

2 EXISTING STATION SITE CONDITIONS

2.1 The King Street Metrorail Station

The King Street station property consists of an aerial-type Metrorail station with three entrance points, six bus bays and Kiss & Ride facilities with metered, short-term parking. The station is served by two mezzanines and three entrances – the southern mezzanine has two of the entrances, one adjacent to the bus facilities and the other along King Street, while the mezzanine to the north has a single entrance facing Commonwealth Avenue at Cameron Street. Access to the station for vehicles is provided at two entrance points – a combined entrance for buses and cars on Diagonal Road and a bus-only entrance on King Street. There is no internal site circulation for buses and automobiles.

2.2 Access and Circulation

The King Street Metro station is located between King Street, Diagonal Road, Duke Street, and the track. King Street, VA Highway 7, is a two-lane arterial providing a link between Interstate 395 and US 1. Diagonal Road is a two-lane local street that provides access to the King Street station for the majority of bus routes. Duke Street alternates as a four- and five-lane major arterial, running parallel to Interstate 495 (Beltway) that provides a link between Interstate 395 and US 1. Figure 1-1 shows the map of the station area and Metro facilities.

Primary pedestrian routes, which include pedestrian tunnels, sidewalks along the street network and marked crosswalks to the station are illustrated in **Figure 2-1**. Pedestrians walking to the station represent the highest mode of access for patrons at the King Street station. Current Metro standards and criteria for station facilities require priority access to all pedestrians in station site planning. At many existing Metrorail stations, pedestrians traveling on the station site must cross bus bays, parking lots, and vehicular lanes to reach the station entrance. King Street station is no exception with the primary pedestrian path crossing the bus bay and Kiss & Ride travel lanes. However, sight distances are good at this crossing so the crossing operates as safely as it can, given the site constraints.

A number of conflict points and deficiencies for pedestrians accessing the station were noted during the data collection effort and during the community walkabout conducted as part of this study. These include:

- The sidewalk from the station entrance to the Duke Street Tunnel is too narrow to accommodate the pedestrian volumes. The obstructions along the sidewalk on Diagonal Road reduce the clear width, therefore not meeting the requirements for ADA accessibility (see **Figure 2-2** and **Figure 2-3**).
- Conflicts between pedestrians and vehicles at the wide intersection of Reinekers Lane, Diagonal Road, and Daingerfield Road where pedestrians cross without crosswalks (see **Figure 2-4**)
- Pedestrian crossing violations on King Street

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- Heavy pedestrian traffic activating the signal at the mid-block crosswalk on Diagonal Road causes frequent traffic backups extending to Duke Street and, in turn, causing delays for buses exiting the station (see **Figure 2-5**)
- Lack of bus platform canopies and shelters for pedestrians waiting for automobile pick-ups (see **Figure 2-6**)
- Poor access to Union Station via the CSX underpass on King Street (see **Figure 2-7**)

