6: Land Use

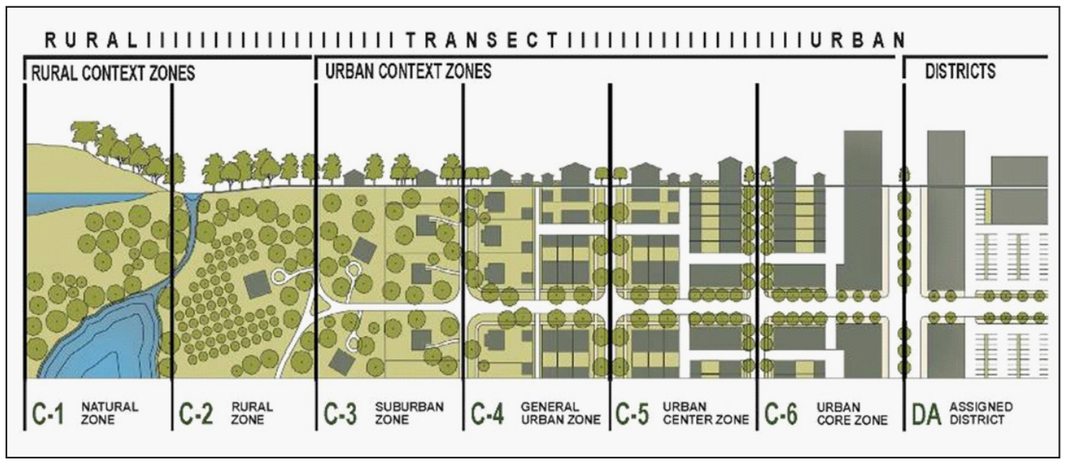
In Richmond, the relationship between land use and transportation has been studied extensively since the 1997 Richmond Transportation Plan. Much has been learned about how land use can affect travel patterns and how transportation investments can alter land use patterns. For example, many have argued that transportation should be planned in accordance with the context of surrounding land uses – hence the "context sensitive solutions" development process for transportation developed by FHWA and other transportation agencies. Advocates for better linkages between land use and transportation, like the Center for New Urbanism, have helped define context by using illustrations like the transect identified below showing how transportation patterns and design should be altered to meet varying forms of intensity and use.

In the field of transit planning research, density, intensity and land use mix have been directly linked to changing trip patterns throughout the U.S. In gross terms, the higher the density and intensity of land use and the greater the diversity of land uses, the higher the potential for alternative modes like transit, walking, and bicycling.

The Five Ds of multimodal mobility planning are:

- Density
- Diversity
- Design
- Distance
- Destinations

Each of the Ds influences not only travel choice and mode split, but also the context and completeness of the transportation network. A discussion of each of the Ds in the context of Richmond is provided below.



Density

As noted above, population and employment density have been shown to directly change trip making patterns and to support the use of alternative modes of travel (Figures 1 and 2). Population is densest to the west of downtown along Broad Street and in the Fan. Here, the developed residential areas consist of houses, townhouses, and rowhouses on small parcels and larger areas with multifamily housing. Within the city, there are pockets of population densities greater than 10,000 persons per square mile. However, lower population densities are much more common in the city and occur along linear patterns on both the north and south sides of the James River. Much more the city is defined by low density residential development of fewer than 4,000 persons per square mile.

The dynamics of employment density are different than those of population density. There is a concentration of employment density downtown where population density is low. Employment density also increases in areas adjacent to interstate facilities that pass through Richmond. Overall, employment density is greatest north of the James River and much less south of the James River.

Higher density and intensity of use and the greater mix, the higher the potential for alternative modes.

Density has many benefits, among them being transportation options. Basic bus service can be provided with a minimum density of seven dwellings per residential acre. Densities that reach 15 dwellings per acre support frequent local bus service. For light rail, a minimum of nine dwellings per residential acre are needed and rapid transit requires 12 dwellings per residential acre.

Employment densities have a greater influence on trip-making than residential densities. For intermediate bus service to be cost-effective, a minimum of 20 employees per acre is needed. For frequent bus service, the employment density threshold is 50 employees per employment acre, although 75 employees per acre is preferred. Light rail transit requires a minimum of 125 employees per employment acre around transit stations. Transit-supportive development typically achieves these density levels through high floor to area ratios (FAR).

Warehouse to residential conversions in Shockoe Bottom have increased residential density and improved the jobs-housing balance.

FAR is defined as the ratio of the total floor area of buildings on a certain location (or parcel as measured for Richmond) to the size of the land of that location, or the limit imposed on such a ratio. The preferred FAR range is 1.0 to 2.0 with structured parking for basic transit service. An FAR of 1.0, for example, allows the developer to build a one-story building that covers the entire parcel, a two-story building covering half of the parcel, or a four-story building covering 25 percent of the parcel. FAR is a measure of the intensity of use of a site. An FAR of less than 1.0 is generally associated with a much more suburban or residential character and is generally not considered dense enough to support transit service on a fixed route of any frequency.

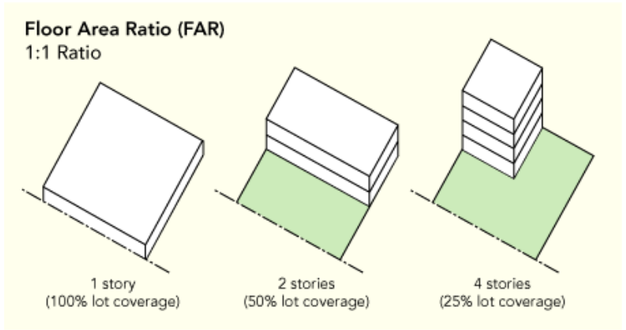


Figure 15 shows the FAR as measured for the City of Richmond. As shown on the map, the only areas within the city that have an FAR in excess of 2.00 are located within the downtown area north of the James River, with only a few dense parcels located south of the river. In general the FAR is the greatest along Broad Street, Main Street and Cary Street in the downtown area and decrease as in a radial fashion away from the downtown area. The majority of parcels in the City have FARs less than 1.0 which is traditionally a more suburban auto-oriented form of development. Existing densities support transit primarily in downtown and along the radial corridors that provide access to downtown. There are few other areas within the city that, under existing conditions, have the density to support additional fixed route transit.

FAR of less than 1.0 is not dense enough to support significant transit service.

