LOWER KING STREET MULTIMODAL FEASIBILITY STUDY

Final Report

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Prepared for: City of Alexandria

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Attachments

EXECUTIVE SUMMARY

As a significant connection between the Alexandria waterfront, the surrounding Old Town neighborhood and beyond, the 100 block of King Street, with Union Street on the east and Lee Street on the west, is a destination for local residents, employees, visitors and tourists. It is active with vehicles, bicyclists, pedestrians, transit, motorcycles, motorcoaches and deliveries. The purpose of the *Lower King Street Multimodal Feasibility Study* is to develop and examine the feasibility of conceptual options to transform the 100 block of King Street into a gateway between Old Town and the revitalized Alexandria waterfront and analyze how the street can address the needs of all users. The study included an assessment of existing conditions, robust public engagement, an analysis of existing and future transportation impacts and the development of conceptual options. The options described will be used for consideration in a future capital improvement program budget.

BACKGROUND

The *Lower King Street Multimodal Feasibility Study* examines options to enhance multimodal circulation along the Alexandria waterfront in Old Town, which was identified as a goal in the *Alexandria Waterfront Plan*. Adopted in 2012, this plan identified King Street as the gateway to the City and specifically noted the block of King Street between Union and Lee Streets as one of the busiest during tourist season. The Plan also recommended a pedestrian plaza at the unit block of King Street (i.e. King Street between Union Street and the waterfront) and The Strand with easy access to the free King Street Trolley.

The 2012 *Union Street Corridor Study*, which evaluated multimodal circulation and safety along the length of Union Street, culminated in a recommendation to staff to further study a long-term vision for a possible shared street on Union Street between Prince Street and Cameron Street. During this study, the Waterfront Commission recommended a study of the 100 block of King Street to explore the feasibility of different pedestrian improvements or the need to pursue other conceptual options on King Street. Several other previous studies and on-going projects all aim to improve the multimodal environment in Old Town and particularly the waterfront area (e.g. 2005 and 2009 *King Street Retail Strategies*, 2010 *Old Town Area Parking Study*, *Phase I Landscape and Flood Mitigation Schematic Design Project*.)

KING STREET TODAY

A benefit of the Old Town neighborhood is the intact gridded street network and short, walkable blocks. Residents and visitors alike travel by various modes to King Street. Those who drive a personal vehicle can park on or off street and walk to many different shops, restaurants and businesses without moving their car. The ability to accomplish these short trips on foot encourages people to park once for multiple destinations in the area, allowing King Street to function as a vibrant commercial district, rather than a through street for cars.

Lower King Street experiences varying demands from different users throughout the day, week and year. At times of peak activity, such as the summer season and on weekends, pedestrians significantly outnumber all other users; however, pedestrians must operate in a constrained space (approximately 5 to 9 feet of available sidewalk width). During busy times, some of the intersections in the study area become congested and there are conflicts between motorists and pedestrians, making it challenging for motorists and uncomfortable for pedestrians to cross the intersection. Crosswalks become crowded, pedestrians sometimes cross outside of the crosswalk and motorists often encroach on crosswalks. There is on-street parking on both sides of the street and the free King Street Trolley runs along King Street between the Metro and the waterfront. There is bicycle activity in the study area; Union Street, which runs

perpendicular to King Street, serves as an on-road connection for the Mt. Vernon Trail. Further, Capital Bikeshare was introduced in 2012 with two bikeshare stations currently within two blocks of the 100 block of King Street.

EARLY PUBLIC ENGAGEMENT

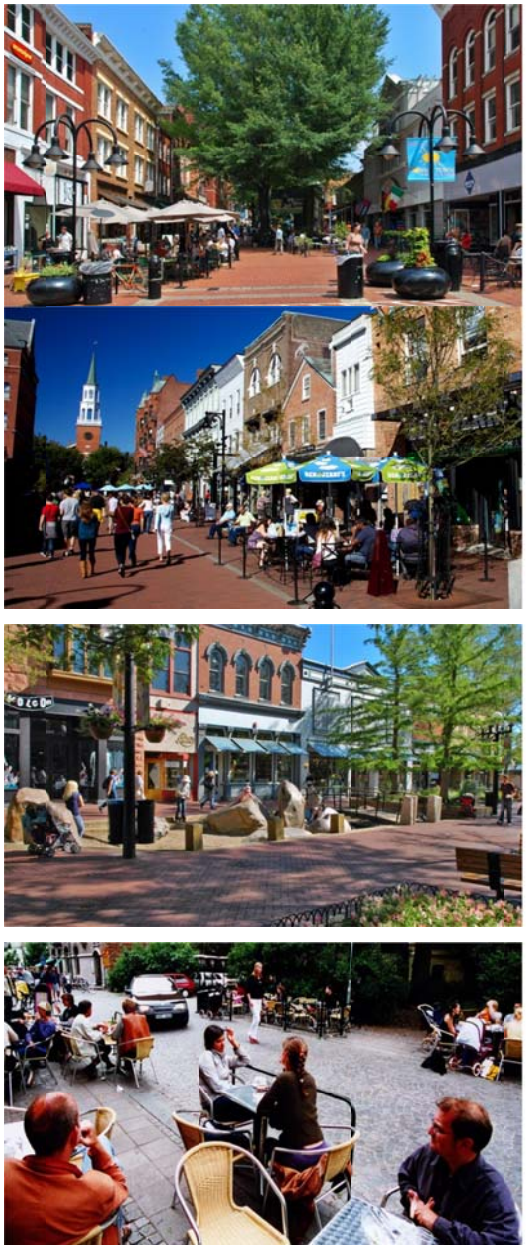
A walking tour, focus group meetings and a public meeting were held in March 2014 to gather concerns and interests from business owners, visitor and tourism associations, residents and City departments (e.g. fire, transportation, maintenance and transit). During the walking tour, attendees provided input on issues and opportunities for pedestrian, bicycle, automobile, delivery and transit improvements, as well as integration with previous plans and on-going projects. The tour was also an opportunity for the business owners to describe the typical day-by-day function of the street and for the participants to witness some of them (e.g. deliveries, trash pickup and parking) firsthand.

Participants at March 10 Walking Tour

Three focus group meetings were held the same day as the walking tour and included a resident focus group, a business focus group and a City staff focus group. These groups participated in roundtable discussions of the issues and opportunities for the 100 block of King Street.

Feedback from the walking tour and focus group meetings suggested that this project should support:

- A more walkable and pedestrian-friendly King Street;
- Attractive and functional design with good programming;
- Good wayfinding for all users;
- A plan for management and maintenance;
- Flexibility in design to meet the needs of different users at different times;
- Management of deliveries, motorcoaches, the King Street Trolley and parking;
- Improved safety and congestion relief, particularly at the intersection of King and Union Streets;
- Improved knowledge of case studies of shared streets or pedestrian malls.



Popular photos from visual preference surveys regarding street character, function and design at March 20 public meeting

The City hosted a public meeting which included two interactive exercises: one to collect attendees' visual preferences of streetscape designs and another asked about their likes and dislikes of King Street today.

Generally, attendees:

- Expressed interest in a shared street and/or pedestrian-only street, though some preferred the existing design of King Street;
- Emphasized the importance of a high-quality, attractive streetscape with seating and outdoor dining;
- Shared concerns about conflicts between modes today and in the future;
- Expressed concerns about loss of on-street parking.

ESSENTIAL ELEMENTS AND VALUES

Based on feedback expressed by the public, the following were established as essential elements for all options and values for evaluating options for the 100 block of King Street.

Essential elements for all options:

- Maintain **access for emergency vehicles**
- Allow on-street **delivery access** during designated times and improve management of alleys for deliveries
- Establish **flexible** design which allows closure when needed
- Create **attractive and functional** design
- Coordinate with Waterfront Plan to have joint governance to **share maintenance**
- Continue **management of parking resources** in Old Town.

Values for evaluating options:

- Increase walking space
- Increase outdoor dining and retail
- Provide direct and efficient trolley service
- Minimize impacts to residential streets
- Improve user comfort (safety) at intersections

CONCEPTUAL OPTIONS AVAILABLE FOR POTENTIAL FUTURE IMPLEMENTATON

Several options were developed for the 100 block of King Street to reprioritize the street to address the needs of all users – pedestrians, bicyclists, transit riders and motorists. The following table provides each of the options and indicates which users have access to the street and whether the option achieves the established project values. With the exception of "Option 1 – Existing Configuration", all options show a flush street, meaning that there is no vertical curb and the street is at a similar elevation (with necessary grades for proper drainage) from building face to building face. This flush condition allows the street to become a truly flexible space and not be "hard wired" to allocate distinct spaces for different modes. When the street is closed to vehicular traffic, the entire space can be easily accessible for people with mobility issues, pushing strollers and carts, movable chairs and furniture, setting up stages, etc.

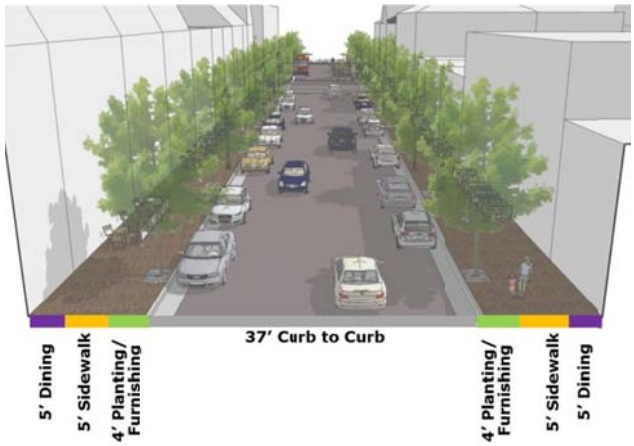
OPTIONS			VALUES				
	Title	Who has access?	Increase Walking Space	Increase Outdoor Dining and Retail	Provide Direct and Efficient Trolley Service	Minimize Impacts to Residential Streets	Improve User Comfort at Intersections
1	Existing Configuration*		☐		✓	✓	
2	Widened Sidewalk/ No Parking*		✓	✓	✓	☐	✓
3	Pedestrian Only		✓	✓	☐		✓
4	Pedestrian/ Trolley Only		✓	✓	✓		✓
5	Widened Sidewalk/ Some Parking*		✓	☐	✓	✓	✓

* Can be closed for pedestrians only seasonally, on weekends or during specific times of day

ANALYSIS OF OPTIONS

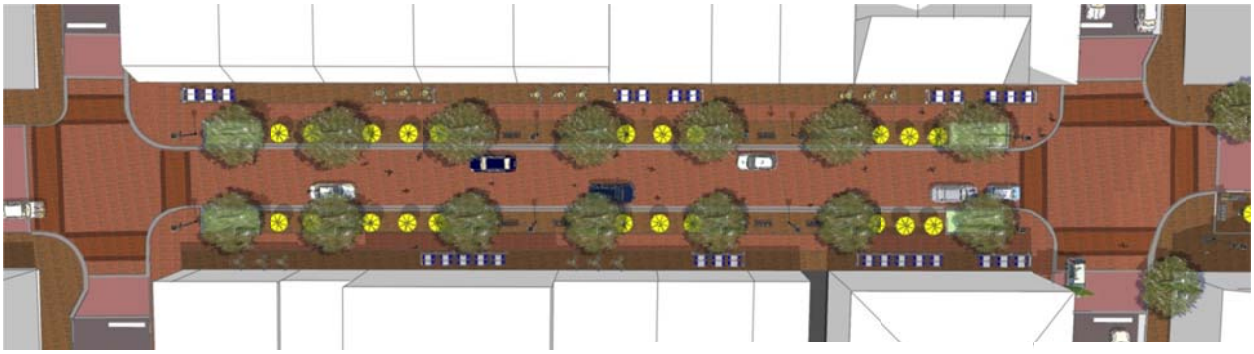
See the descriptions of each option, below. All options can be designed and implemented to satisfy the essential elements described above. Emergency vehicle access will always have access to the street. For options where the street is closed to cars, bollards at each end of the block can be lowered for emergency vehicles. The design of any option will be attractive and functional and will allow for closure to cars seasonally, during special events or on the weekend. Regarding parking, the City is continually working to improve management of both on- and off-street parking in Old Town including a comprehensive update to the parking inventory completed in Fall 2014. In Options 2, 3 and 4, on-street parking will be removed, eliminating approximately 25 on-street spaces. However, within a ¼ mile of the 100 block of King Street, there are over 2,500 on- and off-street parking spaces. In all options, on-street delivery will be allowed during designated times and combined with improved management of existing alleys (e.g. parking restrictions in Fayette Alley to allow for trucks to access business). Since Options 2, 3, 4 and 5 all require the street to be reconstructed as a flush street, the cost of construction is similar. Planning-level construction cost estimates indicate that these options would cost approximately $2 million to construct.

