

**Whitehurst Freeway
Deconstruction Feasibility Study**

Draft Evaluation of Alternatives

August 2006

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1.0 INTRODUCTION

The purpose of the Whitehurst Freeway Deconstruction Feasibility Study is to determine the impacts of removing the Whitehurst Freeway on the study area in terms of traffic, access to Georgetown and the future waterfront park, land use and value, and other factors. This information is used to develop and evaluate alternative roadway configurations and connections to accommodate current and future traffic patterns if the Whitehurst Freeway is removed.

Over the course of the study, the project team of the District Department of Transportation (DDOT) and consultants worked closely with city officials, community and business groups, and individual members of the public to identify goals and objectives for the study and a range of alternatives that would be analyzed. This outreach took the form of technical groups and public meetings in which the project team learned about the options that were preferred by a variety of groups. Members of the public suggested several new alternatives, which the project team then added to the study. In all, the project team evaluated 19 alternatives, which are discussed in detail in Section 2 of this report.

The evaluation of the alternatives was based on the ability of the alternative to meet several key objectives identified by the project technical advisory committee and the general public. The 10 key objectives of the study are to:

- Accommodate future traffic volumes without significant deterioration in peak period traffic operations
- Improve traffic operations on M Street NW during congested periods
- Improve pedestrian access to Georgetown businesses, parking facilities, and the future waterfront park
- Improve transit operations
- Improve vehicular access to Georgetown businesses, parking facilities, and the future waterfront park
- Improve urban design and the visual environment by minimizing the presence of visual barriers at the waterfront
- Avoid impacts on water resources
- Avoid disruption to existing land uses
- Maximize public participation to develop transportation improvements that are supported by the community
- Avoid impacts on historic structures

With these objectives in mind, the project team established a set of criteria to evaluate the alternatives. The 28 criteria are divided into categories: 1) meeting key study objectives, 2) minimizing transportation impacts and traffic, 3) maintaining neighborhood character, and 4) minimizing cost. Details about the study's evaluation process are described in Section 3 of this report, and the evaluation results are presented in Section 4.

Section 5 of the report describes the results of a traffic simulation and impact assessment that was conducted for the best performing alternatives from the evaluation. Section 6 summarizes the key findings of the study and the next steps for the project.

2.0 ALTERNATIVES CONSIDERED

The Whitehurst Freeway Deconstruction Feasibility Study examined 19 alternatives during the course of the project. These alternatives were developed based on a review of existing conditions and the results of two community design workshops held in April and May 2005. At these workshops, participants suggested a variety of options for consideration in the study. Many of the alternatives are variations of the same concept. Thus the 19 alternatives were grouped into four families of alternatives:

- Family 1 – No Build and No Build Plus. For these alternatives, the Whitehurst Freeway would remain in place, but with modifications.
- Family 2 – At Grade Avenue with Connections to Key Bridge and Canal Road. For these alternatives, the Whitehurst Freeway would be deconstructed and K Street NW would become an at-grade avenue with connections to Key Bridge and Canal Road.
- Family 3 – Like Family 2, the alternatives in Family 3 would see a deconstructed Whitehurst Freeway and K Street turned into an at-grade avenue with connections to Canal Road, but without connections to Key Bridge.
- Family 4 – For these alternatives, the Whitehurst Freeway would be deconstructed, K Street would be connected to Canal Road, and K Street traffic would be placed in a tunnel east of 33rd Street.

The four families and 19 alternatives are described in detail below.

2.1 Family 1 – No Build and No Build Plus

For these alternatives, the Whitehurst Freeway would remain in place, but with modifications.

Alternative 1 – No Build

Alternative 1 is a no-build option, where the Whitehurst Freeway would stay in place with no significant modifications. One minor alteration would include a change to the existing lane configuration, adding the ability to make a through movement from the inside left turn lane on the west approach to the Canal Road and Whitehurst Freeway intersection. All of the Family 1 alternatives include this additional through movement. (See Figure 2.1)

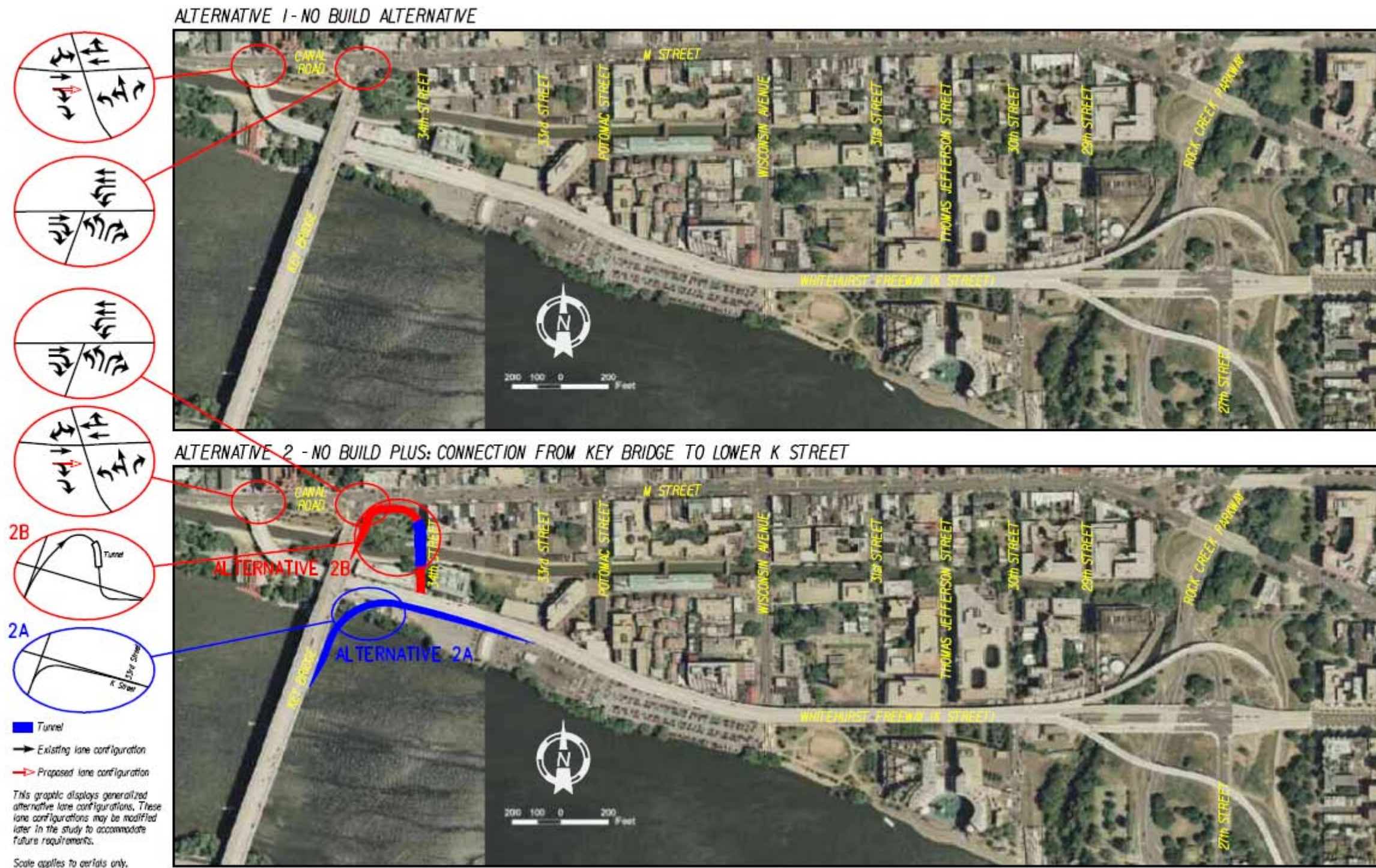
Alternative 2 – No Build Plus, Connection from Key Bridge to K Street

Like Alternative 1, the Whitehurst Freeway would stay in place for Alternative 2. However, Alternative 2A calls for a ramp connection from the Key Bridge to K Street, and Alternative 2B proposes a connection from Key Bridge to K Street featuring a tunnel under the C & O Canal at 34th Street. (See Figure 2.2)

Alternative 3 – No Build Plus, Lane Configuration Improvements

Alternative 3 also assumes that the Whitehurst Freeway remains in place but proposes a change at the eastern end of the Whitehurst Freeway—the addition of a left-turn lane from K Street to 27th Street. The new lane configuration would require modification of signal timing. (See Figure 2.3)

Figures 2.1 and 2.2 – Family 1, Alternatives 1 and 2



Figures 2.3 and 2.4 – Family 1, Alternatives 3 and 4



Figures 2.5 and 2.6 – Family 1, Alternatives 5 and 6

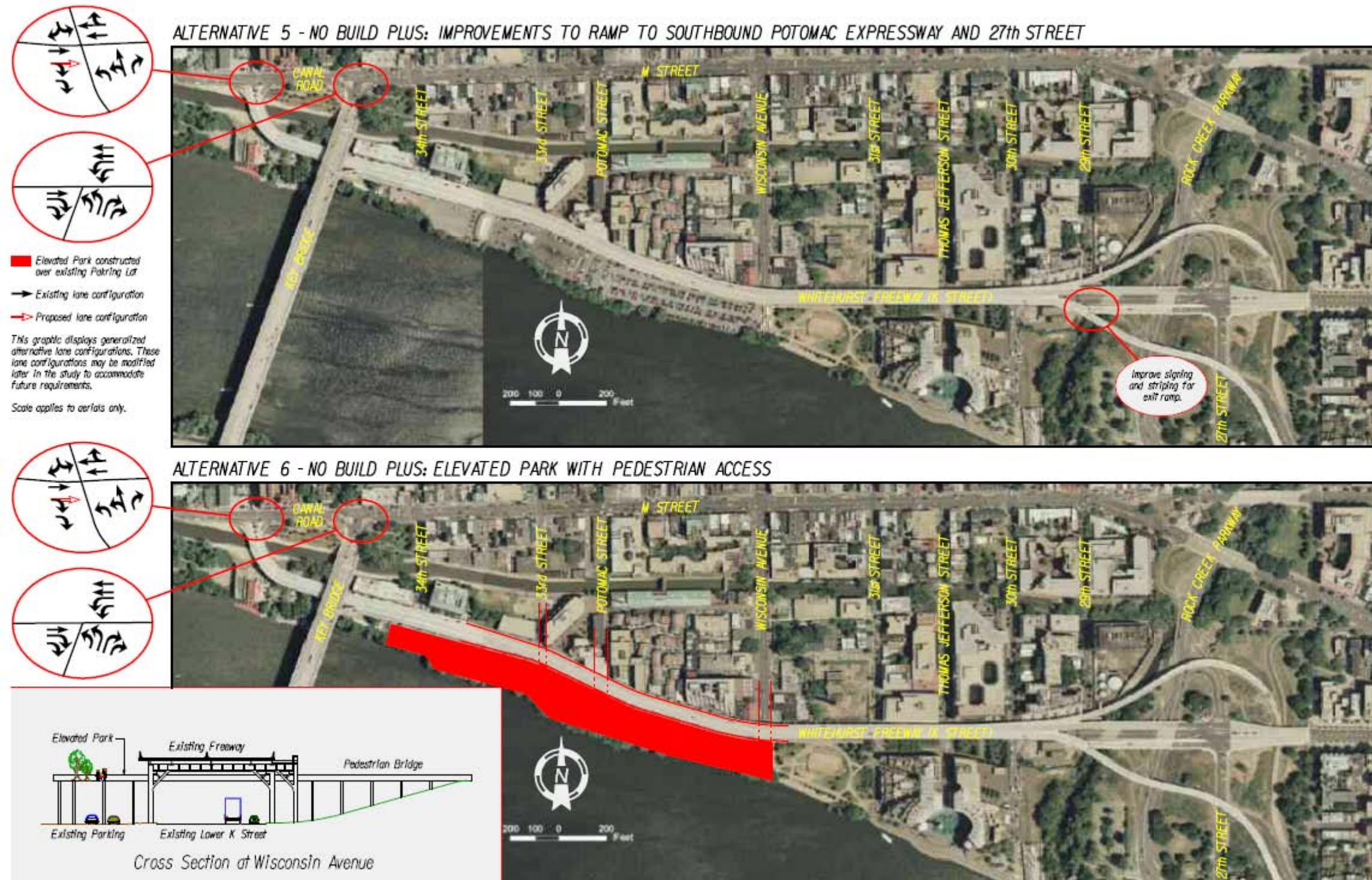
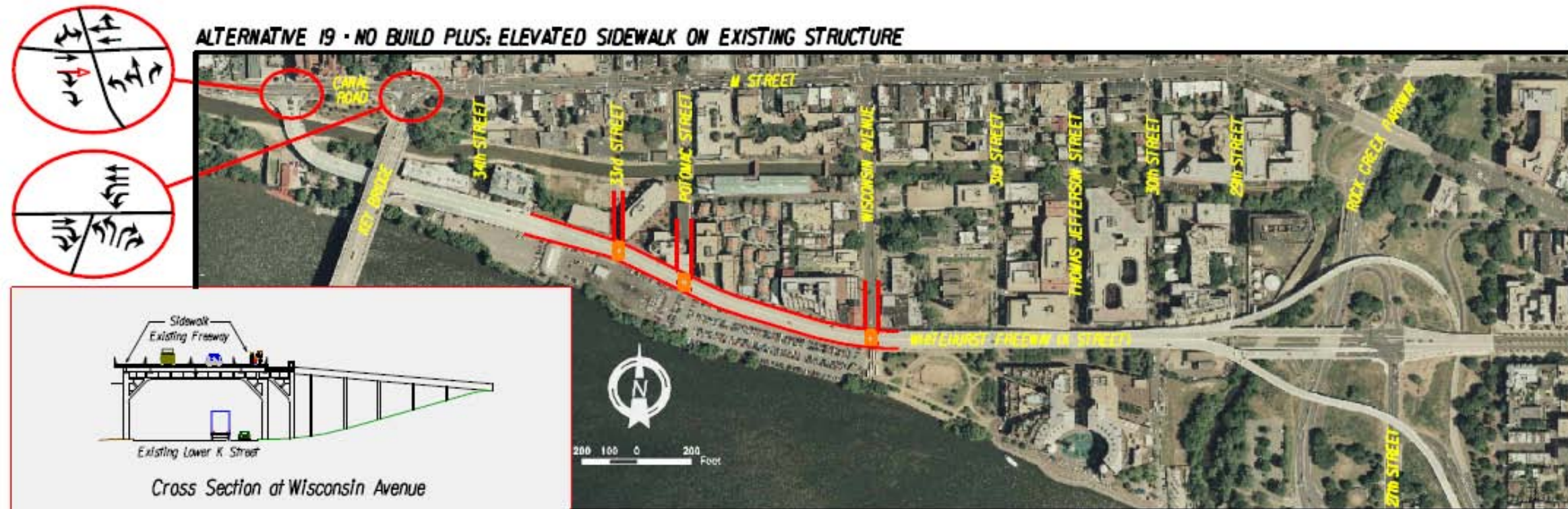


Figure 2.7 – Family 1, Alternative 19



- Existing lane configuration
- Proposed lane configuration
- Pedestrian Signal

This graphic displays generalized alternative lane configurations. These lane configurations may be modified later in the study to accommodate future requirements.

Scale applies to aeriols only.

Alternative 4 – No Build Plus, Access Ramps to Rock Creek Parkway

Alternative 4 includes additional access ramps that would connect the Whitehurst Freeway directly to Rock Creek Parkway. Alternative 4A is a ramp from eastbound Whitehurst Freeway to northbound Rock Creek Parkway, and Alternative 4B is a ramp from eastbound Whitehurst Freeway to southbound Rock Creek Parkway. (See Figure 2.4)

Alternative 5 – No Build Plus, Ramp Improvements to Southbound Potomac Expressway and 27th Street

Alternative 5 proposes improvements to signage and striping for the exit ramp from the Whitehurst Freeway to southbound Potomac Expressway. (See Figure 2.5)

Alternative 6 – No Build Plus, Elevated Park with Pedestrian Access

Alternative 6 proposes that an elevated park be built above existing parking next to the southern side of the Whitehurst Freeway. The elevated park would have pedestrian access from a series of bridges running perpendicular to the freeway from 33rd Street, Potomac Street, and Wisconsin Avenue. (See cross-section in Figure 2.6)

Alternative 19 – No Build Plus, Elevated Sidewalk on Existing Structure

Alternative 19 proposes two elevated sidewalks on the existing Whitehurst Freeway—one in each direction—that would have pedestrian signals and access to 33rd Street, Potomac Street, and Wisconsin Avenue. (See cross-section in Figure 2.7)

2.2 Family 2 – At Grade Avenue with Connections to Key Bridge and Canal Road

For the alternatives in Family 2, the Whitehurst Freeway would be deconstructed and K Street would become an at-grade avenue with connections to Key Bridge and Canal Road. A number of existing lanes in the study area would be reconfigured or eliminated as well.