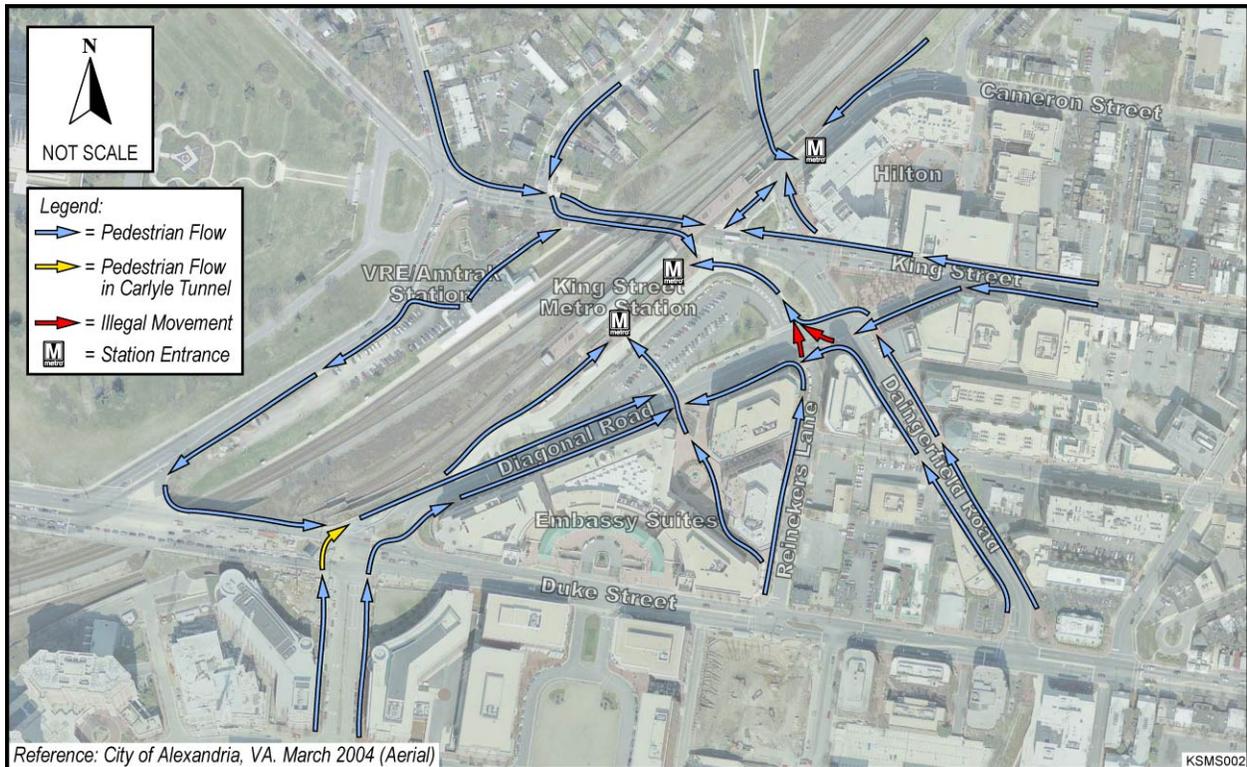


Figure 2-1: Primary Pedestrian Pathways to the King Street Station Entrance

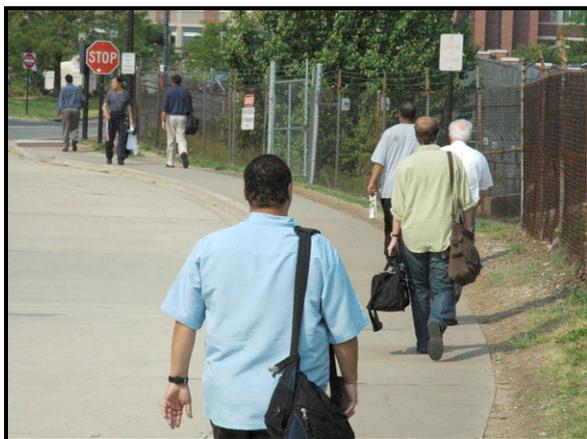


Figure 2-2: Narrow Sidewalks Leading to the Duke Street Tunnel

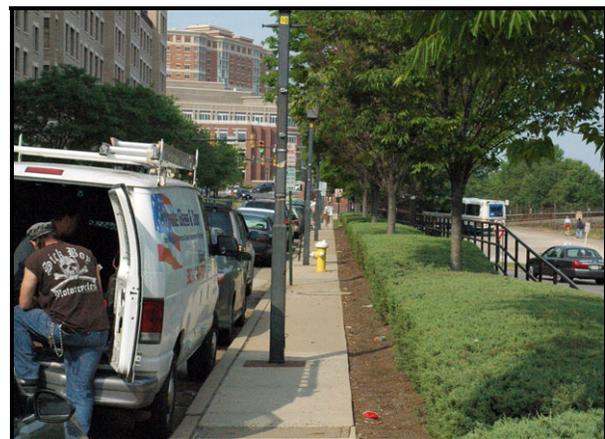


Figure 2-3: Sidewalk Obstructions along Diagonal Road



Figure 2-4: Pedestrians Crossing Daingerfield Road without Crosswalks



Figure 2-5: High Pedestrian Volumes at Crosswalks



Figure 2-6: Lack of Canopy Coverage in the Bus Waiting Area



Figure 2-7: Unwelcoming Passageway to Union Station

In general, a lack of clear signage creates confusion for transit customers traveling between Union Station and King Street station, or from the station to Old Town Alexandria and surrounding land uses in the study area. Poor lighting and decaying infrastructure beneath the CSX bridge makes the pedestrian connection between Union Station and Metrorail appear unsafe, while ineffective storm drainage presents physical hazards. As shown in **Figure 2-8**, field observations yielded that the primary pedestrian traffic to the Metrorail facility at the station in the AM peak period is from mid-block Diagonal Road, from Alexandria Union Station, and from King Street to the new station entrance on Cameron Street. In the PM peak period, the inbound station flows are workers returning from the PTO using the Duke Street tunnel, from mid-block Diagonal Road, and again from King Street to the Cameron Street entrance. While figures for egress from the station were not recorded, an approximate reversal of pedestrian movements may be expected moving away from the station.

