



The area around Cleveland Circle is a densely populated, urban neighborhood on the Boston-Brookline city line. About 30 percent of households do not own a vehicle. Two major Green Line stops serve this area: Cleveland Circle, the terminus of the C Line, and Reservoir on the D Line. No park-and-ride facilities are available, and some bus service is provided at Reservoir. These characteristics contribute to a high walk-access rate to the Green Line at these stops.

Cleveland Circle—the intersection of Beacon Street and Chestnut Hill Avenue—bustles with activity. The intersection carries through traffic as well as traffic destined to the commercial establishments in the area. These establishments also attract pedestrians and bicyclists, who must often contend with the local traffic.

The dense, urban character of the neighborhood, the high walk-access rate to the Green Line, and the challenges faced by pedestrians and bicyclists traveling around this busy area, are reasons for the selection of the area around these Green Line stops for inclusion in this study.

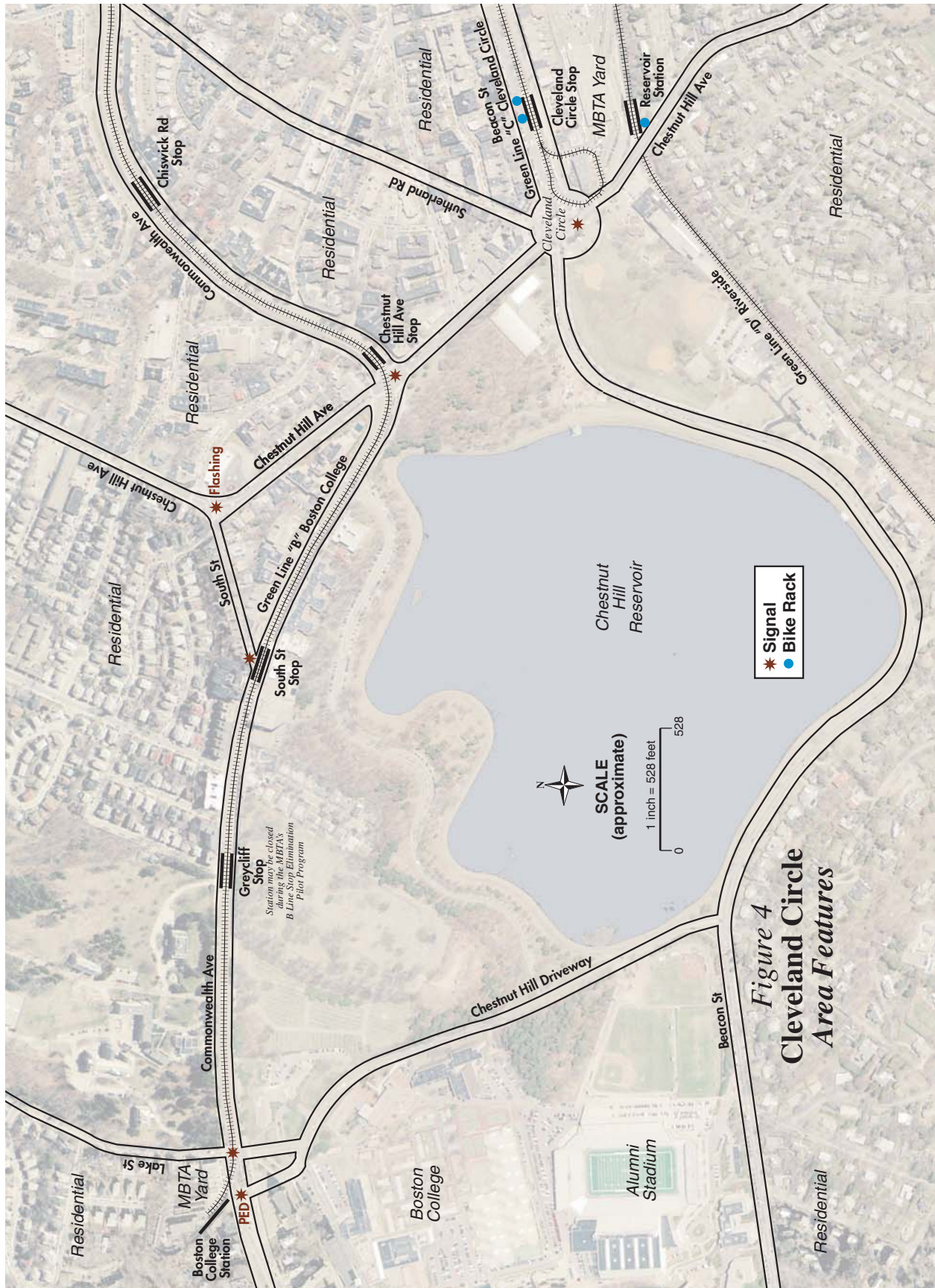
Station Area Characteristics

Over 4,500 people in just over 2,500 households reside in the area within a quarter mile of the Cleveland Circle and Reservoir stops on the Green Line, according to the 2000 census. (About 12,000 people reside within a half-mile radius of the area neighboring Cleveland Circle and Reservoir, in over 6,100 households.) Around 30 percent of the households do not have a private vehicle. Sixty percent of the developed land within a quarter-mile radius of Cleveland Circle is residential (multifamily housing and quarter-acre lots) and nearly 40 percent commercial. Heading farther from Reservoir (particularly south, east, and west into Brookline), the area becomes predominantly residential.

A 1994 Green Line passenger survey¹ counted over 700 boardings on the C Line at the Beacon Street stops from Dean Road through Cleveland Circle during the morning peak period, between 6:00 and 9:00 A.M.; the survey counted over 1,500 boardings between 6:00 A.M. and 3:30 P.M. By far the dominant mode of access to these Green Line stops was walking: 89 percent. Of those passengers who walked to the station, 77 percent had a walk of five minutes or less, and over 99 percent had a walk of fifteen minutes or less.

At the Reservoir stop on the D Line, the 1994 passenger survey noted over 900 boardings during the morning peak period, between 6:00 and 9:00 A.M.; the survey counted over 1,800 boardings between 6:00 A.M. and 3:30 P.M. Similar to the other Green Line stops in this area, the dominant mode of access for Reservoir is walking: 80 percent. Over one-third of those passengers who walked to the station had a walk of five minutes or less, and over 96 percent had a walk of fifteen minutes or less.

¹ *MBTA Systemwide Passenger Survey: Rapid Transit/Light Rail 1994*, a report produced by the Central Transportation Planning Staff for the Massachusetts Bay Transportation Authority, May 1996.



Station Amenities

Presented in this section is a discussion of pedestrian crosswalks and bicycle parking facilities at the two stops.

Cleveland Circle Stop

Passengers at the Cleveland Circle stop on the Green Line C Branch board and alight using ground-level platforms on the outside of the tracks. The platforms have recently been upgraded to provide wheelchair accessibility. On the inbound side, a bench with a roof-only shelter is available for riders. A fence separates waiting passengers on the platform and vehicle traffic on Beacon Street.

CTPS observed the patterns of passengers alighting at the Cleveland Circle stop as they dispersed through Cleveland Circle. The observations were conducted on the afternoon of September 10, 2003, a sunny and warm Wednesday. The majority (over 70 percent) of the nearly 250 passengers observed crossed to the north side of Beacon Street and headed toward Sutherland Road or Chestnut Hill Avenue. Ten percent of alighting passengers crossed north to head east, and the remaining 20 percent crossed Beacon Street to the south and overwhelmingly headed in the direction of Chestnut Hill Avenue.

The Cleveland Circle stop has two ribbon bicycle racks on the outbound-side platform, located at opposite ends of the platform. However, the location of the ribbon rack at the end furthest from Cleveland Circle may not be suitable for bicycle parking: the rack is too close to the fence and to the plant/tree area on the sidewalk. These racks do not appear to be at capacity.

On Beacon Street at the Cleveland Circle stop is a pedestrian-activated crossing signal at both the eastbound/inbound and westbound/outbound sides. Our field audit found these pedestrian signals can have a slow response-to-activation time. Once activated, the pedestrian-crossing signals provide 15 seconds of 'Walk' (and flashing 'Don't Walk') time, which is adequate for crossing the road. The crosswalk on the eastbound side of Beacon Street has been paved over.

Recommendations:

- Paint a crosswalk across the eastbound side of Beacon Street at the pedestrian-crossing signal.
- Paint a stop line for traffic at the crosswalk on both sides of Beacon Street. The stop line should be at least 10 feet back, and have a sign stating, "Stop Here for Crosswalk."
- Reduce the queue time for pedestrians waiting for a "walk" signal at the pedestrian-crossing signals.
- Install illuminated pushbuttons at the pedestrian-crossing signals, to indicate to pedestrians that the crossing signal has been activated.
- Place midstreet pedestrian-crossing cones/signs in the crosswalk on the Beacon Street westbound side (where the road is wide), as a warning to vehicular traffic.

Reservoir Station

At the time of the field observations, buses (Reservoir Station is served by Route 51 and Route 86) were not using the bus turnaround to pick up and drop off passengers; instead, the buses were stopping only on Chestnut Hill Avenue across the street from the station. (Update: As of July 29, 2004, construction is still present at the station bus area, but buses are using the turnaround.) A crosswalk with a pedestrian-crossing sign barrel leads pedestrians across Chestnut Hill Avenue to the bus stop on the southbound side.

Reservoir has single-bike posts and three inverted-U bike racks located at the top entrance at the bus turnaround. These are located along the sidewalk leading from the station stairway toward the Chestnut Hill Avenue walkway. The bicycle parking area is not sheltered.

Recommendation: Install bicycle parking racks in the space between the inbound and outbound staircases at Reservoir Station. This location provides visibility and would not interfere with station patron circulation. Furthermore, the existing roof over the walkways and waiting area could be easily extended over this location to provide shelter to the bicycle racks. A rack with 12 inverted-U rack elements would comfortably fit here; the rack should be placed 30 inches from the wall, and the rack elements should be spaced at 36-inch centers.