Alternative 8.1 – At Grade Avenue with Short Connection from Key Bridge

For Alternative 8.1, the Whitehurst Freeway would be removed and northbound Key Bridge would be connected to eastbound K Street via an exit ramp. The western end of K Street would connect with Canal Road. Changes would take place to at the opposite end of the study area at the at-grade intersection of K Street and 27th Street. At this intersection, 27th Street would be extended north to Pennsylvania Avenue and ramps from the Potomac Expressway would connect directly to K Street at 27th Street. K Street itself would become an at-grade avenue with anywhere from five to eight lanes. (See Figure 2.8.1) Options for the K Street lane configurations for this alternative include:

- Five lane cross-section that includes two-lanes in each direction and a center left turn lane for the peak traffic hours that allows on-street parking in the outside lanes during non-peak hours only
- Five lane cross-section that includes two-lanes in each direction and a center left turn lane with no on-street parking allowed at any time
- Six lane cross-section with three lanes in each direction and no on-street parking allowed along the roadway at anytime

- Six lane cross-section with one barrier-separated outside lane in each direction reserved for local access and two inside travel lanes reserved for through traffic only
- Five lane cross-section that includes a dedicated bus lane in each direction, a through-traffic lane in each direction, and a center left turn lane.

Alternative 8.2 – At Grade Avenue with Long Connection from Key Bridge

Alternative 8.2 is the same as 8.1, except that the connection from Key Bridge to Lower K Street begins closer to mid-span on Key Bridge allowing the ramp to come down to grade on K Street further west than Alternative 8.1. This alternative includes the same five K Street lane configuration options and 27th Street and K Street intersection improvements as Alternative 8.1. (See Figure 2.8.2)

Alternative 8.3 – At Grade Avenue with Connection from Key Bridge via 34th Street

Alternative 8.3 is the same as Alternatives 8.1 and 8.2 except that the ramp connection from Key Bridge to K Street would instead come in the form of a new ramp from Key Bridge north of K Street that would connect with existing 34th Street, cross over the C & O Canal, and intersect with the north side of K Street. This alternative includes the same five K Street lane configuration options and 27th Street and K Street intersection improvements as Alternative 8.1. (See Figure 2.8.3)

Alternative 11 – At Grade Avenue with both Eastbound and Westbound Connection to Key Bridge

Alternative 11 proposes the deconstruction of the Whitehurst Freeway and calls for the same changes to roadway geometry at the at-grade intersection between K Street and 27th Street as Alternatives 8.1, 8.2, and 8.3. However, where those alternatives offer five options for the lane configuration of K Street, Alternative 11 proposes one—three lanes each direction with one center reversible turn lane. In addition, the west end of K Street is different from the other alternatives in that Alternative 11 proposes an on-ramp from westbound K Street to southbound Key Bridge, and an off-ramp from northbound Key Bridge to eastbound K Street using a tunnel under existing 34th Street. (See Figure 2.9)

Alternative 13 – At Grade Avenue with Relocated Connection from Canal Road and Connection from Key Bridge to Eastbound and Westbound K St.

Alternative 13 proposes the deconstruction of Whitehurst Freeway and the same five lane configuration options for K Street as in Alternatives 8.1, 8.2, and 8.3. Alternative 13 also calls for the same roadway improvements for the at-grade intersection of K Street and 27th Street as these alternatives. However, in Alternative 13, K Street would be extended further west along the waterfront to a new connection crossing over the C & O Canal to intersect Canal Road near the entrance to Georgetown University. In addition, a new set of spiral ramps would be constructed to connect northbound Key Bridge with both eastbound and westbound K Street. (See Figure 2.10)

Alternative 16 – Spiral Ramp from Key Bridge to K Street

Alternative 16 proposes the same changes as Alternative 8.1; however, the connection from northbound Key Bridge to eastbound K Street takes the form of a spiral ramp that extends out