2.3 Bus Facilities

There are six bus bays in a single array adjacent to the station abutment providing bus service to the station from Metrobus, the Alexandria Transit Company (DASH), and the REX express bus service (operated by Metrobus).

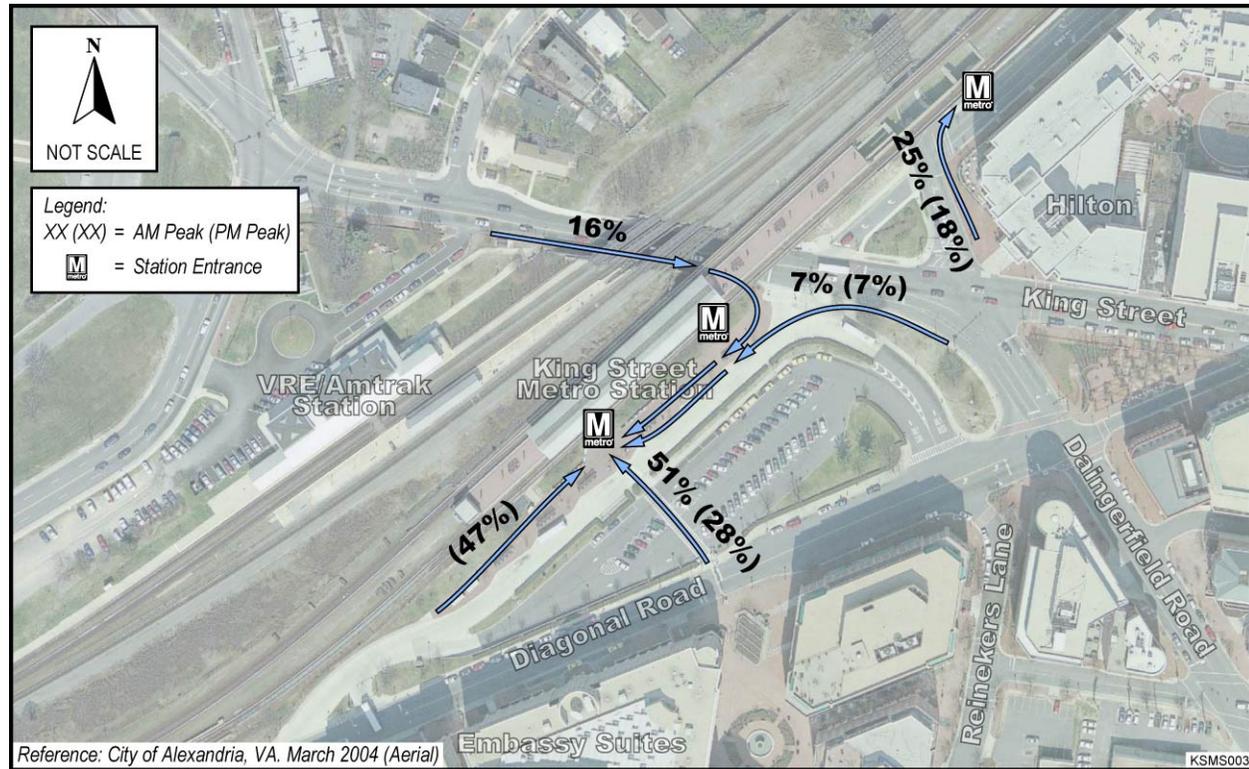


Figure 2-8: Observed Pedestrian Movements to King Street station

2.3.1 Existing Service and Boardings

Two bus systems serve the King Street Metro Station: DASH and Metrobus. DASH is a local bus system, while Metrobus is a regional system operated by Metro. There are six DASH routes, and another five Metrobus routes that stop at the King Street station. The bus lines and routes are listed below in Table 2-1.