Station Access by Pedestrians and Bicyclists

This section discusses the station-area accessibility issues at the following locations:

- Cleveland Circle
- Chestnut Hill Avenue North
- Beacon Street East
- Sutherland Road
- Chestnut Hill Avenue South

Cleveland Circle



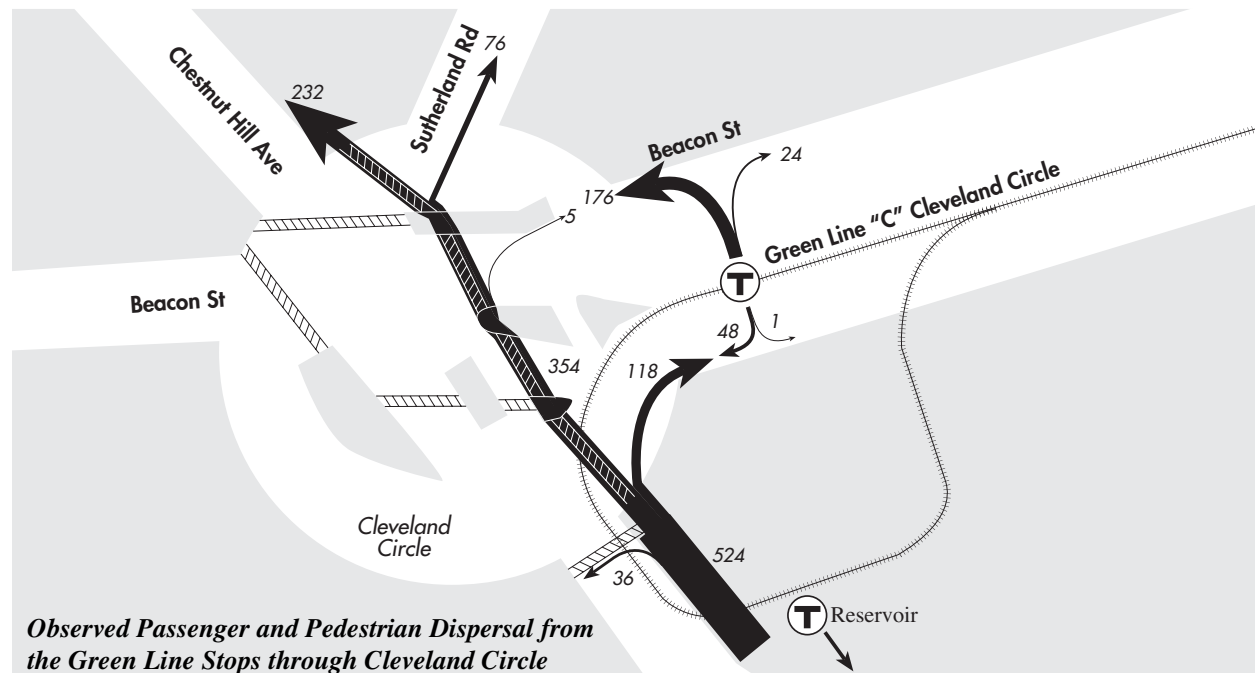
Cleveland Circle—the signalized intersection of Beacon Street and Chestnut Hill Avenue—is a challenging area to negotiate for both pedestrians and bicyclists. The intersection’s design and operation are more complex than usual for a four-leg intersection, which Cleveland Circle is essentially. Its expansive footprint handles busy, two-lane traffic approaches in each direction, in addition to the turning movements of the Green Line light-rail trains. Medians and traffic islands help break up the movements and offer refuge for crossing pedestrians.

Nevertheless, pedestrian and bicyclist circulation through Cleveland Circle is challenging,² as conditions create an intimidating environment: poor crosswalk and pavement condition; misalignment of crosswalks, curb cuts, and traffic/pedestrian islands;

² Even motorists were seemingly confused at navigating the intersection, as we observed a couple of vehicles making illegal turns or heading in the wrong traffic direction!

and the placement of signal and utility poles. Current signal phases create unnecessary wait time for pedestrians crossing Beacon Street.

The signal phasing and timing at Cleveland Circle allow pedestrians to only cross Beacon Street part of the way, forcing pedestrians to wait on traffic islands. The main reason for this is that the right-turn lane from northbound Chestnut Hill Avenue to eastbound Beacon Street has a pedestrian-crossing signal that operates separately from the Beacon Street pedestrian signals. The traffic signal for the intersection of Beacon Street at Chestnut Hill Avenue has an all-red, all-pedestrian-walk phase; vehicles have a “No Turn on Red” restriction.



On the afternoon of September 10, 2003—a sunny and warm Wednesday—CTPS observed the pattern of dispersal of passengers discharging from Reservoir Station. Over 520 pedestrians walked north to Cleveland Circle from the direction of Reservoir Station and Chestnut Hill Avenue, both to the south of the intersection. Nearly 70 percent of these pedestrians headed north along Chestnut Hill Avenue, whereas approximately 25 percent turned right onto Beacon Street. Most of those who chose to cross Chestnut Hill Avenue did so at the crosswalk located just south of Cleveland Circle or proceeded farther north of the intersection. A quarter of those pedestrians who crossed Cleveland Circle heading northbound headed toward Sutherland Road, whereas the majority continued to head north along Chestnut Hill Avenue.

Midblock crossings (those pedestrian crossings not at marked crosswalks) are a common occurrence at Cleveland Circle, despite the high traffic volume.

Recommendations:

- At a minimum, perform the following general maintenance:
 - Restripe pedestrian crosswalks
 - Paint the curbs of the traffic islands yellow
 - Restripe stop lines for vehicular traffic, particularly on Chestnut Hill Avenue
- Since the intersection handles many vehicle turning movements that create conflicts with pedestrians, improvements could be made to the physical design and layout of the intersection even without modification to the traffic circulation—in order to improve the safety of crossings. Suggested design elements to implement consist of the following:
 - Stripe, using yellow paint, narrow shoulders around the traffic islands and medians; this would make these intersection features more visible and help maintain a buffer between vehicles and pedestrians
 - Enlarge particular traffic islands and medians in order to provide pedestrians with more refuge area, as well as to channel traffic better (especially if the above recommendation is implemented)
 - Add a “No Right Turn” from northbound Chestnut Hill Avenue to eastbound Beacon Street at the middle of the intersection on the median between the opposing Beacon Street lanes, since a right-turn bay is already present
 - Consider a bulb-out at the corner of northbound Chestnut Hill Avenue to eastbound Beacon Street, in order to sharpen the turn for vehicles, shorten the crosswalk for pedestrians, and provide additional refuge for crossing pedestrians
 - Realign curb cuts with crosswalks, including correcting for sight and travel interference of signal posts and lampposts
- Adjust pedestrian crossing signals and signal timings to reduce the amount of midintersection wait time. For example, the pedestrian signal for the crossing of westbound Beacon Street lanes did not indicate “walk” at a time when that traffic clearly had a red light phase.
- Install crossing-time-countdown pedestrian signals.

Cleveland Circle Streetscape Plan Recommendations

In 2002, a study team led by The Cecil Group, Inc., studied Cleveland Circle for the Aberdeen and Reservoir Civic Association in an effort to promote and advocate improvements to this intersection. Their report, entitled *Cleveland Circle Streetscape Plan*,³ details long-term recommendations and preliminary designs. The preferred design alternative includes the following notable recommendations:

- Adding textured unit pavers to the midblock crosswalks at the Cleveland Circle stop on Beacon Street
- Enlarging existing traffic islands at Cleveland Circle

³ *Cleveland Circle Streetscape Plan: Final Report*, submitted by The Cecil Group, Inc., and Howard/Stein-Hudson Associates to the Aberdeen & Reservoir Civic Association, October 2002.

- Adding a new traffic island at the northwest corner of Cleveland Circle, channeling right-turning southbound Chestnut Hill Avenue traffic, while providing extra refuge for pedestrians
- Adjusting the curblines at the southeast corner of the intersection, reducing the unnecessary road width for the right-turning northbound Chestnut Hill Avenue traffic
- Straightening the MBTA B Line track on Chestnut Hill Avenue to remove the need for northbound trains to pass through stacked lanes of vehicles on westbound Beacon Street

Chestnut Hill Avenue North



Chestnut Hill Avenue (and Sutherland Road) is the main access road from the north to the Cleveland Circle area. The stretch of Chestnut Hill Avenue to Commonwealth Avenue is a busy, particularly wide four-lane, undivided road with on-street parking and sidewalks on both sides. Chestnut Hill Avenue leads to the B Line stop at Commonwealth Avenue.

The pavement condition on Chestnut Hill Avenue at and north of Cleveland Circle is rough. Rail tracks are also present, adding to the uneven surface. Sidewalks either lack wheelchair ramp/curb cuts at the street corners or have inadequate ones.

Recommendations:

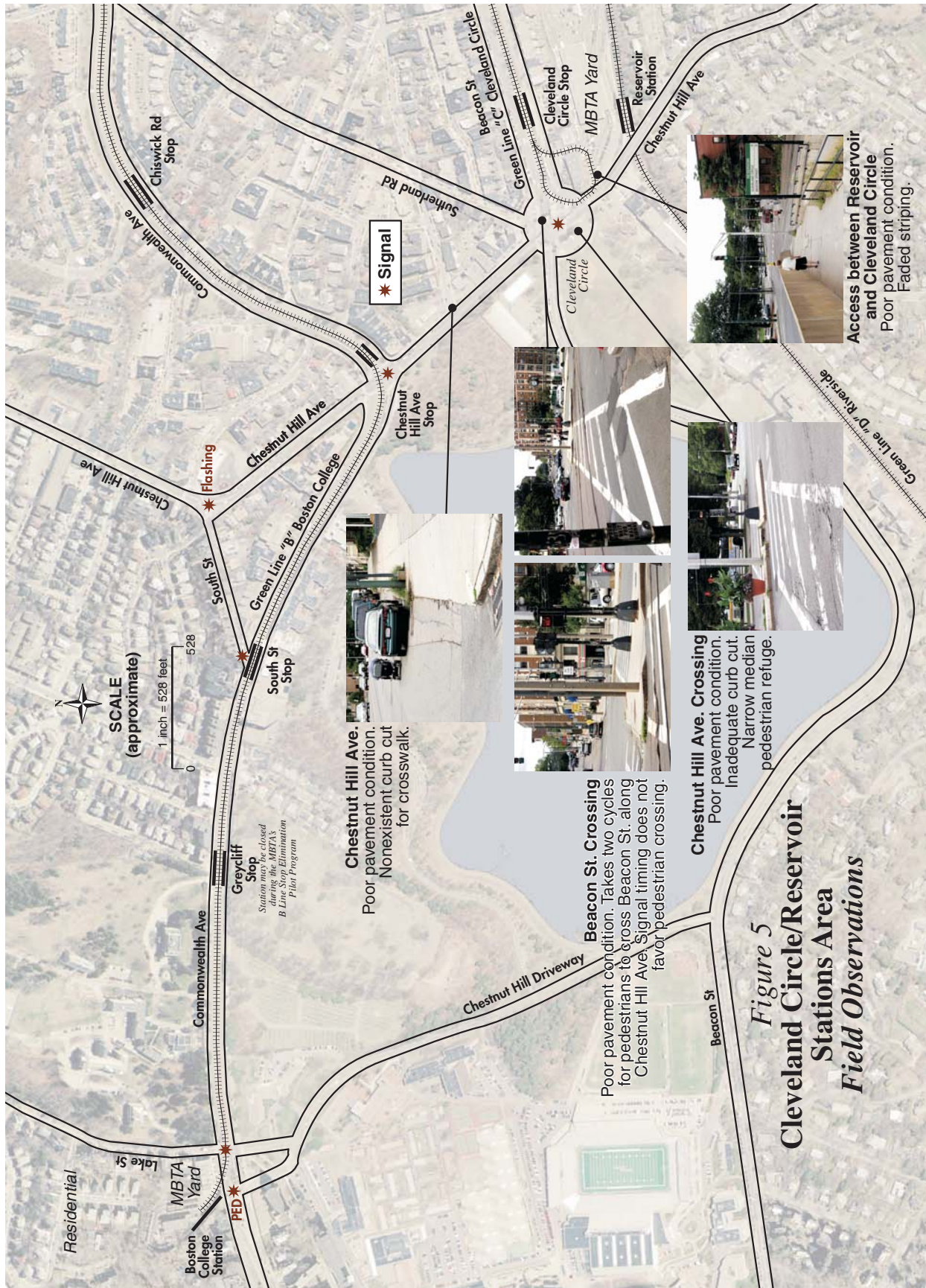
- Repair sidewalks, install curb cuts (particularly in the north-south direction), and repair the road surface pavement, especially at crossings
- Eliminate overgrown weeds and foliage along the sidewalk on the west side of Chestnut Hill Avenue
- Install trailblazing signs along Chestnut Hill Avenue (and at the B, C, D branch station/stops) that inform riders of the connection between the different Green Line branches

