



## Central Station Schematic Design Pedestrian and Bicycle Programming Elements

March 30, 2005

This memorandum summarizes pedestrian and bicycle needs to be programmed into the design of the new MTA Central Station in Downtown Nashville. Accompanying is a summary of the peer review study used to help arrive at the following recommendations.

### Overview

The success of a multimodal transportation system, and its transit centerpiece, relies on safe and convenient travel environments for all modes. It is critical to recognize that almost all bus users begin and end their trips as pedestrians, and transit likewise extends pedestrian travel options. The recent installation of bike racks on all MTA buses further increases multimodal travel options throughout the Nashville region. Having a bicycle- and pedestrian-friendly environment in and around the new transit center is thus critical to maintaining and increasing MTA ridership. Pedestrian accommodation is also the key to integrating a transit facility into the downtown fabric, so that nearby land uses benefit from the transit investment.

### Pedestrian Needs

Walking is the oldest and most basic form of human transportation. It requires no fare, no fuel, no license, and no registration. With the exception of wheelchairs and other devices to enhance the mobility of the disabled, walking demands no special equipment. Thus, walking is the most affordable, accessible, and personal of travel modes. Peter Calthorpe has written:

*"At the core is the pedestrian. Pedestrians are the catalyst which makes the essential qualities of communities meaningful. They create the place and time for casual encounters and the practical integration of diverse places and people. Without the pedestrian, a community's common ground - its parks, sidewalks, squares and plazas, become useless obstructions to the car. Pedestrians are the lost measure of a community, they set the scale for both center and edge of our neighborhoods."*

Pedestrians are thus critical to the success of a mixed-use, multimodal transit center. Pedestrians are the people who shop in the provided retail spaces, wait to get on the bus, transfer between buses, and those who get off the bus and continue to their destination -- whether a nearby parked vehicle or a Downtown attraction.

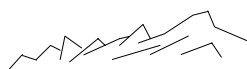
*Minimal* pedestrian needs to be met in the station design include:

#### 1) Universal Design and ADA Access

All aspects of station design shall meet the needs of persons with disabilities, including providing accessible sidewalks, curb ramps, and street/bus aisle crossings. ADA access should be regarded as one aspect of "universal design" where all types of users are able to move about freely, safely and comfortably.

ADA design includes providing a minimum curbside area 5 feet by 8 feet free of any obstructions for bus lift operation to facilitate the boarding and alighting of wheelchaired passengers. (The greatest distance required by an MTA bus lift and/or ramp is 5 feet.)

Pedestrian walk zones shall never be less than 4 feet wide, which is the minimum width required for people using a guide dog. Wheelchair users need 5 feet to turn around and 6 feet to pass other wheelchairs.



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## 2) Walkway Widths

All pedestrian travel zones within Central Station should be at least 8 feet wide since this facility will need to accommodate high pedestrian volumes. An 8-foot walkway width is the minimum that will accommodate two pedestrians walking abreast in both directions of travel.

When the walkway is adjacent to walls, seating, curbs, escalators, stairs or other obstructions, an additional minimum 18 inches of shy distance is required.

## 3) Direct Paths of Travel

Walkways should be as direct as possible and suggest fluid flowing lines of access and circulation. Clear and direct pedestrian circulation routes, free from obstructions such as garbage cans, benches and signage, are needed from the bus bays and crosswalks to the building exits on 4<sup>th</sup> Avenue, 5<sup>th</sup> Avenue and Charlotte Avenue.

## 4) Right-of-Way

Pedestrian access should have the right-of-way over vehicles. Paving areas should clearly delineate pedestrian and vehicular zones with changes in material, color and/or texture.

It is important to note that meeting the above basic minimum requirements will not create Pedestrian Supportive environments nor make great public spaces. To this end, the following additional factors should be considered in the design of MTA's transit centerpiece:

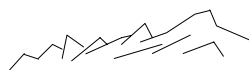
## 1) Curbside Waiting Areas

It is widely recognized that people require varying amounts of space for different activities, and that the amount of space available affects both a person's performance and comfort level. For example, a person waiting on a platform requires a minimum of 7 square feet, but prefers and needs around 10- 13 square feet to remain comfortable for any length of time. When moving, about 25 square feet per person is the threshold for "free flow" where someone can walk as fast as desired with reduced chances of interference or conflict from other pedestrians. When the area per person drops to 7 square feet, walk speeds are typically reduced to about half the free-flow norm.