Figure 2.8.1 – Family 2, Alternative 8.1

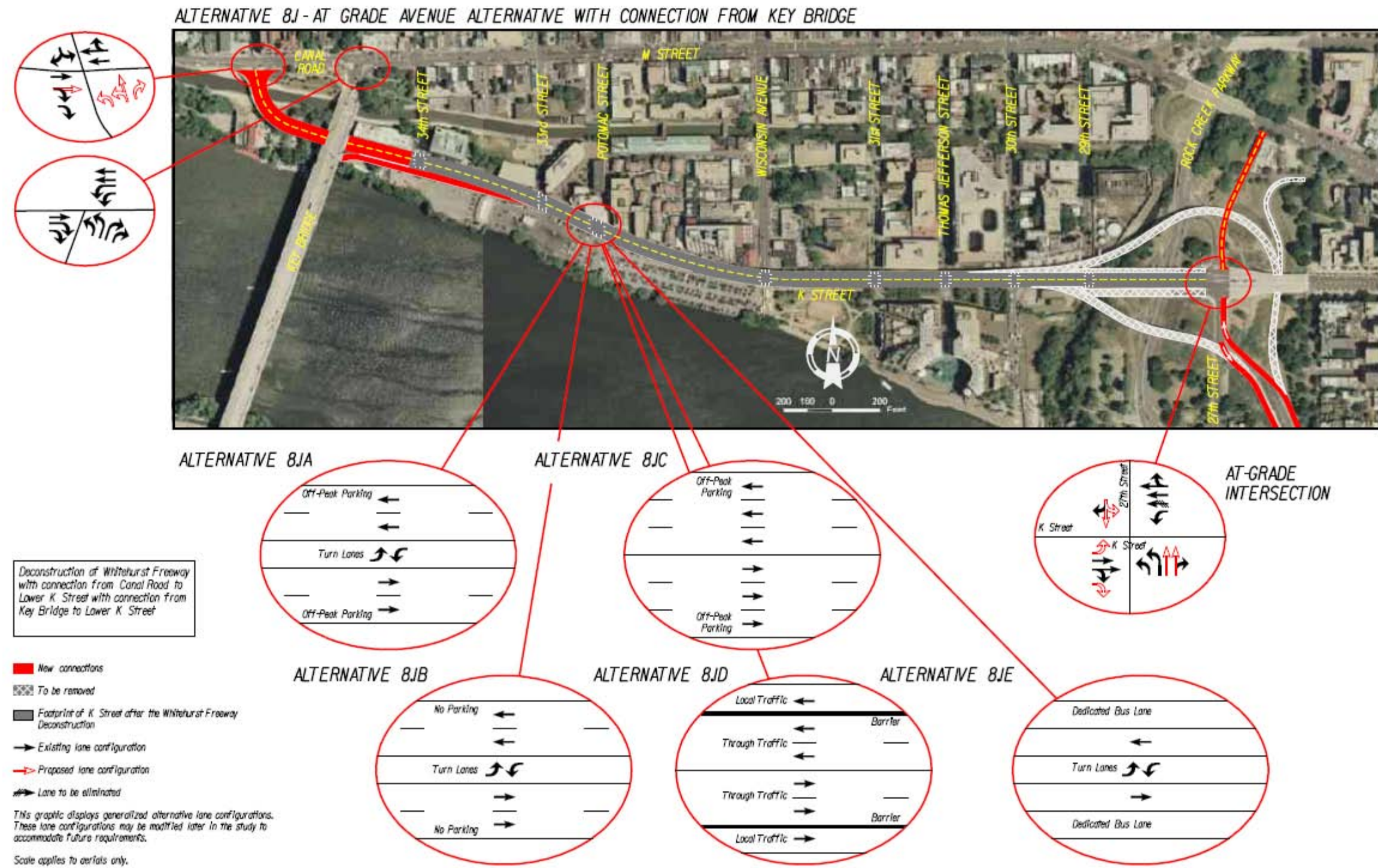


Figure 2.8.2 – Family 2, Alternative 8.2

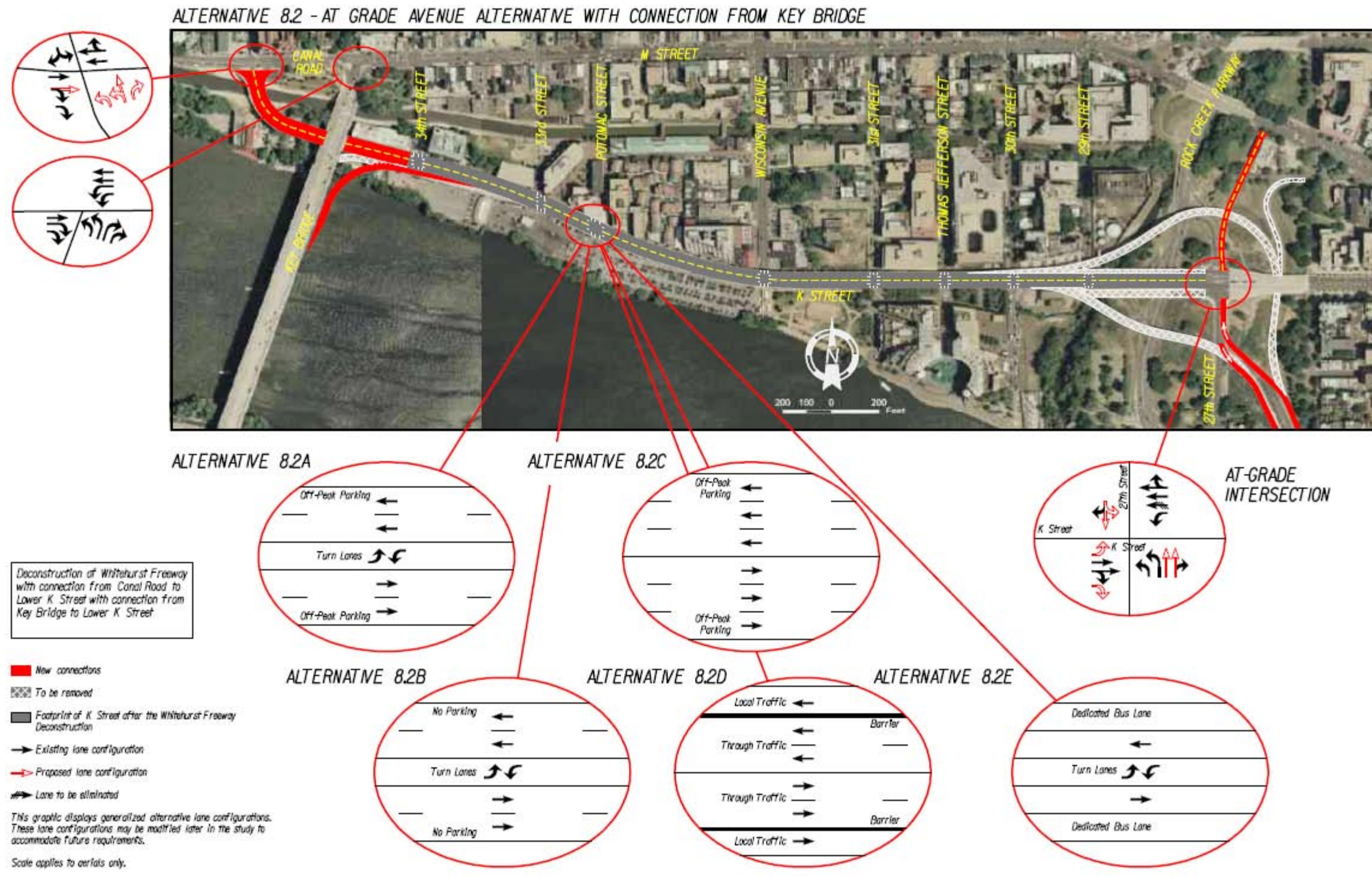


Figure 2.8.3 – Family 2, Alternative 8.3

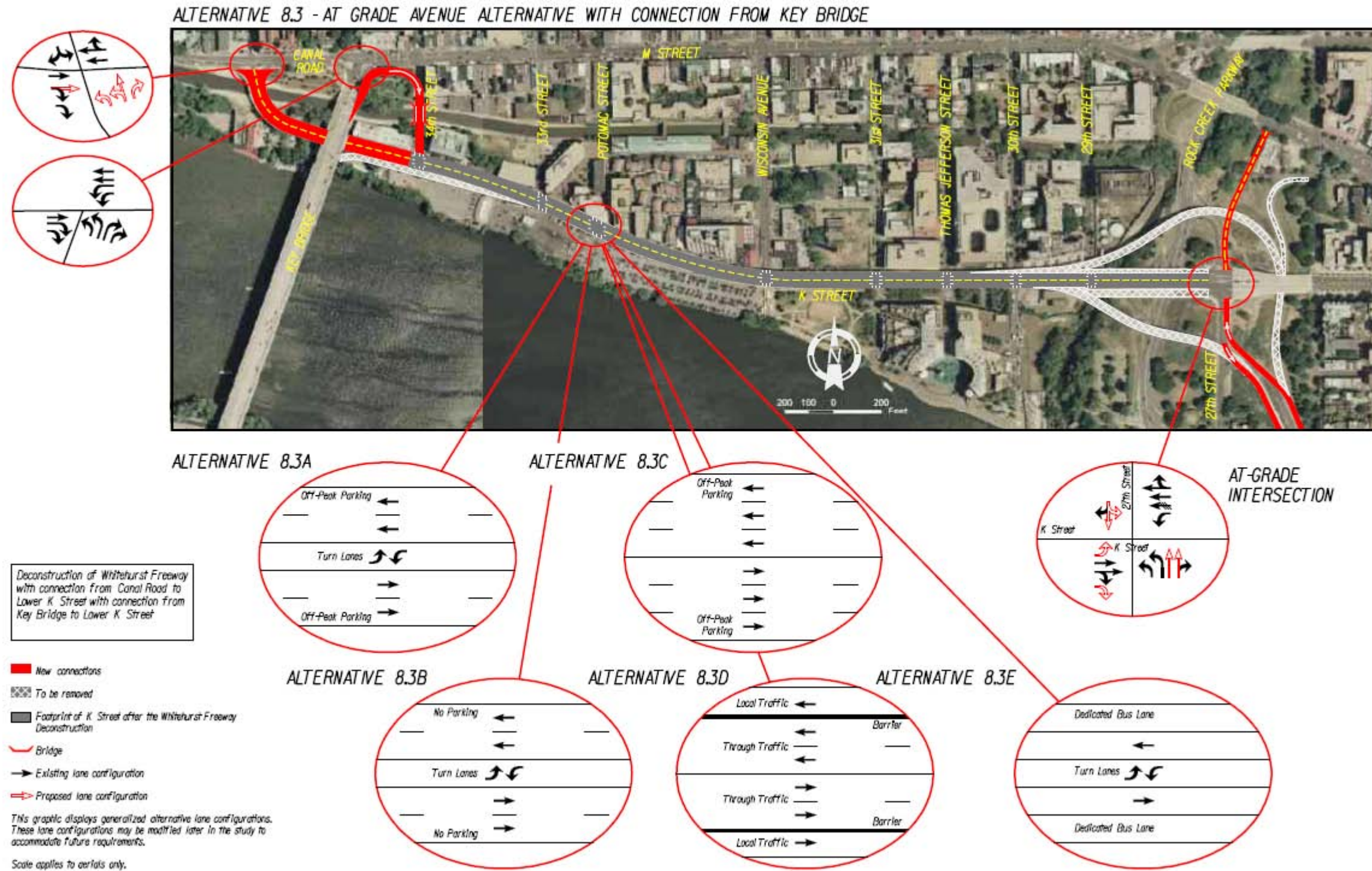


Figure 2.9 – Family 2, Alternative 11

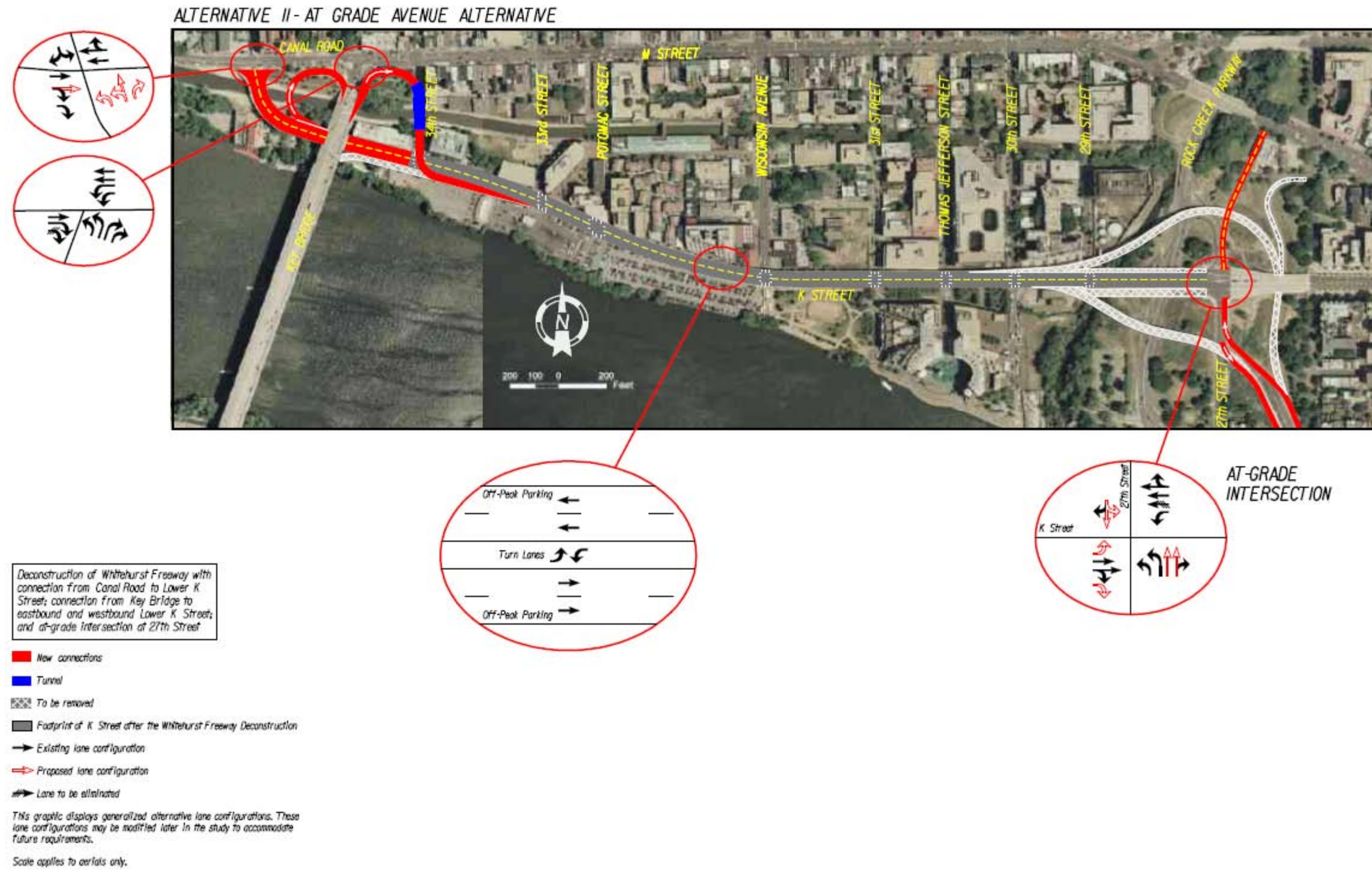


Figure 2.10 – Family 2, Alternative 13

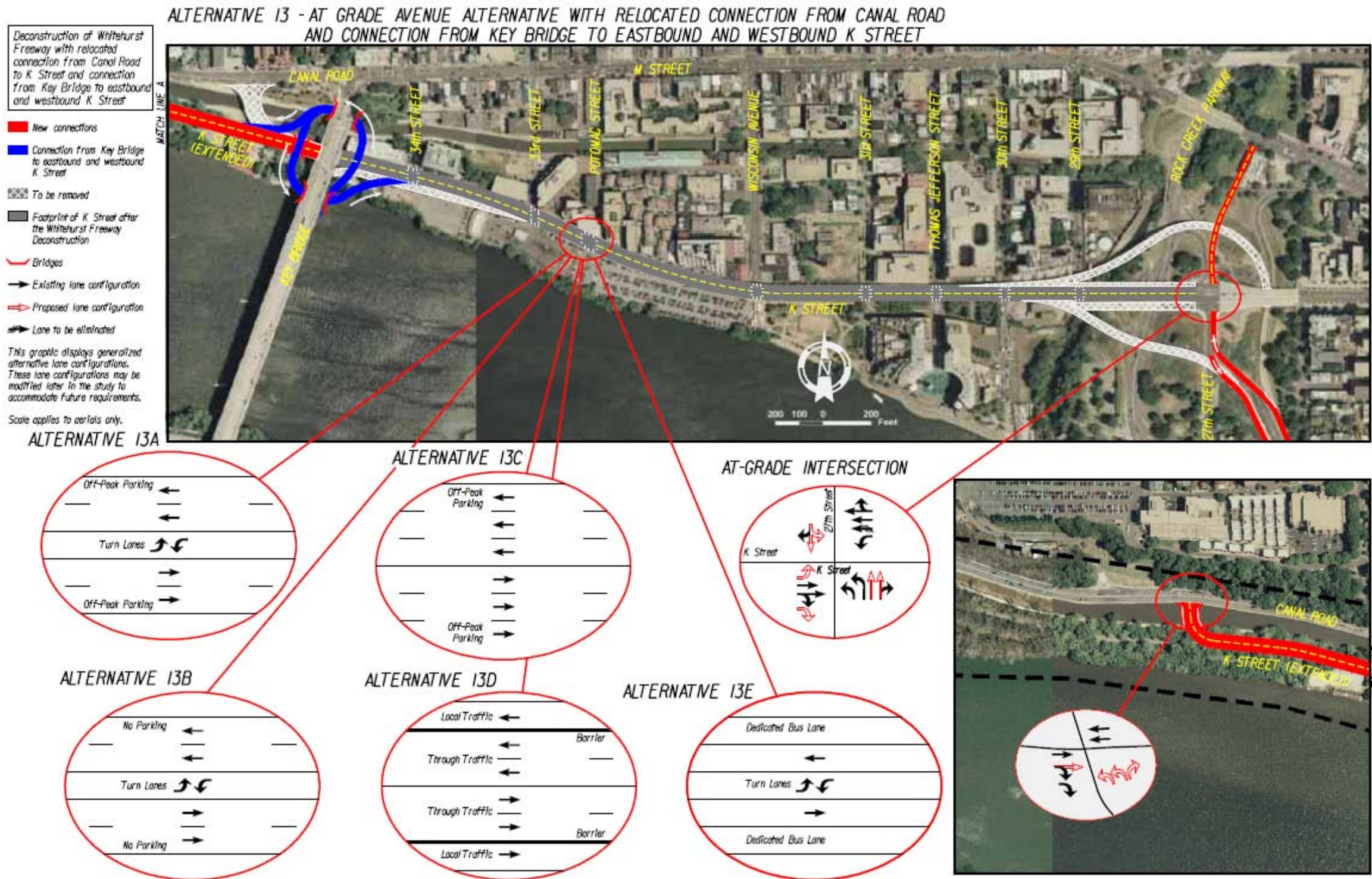
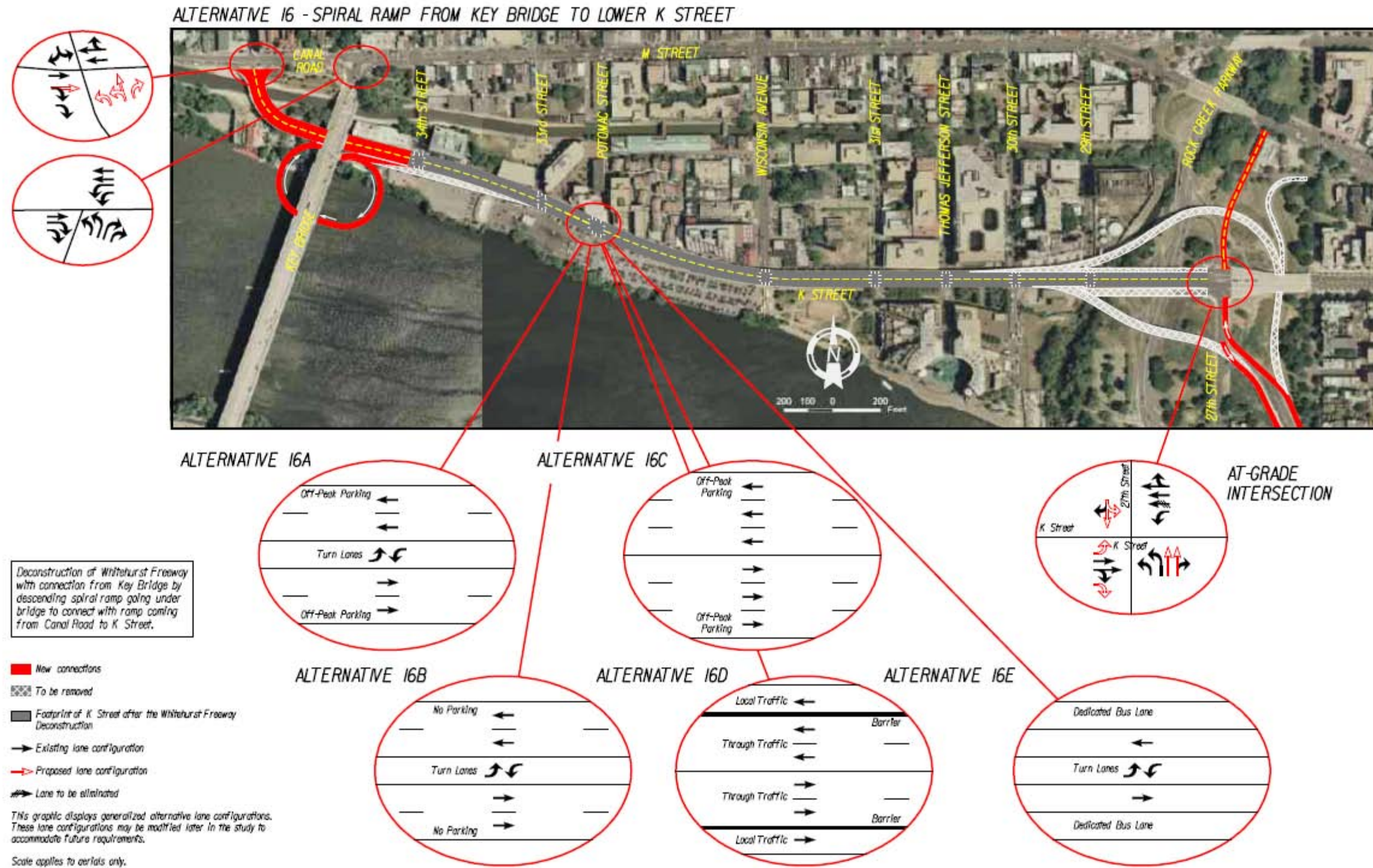


Figure 2.11 – Family 2, Alternative 16



over the Potomac River and then back under the Key Bridge before touching down on eastbound K Street. (See Figure 2.11)

2.3 Family 3 – At Grade Avenue Without Connection from Key Bridge but with Connection from Canal Road

Like Family 2, the alternatives in Family 3 would see a deconstructed Whitehurst Freeway and K Street turned into an at-grade avenue with connections to Canal Road, but without connections to Key Bridge.

Alternative 7 – At Grade Avenue Without Connection from Key Bridge

Alternative 7 proposes the same five lane configuration options for K Street and the same roadway geometry change to the intersection of K Street, 27th Street, and Potomac Expressway as Alternatives 8.1, 8.2, 8.3, 13, and 16. However, there is no connection provided between Key Bridge and K Street. Instead, K Street goes under the Key Bridge and terminates at Canal Road. (See Figure 2.12)

Alternative 9.1 – At Grade Avenue Maintaining Ramps at Eastern End (1)

Alternative 9.1 is like Alternative 7 in that they propose the same five lane configuration options for K Street, and in both scenarios, K Street connects with Canal Road and no connection to Key Bridge is provided. However, Alternative 9.1 includes ramps that connect K Street with the Potomac Expressway and a ramp that connects eastbound K Street with southbound 27th Street for unimpeded traffic flow. (See Figure 2.13.1)

Alternative 9.2 – At Grade Avenue Maintaining Ramps at Eastern End (2)

Alternative 9.2 is the same as 9.1 except that the ramp from Potomac Expressway to K Street would be shortened and there would be no ramp from K Street to southbound 27th Street. (See Figure 2.13.2)

Alternative 10 – Depressed K Street Without Connection from Key Bridge

Alternative 10 features the same roadway geometry changes as Alternative 7 at the intersection of K Street with 27th Street and Potomac Expressway, and the western end of K Street also goes under Key Bridge to connect with Canal Road. However, Alternative 10 also includes a depressed K Street that passes underneath Wisconsin Avenue, 31st Street, and Thomas Jefferson Street, all of which provide access to the Potomac waterfront. One at-grade local access lane in each direction along K Street is maintained to provide local access and connections to the north-south cross streets. (See Figure 2.14)

Alternative 12 – At Grade Avenue with Relocated Connection from Canal Road to K Street

Alternative 12 is the same as Alternative 13, except that the western extension of Lower K Street to Canal Road does not connect with Key Bridge. (See Figure 2.15)

Alternative 14 – Shifting Intersection of 27th and K Street to the East

Alternative 14, like the other alternatives in this family, calls for the deconstruction of the Whitehurst Freeway and the connection of K Street to Canal Road without ramps to Key Bridge.