Table 2-1: Bus Lines and Routes accessing King Street Metro Station

Bus Line and (Route)	System	Bus Stop Type (and Direction) at King Street Metro Station
Lincolnia – Braddock Metro Line (AT2)	DASH	Through (EB), Through (WB)
Van Dorn Metro – Braddock Metro Line (AT5)	DASH	Through (EB), Through (WB)
King Street Metro/Eisenhower Metro – NVCC Line (AT6)	DASH	Through (EB), Through (WB), Start/Terminus (WB)
Landmark – Lee Center Line (AT7)	DASH	Through (EB), Through (WB)
Old Town – Van Dorn Metro Line (AT8)	DASH	Through (EB), Through (WB), Start/Terminus (WB)
King Street Metro – Potomac Yard Line (AT10)	DASH	Start/Terminus (NB)

Bus Line and (Route)	System	Bus Stop Type (and Direction) at King Street Metro Station
Alexandria – Tysons Corner Line (28A,B)	Metrobus	Start/Terminus (WB)
Alexandria – Fairfax Line (29K,N)	Metrobus	Through (EB), Through (WB)
Richmond Highway Express (REX)	Metrobus	Start/Terminus (SB)

As shown in **Tables 2-2 and 2-3**, there are an average of 2,073 weekday DASH boardings and 1,095 Metrobus boardings at King Street. As shown in **Figure 2-9**, buses access the station at one of the two entrances off of Diagonal Road or King Street.

Table 2-2: Weekday DASH Ridership

Route	On
AT2	501
AT5	425
AT6	236
AT7	206
AT8	621
AT10	84
Total	2,073

Source: DASH via Metro

Table 2-3: Weekday Metrobus Ridership

Route	On	Off
26 A, B	282	248
29 K & N	350	250
REX	463	445
Total	1,095	943

Source: 2006, WMATA

In the current configuration, there is an unofficial bus layover area between the two entrances along an island adjacent to Daingerfield Road. Based on field observations, one or two buses frequently layover during the peak periods. Bus bay capacity is shown in **Figures 2-10 and 2-11**. Four bus bays are currently operating at or over 100% in the AM peak period and three bays operating at or above 100% capacity in the PM peak period, based on a conservative 10-minute headway.

2.3.2 Future Bus Service & Capacity Requirements

Bus services are projected to increase at the King Street station as DASH and Metrobus decrease headways and add new routes. To accommodate the service increases, DASH asks that twice the number of bus bays be provided as part of the design of access improvements. The City began a free shuttle service between the King Street Metro and the Old Town Harbor on April 1, 2008. The new service, called the King Street Trolley, runs through a 17 block section of historic Old Town. With over 41,000 riders in the first month of operation, the service is considered a large success by exceeding all ridership projections and by providing tourists a convenient way to visit Old Town.

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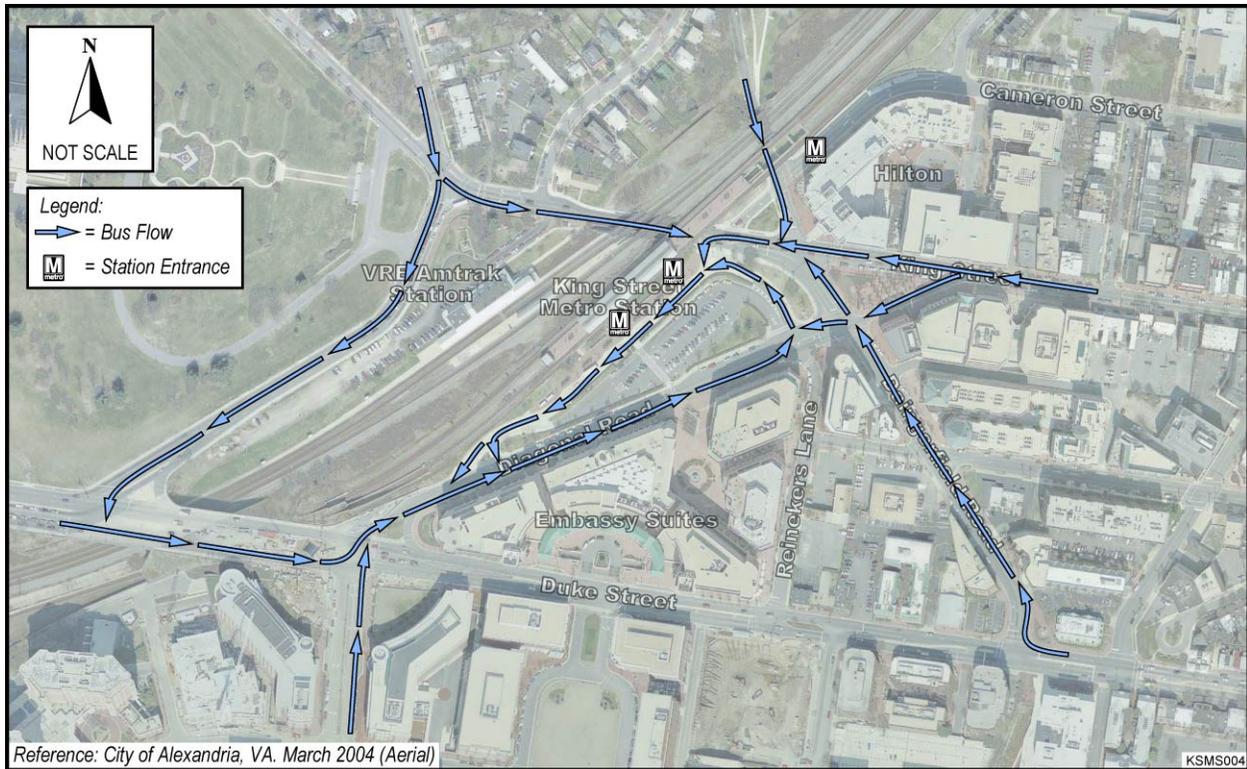


