

# Real-Time Parking Wayfinding System

**THE CHARLOTTE, NC, USA, WAYFINDING AND PARKING GUIDANCE SYSTEM IS CURRENTLY BEING IMPLEMENTED WITH REAL-TIME PARKING SUPPLY INFORMATION THAT OVERCOMES THE PERCEPTION THAT PARKING IS NOT READILY AVAILABLE IN CHARLOTTE'S CENTRAL BUSINESS DISTRICT.**



Figure 1. Vehicular wayfinding sign to Charlotte venues.

MANY CITIES VIEW PARKING AS an economic development tool that can accelerate development and growth of a downtown area. Most lending institutions also believe an ample parking supply is necessary to ensure return on investment. Indeed, there is a philosophical approach among many cities across the United States to leverage their parking resources to support economic development. The common goal of these cities is to ensure that the right amount of parking is available to users, that all visitors can find parking, and that the public and private sectors work together for this mutual benefit.

Charlotte, NC, USA's uptown parking supply is 95 percent privately owned, located in decks designed and built to support its employment base, but it is not visitor friendly. The Charlotte Wayfinding and Parking Guidance System is a project with the following goals:

1. Provide clear, consistent signage to help customers and visitors to uptown more easily find attractions, sports venues, and cultural districts;
2. Improve signage to destinations and parking to save motorists' time and fuel;
3. Reduce confusion through better

directions to available parking;

4. Provide enhanced pedestrian signage to encourage "parking once"; and
5. Provide signage for drivers to find their way back to I-277 or I-77 when leaving uptown.

Charlotte conducted a Center City transportation study in 2004–2005 then adopted transportation and parking policies in 2006 as part of its Center City Transportation Plan. Key parking policies include the following:

- Balance parking supply with transit service;
- Implement a vehicular wayfinding system (see Figure 1) to efficiently direct motorists to the parking supply available on a real-time basis;
- Utilize financial strategies to support parking as incentive for employment and retail development; and
- Create a collaborative parking management system.

A booming economy and significant rezoning and development interest in 2006 reemphasized the need for a wayfinding and parking guidance system. As a first step, the city initiated a parking study and conducted a workshop with business

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stakeholders in 2006. The workshop panelists, peer city reviewers, developed recommendations for a parking management collaborative using best practices and successful district parking management strategies. The workshop focused on organizational structure options and management programs and strategies to enhance parking and downtown access. City leaders and stakeholders were presented with strategies in use in comparable situations throughout the United States, and they examined the roles of effective downtown parking and transportation systems and their ability to support broader community strategic goals and objectives. Panelists presented the value of collaborative strategies to address downtown parking and access issues. City leaders used this opportunity to build upon the principles identified in the recently adopted Center City Transportation Plan, exploring opportunities for cooperation and partnership between the city, county, Charlotte Center City partners (our downtown development district), private parking operators, Center City stakeholders, and other interested entities.

Together, the workshop participants identified parking management organizational models that have demonstrated success in supporting and promoting economic viability and sustainability, effective planning, and operational program development and that contribute to community education and marketing related to parking and transportation options in support of downtown as a local and regional destination.

Peer city experts in 2006 identified these parking challenges through interviews with stakeholders:

- Uptown visitor parking is not supported as well as monthly employee parking;
- Lack of parking guidance or information signs;
- Parking supply is not operated like one system;
- No common marketing;
- Inadequate signage;
- Confusing rate structures;
- Ownership and management are private and fragmented;
- Future demand needs to be balanced with transit investments and inter-section capacity;



Courtesy of Central Parking System

**Figure 2. Charlotte's parking supply locations.**

- Visitors experience confusion in finding parking, whether from out of town or this region. There is little information and direction provided for the “visiting” public on where to park, rates, and so forth;
- The off-street parking system is fragmented and under numerous ownership and management models with little uniformity in signage, hours, or design standards; and
- Parking demand and users change throughout the day and the week.

Focus group research conducted by the city in 2006 also supported efforts to identify the parking supply and allay concerns that parking is generally absorbed by monthly parkers working uptown and not available to visitors.

The analysis of parking space needs during the Center City Transportation Study forecasted the need for off-street parking spaces will increase by nearly 50 percent in the next 20 to 25 years. Private facilities will meet most of that demand, but for the Center City transportation system to function effectively as a whole, and to assure the area's continued economic viability, it is important that the uptown parking system be accessible, well

managed, and user friendly.

The need to accommodate employment is the primary determinant of the off-street, nonresidential parking supply in Center City. In 2005 36,000 off-street parking spaces were used on weekdays by Center City employees.

For operational efficiency, parking decks and lots generally accommodate a maximum of 85 percent of their total capacity. Thus, accommodating 36,000 occupied parking spaces requires approximately 41,400 spaces—which is less than the estimated current total supply of 46,000 off-street parking spaces available for daily commuters in Center City.