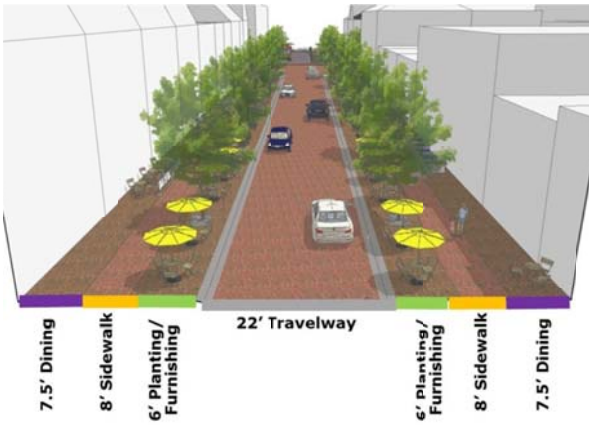
OPTION 1 – Existing Configuration



- Street design includes curb and gutter with street lower than sidewalk.
- Sidewalks are constrained, particularly during peak pedestrian periods.
- Limited space for outdoor dining and retail.
- Continuous trolley routing to the waterfront on King Street.
- Street is open to cars, trolley, bicycles and emergency vehicles. On-street parking (25 spaces).
- Constrained sidewalks and crosswalks without curb extensions reduce user comfort at intersections.

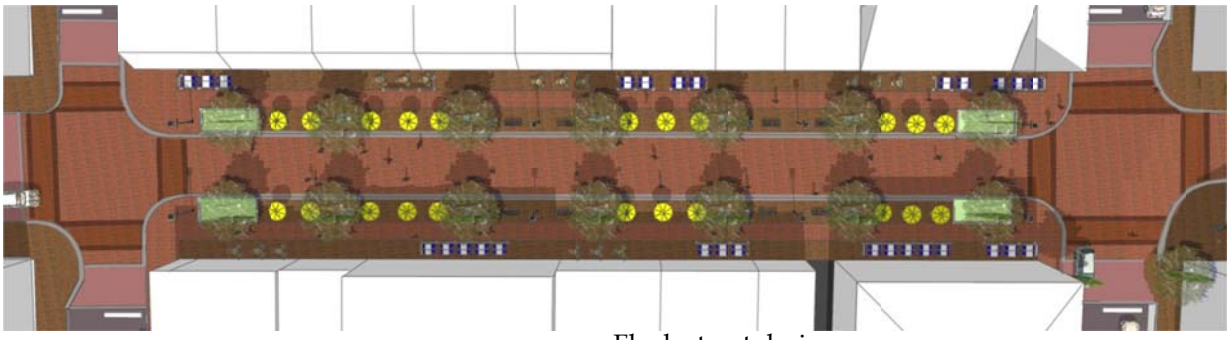
OPTION 2 – Widened Sidewalk/No Parking

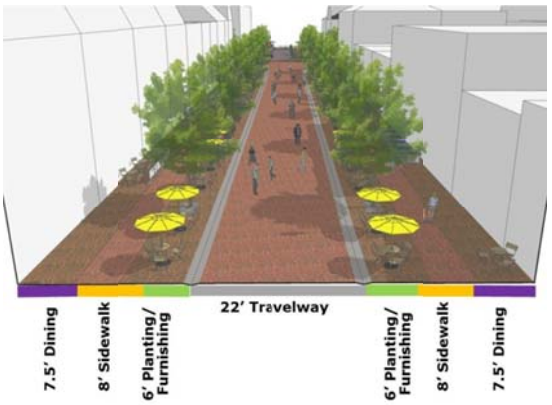




- Flush street design.
- Wider sidewalks on both sides of the street. Street can be closed for pedestrians only during seasonal, weekends, or specific time of day, further increasing walking space.
- Additional outdoor dining and retail.
- No change to trolley routing.
- Street would be open to cars, trolley, bicycles and emergency vehicles. Parking (25 spaces) would be eliminated.
- Wider sidewalks would allow pedestrians to cross in larger groups and curb extensions reduce crossing distance.
- Preliminary construction cost estimate: $2,000,000

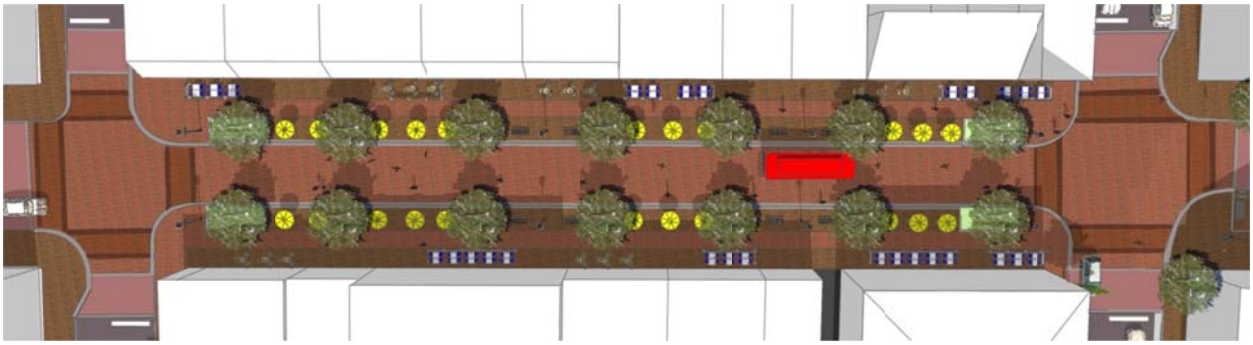
OPTION 3 – Pedestrian Only

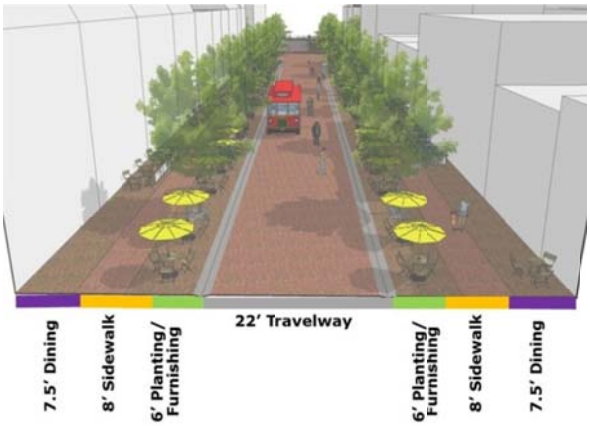




- Flush street design.
- Wider sidewalks and increased walking space in the street.
- Additional outdoor dining and retail.
- Trolley would be rerouted or terminated at Lee Street.
- Street would be open to pedestrians and emergency vehicles. Private vehicles would be diverted to surrounding streets. Parking (25 spaces) eliminated. Deliveries would occur during restricted periods and in alleys.
- Wider sidewalks would allow pedestrians to cross in larger groups and curb extensions reduce crossing distance. Reduced conflict potential at intersections.
- Preliminary construction cost estimate: $2,000,000

OPTION 4 – Pedestrian Only with Trolley





- Flush street design.
- Wider sidewalks and increased walking space in the street, except when trolley is present.
- Additional outdoor dining and retail.
- No change to trolley routing.
- Street would be open to pedestrians, trolley and emergency vehicles. Private vehicles would be diverted to surrounding streets. Parking (25 spaces) eliminated. Deliveries would occur during restricted periods and in alleys.
- Wider sidewalks would allow pedestrians to cross in larger groups and curb extensions reduce crossing distance. Reduced conflict potential at intersections.
- Preliminary construction cost estimate: $2,000,000

OPTION 5 – Widened Sidewalk / Some Parking

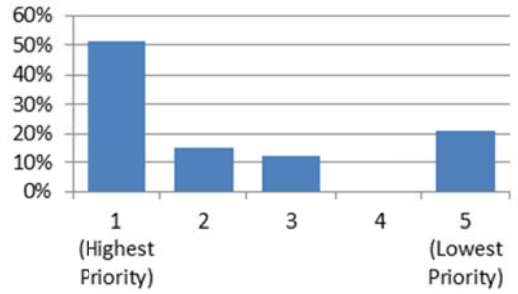
- Flush street design.
- Wider sidewalks on both sides of the street. Street can be closed for pedestrians only during seasonal, weekends, or specific time of day, further increasing walking space.
- Potential for some additional outdoor dining and retail during street closures.
- No change to trolley routing.
- Street would be open to cars, trolley, bicycles and emergency vehicles. Would maintain approximately half of the existing 25 spaces.
- Wider sidewalks would allow pedestrians to cross in larger groups. Curb extensions reduce crossing distance.
- Preliminary construction cost estimate: $2,000,000

FEEDBACK ON OPTIONS

At a public meeting held in May 2014, attendees were asked to provide feedback through a survey on the project values, state their preference on design options and indicate their comfort level with various closure types. Most survey respondents were Alexandria residents with many living in Old Town.

Attendees ranked the project values in the following order:

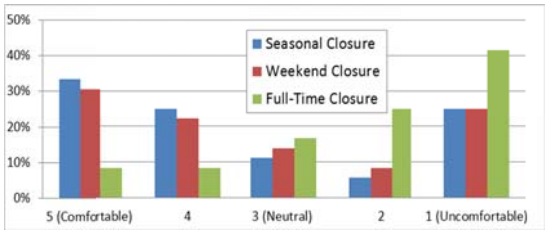
1. Minimize impacts to residential streets.
2. Increase walking space.
3. Improve user comfort at intersections.
4. Provide direct/efficient trolley service.
5. Increase outdoor dining and retail.



Rank of "Minimize Impacts to Residential Streets" from May 29 public meeting survey

Attendees were asked to rank various design options presented. Wider sidewalks scored the best, flush street scored second best and existing sidewalks scored the worst.

Attendees were also asked about their comfort level with various closure types. Generally, attendees were more comfortable with a seasonal or weekend closure and least comfortable with a full-time closure.



Level of comfort with street closure options from May 29 public meeting survey

At a meeting with representatives of the Old Town Civic Association on August 11, 2014, several key themes from comments included:

- preference for Option 5 because it offers the best compromise of all options (wider sidewalk, maintain some parking);
- interest in options that narrow street to encourage cars to move more slowly;
- concern about management of on-street parking;
- preference for trolley routing options that stop at city Hall because the trolley currently blocks views of the waterfront;
- concern about giving too much space to private interests such as outdoor dining rather than having the gained space be used by pedestrians.

At a meeting with business representatives on October 1, 2014, several key themes from comments included:

- recognition that the realization of the Waterfront Plan will attract more people, so some change is needed;
- continued improvement to parking management is essential (e.g. wayfinding, increasing parking garage utilization, management of employee parking);
- preference for Concept 4 (pedestrian/trolley only) and Concept 5 (widened sidewalk/some parking);
- interest in concepts with trolley stopping at city hall;
- concern about confusion associated with seasonal closures.

LOOKING AHEAD

Input from the City staff, interviews, public meetings, fieldwork and traffic analysis have all contributed to the findings in the subsequent chapters. Although this project is only looking at the feasibility of the options presented, it can guide the future development of Lower King Street and can provide a vision for what the merchants and residents in the neighborhood desire. Though it is always difficult to reach full consensus on a particular concept, especially when considering changes to the existing form and function of a place, this study is a presents a first step in analyzing and gathering public input on these options, which will be considered through further design and economic analysis.

2. INTRODUCTION

This report describes the *Lower King Street Mulitmodal Feasibility Study* performed to evaluate potential improvements to the 100 block of King Street. It serves as the documentation of all phases of the project.

1A. Study Area

The primary study area is the 100 block of King Street from Lee Street in the west to Union Street in the east, as shown in **Figure 1**. Additional study areas include fifteen surrounding intersections, as shown in **Figure 1** and, to a lesser extent, the surrounding Old Town neighborhood as it is impacted by changes in the 100 block of King Street.

Figure 1: Study Area and Intersections Location Map

1B. Project Purpose & Background

King Street serves as a destination for people who work or live in the Old Town neighborhood, residents of the Washington, DC region and tourists from around the world. Lower King Street is the heart of historic Old Town, with retail and restaurants serving these users.

The *Lower King Street Multimodal Feasibility Study* was identified based on the *Alexandria Waterfront Plan's* recommendations and the Waterfront Commission's recommendation during the *Union Street Corridor Study*. The purpose of this study was to develop and evaluate conceptual solutions that would transform the 100 block of King Street into a gateway for the revitalized Alexandria waterfront and that would balance the street to address the needs of all users.

The following studies and plans preceded this feasibility study and aimed to improve Old Town as a regionally-significant destination.

Alexandria Waterfront Plan

The *Alexandria Waterfront Plan*, adopted by the City in 2012, identified King Street as a gateway to the City and specifically noted that "…the two blocks of King Street between Fairfax and Union Streets are among the City's busiest during tourist season." [1] The Plan also recommended creating a pedestrian plaza on the unit block of King Street and along The Strand, the street between Union Street and the waterfront. The plan recommended maintaining access along the pedestrian plaza for the free King Street Trolley, which connects the waterfront to the King Street Metrorail Station, approximately one mile to the west.