Diversity

Diversity in the land use – transportation context refers to the overall mix of land uses. As shown in Figure 16, Richmond has a diverse set of land uses located throughout the city. Residential land use is the dominant land use, with the largest land area devoted to the single-family residential classification. Multiple-family residential is interspersed throughout the city, but does not have a high concentration in terms of location. Such units are prevalent in the Shockoe Valley and throughout the Fan District, as well as just north of I-95 / I-64 and along Chamberlayne Avenue.

Downtown is primarily designated as office and commercial use, although residential use is starting to develop. The downotwn area represents the greatest land use mix within the city, especially in such areas as Shockoe Slip and Shockoe Bottom. There are large areas designated for industrial use along the James River, along the Interstates, and along US 1 (Jefferson Davis Highway), including much of the area south of the James River.

Commercial uses include such things as retail facilities. These uses are located throughout the city, especially along several of the primary routes into and out of the city, including Hull Street, Broad Street, and Midlothian Turnpike.

Figure 15: Floor Area Ratios

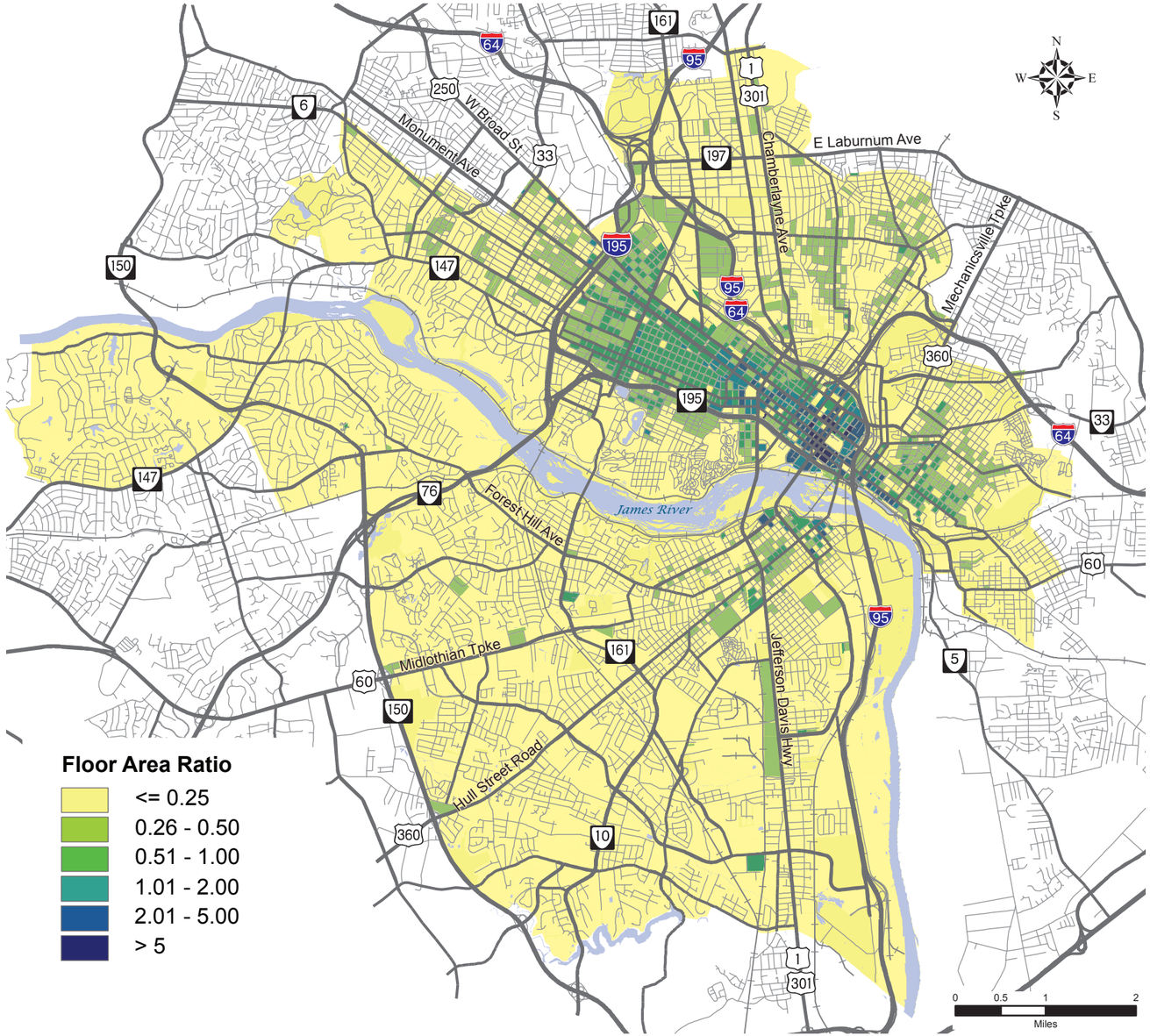
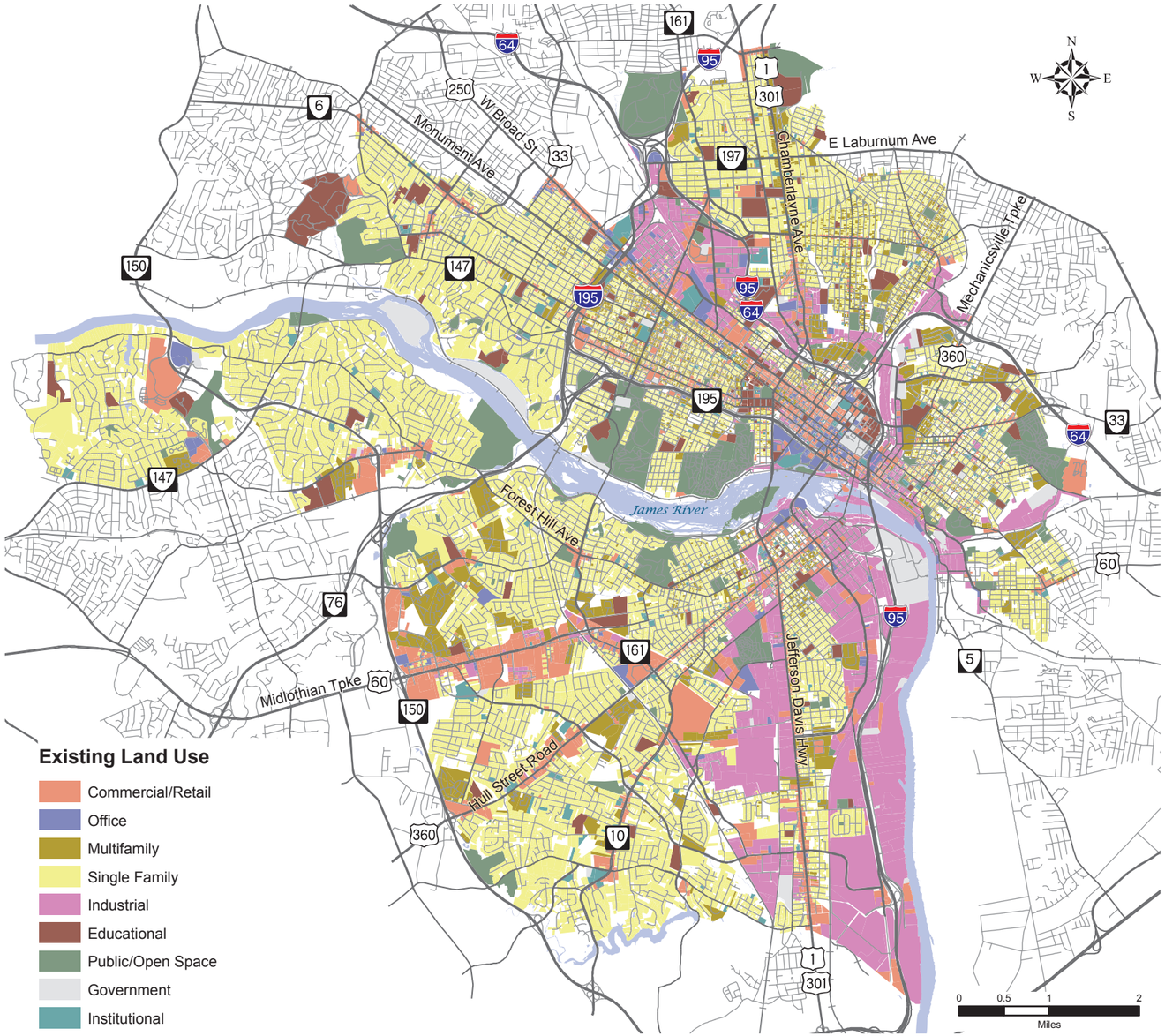
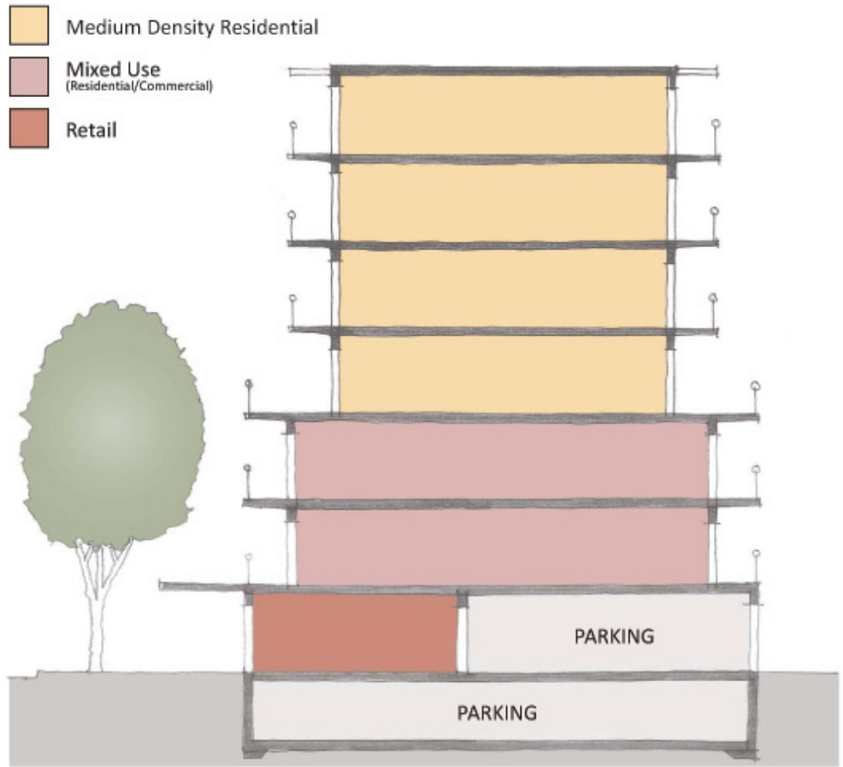