How will that number change in the future? In the next 25 years—by the time the rapid transit system is complete—an additional 40,000 employees are expected in Center City, bringing the total workforce to 95,000 employees, according to growth projections. By that time a greater percentage of commuters will be using the new transit system, but the majority of Center City employees will still drive to work and will need parking. About 20,000 new parking deck spaces (in addition to the existing 38 parking decks shown in Figure 2) will be constructed in Center City over the next 20 to 25 years

to accommodate the forecasted growth in employees and to offset displaced surface parking lots as a result of development.

While the parking supply in 2006 was adequate to meet our needs in terms of the number of spaces, the accessibility of such spaces—the ease of finding convenient parking—had not been addressed. The large number of privately owned facilities with limited, varied signage can make it difficult for visitors to find either short-term or daily parking convenient to their destination. From a systems viewpoint, parking was fragmented and lacked overall coordination. It became important to develop a management approach that would result in a coordinated parking supply, welcoming to the visitor, the tourist, new businesses, employees, and the general public.

Operationally, the off-street parking system is fragmented and under numerous ownership and management models. Hours of operation, rate schedules, management of reserved and non-reserved parking, and design standards (such as lighting and security features) vary by facility. Little or no parking guidance or “wayfinding” exists, nor can it be developed in a fragmented environment, resulting in the presentation of a confused parking system to both the infrequent and frequent visitor.

Maximizing the efficiency of the entire public and private parking system increases the value of the parking assets, reduces development costs, stabilizes user costs, and supports efficient use of the transportation system, including transit. From the public policy standpoint, it is in the interest of an economically viable Center City to have parking facilities and access systems that are designed and managed to support pedestrian-oriented streets, transit development objectives, and efficient use of facilities.

The transportation objective is to use the parking supply as efficiently as possible, balanced with transit services, and to support it with a vehicular wayfinding system and a parking guidance system that enables people to find parking as easily as possible.

The proposed policy approach—a collaborative public-private approach—needs to meet the current and future parking needs of employees and visitors in Center City. It was the recommended



Figure 3. Parking guidance signs in advance of parking decks.

choice among four possible options for the city of Charlotte:

1. Allow the existing fragmented approach to continue;
2. Adopt parking maximums or impose a ceiling on the number of spaces;
3. Begin constructing its own parking structures; or
4. Facilitate a collaborative parking system.

From a land use perspective, a collaborative system including a parking guidance system and a common branding program would be a more cost-effective approach for meeting parking needs than would complete reliance on new parking deck construction. The Center City Transportation Plan recognizes that it is not necessary or desirable to build a parking space for each additional future employee in a central business district supported by transit and with a growing residential population. In part, this is because more employees will live in uptown and walk to work, and more people will be riding the rapid transit system.

Another basic tenet of the collaborative approach is to efficiently use existing facilities by coordinating available parking deck spaces to meet demand as it shifts during the day. It also works on a longer-term basis; for example, if one building has an oversupply of spaces because more employees are using transit, the building or parking management can make these spaces available through the wayfinding and parking guidance system and gain

new users. A collaborative system is a cost-effective alternative to construction.

The Center City Transportation Plan’s recommended policy approach to improving management of the off-street system emphasized that the objective of “changes in management of the parking system” does not refer to changes in management of specific facilities but is aimed at unifying the parking system so that it looks, feels, and is perceived as a system to users, rather than as a fragmented series of parking opportunities.

Elements of the system include

- Common branding and advertising;
- Parking guidance or “wayfinding” system;
- Known pricing;
- Common validation process;
- Consistent specialized parking (van and carpooling); and
- Consistent design and quality standards.

A collaborative parking system will provide opportunities for owners and operators to more effectively market their parking facilities based on support provided by the collaborative’s marketing and branding. Dynamic wayfinding and parking guidance signs (see Figure 3) to direct parkers to their facilities are key components of the collaborative system.

Benefits to owners and operators should include higher revenues from increased utilization, the potential for subsidies by the collaborative to expand operating hours (and, ultimately, generate new revenue), and financial and infrastructure



Figure 4. Each parking deck displays real-time parking supply.

