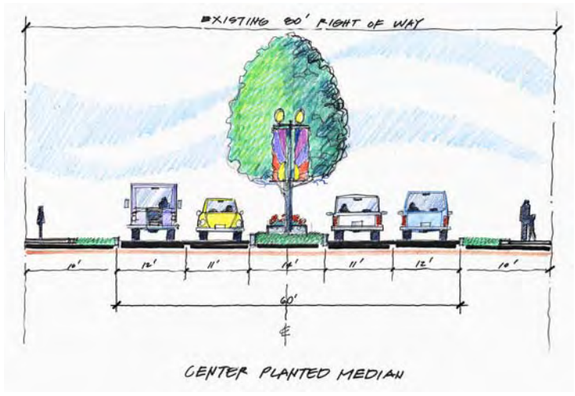
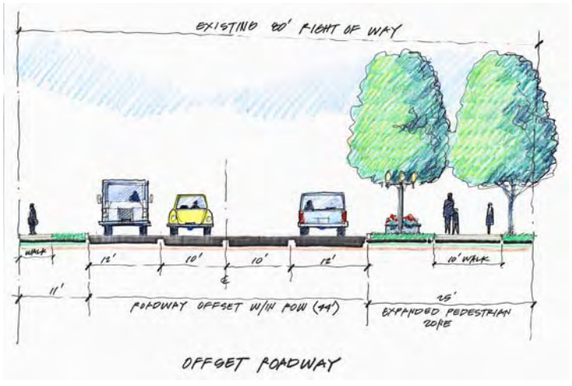
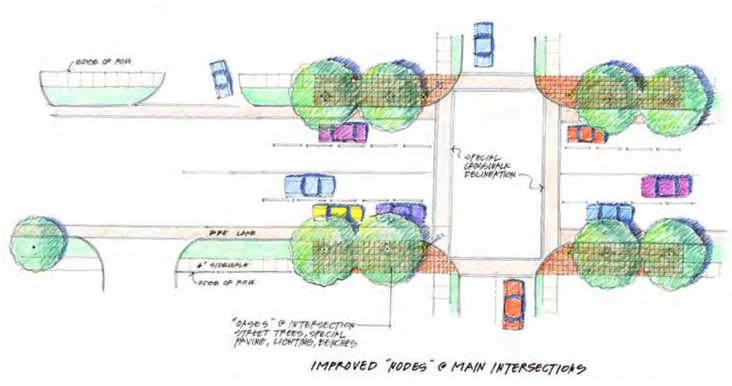
# *King Street Corridor Study*

## Northampton, Massachusetts




Prepared for
**City of Northampton**

Prepared by
***VHB*/Vanasse Hangen Brustlin, Inc.**
**Watertown, Massachusetts**

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# INTRODUCTION

Vanasse Hangen Brustlin, Inc. (VHB) was retained by the City of Northampton to conduct a corridor study of the King Street Corridor. King Street is an important commercial corridor serving the City of Northampton. It also provides a gateway to the downtown from the north. The corridor, which predominantly features a mix of highway business establishments and larger retail centers, was largely developed in the 1960s and 1970s, and is now going through a period of redevelopment. Given this transition, the City of Northampton decided that it was an important time to examine the future of King Street and, perhaps, set a blueprint for redevelopment. This study follows on the heels of a recently approved rezoning of the corridor. The goal of this study is to determine the most effective allocation of the roadway right-of-way to accommodate the future needs of all users, motorized and non-motorized, while serving the access needs of existing and planned development.

## Study Area

The King Street Corridor study area stretches approximately one mile from its intersection with Damon Road/Bridge Road south to its intersection with Summer Street/ North Street (see Figure 1). This section of King Street is classified as an urban roadway by the Massachusetts Highway Department. Although it is a state numbered route, within the study area King Street is owned and maintained by the City of Northampton. Regionally, the corridor is part of Route 5/10, and connects the City of Northampton with the communities of Easthampton and Hatfield. This report describes the existing conditions along the corridor as well as alternatives for improvement.


Figure 1
King Street Corridor Study Area

# EXISTING CONDITIONS

An assessment of existing conditions was completed based on a review of available data, plans, and studies; field observations; and public outreach. The following meetings were held during the preparation of this study:

- Kick-off meeting with the City staff and the Transportation Committee;
- Walking tour with City staff and corridor stakeholders;
- Evening design charrette with invited City officials and the public; and
- Meeting with the Chief of Police and Traffic Safety Officer.

This section summarizes the findings of the assessment of existing corridor conditions.

## Vehicular Traffic

King Street is a four-lane roadway with a curb-to-curb roadway width varying from 54 to 60 feet (typically a four-lane roadway is 48 to 52 feet wide, but can be as narrow as 44 feet). The roadway is a key gateway to the downtown area from the north. There are five signalized intersections and three unsignalized intersections along the mile corridor. One intersection is under flashing signal control. The intersections are:

- King Street (Route 5/10) at Damon Road/Bridge Street (signal control)
- King Street at Barrett Street (signal control)
- King Street at Carlon Drive (flashing signal control)
- King Street at Stop & Shop Drive (signal control)
- King Street at Church Street (stop control)
- King Street at Hooker Avenue (stop control)
- King Street at Finn Street (signal control)
- King Street at Myrtle Street (stop control)
- King Street at Summer Street/North Street (signal control)

In addition to the nine intersections, numerous driveways along both sides of the roadway serve the many businesses along the corridor. Parking is restricted along the majority of the corridor; except toward the southern end of the study area, where four on-street parking spaces are available. Poorly delineated lane markings and lane use restrictions add a degree of confusion to corridor operations.

The posted speed limit is 30 miles per hour (mph), although some vehicles were observed to be traveling faster. (VHB used the floating car method to determine travel speed, traveling at the speed of the vehicles on the roadway). However, discussions with the Northampton Police Department indicate that they feel, in general, that speed is not an issue along the corridor, especially during the peak commuting hours, when heavier traffic prevents vehicles from being able to travel above the speed limit.



In the future, the City seeks to limit the number of access points provided along King Street. Already underway, they are requiring new developments to work with adjacent property owners to consolidate driveways wherever possible. The City is also looking for safe and efficient ways to provide bicycle and pedestrian accommodations along the length of the corridor.

## Observed Traffic Conditions

Information provided in the Hill and Dale Mall Redevelopment Study, the Northampton Transportation Plan, and the Connecticut River Crossing Transportation Study show 24-hour automatic traffic recorder (ATR) volumes along King Street in the range of 16,000 to 22,000 vehicles per day (vpd), depending upon location. A summary of the available weekday daily traffic volumes is presented in Table 1.

### Table 1
### Existing Weekday Traffic Volume Summary

| Location | Weekday Daily Traffic Volume (vpd)[1] |
|---|---|
| North King Street, immediately north of Damon Road (2002) | 21,200 |
| King Street at the Hill and Dale Mall (1999) | 19,000 |
| King Street, immediately south of Barrett Street (1999) | 22,000 |
| King Street, immediately south of North Street (2002) | 16,000 |

Source: Shops of Northampton Traffic Impact Study Fuss & O'Neill, April 2003; Northampton Transportation Plan, PVPC, May 2002; CT River Crossing Study, VHB 2003
1 Daily traffic volumes expressed in vehicles per day.

## Peak Period Traffic Demands

Various studies along the corridor also provide peak period turning movement counts (TMCs) and level of service (LOS) analysis at study area intersections. Traffic demands vary throughout the day but generally peak in the late afternoon/early evening period. The most recently available evening peak hour traffic volumes are provided in the Appendix to this report. The average peak hour traffic flow ranges from 850 to 1,050 vehicles per hour per direction along King Street.

## Driveway Access

Land use along the corridor is zoned as highway business, with a small residential section along the west side of King Street in the southern part of the study area. Land uses surrounding the corridor are mainly residential to the west and southeast, and commercial/industrial to the east.

The King Street corridor provides driveway access to many local businesses. Approximately 57 driveways exist within the one-mile study area limits, or about a driveway every 100 feet, on average. In several locations, driveways are very closely spaced together and at some locations provide multiple access to one business. The majority of driveways provide full access to/from King Street (left and right-turns are permitted into and out of the driveway).