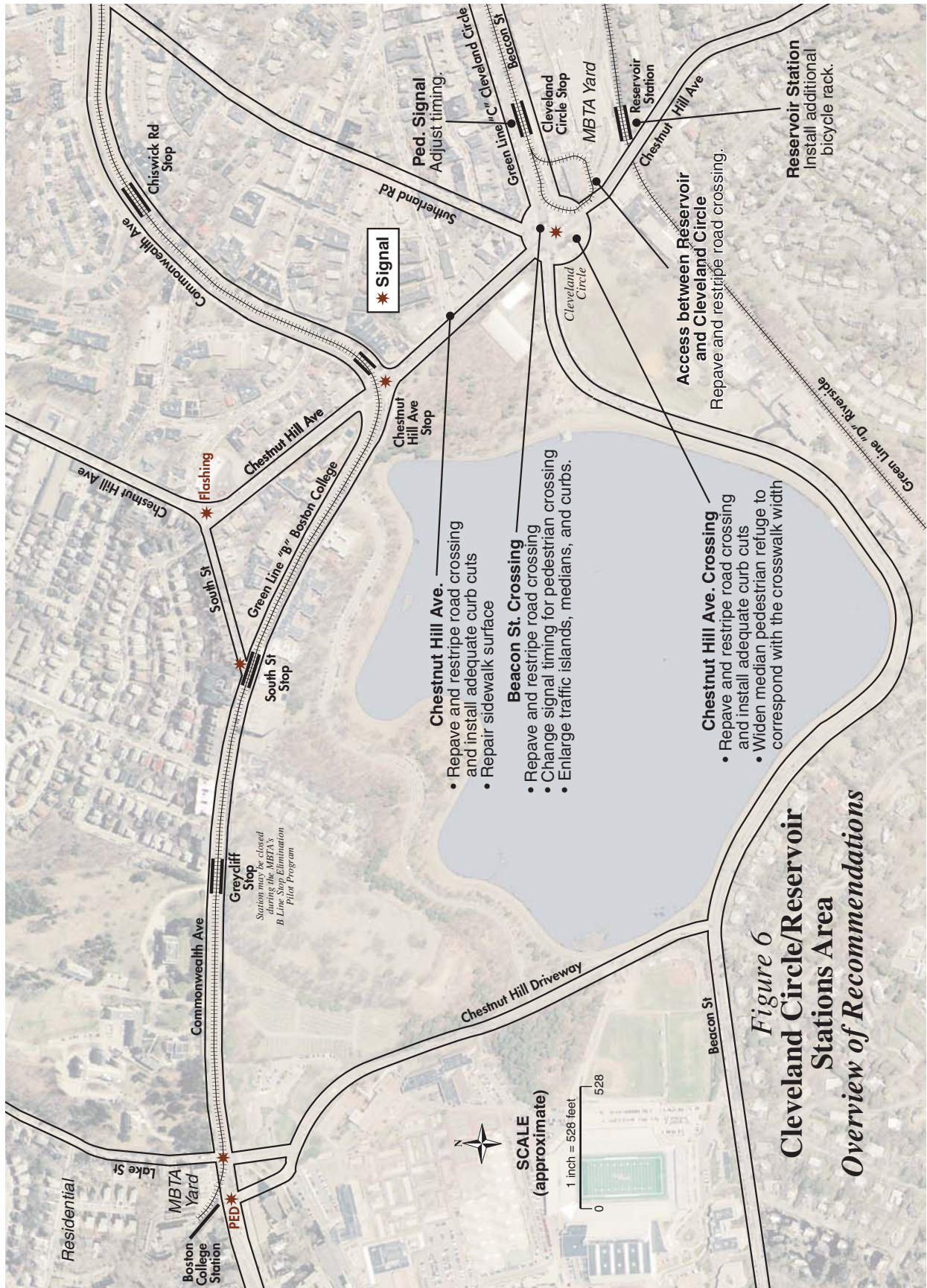
Beacon Street East



Beacon Street is a major access route eastward. The C Line travels along the median of Beacon Street, separating the eastbound and westbound traffic. Sidewalks are provided on the outside of the roadway. East of Ayr Road and the Green Line stop, westbound Beacon Street has three lanes, with on-street parking on both sides (parallel parking on the outside and angled parking along the median). Eastbound Beacon Street has two lanes for traffic, with on-street parking on the outside. West of Ayr Road, along the Cleveland Circle Green Line stop, Beacon Street is only two lanes wide in each direction, with on-street parking. At Cleveland

Circle, though, Beacon Street is four lanes wide at its westbound approach (including turning lanes) and three lanes wide heading east from the intersection.





Sutherland Road

Sutherland Road connects a dense residential neighborhood to the commercial area of Cleveland Circle. Parking is permitted on both sides of the narrow street. Sidewalks are provided on both sides; some repair is needed on the sidewalk on the east side, near Cleveland Circle.

Chestnut Hill Avenue South



Chestnut Hill Avenue south of Reservoir Station is a two-lane roadway. Concrete sidewalks are found along both sides, and they have a grass-and-tree buffer separating them from the roadway lanes.

Along Chestnut Hill Avenue at the Reservoir Station bus turnaround, most of the observed pedestrian activity (about 72 percent, close to 400 pedestrians) took place north of the station (Cleveland Circle direction). Only 11 percent of pedestrians (for a total of about 44 in a two-hour afternoon period) were observed heading to or from Chestnut Hill Avenue south of Reservoir. The remaining pedestrian activity in the area was related to bus passengers, who waited at the stop on Chestnut Hill Avenue. Activity was intermittent, picking up when the Green Line dropped off passengers.



Passengers walking from Reservoir Station to Cleveland Circle must cross the entrance to the MBTA service facility, used by authorized vehicles and trains. The pavement at the MBTA driveway, between the Reservoir walkways and the sidewalk to the north at Cleveland Circle, is in poor condition, and a crosswalk is not provided. The pavement condition of the sidewalk leading to the top of Reservoir on the east side of Chestnut Hill Avenue shows signs of deterioration.

Recommendations:

- Repave and stripe the crossing of the MBTA service facility entrance between the Reservoir walkways and the sidewalk to the north at Cleveland Circle
- Repave the eastside concrete sidewalk/ramp along Chestnut Hill Avenue at Reservoir Station



This chapter presents the conditions on the stretch of the Green Line B Branch along Commonwealth Avenue between the terminal stop at Boston College and the Chestnut Hill Avenue stop to the east. Between these two stops, the Green Line makes stops at South Street and Greycliff Road, which are both located in the median of Commonwealth Avenue.¹

Boston College Station is the terminus for the B Branch of the Green Line light rail transit service. No park-and-ride facilities are available, and the station is not an MBTA bus destination. Consequently, most passengers boarding at these stops arrive by walking.

Private residences and a major college campus characterize the area around the station. The study area is likely to retain its present character and scale of development in the near term. However, Boston College, according to newspaper reports, is exploring opportunities to expand its campus to an area north of Commonwealth Avenue, just east of Lake Street. This may add activity (vehicle, pedestrian, and bicycle) to the study area once new developments are constructed.

The rest of the corridor studied is primarily residential and is densely developed. A high percentage of households do not own a vehicle. The percentage of the population categorized as minority is slightly greater here than the region's average.

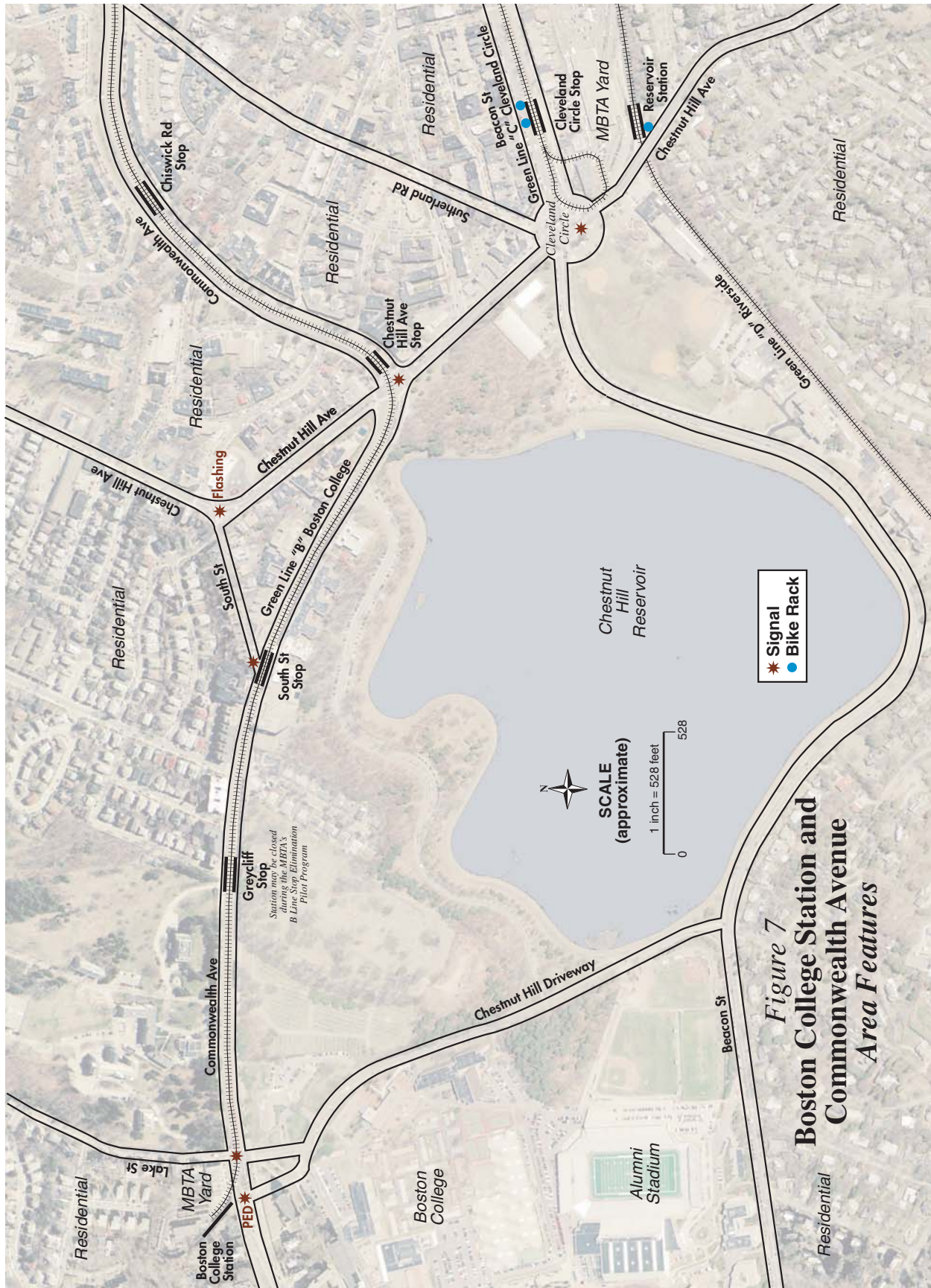
The dense, urban character of the neighborhood, the presence of a major academic institution, and the high walk-access rate, were reasons this Green Line segment along Commonwealth Avenue was selected for this study.