Figure 16: Richmond Land Use



One important point regarding land use diversity is that it is hindered by the lack of linkage between existing zoning, land use planning, and transportation planning. For example, currently there are very few actual mixed-use land use classifications in Richmond; multiple permitted uses are different than actual requirements for a mix of uses. Often mixed-use land use is required as part of the adoption of such things as Transit-Oriented Development Overlay Districts or in areas that are defined as station areas along major transit routes. These types of mixed –use classifications are not currently codified in Richmond, although multiple uses are permitted.

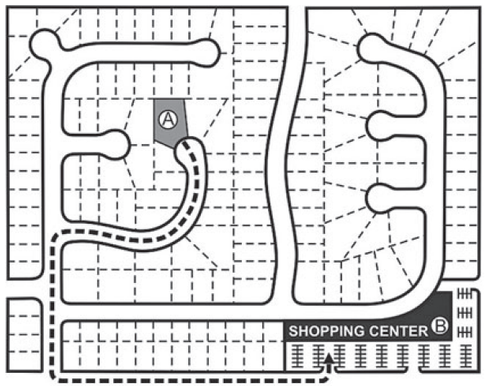
Diversity can also be measured by looking at the balance of housing to jobs, as shown in Figure 3 of this report. Generally the city is either housing-rich or jobs-rich in most areas, either of which tend to generate longer commuting trips and an overall increase in VMT compared to areas that have a balance of jobs to housing. This partially explains the dominant commuting patterns seen in the region into and out of the downtown area.



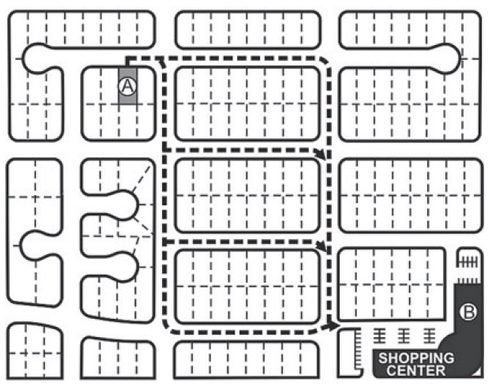
Design

Design refers primarily to the overall configuration of land use and transportation. Richmond is fortunate to have large areas of a grid network that performs well from a transportation perspective. Grid networks allow for multiple route choices for commuters (including cyclists and walkers) whereas more suburban patterns of development, as shown in the illustration below, offer fewer overall connections. The illustration shows how land use and its supporting transportation system are designed affects trip distances at the individual level. How land use and the supporting transportation system are designed at the larger scale affects the distance of trips overall.