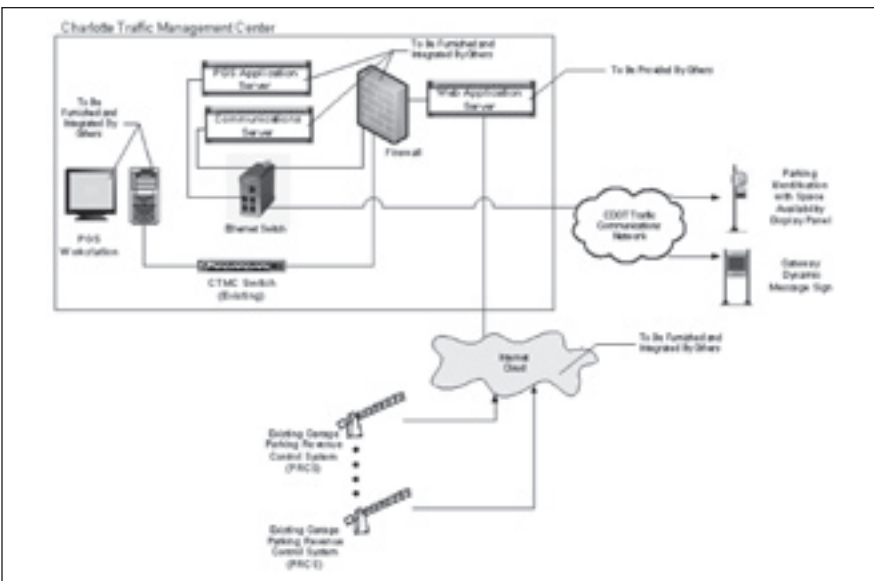


Figure 5. Communications relationships of the parking guidance system.

support for new technology costs.

A collaborative approach can also dispel the perception that parking demand is not balanced with parking supply. This perception probably comes more directly from the lack of clear information and directions on where and how to park.

While it may seem counterintuitive to invest in programs in support of private vehicle use in a transit-oriented central business district (CBD), we acknowledge the choices of motor vehicles, bicycles, pedestrians, or transit to access employment and entertainment. The project goals are expected to reduce the time spent by motorists searching for parking, as well as reduce fuel consumption and queuing at parking facilities.

In Figure 4, the prominent “P” parking sign has both a garage identification number and a real-time parking supply field. Avail-

able parking supply data comes directly from the deck operators’ revenue control system, with frequent updates. This information is routed to the parking deck sign, the city’s Traffic Control Center, a “Find Your Way” Web site, dynamic gateway signs at primary portals to the CBD, and eventually to personal digital assistants or next-generation personal information devices.

Many parking guidance systems have been deployed in large parking facilities with multiple levels (at airports, for example). In most cases there would be a sign at the facility entrance displaying available parking on each level. In a CBD, the parking is more likely to be spread over several blocks rather than located within one facility. Motorists would need information in advance to make maneuvering decisions to locate available park-

ing. Allowing motorists to make informed decisions about their driving direction will benefit the city and the environment, while providing an enjoyable experience.

Parking guidance systems are popular in Europe and are gaining popularity in developing areas of Asia and the United States.

To optimize the effectiveness of the parking guidance system, a number of operational and design decisions must be made. First, participating facilities must be identified. Participation in the parking guidance system depends on facilities’ willingness to provide real-time parking availability levels.

Second, special events parking information is needed, since major venues may individually or in combination with others supply a large volume of parking. Information from revenue control software may not be dependable when fixed-fee collections at the deck entrance bypass normal collection protocols. An alternative reporting method may be needed.

Third, data collection approaches vary. Inductance loops at facility entrances and exits can monitor vehicles entering and exiting. Video detection is another approach; however, pedestrians and extreme weather conditions may generate false reports. Facility owners may choose self-reporting to retain the option of reserving or temporarily closing the facility to the public, also known as an override option.

Technical requirements and standards must be established for the transfer of data from a revenue control system to the traffic control center to ensure the accuracy of data, as well as data transfer intervals.

Data can be sent from the parking decks to the traffic control center through several optional forms of communication, including wired, wireless, or purchased services options. Selection of a communications medium may depend on cost, existing infrastructure, building footprints and sight distance, exposure to installation/ operation risks, and electronics to send and receive data.

Dynamic message signs (DMS) units are considered to have low bandwidth needs. On a continuous basis, they send and receive status poll data indicating the health of the sign. When posting a message to a sign, there is an increase in message size, but even with this increase, it is still considered

to be a low-bandwidth application. Purchased services are those telecommunications services that are available for purchase from telecommunications services providers. If parking decks have existing telecommunication services, information exchange over the Internet may be feasible.

Several technological options exist for communicating parking availability and status. Dynamic message signs along the roadway and on parking structures will be the primary means of conveying information to motorists. The flowchart in Figure 5 reflects the communications relationships between parking decks, the traffic control center, dynamic signs, and Internet-supported information devices.

A well-organized system of parking, regardless of ownership, can result in better utilization of existing facilities and reduce the perceived need for additional parking to accompany investments in office or mixed use developments. An important benefit is avoidance of an oversupply of parking that could compete with a growing transit system. The Center City Transportation Plan traffic analysis assumes a 25 percent reduction in vehicular traffic in uptown upon full implementation of Charlotte's 2025 Transit System Corridor Plan. The 2030 Transit System Plan in Figure 6 reflects developing rapid transit service in five corridors. It is in Center City that the five corridors converge and then radiate out to the rest of the system. The Center City improvements will enable these individual corridors to function as an integrated system. These improvements will also provide services for the uptown area and connectivity with surrounding neighborhoods.