The *Alexandria Waterfront Plan's* recommendations to facilitate multimodal circulation along the Alexandria waterfront generated support to conduct the *Lower King Street Multimodal Feasibility Study*.

Other Completed and Ongoing Efforts

The 2005 and 2009 *King Street Retail Strategies* provided a general overview of transportation, land use and urban design issues along King Street and established a vision for the future of King Street, which initiated several studies, plans and guidelines that expanded upon this work.

The 2010 *Old Town Area Parking Study* evaluated on- and off-street parking in Old Town. Recommendations included installing multi-space meters, extending meter hours, reviewing parking pricing, decreasing parking duration at locations with demand for high turnover, implementing wayfinding and working with garage owners to make off-street parking more desirable. The parking study included the creation of the Old Town Area Parking Study Work Group, which is a City-Manager-appointed stakeholder group which discusses key findings and observations from the study and advises City Staff.

The 2010 *Potomac River Flood Mitigation Study* which identified and assessed a series of structural and non-structural measures to mitigate possible nuisance, intermediate and extreme flooding events along the Potomac River in the City of Alexandria.

The 2012 *Union Street Corridor Study* evaluated multimodal circulation and safety along the length of Union Street in Old Town, which is perpendicular to King Street and adjacent to the

[1] *Alexandria Waterfront Plan,* (Chapter 3, Page 57)

waterfront and developed short- and long-term recommendations. The study, which was approved by the Transportation Commission, Planning Commission and City Council, included the recommendation to transform Union Street between Prince Street and Cameron Street into a Shared Street. During this study, the Waterfront Commission recommended a study of the 100 block of King Street, which was the impetus for the *Lower King Street Multimodal Feasibility Study*.

Implementation of the *Alexandria Waterfront Plan* began with the *Phase I Landscape and Flood Mitigation Schematic Design* developed between summer 2013 and summer 2014 and approved by the City Council in June 2014. It builds on the *Waterfront Plan's* illustrative concept by taking the public improvements including parks, piers, art and history elements, flood mitigation and the continuous walkway to a higher level of design specificity. Further design work is anticipated to continue in Phase II of the *Waterfront Plan* implementation process.

The *Unit Block of King Pedestrian Plaza* is a proposal for a temporary pedestrian plaza at the foot of King Street. The design of this facility is complete, but installation is pending identification of funding for operation and maintenance. The temporary plaza will help extend the outdoor gathering space at the foot of King Street during phasing in of the *Waterfront Plan* components. The design includes a raised brick seating area that is defined by stone benches, planter boxes and movable furniture such as tables, chairs and umbrellas.

3. Existing Conditions

This section describes the multimodal existing conditions on the 100 block of King Street and in the surrounding area. The analysis contains an evaluation of the existing roadway design; vehicle, bicycle, and pedestrian operations; and transit, delivery vehicle, and motorcoach operations. **Figure 2** diagrams some of the existing transportation features along the 100 block of King Street and in the immediate area.

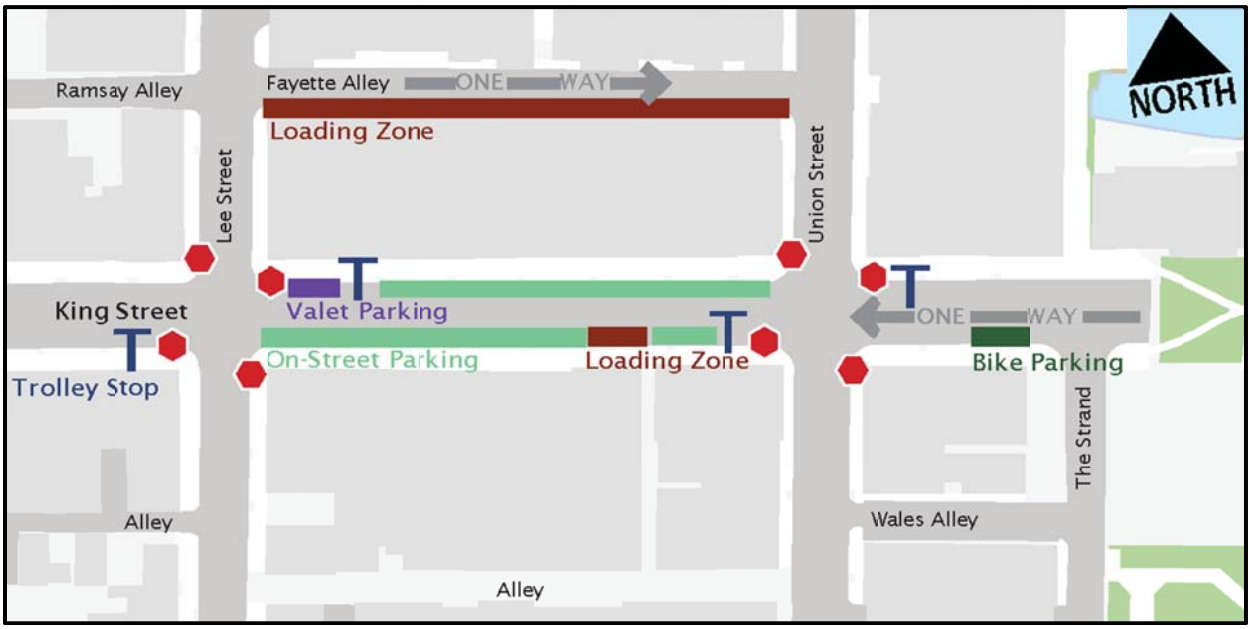


Figure 2: Lower King Street Existing Conditions Map

4A. Existing Street Design

The existing King Street cross section is 65 feet from building face to building face. The curb-to-curb width is 37 feet, with approximately 7.5 feet of parking on each side and two 11-foot travel lanes, as illustrated in **Figure 3**. There are no pavement markings delineating parking or travel lanes. The speed limit is 25 miles per hour. The 100 block of King Street is bounded by two all-way stop-controlled intersections with Lee Street to the west and Union Street to the east.

Figure 3: Lower King Street Curb-to-Curb Cross Section

On both the north and south sides the cross section is approximately 14 feet from building face to face-of-curb, consisting of a one-foot curb, space for outdoor dining, building frontage and the furniture zone. Building frontage includes stoops, windows, etc. and the furniture zone contains street trees, light posts, sign posts, parking meters, trash receptacles, etc. The effective sidewalk width, or the clear pedestrian zone, is five to nine feet wide. **Figure 4** and **Figure 5** show two example sections along the north sidewalk where the effective sidewalk width varies.

Figure 4: Lower King Street Sidewalk Example Cross Section

Figure 5: Lower King Street Sidewalk Example Cross Section

4B. Vehicles, Bicycles and Pedestrians

The following describes lower King Street's users, including multimodal volumes, vehicle access and operations, vehicle and bicycle parking and multimodal conflicts.

Multimodal Traffic Volumes

Intersection counts, known as "turning-movement counts," were previously conducted by the City in March 2013 to measure the volume of vehicles, heavy vehicle and bicycles by movement (i.e. left, thru and right) for each approach and the volume of pedestrians using each crosswalk. Heavy vehicles include transit vehicles, motorcoaches and delivery trucks. **Figure 6** and **Figure 7** illustrate the multimodal volumes for all 15 study intersections for the Friday midday (12 PM – 1 PM) and Saturday afternoon (4 PM – 5 PM) periods, respectively. In addition to the total volumes, the figures show the breakdown of volumes by mode. During the count days in March 2013, the weather was cloudy or clear with highs between 50 and 60 degrees Fahrenheit. Traffic volumes in the study area were slightly higher than the counts conducted in May 2012 for the *Union Street Corridor Study*.

Within the study area, the intersections on King Street within the study area are the busiest, with the highest pedestrian volumes. Pedestrian movements significantly outnumber vehicle movements during both periods at all three study intersections on King Street. Pedestrian volumes are also highest during the Saturday afternoon period, especially along King Street. Bicycle volumes are notably highest along Union Street, which serves as an on-road connection for the Mount Vernon Trail, and vehicle volumes are highest along Fairfax Street, which is the largest north-south thoroughfare in the study area.