Figure 2.12 – Family 3, Alternative 7

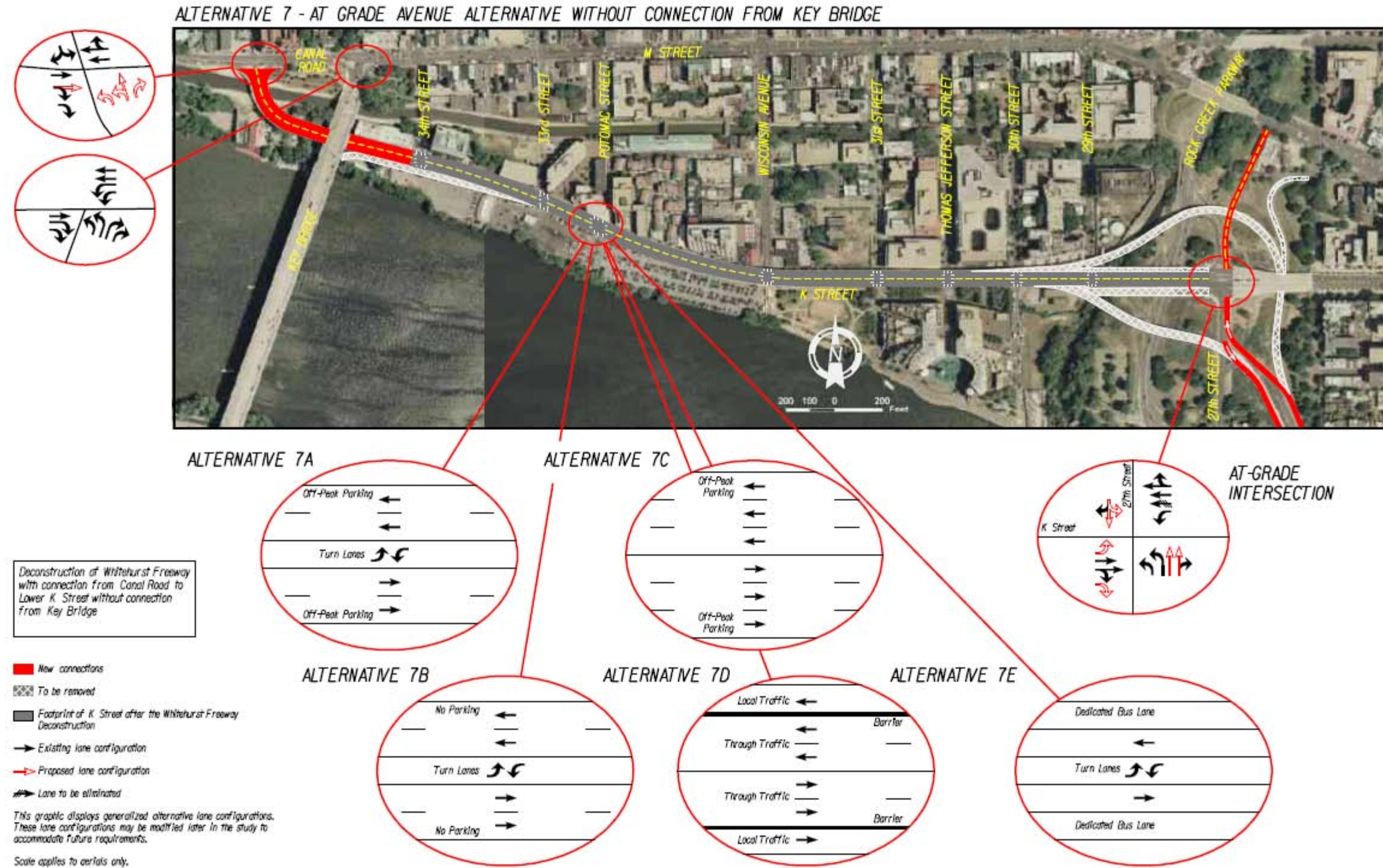


Figure 2.13.1 – Family 3, Alternative 9.1

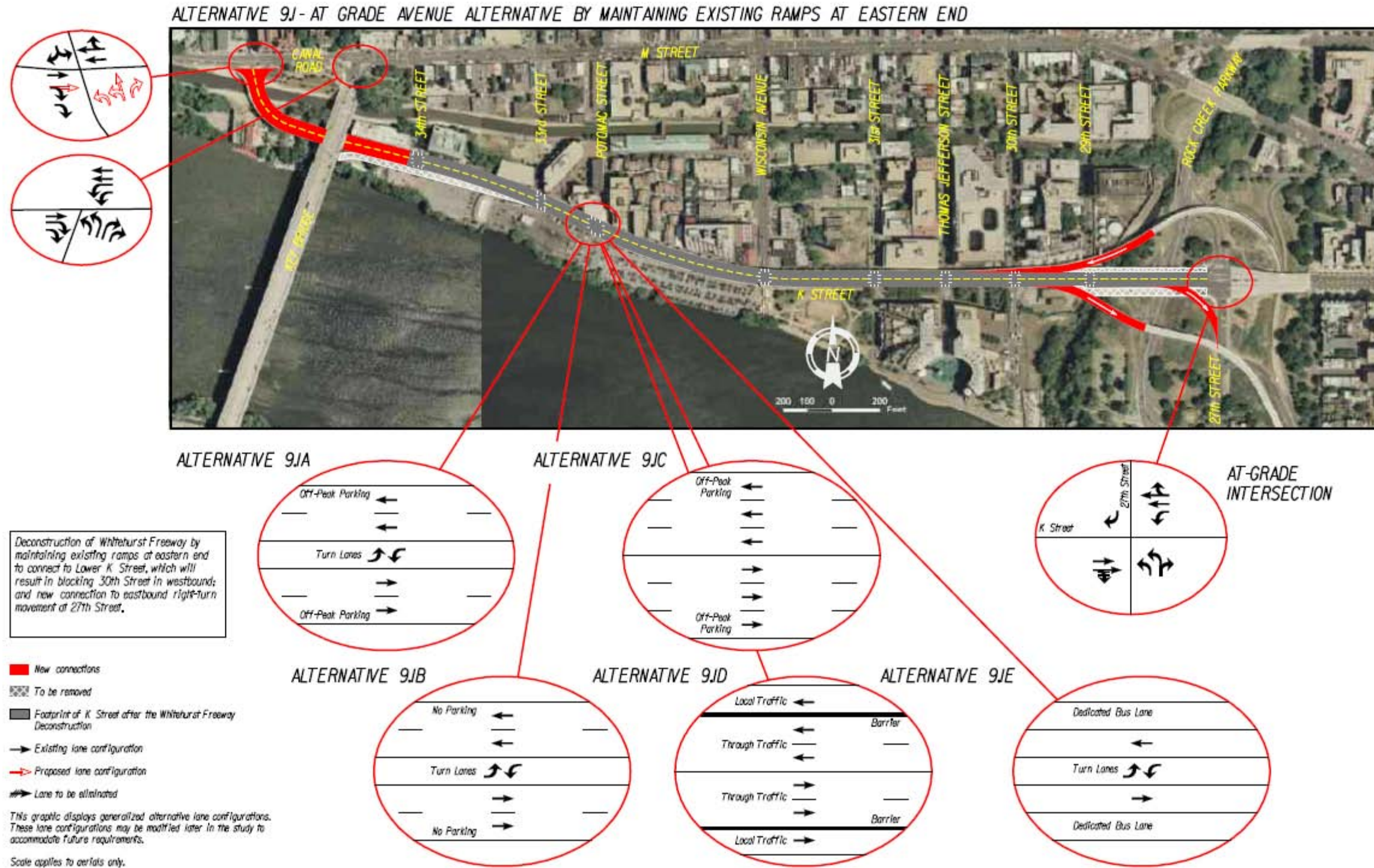


Figure 2.13.2 – Family 3, Alternative 9.2

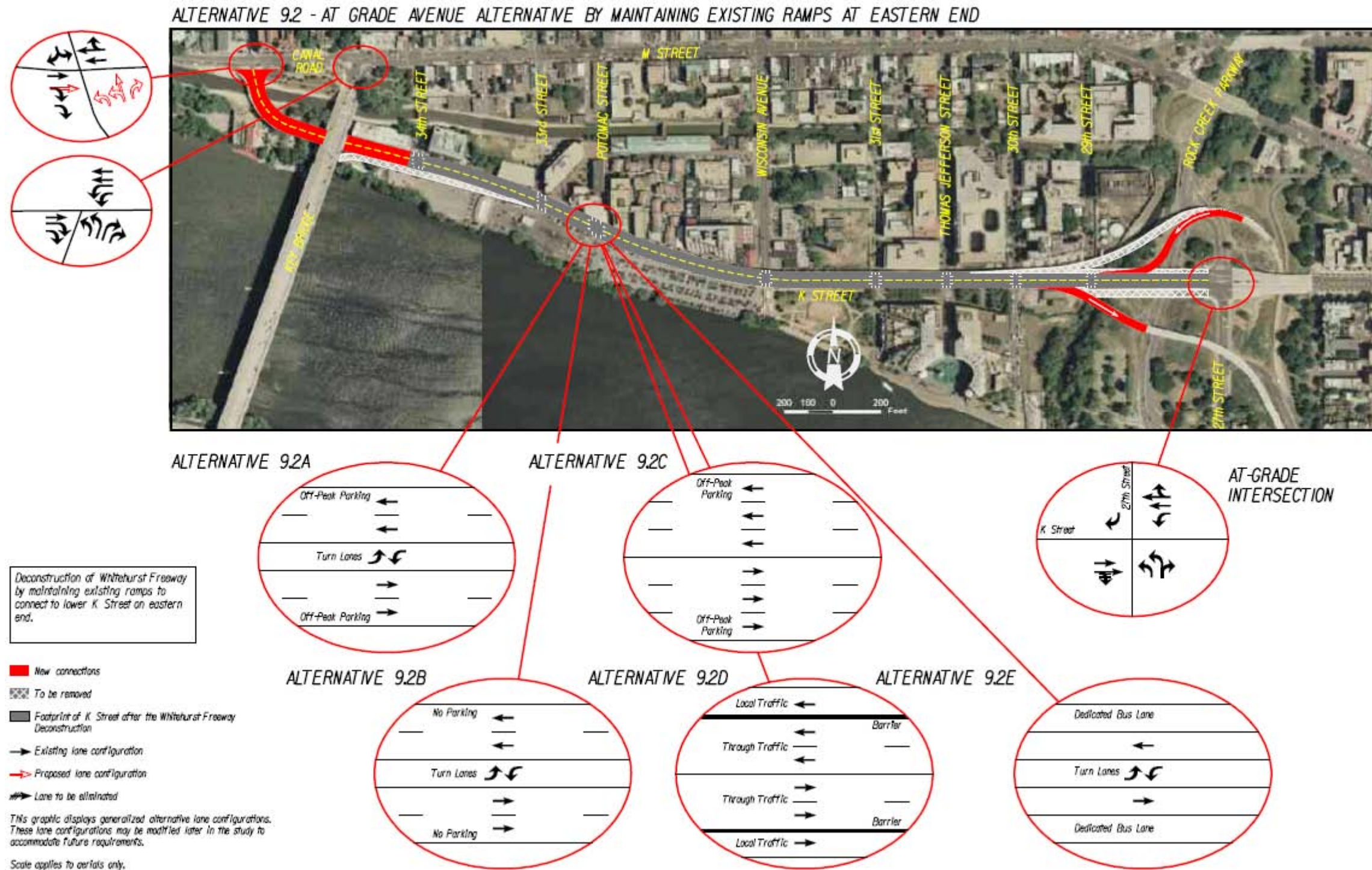


Figure 2.14 – Family 3, Alternative 10

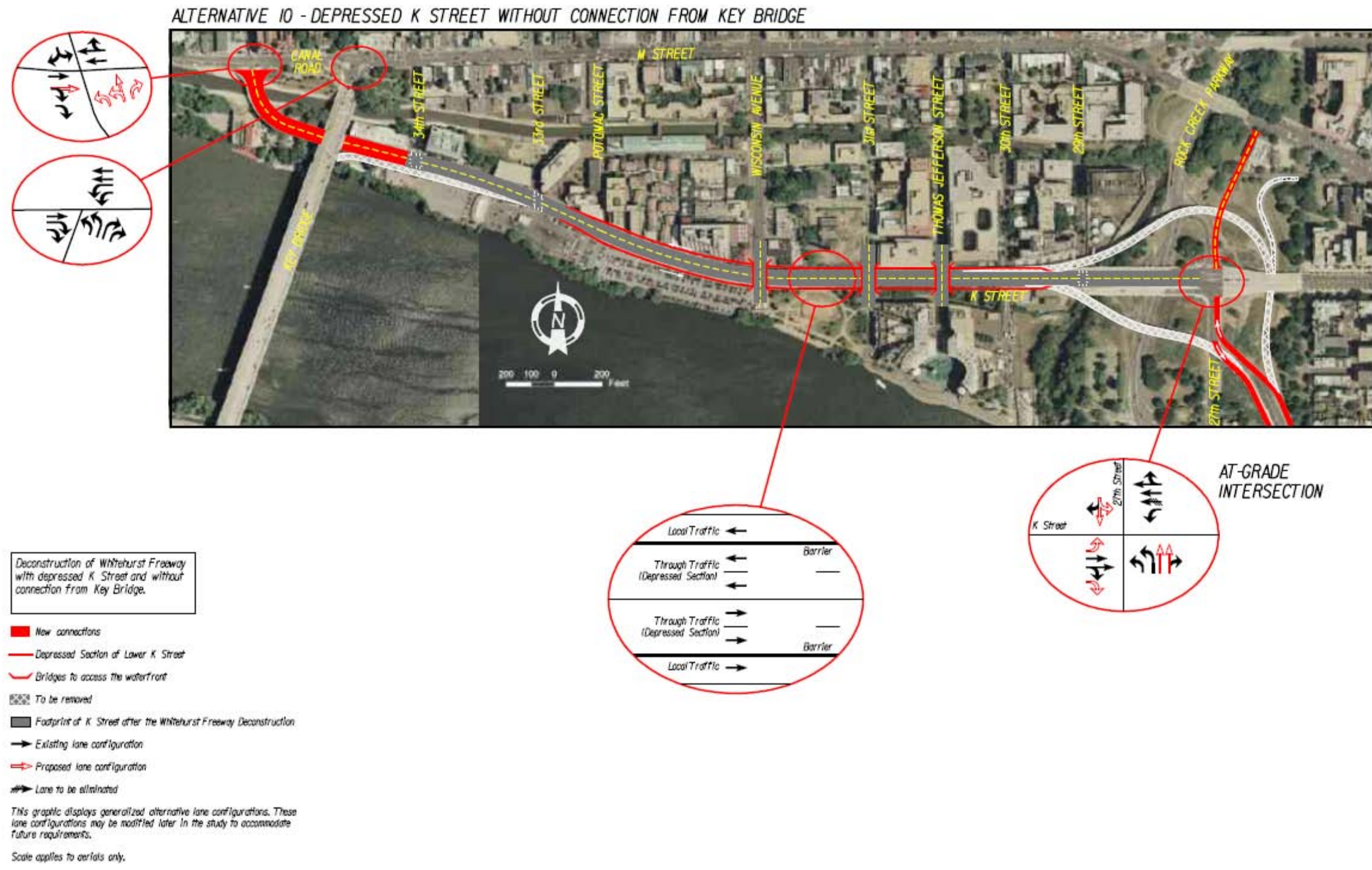


Figure 2.15 – Family 3, Alternative 12

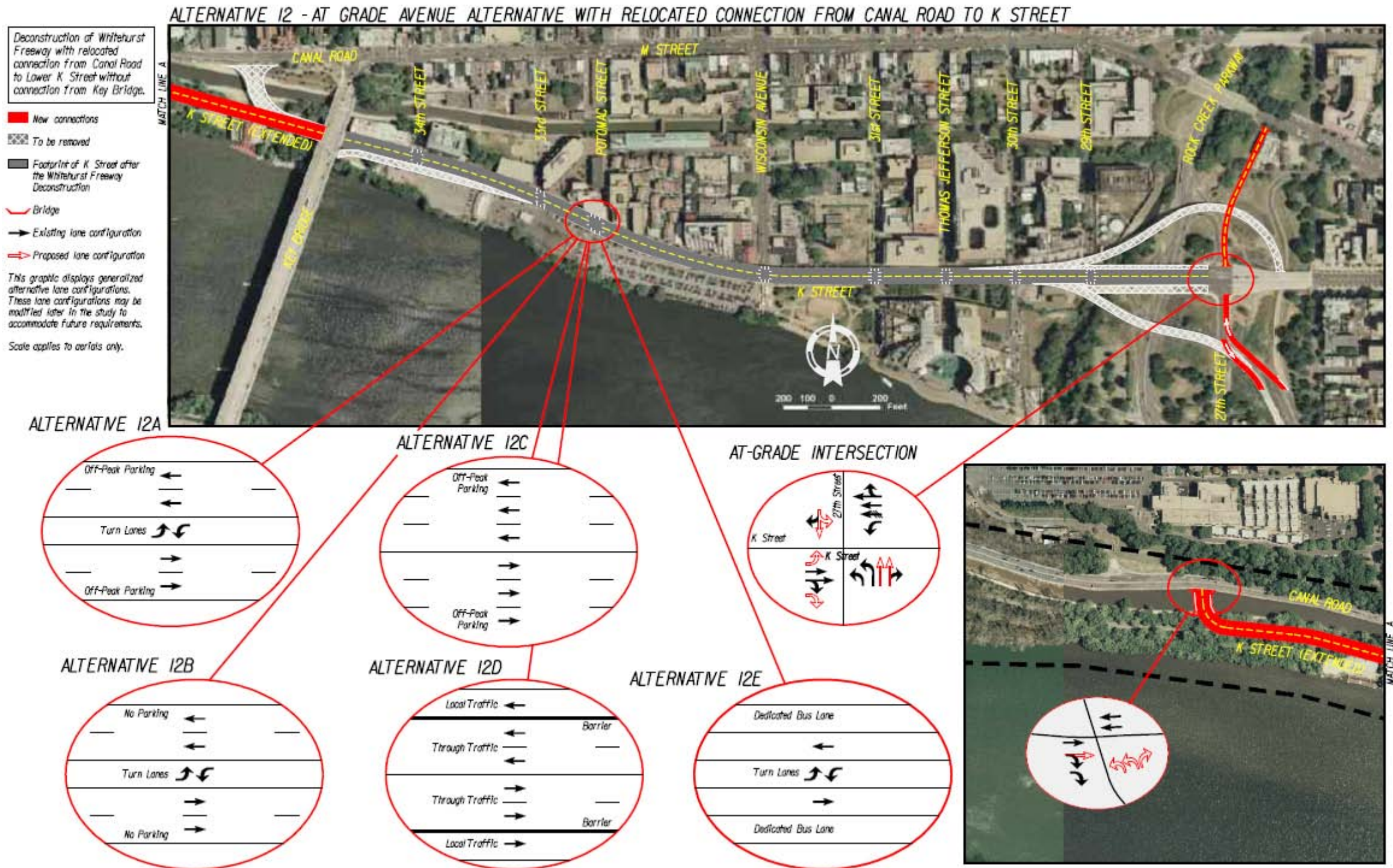


Figure 2.16 – Family 3, Alternative 14

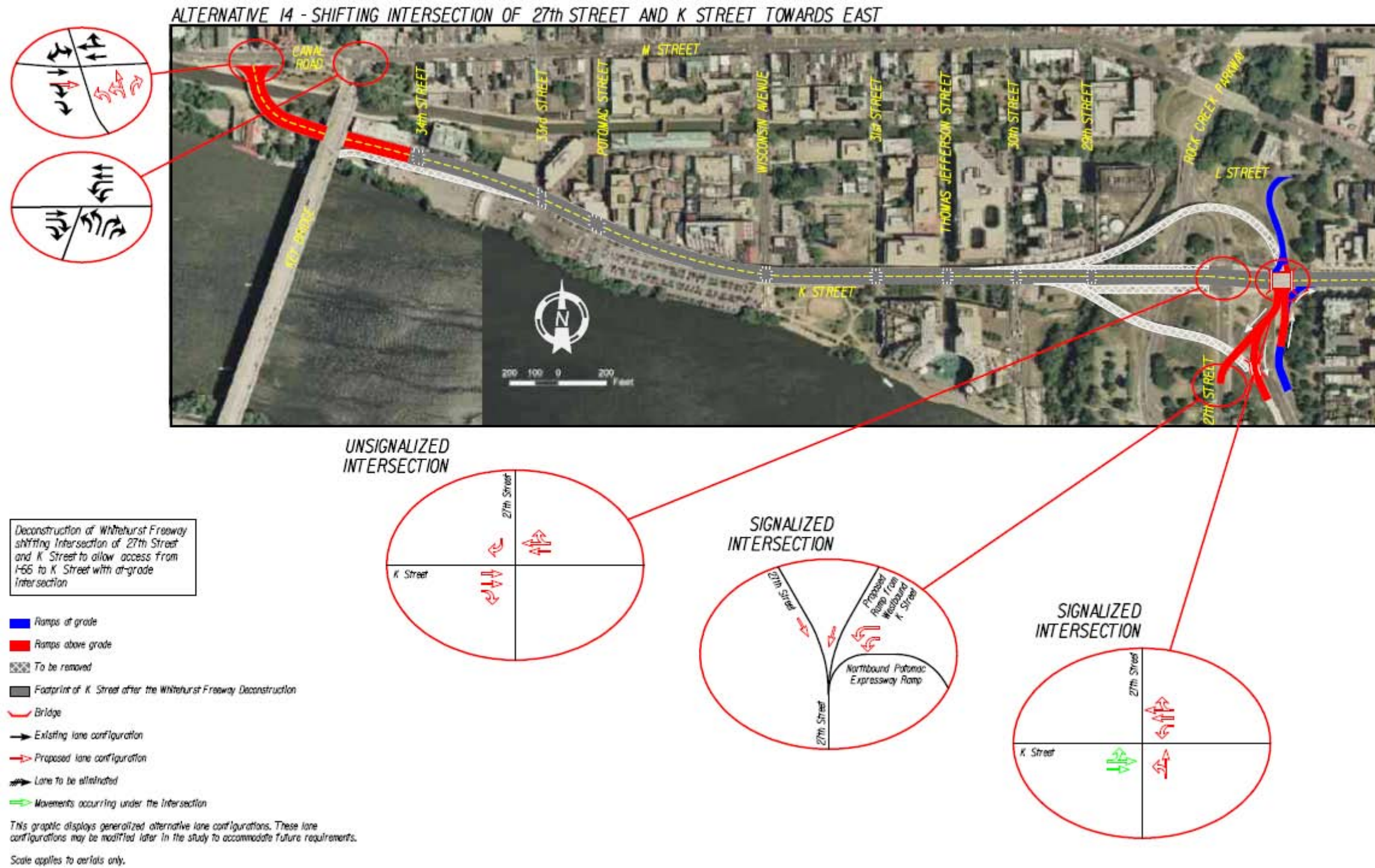
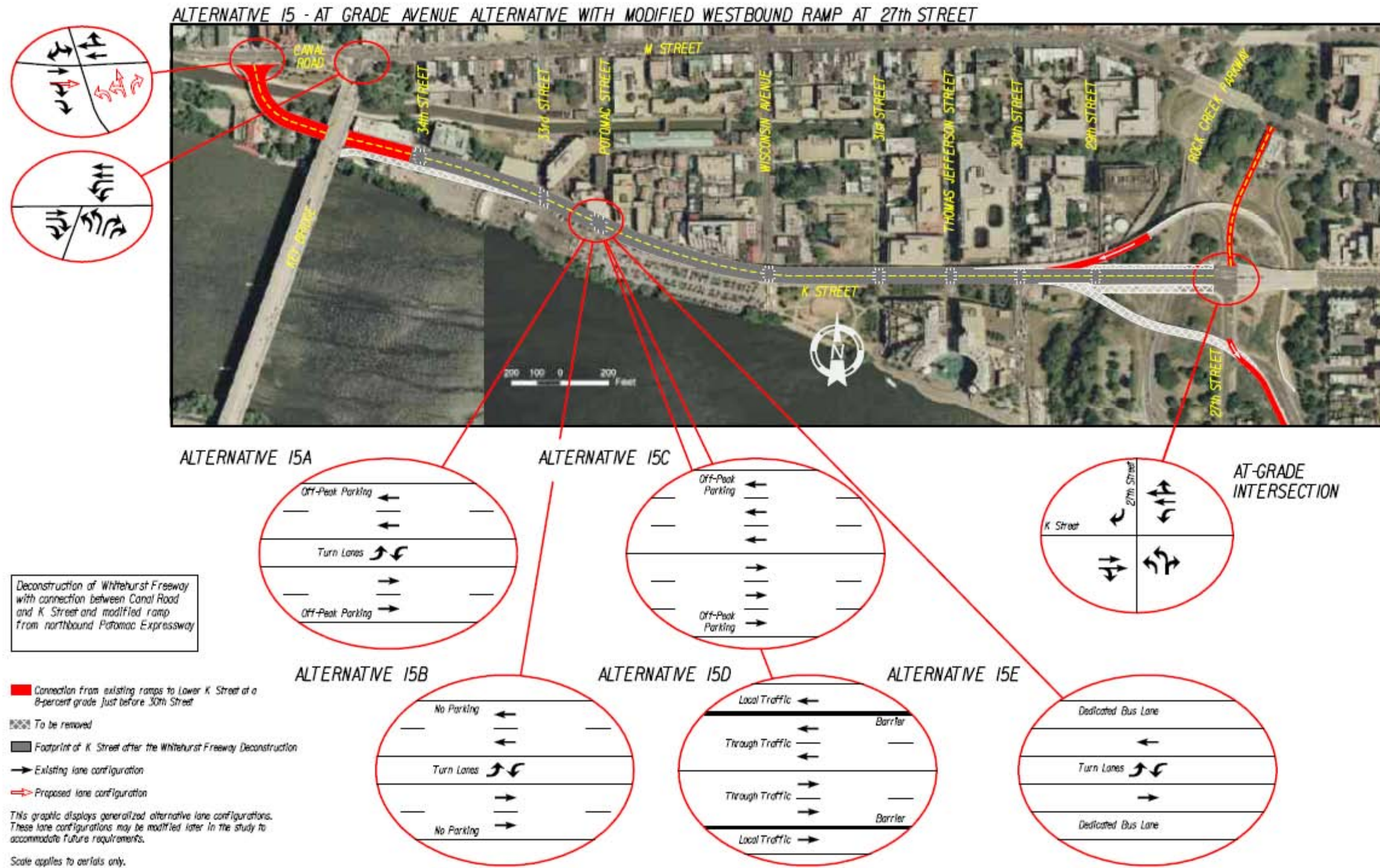


Figure 2.17 – Family 3, Alternative 15



But this alternative is different at the eastern end of the study area where the intersection of K Street with 27th Street and Potomac Expressway would be moved to the east. Some of the new ramps in the new configuration would be at grade, while others would be above grade. The existing at-grade intersection of K Street and 27th Street would be unsignalized. A signal would be used at the new above-grade intersection of K Street and a new north/south roadway to the east of 27th Street. The eastbound through traffic movement on K Street would be grade-separated from the new signalized intersection so that movement would not have to stop as traffic continues on the east. Westbound traffic at the new intersection on K Street would be subject to the new traffic signal. A signal would also be used at the intersection of 27th Street with a proposed ramp from westbound K Street and the ramp from northbound Potomac Expressway. (See Figure 2.16)

Alternative 15 – At Grade Avenue with Modified Westbound Ramp at 27th Street

Alternative 15 is the same as Alternative 9.1, except for changes to the intersection between K Street and 27th Street. In Alternative 15, 27th Street would be extended north from the intersection with K Street to Pennsylvania Avenue. In addition, the ramp from northbound Potomac Expressway to westbound K Street would be reconfigured, and the ramp from eastbound K Street to Potomac Expressway would be removed in favor of an on-ramp from southbound 27th Street. (See Figure 2.17)

2.4 Family 4 – Tunnel Options

For these alternatives, the Whitehurst Freeway would be deconstructed and a tunnel under existing K Street would be provided east of 33rd Street. Alternatives 17 and 18 would include this tunnel to accommodate through traffic along K Street plus some other roadway modifications as described below.

Alternative 17 – Short Tunnel along K Street

Alternative 17 includes the removal of the Whitehurst Freeway and the construction of a short tunnel between 33rd Street and 29th Street, underneath K Street, to accommodate through traffic. On the surface above the tunnel, K Street would have three lanes in each direction with a reversible turn lane in the center to access local businesses and cross streets. The tunnel itself would have one of two lane configurations: Alternative 17A calls for two lanes in each direction, while Alternative 17B calls for one lane in each direction. The western end of K Street would run underneath Key Bridge and connect with Canal Road; no direct connection from Key Bridge to K Street would be provided. 27th Street would extend north from the at-grade intersection of K Street and 27th Street to Pennsylvania Avenue, and new ramps would be built to Potomac Expressway from southbound 27th Street and to northbound 27th Street from Potomac Expressway. (See Figure 2.18)