Figure 2-9: Bus Routes near King Street Metro Station

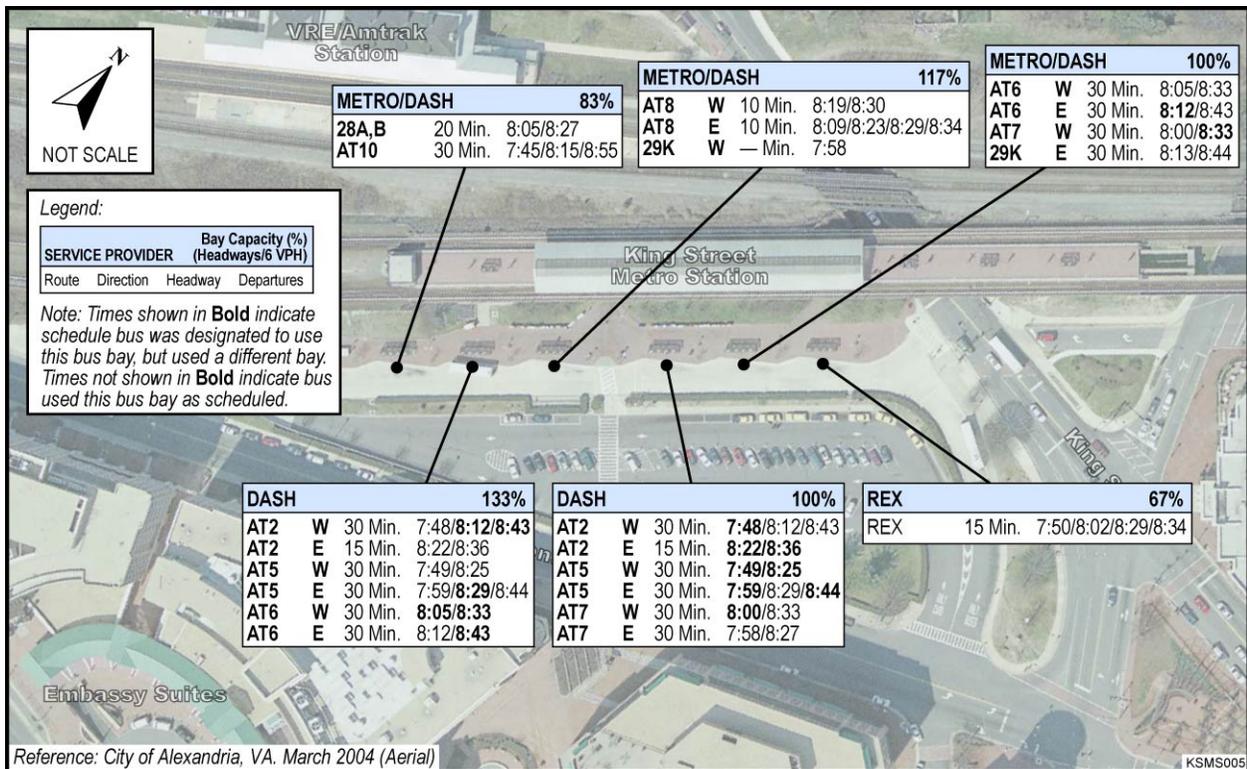


Figure 2-10: Existing AM Peak Hour Bus Service

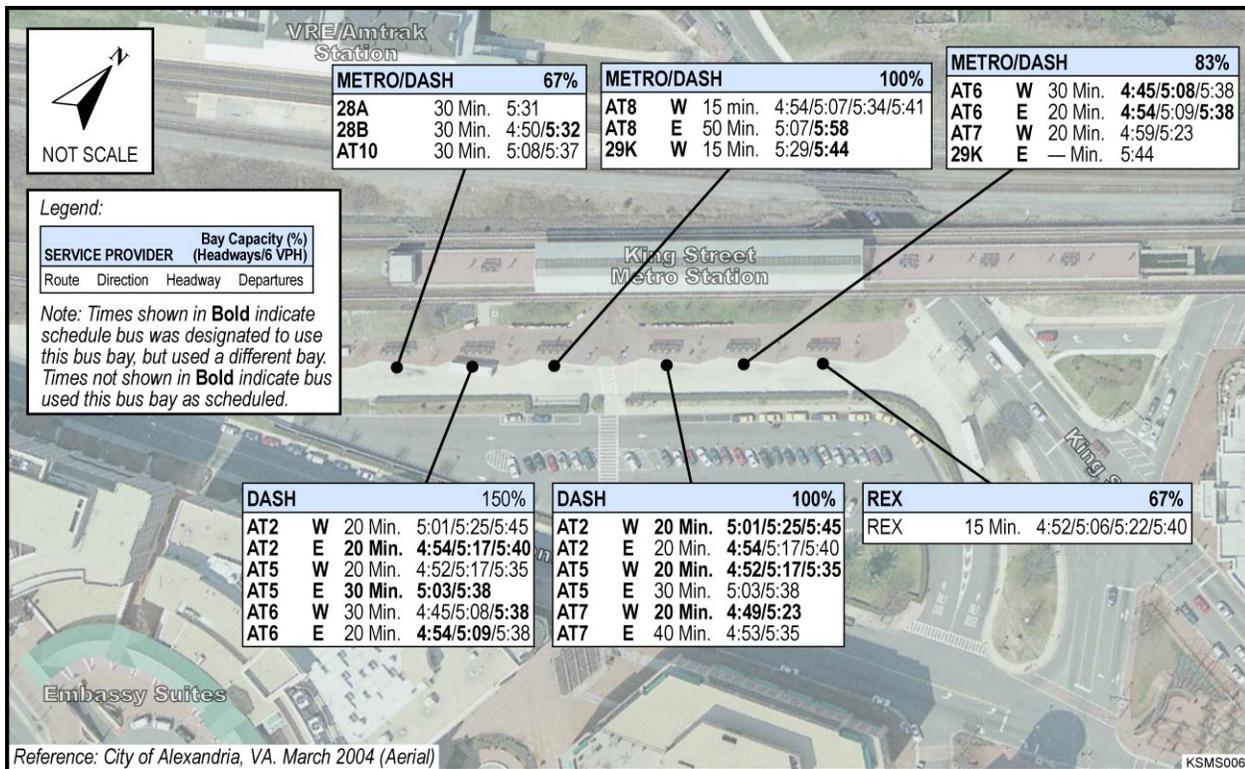


Figure 2-11: Existing PM Peak Hour Bus Service

2.4 Kiss & Ride Facilities

The Kiss & Ride (K&R) facility is located adjacent to the bus facilities at the King Street station. As observed during every field visit, many parking violations occur during the peak hours when most of the parking spaces reserved for transit use are used by the development surrounding the station site.

2.4.1 Space Allocation

There are a total of 56 parking spaces in the existing Kiss & Ride facility with three accessible spaces for the disabled, nine 'A' spaces reserved all day for automobile waiting, six spaces for car sharing vehicles, and 38 metered spaces for short-term parking. In addition to these parking spaces, there is curbside space for five taxis and about 40 additional feet of curbside space for automobile pick-up/drop-off activity and private shuttles. The taxi queue significantly exceeds the space allocation at the station as shown in Figure 2-12.