Station Area Characteristics

In the area within a quarter mile of the Boston College stop reside approximately 1,400 people in just over 570 households, according to the 2000 census. (This figure may vary from actual conditions, because of the high number of college students in this area and the Census's classification and geocoding practices.) Just over 10 percent of the households do not have a private vehicle. Three-quarters of the developed land around the station area is residential (multifamily housing and less than quarter-acre lots), with very little commercial and no industrial; other significant land uses include urban open space, as the immediate area includes a university campus and a cemetery.

A bit farther inbound along the B Line, the area characteristics change to a more urban residential character. Within a quarter mile of the Chestnut Hill Avenue stop reside over 5,400 people in just over 3,200 households, according to the 2000 census. Approximately 38 percent of the households do not have a private vehicle. Two-thirds of the developed land around the station area is residential (exclusively multifamily housing), with some commercial and no industrial.

¹ The stop at Greycliff Road is under consideration to be eliminated by the MBTA; it is one of the locations in the MBTA's Stop Elimination Pilot Program, which began in April 2004. Also, the Boston College Station operations are being relocated to the median of Commonwealth Avenue just east of Lake Street: recommendations are made accordingly.



A 1994 Green Line passenger survey² counted 375 boardings on the B Line at the Commonwealth Avenue stops from Boston College through Chestnut Hill Avenue during the morning peak period (6:00 A.M. to 9:00 A.M.); during the longer period of 6:00 A.M. to 3:30 P.M., the survey counted over 1,200 boardings. By far the dominant mode of access for these Green Line stops is walking: 92 percent of passengers surveyed accessed the station by walking. None of the surveyed passengers rode a bicycle to the Green Line. Seventy-one percent of those passengers who walked to the station had a walk of five minutes or less, and over 99 percent of passengers had a walk of fifteen minutes or less.

Station Amenities

In terms of station amenities for pedestrians and bicyclists at these Green Line stops, the following two issues are discussed in this section:

- Bicycle Parking at Boston College Station
- Passenger Wait Area at Chestnut Hill Avenue Stop

Bicycle Parking at Boston College Station



No bicycle parking is provided at Boston College Station. A demand for bicycle parking exists, as demonstrated by the locked bicycle observed along a chain-link fence at the station.

Recommendation: Install a bicycle rack at Boston College Station. A rack with four inverted-U racks elements should be added. An appropriate location for the rack is just to the right of the MBTA information panel. The proposed bicycle rack location is visible to station patrons and personnel, provides shelter, and the platform width can accommodate bicycles while not interfering with the circulation of passengers. (However, a bench is presently located here; the bench can be relocated to the empty space to the right of its current location, where the platform is too narrow for a bicycle rack.)

² *MBTA Systemwide Passenger Survey: Rapid Transit/Light Rail 1994*, a report produced by the Central Transportation Planning Staff for the Massachusetts Bay Transportation Authority, May 1996.

Passenger Waiting Area at Chestnut Hill Avenue Stop



At the Chestnut Hill Avenue stop, the passenger waiting area consists of a narrow (four-foot wide), blacktop median between the inbound tracks and the curving eastbound lanes of Commonwealth Avenue. No crosswalk is provided across Commonwealth Avenue at the head-of-the-train area. The wide inside traffic lane on Commonwealth Avenue does not have a striped shoulder separating traffic from the curb along the median.

Recommendation: Consider measures to increase passenger safety for Green Line riders on the median platform on Commonwealth Avenue. The MBTA's Design and Construction Department should identify appropriate improvements, which may include:

- Restriping the Commonwealth Avenue lanes, particularly in the stretch adjacent to the transit stop, with the intent of narrowing the lanes by one foot each and adding a shoulder to the inside lane. This should slow down traffic and would provide an extra buffer between vehicular traffic and passengers. The inside shoulder solid line should visibly stand out—it could be yellow and light-reflective.
- Installing a fence along the road-side perimeter of the passenger wait area.
- Extending the platform width, in conjunction with the recommendations above.

Station Access by Pedestrians and Bicyclists

This section discusses the station-area accessibility issues at the following locations:

- Boston College Station
- Commonwealth Avenue at Lake Street/St. Thomas More Road (Boston College)
- Green Line Stops at South Street and Greycliff Road
- Commonwealth Avenue between Lake Street and Chestnut Hill Avenue
- Commonwealth Avenue at Chestnut Hill Avenue
- Chestnut Hill Avenue between Commonwealth Avenue and Cleveland Circle

CTPS conducted a sample of midafternoon observations of pedestrian activity at Boston College Station on September 18, 2003, a sunny, warm day. In an hour, approximately 450 pedestrians crossed Commonwealth Avenue to and from the Boston College campus. Pedestrians crossed Commonwealth Avenue at one of two locations, Lake Street or Boston College Station. Approximately the same number of pedestrians crossed Commonwealth Avenue to the Boston College campus side of the street as those who crossed to the north side. (Due to the midafternoon peak-period changes in Green Line operations here, a full peak-period pedestrian observation was not performed.)

For the other stops on this stretch of the Green Line, a walking inspection of the accessibility conditions were made. Some pedestrian observations were made, but no systematic counts.

Boston College Station



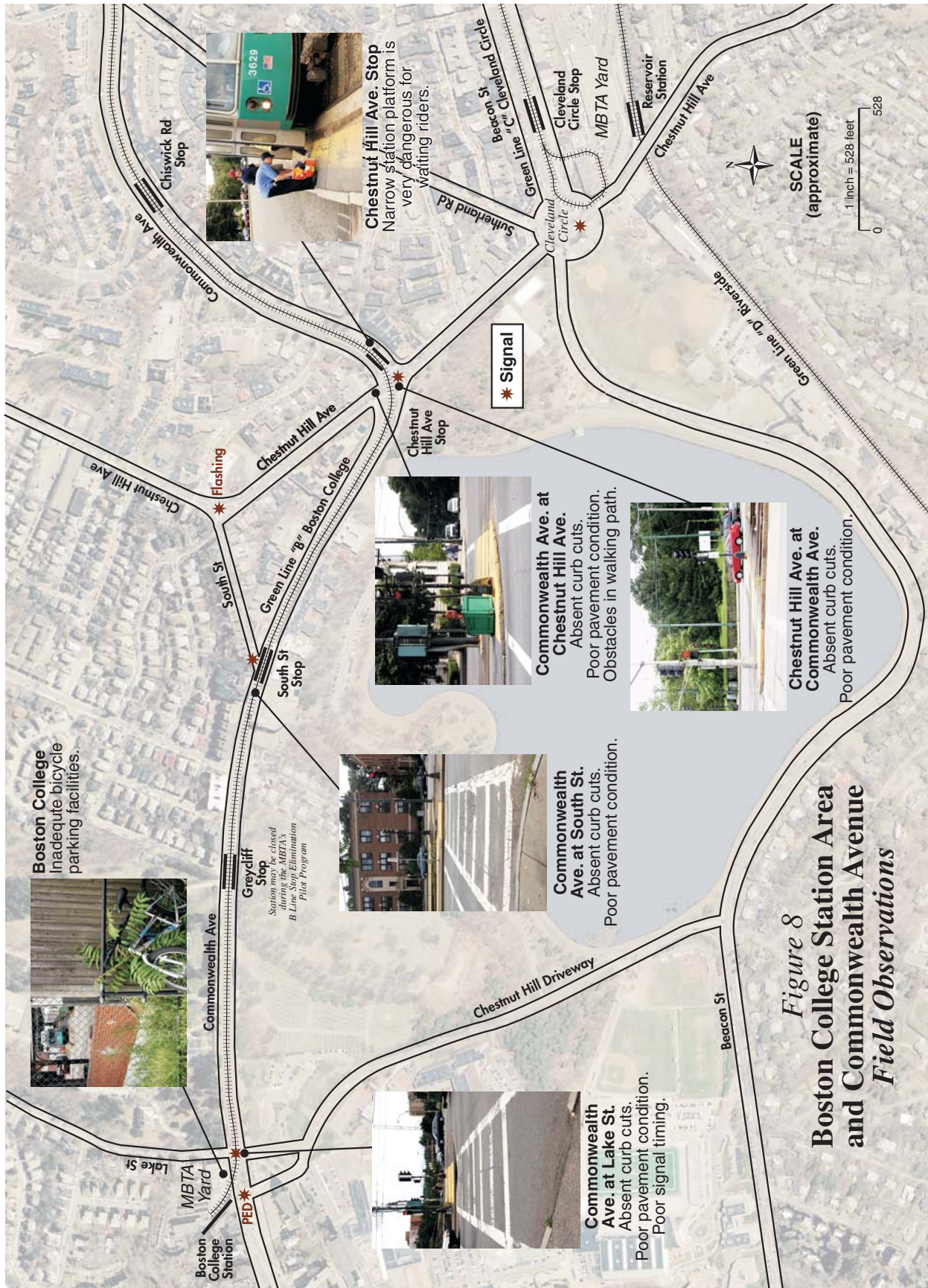
A pedestrian-crossing signal is located at the striped crosswalk at Boston College Station across Commonwealth Avenue from the Boston College campus (and the campus entrance at Fr. Herlihy Drive). Four signal posts, each with a pedestrian-crossing button and signals, make up the signalized portion of this crosswalk; two are located in the median of Commonwealth Avenue and the other two at the north and southbound sides of the crosswalk. The pedestrian-crossing button on the north side of the crosswalk, at Boston College Station, did not trigger the pedestrian crossing signal on the day of the field observation. Also noted was that the “Walk” light displayed properly at all four signals, but the “Don’t Walk” lights only worked on the median post that faces the station. The pedestrian-crossing signal is coordinated with the nearby traffic signal at Lake Street/St. Thomas More Road (Boston College campus). The field observation noted two vehicles ignoring the red signal and making a right turn from Commonwealth Avenue to Boston College without stopping.