Pedestrian level of service in queueing spaces has been defined by the Transportation Research Board (TRB) as follows:

| Level of Service | Average Pedestrian Area Occupancy (square feet) | Description                                                             |
|------------------|-------------------------------------------------|-------------------------------------------------------------------------|
| A                | >13                                             | Standing and free circulation                                           |
| B                | 10-13                                           | Standing and partially restricted circulation without disturbing others |
| C                | 7-10                                            | Standing and limited circulation by disturbing others.                  |
| D                | 3-7                                             | Standing without touching others, circulation severely restricted       |
| E                | 2-3                                             | Unavoidable physical contact, circulation not possible                  |
| F                | ≤2                                              | Close physical contact, discomfort, no movement, potential danger       |

Assuming that LOS of at least C is desired and 65 people (peak) could be waiting to load a bus (maximum articulated bus capacity), 455-650 square feet will be needed at each bay for curbside queueing. At a bus bay length of 65 feet, this requires a minimum width of 7-10 feet to accommodate waiting pedestrians. This is in addition to the minimum 8-foot walkway requirements previously described.



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## 2) Conditioned Waiting Areas

Several of the transit stations interviewed in the peer study provide additional waiting space in enclosed, conditioned waiting areas. MTA has expressed desire for similar features in the new Central Station design. While separate climate-controlled areas benefit persons waiting for bus arrival, they must be carefully designed to accommodate pedestrian circulation and bus rider needs.

- **Location** - The location of enclosed, conditioned areas shall not interfere with basic pedestrian circulation between bus bays, elevator/stairs/escalator access, and building exits.
- **Doors** - Because of the added time and space required for door-opening functions, entrances could be the weak links in the station's pedestrian circulation system. All entrances should thus have sliding glass pocket doors to help with circulation.
- **Visibility** - Real-time display monitors shall be used to display arrival information in large conditioned areas where individual bays and approaching buses are not visible. NextBus GPS satellites, or a similar equivalent, should be considered to make real-time arrival information available at Central Station, future rail stations, and on the Internet. All applications should be visible for all users from a universal design perspective.

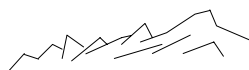
## 3) Transit Center Seating

No clear procedures exist for determining how much or what type of seating is needed in a transit station. The absolute minimum amount of seating found in the peer review conducted for this study was one covered bench (or 4 seats) per bus bay. Application of this guideline would translate into a minimum seating capacity of 96 curbside seats in the Nashville Central Station. Most peer group stations had additional seating curbside where space allowed. The average for the seven stations reviewed was 3-4 seats per bus route and 9-10 seats per bus bay. Many stations also provided supplemental seating in climate-controlled areas.

As a general rule of thumb for transit station planning, seating shall be provided near the bus bays for 15% of the peak passengers waiting for a bus. Generally, seating is more comfortable if oriented at right angles to the parked buses. Benches can be fitted within the queuing/waiting space, but should never obstruct or reduce the circulation space. Assuming 65 people (maximum bus capacity) peak, each bus bay in Central Station should provide 10 seats, or 3 benches.

Additional design recommendations for seating include:

- **Benches and seating ledges must not interfere with pedestrian circulation** - ADA requires a minimum of five feet between the front edge of seating structures and the curb. A minimum of three feet is required between furniture in interior spaces.
- **Locate seating as close to transit boardings as possible** - This ensures elderly and less mobile patrons using seating have sufficient time to board.
- **Locate seating where the fronts of arriving buses will be visible** - This ensures patrons waiting for buses can detect their bus arrival. If this is not possible due to space limitations, Central Station should utilize real-time display monitors with arrival information so that people can virtually watch for their bus when within peripherally- or centrally-located conditioned waiting areas.



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- **Provide as much seating as possible in climate-controlled areas** - Due to the high levels of use of the existing downtown transit center (14,000 boardings and alightings per day, with 74% transfers) as much seating as space permits should be provided in the climate-controlled areas.
  - **Provide seating with armrests** - This provides leverage for persons with difficulty standing. This also ensures that benches will not be used for sleeping.
  - **Leaning rails** - Where space restrictions are an issue, up to half of the suggested seating standard could be met by leaning rails and furnishings that allow people to set parcels and briefcases down without placing them on the ground.

#### 4) Pedestrian Supportive Streetscape

The design of sidewalks, streetscape amenities, and street level retail as part of Central Station design is critical to creating Pedestrian Supportive urban street corridors and furthering the vision to create a thriving 24-hour downtown with a mix of residential, retail, office, and city services.