Alternative 18 – Long Tunnel Extending to Washington Circle

Alternative 18 is the same as Alternative 17 with regard to the lane configuration options for the tunnel and K Street, the connection of K Street and Canal Road, and the connections between K Street with 27th Street and Potomac Expressway. The difference is that, instead of the eastern portal of the tunnel being located near 29th Street, the tunnel extends farther east to Washington Circle. (See Figure 2.19)

Figure 2.18 – Family 4, Alternative 17

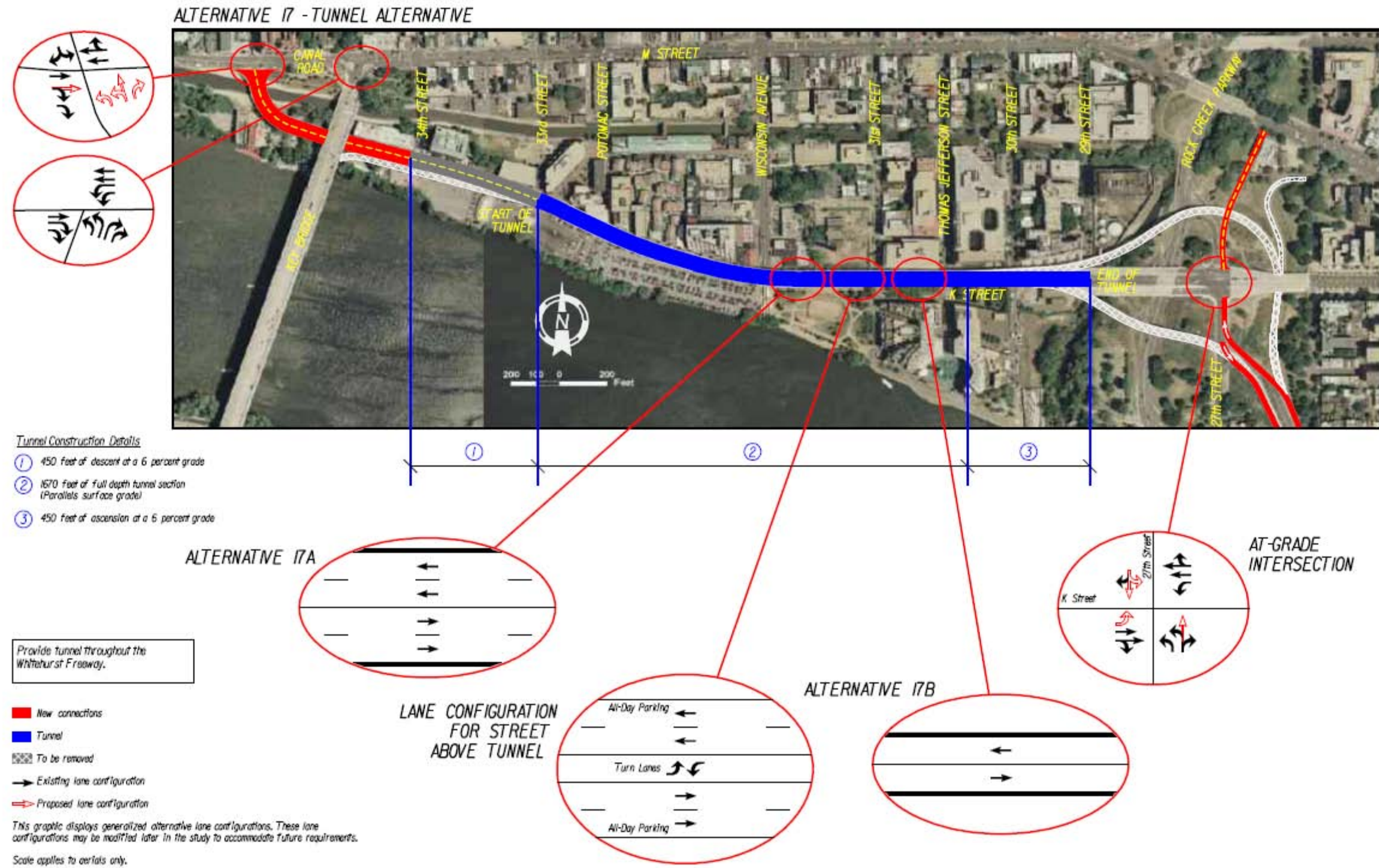
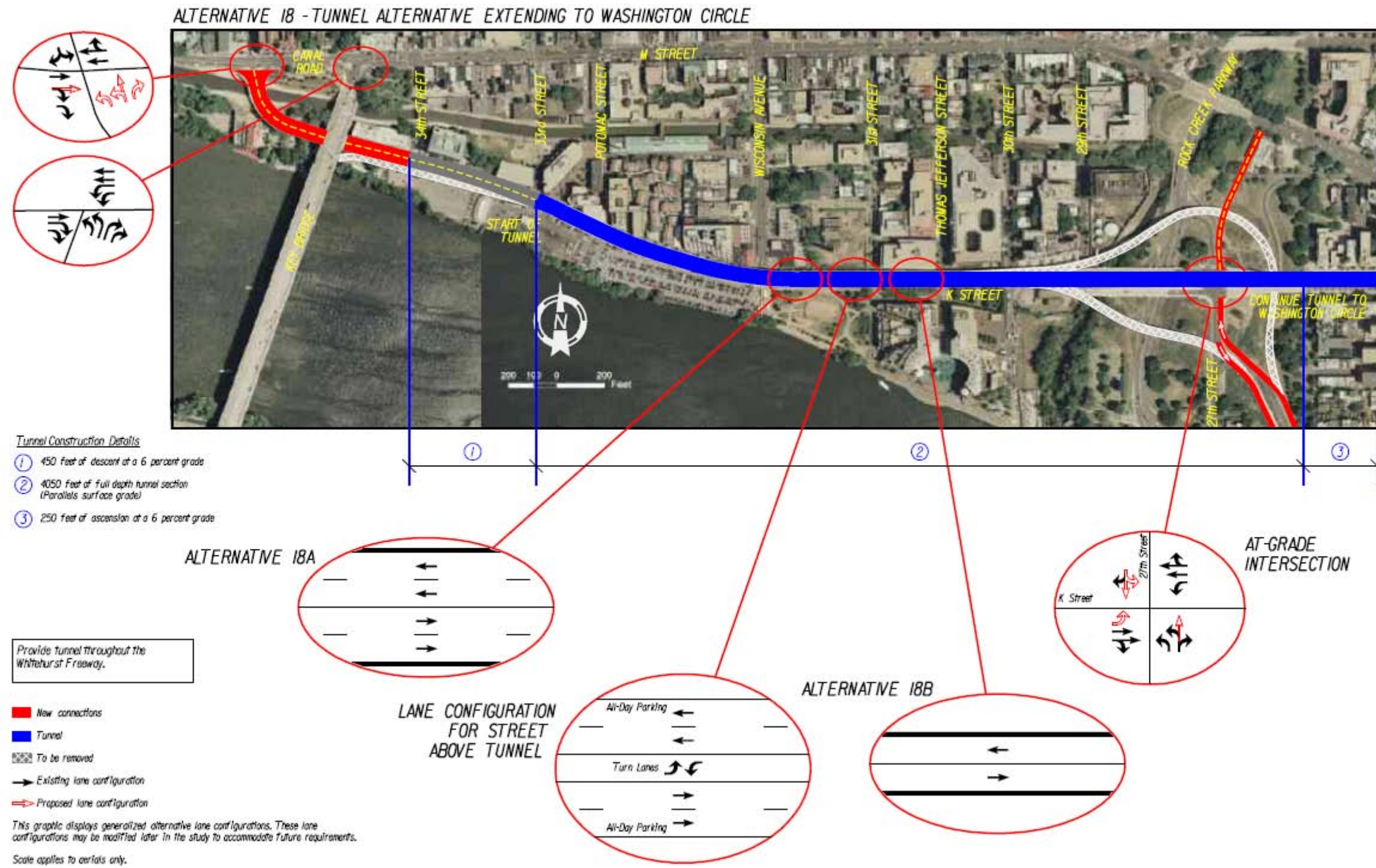


Figure 2.19 – Family 4, Alternative 18



3.0 EVALUATION PROCESS

Each of the 19 alternatives was evaluated based on a series of evaluation criteria that address the study objectives. The evaluation results are used as a basis to rate and score each of the alternatives and compare the relative performance of the alternatives..

3.1 Project Objectives

The development of evaluation criteria for the project began with the identification of a series of objectives for the project. Based on input from the project technical advisory committee and the general public a series of project objectives were identified. These included the following:

- Accommodate future traffic volumes without significant deterioration in peak period traffic operations
- Improve traffic operations on M Street NW during congested periods
- Improve pedestrian access to Georgetown businesses, parking facilities, and the future waterfront park
- Improve transit operations
- Improve vehicular access to Georgetown businesses, parking facilities, and the future waterfront park
- Improve urban design and the visual environment by minimizing the presence of visual barriers at the waterfront
- Avoid impacts on water resources
- Avoid disruption to existing land uses
- Maximize public participation to develop transportation improvements that are supported by the community
- Avoid impacts on historic structures

3.2 Evaluation Criteria

The project objectives were grouped into three major categories and were used as a basis for developing individual criteria and measures to be applied to the project alternatives. The three categories of criteria are as follows:

- Minimize transportation impacts and traffic
- Protect neighborhood character
- Minimize cost

A total of 28 individual criteria and measures were developed based on input and review by the project technical advisory committee and the general public through a series of public meetings held in November 2005. The measures were used as a basis for rating the performance of each of the alternatives for each of the 28 criteria. The ratings for each of the criteria are used as a basis for identifying the overall best performing alternatives. The rating, scoring, and results of the evaluation of alternatives are presented in Section 4.0 of this report. Each of the evaluation criteria are described as follows.