The crash data provided by the Massachusetts Highway Department (summarized below) show 150 crashes occurred at unknown locations along King Street within the study area. It is likely that a majority of these crashes occurred at driveway locations throughout the corridor. Studies have shown that crashes increase along a corridor with the number of driveways (e.g. a corridor with 60 access points per mile is likely to have a crash rate three times greater than a corridor with 10 access points per mile)[1]. Better planned driveways should be well spaced (desirably a minimum of 250 feet apart) and provide access to multiple businesses from a single location. Where possible, access should be provided off of a side street instead of directly onto King Street. Incremental improvements to access management/control are desirable outcomes of redevelopment projects along the corridor in the future.


Driveway Access to the Agway Retail Store

[1] "Impacts of Access Management Techniques", NCHRP Report 420, Transportation Research Board, 1999.



## Pedestrian Accommodation

The King Street Corridor is a moderate to lightly traveled pedestrian corridor. It is worth noting that the current land use mix and pedestrian environment do not encourage walking. Pedestrians were observed more on the west side of the corridor traveling to/from residential areas to the west. Pedestrians are occasionally forced to cross King Street at unmarked locations due to the lack of pedestrian crossings. The bike path located adjacent to Stop & Shop attracts both bicycle and pedestrian traffic to the corridor. As the projects slated for development move forward, it is likely that pedestrian activity will also increase.

A full sidewalk is provided on both sides of the roadway for the entire length of the corridor. The width of the sidewalk varies greatly and is less than four-feet in some locations. These narrow sidewalks do not meet the requirements established by the Americans with Disabilities Act (ADA). The majority of wheelchair ramps located at the intersections along King Street are also not ADA compliant.

There are currently four crosswalks across King Street within the study area – at Barrett Street, Stop & Shop, Finn Street, and at North Street. Although these crosswalks are provided at signalized intersections, pedestrian crossing phases (either exclusive or concurrent) are not provided at the traffic signals. Crosswalks also exist along the majority of minor street approaches at signalized intersections. None of these crosswalks are provided with a protected pedestrian crossing phase.

## Planned Pedestrian Crossings

There are current plans to provide pedestrian crossing accommodations at two locations within the corridor. A pedestrian phase at the existing Stop & Shop traffic signal has been designed and is out to bid for construction. The Hill and Dale Mall redevelopment plan includes a traffic signal at the main driveway that will have full pedestrian accommodations and provide a protected crossing of King Street. These two locations will provide pedestrians with a safe King Street crossing to the north and center of the study area; however, they are not sufficiently close enough to prevent illegal crossings elsewhere. (As a general rule of thumb, 400 to 800 feet are cited as a reasonable spacing between crossing locations).

## ADA Compliance

As mentioned above, portions of the sidewalk and many wheelchair curb ramps do not comply with the Americans with Disabilities Act. The corridor should provide a minimum of five-foot sidewalks. This width allows two pedestrians (including wheelchair users) to walk side by side, or to pass each other comfortably. It also allows two pedestrians to pass a third pedestrian without leaving the sidewalk. The minimum clear width requirement is four-foot six-inch sidewalks, with a minimum of 3-feet of clearance around obstructions such as light/utility poles and traffic signal cabinets. Where the clearance width is less than five-feet, a five-foot square area of sidewalk must be provided at 200 feet intervals or less.

Curb ramps at crosswalks should be a minimum of three-feet wide (exclusive of flares) and should be parallel with the direction of travel. At locations where there is a four-foot clearance between the bottom of the ramp and the far crosswalk line, one apex (corner) ramp is acceptable. Otherwise, two ramps must be provided at each corner.

Massachusetts's regulations state that if a sidewalk is placed less than two feet from the road pavement, curbing must be used on the edge of the road. However, if enough right-of-way exists to provide at least two feet minimum of separation between the road and sidewalk, curbing could be avoided. A 4 to 5-foot separation between the sidewalk and the roadway is desirable to the extent feasible. This separation enhances safety and is aesthetically more pleasing to the pedestrian, particularly if trees are retained between the road and sidewalk.

The ADA principles outlined above can be found in detail in the Appendix along with typical cross-section diagrams. None of the signalized intersections within the study area appear to completely meet ADA standards.

In the future, it is desirable for King Street to feature:

- Sidewalks that meet ADA requirements;
- Protected pedestrian crossings of King Street spaced a maximum of 800 feet apart;
- ADA compliant ramps at intersections; and
- More pedestrian-related amenities/streetscape features.


Pedestrian observed crossing King Street at unmarked location, south of Stop & Shop

## Bicycle Access

There are currently no formal bicycle accommodations along the King Street corridor. Bicyclists were observed traveling the corridor either on the sidewalk, in the roadway against the curb, or in the right-most travel lane. All three alternatives can be dangerous for bicyclists, motorists, or pedestrians. With the numerous driveways along the corridor, riding along the curb or on the sidewalk can obstruct the bicycle from the view of motorists trying to exit the driveways. Additionally, riding in the traffic lane could pose a danger as through vehicles attempt to maneuver around turning vehicles and bicyclists.

In the future, more space designated for bicyclists within the roadway cross-section is generally the preferred treatment to better accommodate adults and more confident bicyclists. (Children and less experienced riders will still gravitate to the sidewalk).

As part of the Stop & Shop development, a bikeway was constructed to connect the Manhan Trail with King Street. This dedicated way runs along the backside of the parking lot, down the southern side of Liquors 44, and across the front of the property. A pedestrian walkway runs through the parking lot immediately adjacent to Stop & Shop. Both paths currently end at the main driveway.

## Planned Bicycle Accommodations

Final design plans for a connection over King Street and extension of the Manhan bike trail along the railroad right of way have been completed. These plans call for a bridge structure for the King Street crossing. An interim crossing provision will be provided by the new signal accommodations at Stop & Shop, although the means of connecting this crossing to the Manhan Rail Trail to the east remains unresolved (see later discussion).

## Transit

Two buses currently travel along King Street. The Pioneer Valley Transit Authority (PVTA) Red 44 bus runs along King Street between Barrett Street and Main Street and the Franklin Regional Transit Authority (FRTA) Valley Route runs north along the length of the study area as it travels from the Academy of Music to Court Square in Greenfield. There are no dedicated bus stops for either bus along the corridor. However, both services operate on a flag system and will stop to pick up passengers if flagged down. The City of Northampton is currently working with the PVTA and FRTA to abolish the flag system and provide system service only at dedicated bus stops. It is envisioned that in the future, King Street will have well defined, visible transit stops.

Bicyclist heading north on King Street

## Safety

In order to identify crash trends, safety concerns, and/or roadway deficiencies within the study area, crash data were obtained from the Massachusetts Highway Department (MassHighway) for the three-year period from January 1, 1999 to December 31, 2001 (the most recent data available). A summary of the crash data is presented in Table 2.

A total of 110 crashes have occurred at the study area intersections between January 1, 1999 and December 31, 2001. The highest incidence was experienced at King Street and Damon Road where 31 collisions were recorded. The next highest incidence was at King Street and Barrett Street (20 crashes), followed by King Street and Finn Street (20 crashes), and King Street and North/Summer Street (15 crashes). The state records show that an additional 150 crashes occurred somewhere along King Street over the three-year period. While it is not possible to pinpoint the location of these crashes, it is likely that they occurred at the many driveways within the corridor. Approximately 43 percent of all (260) crashes involved personal injury. One fatality occurred during 2000 at the intersection of King Street and Carlon Drive. Due to the limited data available through MassHighway, the City of Northampton Police Department was contacted to identify any crash trends that have occurred during 2002 and 2003. Based on the 2003 City data available and discussions with the City's Police Chief and Traffic Safety Officer, no new crash trends have developed over the past two years. However, there was an additional fatality at the intersection of King Street and Carlon Drive. The police department does not feel that the fatalities at this intersection are due to a geometric deficiency or reckless driving, but rather to extenuating circumstances such as sudden illness in one case and poor weather in the other. No citations were issued at either of the collisions. The 2003 data is provided in the Appendix to this report.

