.

<sup>2</sup> Based on a review of literature about hospital location, particularly: James Lifton, *Site Selection for Health Care Facilities*, American Hospital Association, Catalog No. 127200, 1982. Miller, Richard et al. *Hospital and Healthcare Facility Design*. W. W. Norton and Company, New York: 2002. Mayhew, Leslie. *Urban Hospital Location*. Allen & Unwin, London: 1986. Articles: "In Through the Out Door," *Facilities Design and Management*, Vol 17 Issue 10, p 42-44. New York, October 1998; "St. Luke's Plans \$70 million campus revitalization," *Health Care Strategic Management*, Vol 20 Issue 6, p.4. Chicago, June 2002.

<sup>3</sup> The joint hearing took place on May 1, 2003. Notes from the hearing can be found on the web at <http://www.house.gov/transportation>.

<sup>4</sup> Author's interview with Andy Icken, April 10, 2003. EVP Support Service and Enterprises, Texas Medical Center.

<sup>5</sup> CTA Marketing Department.

<sup>6</sup> Concept forwarded by Fred Salvucci, lecturer, MIT Center for Transportation and Logistics.

<sup>7</sup> Interview with Sarah Hamilton, Director, LMA Area Planning, March 2003.

<sup>8</sup> I believe this contrasts with employees serving inpatients because those employees are more likely to be visited by specialists on rounds, such as physicians. In contrast, employees seeing out-patients tend to stay in the office while patients come to them.

<sup>9</sup> George Proakis.. others?

<sup>10</sup> Miller, Richard L. and Earl S. Swensson. *Hospital and Healthcare Facility Design*. W. W. Norton and Company, New York: 2002: p. 20

<sup>11</sup> This point was originally observed to me during a phone conversation with David Dixon, AIA, of Goody Clancy.

<sup>12</sup> For more information on parking garage aesthetics, please see research by Eli Curtis.

<sup>13</sup> J. Paul and J B Hanna. "Applying the marketing concept in health care: the no-show problem." *Health Marketing Quarterly*. 1997; 14(3): 3-17. The authors find that lack of transportation is an important determinant of no-show behavior among the clinic's low-income and elderly patient population. The authors suggest health care organizations offer individualized transportation services to and from their facilities.

<sup>14</sup> Cheng et al., "Strategies to Increase Adherence With Tuberculosis Test Reading in a High-risk Population" *Pediatrics* 1997; 100: 210-213. August, 1997

<sup>15</sup> McCarthy, Melissa L. et al. "Determinants of Use of Outpatient Rehabilitation Services Following Upper Extremity Injury." *Journal of Hand Therapy*. Vol. 11 No. 1 pp. 32-38, 1998.

<sup>16</sup> Ibid, 32.

<sup>17</sup> Guidry et al., "Transportation as a barrier to cancer treatment". *Cancer Practice*, 1997: Nov-Dec 5(6): 361-6. The study compared the distance and mode of transportation to radiotherapy and chemotherapy and perceptions of transportation as a barrier to care among white, black and Hispanic cancer patients receiving treatment from a consortium of cancer treatment facilities in Texas. A mail questionnaire was sent to 910 patients, 593 returned. The study appears to have sorted for race and age but not for income.

<sup>18</sup> Ibid, 38.

<sup>19</sup> Conversation with Andy Icken, EVP Texas Medical Center Support Services. Held at TMC, Houston, TX on April 11, 2003.

<sup>20</sup> Provided by Joyce Camp, Senior Vice President, Institutional and Customer Services. Tables available in appendix.

<sup>21</sup> A lecture entitled "Without Zoning" by Professor Bernard Siegan, University of San Diego provided an overview on Houston's history with zoning. November 18, 2002, at MIT.

<sup>22</sup> Anecdote recounted by Scott Barker, Houston METRO Senior Transit Planner and Houston resident.

<sup>23</sup> Lecture by the director of Downtown Houston, Inc, April 2003.

<sup>24</sup> TCRP Repot 27, p. 20

<sup>25</sup> Email from Joyce Camp, TMC, Sr. Vice President Institutional and Customer Services

<sup>26</sup> Conversation with Bob Stott, EVP Texas Medical Center Planning, held at TMC, Houston, TX on April 11, 2003.