3.2.1 Transportation Impacts and Traffic

The second criteria group addresses potential transportation impacts posed by the alternatives. There are five criteria in this group:

- Accommodate future traffic volumes
- Improve traffic operations on M Street
- Improve transit operations
- Improve travel times for Maryland and Virginia drivers
- Minimize number of stops for key traffic movements

Accommodate Future Traffic Volumes

This criterion measures the alternatives according to their ability to accommodate presumed future increases in traffic volume, but without causing a significant deterioration in traffic operations (increased traffic and delays) during the AM and PM peak periods. This criterion considered the following four key components.

1) Estimated potential changes in travel times (in seconds) for the AM peak at six locations:

- Whitehurst Freeway/K Street eastbound
- Whitehurst Freeway/K Street westbound
- M Street eastbound
- M Street westbound
- Virginia Avenue eastbound
- Virginia Avenue westbound

2) Estimated potential changes in travel times (in seconds) for the PM peak at the same six locations.

To estimate changes in travel times, computer models were used to estimate how many seconds of delay would be added or reduced from travel times along three key roadways in the study area, eastbound and westbound. Alternatives that would result in reductions in travel time were rated better than alternatives that would result in increases in travel times.

3) Alternatives that create the greatest diversity of route choices.

Alternatives that would create a wider variety of route choices were given higher ratings, while those that would take away route choices were given lower ratings. For instance, an alternative that would remove the connection between Key Bridge and K Street would receive a lower rating than one that would open up a new way to get from one place to another in the study area.

4) Alternatives minimize the addition of traffic signals.

Alternatives that would minimize the addition of traffic signals to study area roadways received higher ratings than other alternatives, as adding signals increases traffic delays. The ratings are based on the number of signals that would need to be added for each alternative. The number ranged from as few as three to as many as seven.

The results of each of these four measures were averaged to identify a rating for this criterion.

Improve Traffic Operations on M Street

This criterion looks at which alternatives would be most successful in improving traffic operations on M Street. Alternatives were rated based on the extent to which they would facilitate the movement of traffic. Alternatives that would allow vehicles to travel between Key Bridge and K Street without using M Street received a higher rating. Also rated highly were alternatives that would improve connections between Canal Road and K Street. Conversely, alternatives that would decrease capacity on the existing Whitehurst Freeway received lower ratings.

Improve Transit Operations

Alternatives that would provide a connection from Key Bridge to K Street, for buses traveling from Virginia to Georgetown, received higher ratings than those that would not. Additionally, alternatives that would provide future bus route connections from K Street to Canal Road were also rated higher.

Improve Travel Times for Maryland and Virginia Drivers

Alternatives that would provide a connection between K Street from Key Bridge or to Georgetown from Maryland earned higher ratings. However, many elements of the alternatives may end up slowing travel times for Maryland and Virginia drivers traveling to or through Georgetown: the addition of traffic signals and the reduction of lanes on certain routes; the interruption of access to E Street; the interruption of traffic flow on K Street between 33rd and 29th Streets; the elimination of connection between K Street and Key Bridge; and other potential factors. Alternatives that would improve travel times overall for Maryland and Virginia drivers—weighing all the various factors—received better ratings.

Minimize Number of Stops for Key Traffic Movements

This criterion examined whether the alternatives would create the ability for drivers to minimize the number of stops at intersections that would be required to move through the study area and maximize the ability to travel through the study area without stops, compared with existing conditions. The proposed removal of particular free flow ramps and connections between roadways caused alternatives to receive lower ratings, as they would force drivers to make additional turns, causing delays.

3.2.2 Neighborhood Character

Effects on transportation are only one part of the consideration for the Whitehurst Freeway study; another critical element is the effects that alternatives might have on neighborhood character. There are 12 criteria in this group:

- Improve pedestrian and bicycle access
- Improve vehicular access
- Improve urban design and the visual environment
- Impacts on water resources
- Disruption to existing land uses
- Impacts on the natural environment
- Impacts on historic, cultural, and parkland resources

- Impacts on existing utilities
- Impacts on property values
- Impacts on emergency access and response
- Construction impacts
- Impacts on tourism

These criteria are described as follows.

Improve Pedestrian and Bicycle Access

This criterion looks at how well the alternatives improve pedestrian and bicycle access to Georgetown businesses, parking facilities, and the future waterfront park. Alternatives that would add pedestrian walkways, bikeways, or pedestrian signals; decrease conflicts between motor vehicles and pedestrians/bicyclists; or remove visual barriers received higher ratings than those that would not.

Improve Vehicular Access

This criterion also examines access to Georgetown businesses, parking facilities, and the future waterfront park, but for motor vehicles. Alternatives that would add a roadway connection to Georgetown from Canal Road or from Key Bridge to K Street received higher ratings than those that would not. Alternatives that would add both earned the highest ratings.

Improve Urban Design and the Visual Environment

This criterion looks at which alternatives are likely to impact viewsheds in Georgetown and near the Potomac River or be out of context with urban design features of the study area. Alternatives that would block views, create barriers, or negatively affect visual environments (parks, etc.) received lower ratings than alternatives that would remove barriers and create better views.

Impacts on Water Resources

Alternatives that involve ramps over or columns in the Potomac River, Rock Creek Parkway, or the C & O Canal would be regarded as detrimental to those water resources. Alternatives that affect Rock Creek Parkway or the C & O Canal would be especially problematic as they are federally protected resources. Higher ratings were given to alternatives that had little or no impact to water bodies in the study area.

Disruption to Existing Land Uses

In instances where features of alternatives such as ramps, bridges, or columns would adversely affect existing properties or land uses in the study area, those alternatives would receive a lower rating. Existing land uses may include commercial or residential areas

Impacts on the Natural Environment

This criterion looks at the potential for alternatives to impact natural resources such as the Potomac River, Rock Creek Park, the open space around the intersection of 27th and K Streets and 34th and K Streets, and other open spaces in the study area. As with water resources,

higher ratings were given to alternatives that had little or no impact on the natural environment in the study area. Some alternatives were regarded as having no potential effects on the environment; however, those with ramps, bridges, columns, or tunnels that have the potential to disrupt the natural environment received lower ratings.

Impacts on Historic, Cultural, and Parkland Resources

Few historic and cultural resources—defined as federally protected landmarks, districts, and monuments—would be affected by the alternatives; resources that may be impacted include Key Bridge, the C & O Canal, and Rock Creek Park. Alternatives that have potential to adversely impact these resources were given lower ratings.

Impacts on Existing Utilities

This criterion considers the potential for the alternatives to disrupt existing underground utilities. Those alternatives that include major roadway construction including additional columns and ramp supports or depressed roadways and tunnels received lower ratings than those alternatives that minimize these types of impacts.

Impacts on Property Values

This criterion includes an analysis of data on potential impacts on property values in Georgetown, Palisades, and Foggy Bottom. In many cases, the alternatives were deemed to have a neutral impact on property. However, alternatives that have the potential to enhance access and adjacent amenities received higher ratings than other alternatives.

Impacts on Emergency Access and Response

Alternatives that would provide better access for emergency vehicles to Georgetown or to K Street from Virginia received higher ratings than those that would not. However, some alternatives would have the effect of degrading emergency access and response, and would receive lower ratings. One factor that may produce that negative result is a reduction in lanes on roadways; in these cases, the alternatives received lower ratings. Some alternatives that call for the removal of the Whitehurst Freeway would create better emergency access for K Street while degrading access to property west of Key Bridge.

Construction Impacts

This criterion examines negative impacts that could surface during the construction phase of alternatives. Alternatives that would require lane closures on Key Bridge or K Street; or create impacts on Rock Creek Park, north/south streets, Canal Road, the area east of 27th Street, or the area near the river; or create a combination of multiple impacts received lower ratings than alternatives that would create fewer impacts.

Impacts on Tourism

The final criterion in this group examines each alternative's potential impact on tourism. The assumption in this criterion is that a reduction in tourism is bad for the study area and for the District of Columbia as a whole. Alternatives received higher ratings if they would provide access to or created shorter travel times for tourists in Georgetown, Palisades, and Foggy Bottom. In some cases, the alternatives themselves—such as the elevated park option—could

become tourist attractions in their own right. However, if an alternative degraded tourist access to key areas, they received lower ratings.

3.2.3 Cost

The last of the four main criteria is the relative estimated order of magnitude capital cost of each alternative. Estimates range from \$0 for Alternative 1, the No Build option, to \$155 million for Alternative 18, a tunnel option.

3.3 Rating the Alternatives

Each of the alternatives were rated on an eight point scale with a rating of 1 representing the lowest or worst performance and 8 representing the highest or best performance relative to each of the evaluation criteria. In each case the No Build (no action) Alternative was rated as a 4 and then alternatives that would perform worse than the No-Build received ratings of 0 through 3 with a rating of 0 as the worst performing alternative. Alternatives that would perform better than the No Build Alternative received ratings of 5 through 8, with 8 representing the best performing alternatives.

Based on input from the general public at a series of public meetings held in April and May 2005, the evaluation criteria were weighted to emphasize the criteria that the public felt were most important in evaluating alternatives. At the public meetings, participants were asked to select criteria that they felt would be the most important in evaluating alternatives. There were a total of 112 responses. The second column in Table 3-1 shows the number of respondents that identified each criterion as important. This number was used to determine the percent of all respondents that the particular criterion as most important. These percentages, as shown in Column 3 of the table, were used as a basis for establishing a weighting for each of the criteria. The weightings ranged from 1 through 10 based on the following ranges:

Percentage Identifying Criterion as Most Important	Weighting Factor
5% - 14%	1
15% - 24%	2
25% - 34%	3
35% - 44%	4
45% - 54%	5
55% - 64%	6
65% - 74%	7
75% - 84%	8
85% - 95%	9
95% - 100%	10

The fourth column in Table 3.1 below shows the resulting weighting factors for each of the criteria.

Table 3.1 – Weighting of Evaluation Criteria

Weighting of Evaluation Criteria Based on Public Response			
Evaluation Criteria	Number of Respondents Identifying Criterion as Important	Out of 112	Weight
Impacts on traffic	112	100%	10
Improve pedestrian and bicycle access to Georgetown businesses, parking facilities, and the future waterfront park	82	73%	7
Impacts on the natural environment	79	71%	7
Improve urban design and the visual environment by minimizing the presence of visual barriers at the waterfront	79	71%	7
Impacts on historic structures, cultural resources and parklands	72	64%	6
Impacts on existing infrastructure including transportation and utilities	65	58%	5
Impacts on property values	61	54%	5
Cost effectiveness	56	50%	5
Improve transit operations	31	28%	3
Positive effects for Maryland and Virginia residents/freeway users	31	28%	3
Emergency access and response	28	25%	3
Availability of funds	24	21%	2
Improve vehicle access to Georgetown businesses, parking facilities, and the future waterfront park	24	21%	2
Minimize disruption to existing land uses	24	21%	2
Construction phase impacts	16	14%	1
Ability to make certain movements without stops (compared to existing conditions)	8	7%	1
Impacts on tourism	6	5%	1

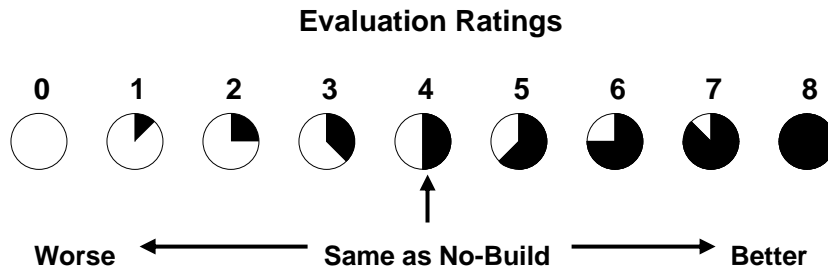
The weighting factors are applied to the appropriate evaluation ratings for each criterion for each alternative to determine a weighted score for each alternative for each criterion. The weighted scores are determined by multiplying the evaluation rating for an alternative (a value between 1 and 8) by the appropriate weighting factor each of the criteria. The weighted score for each of criteria are then summed by alternative to determine an overall composite score for each alternative. The overall composite scores are used to help in identifying the best overall performing alternatives. The alternatives with the highest composite scores represent the best performing alternatives based on the weighted criteria considered in the evaluation. The results of the evaluation, including the alternative scoring, are presented in Section 4 of this document.

4.0 EVALUATION RESULTS

The evaluation process described in Section 3.0 of this report was applied to the alternatives described in Section 2.0 of the report.

4.1 Evaluation Ratings

As described in Section 3.3 of this report, each of the alternatives was rated on a scale of 1 through 8 based on its performance relative to the No Build Alternative, with those alternatives performing the same as the No Build receiving a rating of 4 and alternatives performing worse than the No Build Alternative receiving a rating of 0 through 3, with a rating of 0 representing the worst performing alternative. Alternatives performing better than the No-Build Alternative received a rating of 5 through 8, with a rating of 8 representing the best performing alternative. The results of the evaluation are summarized in the matrix shown in Table 4-1 on the following pages. To make it easier to quickly compare the relative performance of the alternatives to each other, a series of symbols that represent the ratings for each alternative are shown in the matrix in addition to the numerical rating. These symbols represent rating values (from 1 through 8) as shown below.



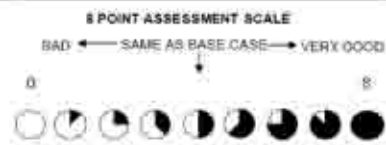
The summary matrix also includes the rationale or basis for each of the alternative ratings for each criterion unless it is no different than the No Build condition (which receives a rating of 4).

4.2 Best Performing Alternatives

Weighting factors as described in Section 3.3 of this report have been applied to each of the ratings for each of the alternatives and for each of the criteria as shown in the evaluation results matrix (Table 4.1). The weightings reflect the relative importance of the criteria as determined by the participants of the public meetings held for the project. Table 4.2 shows the resulting weighted scores by criterion and overall composite scores for each of the alternatives being considered.

Table 4.1.1 – Evaluation Matrix: Family 1, Alternatives 1-3

		FAMILY 1 - NO BUILD AND NO-BUILD PLUS			
		Alternative 1: No Build	Alternative 2: No build Plus - Connection from Key Bridge to Lower K Street	Alternative 3: No build Plus - Lane Configuration Improvements	
Transportation Impacts	2.1. Accommodate future traffic volumes without significant deterioration in peak period traffic operations (Average of A, B, C, and D below)	4	4	4	
	A. Change in travel times (in seconds) for AM Peak ¹	a. Whitehurst Freeway / K Street Eastbound	Base	No Significant Difference from Base	No Significant Difference from Base
		b. Whitehurst Freeway / K Street Westbound	Base	No Significant Difference from Base	No Significant Difference from Base
		c. M Street Eastbound	Base	No Significant Difference from Base	No Significant Difference from Base
		d. M Street Westbound	Base	No Significant Difference from Base	No Significant Difference from Base
		e. Virginia Avenue Eastbound	Base	No Significant Difference from Base	No Significant Difference from Base
		f. Virginia Avenue Westbound	Base	No Significant Difference from Base	No Significant Difference from Base
	B. Change in travel times (in seconds) for PM Peak ²	a. Whitehurst Freeway / K Street Eastbound	Base	No Significant Difference from Base	No Significant Difference from Base
		b. Whitehurst Freeway / K Street Westbound	Base	No Significant Difference from Base	No Significant Difference from Base
		c. M Street Eastbound	Base	No Significant Difference from Base	No Significant Difference from Base
d. M Street Westbound		Base	No Significant Difference from Base	No Significant Difference from Base	
e. Virginia Avenue Eastbound		Base	No Significant Difference from Base	No Significant Difference from Base	
f. Virginia Avenue Westbound		Base	No Significant Difference from Base	No Significant Difference from Base	
C. Create a diversity of route choices	4	5	4		
D. Maximize the addition of traffic signals	4	3	4		
Neighborhood Character	3.1. Improve pedestrian and bicycle access to Georgetown businesses, parking facilities, and the future waterfront park	4	4	4	
	3.2. Improve vehicle access to Georgetown businesses, parking facilities, and the future waterfront park	4	4	4	
	3.3. Improve urban design and the visual environment by minimizing the presence of visual barriers at the waterfront	4	2	4	
	3.4. Impacts on water resources	4	4	4	
	3.5. Disruption to existing land uses	4	1	4	
	3.6. Impacts on the natural environment	4	2	4	
	3.7. Impacts on historic structures, cultural resources, and parks	4	2	4	
	3.8. Impacts on existing utilities infrastructure from transportation improvements	4	3	4	
	3.9. Impacts on property values	4	4	4	
	3.10. Impacts on emergency access and response	4	4	4	
3.11. Construction phase impacts	4	4	4		
3.12. Impacts on tourism	4	4	4		
Cost	10	22.7 M	50.1 M		



¹ Whitehurst Freeway / K Street is from the intersection of Foshell and Canal Roads to K & 18th Street
² M Street EB is from the intersection of Foshell and Canal Roads to Washington Circle via Pennsylvania Avenue NW