Figure 17 shows how "connected" the city is by measuring the density of intersections (intersections with at least three legs). This is a measurement of how much of a grid network is in place from a design perspective so commuters can make alternative and shorter routing decisions. The greatest densities occur in the traditional grid networks located downtown, in the Fan, in Manchester south of the James River, on Church Hill, and northwards towards Laburnum Avenue. The strong performance of the city from this design perspective is due to its historic development as a trolley city, which supported smaller blocks, walkability, and access to transit. In terms of "connectedness", however, the Southside has a much less dense pattern, which is indicative of its more suburban and auto-oriented design.



(A) Conventional suburban hierarchical network.



(B) Traditional urban connected network.

Figure 17: Density Of Intersections

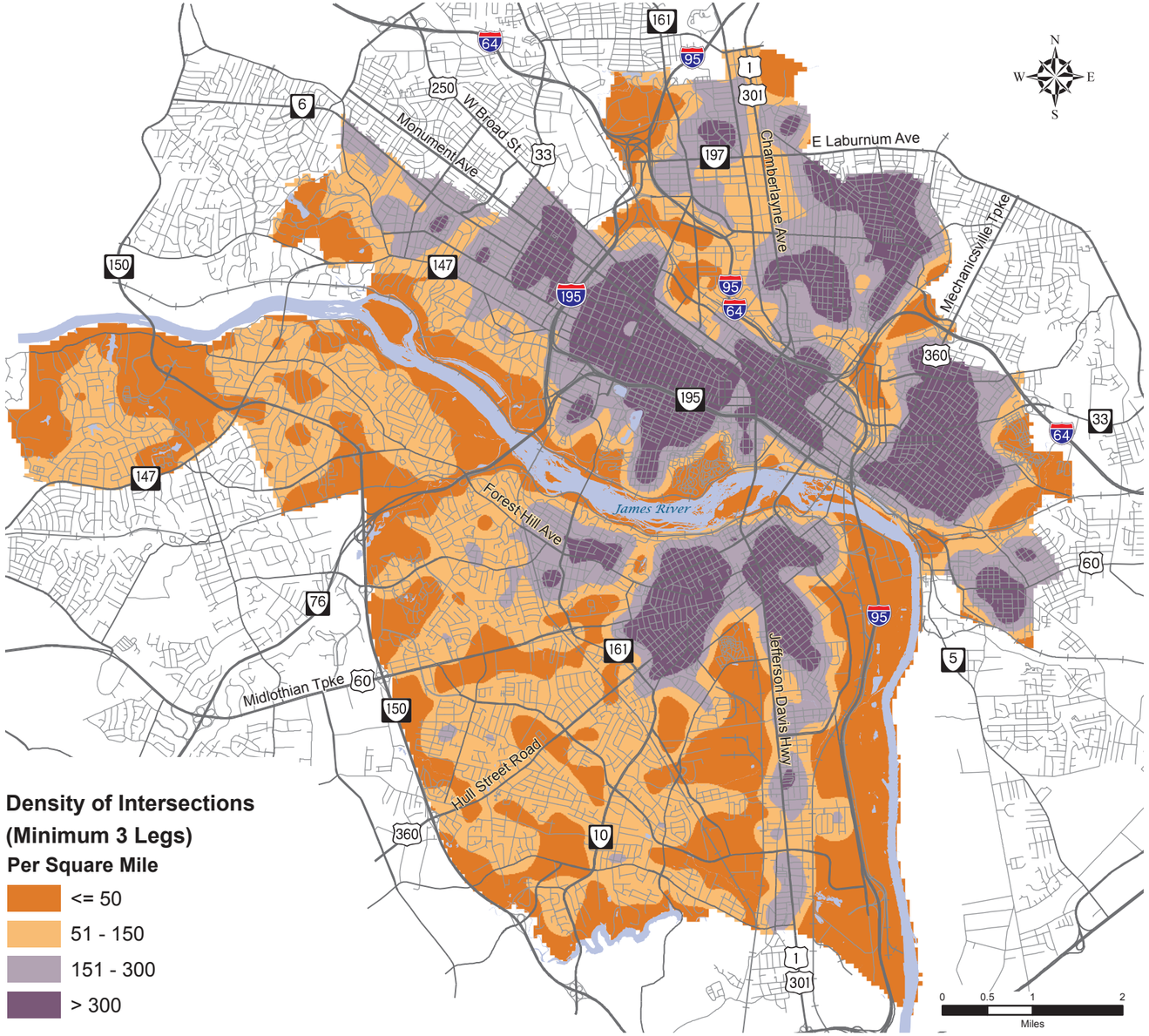
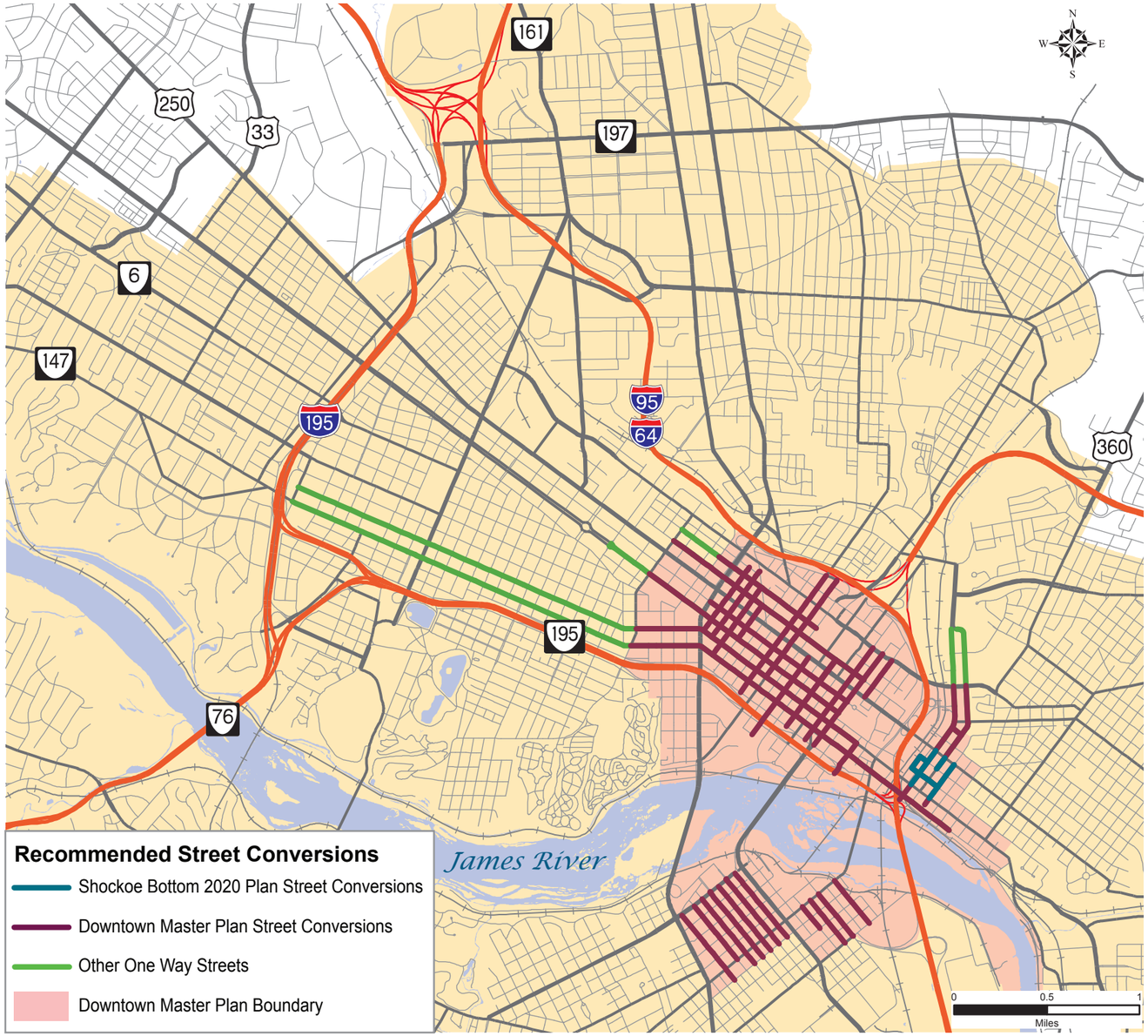