Key requirements for Pedestrian Supportive urban sidewalks and streetscapes include:

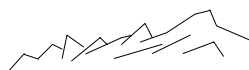
- **Maintain total minimum sidewalk width of 16 feet from back-of-curb** - This includes space for a 6-foot planter/furnishings zone, an 8-foot pedestrian travel zone free from obstructions, and a 2-foot frontage zone for “shy” distance away from building walls.
- **Minimize blank street walls** - Provide as much visual interest along the sidewalk as possible. Pedestrians shall be connected with the interiors of retail establishments both physically (frequent doors) and visually (frequent windows). To create a Pedestrian Supportive streetscape, blank stretches of wall without doors and windows on ground level shall not exceed 25 feet. Street walls shall contain transparent windows (not reflective, opaque or painted glass), window displays, or sculptural, mosaic or bas-relief artwork for at least 75% of the area of the façade between 2 feet and 7 feet above ground level.
- **Utilize awnings to define the pedestrian realm** - Awnings contribute significantly to the urban environment by defining and sheltering pedestrian space, reducing the perceived scale of tall buildings, and focusing pedestrian views on street frontages and ground level activities. Awnings should be considered along the entire Charlotte Avenue facade, and used to help to define the secondary pedestrian entrances off of 4<sup>th</sup> Avenue and 5<sup>th</sup> Avenue that provide direct access to the boarding islands. A vertical clear zone of at least 8 feet shall be provided below all awnings, and the awnings shall extend at least 6.5 feet from the building to be functional.

#### 5) Plaza Access and Design

A final pedestrian consideration in this project is the re-design of the adjacent plaza. The goal for the plaza should be to create a place, not a design.

Four cornerstones of successful public places include:

- ✓ **Uses and Activities** - providing a range of things to do
- ✓ **Access and Linkage** - easy to get to and connected to the surrounding community
- ✓ **Comfort and Image** - safe, clean and attractive
- ✓ **Sociability** - is a place to meet other people.



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In summary, people like to be where other people are. Programming activities into the plaza space will thus be critical. Good design can further this, and can enhance overall pedestrian activity on the block by implementing the following:

- **Enhance access to plaza** - To transform the existing plaza into successful public space, pedestrian access must be enhanced, both visually and physically, to create more effective relationships with surrounding land uses. 5<sup>th</sup> Avenue access must be opened up to provide seamless flow from sidewalk into plaza. Visual connections need to be improved up from 4<sup>th</sup> Avenue, and physical connections should be provided down from the adjacent second level bus concourse.
- **Triangulate activities** - Arrange plaza elements in relation to each other to provide spaces that prompt strangers to talk to other strangers as if they knew each other. By providing at least three activities in close relation to each other, more activity will occur than if activities are located separately and will naturally bring people together.

## **Bicycle Needs**

Providing bicycle racks on all MTA buses as part of the recently implemented Bike-and-Ride program was the first step in expanding MTA into a multi-modal transportation provider. Including bicyclist needs in the design of the Central Station centerpiece is a logical expansion of this commitment to progressive transportation planning and service.

### **1) Bicycle Parking**

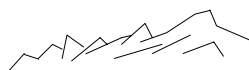
MTA programming requests for Central Station included space for a bicycle rental counter to serve Downtown workers and visitors. However, peer review of bicycling provisions at multimodal transit stations indicates that the first level of bicycle accommodation is most often the provision of safe, secure and convenient bicycle parking facilities. MTA should thus be encouraged to provide bicycle parking as part of the station design.

The Metropolitan Government of Nashville and Davidson County currently does not have zoning code or development criteria that regulates bicycle parking. However, as part of an Active Living by Design grant received from the Robert Wood Johnson Foundation, they will be addressing policy and regulatory issues for including bicycle parking in the fall of 2005.

In the absence of adopted city standards, bicycle parking shall be provided based on the following general guidelines. (Specific details and diagrams will be provided as a supplement to this initial Schematic Design narrative, once all programmatic elements of Central Station have been finalized.)

- **Quantities of bike parking** - A general rule of thumb is to provide bicycle parking spaces equal to at least 10% of the off-street car parking requirement for that land use. However, since Central Station is located within Downtown Nashville's CC zoning, no automobile parking spaces are required for this site.

General City standards for retail and multi-family residential (outside of the CC district) can be used to arrive an estimated minimal quantity of bicycle parking to initially provide. However, estimates of additional future demand by Bike-and-Ride transit users cannot be calculated at this point in time. As revealed in the peer study interviews, additional space should be allocated for future expansion of bicycle parking as demand grows.