M Street WB is from the intersection of New Hampshire Avenue and M Street to Foshell and Canal Roads
 Virginia Avenue is from 27th Street to 23rd Street

Table 4.1.2 – Evaluation Matrix: Family 1, Alternatives 4, 5, 6, 19

		FAMILY 1 - NO BUILD AND NO-BUILD PLUS			
		Alternative 4: No Build Plus - Access Ramps to Rock Creek Parkway	Alternative 5: No Build Plus - Ramp Improvements to Southbound Potomac Freeway and 29th Street	Alternative 6: No Build Plus - Elevated Park with Pedestrian Access	Alternative 19: No Build Plus - Elevated Sidewalk on Existing Structure
Transportation Impacts	2.1 - Accommodate future traffic volumes without significant deterioration in peak period traffic operations. (Average of A, B, C, and E boxes)	4	4	4	4
	2.2 - Change travel times (in seconds) for AM Peak: a. Whitehurst Freeway / K Street Eastbound b. Whitehurst Freeway / K Street Westbound c. M Street Eastbound d. M Street Westbound e. Virginia Avenue Eastbound f. Virginia Avenue Westbound	4	4	4	4
	2.3 - Change travel times (in seconds) for PM Peak: a. Whitehurst Freeway / K Street Eastbound b. Whitehurst Freeway / K Street Westbound c. M Street Eastbound d. M Street Westbound e. Virginia Avenue Eastbound f. Virginia Avenue Westbound	4	4	4	4
	2.4 - Create a diversity of route choices	5	4	4	4
	2.5 - Minimize the number of traffic signals	3	4	4	4
	2.6 - Improve traffic operations on M Street NW during congested periods	4	4	4	3
	2.7 - Improve transit operations	4	4	4	4
	2.8 - Improve transit travel time between and within stations/freeway lanes	4	4	4	2
	2.9 - Create the ability for drivers to make certain movements without stops (compared to existing conditions)	4	4	4	4
	2.10 - Number of movements without stops	4	4	4	4
Neighborhood Character	3.1 - Improve pedestrian and bicycle access to Georgetown businesses, parking facilities, and the future waterfront park	4	4	4	4
	3.2 - Improve vehicle access to Georgetown businesses, parking facilities, and the future waterfront park	4	4	4	4
	3.3 - Improve urban design and the visual environment by minimizing the presence of visual barriers at the waterfront	3	4	4	3
	3.4 - Impacts on water resources	3	4	4	4
	3.5 - Impacts on existing land uses	3	4	4	3
	3.6 - Impacts on the historic environment	3	4	4	4
	3.7 - Impacts on historic structures, cultural resources, and landmarks	3	4	4	4
	3.8 - Impacts on existing utility infrastructure from transportation improvements	3	4	3	4
	3.9 - Impacts on property values	4	4	3	4
	3.10 - Impacts on emergency access and response	4	4	4	3
	3.11 - Displacement/loss impacts	3	4	4	3
	3.12 - Impacts on tourism	3	4	4	3
	4.0 - Order of magnitude cost estimate	4	\$1.1 M	\$0.1 M	\$0.1 M

Table 4.1.3 – Evaluation Matrix: Family 2, Alternatives 8.1, 8.2, 8.3

		FAMILY 2 - 67 GRADE AVENUE WITH CONDUIT OVER TROWLET BRIDGE AND CANAL TUNNEL			
		Alternative 1: 2-stage Tunnel with 200m Conduit from 100m Bridge	Alternative 2: 2-stage Tunnel with 200m Conduit from 100m Bridge	Alternative 3: 2-stage Tunnel with 200m Conduit from 100m Bridge	
Transportation Impacts	8.1	4	4	4	4
	8.2	4	4	4	4
	8.3	4	4	4	4
	8.4	4	4	4	4
	8.5	4	4	4	4
	8.6	4	4	4	4
	8.7	4	4	4	4
	8.8	4	4	4	4
	8.9	4	4	4	4
	8.10	4	4	4	4
Engineering Feasibility	9.1	4	4	4	4
	9.2	4	4	4	4
	9.3	4	4	4	4
	9.4	4	4	4	4
	9.5	4	4	4	4
	9.6	4	4	4	4
	9.7	4	4	4	4
	9.8	4	4	4	4
	9.9	4	4	4	4
	9.10	4	4	4	4
9.11	4	4	4	4	
9.12	4	4	4	4	
9.13	4	4	4	4	
9.14	4	4	4	4	
9.15	4	4	4	4	
9.16	4	4	4	4	
9.17	4	4	4	4	
9.18	4	4	4	4	
9.19	4	4	4	4	
9.20	4	4	4	4	
9.21	4	4	4	4	
9.22	4	4	4	4	
9.23	4	4	4	4	
9.24	4	4	4	4	
9.25	4	4	4	4	
9.26	4	4	4	4	
9.27	4	4	4	4	
9.28	4	4	4	4	
9.29	4	4	4	4	
9.30	4	4	4	4	
9.31	4	4	4	4	
9.32	4	4	4	4	
9.33	4	4	4	4	
9.34	4	4	4	4	
9.35	4	4	4	4	
9.36	4	4	4	4	
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9.39	4	4	4	4	
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9.41	4	4	4	4	
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9.71	4	4	4	4	
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9.82	4	4	4	4	
9.83	4	4	4	4	
9.84	4	4	4	4	
9.85	4	4	4	4	
9.86	4	4	4	4	
9.87	4	4	4	4	
9.88	4	4	4	4	
9.89	4	4	4	4	
9.90	4	4	4	4	
9.91	4	4	4	4	
9.92	4	4	4	4	
9.93	4	4	4	4	
9.94	4	4	4	4	
9.95	4	4	4	4	
9.96	4	4	4	4	
9.97	4	4	4	4	
9.98	4	4	4	4	
9.99	4	4	4	4	
9.100	4	4	4	4	

Table 4.1.4 – Evaluation Matrix: Family 2, Alternatives 11, 13, 16

		FAMILY 2 - STADLEY AVENUE NORTH (CONSTRUCTION PERIOD) BRIDGE AND CANAL ROUTE			
		Alternative 11 - Stadle Avenue North (Construction Period) Bridge and Canal Route	Alternative 13 - Stadle Avenue North (Construction Period) Bridge and Canal Route	Alternative 16 - Stadle Avenue North (Construction Period) Bridge and Canal Route	
Transportation Needs	T.1 - Accessible from local roads to provide alternative access to local destinations, including the surrounding residential area.	4	4	4	
	T.2 - Provide access to local destinations, including the surrounding residential area, and provide access to local destinations.	4	4	4	
	T.3 - Provide access to local destinations, including the surrounding residential area, and provide access to local destinations.	4	4	4	
	T.4 - Provide access to local destinations, including the surrounding residential area, and provide access to local destinations.	4	4	4	
	T.5 - Provide access to local destinations, including the surrounding residential area, and provide access to local destinations.	4	4	4	
	T.6 - Provide access to local destinations, including the surrounding residential area, and provide access to local destinations.	4	4	4	
	T.7 - Provide access to local destinations, including the surrounding residential area, and provide access to local destinations.	4	4	4	
	T.8 - Provide access to local destinations, including the surrounding residential area, and provide access to local destinations.	4	4	4	
	T.9 - Provide access to local destinations, including the surrounding residential area, and provide access to local destinations.	4	4	4	
	T.10 - Provide access to local destinations, including the surrounding residential area, and provide access to local destinations.	4	4	4	
	T.11 - Provide access to local destinations, including the surrounding residential area, and provide access to local destinations.	4	4	4	
	T.12 - Provide access to local destinations, including the surrounding residential area, and provide access to local destinations.	4	4	4	
	T.13 - Provide access to local destinations, including the surrounding residential area, and provide access to local destinations.	4	4	4	
	T.14 - Provide access to local destinations, including the surrounding residential area, and provide access to local destinations.	4	4	4	
	T.15 - Provide access to local destinations, including the surrounding residential area, and provide access to local destinations.	4	4	4	
	T.16 - Provide access to local destinations, including the surrounding residential area, and provide access to local destinations.	4	4	4	
Transportation Safety	S.1 - Provide safety for pedestrians and cyclists.	4	4	4	
	S.2 - Provide safety for pedestrians and cyclists.	4	4	4	
	S.3 - Provide safety for pedestrians and cyclists.	4	4	4	
	S.4 - Provide safety for pedestrians and cyclists.	4	4	4	
	S.5 - Provide safety for pedestrians and cyclists.	4	4	4	
	S.6 - Provide safety for pedestrians and cyclists.	4	4	4	
	S.7 - Provide safety for pedestrians and cyclists.	4	4	4	
	S.8 - Provide safety for pedestrians and cyclists.	4	4	4	
	S.9 - Provide safety for pedestrians and cyclists.	4	4	4	
	S.10 - Provide safety for pedestrians and cyclists.	4	4	4	
	S.11 - Provide safety for pedestrians and cyclists.	4	4	4	
	S.12 - Provide safety for pedestrians and cyclists.	4	4	4	
	S.13 - Provide safety for pedestrians and cyclists.	4	4	4	
	S.14 - Provide safety for pedestrians and cyclists.	4	4	4	
	S.15 - Provide safety for pedestrians and cyclists.	4	4	4	

Table 4.1.5 – Evaluation Matrix: Family 3, Alternatives 7, 9.1, 9.2

		FAMILY 3 - AT-GRADE AVENUE (WITHOUT CONNECTION FROM KEY BRIDGE BUT WITH CONNECTION FROM CANAL ROAD)		
		Alternative 1: At-grade Avenue without Connection from Key Bridge	Alternative 3: At-grade Avenue Maintaining Ramps at Eastern End	Alternative 9.2: At-grade Avenue Maintaining Ramps at Eastern End
Transportation Impacts	2.1. Accommodate EB and WB traffic volumes without significant deterioration in peak-period traffic operations. (Average of A, B, C, and F below)	4	4	4
	3. Change in travel times (in seconds) for AM Peak	<p>Total = -82 seconds</p> <ul style="list-style-type: none"> -165 seconds + 13 seconds -44 seconds + 99 seconds + 2 seconds + 8 seconds 	<p>Total = -82 seconds</p> <ul style="list-style-type: none"> -165 seconds + 13 seconds -44 seconds + 99 seconds + 1 second + 9 seconds 	<p>Total = -82 seconds</p> <ul style="list-style-type: none"> -165 seconds + 13 seconds -44 seconds + 99 seconds + 1 second + 8 seconds
	6. Change in travel times (in seconds) for PM Peak	<p>Total = -53 seconds</p> <ul style="list-style-type: none"> + 107 seconds -43 seconds -372 seconds + 247 seconds -14 seconds -1 second 	<p>Total = -53 seconds</p> <ul style="list-style-type: none"> + 107 seconds -43 seconds -372 seconds + 247 seconds -14 seconds -1 second 	<p>Total = -53 seconds</p> <ul style="list-style-type: none"> + 107 seconds -43 seconds -372 seconds + 247 seconds -14 seconds -1 second
	7. Create a diversity of route choices	3	3	3
	8. Minimize the number of traffic signals	2	2	2
	Number of signals	3	4	5
	22. Improve traffic conditions on M Street NW during congested periods	6	6	6
	23. Improve transit operations	6	6	6
	24. Improve travel times for Maryland and Virginia motorists/travelers	1	1	1
	25. Create the ability for drivers to make certain maneuvers without stops (impedement to driving/realtime)	0	0	0
Neighborhood Character	Removal of connections without stops	4	1	1
	5.1. Improve pedestrian and bicycle access to Georgetown businesses, parking facilities, and the future waterfront park	6	6	6
	5.2. Improve vehicle access to Georgetown businesses, parking facilities, and the future waterfront park	6	6	6
	5.3. Improve street design and the visual environment by minimizing the presence of visual barriers at the waterfront	8	7	2
	5.4. Impacts on water resources	4	7	5
	5.5. Obstruction to existing land uses	3	3	5
	5.6. Impacts on the natural environment	3	3	3
	5.7. Impacts on historic structures, cultural resources, and parks	5	3	5
	5.8. Impacts on existing utilities infrastructure from transportation improvements	3	3	3
	5.9. Impacts on property values	6	6	6
	5.10. Impacts on emergency access and response	8	7	7
	5.11. Construction phase impacts	2	2	2
	5.12. Impacts on noise	8	8	8
Cost	4.0. Value of roadway cost estimate	4	4	4
		\$21.8M	\$30.7M	\$20.9M

Table 4.1.6 – Evaluation Matrix: Family 3, Alternatives 10, 12, 14, 15

		FAMILY 3 - 40' CRASH AVAILABILITY WITHOUT BARRIER (CONSTRUCTION PHASE) - BROAD RAMP WITH CONCRETE SIDEWALK RAMP			
		Alternative 10: 40' Crash Avail. w/ 40' Barrier (Construction Phase)	Alternative 12: 40' Crash Avail. w/ 40' Barrier (Construction Phase)	Alternative 14: 40' Crash Avail. w/ 40' Barrier (Construction Phase)	Alternative 15: 40' Crash Avail. w/ 40' Barrier (Construction Phase)
Transportation Network	1.0 Overall Network Performance (Relative to Other Alternatives)	3	3	3	3
	1.1 Network Resilience (Ability to Recover from Disruptions)	3	3	3	3
	1.2 Network Capacity (Ability to Handle Increased Demand)	3	3	3	3
	1.3 Network Reliability (Consistency of Performance)	3	3	3	3
	1.4 Network Safety (Reduction in Accidents)	3	3	3	3
	1.5 Network Efficiency (Minimization of Delays)	3	3	3	3
	1.6 Network Flexibility (Ability to Adapt to Changes)	3	3	3	3
	1.7 Network Sustainability (Long-term Viability)	3	3	3	3
	1.8 Network Cost-Effectiveness (Value for Money)	3	3	3	3
	1.9 Network Environmental Impact (Minimization of Disruption)	3	3	3	3
Regulatory Compliance	2.0 Overall Regulatory Compliance (Adherence to Standards)	3	3	3	3
	2.1 Environmental Impact (Minimization of Disruption)	3	3	3	3
	2.2 Safety Compliance (Adherence to Safety Standards)	3	3	3	3
	2.3 Noise Abatement (Minimization of Noise Impact)	3	3	3	3
	2.4 Air Quality (Minimization of Air Pollution)	3	3	3	3
	2.5 Water Quality (Minimization of Water Pollution)	3	3	3	3
	2.6 Cultural Resources (Protection of Historical Sites)	3	3	3	3
	2.7 Socioeconomics (Minimization of Community Impact)	3	3	3	3
	2.8 Visual Quality (Minimization of Visual Impact)	3	3	3	3
	2.9 Overall Project Feasibility (Compliance with All Requirements)	3	3	3	3

Table 4.1.7 – Evaluation Matrix: Family 4, Alternatives 17 & 18

		FAMILY 4 - 17/18	
		Alternative 17 (17A)	Alternative 18 (18A)
Investment Objectives	1.1. Increase the number of lanes in the existing freeway	1	1
	1.2. Increase the number of lanes in the existing freeway	1	1
	1.3. Increase the number of lanes in the existing freeway	1	1
	1.4. Increase the number of lanes in the existing freeway	1	1
	1.5. Increase the number of lanes in the existing freeway	1	1
	1.6. Increase the number of lanes in the existing freeway	1	1
	1.7. Increase the number of lanes in the existing freeway	1	1
	1.8. Increase the number of lanes in the existing freeway	1	1
	1.9. Increase the number of lanes in the existing freeway	1	1
	1.10. Increase the number of lanes in the existing freeway	1	1
Investment Objectives	2.1. Increase the number of lanes in the existing freeway	1	1
	2.2. Increase the number of lanes in the existing freeway	1	1
	2.3. Increase the number of lanes in the existing freeway	1	1
	2.4. Increase the number of lanes in the existing freeway	1	1
	2.5. Increase the number of lanes in the existing freeway	1	1
	2.6. Increase the number of lanes in the existing freeway	1	1
	2.7. Increase the number of lanes in the existing freeway	1	1
	2.8. Increase the number of lanes in the existing freeway	1	1
	2.9. Increase the number of lanes in the existing freeway	1	1
	2.10. Increase the number of lanes in the existing freeway	1	1
Investment Objectives	3.1. Increase the number of lanes in the existing freeway	1	1
	3.2. Increase the number of lanes in the existing freeway	1	1
	3.3. Increase the number of lanes in the existing freeway	1	1
	3.4. Increase the number of lanes in the existing freeway	1	1
	3.5. Increase the number of lanes in the existing freeway	1	1
	3.6. Increase the number of lanes in the existing freeway	1	1
	3.7. Increase the number of lanes in the existing freeway	1	1
	3.8. Increase the number of lanes in the existing freeway	1	1
	3.9. Increase the number of lanes in the existing freeway	1	1
	3.10. Increase the number of lanes in the existing freeway	1	1