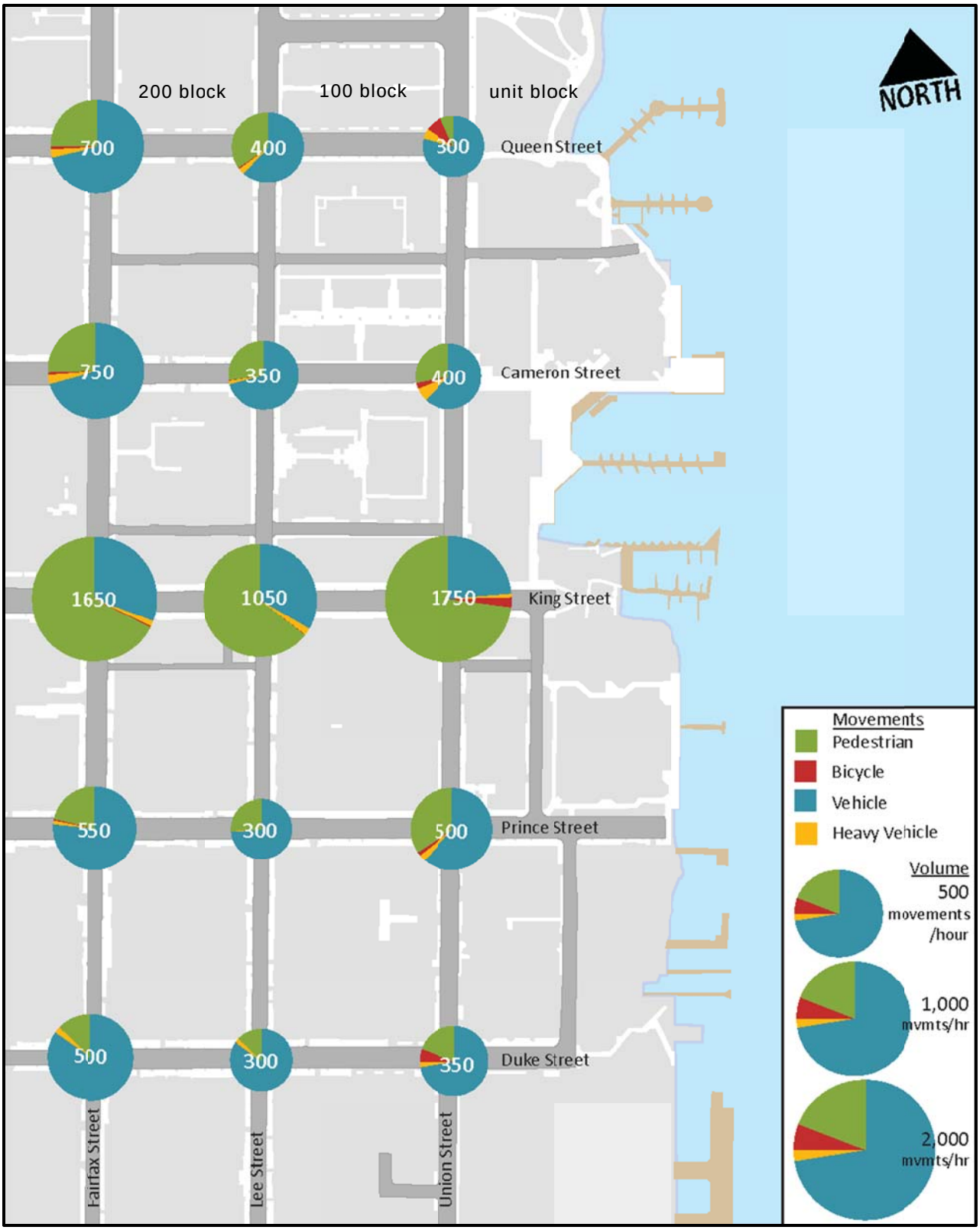


Figure 6: Friday 12:00 – 1:00 PM Multimodal Traffic Volumes

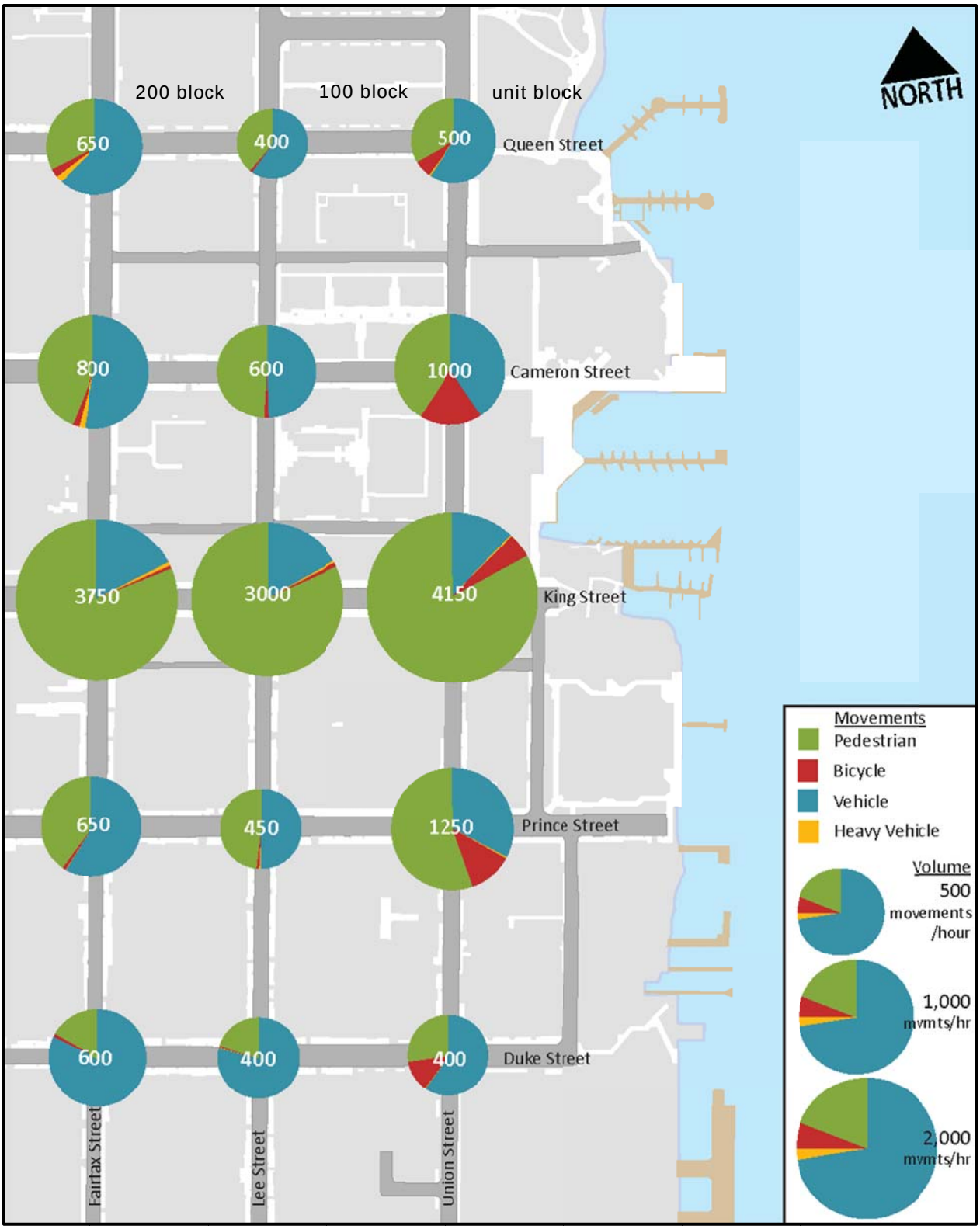


Figure 7: Saturday 4:00 – 5:00 PM Multimodal Traffic Volumes

Motor Vehicle Access and Operations

Motor vehicle operation for all roadways in the study area is two-way with no turn restrictions, with two exceptions: the unit block of King Street is one-way westbound and the 100 block of Prince Street is one-way eastbound. Motor vehicle traffic operations were evaluated at each of the study intersections. Generally, intersections within the study area operate with limited vehicle delay when pedestrians are not present. However, as pedestrian volumes increase (e.g. the weekend midday and afternoon), the intersections on King Street and nearby intersections on Union Street experience congestion (i.e. delay and back-ups at intersections). Much of the congestion at these intersections is due to conflicts between motorists and pedestrians, making it challenging for motorists to cross the intersections. Additional details on the operational analysis at each of the study intersections can be found in **Attachment B**.

Motor Vehicle Parking

King Street has 2-hour metered parking from 8:00 AM to 9:00 PM Monday through Saturday with multi-space meters and pay-by-phone payment options. There are approximately 25 on-street parking spaces on the 100 block of King Street. Based on on-street parking data collected in 2012 for the *Union Street Corridor Study* and off-street parking data collected in 2009 for the *Old Town Area Parking Study*, there are over 2,500 public parking spaces within a quarter mile of the 100 block of King Street, shown in **Figure 8**. A quarter mile is approximately a 5-minute walk and considered an acceptable walking distance for mid- and long-term parking (over 1-2 hours).

Figure 9 illustrates the parking occupancy on a Saturday night, showing numerous parking spaces available in off-street lots or garages and some parking available on street within a quarter mile of lower King Street.

Landini Brothers has a special use permit for a valet loading zone on the north side of the western end of King Street, near the intersection with Lee Street, as shown in **Figure 2**. This zone is approximately two parking spaces in length and restricts parking from 5:30 PM to 11:00 PM on Friday and Saturday when the valet service is in operation for patrons of Landini Brothers facilities: Landini Brothers restaurant at 115 King Street, CXIII Rex private club at 113 King Street and Fish Market restaurant at 105 King Street. Vehicles are stored at the parking garage at 115 South Union Street where Landini Brothers leases 50 parking spaces on the second floor. This permit allows the City to reclaim the valet loading zone if the need arises. The permit also requires that Landini Brothers keep a written log. Based on this log, the valet loading zone is used by an average of 20 vehicles per Friday or Saturday evening.

Figure 8: On-Street and Off-Street Parking Spaces within ¼ Mile of Lower King Street

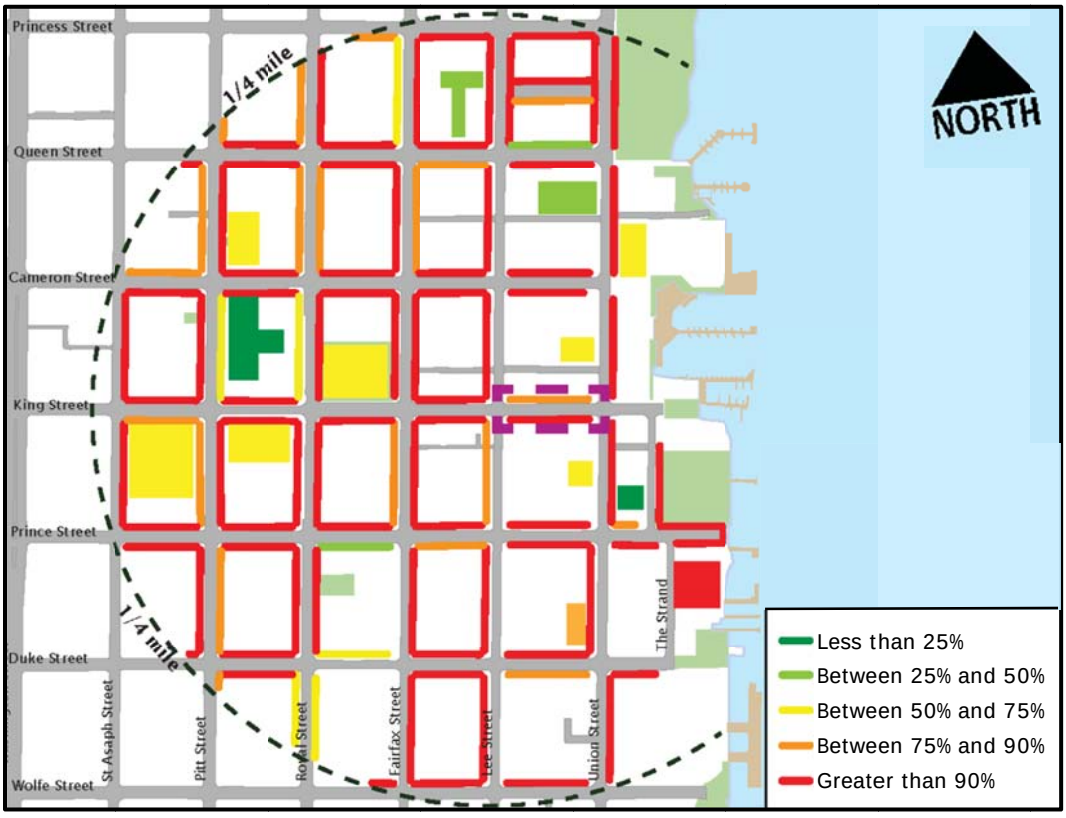


Figure 9: Weekend Evening Parking Occupancy within ¼ Mile of Lower King Street

Bicycle Parking

There is no formal bicycle parking on the 100 block of King Street, though bicycles were observed locked to sign posts and light posts in the study area. There is a bicycle corral on the unit block of King Street with parking capacity for 10 bicycles.

Sidewalk Condition

Though no formal accessibility analysis was performed, field observations noted that there may be a need for a formal ADA study of sidewalk conditions. Sidewalks are composed of brick pavers and intersection corners have curb ramps.

Sidewalk Crowding and Conflicts at Intersections

As shown in the multimodal count figures, lower King Street operates with pedestrians, motorists and bicyclists in a constrained right-of-way. Hundreds of pedestrians use the relatively narrow sidewalks where outdoor dining, building frontages and other streetscape elements constrain the available sidewalk space. Sidewalks are particularly crowded at corners where pedestrians wait to cross.

At intersections, pedestrians and motorists conflict and must communicate their intended behavior through eye contact, hand signals and vehicle or body positioning to negotiate their opportunity to maneuver through the intersection. As noted in the *Union Street Corridor Study* regarding the intersection of King and Union Streets, motorists frequently encroach on the crosswalks when coming to a stop or rolling stop at the all-way stop intersection. Pedestrians occasionally cross streets outside of the crosswalks either to walk more directly to their destination or because the crosswalks are overcrowded. While the pedestrian volumes are slightly lower at the intersection of King and Lee Streets, behaviors, conflicts and safety concerns are similar.

In the last five years, there was one reported collision involving a pedestrian on the 100 block of King Street in which a motorist struck a pedestrian crossing the street on a rainy evening.

4C. Transit, Motorcoaches and Deliveries

This section describes the King Street trolley, motorcoach, and delivery vehicle operations.

King Street Trolley

The free King Street Trolley operates along King Street in both directions between the King Street Metrorail station and the waterfront. The trolley runs daily from 11:30 AM to 10:15 PM with 15-minute headways. Eastbound, the trolley turns right on Union Street to turn around via The Strand, which is the street paralleling and between Union Street and the waterfront. Westbound, the trolley travels west from the unit block of King Street to the King Street Metro Station. There are four trolley stops in the immediate vicinity of the 100 block of King Street, as shown in **Figure 2** (page 8), two in each direction at the near side of the intersections with Union Street and Fairfax Street. The stop on the unit block of King Street is used for trolley layovers. See **Figure 10** for a map of the existing trolley route and stops within a few blocks of the study area.

Figure 10: Existing King Street Trolley Routes and Stops

Motorcoaches

Motorcoaches frequently travel along King Street to access the motorcoach loading and unloading areas on the unit and 300 blocks of King Street and the short-term parking area on the 500 block of North Union Street. Motorcoach parking reservation data from July 2010 to April 2014 show that reservations peak in Old Town during the spring months, with a smaller peak in the fall, as illustrated in **Figure 11**. Parking reservations are required for most, but not all, motorcoach parking spaces, so the data is not entirely comprehensive, but it is still likely representative of overall motorcoach activity in the area.