Based on the MassHighway data, the majority of crashes at the above locations are of the angle or rear-end type. Angle-type crashes are indicative of vehicles turning onto a higher-speed/ high volume major roadway from uncontrolled driveways or minor intersections, or turning traffic conflicting with through traffic at signalized intersections or driveways. Rear-end crashes are often indicative of turning movements from the major roadways into driveways or side streets along a corridor. Often these vehicles are attempting to turn and the vehicle behind them either does not slow in enough time, or advances thinking that the turning vehicle has already proceeded. The relatively high number of personal injury collisions occurring at study area intersections may also be attributed to the volume and speed of traffic driving the corridor.

MassHighway has prepared a list of the top 1,000 high crash locations through the entire state of Massachusetts. The most current list (2002) compiles data from 1997, 1998, and 1999. Within the study area, the intersection of Damon Road and King Street appears on the list.[2]

To better understand the safety conditions along a corridor, crash rates are calculated based on the number of crashes at an intersection and the volume of traffic traveling through that intersection on a daily basis. Rates that exceed the statewide average could indicate safety or geometric issues at an intersection. The 2003 statewide crash rate is 0.66 for an unsignalized intersection and 0.87 for a signalized intersection. These rates imply that on average 0.66 crashes occur per million entering vehicles at unsignalized intersections throughout the state of Massachusetts and 0.87 crashes occur per million entering vehicles at signalized intersections. The City of Northampton is part of MassHighway District 2. District 2 crash rate averages for 2003 are 0.87 for unsignalized intersections and 1.02 for signalized intersections. None of the intersections within the study area exceed the statewide or District 2 average crash rates and, therefore, would not be eligible for safety improvement funding or given high priority for safety mitigation actions .

There have been six reported pedestrian collisions along King Street between January 1999 and December 2001. Three of them have occurred at study area intersections. The locations of the other three are not clear from the available data. One collision resulted in a fatality (at Carlon Drive as discussed above). The majority of these collisions (including the fatality) occurred during daylight hours under clear skies, indicating that weather was not a factor. Historic crash data provided by the Massachusetts Highway department shows that an additional 23 pedestrian collisions have occurred since 1990. Discussions with the Northampton Police Department indicate that a majority of these collisions are the result of pedestrians trying to cross King Street where a protected crosswalk does not exist, thereby creating a dangerous situation for themselves. Regardless, the number of pedestrian collisions indicates that protected pedestrian crossings are desirable throughout the corridor.

There were two bicycle related collisions reported along the corridor between January 1999 and December 2001 – one occurring at Finn Street and the other at Stop & Shop. Neither of these collisions resulted in a fatality. Historic crash data shows an additional 13 bicycle collisions since 1990. These collisions happen at various unspecified locations throughout the corridor and reinforce safety concerns for bicycles along King Street. (There is a general need to have crash data better referenced geographically in the future for a more thorough safety analysis).

[2] High Crash Intersection Report. Prepared by the MassHighway Safety Management Unit. 2002.

## Table 2
## Crash Experience Summary

| | King Street at | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Damon Road/ Bridge Road | Barrett Street | Carlon Drive | Stop & Shop | Hooker Avenue | Finn Street | Myrtle Street | Summer Street/ North Street | Total |
| **Year** | | | | | | | | | |
| 1999 | 12 | 7 | 4 | 5 | 3 | 9 | 0 | 7 | 47 |
| 2000 | 9 | 9 | 1 | 5 | 2 | 9 | 0 | 4 | 39 |
| 2001 | 10 | 4 | 1 | 2 | 0 | 2 | 1 | 4 | 24 |
| Total | 31 | 20 | 6 | 12 | 5 | 20 | 1 | 15 | 110 |
| **Collision Type** | | | | | | | | | |
| Angle | 16 | 7 | 1 | 9 | 1 | 8 | 0 | 9 | 51 |
| Head-on | 1 | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 4 |
| Rear-end | 11 | 11 | 2 | 3 | 3 | 8 | 1 | 4 | 43 |
| Unknown | 3 | 1 | 2 | 0 | 1 | 3 | 0 | 2 | 13 |
| Total | 31 | 20 | 6 | 12 | 5 | 20 | 1 | 15 | 110 |
| **Severity** | | | | | | | | | |
| Fatality | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 |
| Injury Crash | 11 | 10 | 4 | 3 | 4 | 9 | 1 | 5 | 47 |
| Property Only | 19 | 10 | 1 | 9 | 1 | 11 | 0 | 10 | 61 |
| SCHOOL BUS | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| Total | 31 | 20 | 6 | 12 | 5 | 20 | 1 | 15 | 110 |
| **Time of day** | | | | | | | | | |
| 7:00 AM - 9:00 AM | 0 | 1 | 1 | 0 | 0 | 1 | 0 | 2 | 5 |
| 9:01 AM - 3:59 PM | 23 | 16 | 2 | 8 | 2 | 12 | 1 | 7 | 71 |
| 4:00 PM - 6:00 PM | 4 | 0 | 3 | 2 | 2 | 2 | 0 | 2 | 15 |
| 6:01 PM - 6:59 AM | 4 | 3 | 0 | 2 | 1 | 5 | 0 | 4 | 19 |
| Total | 31 | 20 | 6 | 12 | 5 | 20 | 1 | 15 | 110 |
| **Day of Week** | | | | | | | | | |
| Monday-Friday | 23 | 15 | 6 | 11 | 5 | 17 | 1 | 11 | 89 |
| Saturday-Sunday | 8 | 5 | 0 | 1 | 0 | 3 | 0 | 4 | 21 |
| Total | 31 | 20 | 6 | 12 | 5 | 20 | 1 | 15 | 110 |
| **Pavement Conditions** | | | | | | | | | |
| Dry | 23 | 17 | 6 | 11 | 4 | 13 | 1 | 12 | 87 |
| Wet | 7 | 3 | 0 | 0 | 1 | 6 | 0 | 2 | 19 |
| Snowy | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 2 |
| Icy | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Unknown | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 2 |
| Total | 31 | 20 | 6 | 12 | 5 | 20 | 1 | 15 | 110 |
| MassHighway Crash Rate | 0.82 | 0.80 | NA | 0.43 | 0.20 | 0.69 | NA | NA | -- |

Source: Compiled by VHB from data provided by the Massachusetts Highway Department.

# ALTERNATIVES DEVELOPMENT

Based on the existing conditions assessment and charrette, VHB developed various alternatives that address the constraints of the corridor. These alternatives, summarized below, provide various options for allocation of roadway right-of-way and the accommodation of all modes of transportation.

## King Street Opportunities and Constraints

A summary of the existing opportunities and constraints found within the King Street corridor are provided in Figures 2 and 3. These issues and opportunities can generally be summarized in the following four categories.

### Gateways

A gateway along a corridor creates a focal point indicating a change in land use or the characteristic of the roadway. It creates a sense of arrival at a destination or special place. It can occur at a node (intersection) or linearly, and can consist of landscaping, period lighting, and/or aesthetic signage, intersection or roadway treatment, or a roundabout. For the King Street corridor:

- The lack of gateways into the corridor or downtown reinforces the highway, rather than a sense of place.
- The lack of gateways is a missed opportunity to create an identity for the corridor and calm traffic.
- Logical nodes and right-of-way (ROW) exist to create gateways.

### Competing Interests

There are many demands placed on the corridor that require special consideration:

- Accommodating access for motorists, pedestrians, and bicycles requires an appropriate allocation of space within the ROW.
- There is a need to address both through (regional) traffic and traffic destined for corridor businesses.
- There is a need to accommodate pedestrian and bicycle traffic traveling both north/south and east/west.

### Safety

Improvements need to enhance the safety of the corridor for all users:

- The multitude of access points along King Street has contributed to the frequency of crashes along the corridor.
- No pedestrian crossings or bike lanes exist on King Street.
- The lack of well-defined lane markings adds confusion for the motorist.
- For the most part, adequate ROW exists to improve transportation conditions.

### Aesthetics (Visual Relief and Unifying Elements)

As the corridor has evolved, it has failed to become a comfortable place for people or motorists:

- There is an inconsistent use of streetscape features along the corridor and limited pedestrian amenities.
- King Street lacks significant green space or "visual oases" from commercial development and paved areas.
- Signage, directional information, and advertising add to roadway clutter.