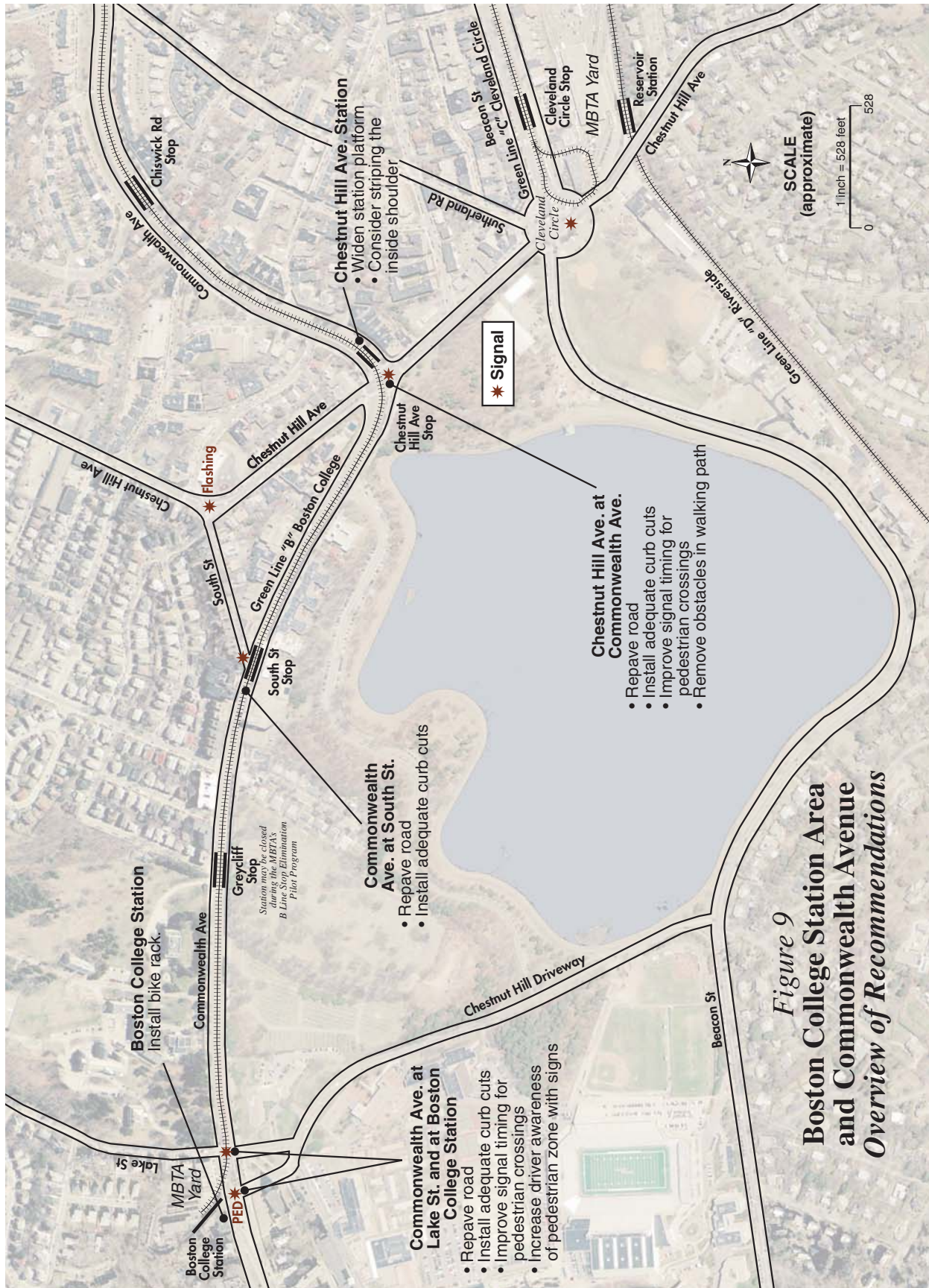
Many pedestrians were observed using the crosswalk at the station, just west of Lake Street and the Boston College campus entrance at Fr. Herlihy Drive.³ From 4:00 to 4:30 P.M., 79 pedestrians crossed from the Boston College Station side to the Boston College campus side (most were riders who got off the B Line train); 57 pedestrians crossed from the campus side to the station side.

Recommendation: General maintenance of the crosswalk and pedestrian-crossing signal is needed, consisting of the following improvements:

- Restripe the pedestrian crosswalk. Consider adding ladder-style stripes for greater visibility.
- Fix the pedestrian-crossing signals and the activation buttons.
- Consider adding “pedestrian crossing” signs to alert motorists.
- Extend the median of Commonwealth Avenue west of Fr. Herlihy Drive approximately 50 feet farther east, in order to limit vehicle and pedestrian conflicts.

³ At the time of the observations, late-afternoon Green Line operations switched from using Boston College Station to pick up/drop off passengers to using the platform on the median of Commonwealth Avenue to the east of Lake Street. Therefore, a full afternoon of counts could not be obtained.





Commonwealth Avenue at Lake Street/St. Thomas More Road (Boston College)



A traffic signal with pedestrian-crossing signals is located on Commonwealth Avenue at Lake Street (to the north) and St. Thomas More Road (to the south, at the Boston College campus). The intersection features many movements, requiring close attention by those traversing this location: westbound and eastbound Commonwealth Avenue traffic is split with a median on which the Green Line trains operate; Lake Street handles one-way traffic heading north from the intersection; St. Thomas More Road is two-way, two-lane street. Right turns are permitted on red at all

approaches. Vehicle loop detectors on Commonwealth Avenue are located in the pavement on which the pedestrian crosswalk is located; not only does this placement of loop detectors create cracks in the crosswalk's pavement, but reduces the efficiency of traffic signal operation as well.

The intersection has two characteristics that may potentially be confusing to motorists. One is the lack of indication that Lake Street is one way heading north of the intersection. The second characteristic is the two westbound Commonwealth Avenue signals located in the median of the roadway: one signal is for the Green Line trains and one is for the Commonwealth Avenue traffic. Although each signal is angled toward the traffic it is supposed to serve, neither one has a sign indicating its purpose. Either of these two characteristics of the intersection can lead to a potentially hazardous situation for pedestrians, as motorists may not be clear on the intersection operation.



A ladder-striped crosswalk is painted across Commonwealth Avenue on the east side only, and both Lake Street and St. Thomas More Road also have crosswalks. The crosswalk paint is visible; across the median, the crosswalk is painted solid yellow. The median, however, does not have curb cuts for the pedestrian crossing. Pedestrians crossed Commonwealth Avenue at a rate corresponding to 180 pedestrian crossings per hour during the afternoon peak period.⁴

Pedestrian-crossing signal phasing and activation at this intersection is not at its most efficient. The pedestrian signals are activated by buttons, and different pedestrian-crossing movements are allowed concurrently with vehicular movements. Two signal light inefficiencies were noticed. First, east-west pedestrian crossing of St. Thomas More Road is not permitted when the eastbound-only Commonwealth Avenue traffic movement phase is active; pedestrians should be allowed to cross at the same time. Second, the north-south Commonwealth Avenue pedestrian crossing requires activation both at the beginning of the crosswalk and at the median signal; this assumes that pedestrians are only proceeding halfway across Commonwealth Avenue.

⁴ From 4:00 to 4:30 P.M., 64 pedestrians crossed from the Boston College campus side to the Lake Street side (although 25 of them did not use the crosswalk); 27 pedestrians crossed from the Lake Street side to the campus side. This rate corresponds to 180 pedestrian crossings per hour during the afternoon peak period. At the time of the field observations, Green Line operations at this end of the B Green Line branch were alternating between use of the station and the Commonwealth Avenue median for passenger boardings and alightings. Therefore, a full afternoon of counts could not be obtained.

Recommendation: In addition to restriping the crosswalks, the signalized intersection should receive an upgrade of the signals and design, consisting of the following improvements:

- Adjusting the pedestrian-crossing signals and the activation buttons in order to allow more opportunities for pedestrian crossing.
- Creating ramps/curb cuts for the pedestrian crossing at the median on Commonwealth Avenue. This may require relocating a storm drain and/or signal posts. If the intersection is redesigned, the vehicle loop detectors should not be at the pedestrian crosswalk.
- Adding signs to the two westbound Commonwealth Avenue signals located in the median of the roadway indicating which traffic is intended for its respective control.
- Adding a bulb-out at the northeast corner of Commonwealth Avenue at Lake Street in order to slow down the right-turning vehicles (which must yield to pedestrians in the crosswalk).
- Adding pedestrian crossing signs to alert motorists.

Greycliff Road and South Street Stops



The Greycliff Road and South Street stops are in the median of Commonwealth Avenue—a typical characteristic of this light-rail branch. Pedestrian crosswalks between the Commonwealth Avenue sidewalks and the median station platforms at the South Street and at the Greycliff Road stops are in poor condition. Although these crosswalks have white, ladder-striped pavement markings, the pavement condition is cracked and ramps/curb cuts are nonexistent. Plus, on the north sidewalk along Commonwealth Avenue, the grass buffer that separates the paved sidewalk and the curb—a recommended design feature of sidewalks—does not contain paved breaks/cuts at the crosswalks.

Recommendation: Add ramps/curb cuts to the pedestrian crossings and perform general rehabilitation of the crosswalk, including restriping and improving pavement condition.

Commonwealth Avenue between Lake Street and Chestnut Hill Avenue

Sidewalks are present on both sides of the road. The northside sidewalk is separated from the road by a three-to-four-foot planted (grass and tree) buffer, and on-street parked vehicles are found on most of the roadway (particularly in the denser residential area between South Street and Chestnut Hill Avenue). The sidewalk on the south side does not feature a similar buffer from the road, except for the on-street parked vehicles. Both sidewalks are approximately six-feet wide and in good condition, although the landscaping care is noticeably better east of South Street than on the rest of the stretch of Commonwealth Avenue to the west.