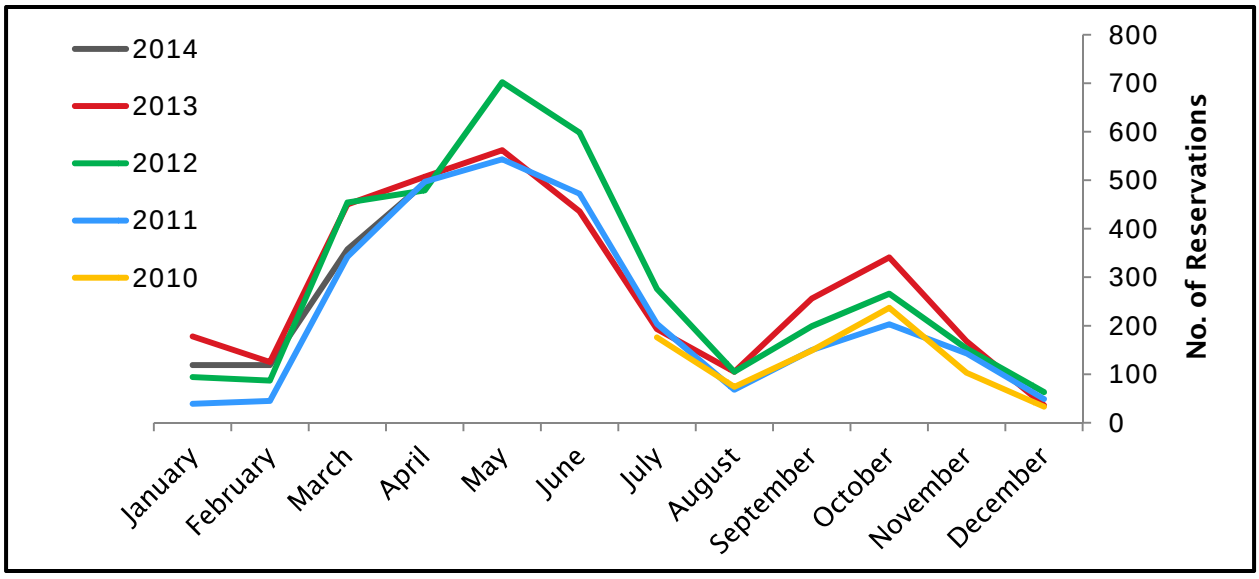


Figure 11: Motorcoach Parking Reservations by Month

Deliveries

There is a loading zone along the south side of King Street, as shown in **Figure 2**, which restricts parking from 8:00 AM to 9:00 PM Monday through Saturday. Deliveries occur in this loading zone and in the alleys parallel to King Street during the day and elsewhere along the street in the morning. Fayette Alley to the north is approximately 22 feet from face-of-curb to face-of-curb with a 3.5-foot sidewalk to the south and a 6-inch curb to the north. The south side is generally signed as a loading zone; however, non-delivery parking was observed in the afternoon and evening. The clear width is 15 feet with one-way eastbound operation. The alley to the south of King Street does not have a curb or parking and is 19 feet from building face to building face. Where dumpsters protrude into the alley, the clear width is 11 feet.

4. Civic Engagement

Civic engagement efforts included a project website and outreach throughout the duration of the project. For more detailed information on all civic engagement activities, see the Civic Engagement Report in **Attachment A**.

3A. Project Website

The project website (www.alexandriava.gov/76226) provided information on upcoming public meetings, meeting presentations and commission briefings.

3B. Community Outreach

Initial outreach included walking tours, focus group meetings and a public meeting. These were held in March 2014 to gather concerns and ideas from business owners, visitor and tourism associations, residents and City departments (e.g. fire, transportation, maintenance and transit).

Walking Tour

Participants at March 10, 2014 Walking Tour

On the March 10, 2014 walking tour of the study area, attendees included business owners and representatives from the Alexandria Convention and Visitors Association (ACVA), Alexandria Economic Development Partnership (AEDP), Alexandria Chamber of Commerce, Old Town Civic Association (OTCA) and Old Town Business and Professional Association (OTBPA). Attendees commented on pedestrian, bicycle, automobile, delivery vehicle and transit issues and opportunities, as well as previous plans and on-going project integration. Business owners in attendance described the typical day-by-day function of the street and participants observed these activities (e.g. deliveries, trash pickup and parking) firsthand.

Focus Group Meetings

Three focus group meetings were held the same day as the walking tour: (1) a resident focus group, (2) a business and tourism focus group and (3) a City staff focus group with

representatives from various City departments. These groups participated in roundtable discussions of the issues and opportunities for the 100 block of King Street.

Feedback from the walking tour and focus group meetings suggested that this project should support:

- A more walkable and pedestrian-friendly King Street;
- Attractive and functional design with good programming;
- Good wayfinding for all users;
- A plan for management and maintenance;
- Flexibility in design to meet the needs of different users at different times;
- Management of deliveries, motorcoaches, the King Street Trolley and parking;
- Improved safety and relief from congestion, particularly at the intersection of King Street and Union Street;

Initial Public Meeting

The City also hosted a public meeting on March 20, 2014. The meeting included two interactive exercises: (1) a visual preference survey on potential streetscape concepts for lower King Street (placing dot stickers on the image indicated preferred concept) and (2) community discussion of the community's likes and dislikes of King Street today. Generally, attendees:

- Expressed interest in a shared street and/or pedestrian-only street, though some preferred the existing design of King Street;
- Emphasized the importance of a high-quality, attractive streetscape with seating and outdoor dining;
- Shared concerns about conflicts between modes today and in the future; and
- Expressed concerns about the potential loss of on-street parking.

Popular photos from visual preference surveys regarding street character, function and design at March 20 public meeting

Transportation Commission Meeting

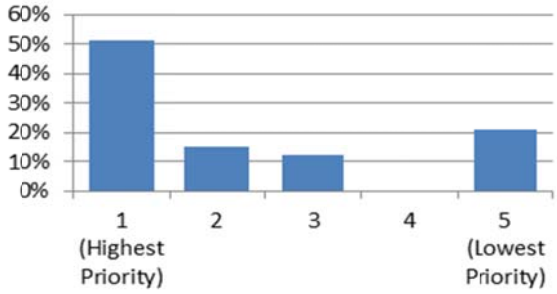
On May 21, 2014, the project team provided a project update and the Transportation Commission members provided feedback. Some key issues raised included the need to address parking, for outreach to the business community and for a design that benefits all users.

Second Public Meeting

The City hosted the second public meeting on May 29, 2014. Conceptual options were presented and attendees were asked to fill out a survey on the project values, state their conceptual preferences and indicate their comfort level with various street-closure scenarios. Most survey respondents were Alexandria residents with many living in Old Town.

Attendees ranked the project values in the following order:

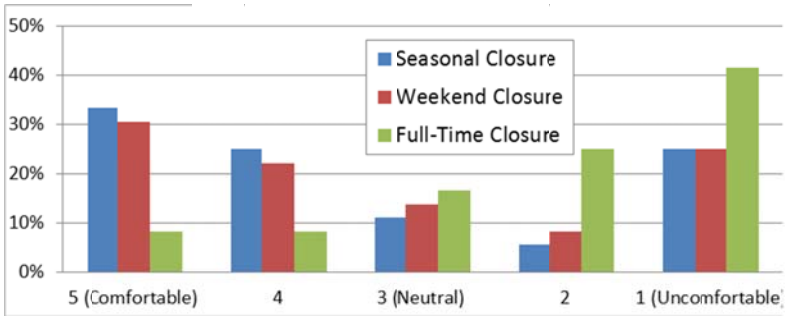
1. Minimize impacts to residential streets.
2. Increase walking space.
3. Improve user comfort at intersections.
4. Provide direct/efficient trolley service.
5. Increase outdoor dining and retail.



Priority of "Minimize Impacts to Residential Streets" from May 29, 2014 Public Meeting

Attendees were asked to rank various conceptual options. Wider sidewalks scored best, a flush street scored second best and existing sidewalks scored worst.

Attendees were also asked about their comfort level with various street-closure types. Generally, attendees were more comfortable with a seasonal or weekend closure and least comfortable with a full-time closure.



Level of comfort with street closure options from May 29 public meeting survey

Additional Outreach

At a meeting with representatives of the Old Town Civic Association on August 11, 2014, several key themes from comments included:

- preference for compromise option (Option 5, as described below);
- interest in options that narrow the street to encourage cars to move more slowly;
- concern about management of on-street parking;
- preference for trolley routing options that stop at city Hall because the trolley currently blocks views of the waterfront; and
- concern about giving too much space to private interests such as outdoor dining rather than having the gained space be used by pedestrians.

At a meeting with business representatives on October 1, 2014, several key themes from comments included:

- recognition that the realization of the Waterfront Plan will attract more people, so some change is needed;

- continued improvement to parking management is essential (e.g. wayfinding, increasing parking garage utilization, management of employee parking);
- preference for Options 4 and 5 (as described below);
- interest in concepts with trolley stopping at city hall;
- concern about confusion associated with seasonal closures.

Waterfront Commission Meeting

On December 16, 2014, the Waterfront Commission Meeting received a project status update on the *Lower King Street Multimodal Feasibility Study*. The Waterfront Commission endorsed staff's plans to hold off on recommendation until further parking analysis is performed.

5. Essential Elements and Values

Based on public feedback, the following **essential elements** were established for the 100 block of King Street:

- Maintain **access for emergency vehicles**
- Allow on-street **delivery access** during designated times and improve management of alleys for deliveries
- Establish **flexible** design which allows closure when needed
- Create **attractive and functional** design
- Coordinate with Waterfront Plan to have joint governance to **share maintenance**
- Continue **management of parking resources** in Old Town.

Based on public feedback, the following values were used to evaluate potential options for lower King Street:

- Increase walking space
- Increase outdoor dining and retail
- Provide direct and efficient trolley service
- Minimize impacts to residential streets
- Improve user comfort (safety) at intersections

6. Options

This section describes the five functional options, all of which meet the essential elements and are evaluated based on the values, as described in Section 2.

With the exception of "Option 1 – Existing Configuration," all options assume a flush street, meaning that there is no vertical curb and the street is at a similar elevation (with necessary grades for proper drainage) from building face to building face. The sidewalk and street are typically delineated with a change in pavement type or color and sometimes a drainage channel. While non-flush street options were initially considered, the flexibility inherent in the flush street ultimately made it the most desirable. A flush street does not define distinct spaces for different transportation modes or street uses. Rather, many streetscape components such as sidewalks, outdoor dining and retail, parking and vehicle travel lanes can be allocated to meet

different needs by time of day, day of week, or season. For instance, sidewalks can narrow to add outdoor dining and retail when desirable or can widen when outdoor dining and retail is not a priority, but pedestrian volumes are high. Similarly, when the travel way is closed to vehicular traffic, it can accommodate pedestrian uses, movable furniture, performance stages, etc. Streetscape elements that are permanently set in place, such as trees and street furniture, remain in the same location in all options, so there is additional flexibility between options. Since the general design components remain the same, all options, except Option 1 – Existing Configuration which would incur no cost, have a planning-level cost estimate of approximately $2,000,000.

In all options, emergency vehicles will always have access to the street. For options where the street is closed to cars, bollards at each end of the block can be lowered for emergency vehicles. The design allows for closure to cars seasonally, during special events or on the weekend. The City is continually working to improve management of both on- and off-street parking in Old Town including a comprehensive update to the parking inventory completed in Fall 2014. In Options 2, 3 and 4, on-street parking will be removed, eliminating approximately 25 on-street spaces. Option 5 would remove approximately half of the existing on-street parking. However, within a ¼ mile of the 100 block of King Street, there are over 2,500 on- and off-street parking spaces. In all options, on-street delivery will be allowed during designated times and combined with improved management of existing alleys (e.g. parking restrictions in Fayette Alley to allow for trucks to access business). Since Options 2, 3, 4 and 5 all require the street to be reconstructed as a flush street, the cost of construction is similar. Planning-level construction cost estimates indicate that these options would cost approximately $2 million to construct.

5A. Option 1 – Existing Configuration

In Option 1, the Existing Configuration, as described in the Existing Conditions section of this report, remains. Street design includes curb and gutter with the street lower than sidewalk (traditional street design). The road can be closed for pedestrian or pedestrian and trolley access seasonally, by day of week, or by time of day.

Figure 12: Plan View of Option 1 – Existing Configuration

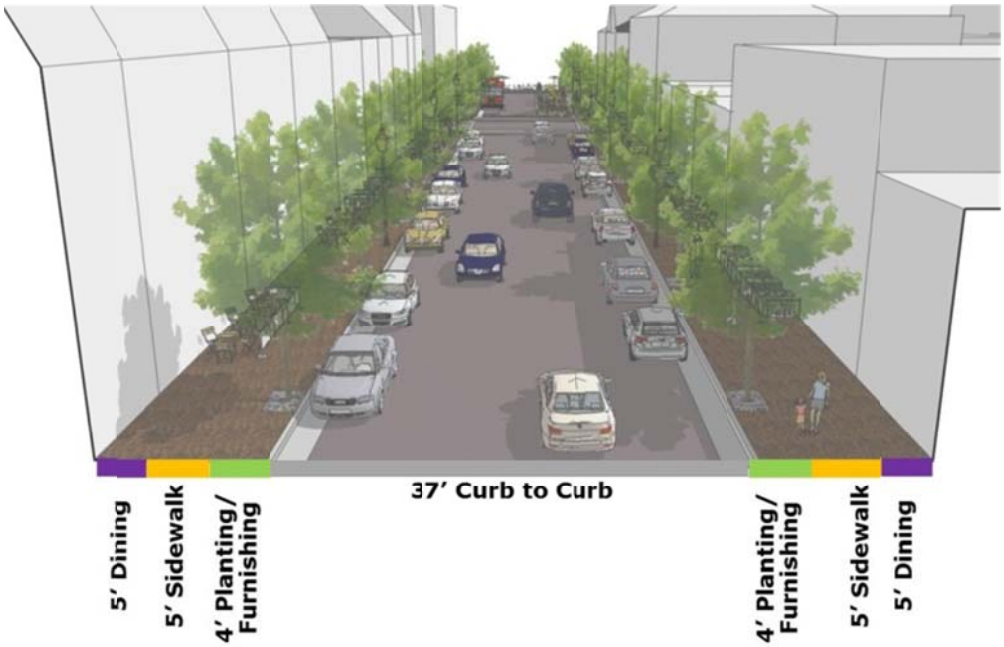


Figure 13: Typical Section of Option 1 – Existing Configuration

The following describes this alternative as it relates to the project values:

- *Walking space* - Sidewalks are constrained, particularly during peak pedestrian periods. Though there is additional walking space in the street when closed to cars, pedestrians may be less likely to utilize it due to the curb separation which is a barrier for pedestrians, particularly those requiring a curb ramp.
- *Outdoor dining and retail* – There is limited space for outdoor dining and retail. Outdoor dining and retail is primarily limited to a 5' width on each side of the street along the building face as shown in Figure 13. Some businesses have outdoor dining or benches in the planting/furnishing zone.
- *Trolley service* – The trolley is currently routed continuously on King Street from the King Street Metro to the waterfront at the unit block of King Street with a small turnaround on each end.
- *Impacts to residential streets* – Lower King Street is open to cars, the trolley, bicycles and emergency vehicles, so there is no traffic diversion from the existing condition. On-street parking includes approximately 25 parallel parking spaces.
- *User comfort at intersections (safety)* – Sidewalk and crosswalk widths are constrained, which reduces user comfort at intersections. Crosswalks do not include curb extensions, which increases crossing distance and reduces visibility between pedestrians and motorists.