Figure 18: One Way Streets



In considering the design of the transportation system, an assessment of the one-way street system has been conducted as part of the Downtown Master Plan. Figure 18 shows the one-way streets within the downtown business district, Shockoe Bottom and Manchester recommended for conversion. The benefit of one-way streets is that they move traffic efficiently and tend to be safer. Yet the benefit of moving traffic efficiently is also considered a negative effect in that the downtown network has been historically over-designed to serve automobile movements into and through the city at the expense of other modes of transportation. The sheer number of one-way streets within these areas can create confusion for visitors and creates more circumferential routing, depending on destinations of drivers. From a design perspective, one-way streets do limit visibility, as well as access, to land uses located within those blocks, which is considered to be a deterrent to full economic development. The pros and cons of the conversion of the one-way streets will be assessed as part of the Richmond Connects process.

Grace Street, Downtown, was recommended for conversion to two-way operation by the Downtown Master Plan.

Distance

Distance refers to how far it is for commuters to access transit. Generally, large areas of the Southside are not within walking distance of fixed-route transit. The highest level of transit service within walking distance is located north of the James River, along Broad Street, and radiates out to the north along the historic trolley routes. Walking to transit on the Southside is limited to Jefferson Davis Highway, portions of Hull Street, portions of Midlothian Turnpike, and along Forest Hill Avenue.

Destinations

One of the fundamental purposes of transportation facilities and services is to provide access to regional activity centers. Richmond performs well from an overall access perspective at the regional scale. Within the city limits, there are multiple access points to two interstates and limited access roadways, there is a port facility on the James River, and there is an Amtrak train station downtown. The city also has a high-performing transit service, as well as inter-city bus operations. Improvements are needed, especially rail improvements to Main Street Station and general access improvements to the Port of Richmond.

Downtown access is important, not only for employment but also for tourism in terms of site access and parking. As shown in Figure 19, there are several transit routes that connect many of the major tourist sites within the city. These routes serve an important multimodal component and should be retained in order to maintain access to tourists sites for visitors, citizens, and downtown workers.

To The Bottom and Back (2BNB) is a non-profit that operates buses on weekend evenings and late-nights in the Fan, Downtown and Shockoe Bottom.