Commonwealth Avenue at Chestnut Hill Avenue



The four-approach, signalized intersection of Chestnut Hill Avenue at Commonwealth Avenue features two lanes in each direction of east-west through traffic, two railroad tracks for the Green Line light-rail trains, and the north-south lanes of vehicle traffic (two to the north, four to the south). Pedestrian walk signals are present at all four corners of the intersection and at the median on Commonwealth Avenue.

The pedestrian signals seem to function in an appropriate manner. A brief all-red traffic signal (all-walk for pedestrians) coupled with a “No Turn on Red” restriction for vehicular traffic gives pedestrians a chance to cross these streets without turning-vehicle conflicts. Furthermore, partial pedestrian crossing (to the median) of Commonwealth Avenue is permitted depending on the vehicular movement.



The condition of the pedestrian crosswalks is marginal, particularly across Commonwealth Avenue. The pavement has visible signs of pothole patchwork, and railroad tracks cut across the pedestrian crosswalks. The street corners and the medians lack curb cuts for wheelchair access. The median crosswalks on Commonwealth Avenue have obstructions (signal posts) in the pathway of pedestrians. The painted crosswalks have fading paint.

Recommendations: Add ramps/curb cuts to the pedestrian crossings and perform general maintenance of the crosswalks, including restriping and improving pavement condition. Consider adding curb extensions or bulb-outs to protect pedestrians and enhance their use of the intersection.

Chestnut Hill Avenue between Commonwealth Avenue and Cleveland Circle



Chestnut Hill Avenue connects three Green Line branches: B at Commonwealth Avenue, C at Cleveland Circle, and D at Reservoir to the south—all in close proximity to each other. Chestnut Hill Avenue also serves as the main access from the north and south for pedestrians and bicyclists to the Commonwealth Avenue stop.

To the south of Commonwealth Avenue, Chestnut Hill Avenue is a busy, wide, four-lane, undivided road with on-street parking and sidewalks on both sides. The pavement condition on this stretch is rough. Rail tracks are also present, adding to the unevenness of the surface. Sidewalks either lack curb cuts at the street corners or have inadequate ones.

To the north of Commonwealth Avenue, the conditions on Chestnut Hill Avenue seem more pleasant for pedestrians. Traffic is limited to one lane in each direction, and the sidewalks are buffered by parking lanes on both sides of the street. The sidewalk conditions are adequate, and trees line the street.

Recommendations:

- Repair sidewalks, install curb cuts at street corners (particularly in the north-south direction), and repair the roadway surface, especially at crossings.
- Eliminate overgrown weeds and foliage along the sidewalk on the west side of Chestnut Hill Avenue.
- Install trailblazing signs along Chestnut Hill Avenue, particularly at Commonwealth Avenue, that direct Green Line riders to the stations at Cleveland Circle and Reservoir, just two blocks to the south. Some passengers may find different transfer and travel opportunities if they are aware of the ease of accessing one of the neighboring stations.



Situated on the boundary of the Jamaica Plain and Roslindale neighborhoods of Boston, Forest Hills Station serves commuters using MBTA buses, rapid transit, and commuter rail. With multiple transit services offered, this station in an urban area southwest of downtown Boston is a busy destination and transfer point.

Park-and-ride lots, one of which was recently expanded in 1997, accommodates one type of passenger access to the station. However, buses are the most common means of access to the station: over half of passengers here arrive by bus. Still, pedestrians comprise nearly a fifth of all passengers accessing Forest Hills Station. Also, an off-road, shared-use path along the Southwest Corridor Park serves the station.

The station is surrounded by busy, multilane arterial roadways. Thus, pedestrians and bicyclists must face appreciable vehicular traffic as a final obstacle in reaching the station.

The neighborhoods in the vicinity of the station can be classified as a target community for environmental justice. Nearly 50 percent of residents are characterized as minority. And the median household income is just above 75 percent of the metropolitan region's. Furthermore, approximately 25 percent of the households do not have a private vehicle. (All these figures are for the population in the area within a half-mile radius of this station.)

Forest Hills Station was selected as one of the sites for this study because of the makeup of the neighborhood's population, the importance of the station as a destination, and the challenges that await pedestrians and bicyclists accessing the station.

Station Area Characteristics

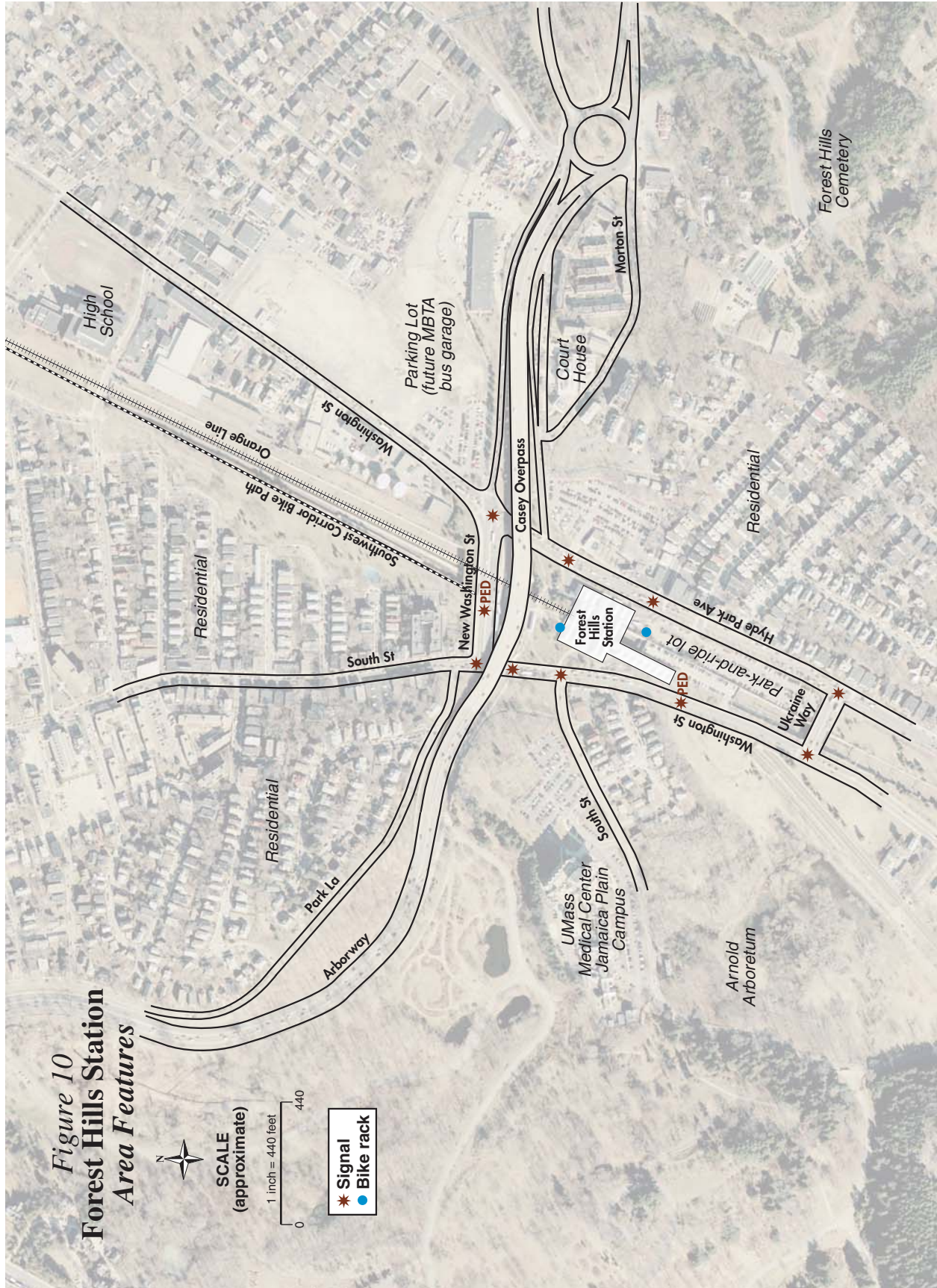
In the area within a half-mile radius of this station reside nearly 7,000 people in just over 2,600 households, according to the 2000 Census. (About 13,500 people reside within a three-quarter-mile radius of this station, in over 5,400 households.) Half of the developed land around the station area is residential (primarily multifamily housing), along with commercial (15 percent) and light industrial (11 percent); other significant land uses include open areas and transportation infrastructure.

A 1994 survey of Orange Line passengers counted over 5,000 boardings on that line at Forest Hills during the morning peak period, between 6:00 and 9:00 A.M., the highest number of boardings on the Orange Line.¹ Although the dominant mode of access to Forest Hills is by bus (over half the passengers at this station), about 20 percent of the passengers surveyed accessed the station by walking. One half of those passengers who walked to the station had a walk of five minutes or less, and over 92 percent of them had a walk of fifteen minutes or less.

Adjacent commuter park-and-ride lots fill to a combined 89 percent of capacity according to both the 2000 and 2002 surveys.²

¹ *MBTA Systemwide Passenger Survey: Rapid Transit/Light Rail 1994*, a report produced by the Central Transportation Planning Staff for the Massachusetts Bay Transportation Authority, May 1996.

² The year 2000 survey was conducted by CTPS; results are documented a report entitled *Commuter Rail and Rapid Transit Parking and Ridership Demand Forecasts (January 2002)*. The year 2002 survey was conducted by CTPS for the Congestion Management System. In early 2003, the parking fees were raised to \$3.50 per vehicle per day.



Station Amenities

Bicycle Parking



Bicycle rack, southeast



Bicycle rack, north

Bicycle racks are located on the north side and southeast side of the station. At the north entrance, toward the South Street side, two ribbon racks (8 spaces each) are situated just under the station roof overhang. On the southeast side of the station platform (Hyde Park Avenue entrance), two ribbon bicycle racks are located in an open area (unsheltered) just north of the parking lot. The spaces at the north entrance's bicycle racks were nearly all occupied, while most spaces were available at the bicycle racks on the southeast side.

Recommendations:

- Install a bicycle rack with 18 inverted-U rack elements at the north entrance in the same area as the ribbon racks. This location provides shelter from precipitation and is visible to users of the north station entrance. The rack should be placed 30 inches from the building's outside wall, and the rack elements should be spaced at 36-inch centers.
- Install a bicycle rack with 6 inverted-U rack elements at the southeast entrance under the station's roof. The placement could be near the base of the escalator/staircase or at the end of bus berth #1. The location near the stairs is visible to station users and personnel, and it provides desirable shelter. A rack here would not interfere with the circulation of station users. (One of the benches that is currently near the stairs could be relocated closer to the bus waiting area, in order to provide even more room at this location for bicycle parking.) The location at the bus berth platform is also visible to station patrons and would not interfere with the circulation of station users. The station roof could be extended to provide complete shelter. The rack should be placed 24 to 30 inches from the building's outside wall, and the rack elements should be spaced at 30-inch centers.
- Install a bicycle rack with 8 inverted-U rack elements at the southwest (Washington Street) side of the station, near the T operator house. This location provides bicycles with protection from the weather, and it is very visible—MBTA employees and patrons are present in this area. Bicycle parking here would not adversely affect the circulation of station users in this area. The rack should be placed 30 inches from the building's outside wall, and the rack elements should be spaced at 36-inch centers.