5B. Option 2 – Widened Sidewalks/No Parking

Option 2 has a flush-street design. The flush curb lines create an approximate 22-foot travelway. This creates a 21.5' wide pedestrian area on each side of the street, which widens each the planting/ furnishing zones, effective sidewalks, and dining/retail zones. The concept maintains access for vehicles, but the road can be closed for pedestrian or pedestrian and trolley access seasonally, by day of week, or by time of day.

Figure 14: Plan View of Option 2 - Widened Sidewalks/No Parking

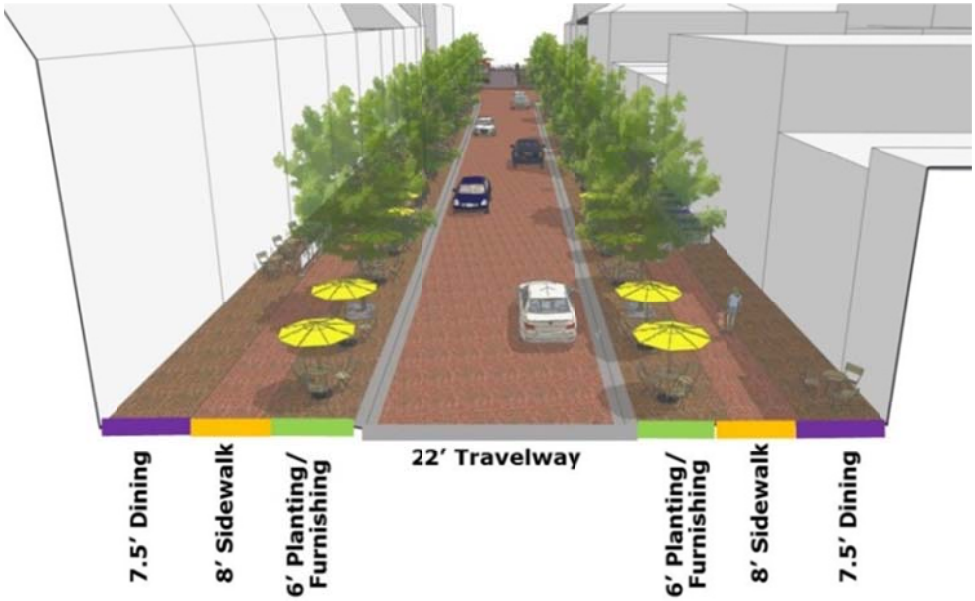


Figure 15: Typical Section of Option 2 – Widened Sidewalks/No Parking

The following describes this alternative as it relates to the project values:

- *Walking space* – Effective sidewalks (sidewalks less the dining/retail zone) would be widened from 5 feet to 8 feet on both sides of the street. Lower King Street could be closed for pedestrians only during seasonal, weekends, or specific time of day, further increasing walking space.
- *Outdoor dining and retail* – The outdoor dining/retail zone abutting each building face would increase from 5 feet to 7 feet in width and additional outdoor dining and retail could exist in the expanded 6-foot planting/furnishing zones in between trees and street furnishings.
- *Direct and efficient trolley service* – This option would not change the trolley route.
- *Impacts to residential streets* – The street would be open to cars, the trolley, bicycles and emergency vehicles, so there is no traffic diversion from the existing condition. All parking spaces, approximately 25, would be eliminated. Valet parking loading zones would be relocated to adjacent cross streets.
- *User comfort at intersections (safety)* - Wider sidewalks would allow pedestrians to cross in larger groups and curb extensions would reduce crossing distances.

5C. Option 3 – Pedestrian Only

Option 3 has a flush-street design and is restricted to pedestrian access only. The flush curb lines create an approximate 22-foot travelway dedicated to pedestrian use. This is in addition to the increased 21.5' wide pedestrian area on each side of the travelway which widens each the planting/ furnishing zones, effective sidewalks, and dining/retail zones. Pneumatic bollards on each end of the street would allow access for emergency vehicles, maintenance vehicles and delivery vehicles during limited hours, but prevent private vehicle access.

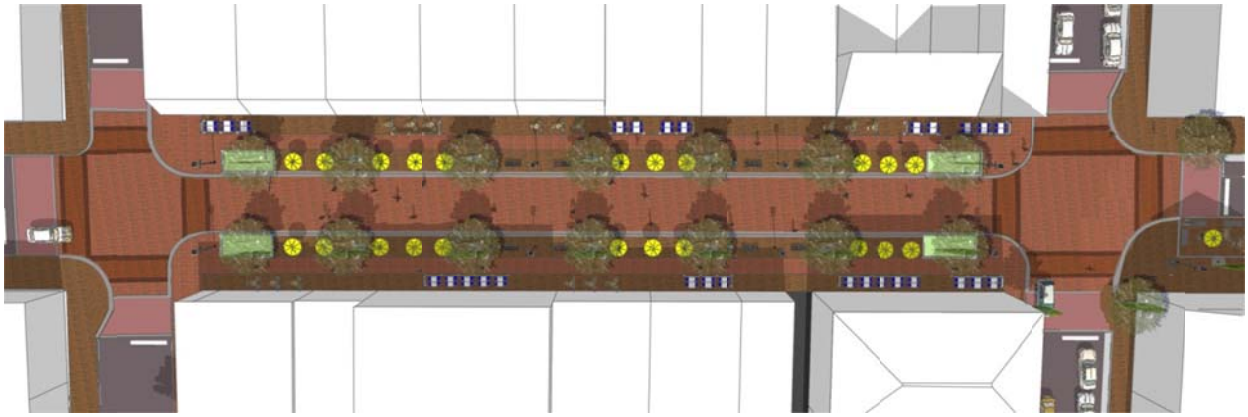


Figure 16: Plan View of Option 3 – Pedestrian Only

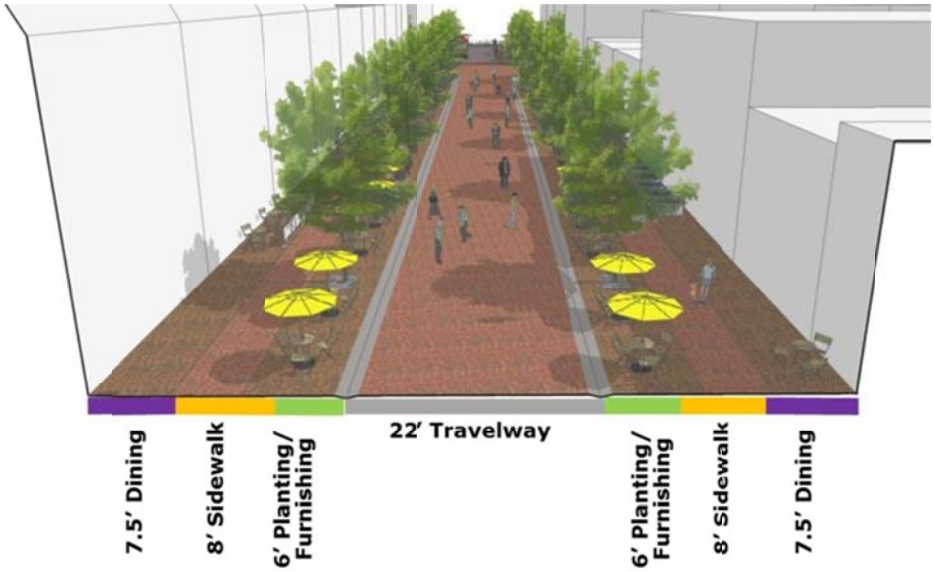


Figure 17: Typical Section of Option 3 – Pedestrian Only

The following describes this alternative as it relates to the project values:

- *Walking space* – Effective sidewalks (sidewalks less the dining/retail zone) would be widened from 5 feet to 8 feet on both sides of the street. Pedestrians would also have significantly more walking space in the pedestrian-only travelway.
- *Outdoor dining and retail* – The outdoor dining/retail zone abutting each building face would increase from 5 feet to 7 feet in width and additional outdoor dining and retail could exist in the expanded 6-foot planting/furnishing zones.
- *Direct and efficient trolley service* – This option would require the trolley to be rerouted or terminated at Lee Street. For more information on rerouting options, see the following section on Impacts of Options.

- *Impacts to residential streets* – The street would be closed to cars, so there would be traffic diversion as described in Future Traffic Conditions Technical Memorandum in **Attachment C**. All parking spaces, approximately 25, would be eliminated. Valet parking loading zones would be relocated to adjacent cross streets.
- *User comfort at intersections (safety)* - Wider sidewalks would allow pedestrians to cross in larger groups and curb extensions would reduce crossing distances. Each intersection would be reduced from four active approaches to three, reducing conflict points.

5D. Option 4 – Pedestrian Only with Trolley

Option 4 has a flush-street design and is restricted to pedestrian access with trolley access maintained. The flush curb lines create an approximate 22-foot travelway dedicated to pedestrian use. This is in addition to the 21.5' wide pedestrian area on each side of the travelway which widens each the planting/ furnishing zones, effective sidewalks, and dining/retail zones. Pneumatic bollards on each end of the street would allow access for the King Street Trolley, emergency vehicles, maintenance vehicles and delivery vehicles during limited hours, but prevent private vehicle access.

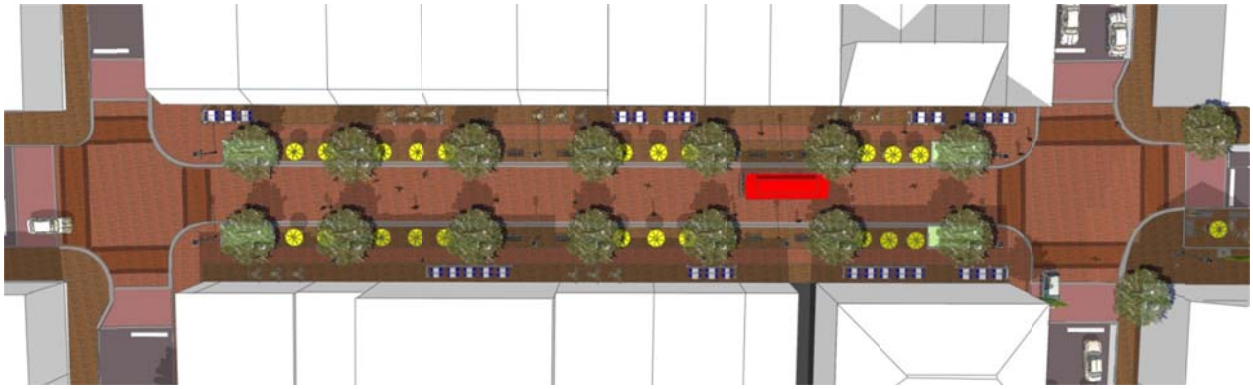


Figure 18: Plan View of Option 4 – Pedestrian Only with Trolley

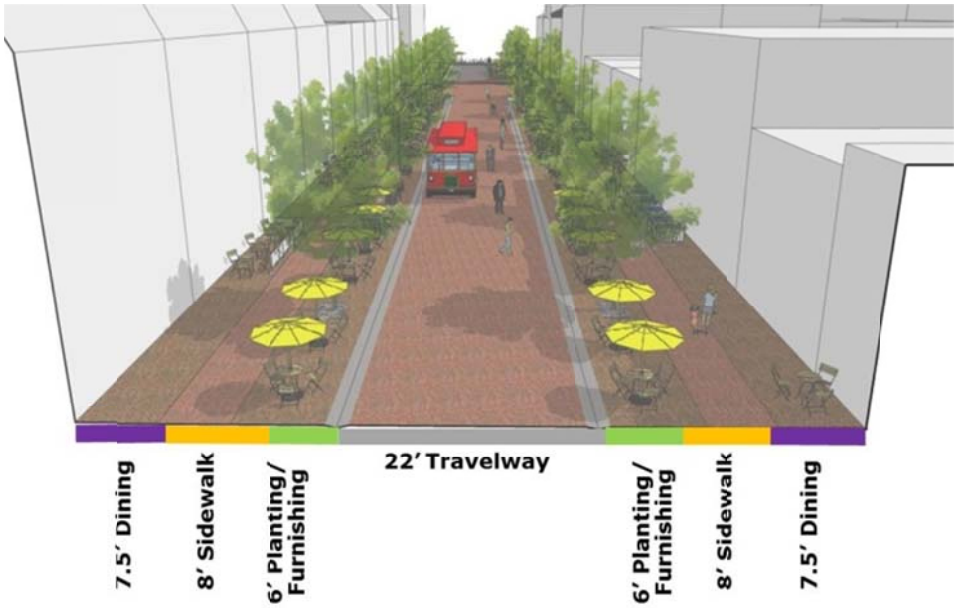


Figure 19: Typical Section of Option 3 – Pedestrian Only with Trolley

The following describes this alternative as it relates to the project values:

- *Walking space* – Effective sidewalks (sidewalks less the dining/retail zone) would be widened from 5 feet to 8 feet on both sides of the street. Pedestrians would also have significantly more walking space in the center travelway, though they must share this space with trolleys.
- *Outdoor dining and retail* – The outdoor dining/retail zone abutting each building face would increase from 5 feet to 7 feet in width and additional outdoor dining and retail could exist in the expanded 6-foot planting/furnishing zones in between trees and street furnishings.
- *Direct and efficient trolley service* – This option would not change the trolley route.
- *Impacts to residential streets* – The street would be closed to cars, so there will be traffic diversion as described in the Future Traffic Conditions Technical Memorandum in **Attachment C**. All parking spaces, approximately 25, would be eliminated. Valet parking loading zones would be relocated to adjacent cross streets.
- *User comfort at intersections (safety)* - Wider sidewalks would allow pedestrians to cross in larger groups and curb extensions would reduce crossing distances. Each intersection would be reduced, with the exception of trolley traffic, from four active approaches to three, reducing potential conflict points.

5E. Option 5 – Widened Sidewalks/Some Parking

Option 5 has a flush-street design. The flush curb lines create an approximate 22-foot travelway. This concept maintains access for vehicles and maintains some parking. Trees and other vertical elements such as parking meters, light poles, and other street furniture are relocated to designated areas within the parking zone, allowing the effective sidewalk and retail/dining zones to increase. The road can be limited to pedestrians or pedestrians and trolleys seasonally, by day of week, or by time of day. During road closures, the parking spaces can be used for additional outdoor dining and/or retail.

Figure 20: Plan View of Option 5 - Widened Sidewalks/Some Parking

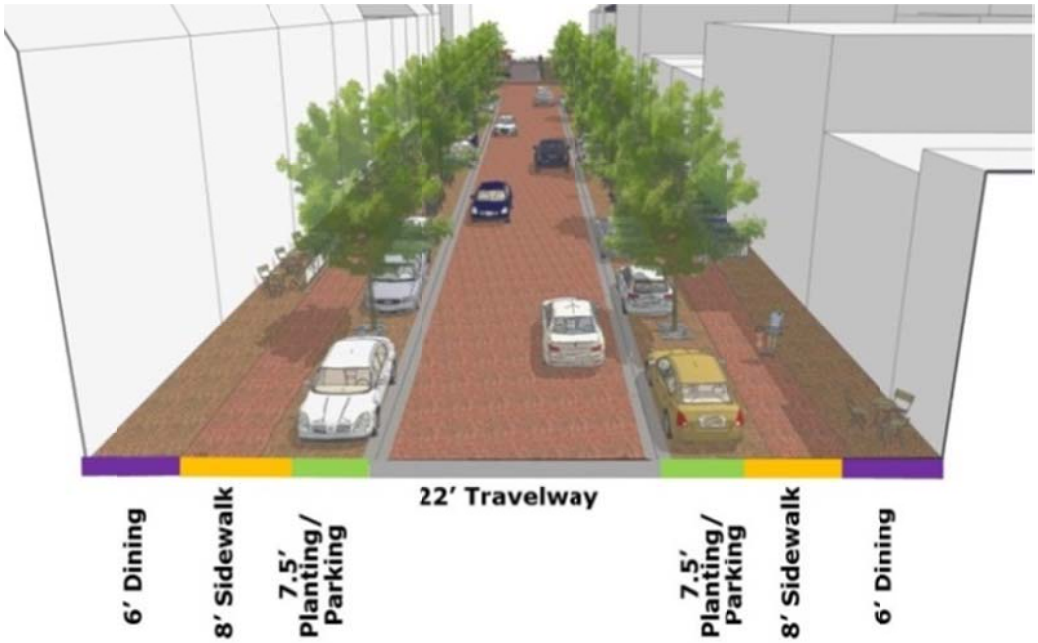


Figure 21: Typical Section of Option 5 - Widened Sidewalks/Some Parking

The following describes this alternative as it relates to the project values:

- *Walking space* – Effective sidewalks (sidewalks less the dining/retail zone) would be widened from 5 feet to 8 feet on both sides of the street. Lower King Street could be closed for pedestrians only during seasonal, weekends, or specific time of day, further increasing walking space.
- *Outdoor dining and retail* – The outdoor dining/retail zone abutting each building face would increase from 5 feet to 6 feet in width and additional outdoor dining and retail can exist in the expanded 7.5-foot planting zone in between trees when the street is closed.
- *Direct and efficient trolley service* – This option would not change the trolley route.
- *Impacts to residential streets* – The street would be open to cars, the trolley, bicycles and emergency vehicles, so there would be no traffic diversion from the existing condition. Approximately one half of the 25 existing parking spaces would be eliminated. Valet parking loading zones could be maintained in lieu of one or more parking spaces or relocated to adjacent cross streets.
- *User comfort at intersections (safety)* - Wider sidewalks would allow pedestrians to cross in larger groups and curb extensions would reduce crossing distances.

7. Evaluation of Options

6A. Options and Values Comparison

The following table lists each of the options and indicates which users have access to the street and whether the option achieves the project values.

Table 1: Options & Values Comparison Matrix

OPTIONS			VALUES				
Title		Who has access?	Increase Walking Space	Increase Outdoor Dining and Retail	Provide Direct and Efficient Trolley Service	Minimize Impacts to Residential Streets	Improve User Comfort at Intersections
1	Existing Configuration*				✓	✓	
2	Widened Sidewalk/ No Parking*		✓	✓	✓		✓
3	Pedestrian Only		✓	✓			✓
4	Pedestrian/ Trolley Only		✓	✓	✓		✓
5	Widened Sidewalk/ Some Parking*		✓	✓	✓	✓	✓

* Can be closed for pedestrians only seasonally, on weekends or during specific times of day

Below is a brief discussion of how each option addresses the project values comparatively.

Increase walking space

Table 2 displays a comparison of the availability of walking space for each of the five conceptual options. All four options would increase the amount of space devoted to pedestrians compared to existing conditions. Conceptual Options 3 and 4 provide the most space available for pedestrians, though pedestrians must share the 22-foot travelway in Option 4 with the King Street Trolley.

Table 2: Comparison of Walking Space

Option	Pedestrian Walking Space	Increase from Existing Conditions (Option 1)
1. Existing Configuration	**10 feet** (Two 5-foot effective sidewalks)	-
2. Widened Sidewalk / No Parking	**16 feet** (Two 8-foot effective sidewalks)	**6 feet**
3. Pedestrian Only	**38 feet** (Two 8-foot effective sidewalks and 22 feet in the travelway)	**28 feet**
4. Pedestrian / Trolley Only	**38 feet** (Two 8-foot effective sidewalks and 22 feet in the travelway shared with the trolley)	**28 feet**
5. Widened Sidewalk / Some Parking	**16 feet** (Two 8-foot effective sidewalks)	**6 feet**

Increase outdoor dining and retail

Table 3 displays a comparison of the availability of outdoor dining and retail space for each of the five conceptual options. All four conceptual options would increase the amount of space devoted to dining and retail space compared to existing conditions. Conceptual Options 2, 3, and 4 would offer space for two rows of dining and retail with an approximate seven-foot dining zone along the building frontages and six-foot planting/furnishing zones between the sidewalk and travelway. The wider dining zones would be able to accommodate larger tables and improved access for servers. Conceptual Option 5 offers six-foot outdoor dining and retail space along both building frontages and a temporary 7.5-foot dining or retail zone in the parking spaces when the street would be closed to private vehicles.

Table 3: Comparison of Outdoor Dining and Retail Space

Conceptual Option	Dining and Retail Space	Increase from Existing Conditions (Option 1)
1. Existing Configuration	**10 feet** (Two 5-foot wide dining/retail zones)	-
2. Widened Sidewalk/No Parking	**15 to 27 feet** (Two 7.5-foot wide dining/retail zones and opportunity to expand into two 6-foot planting/furnishing zones)	**5 to 17 feet**
3. Pedestrian Only	**15 to 27 feet** (Two 7.5-foot wide dining/retail zones and opportunity to expand into two 6-foot planting/furnishing zones)	**5 to 17 feet**
4. Pedestrian/Trolley Only	**15 to 27 feet** (Two 7.5-foot wide dining/retail zones and opportunity to expand into two 6-foot planting/furnishing zones)	**5 to 17 feet**
5. Widened Sidewalk/Some Parking	**12 to 27 feet** (Two 6-foot wide dining/retail zones and opportunity to expand into two 7.5-foot planting/furnishing zones)	**2 to 17 feet**

Provide direct / efficient trolley service to the waterfront

All options maintain access for the trolley with the exception of Option 3, which requires an alternate route for the trolley. Several alternative trolley routes were considered with the goal of balancing several factors: trolley turnaround/layover before Union Street versus maintaining "Rails to Waterfront"; impacts to residential streets; and directness of route. These options were also reviewed based on physical ability for the trolley vehicle to make the necessary turns and two routes were found to be physically feasible:

1. **Alternative 1: To City Hall –** This alternative would utilize the existing trolley detour route which is currently used when the trolley cannot run its regular route to the waterfront, typically due to flooding at lower King Street. As shown in **Figure 22**, the trolley would turn north on Royal Street, then east on Cameron Street and south on Fairfax Street, traveling around Alexandria City Hall. The trolley has a layover stop at the northwest corner of the intersection of Fairfax Street and King Street and then turns

right to travel westbound on King Street. The route is direct, with a one block route to turn, around and does not run on residential streets. The closest stop to the unit block of King Street is the layover stop approximately two blocks away.

2. **Alternative 2: To Waterfront –** This is the most feasible route for the trolley to the unit block of King Street without operating on the 100 block of King Street and also avoiding cobblestone pavers on the 100 block of Prince Street. As shown in **Figure 22**, the trolley would turn south on Fairfax Street, east on Duke Street and north on Union Street. The trolley's layover stop is at the northeast corner of the intersection of King Street and Union Street. After layover, the trolley would turn west on Cameron Street, south on Fairfax Street and then return to King Street westbound. The route is somewhat indirect, requiring the trolley to travel several blocks to turn around, past about 11 residential block faces (with one block face being one side of the street between two intersections).

Figure 22: Trolley Route Alternatives Diagram

Error! Reference source not found. provides a comparison of the two alternatives with the existing King Street Trolley route. The evaluation criteria were developed by the City with particular input from DASH, the trolley operator. The second alternative route achieves the goal of connecting "Rails to Waterfront" with the King Street Trolley and demonstrates that it is possible to achieve this connection; however, the route does not meet the value of being direct and efficient.

Table 4: Trolley Route Alternatives Comparison Matrix

Evaluation Criteria	Existing	To City Hall	To Waterfront
Is last westbound stop and first eastbound stop at same intersection?	Yes	Yes	Yes
How far is the unit block of King Street from the first and last stop?	0 blocks	2 blocks	0 blocks
Is the route direct? (runs along King Street, only one block to turn around)	Yes	Yes	No
Are there any new stops needed?	No	Yes	Yes
Does the trolley run on residential streets?	No	No	Yes (for about 11 block faces)

Minimize impacts to residential streets

This analysis included evaluation of traffic and parking impacts to residential streets in the study area. Traffic analysis for the weekend midday peak hour was completed for all alternatives, to show the difference between allowing vehicles to travel through King Street (Options 1, 2, and 5) and closing the 100 block to private motor vehicles (Options 3 and 4). Analysis was for future year 2035 and future land uses as recommended in the Waterfront Plan. **Table 5** below summarized the changes in traffic volumes, level-of-service, volume-to-capacity ratio (v/c) as well as parking and valet service impacts for the 100 block of King Street.