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Initial quantities to provide include:

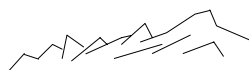
- ✓ Retail parking is generally provided in greater Nashville at a rate of 1 automobile space per 200 square feet. An estimated 9,000 – 12,000 square feet of retail activity is proposed for Central Station. This equates to a need for at least 5-6 bicycle parking spaces for retail uses.
  - ✓ Nashville's multi-family residential parking requirements are based upon number of dwelling units. 145 – 151 apartments are proposed to be added above the station. If multi-bedroom units, auto parking is typically calculated at a ratio of 1.5 to 1. This would indicate demand for 21-23 additional bicycle parking spaces for resident use.
  - ✓ The total represents a minimal need to provide 25-30 bicycle parking spaces.
- **Type of parking racks** – Most of the peer group transit stations, as well as the larger bicycle stations, used “inverted-U” style racks. These racks, which mount to the floor, are the preferred industry standard for short-term parking that accommodates two bicycles per rack.

Inverted U or other acceptable styles of racks should:

- ✓ Support the bicycle upright by its frame in two locations.
  - ✓ Allow both the frame and one wheel to be secured using standard U-shape lock.
  - ✓ Be spaced on 30-inch centers to allow enough room for two bicycles to be secured to each rack.
  - ✓ Be located to provide 72 inches of depth for each row of parked bicycles (the length of a bike)
- **Spatial requirements** – The amount of space to allocate for bicycle parking depends on type of rack selected and the configuration of the designated parking area. In urban locations where floor space is premium (such as in New York City), wall-mounted racks that meet the above criteria are commonly used instead of floor-mounted racks.

Spatial programming guidelines include:

- ✓ In general, allow 12-15 square feet of space per bike for floor-mounted designs.
  - ✓ For vertical, wall-mounted designs, allow 8 square feet per bicycle parking space.
  - ✓ Provide adequate space between rows of racks for access aisles that are at least 48 inches wide (minimum space for a person to walk a bike) measured from tip to tip of bike tires
- **Location** – The station's bicycle parking area must be well lit, visible and in a convenient location with sufficient maneuvering space separate from the bus drive aisles. Bicycle storage must also avoid conflicts with pedestrian circulation and traffic. If the location is viewed as convenient and secure, bike parking can fit into leftover spaces in a building's design, such as unused space in corners near entrances, or even space under the garage ramps leading to upper parking levels.
  - **Security** – Different types of bicycle parking facilities offer increased levels of security, particularly for long-term (more than 4 hours) or overnight storage. Many of the bicycle stations contacted as part of the peer group study provide



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what is typically viewed as short-term parking facilities, but contained within a “cage” or visible room that offers limited access for enhanced longer-term security. Valet bike parking during business hours, combined with providing key-cards to give “members only” access 24/7 was the most common approach. The memberships were sometimes required to be purchased to help offset management costs, or were provided free of charge.

Bicycle lockers (free-standing, individual storage units for one or two bicycles) are another long-term parking alternative. Lockers are most often used outside of buildings to provide both security and protection from rain and snow. Lockers have similar rental and access management needs as caged or corralled areas. An average space requirement to park 12 bicycles in lockers is 20.5 feet x 6.5 feet, plus adequate space to load and unload bikes, typically needed on both ends of the locker unit.

## **2) Bicycle Rental Counter**

Early MTA programming requests for Central Station included space for a bicycle and electric scooter rental counter to further multimodal travel options for persons living, working or visiting Downtown Nashville. However, details of management, operation, vehicle fleet size and other services to be offered remain unknown.

Peer review research suggests that a bike rental counter is most often provided when a transit station becomes a full-service “bike station” offering large quantities of secure bicycle parking and additional services such as bicycle repairs and tune-ups, lockers, restrooms and showers to serve commuter needs, and/or retail sales. Bicycle stations may be operated by a public agency (such as MTA), a private company (most often a local bicycle shop), a non-profit (such as a bicycle advocacy group), or a combination of public/private resources.

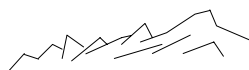
Further decisions by MTA are thus needed to more fully program space for whatever rental counter functions are desired, as well as additional storage space required for the rental bicycles and scooters.

## **3) Access to Nashville’s Bicycle Facility Network**

As previously discussed, cyclists may use the MTA Central Station to store their personal bicycles, obtain rental bicycles, and/or load and unload their bicycles from buses at the transfer facility. For each of these purposes, bicyclists will need access within the building to the loading bays/storage facilities, as well as direct access from the station to Nashville’s developing network of on- and off-street bicycle facilities.