Station Access by Pedestrians and Bicyclists

This section discusses the station-area accessibility issues at the following locations:

- South Street West
- Washington Street at South Street West
- Washington Street South
- South Street
- South Street at New Washington Street
- Southwest Corridor Park at New Washington Street
- Washington Street at New Washington Street and Hyde Park Avenue
- Washington Street North
- Hyde Park Avenue between New Washington Street and Ukraine Way
- Hyde Park Avenue South

South Street West

South Street, which heads west from Washington Street and Forest Hills Station, serves a small residential area and the University of Massachusetts Medical Center–Jamaica Plain campus. Sidewalks are found on both sides of the street only up to the medical center. The sidewalks are not buffered from the street and were found to be in good condition. The street lighting appears adequate. West of the medical center, the sidewalks are replaced by a soft shoulder as South Street heads into the Arnold Arboretum.

Recommendation: Consider extending the sidewalk on the north side of South Street to where the Arboretum has an entrance at Beech Path Gate. Pathways through the Arboretum connect to Centre Street on the west side.

Washington Street at South Street West



The intersection of South Street at Washington Street at the west side of the station is signalized (cycle length is 80 seconds). Pedestrian walk signals activate when concurrent traffic has a green phase. Pedestrian crosswalks are marked only for the north–south movements (across South Street and across the bus exit) and for the southeast–west movement (across Washington Street). This design discourages pedestrians from crossing Washington Street at the north side of the intersection, which handles most of the turning traffic. South Street traffic onto Washington Street in the



evening has a predominant left-turning movement. Since traffic has a “Yield to Pedestrians on Turns” sign, pedestrians can cross Washington Street to the station (east) side along the south crosswalk while most of South Street traffic has a green phase. Significant southbound traffic from Washington Street turns right onto South Street heading west.

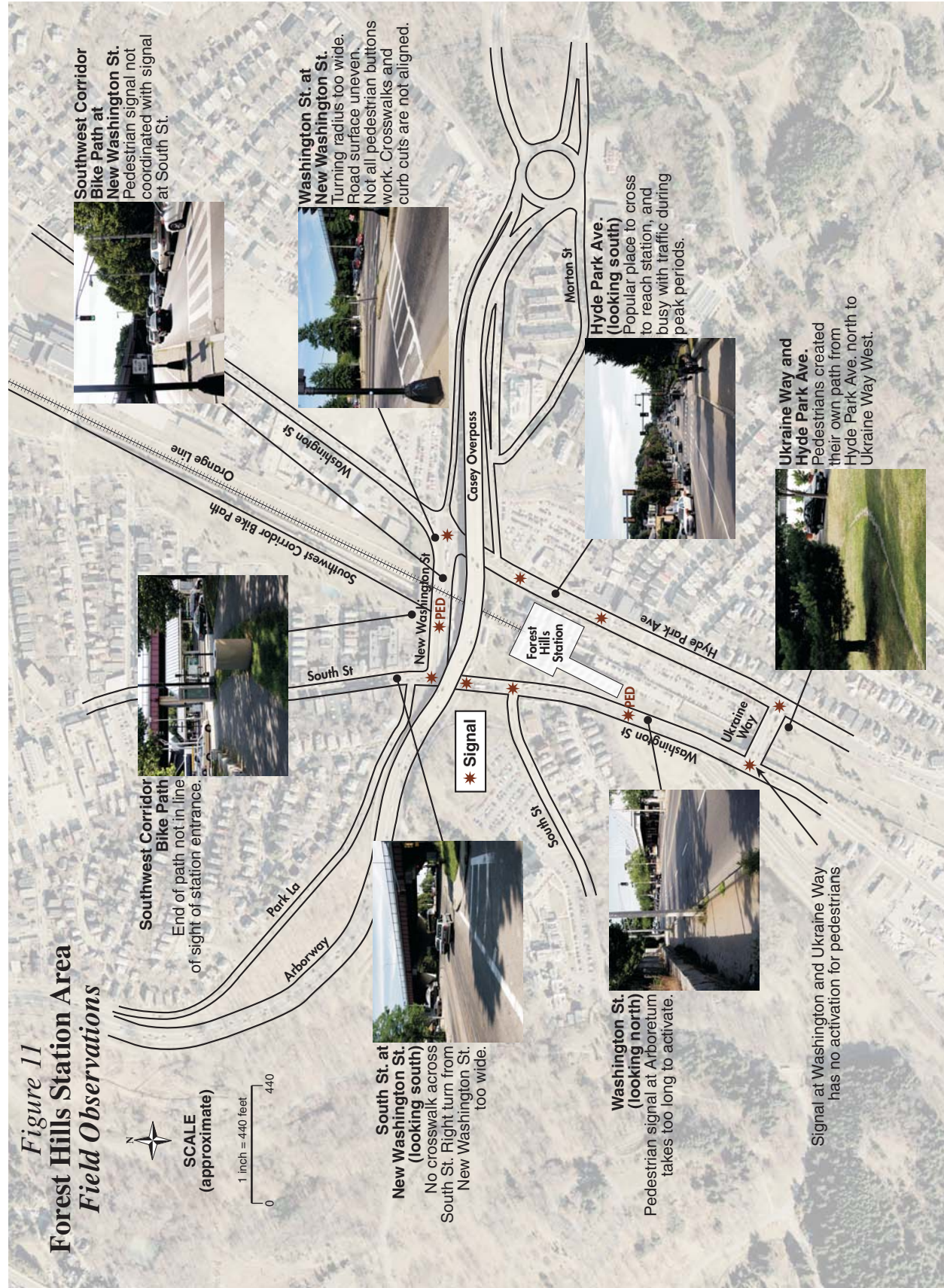
CTPS staff observed over 170 pedestrians and 40 bicyclists traversing this intersection during a two-hour afternoon period.³ Half of the crossing pedestrians observed crossed Washington Street from South Street heading toward the Forest Hills Station side. (Presumably, the generator of this pedestrian traffic is the University of Massachusetts Medical Center–Jamaica Plain campus on South Street.) As noted earlier, the design of the intersection leads pedestrians to cross Washington Street along the south side of the intersection. However, many pedestrians from South Street happen to arrive at the intersection on the north side of the intersection; similarly, from the station side, pedestrians who have walked along the busway’s northside sidewalk (the only one available) also arrive at the intersection on the north side. In both cases, pedestrians who wish to cross Washington Street must first cross the street southbound to reach the Washington Street crosswalk. Pedestrians, however, were observed crossing along the north side of the intersection, despite the lack of a marked crosswalk.

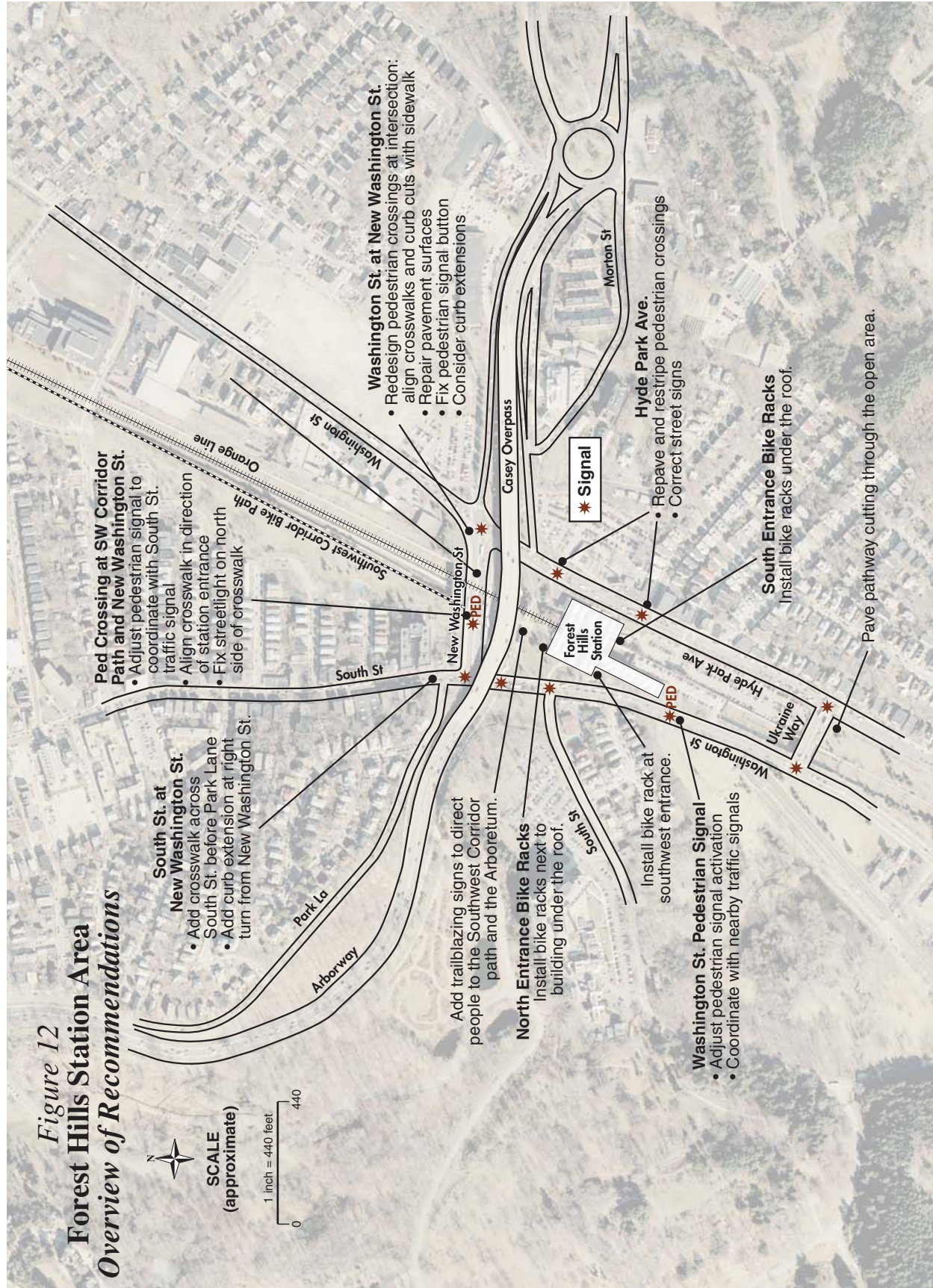
Of the observed bicycle traffic, two-thirds headed south along Washington Street; no bikes were observed traveling along South Street.