Table 5: Comparison of Traffic Volumes, Level of Service, V/C Ratio, Parking and Valet Service

	King Street/ Lee Street			King Street/ Union Street			Impacts on the 100 block of King Street	
Option	TEV (veh/hr)[1]	LOS [2]	V/C[3]	TEV (veh/hr)[1]	LOS [2]	V/C[3]	# of Parking Spaces	Valet Service Impacts
1. Existing Configuration	650	F	0.38	670	F	0.38	25	None
2. Widened Sidewalk / No Parking	650	F	0.38	670	F	0.38	0	Relocated to adjacent streets
3. Pedestrian Only	360	E	0.19	480	F	0.28	0	Relocated to adjacent streets
4. Pedestrian / Trolley Only	360	E	0.19	480	F	0.28	0	Relocated to adjacent streets
5. Widened Sidewalk / Some Parking	650	F	0.38	670	F	0.38	12-13	Relocated to adjacent streets or maintained with removal of two parking spaces

[1] Total entering vehicles (vehicles/hour)
[2] Level-of-service
[3] Volume-to-capacity ratio

Closing the 100 block of King Street will require vehicles to divert to surrounding streets. The traffic analysis shows that the street grid in Old Town would be able to accommodate diverted traffic as well as anticipated future growth in vehicular traffic as described in the Future Traffic Conditions Technical Memorandum in **Attachment B**.

Figure 23 on the following page is based on the traffic analysis and illustrates the volume of vehicles projected to enter each study intersection in the year 2035 during the weekend midday peak hour ("Existing"), compared to the estimated traffic volumes at each intersection accounting for traffic diversion due to closure of the 100 block of King Street ("Diverted"). As shown, all three of the study intersections along King Street would experience a reduction in total entering volume (TEV). Intersections along Prince Street, Duke Street, and Cameron Street would see slightly increased traffic volumes and Queen Street would see no change.

Key findings from the transportation analysis where the 100 block of King Street would be closed to motorized vehicles include:

- vehicles would be less likely to use King Street as a through street east of Fairfax Street;
- Cameron Street and Duke Street would carry more east-west traffic;
- Union Street and Lee Street would carry more north-south traffic;
- vehicle operations would improve at King Street/Fairfax Street because of lower total entering traffic volumes;
- vehicle operations would improve at King Street/Lee Street by decreasing the number of pedestrian/vehicle conflicts;
- there would be an increase in congestion on Union Street because of additional traffic volumes;
- closing the 100 block of King Street to motorized vehicles would improve traffic operations for intersections along King Street; and,
- the closure of the 100 block of King Street to motorized vehicles would provide additional capacity for pedestrians where there is the highest demand.

Options 2, 3, 4, and 5 would offer flexibility by allowing the street to close to cars only when it will have the greatest positive impact to pedestrians. The removal of parking on the 100 block of King Street in Options 2, 3, and 4 will divert vehicles to other locations. Some drivers may opt to take an alternate mode, but most will likely park elsewhere in Old Town. Parking diversion is a component of the increased traffic on adjacent streets as drivers could spend time circulating as they look for parking spaces. The City's ongoing work to improve parking and circulation in Old Town seeks to develop solutions to mitigate any potential impacts of parking removal on lower King Street.

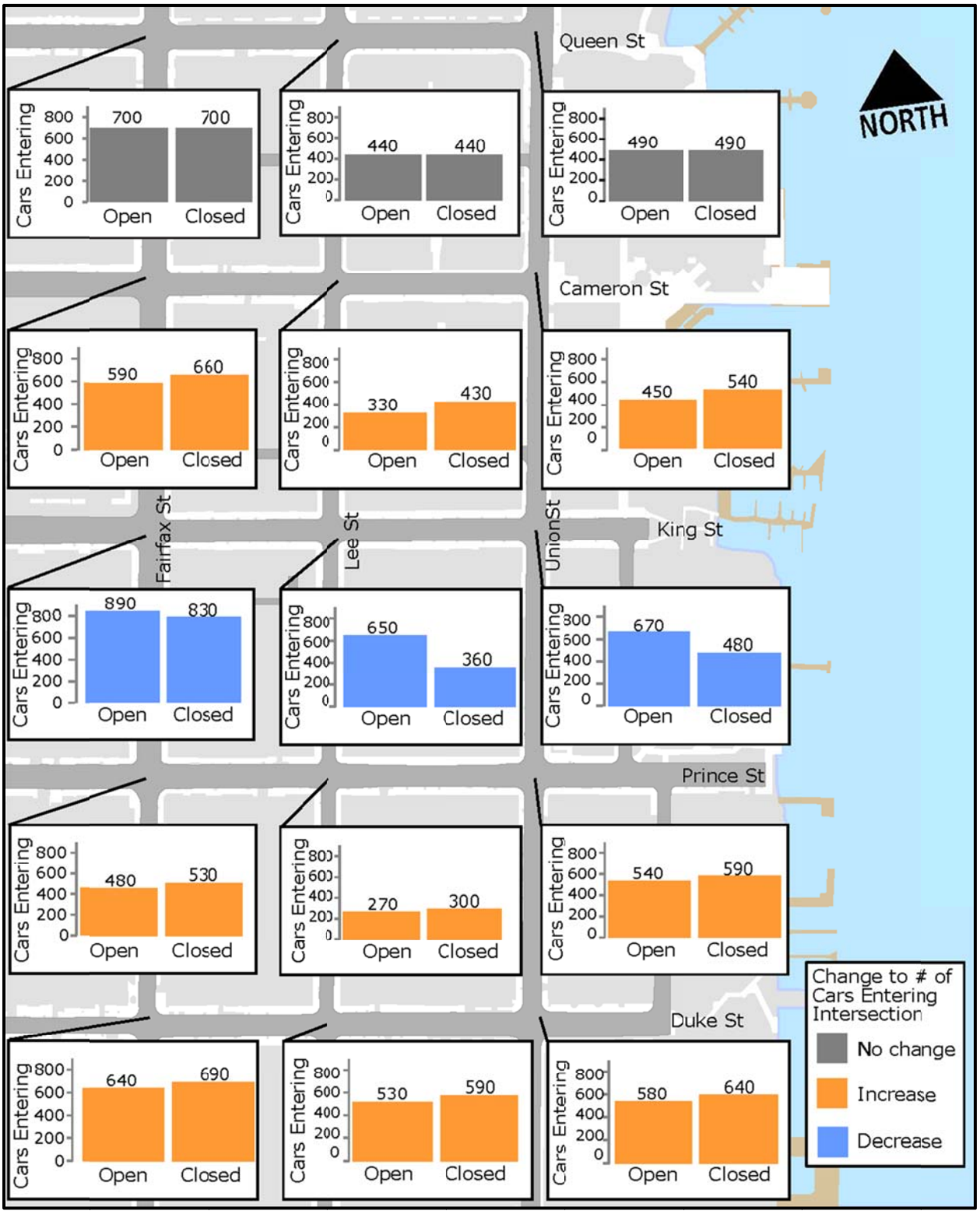


Figure 23: Weekend Midday Hour-long Volumes of Vehicles Entering Study Intersections with ("open") and without ("closed") Lower King Street Closure for the Future Analysis Year of 2035

Improve user comfort at intersections

In the existing configuration (Option 1) pedestrians and motorists experience conflicts at intersections, especially during peak activity times. The following describes the difference between Options 2, 3, 4, and 5 compared to Option 1:

- Option 2 would provide wider sidewalks that would allow pedestrians to cross in larger groups and curb extensions to reduce crossing distance. Both of those design elements would reduce opportunity for conflicts, crossing time for pedestrians and delay for motorists.
- Options 3 and 4 (except when the King Street Trolley is present in Option 4) would convert the intersections of King Street/Lee Street and King Street/Union Street from four-way intersections to three-way intersections. This would offer an additional benefit over Option 2 because it would physically remove one conflict point with vehicles and provide a dedicated crossing for pedestrians at each of the adjacent intersections.
- Option 5 would offer similar benefits as Option 2 when the 100 block of King Street is open. When the 100 block is closed, user comfort would be similar to Options 3 and 4.

6B. Other Impacts

Motorcoaches

Motorcoaches would divert from King Street at times when the street is closed to vehicles. As a potential mitigation effort to minimize impacts to residential streets, the City could consider developing primary alternative motorcoach routes to recommend to motorcoaches via the motorcoach page[2] on the City website to attempt to minimize impacts to residential streets.

Emergency Vehicles

All options would maintain access for emergency vehicles. Two types of bollards could be used to restrict access to vehicles while maintaining access for emergency vehicles on lower King Street. Manual retractable pneumatic bollards can be raised and lowered by the fire department or police with a key on each bollard. For an increased cost, automatic pneumatic retractable bollards can be raised and lowered with a switch, key card, key, radio control, or smart phone app by fire department or police with a key on each bollard. Option 4 will require automatic bollards because they will need to be raised and lowered each time a Trolley passes; however, Options 2, 3 and 5 could use either type of bollard for temporary conditions (street closures in Options 2 and 5 or street openings for emergency vehicles and deliveries in Option 3).

Both types of bollards would require pneumatic equipment to be stored along the 100 block of King Street. The equipment is approximately 8 feet tall and 30 square feet in area (various arrangements possible). The ideal location is typically indoors, but it can also be contained outdoors in a free-standing encasement above, partially below or fully below grade. Storing the equipment below grade is typically challenging due to utility conflicts and maintenance needs.

Delivery Vehicles

All options would allow on-street delivery access on lower King Street during designated times, likely during specific morning hours. All options would also include plans to improve the management of alleys to allow for efficient alley loading and unloading.

[2] http://alexandriava.gov/Motorcoach

Valet Parking

The Landini Brothers special-use permit for a valet loading zone on the north side of the western end of King Street, near the intersection with Lee Street, allows the City to reclaim the valet loading zone if the need arises. For Options 2, 3 and 4, and possibly for Option 5, this valet zone would no longer be accommodated on lower King Street; however, the City would continue to work with Landini Brothers to determine a suitable alternative location, preferably on an adjacent cross street such as Lee Street.

Economic

Full-time street closures, such as those in Options 3 and 4, may potentially have economic impacts to businesses on the 100 block of King Street and in the surrounding area.

The economic impacts of pedestrian-only streets can vary by location based on different critical variables, such as street design, proximity to user base and transit access. Street design elements such as street length and width can impact the experience of walking along the street, but should be considered in context with other factors. Successful pedestrian-only streets have retail storefronts surrounded by both residential and office uses to support businesses during all times of the day and week. Further, their success is bolstered by proximity to universities, tourist areas or central business districts. Much like King Street, these locations often have high pedestrian activity and existing pedestrian infrastructure that allows pedestrians to access destinations beyond the pedestrian-only street. Good transit access either adjacent to or along pedestrian-only streets similarly increases use of pedestrian-only streets. Similar to Option 4, the free MallRide bus operates along the 16th Street Pedestrian Mall in Denver and brings over 55,000 people every day to the street. Pedestrian-only streets can be supported by special assessment districts which tax businesses along the street to provide funding for ongoing maintenance and management.

With careful planning and design, pedestrian streets can be a welcome addition to any city. Their economic benefits can be generated during special events, at specific times of the day or week, or when the street is free from motorized vehicles year-round. The 100 block of King Street shares many similarities to successful pedestrian-only streets throughout the United States. It's location in Old Town Alexandria is a place that attracts tourists, has residents and businesses close by, has high pedestrian traffic during many different times of the day and week, has good transit access, and has existing pedestrian infrastructure and a street grid that supports short trips to and from King Street. As a transit-accessible street with high pedestrian activity in a mixed-use tourist area, lower King Street is poised to maintain its economic viability as a pedestrian-only street or as a street open to vehicle traffic or as an appropriate combination of the two.

Utilities & Drainage

For Options 2, 3, 4 and 5, utility impacts include light post relocations, fire hydrant relocations and drainage inlet removals and relocations. In Option 5, parking meters will need to be relocated. There are no signalized intersections or above-ground utilities that are expected to be impacted.

Construction and Operational Costs

Attachment D summarizes the cost estimates for Options 2, 3, 4 and 5. At the planning-level, the cost of all flush street alternatives is estimated to be about $2,000,000. The cost estimates include assumptions for utilities, erosion and sediment control, maintenance of traffic, design and construction management as well as a 30 percent contingency. Other cost considerations include maintenance of parking meters, loss of revenue in cases where meters would be removed and the cost of installing and operating pneumatic retractable bollards.