Figure 2-12: Inadequate Storage for Taxi Queues

2.4.2 Access and Circulation

Drivers accessing the Kiss & Ride facility have one approach from a double access road off Diagonal Road, the other half of the access road is utilized by buses. The existing lot has two rows of parking with three one-way aisles. One of the parking aisles faces the station, while the other aisle faces away from the station towards Diagonal Road, which may contribute to the parking violations noted (during peak periods when there are 15 minute waiting restrictions many of the vehicles are vacant and the spaces are being used for short-term parking). There is no re-circulation potential for buses and automobiles within the site. Once a vehicle enters the station lot, it must park, drop off or pick someone up, and then proceed to the opposite exit.

2.4.3 Capacity and Demand

To compare existing capacity with actual demand, an estimate is made of the number of customers using the Kiss & Ride facility in the peak hour, then the capacity required to meet the K&R demand ($C_{K\&R}$) is calculated using the Metro standard formula: $C_{K\&R} = (2) (N/\text{Number of trains per hour/peak hour factor})$. In the formula, N denotes the number of people exiting Metrorail that use the K&R facility as their mode of egress. To provide adequate K&R capacity, twice the average PM peak hour Kiss & Ride arrivals are used, representing two consecutive trains; this explains the factor of two in the above formula. A peak hour factor of 0.85 is used to simulate the peak surge condition.

2.4.4 Peak Hour Demand

Using Metro faregate data, there was an average of 1,015 PM peak hour exits per day in 2007. Assuming a 10% egress mode share, there are 102 customers being picked up in the PM peak hour which is consistent with the field data collected. With 20 train arrivals at the station during the peak hour in the peak direction, there are on average 5.08 customers from each train who use the K&R mode during the peak hour. This equates to five people accessing the K&R every three minutes. Using these calculations, as shown in **Table 2-4**, current K&R demand is for 12 K&R spaces. During field data collection, this demand was verified with a total of 13 spaces utilized for K&R activity.

Table 2-4: 2007 Kiss & Ride Capacity and Space Allocations

Number of Trains/Hour		20
N: Number of Peak Hour K&R Arrivals		102
Peak Hour Factor		0.85
Formula: $SR = (2)(N/\text{Trains per Hour} / \text{Peak Hour Factor})$		
	Calculation	No. Spaces*
Spaces Required (SR)	11.94	12
Pick-up/Drop-Off Spaces (SR/6)	2.00	2
Taxi Queue Spaces (SR/6)	2.00	2
Motorcycle Parking (SR/5)	2.40	3
Shuttle Parking (SR/10)	1.20	2
Driver Attended Spaces (SR/2)	6.00	6
Short-Term Spaces (SR/2)	6.00	6

(SR) includes ADA; driver-attended; and short-term parking spaces. (SR) excludes curb side spaces for automobile pick-up / drop-off, taxi queue, shuttles, and motorcycle spaces. *Number of spaces are rounded to the greater whole number.

2.4.5 Calculating Future Capacity Requirements

Using the standard Metro formula with 2030 ridership projections (see 2.5.3), 14 spaces will be needed to meet future K&R demand (see **Table 2-5**). This is far less than the currently provided spaces at the station. In addition, Table 2-5 shows the required number of curbside spaces for automobile pick-up/drop-offs, taxi spaces, and private shuttles. In the case of the King Street station, peak hour data in the field indicates that taxi queues and the volume of shuttle buses exceed these statistics – the designs prepared address these observations as well as the standard projections.

Table 2-5: 2030 Kiss & Ride Capacity and Space Allocations

Number of Trains/Hour		20
N: Number of Peak Hour K&R Arrivals		119
Peak Hour Factor		0.85
Formula: $SR = (2)(N/Trains\ per\ Hour / Peak\ Hour\ Factor)$		
	Calculation	No. Spaces*
Spaces Required (SR)	13.99	14
Pick-up/Drop-Off Spaces (SR/6)	2.33	3
Taxi Queue Spaces (SR/6)	2.33	3
Motorcycle Parking (SR/5)	2.8	3
Shuttle Parking (SR/10)	1.4	2
Driver Attended Spaces (SR/2)	6.99	7
Short-Term Spaces (SR/2)	6.99	7

(SR) includes ADA; driver-attended; and short-term parking spaces. (SR) excludes curb side spaces for automobile pick-up / drop-off, taxi queue, shuttles, and motorcycle spaces.