Recommendations:

- Improve visibility of the pedestrian crossings by restriping the crosswalks, which are faded
- Install pedestrian-crossing signs, as further warning to vehicles
- Consider installing pedestrian-crossing signals with animated-eyes displays, as a reminder to pedestrians to watch for turning vehicles

³ CTPS staff observed midweek, late-afternoon pedestrian and bicycle activity at several points around Forest Hills Station. The observations took place between 4:00 and 6:00 P.M. on September 11, 2003, a sunny and warm day. (The data collectors took a 15-minute break, so the reported totals are for a period of just under two hours.)





Washington Street South



Washington Street to the south is a four-lane arterial roadway with narrow shoulders and heavy traffic. Bicyclists were observed using this road heading north and south between South Street and points south off of Washington Street; some bicyclists were observed using the sidewalk. Sidewalks are provided on both sides, with no buffer separation between the road and pedestrian traffic. The sidewalk on the west side is of adequate width, but weeds and dirt/debris accumulation are contributing to reducing the practical width. The midblock pedestrian crossing signal at the Arboretum entrance (on the west side, across from the bus bay at the station) does not function well: the signal takes too

long to activate (two minutes); the field audit also noted that the signal is not coordinated with the signal at South Street to the north or Ukraine Way to the south. The traffic signal at Ukraine Way has pedestrian crossing signals; they are not pedestrian activated and turn on at appropriate signal phases.

Recommendations: Improve pedestrian and bicyclist safety and comfort by implementing the following:

- Keep the sidewalk clear of weeds and dirt/debris.
- Adjust the midblock pedestrian-crossing signal between South Street and Ukraine Way to activate more quickly. Consider coordinating the activation with either or both traffic signals to the north and south.
- Consider adding a sign for pedestrians at the Ukraine Way intersection to encourage crossing only when they have the “Walk” signal, since the signal is not pedestrian activated.

South Street



South Street approaching from the north side of the station area is a two-lane road with parked vehicles on both sides of the street. In addition, along the middle of the roadway are two sets of inactive trolley railroad tracks. The condition of the pavement is bumpy and poor. Although this street connects a heavily residential neighborhood to the station area, bicyclists are better off not riding along this street. The Southwest Corridor should be used instead, if possible.

The sidewalk along South Street seems adequate: it is wide and in good condition. However, ramp/curb cuts for wheelchairs are absent on many nearby intersections at side streets. Streetlights are present on both sides of the street.

South Street at New Washington Street



The intersection of South Street at New Washington Street and the Arborway eastbound on-ramp is signalized. South Street at the intersection is wide enough for four lanes of traffic, although no striping is present other than the middle-of-the-road yellow stripe. No pedestrian crossing is marked across South Street north of the intersection with New Washington Street.



Recommendation: Install a crosswalk across South Street, to guide pedestrians from South Street and Park Lane in the direction of the station's north entrance. Since the intersection with New Washington Street is wide, consider the following when installing this crosswalk:

- Place the crosswalk farther north, between St. Marks Street on the east and Park Lane on the west. This would discourage pedestrians from crossing South Street at the intersection, which does not have a pedestrian crossing signal or crosswalk.
- The crosswalk should be striped and have a pedestrian signpost or barrel in the center of the roadway as an added caution to drivers.
- Alternatively, or in addition, South Street could be narrowed at the intersection of New Washington Street to slow down through and turning traffic. A bulb-out at the northeast corner of the intersection, for instance, would slow down the right-turning vehicles from New Washington Street to South Street.

Southwest Corridor Park at New Washington Street



The Southwest Corridor Park (and Bike Path) approaches Forest Hills Station from the north. Leaving it at New Washington Street, across from the station, bicyclists and pedestrians can cross midblock using a signalized (pedestrian actuated) and striped pedestrian crossing.

Over 360 pedestrians and over 40 bicycles crossed here during the afternoon peak period. The majority of pedestrians (over 80 percent) traveled north (away) from the station, while the majority of bicycles (nearly 80 percent) traveled south from the bike path. These southbound bicyclists are likely users of the Southwest Corridor Bike Path headed to neighborhoods south of the transit station.



Vehicle queues can extend back from the New Washington Street intersection at South Street. These queues are far enough to block the crosswalk at the Southwest Corridor Park.

The design of the New Washington Street crossing of the Southwest Corridor and the north entrance of the station fails to make a good connection between these transportation facilities. The crosswalk (and median curb cut) angle away from the station's north entrance; the crosswalk does not follow desire lines of users of the Southwest Corridor Park to the station entrance. Furthermore, no signs are posted directing station users exiting the station to the Southwest Corridor Park and Bike Path; and from the southbound perspective heading toward the station, the north entrance location is not easily visible.

Recommendations:

- Prevent the unnecessary blocking of the pedestrian crosswalk at Southwest Corridor Park by implementing the following:
 - Add a “Do Not Block Crosswalk” sign for vehicles approaching from either direction.
 - Coordinate the pedestrian signal with the downstream signal at South Street. Thus, the pedestrian-crossing signal would become activated every time traffic is stopped downstream at South Street. This would prevent vehicles from driving past the pedestrian crossing only to be stopped a several yards downstream.
- Improve the flow of pedestrians and cyclists between the station's north access and the Southwest Corridor Park by implementing the following:
 - Realign the crosswalk toward the north station entrance. This includes partial reconstruction of the median and its curb cuts.
 - Restripe the existing crosswalk.
 - Install pedestrian-crossing signs for vehicular traffic.
 - Fix the broken streetlight on north side of the pedestrian crossing of New Washington Street at Southwest Corridor.

- Add more street lighting along New Washington Street. Currently, streetlights along New Washington Street are only located along the south side of the roadway, and these are spaced widely apart. (In the park on the north side, a pathway parallel to New Washington Street has street lights.)
- Install additional lighting along the connection between the north station entrance and the Southwest Corridor Park crosswalk.
- Install trailblazing signs on the north side of the station directing users to the Southwest Corridor Park.

Washington Street at New Washington Street and Hyde Park Avenue



Five roadway legs intersect just northeast of Forest Hills Station: Washington Street to the north, Hyde Park Avenue to the south, New Washington Street to the west, plus Morton Street to the southeast and the Arborway exit ramp to the east. The intersection is wide and intimidating for pedestrians and bicyclists. Many of the approaches carry two lanes of through and/or turning traffic, which is channeled by medians and islands. Pavement conditions are rough and uneven, old railroad tracks cross the intersection, and the striping of the pedestrian crossings is fading. North-south pedestrian crossing along the west side is not encouraged, as shown by the absence of pedestrian crosswalks and walk signals; such a crossing should take place farther west at the pedestrian crossing signal at Southwest Corridor Park. Not many pedestrians were observed crossing this intersection during busy periods.



Recommendations: Improve the intersection design and operation to increase the comfort and safety of pedestrian crossings and bicycle navigation.

- Restripe pedestrian crosswalks
- Narrow the turning lanes to slow traffic
- Redesign traffic islands and pavement striping, in order to reduce the expanse of the intersection, giving it a less intimidating appearance
- Paint the corner curbs yellow, especially those of the traffic islands, in order to increase visibility
- Repair the pavement surface
- Install additional street lighting

Washington Street North



Washington Street to the north of the station is a busy two-lane roadway. The street allows for parking on both sides of the road. A school located farther north on Washington Street generates pedestrian activity toward the station. Sidewalks between the school and the station area seem adequate. Bicycle conditions are not favorable due to on-street parking and the high traffic volumes along Washington Street.

Hyde Park Avenue between New Washington Street and Ukraine Way



Hyde Park Avenue, which runs along the east side of the station, is a busy four-lane road. The avenue lies between a residential neighborhood to the east and the station to the west. A series of closely spaced driveways create the need for two signalized intersections (for access to the bus bays, Tower Street, and Woodlawn Street), and one unsignalized intersection (at the southeast parking lot), all of which handle many turning vehicles and pedestrian crossings. The street sign at Tower Street indicates that the north–south avenue is called “Washington St.” not “Hyde Park Ave.”

Over 450 pedestrians were observed crossing at the signalized intersection of Hyde Park Avenue at the north bus

entrance during the afternoon peak period. Three-quarters of this activity was made up of pedestrians crossing Hyde Park Avenue from the Forest Hills Station side. The distribution was fairly even throughout the late-afternoon period, with approximately 63 pedestrians crossing every fifteen minutes. Over 160 pedestrians traveled east toward/along Morton Street, just northeast of the station.



Bike activity was also observed along this stretch of Hyde Park Avenue: 14 bicycles traveled south during the observation period, and 4 traveled north.

There is just as much pedestrian activity at Hyde Park Avenue at the south bus entrance across from Tower Street as at the intersection of Hyde Park Avenue at the north bus entrance and parking lot. Nearly 500 pedestrians crossed during a two-hour late-afternoon period. The majority, 60 percent, of the east–west crossings of Hyde Park Avenue were eastbound (away from the station). As in the other locations, most observed bicyclists were headed south.

Approximately 80 pedestrians crossed Hyde Park Avenue at the unsignalized intersection at Woodlawn Street, across from the commuter parking lot entrance. The distribution of trips favored the station as the destination.

Recommendations: Improvements along Hyde Park Avenue between Ukraine Way and New Washington Street should facilitate driver awareness and visibility of pedestrian activity at the intersections along this stretch of road. Basic improvements should consist of the following:

- Restripe the pedestrian crosswalks.
- Add pedestrian crossing signs.
- Move all stop lines 10 feet back from crosswalks, and add “Stop Here on Red” sign.
- Consider posting “No Turn on Red” signs, but not before analyzing their impact on traffic operations. Alternatively, add “Yield to Pedestrians on Turns” signs.
- Consider signs for pedestrians to encourage street crossing only during the “Walk” signal.
- Correct the street name sign at Tower Street, to indicate that the roadway heading north is “Washington St.” and the roadway heading south is “Hyde Park Ave.”

Hyde Park Avenue South



To the south of the station, and south of Ukraine Way, Hyde Park Avenue continues as a four-lane road with narrow shoulders. On-street parking is allowed on the northbound side of the street. The sidewalks on both sides are in good condition but are not buffer-separated from the street curb. However, the decorative streetlights, closely spaced along this stretch of road, act as a physical separation of traffic and pedestrian activity. Although pedestrians do not have any challenges using this corridor to reach the station, bicyclists have to deal with a challenging road, particularly northbound. Street sweeping and removal of debris should be done frequently in order to reduce hazards for bicyclists.