Figure 19: Circulator Routes

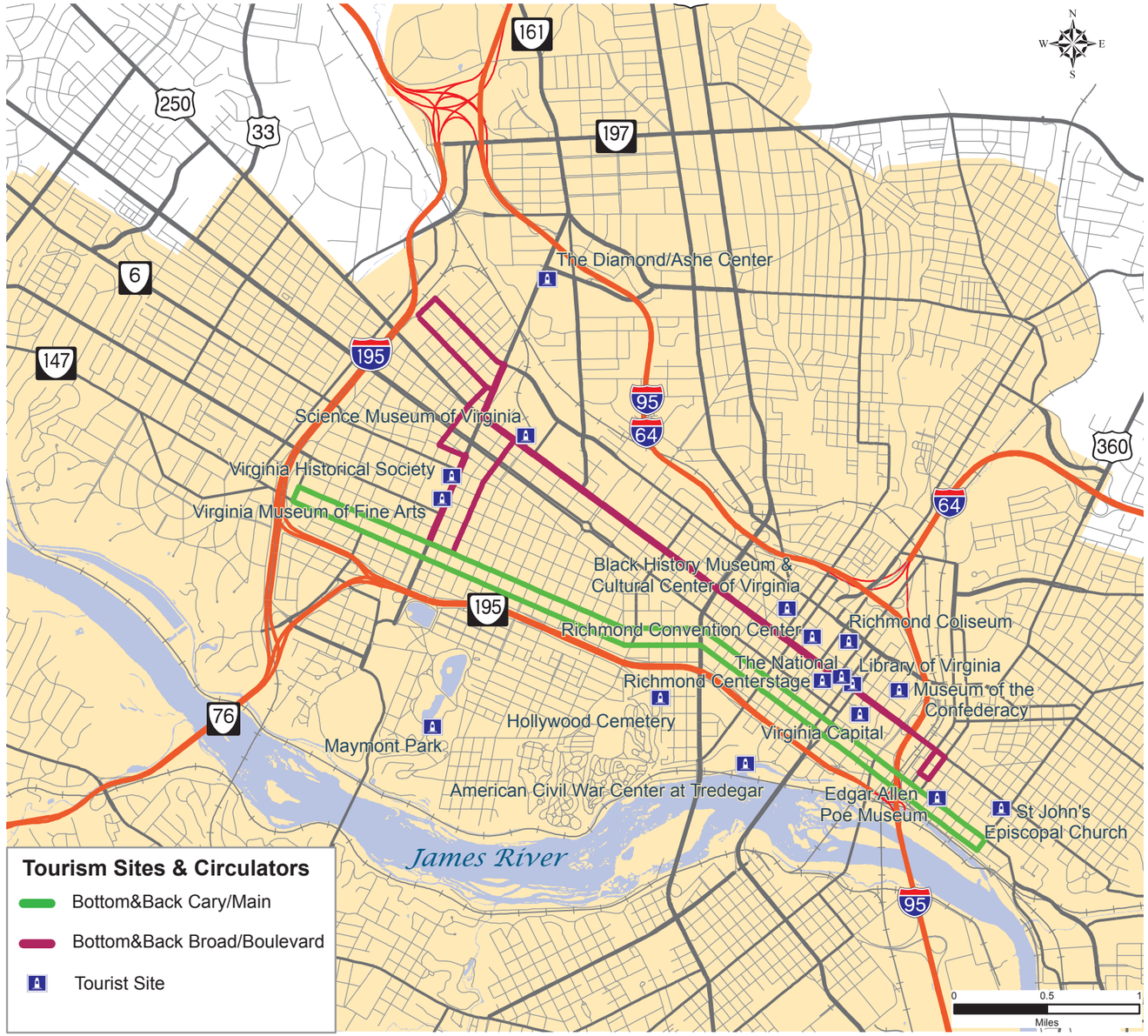
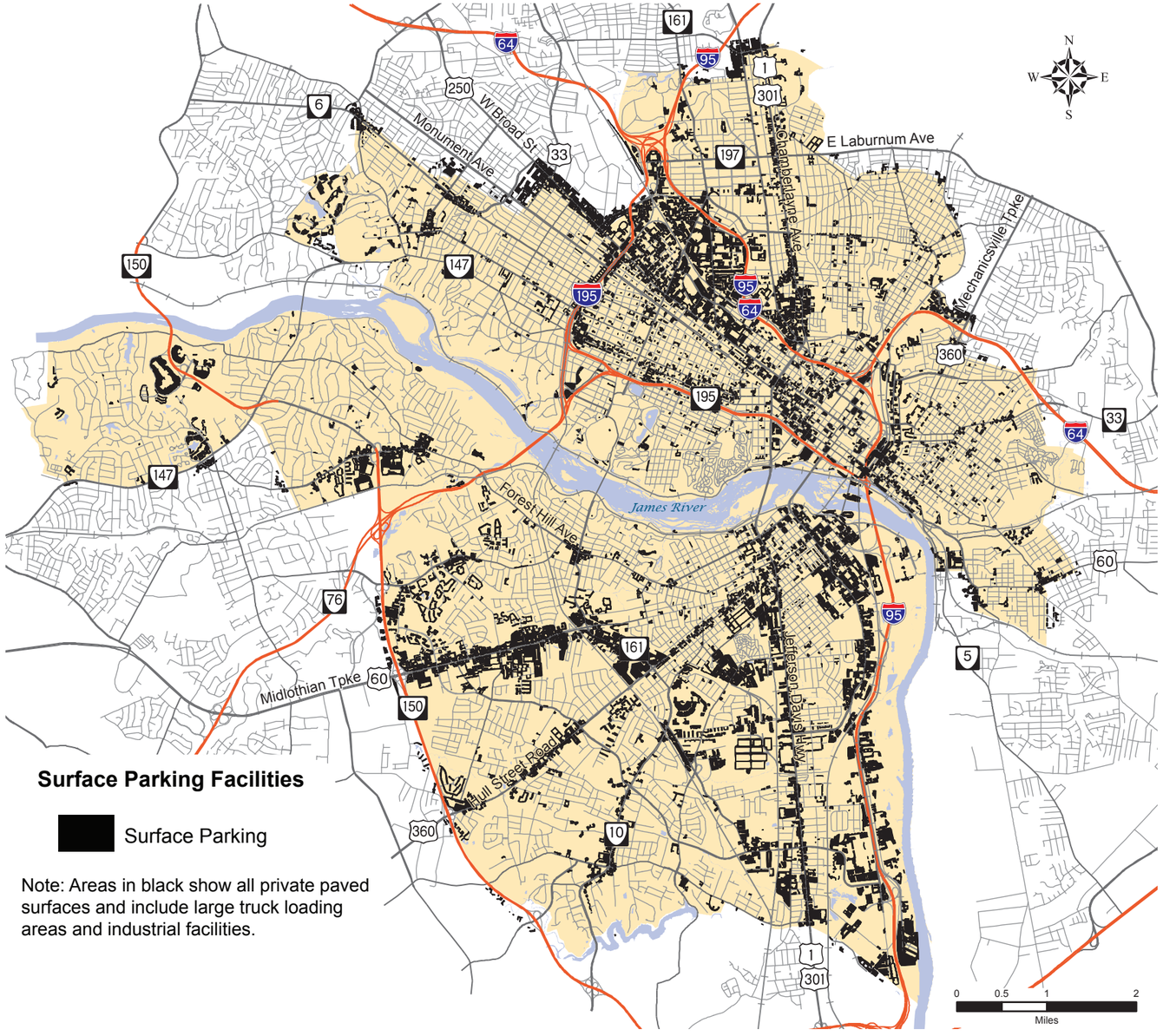


Figure 20: Surface Parking Facilities



Downtown Richmond serves as the largest regional activity center. The transportation system has been developed to support access into and out of it, both by transit and the roadway system, in a hub and spoke pattern of development. Figures 20 and 21 show two important components of the parking infrastructure within the city: the location of surface parking facilities and the number of parking spaces per employee in the downtown area.