In the future, the significant portion of the corridor that is ripe for redevelopment offers tremendous opportunity to:

- Demonstrate the principles of good access management;
- Improve bicycle/pedestrian accommodations;
- Improve corridor aesthetics through:
  - creation of gateways/corridor identity,
  - placement of buildings closer to the street,
  - providing green relief,
  - reducing corridor scale to a more people oriented level, and
  - unifying corridor appearance through signage and streetscape.

The blueprint for King Street needs to be cognizant of all of these factors.

**Redevelopment Opportunities**
- Relocation options
- Demonstrate principles
- Linkages to neighborhoods
- Provide green relief
- Buildings on the street

**Opportunity**
Utilize portion of RR ROW for bikeway

**Opportunity**
Use signalized intersections and improvements to define smaller "precincts" within corridor

**Opportunity**
Bike access across King Street to Manhan and Norwottuck Rail Trails

**Gateway Opportunity**
Strengthen introduction to corridor and downtown

**Opportunity**
Link properties and reduce curb cuts

**Opportunity**
Create pedestrian nodes/ oases at signalized intersections

**Opportunity**
Create pedestrian oasis with seating, shade trees

**Opportunity**
Adequate ROW (80') to accomplish meaningful results

**Redevelopment Opportunities**
Reinforce gateway/transition to downtown

**Gateway Opportunity**
Strengthen introduction to corridor


**Corridor-Wide Issue**
Accommodating:
- Multiple, often competing objectives/needs
- Commerce
- Economic development
- Aesthetics
- Safety/comfort

**Corridor-Wide Issue**
Improving pedestrian experience/bicycle safety within an automobile dominated corridor
- Traffic Movements
- Multitude of Curb Cuts
- Psychological Comfort

**Corridor-Wide Issue**
Paved vs. Green: Need to provide oases/visual relief

**Corridor-Wide Issue**
Density of traffic signals along the corridor

**Corridor-Wide Issue**
Balancing Information Needs: Business identity, directional information, advertising

**Corridor-Wide Issue**
Lack of unifying elements, sense of arrival

**Corridor-Wide Issue**
Lack of protected pedestrian crossings

**Corridor-Wide Issue**
Bicycle trail connectivity across King Street

**Corridor-Wide Issue**
Overhead Utilities

**Corridor-Wide Issue**
Erratic Building Alignment: "solids and voids"

**Aerial Map: 2001 MassGIS**

# Figure 2
# Opportunities and Constraints "Creating a District"

King Street Corridor Study
Northampton, Massachusetts

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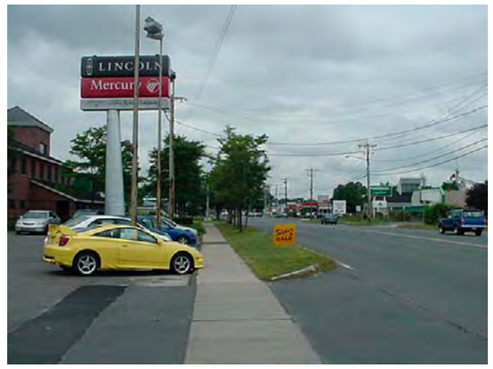
## Gateways


South Gateway at Summer Street

Approaching North Gateway

Transition to Downtown

## Competing Interests

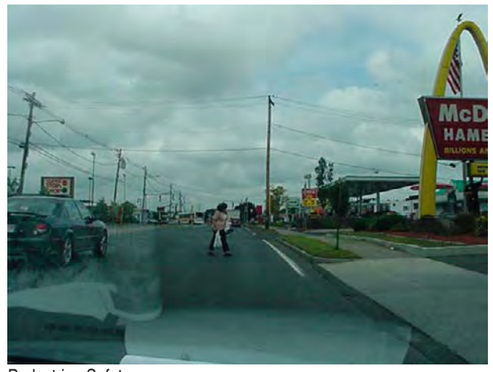


Balancing Competing Interests

Commercial Interests-Product Identity

Bicycle / Pedestrian Access

## Safety



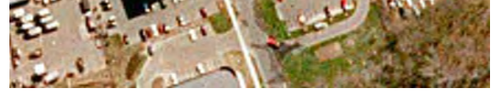
Pedestrian Safety

Bicycle Safety

"No Man's Land"- Providing Psychological Comfort for Pedestrians

## Visual Relief

Visual Relief

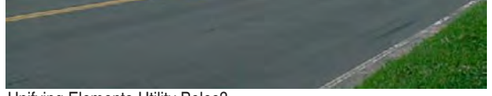


Grassed Setbacks Provide Visual Relief

To Plant or Not to Plant?

## Unifying Elements

Absence Of Unifying Elements



Unifying Elements-Utility Poles?

Need for Uniform Light Standards

# Figure 3
# Opportunities and Constraints
# "Creating a District"

King Street Corridor Study
Northampton, Massachusetts

## Alternatives Considered

The next several pages discuss alternatives for improving King Street to generally accomplish the following goals:

- ➤ Determine the most effective allocation of right-of-way to accommodate the future needs of all users, motorists, pedestrians, and bicycles;
- ➤ Determine the most effective allocation of right-of-way to accommodate current and future traffic demands along the corridor;
- ➤ Define other access improvements to improve safety while maintaining visibility for access points at adjacent land uses;
- ➤ Ensure improvements maintain visibility of adjacent businesses
- ➤ Create a "sense of place" through improved corridor aesthetics that reinforces King Street's importance in the community; and
- ➤ Provide for a healthy business climate, today and in the future.

## Right of Way Reallocation

Four improvement alternatives that examine reallocation of the pavement width/right-of-way have been investigated as part of this study. King Street, today, generally features a 54 to 60-foot pavement width within about an 80-foot right of way. These dimensions are prevalent throughout the corridor; however, they do narrow at both ends of the study area. The cross section of each alternative is modified, as necessary, to be accommodated within the existing right of way. The four alternatives include:

- ➤ Center Planted Median
- ➤ Offset Roadway
- ➤ Bicycle/Pedestrian Zone
- ➤ Center two-way left-turn lane (TWLTL)

Each alternative is described and illustrated below. A matrix evaluation of the different alternatives is provided in the next section of this report.

### Center Planted Median

The Center Planted Median Alternative is shown in Figure 4. This alternative proposes to convert the four/five-lane King Street to a median divided boulevard. As such, a 14-foot median would be constructed down the center of the roadway. This alternative maintains two travel lanes in each direction along King Street. These lanes are narrowed to 11-foot inside lanes and 12-foot outside lanes. The median would break at strategic locations, such as at major intersections with left-turn lanes, to allow for left-turns and U-turns. Tree, shrubs, and flowers would be planted within the median to create a gateway to the downtown area. Banners and ornamental lighting can also be used to accent the transition from the highway into the downtown and help create a sense of place. A ten-foot width would be provided on either side of the roadway for a grass strip and sidewalk. Bicycles would be accommodated off-road or within the travel lane, with crossings provided at signalized intersections.



**Advantages**

- ➤ Narrow lanes can slow traffic
- ➤ Improves safety through reduced traffic conflicts
- ➤ Pedestrian crossing length is shortened and a refuge is created (which could allow for uncontrolled crossings)
- ➤ Creates gateway to downtown and a unifying element to the corridor

**Disadvantages**

- ➤ Movements into and out of intermediate driveways are restricted to right-in/right-out
- ➤ Bicycles are not specifically accommodated within the right of way
- ➤ Potential for illegal U-turns at unauthorized intersections
- ➤ Requires major reconstruction along the corridor
- ➤ May negatively impact adjacent commercial land uses

### Offset Roadway

The Offset Roadway Alternative is shown in Figure 5. This alternative offsets the roadway to one side within the right of way (this would likely be the east side), providing approximately 11-feet for a grass strip and sidewalk on that side. Similar to the Center Planted Median, this alternative maintains two travel lanes in each direction - 10-foot inside lanes and 12-foot outside lanes. The opposite side of the roadway would provide approximately 25-feet for an expanded pedestrian zone. This zone would have a 10-foot walkway/bikeway as well as 15 feet of space for plantings and a buffer zone from the road. Banners and ornamental lighting can also be used to accent the transition from the highway into the downtown.