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- <sup>27</sup> Texas Medical Center Master Plan, p. 9.
- <sup>28</sup> Texas Medical Center Master Plan, p. 9
- <sup>29</sup> Mary Ann Collier, METRO Communications and Marketing
- <sup>30</sup> Conversation with Miki Milovanovic, Senior Transit Planner, METRO Houston.
- <sup>31</sup> Reported by both Andy Icken and Bob Stott at TMC, April 11, 2003.
- <sup>32</sup> TMC Master Plan, p. 9.
- <sup>33</sup> All history comes from the Johns Hopkins Medicine website, at <http://www.hopkinsmedicine.org/aboutus/>
- <sup>34</sup> Source: MTA Metro Subway timetable: <http://www.mtmaryland.com/schedules/subway/newmetro.pdf>
- <sup>35</sup> Source: Michael Iati, JHH, Director, Planning and Architecture
- <sup>36</sup> According to Larry Cohen, Director, Parking Operations and Transportation, Johns Hopkins Medical Institutions, conversation held April 23, 2003.
- <sup>37</sup> Figures as reported by Graduate Student parking liaison Valerie DeLeon, over telephone, April 2003.
- <sup>38</sup> Title 9 Planned Unit Developments, Baltimore City Revised Code. § 9-102. Regulatory Intent.
- <sup>39</sup> From the MASCO website: [http://www.masco.org/aboutMasco\\_facts.htm](http://www.masco.org/aboutMasco_facts.htm)
- <sup>40</sup> Data Collected by Cecily Way, from Longwood Medical Area Transportation Study, Technical Memo #1, by Vanasse Hangen Brustlin, Inc., 1988.
- <sup>41</sup> Data Collected by Cecily Way, from Longwood Medical Area Transportation Study, Technical Memo #1, by Vanasse Hangen Brustlin, Inc., 1988. p. 16
- <sup>42</sup> Ibid, p. 35.
- <sup>43</sup> Data Collected by Cecily Way. From MASCO website.
- <sup>44</sup> As researched by Cecily Way. From Longwood Medical Area Transportation Study, Technical Memo #3, by Vanasse Hangen Brustlin, Inc., 1988, p. 33-34.
- <sup>45</sup> All quotations from Ms. Hamilton come from an interview at MASCO office on 2/19/03.
- <sup>46</sup> From the US Census website: Travel to Work Characteristics for the 50 Largest Metropolitan Areas by Population in the United States: 1990 Census. <http://www.census.gov/population/socdemo/journey/msa50.txt>
- <sup>47</sup> Interview with John Meserve, Director, Partners HealthCare Capital and Facilities Planning. Telephone interview on March 13, 2003.
- <sup>48</sup> Compiled from 1990 Census data CTPP by author and Jeff Busby, a graduate student at the Center for Transportation and Logistics at MIT.
- <sup>49</sup> Illinois Medical District Master Plan, p.4.1
- <sup>50</sup> Illinois Medical District Master Plan, p.2.3
- <sup>51</sup> According to Diane Hodges, UIC Associate Vice Chancellor of Administration.
- <sup>52</sup> IMDC Master Plan, p.6.5.
- <sup>53</sup> Conversation with Joseph Dunne, Deputy Director IMDC, May 2, 2003
- <sup>54</sup> Chicago Transit Authority 2003 Annual Budget Summary, p. 62
- <sup>55</sup> Chicago Transit Authority 2003 Annual Budget Summary, p. 61.
- <sup>56</sup> Source: CTA Press Release, 2/5/03, available at: <http://www.transitchicago.com/news/ctaandpress.wu?action=displayarticledetail&articleid=122179>
- <sup>57</sup> Source: *March 2003 Ridership Summary*, CTA Planning.
- <sup>58</sup> Chicago Transit Authority 2003 Annual Budget Summary, p. 59.
- <sup>59</sup> *TCRP Synthesis 39, Transportation on College and University Campuses*. National Research Council -- Transportation Research Board. National Academy Press: Washington, D.C., 2001, p. 35.
- <sup>60</sup> Telephone interview with Jeff Wilson, CTA U-PASS administrator, May 4, 2003.
- <sup>61</sup> *2001-02 U-Pass Student Ridership*. CTA Market Research Department, Planning and Development Division. Chicago Transit Authority: Chicago, 2002, p. 4.
- <sup>62</sup> According to Dr. David Boyce, UIC Professor of Transportation and Regional Science. Interview at UIC, January 29, 2003.
- <sup>63</sup> This was the Northwestern University transportation office, which is located north of the Loop.
- <sup>64</sup> This is a paraphrase of sentiments expressed by Denise Milby of Texas Medical Center.
- <sup>65</sup> Chicago Transit Authority 2003 Annual Budget Summary.
- <sup>66</sup> Conversation with Criseida Navarro, January 2003.
- <sup>67</sup> Sources: All prices accurate as of April 15, 2003. JHM: available on-line at <http://www.hopkinsmedicine.org/security/parking/rates.htm>; TMC: Collected by site visit to TMC and

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