Figure 20 shows the extent to which surface parking exists within the City of Richmond. In general, the figure shows a distinct pattern of surface parking as the primary form of parking along the major commercial routes such as the Interstates, Jefferson Davis Highway, and Midlothian Turnpike, as well as the major transit routes along Broad Street and Chamberlayne Avenue. The figure also shows the extensive public parking in Shockoe Bottom just to the west of downtown and the large industrial parking concentration north of Broad Street and north of the Fan District. Some of the areas shown are informal industrial space where trucks, storage, and other generally undeveloped use may exist as well.

Surface parking is a cost-effective parking solution, but the amount of it within the City does raise some concerns. First, surface parking is considered to be a deterrent to a walkable environment as pedestrians are often exposed and do not have the benefit of “eyes on the street” that occur in more developed areas. Second, the sheer volume of impervious surface associated with the large surface lots is not as sustainable as it could be overall. Third, the total number of spaces encourages the pattern of single-occupant vehicle access. Lastly, surface parking is rarely the highest and best use of a property and the prevalence of surface parking in some areas of the city can deter economic development. Currently, there is enough off-street, surface paved area within the City of Richmond to park over 340,000 passenger vehicles including most of the parking decks in downtown Richmond.

Surface parking lots like these at Main and 6th Streets disrupt a pedestrian scale environment.

Figure 21 displays the relationship of parking to overall demand. The physical location of parking results in highly variable access patterns with portions of the downtown having fewer than 1 parking space per employee and other areas have over 5 parking spaces per employee. The effect of the surface lots in Shockoe Bottom is also illustrated – with an average of 2 to 5 parking spaces per employee, which explains why many people rely on parking in Shockoe Bottom to access employment centers that have fewer than 1 parking space per employee. This high level of parking supply indicates why there continue to be perceptions of a lack of parking within certain areas in Richmond – it is the location of that parking relative to density that causes this overall perception..

Well designed parking structures are integrated into the streetscape with ground level uses such as the VCU Bookstore at the Monroe Park Campus.

Poorly designed parking structures create gaps in active downtown streets

Figure 21: Parking Spaces per Employee

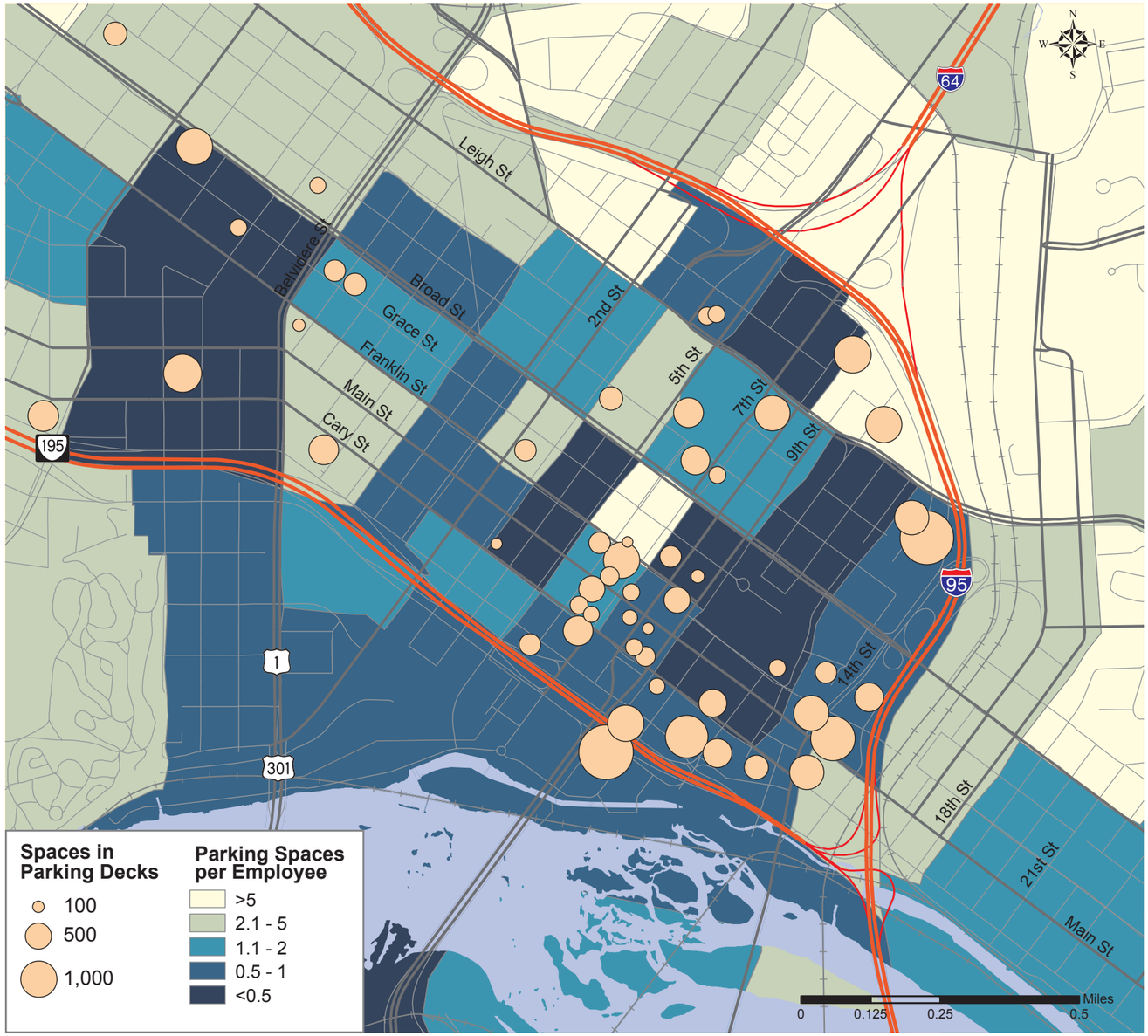
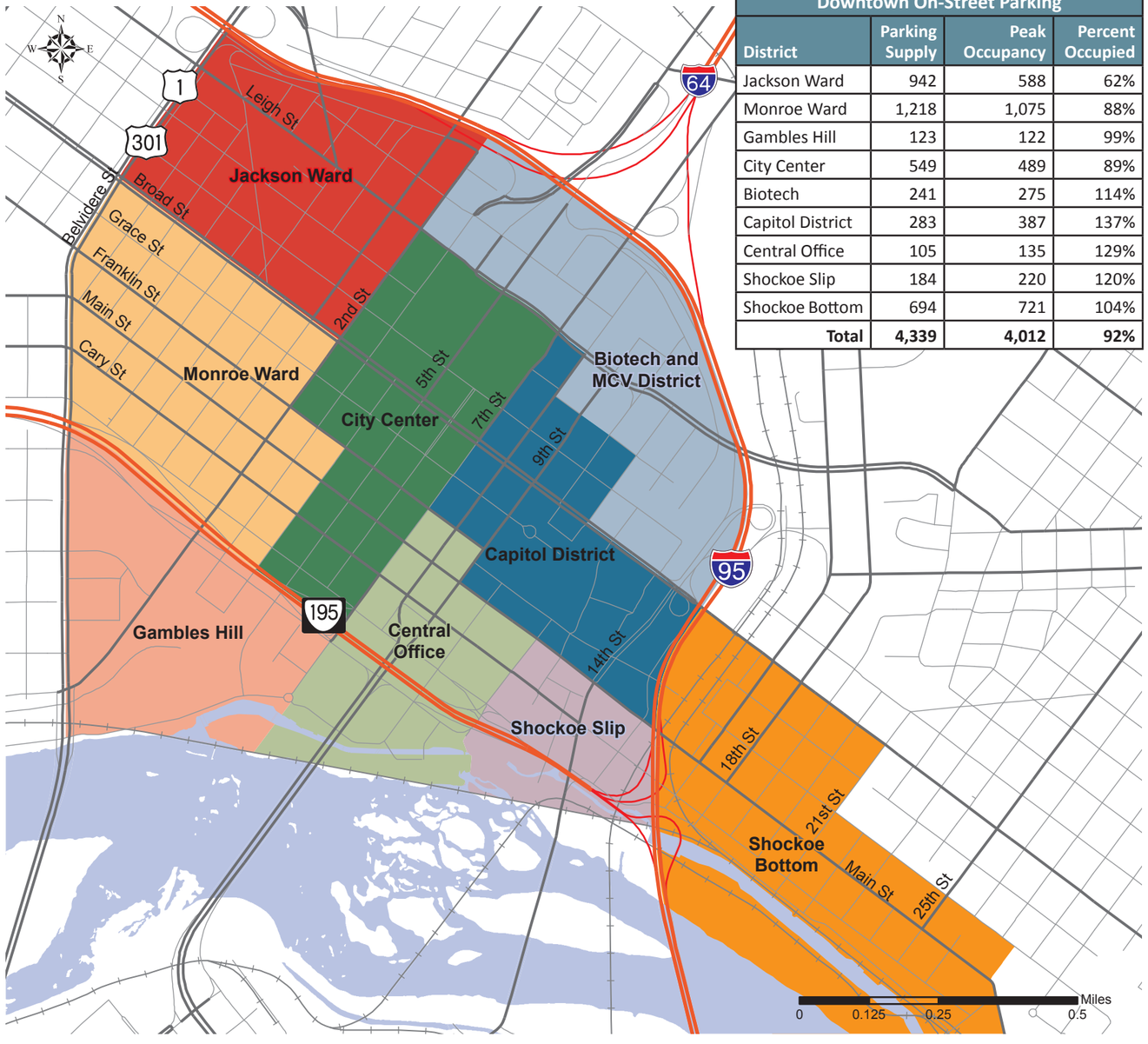