**Advantages**

- ➤ Narrow lanes can slow traffic
- ➤ Pedestrian crossing length is shortened
- ➤ Bicycles and pedestrians are accommodated within the right of way via a multi-purpose path
- ➤ Addresses Manhan Rail Trail crossing alignment at-grade
- ➤ Creates a meaningful streetscape/pedestrian zone

**Disadvantages**

- ➤ Need to relocate utilities in some areas
- ➤ Full access still permitted at many driveways (including left-turns which have a greater potential to create vehicular conflicts)
- ➤ Requires major reconstruction along the corridor

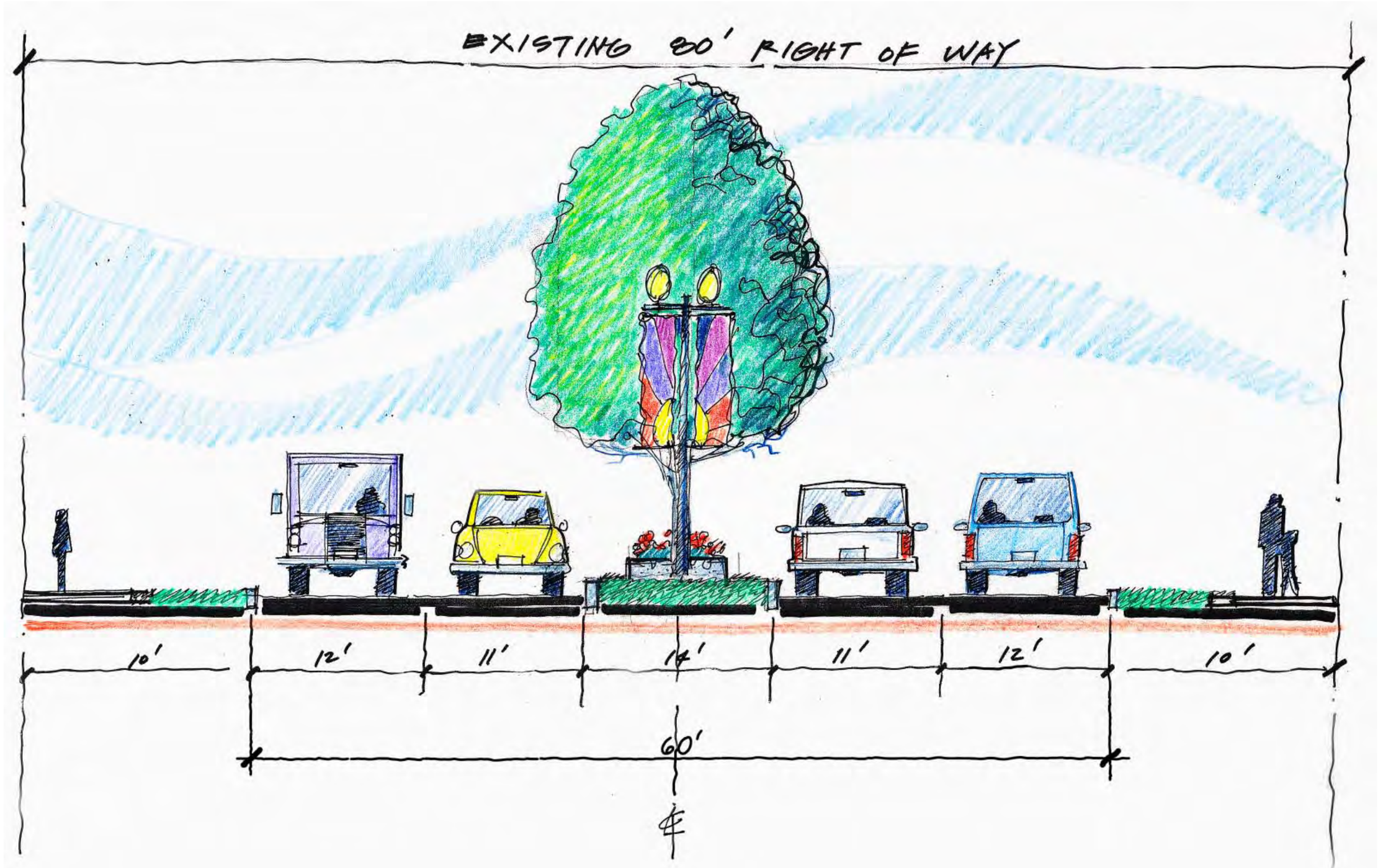



**Figure 4**
**Center Planted Median Alternative**
**"Creating a District"**

King Street Corridor Study
Northampton, Massachusetts

VHB

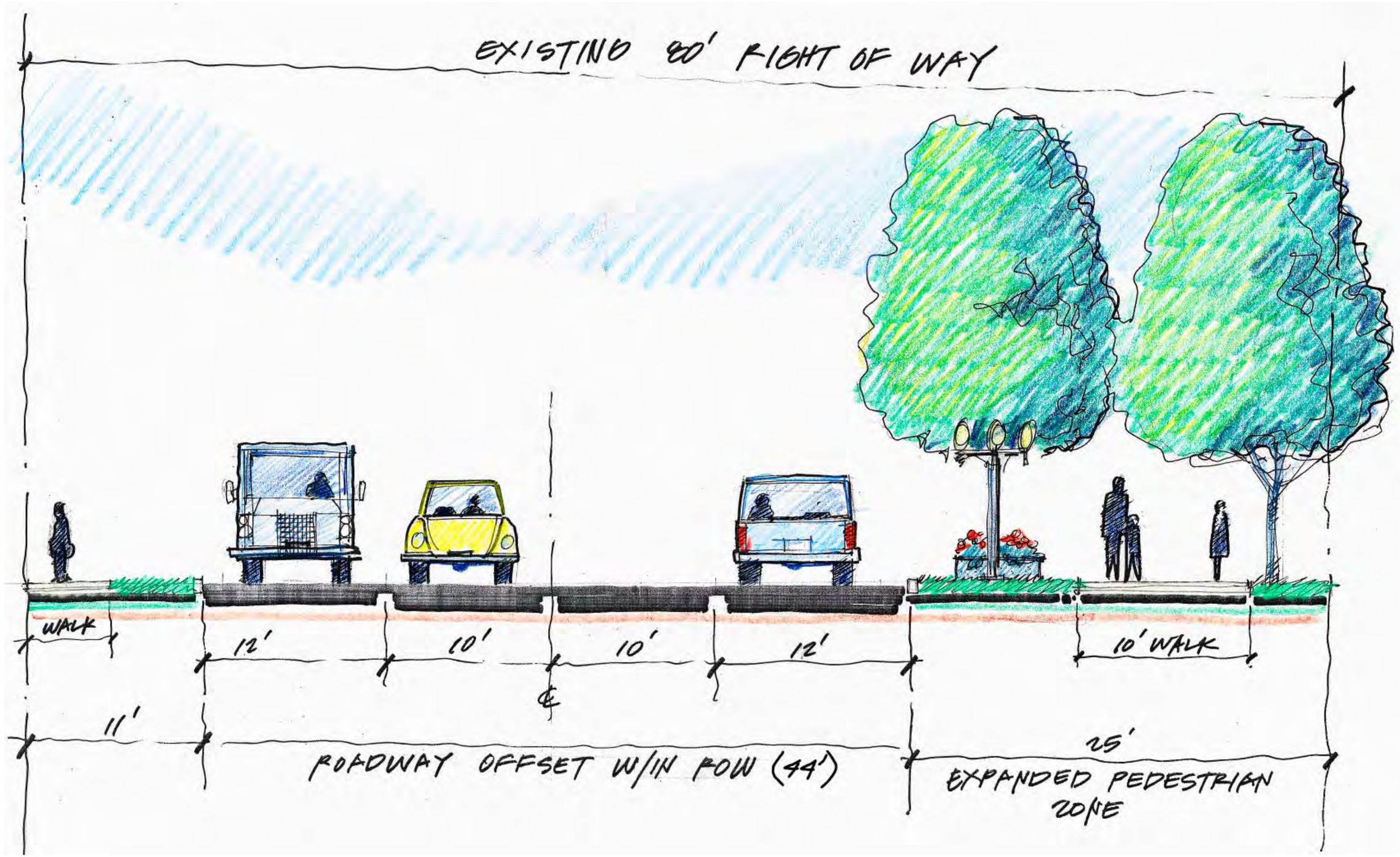



**Figure 5**
**Offset Roadway Alternative**
**"Creating a District"**

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### Center Turn Lane

The Center Turn Lane Alternative would provide one travel lane in each direction along King Street (see Figure 6). A third, center lane would be provided to accommodate vehicles turning into the many driveways. The travel lanes for this alternative would each be 14 feet wide with a 14-foot center turn lane. There would be approximately 20 feet remaining on each side of the roadway to accommodate a grass planting strip and sidewalks. Alternatively, these 20 feet could be used to accommodate on road bicycle lanes and/or parking.