As parking demand increases over the next 25 years, there will be many opportunities for Charlotte to partner with the private sector in providing parking solutions as part of new mixed use development projects. The recommended model is the development of mixed use projects that serve needs for shared parking, transit accessibility, and multiple trip destinations. This model—with the city as a partner in jointly addressing parking needs—can result in efficient, effective, and sustainable development that has a positive impact on development as a whole in Charlotte.

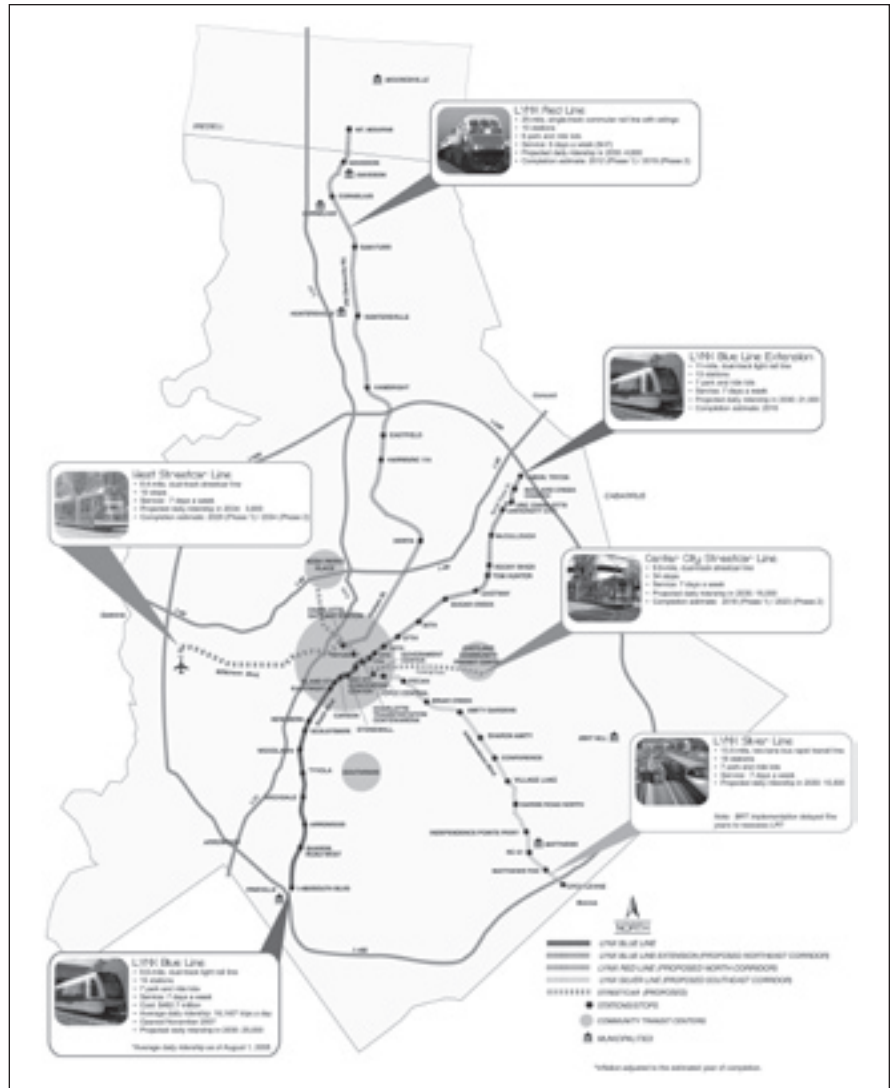


Figure 6. 2030 Transit systems plan.

Balancing the parking supply with transit service is a key policy of the Center City Transportation Plan; however, there is a growing need for a new paradigm for economic development that incorporates transit into the financing model historically used by banking/lending institutions.

The Charlotte wayfinding and parking guidance system creates an umbrella management system for parking that is privately owned. Goals are to create common branding/advertising; develop facility design standards; reduce vehicle miles of travel by creating a clear, concise directional wayfinding and signage system; and encourage optimal use of existing facilities. This program addresses conditions similar to many U.S. cities that have not invested in significant public parking programs.

Capital funding from the Federal

Congestion Mitigation and Air Quality Program and an Energy Efficiency and Conservation Block Grant was granted based on project goals to reduce vehicle miles of travel by creating a clear, concise directional wayfinding and parking signage system. Improved air quality is a direct benefit of this system. ■



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