Figure 22: On-Street Parking by District



Downtown On-Street Parking			
District	Parking Supply	Peak Occupancy	Percent Occupied
Jackson Ward	942	588	62%
Monroe Ward	1,218	1,075	88%
Gambles Hill	123	122	99%
City Center	549	489	89%
Biotech	241	275	114%
Capitol District	283	387	137%
Central Office	105	135	129%
Shockoe Slip	184	220	120%
Shockoe Bottom	694	721	104%
Total	**4,339**	**4,012**	**92%**

On-street parking is a common feature throughout Richmond in downtown and in many of the older neighborhoods of the city. On-street parking is critical to the urban environment and transportation system. It provides convenient parking access for customers to street front businesses, it provides a buffer between travel lanes and the sidewalk and it provides a valuable shared parking supply for area businesses and residents. On-street parking can have many drawbacks, however. When occupancy of on-street parking exceeds 85%, drivers looking for on-street parking may become frustrated by the lack of parking availability and sense that parking is too hard. Furthermore, when on-street parking occupancy begins reaching capacity, a common problem is excessive vehicle miles traveled by persons circling the block looking for parking. Additionally, as on-street parking occupancy increases, it becomes more difficult for drivers to maneuver into and out of on-street spaces, causing traffic delays.

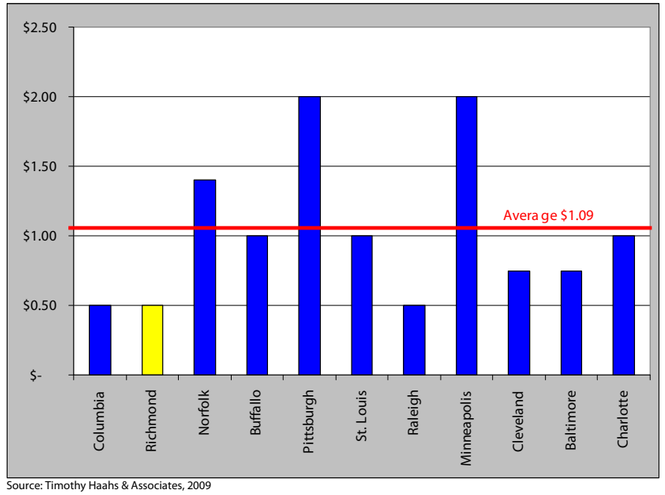
Timothy Haahs & Associates, Inc. completed a parking study of the downtown Richmond area in 2009 that addressed both on-street and off-street parking capacity, usage and existing and future needs. They concluded that

Most on-street parking in and around downtown is underpriced during peak demand periods.

1. current parking supply is adequate for existing parking demand,
2. on-street parking is often near or over capacity while off-street parking is often well under capacity,
3. many areas with high on-street parking occupancy rates do not have metered parking, which discourages parking turnover and requires labor-intensive enforcement of time limits,
4. on-street metered parking rates are low relative to peak demand for parking and compared to cities of similar size.

In addition to on-street parking issues downtown, many neighborhoods, especially those around VCU's Monroe Park Campus, have high demand for on-street parking. The city maintains three residential parking permit programs, two in the Fan and one in Carver, to attempt to address this issue. In general, the city does not lack sufficient parking spaces or facilities, it lacks of adequate parking management.

Metered Parking Rates in Comparable Cities



Source: Timothy Haahs & Associates, 2009