**Advantages**

- Left-turns are removed from traffic stream
- Bicycles can be accommodated within the right of way, if desired
- Opportunity for on-street parking, if desired

**Disadvantages**

- Loss of lane could potentially result in significant traffic congestion
- King Street traffic delays could mean additional traffic diversions through neighborhoods (Jackson Street, Industrial Drive, North Street)
- Reduction in travel lane limits redevelopment potential along corridor
- Full access still permitted at many driveways

King Street traffic volumes under existing conditions (ranging from 19,000 to 22,000 vehicles per day over most of the corridor) are at the upper threshold of capacity for a three-lane cross-section (generally considered when daily volumes are less than 20,000 vehicles per day) . Implementing this alternative potentially forecloses on redevelopment opportunities along the corridor in the future.

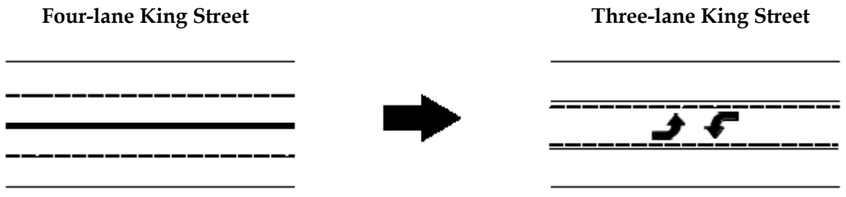


**Figure 6**
**King Street Center Turn Lane**

### Bicycle/Pedestrian Zone

The Bicycle/Pedestrian Zone Alternative is shown in Figure 7. This alternative also maintains a four-lane cross section, providing approximately two 11-foot travel lanes in each direction. These narrower travel lanes allow for the provision of approximately a five-foot bike lanes on each side of the roadway within the existing cross-section. An additional 12-feet (varies) would be available on each side to accommodate a grass strip for plantings and a sidewalk.

**Advantages**

- Provides visible, dedicated space for bicyclists within roadway
- Narrower lanes and bike lanes can slow traffic
- Maintains through traffic capacity
- Bicycles are accommodated within the right of way

**Disadvantages**

- Full access still permitted at many driveways (including left-turns which have a greater potential to create vehicular conflicts)
- Number of turning locations adversely affects provision of bike lane
- Some reconstruction along King Street is required

## Additional Alternatives

There are several additional improvement alternatives that were investigated as part of this study that do not include major reconstruction of the entire corridor. These improvements include:

- Intersection treatments;
- Pedestrian accommodation at intersections;
- Bicycle crossing at Manhan Rail Trail:
- Access management improvements;
- Corridor-wide traffic signal coordination; and
- Installation of a modern roundabout

The implications of these alternatives are described below.

### Intersection Treatments

As part of any cross-sectional alternative, more attention should be paid to key nodes along the corridor. At key intersections, special crosswalk treatments, street trees, paving techniques, lighting, and benches could help emphasize the transition from the highway into the downtown. These treatments would also be helpful to define smaller "precincts" within the corridor. A typical intersection treatment would feature:

- Controlled pedestrian crosswalks on all approaches (see discussion below);
- ADA compliant ramps, sidewalks, and traffic control;
- Well defined curb space with pedestrian refuge area and streetscape features and lighting; and
- Far side bus stops (if possible) at key nodes.

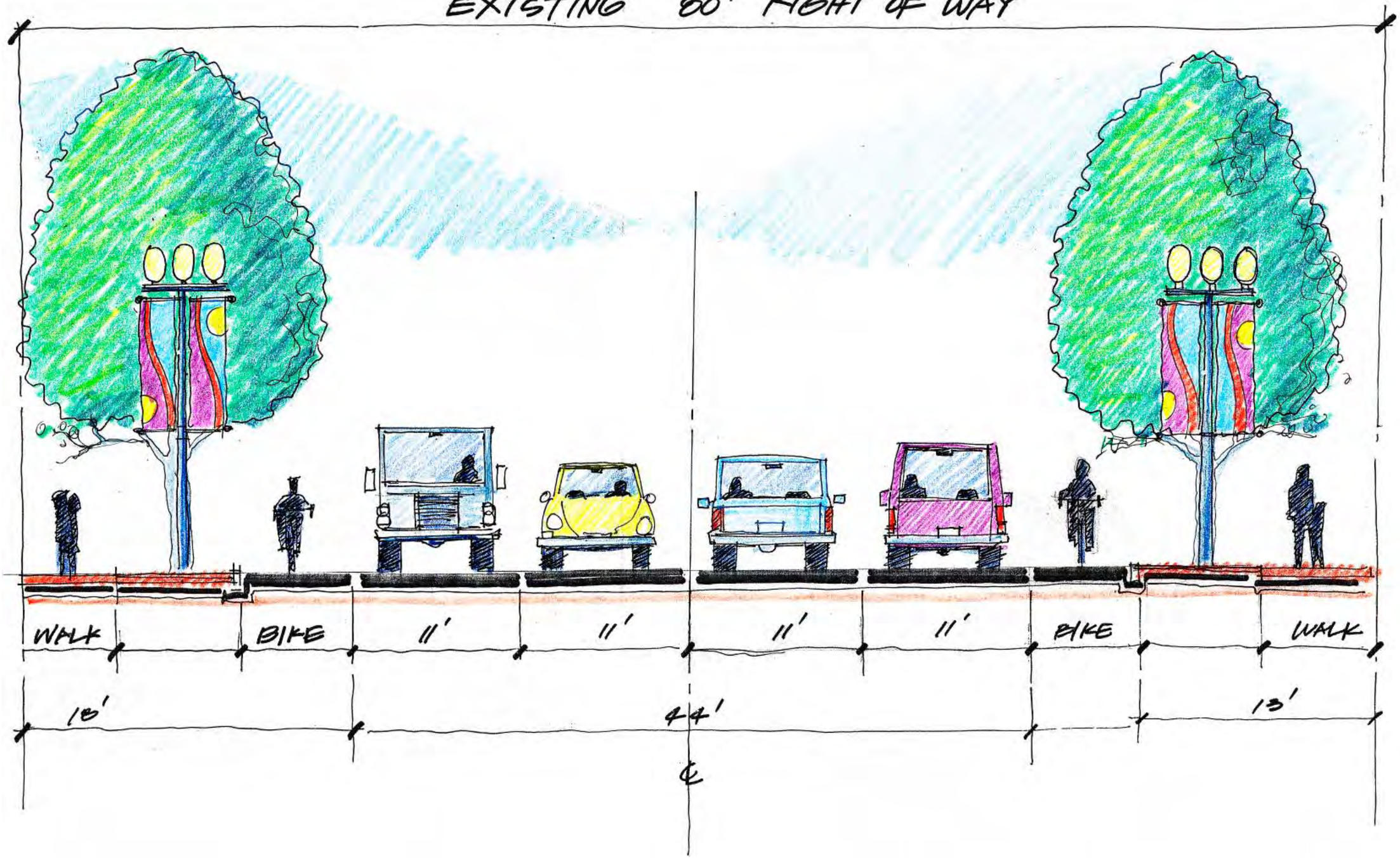


**Figure 7**
**Improve Pedestrian/Bicycle Zone Alternative**
**"Creating a District"**

King Street Corridor Study
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### Pedestrian Accommodation at Intersections

As part of this study, pedestrian phases at signalized crosswalks and the feasibility of marked crosswalks at unprotected locations were investigated. Research shows that the number of pedestrian related traffic crashes increases along roadways with unprotected, marked crosswalks when the average daily traffic volume (ADT) exceeds 10,000 vehicles[3] (remember, King Street ADT ranges from 16,000 to 22,000). In addition, several resources for pedestrian accommodation recommend that unprotected crosswalks (crossings without traffic control or refuge islands) be limited to two-lane roadways. This research, combined with the pedestrian crash experience and illegal crossings observed along the corridor, indicate the need for protected pedestrian crossings.