**Number of spaces are rounded to the greater whole number.*

2.5 Metrorail Ridership

2.5.1 Existing Ridership

Station entries at the King Street station have increased every year since 1999. According to 2007 WMATA data, there were an average of 8,354 station entries on a typical weekday through all station entrances. The number of daily boardings has nearly doubled in eight years. The largest increases in station entries occurred in 2004 and in 2005, with increases of 15% and 18% over the previous year (see **Table 2-6**).

2.5.2 Boardings by Mode Share

The current number of boardings by mode share is shown in **Table 2-7**. As can be seen in the table, walking is the most common mode of access to this station with 66% of the arrivals and over 5,500 trips.

Multimodal access is also particularly high, with transfers from bus and the VRE making up nearly a quarter of the Metrorail boardings at this station.

Field data taken in 2007 verified these results as shown in Table 2.7. During several weekday site visits, the mode split for customers accessing the station was observed to be similar to

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Metro data. The King Street station receives a high number of shuttle operators that access the station as well as connecting rail and bus service. Data from site observations also verify that a high percentage of drop-offs, nearly 25% of the K&R mode share, are from private shuttle buses.

Table 2-6: Average Weekday Passenger Boardings

Year	Daily	Year-to-Year Change
	No.	%
1999	4,669	--
2000	5,232	12%
2001	5,678	9%
2002	5,800	2%
2003	6,053	4%
2004	6,971	15%
2005	8,242	18%
2006	8,739	6%
2007	9,084	4%

Source: WMATA, Boardings collected during the month of May for each year

Table 2-7: 2007 Modes of Access

Mode of Access	Daily	
	No.	%*
Pedestrian / Bicycle	5,503	66%
Bus and Connecting Rail	1,850	22%
Drop-offs	767	9%
Drove and Parked	234	3%
Total	8,354	100%

*Percentage Source: 2007 WMATA Ridership Survey

2.5.3 Ridership Projections

According to the 2007 WMATA Station Access and Capacity Study, which analyzed ridership projections at each station in the Metrorail system, rail ridership at the King Street station will increase to 10,188 daily boardings by 2030. **Table 2-8** shows the overall increase in ridership expected at the King Street station through the year 2030. This projection was used when determining capacity requirements for future conditions. While the study's forecasting method showed reasonable overall growth in transit trips system wide, the study noted that the forecasting tool poorly estimated ridership at the station level, therefore it is recognized that ridership at the King Street station could be ultimately higher. But with the station area largely built-out in development and given the proximity to the Eisenhower Avenue station area where more development is planned, most of the ridership growth at the King Street station will likely be generated by the expected increase in bus transfers and from a gradual overall increase in the transit mode share over time. Since the Kiss & Ride mode share is not expected to grow significantly, the 10,188 projected rail boardings were used when determining capacity requirements for future conditions

Table 2-8: Projected Weekday Passenger Boardings

Year	Daily	Year-to-Year Change
	No.	%
2007**	9,084	--
2010*	8,446	-7%
2020*	9,269	10%
2030*	10,188	10%

*Source: 2007 WMATA Station Access and Capacity Study

**Source: WMATA, faregate data for May 2007

Using the information collected by Metro for future ridership and estimated mode splits, estimates of trips for each mode of access for the year 2030 can be projected. **Table 2-9** shows the projected mode of access for 2030. Assuming the portion of each mode used to access the station remains the same in 2030 as it was in 2007, increases in capacity of the station will be necessary to accommodate traffic.

Table 2-9: Mode of Access 2030

Mode of Access	Daily	
	No.	%
Pedestrian / Bicycle	6,711	66%
Bus and Connecting Rail	2,256	22%
Drop-offs	936	9%
Drove and Parked	285	3%
Total	10,188*	100%

*Source: 2007 WMATA Station Access and Capacity Study / 2007 WMATA Ridership Survey

2.6 Bicycle Facilities

Currently, bicycle storage facilities are near capacity with 34 bike racks and 20 lockers, with an average of 42 rail customers accessing the station by bicycle. According to the 2006 WMATA Bicycle Survey, bicycle rack usage is at 78%. In addition, 17 of the 20 bicycle lockers at the station are being rented.

The WMATA Bicycle Survey also states that the storage facilities are inadequate and that an additional 34 racks are proposed. Currently, bicycles are being chained to station fences, which is not an optimal situation. Some bicycle racks are located in areas that are unprotected from weather (see **Figure 2-13**). The bike lockers are located at the south end of the bus bay array where the sidewalk narrows and where pedestrian traffic is heavy.



Figure 2-13: Bike racks exposed to weather