- **External access** – Charlotte Avenue and the James Robertson Parkway are designated as long-range planned bicycle facilities identified on Nashville-Davidson County Bicycle Facilities Vision map, but not programmed for construction. Charlotte, west of 8th Avenue is a priority segment included in the Phase 1 construction plan, although no funds have been allocated or timelines set for bike lane implementation. To the east, Charlotte/3rd/Union provides a direct on-road route to connect with the nearby Cumberland River Trail and Woodland Street Bridge. Thus, bicyclists should be provided with direct ingress/egress from the station onto Charlotte Avenue. This station access should be a bike dismount zone to avoid safety issues with pedestrians.

Downtown Nashville’s one-way street system presents additional access challenges for bicyclists trying to enter or leave the proposed Central Station on either 4th or 5th. If an adequate entrance is not provided for bicyclists off Charlotte, bicyclists will be forced to either ride several blocks out of their way



around the Municipal Auditorium complex, ride wrong-way against traffic on a one-way street, or ride on sidewalks intended only for pedestrian traffic - which will often be experiencing high fluxes of pedestrian volumes.

- **Internal access** - The final multimodal access issue to address in the design of Central Station is how bicyclists will move between the two different station levels. It is assumed that cyclists will actually be pedestrians walking their bikes when in the structure, but provisions should be made to include an elevator large enough to accommodate a bicycle, or stairs/escalators with a parallel grooved running board for people to use to guide their bikes while ascending and descending. Peer review showed that cyclists lift and carry bicycles up and down steps, but this problem could be addressed through design if bicycles are programmed into the initial station planning rather than added as an afterthought or retrofit condition.

From the individual bus bays and central loading platforms, bicyclists will need to use pedestrian crosswalks and through travelways previously required. If designed to meet ADA requirements and high volumes of pedestrian traffic, such facilities should be able to accommodate bicycle access as well.

## Summary

The following chart summarizes the recommendations presented in this Schematic Design narrative regarding pedestrian and bicyclist needs for the design of Central Station. Recognizing that varying functions are vying for limited building space, the relative priority of each individual recommendation is also presented.

| Priority:                                                                                                                     | Moderate |   |   |   |   | High |   |   |   |    |
|-------------------------------------------------------------------------------------------------------------------------------|----------|---|---|---|---|------|---|---|---|----|
|                                                                                                                               | 1        | 2 | 3 | 4 | 5 | 6    | 7 | 8 | 9 | 10 |
| A. Meet requirements of the American with Disabilities Act (ADA)                                                              |          |   |   |   |   |      |   |   |   |    |
| B. Provide 8-foot wide walkways within the station, with an additional 18 inches of width next to obstructions                |          |   |   |   |   |      |   |   |   |    |
| C. Provide direct and obvious paths of pedestrian travel from the platforms across bus drive aisles and to building exits     |          |   |   |   |   |      |   |   |   |    |
| D. Provide a waiting area next to each bus bay that is 455-650 square feet (this is in addition to the 8-foot walkway)        |          |   |   |   |   |      |   |   |   |    |
| E. Provide a minimum of 10 seats within each bus bay waiting area                                                             |          |   |   |   |   |      |   |   |   |    |
| F. Supplement with additional conditioned waiting space with seating as space permits                                         |          |   |   |   |   |      |   |   |   |    |
| G. Maintain a total minimum sidewalk width of 16 feet from back-of-curb to building face                                      |          |   |   |   |   |      |   |   |   |    |
| H. Limit blank walls along the streetscape to façade lengths less than 25 feet                                                |          |   |   |   |   |      |   |   |   |    |
| I. Use awnings to reduce the mass of the building to pedestrian scale                                                         |          |   |   |   |   |      |   |   |   |    |
| J. Design the plaza to be a functional space that has improved pedestrian access to adjacent sidewalks and the transit center |          |   |   |   |   |      |   |   |   |    |
| K. Provide parking racks for 25-30 bicycles (+/- 450 square feet located in a secure area)                                    |          |   |   |   |   |      |   |   |   |    |
| L. Consult with MTA on additional details/needs for a bike rental counter and supplemental bike storage area                  |          |   |   |   |   |      |   |   |   |    |
| M. Provide an exit for bicyclists to have direct access onto Charlotte Street                                                 |          |   |   |   |   |      |   |   |   |    |
| N. Accommodate the need for people with bicycles to move between station levels                                               |          |   |   |   |   |      |   |   |   |    |