To give the pedestrian ample opportunity to cross King Street, it would be desirable to incorporate a crosswalk and pedestrian phase into all signalized intersections. As part of ongoing projects, the planned upgrade to the existing traffic signal at Stop & Shop and the proposed traffic signal at Hill and Dale Mall will both include exclusive pedestrian phases. Although providing an exclusive pedestrian phase can increase delay for vehicles at intersections, it will improve pedestrian safety along the corridor.

Key to the success of implementing this improvement is an appropriate spacing of future crossing locations along the corridor (strategically located based on travel paths and spaced a maximum of 800 feet apart). The location of existing and future traffic signals along the corridor is such that these objectives can be reasonably accomplished, as described further below.

### Bicycle Crossing at Manhan Rail Trail

As previously mentioned, final design plans for the extension of the Manhan Rail Trail call for a bridge structure at the King Street crossing. An interim crossing provision will be provided by new signal accommodations at Stop & Shop, although the means of connecting this crossing to the Manhan Rail Trail to the east remains unresolved. Given funding concerns for the trail project, this study reviewed several options for making an at-grade connection a more permanent alternative, if possible, to the bridge treatment planned. While a number of options were considered, the most promising included:

- Continuing the bikeway between Spoleto's and the Pot Pourri Mall and connecting to the bike right-of-way. This option requires right-of way acquisition and demolition of the back third of the Back to Work Center building. Given these constraints, this option was discounted. (If this site becomes slated for redevelopment, however, this would become the preferred route).
- Regrading and paving (with textured surface treatments) the front of the Spoleto's site to create space for an 8 to 10-foot shared path (while retaining the circulation pattern around Spoleto's). Bicyclists would then be routed south to the beginning of the Hess property and then east to the bikeway right-of-way. This option appears viable from an engineering standpoint, but does require easements from both the Spoleto's and Hess property owners. Discussions with the property owners would be the logical next step for this option.
- The last option worth considering is the extension of the raised median south from the Stop & Shop driveway to Church Street, with the provision of a median pedestrian refuge area at an at-grade crossing in the vicinity of Church Street and the southern limits of Mass Electric property. (This location would be signed and well-lit but not signalized. Utilization would need to be monitored to evaluate the need for a pedestrian signal in the future). Minor widening of King Street would likely be required on the west side, but it appears that this can be accomplished within the existing right-of-way. Modification of the current easement with Mass Electric would also be required. More engineering is required (with better base mapping) to understand the full extent of the improvements needed to accomplish this connection.

### Access Management Improvements

Many driveway curb cuts and five signalized intersections exist along the one-mile length of the corridor. Many studies have verified the correlation between crash frequency and the number of driveways and intersections along arterial corridors. A well-managed corridor in this type of setting, from an access perspective, would provide a maximum of 20 to 30 access points per mile. The King Street corridor currently has twice that number. To the extent possible, driveway access should be limited along King Street. This is important not just from the motorists' perspective but also reduces potential conflicts with bicycles and pedestrians. This could be accomplished with the installation of a center median and/or by driveway consolidation as redevelopment of the corridor occurs. Where multiple driveways exist for one business, the number should be reduced to one driveway or two with one-way in/one-way out access restrictions. Wherever possible, driveway access should be shared by multiple businesses or provided off of existing side streets.

With respect to overall mobility, an arterial of this type would also have a maximum of four (4) to eight (8) traffic control signals per mile, appropriately spaced along the corridor. King Street already has five traffic signals along its length and one flashing beacon. A sixth traffic signal is currently proposed at the site of the old Hill and Dale Mall. As a result, the King Street corridor is pretty well saturated with traffic signals. All major redevelopment projects along the corridor should strive to integrate their access/egress locations into one of these pre-existing or planned traffic signals.

### Corridor-wide traffic signal coordination

With regard to overall traffic signal coordination and management, a field inventory of the five existing signalized intersections along the corridor was conducted in October 2003. This inventory was completed to help identify the necessary steps for future traffic signal coordination along the corridor. A coordinated system can minimize the number of stops that through traffic along the corridor would have to make and can also reinforce the 30 mph speed limit by timing traffic signals so that a vehicle in progression can travel the corridor

[3] Alternative Treatments for At-Grade Pedestrian Crossings, Institute of Transportation Engineers (ITE) 2001

uninterrupted at 30 mph. It is anticipated that as many as two additional signals could be added to this coordination, as necessary, in the future. These two locations are the Hill and Dale Mall and Carlon Drive (currently a flashing signal)[4]. In addition, redevelopment opportunities along the corridor may alter the current traffic signal at Finn Street to provide time for a new site driveway located directly across from Finn Street. While traffic signal warrants and associated analysis would need to be performed, (to determine if fully operational traffic signals are required at these locations) the optimal design for access to these new developments would align them directly across from Carlon Drive and Finn Street to provide for four-way traffic signals.

To implement a coordinated signal system along King Street in the future, south of the Bridge Road/Damon Road intersection, traffic signal equipment upgrades will be required at Barrett Street and at Carlon Street (should this signal be deemed warranted). An equipment upgrade would also be required at the Stop & Shop driveway should one not be provided as part of the pedestrian improvements slated at that location. In addition, loop detection is recommended on the local street approaches of Finn Street and North Street and a southbound lead phase could also be desirable at North Street. A more detailed intersection analysis of King Street and North Street (including a data collection effort) is necessary to identify the need for a southbound lead phase at that location.

## Installation of a Modern Roundabout

The feasibility of a modern roundabout was investigated at all intersections within the study area. Roundabouts are channelized intersections where traffic moves in a one-way direction around a raised central island that is usually circular in shape. They should be fitted to the characteristics of the intersection and designed so that emergency vehicles and trucks can easily navigate the circle. A mounted curb is sometimes used to provide enough room for the trucks to negotiate the circle. Typically, the right of way is designated to those vehicles inside the roundabout and entering vehicles must yield. This operation allows free-flowing movement on the circular roadway, while minimizing the delay for entering vehicles.

Modern roundabouts should not be confused with the infamous New England rotary. Rotaries are typically very large (300 to 600 feet in diameter) creating a high-speed environment that can result in high crash rates and low capacity. Modern roundabouts have a much more compact design (100 to 250 feet in diameter) and their geometry dictates vehicle speeds of between 12 and 20 mph approaching and through the intersection. Crash rates for single lane roundabouts have been shown to be considerably lower than any other type of intersection control, and, although the addition of an additional lane in the roundabout brings crash rates closer to those of traffic signals, the low speed environment tends to keep the severity of those crashes to property damage only. Improvements in pedestrian safety is seen particularly at single lane roundabouts due to the simplification of the crossing as the pedestrian crosses one direction of traffic at a time. At two lane roundabouts, the safety benefits are reduced somewhat. The visually impaired community has raised some concern towards roundabouts. Those concerns include trouble finding the crossing points and then determining when it is safe to cross due to the noise of circulating traffic masking vehicles stopped at the crosswalk. Good design can solve the first problem and research is currently being conducted to develop measures to assist with the second. Safety of bicyclists at roundabouts has seen mixed results. The general consensus is that bike lanes should not be marked around the circulating roadway of a roundabout and in higher volume roundabouts an off road option should be provided.

Due to the current right of way limits along the King Street corridor, a modern roundabout could not be placed at any of the current intersections without significant land takings. If future signalized intersection improvements require the addition of more turning lanes and require expanding the right of way, a roundabout option should also be considered and the overall impacts of both should be compared.

[4] Plans to convert Carlon Drive to a full traffic signal hinge on redevelopment plans at the currently vacant Ponderosa Steakhouse and defunct plumbing supply store (both located on King Street opposite Carlon Drive)

# A "BLUEPRINT FOR THE FUTURE"

Heavy traffic volume, numerous driveways, high crash experience, and the lack of pedestrian and bicycle accommodations all indicate that King Street is not functioning as the kind of community resource that it has the potential to be. The King Street corridor is in need of "a vision" that can guide redevelopment along the corridor. This vision would achieve an effective allocation of right of way to accommodate the needs of all users, motorized and non-motorized, while serving the access needs of adjacent land uses. This vision would also embrace many principles of good access management, traffic management, and context sensitive design.

The challenge facing King Street is to identify and provide the transportation infrastructure needed to support and enhance it as a destination corridor, a gateway to the downtown center, and a vibrant neighborhood. The alternatives considered identify potential localized and corridor-wide enhancements that will help improve the operations and safety for all users, while at the same time preserving the character of the area. Corridor recommendations are provided in Figure 8. An evaluation matrix associated with the potential alternatives (presented in Table 3) was used to shape the corridor recommendations.

The recommendations presented herein will undoubtedly require further discussion among the Northampton Office of Planning and Development, the City's Transportation Advisory Committee, and interested stakeholders. Upon reaching consensus on the ultimate plan, action items should then be prioritized into a phased implementation plan.

## Near-Term Actions

There are a number of near-term actions that the City of Northampton should implement along the King Street Corridor regardless of the larger scale vision for the corridor. These more immediate actions could be completed over the next two to five years, and in many ways are concepts already embraced by the City. They include:

- Seek to reduce the number of curb cuts along King Street in half. As opportunities arise, the City should consider restricting driveway access along the corridor. To the extent possible, curb cuts should be consolidated and the feasibility of limiting access to side streets and at existing signals investigated.
- Provide for safe pedestrian and bicycle crossing locations at multiple opportunities along the corridor through the integration of pedestrian phases and traffic controls at all signals along the corridor.
- Through the planned King Street/Damon Road/Bridge Road improvements and redevelopment of the Hill and Dale Mall and Kohl Morgen, establish a northern gateway into the King Street Commercial District and Downtown Northampton.
- Through land uses (municipal, residential, and urban in nature) and streetscape treatments (potentially narrowing the cross-section or providing bulb-outs with on-street parking) begin a transition to the Downtown along King Street in the vicinity of Finn Street.
- As intersection and sidewalk improvements are made, bring all sidewalks and ramps into ADA compliance.
- As a demonstration project, incorporate a bike lane in each direction along King Street, between Bridge Road/Damon Road intersection and the Manhan Trail connection by narrowing the traffic lanes along the corridor. Begin to monitor the effectiveness and utilization of these lanes.
- Consider beginning design for longer-term improvements to accommodate the Manhan Rail Trail connection in the absence of a bridge.

## Medium-Term Actions

Additional corridor-wide improvements, conceivably a longer-term 5 to 10 year plan, should be progressed and occur as redevelopment of King Street takes place. This may take several years to accomplish. Over the longer-term, the City should:

- Confirm the effectiveness of bike lanes along the corridor and, if deemed worthwhile, make any minor improvements to formalize their presence and operation in the corridor;
- Implement traffic signal coordination of the five existing traffic signals and any future traffic signals along the length of the corridor;
- Complete the extension of the Manhan Rail Trail with a crossing of King Street, either at-grade as previously described, or with the bridge that is already designed;
- Improve the transition between the highway business district and the downtown, south of Stop & Shop, by reinforcing the urban environment through land uses, site design, and a narrow traveled way; and,
- Incrementally improve corridor aesthetics through:
  - good site design,
  - placement of buildings closer to the street,
  - providing green relief,
  - providing pedestrian amenities,
  - reducing corridor scale to a more people oriented level, and
  - unifying corridor appearance through signage and streetscape.

**Table 3**

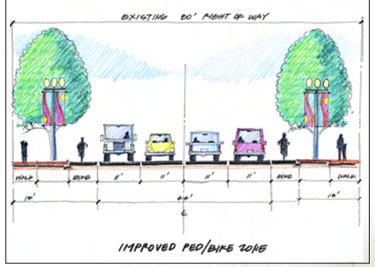
**Alternatives Evaluation Matrix - King Street Corridor Study**

| Proposed Alternative | Description | EVALUATION CRITERIA: Roadway Safety | Traffic Flow | Lack of Pedestrian/ Bicycle Facilities | Pedestrian/Bicycle Safety | Roadway Speed | Access Management | Potential for Traffic Diversion to Neighborhoods | Community Character | Potential Timetable | Cost | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Driveway Access Restriction** | Consolidate driveways or restrict turn-movements at driveways along corridor | ✓ | ✓ | ❍ | ✓ | ❍ | ✓ | ❍ | ✓ | Near-Term | $1,500 per location | Work is on-going to achieve this objective |
| **Traffic Signal Coordination** | Install coordinated system along entire corridor | ✓ | ✓ | ❍ | ❍ | ✓ | ✓ | ✓ | ❍ | Near-Term | $400,000 | |
| **Pedestrian Phasing Accommodation** | Provide pedestrian crossing phase and controls at all signalized intersections | ✓ | × | ✓ | ✓ | ❍ | ✓/×[1] | ❍ | ✓ | Near-Term | $20,000 per location. Included in signal coordination cost above. | Improved pedestrian accommodation should be a priority for the City |
| **Intersection Treatments** | Provide paving and streetscaping techniques that bring increased awareness to pedestrians | ❍ | ❍ | ✓ | ❍ | ✓ | ❍ | ❍ | ✓ | Medium-Term | $50,000 to $100,000 per intersection | Treatments will alert drivers to a change in surrounding land use from highway business to downtown center - focus on northern end of corridor and south of Stop & Shop |
| **Manhan Trail Cross Section** | Connect bikeway across King Street at grade | ❍ | ❍ | ✓ | ✓ | ❍ | ❍ | ❍ | ✓ | Medium-Term | TBD[2] | A worthwhile interim action given bridge funding status |
| **Corridor-wide Bicycle/ Pedestrian Zone** | Narrow lanes to provide on-road bicycle accommodation | ✓ | ❍ | ✓ | ✓ | ✓ | ❍ | ❍ | ✓ | Near-Term | $75,000 to $125,000 | Needs to be closely coordinated with access management improvements |
| **Corridor-wide Center Turn Lane** | Narrow roadway to 2-lane cross section and provide center left-turn lane | ✓ | × | ✓ | ✓ | × | ✓ | ❍ | ✓ | Near-Term | $100,000 to $150,000 | Alternative will result in significant traffic congestion. Congestion may cause vehicles to divert to parallel residential roadways |
| **Corridor-wide Center Planted Median** | Realign roadway to provide 4-lane cross section and median divided King Street | ✓ | ❍ | ❍ | ✓ | ✓ | ✓/×[3] | × | ✓ | Long-Term | $3,400,000 | Most appropriate alternative for access management and turning restrictions |
| **Corridor-wide Offset Roadway** | Realign roadway to provide 4-lane cross section and 25-foot off-road bike/ped path | ❍ | ❍ | ✓ | ✓ | ✓ | ❍ | ❍ | ✓ | Long-Term | $3,600,000 | Arguably the most disruptive alternative |

✓ = Positive Impact
❍ = No Impact
× = Negative Impact

1 Positive impact from reducing turning conflicts, potentially negative impact by businesses that have this access restriction.
2 TBD - To be determined upon further feasibility study.
3 Positive impact from the pedestrian perspective, potentially negative impact from the motorists' perspective.

Install (as a Demonstration Project) Bike Lanes along King Street between Bridge Road/Damon Road and Manhan Rail Trail Connection




Complete connection to Manhan Rail Trail across King Street

Reinforce beginning of downtown area by streetscape and land use design

Narrow roadway width to provide better pedestrian accommodation on west side

Restripe King Street for one through lane and an exclusive right-turn lane southbound to Finn Street

Damm Road
Bridge Road
King Street
Carlon Drive
Barrett Street
Finn Street
Myrtle Street
Summer Street
North Street

**Legend**

- Redevelopment Areas
- Existing Signalized Intersection
- Future Signalized Intersection
- Future Access Locations
- Potential Cross Access Points

**Aerial Map: 2001 MassGIS**

**General Recommedations**

- Provide for protected pedestrian crossings at all signalized locations
- Consolidate/limit driveways wherever possible or seek access from side streets
- Limit new signals along corridor
- Coordinate traffic signals south of Bridge Road/Damon Road intersection
- Improve corridor aesthetics through good site design, corridorlandscaping,and pedestrian amenities

# Figure 8
# Recommendations “Creating a District”

King Street Corridor Study
Northampton, Massachusetts

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