Table 4.2 – Best Performing Alternatives

Category	Objective	FAMILY 1 - NO BUILD AND NO BUILD PLUS												FAMILY 2 - AT-GRADE AVENUE WITH CONNECTIONS FROM KEY BRIDGE AND CANAL ROAD										FAMILY 3 - AT-GRADE AVENUE (WITHOUT CONNECTION FROM KEY BRIDGE BUT WITH CONNECTION FROM CANAL ROAD)										FAMILY 4 - TUNNEL				Weighting Factor				
		Alternative 1: No Build		Alternative 2: No Build Plus - Connection from Key Bridge to Lewis K Street		Alternative 3: No Build Plus - Lane Configuration Improvements		Alternative 4: No Build Plus - Access Ramps to Rock Creek Parkway		Alternative 5: No Build Plus - Ramp Improvements to Southbound Potomac Expressway and 27th Street		Alternative 6: No Build Plus - Elevated Park with Pedestrian Access		Alternative 7: No Build Plus - Elevated Sidewalk on Existing Structure		Alternative 8.1: At-grade Avenue with Short Connection from Key Bridge		Alternative 8.2: At-grade Avenue with Long Connection from Key Bridge		Alternative 8.3: At-grade Avenue with Connection from Key Bridge via 14th Street		Alternative 9: At-grade Avenue with both Eastbound and Westbound Connections to Key Bridge		Alternative 10: At-grade Avenue with Relocated Connection from Canal Road and Connection from Key Bridge to Eastbound and Westbound K Street		Alternative 11: At-grade Avenue without Connection from Key Bridge		Alternative 12: At-grade Avenue with Maintaining Ramps at Eastern End		Alternative 13: At-grade Avenue with Maintaining Ramps at Eastern End		Alternative 14: At-grade Avenue with Depressed K Street without Connection from Key Bridge		Alternative 15: At-grade Avenue with Relocated Connection from Canal Road to K Street		Alternative 16: Stalling Intersection of 27th & K Street to the East			Alternative 17: At-grade Avenue with Modified Westbound Ramp at 27th Street		Alternative 18: Long Tunnel Extending to Washington Circle	
		Score	Weighted Score	Score	Weighted Score	Score	Weighted Score	Score	Weighted Score	Score	Weighted Score	Score	Weighted Score	Score	Weighted Score	Score	Weighted Score	Score	Weighted Score	Score	Weighted Score	Score	Weighted Score	Score	Weighted Score	Score	Weighted Score	Score	Weighted Score	Score	Weighted Score	Score	Weighted Score	Score	Weighted Score	Score	Weighted Score					
Transportation Impacts	2.1 Accommodate peak traffic volume without significant deterioration of peak period traffic operations	40	40	40	40	40	40	40	40	40	30	40	40	40	40	40	40	50	50	40	40	50	40	50	50	50	50	40	60	50	10											
	2.2 Reduce traffic operations on 14 Street and other congested roads	40	60	40	40	40	40	40	40	30	80	80	80	80	80	80	80	80	80	80	80	60	60	60	60	60	60	60	60	70	70	10										
	2.3 Improve transit operations	12	15	12	12	12	12	12	12	12	21	21	21	21	21	21	21	21	21	21	18	18	18	15	18	18	18	18	18	18	18	18	18	18	18	18	3					
	2.4 Improve transit access to Maryland and Virginia (Washington) transit	12	15	12	12	12	12	12	12	6	6	6	6	6	6	6	6	6	6	6	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3				
	2.5 Provide the ability to transit to transit station entrances without being subjected to existing conditions	4	5	4	4	4	4	4	4	4	1	1	1	1	2	2	1	1	1	1	0	3	3	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1			
Neighborhood Character	3.1 Improve pedestrian and bicycle access to destination businesses, transit facilities, and the future proposed transit access to designated businesses, parking facilities, and the future proposed transit access	28	42	28	28	28	28	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	7			
	3.2 Encourage businesses, parking facilities, and the future proposed transit access	8	12	8	8	8	8	8	8	8	16	16	16	16	16	16	16	16	16	16	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	2			
	3.3 Improve urban design and visual character by incorporating provisions of visual quality at the intersection	28	14	28	21	28	14	21	28	14	21	42	35	49	42	35	42	56	49	49	56	42	49	49	56	42	49	49	56	42	49	49	56	42	49	49	56	56	7			
	3.4 Minimize noise impacts	28	14	28	21	28	28	28	28	28	28	28	14	14	7	7	14	28	21	21	28	21	28	21	28	21	28	21	28	21	28	21	28	21	28	21	28	28	28	7		
	3.5 Minimize air quality impacts	8	2	8	6	8	6	6	6	6	4	4	4	2	0	2	4	6	6	6	6	2	2	2	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	2		
	3.6 Impact on the visual character	28	14	28	21	28	28	28	28	28	21	7	14	14	7	0	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	7		
	3.7 Impact on historic structures, cultural resources, and parks	24	12	24	18	24	6	24	6	24	18	6	6	6	6	6	18	30	18	18	18	18	12	30	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	6		
	3.8 Impact on existing transit infrastructure from transportation improvements	20	15	20	15	20	15	20	15	15	10	10	10	10	10	10	10	15	15	15	15	10	15	15	15	10	15	15	15	10	15	15	15	10	15	15	15	15	5			
	3.9 Minimize impacts on existing transit infrastructure	20	25	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	4		
	3.10 Minimize impacts on existing transit infrastructure	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	3		
	3.11 Minimize impacts on existing transit infrastructure	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	1		
3.12 Impact on transit	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	1			
TOTAL		346	731	346	388	346	308	311	401	356	374	384	351	382	401	389	379	383	381	383	365	419	394																			

Top 5 Performing Alternatives Based on Overall Composite Scores (in red)

The bottom line of Table 4.2 shows the overall composite scores for each of the alternatives which is used as a basis for identifying the best overall performing alternatives. The composite scores for the alternatives range from a low (worst) score of 306 to a high (best) of 418. The top five performing (best) alternatives based on composite score include the following:

Alternatives 17 and 18

These alternatives include removal of the Whitehurst Freeway with the addition of a tunnel along K Street and connections of K Street to Canal Road. Alternative 17 includes a short tunnel from 33rd Street to 29th Street. Alternative 18 includes a longer tunnel from 33rd Street to Washington Circle. These alternatives had the highest composite scores and performed better than the No Build Alternative in terms of:

- Improving the visual environment by minimizing visual barriers at the waterfront
- Improving traffic operations on M Street during peak hour periods
- Improving pedestrian and bicycle access to Georgetown businesses and waterfront area
- Positive impacts on property values
- Minimizing impacts to emergency access and response
- Positive impacts for tourism
- Improving vehicular access to Georgetown businesses, parking facilities, and waterfront
- Enhancing transit operations
- Accommodating future traffic volumes
- Minimizing impacts to parklands and cultural resources

Alternative 17 received a higher composite score than Alternative 18 due to the lower cost rating for the more expensive Alternative 18.

Alternative 8.1

This alternative includes the removal of the Whitehurst Freeway and the addition of connections between K Street and both Canal Road and Key Bridge. This alternative performed better than the No Build Alternative in terms of:

- Improving vehicular access to Georgetown businesses, parking facilities, and the waterfront
- Improving traffic operations on M Street during peak hour periods
- Improving transit operations
- Improving pedestrian and bicycle access to Georgetown businesses and waterfront area
- Positive impacts on property values
- Minimizing impacts to emergency access and response
- Improving the visual environment by minimizing visual barriers at the waterfront

Alternative 7

This alternative includes the removal of the Whitehurst Freeway and the addition of connections between K Street and Canal Road but without access from K Street to Key Bridge. This alternative performed better than the No Build Alternative in terms of:

- Improving the visual environment by minimizing visual barriers at the waterfront
- Improving vehicular access to Georgetown businesses, parking facilities, and the waterfront
- Improving traffic operations on M Street during peak hour periods
- Improving transit operations

- Improving pedestrian and bicycle access to Georgetown businesses and waterfront area
- Positive impacts on property values
- Minimizing impacts to emergency access and response
- Minimizing impacts to parklands and cultural resources

Alternative 14

This alternative is similar to Alternative 7 in that it includes the removal of the Whitehurst Freeway and the addition of connections between K Street and Canal Road but without access from K Street to Key Bridge. This alternative also includes eliminating the signal at 27th Street and K Street and only allowing through and right-turn movements from the east, west, and north and adding a new signalized intersection on K Street just east of the existing 27th Street intersection that provides a connection between K Street and Potomac Expressway and southbound 27th Street. Similar to Alternative 7, this alternative performed better than the No Build Alternative in terms of:

- Improving the visual environment by minimizing visual barriers at the waterfront
- Improving vehicular access to Georgetown businesses, parking facilities, and the waterfront
- Improving traffic operations on M Street during peak hour periods
- Improving transit operations
- Improving pedestrian and bicycle access to Georgetown businesses and waterfront area
- Positive impacts on property values
- Minimizing impacts to emergency access and response
- Minimizing impacts to parklands and cultural resources

Criteria Where the Top 5 Alternatives Performed Worse than the No Build Alternative

As shown in the Table 4-1, there are some criteria where the overall Top 5 performed worse than the No-Build Alternative. These criteria included:

- Improve travel times for Maryland and Virginia Residents and Drivers
- Create the Ability for Drivers to Make Certain Movements Without Stopping
- Disruption to existing land uses
- Impacts on the natural environment
- Impacts to Existing Utilities Infrastructure from Transportation Improvements
- Construction Phase Impacts
- Capital Costs

5.0 TRAFFIC SIMULATIONS

5.1 Traffic Simulation Analysis Approach

This chapter summarizes the results of the traffic analysis conducted for the No Build Alternative (Whitehurst Freeway remains in operation) and the four best-performing alternatives from the Evaluation of Alternatives described in Chapter 4 of this report. The best-performing alternatives include:

- Alternative 7: Whitehurst Freeway is removed, K Street is connected to Canal Road, and no direct connection between Key Bridge and K Street is provided
- Alternative 8.1: Whitehurst Freeway is removed, K Street is connected to Canal Road, and a ramp from Key Bridge to K Street is provided
- Alternative 14: Whitehurst Freeway is removed, K Street is connected to Canal Road, no direct connection between Key Bridge and K Street is provided, and improvements to facilitate movements at the K Street and 27th Street intersection are made
- Alternatives 17 and 18: Whitehurst Freeway is removed, K Street is connected to Canal Road, no direct connection between Key Bridge and K Street is provided, and a tunnel to accommodate through traffic along K Street is provided from 33rd Street to 29th Street for Alternative 17 and further east to Washington Circle for Alternative 18. For the Traffic Simulation Analysis, Alternative 17 was used, since the traffic impacts of Alternatives 17 and 18 would be the same with the exception of potential impacts at the 27th Street and K Street intersection. Alternative 18 extends a tunnel underneath this intersection, reducing the through traffic at this location. However, the tunnel included in Alternative 17 only extends as far east as 29th Street, thus traffic from this alternative would need to pass through the 27th Street and K Street intersection. Therefore, the potential traffic impacts of Alternative 17 were analyzed as part of the traffic simulation analysis.

The potential impacts to traffic operations at key intersections within the project study area have been identified. These intersections focus on Canal Road, M Street, Pennsylvania Avenue, and K Street which are the major through traffic carriers in the project study area. The key intersections identified for analysis include the following:

- Canal Road and Foxhall Road
- M Street and Whitehurst Freeway/K Street Extension
- M Street and Key Bridge
- M Street and 34th Street
- M Street and Wisconsin Avenue
- Pennsylvania Avenue NW and 28th Street
- K Street and Wisconsin Avenue
- K Street and 27th Street
- K Street and 25th Street
- Virginia Avenue and 27th Street

The results of the traffic analysis are presented in terms of two Measures of Effectiveness (MOEs): 1) Intersection Level of Service and 2) Travel Time. These are described as follows:

- Level of Service: According to the Highway Capacity Manual (HCM) 2000, Level of Service (LOS) for a signalized intersection is evaluated on the basis of control delay per vehicle (in seconds per vehicle). According to the HCM 2000, delay in seconds per vehicle is defined as the "Control Delay," which is the delay attributed to traffic signal

operation for signalized intersections. Control Delay includes initial deceleration delay, queue move-up time, stopped delay, and final acceleration delay. LOS is “a qualitative measure describing operational conditions within a traffic stream, generally described in terms of such factors as speed and travel time, freedom to maneuver, traffic interruptions, comfort, and convenience and safety.” LOS varies from A through F. LOS “A” describes operations with control delay less than (or equal to) 10 seconds per vehicle, and “F” describes operations with delay in excess of 80 seconds per vehicle. Delay in excess of 80 seconds per vehicle often occurs with oversaturated conditions; that is, when the arrival flow rate exceeds the capacity of the intersection.

- **Travel Time:** This measures the potential change in travel time for the alternatives when compared to the No Build conditions. This assesses the potential impacts to vehicular traffic traveling along Canal Road, M Street, Pennsylvania Avenue, K Street, and Virginia Avenue for the future year condition. These results are based on the CORSIM model analysis results.

The Synchro software package was used to estimate the intersection Level of Service for each of the key intersections in the study area for the No Build condition and for each of the four best-performing alternatives. Impacts on intersection Level of Service for Year 2030 AM and PM peak-hour conditions have been identified. Forecast traffic volumes that are used as inputs into the simulation for the No-Build condition and the alternatives are based on the Year 2030 Regional Travel Demand Forecasting Model developed by the Metropolitan Washington Council of Governments (MWCOCG). The traffic volumes used for each of the alternatives and for each of the intersections studied are shown in Appendix A of this document. In addition to calculating the intersection Level of Service, the Synchro package also provides an opportunity to optimize the traffic signal cycle lengths and splits, which are inputs into the analysis of vehicle delay. These signal timing changes minimize delays and provide traffic flow progression along surface streets in the area.

A series of traffic simulation analyses using the FHWA CORSIM (CORridor SIMulation) model were also prepared to help in identifying potential impacts on vehicle delay and travel times for each of the four best-performing alternatives for Year 2030 AM and PM peak hour conditions in comparison to the No Build condition. The CORSIM program is a time-driven microscopic computer simulation model developed by the Federal Highway Administration (FHWA). CORSIM has undergone numerous revisions since its introduction, and has been extensively used and accepted by Department of Transportation for traffic network analysis in complex situations. The CORSIM model contains two sub-models known as NETSIM (NETwork SIMulation) and FRESIM (Freeway SIMulation) that give it the capability to model both freeway and surface street networks. CORSIM is incorporated into TSIS, a package of programs that includes a Graphical User Interface (GUI) utility, CORSIM, and TRAFUV, a Windows-based post-processor that provides Measures of Effectiveness (MOEs) and animations of traffic flow based on the CORSIM outputs.

5.2 Traffic Level of Service Analysis Results

The results for the Level of Service analysis for the AM and PM peak hours are presented in Table 5.1. The table shows estimated delay in seconds per vehicle and the resulting intersection Level of Service for each of the 11 intersections identified for evaluation. These results are presented for the No Build condition (Whitehurst Freeway remains in operation) as well as each of the best-performing alternatives for the removal of the freeway. Detailed results by each approach to each of the intersections are shown in Appendix B of this document.

Table 5.1, Level of Service Changes for Top-Performing Alternatives

AM Peak Period					
Intersection	No Build LOS/Avg Delay	Alt 7 LOS/Avg Delay	Alt 8.1 LOS/Avg Delay	Alt 14 LOS/Avg Delay	Alt 17 LOS/Avg Delay
Foxhall & Canal	B / 14.6 sec	B / 11.3 sec	B / 10.2 sec	B / 11 sec	B / 12.7 sec
Canal & Whitehurst Fwy	B / 10.1 sec	B / 17.2 sec	C / 21.5 sec	C / 32.4 sec	E / 58.4 sec
M St & Key Bridge	D / 38.6 sec	E / 72.6 sec	D / 43.1 sec	F / 80.8 sec	F / 94.2 sec
M St & 34th St NW	E / 62.8 sec	D / 53.1 sec	D / 50.2 sec	C / 31.2 sec	F / 82.5 sec
M St & Wisconsin Ave	C / 21.4 sec	C / 26 sec	D / 49.4 sec	D / 41 sec	C / 25.7 sec
Pennsylvania Ave & 28th St	A / 2.2 sec	A / 9.4 sec	B / 15.6 sec	A / 3.1 sec	B / 11.6 sec
K St & Wisconsin Ave	B / 18.1 sec	B / 15 sec	D / 50.9 sec	D / 40.8 sec	B / 15.9 sec
K St & 27th St NW	F / 116.5 sec	C / 31.6 sec	C / 32.9 sec	B / 14.3 sec	C / 25.5 sec
K St & 25th St NW	F / 191.8 sec	B / 12.8 sec	A / 7 sec	B / 14.3 sec	A / 8.7 sec
Virginia Ave & 27th St	B / 10.9 sec	A / 9.7 sec	A / 5.8 sec	B / 12.8 sec	B / 11.2 sec
M St & 28th St NW	B / 18.8 sec	C / 24.5 sec	B / 19.2 sec	C / 24.2 sec	C / 32.9 sec
PM Peak Period					
Intersection	No Build LOS/Avg Delay	Alt 7 LOS/Avg Delay	Alt 8.1 LOS/Avg Delay	Alt 14 LOS/Avg Delay	Alt 17 LOS/Avg Delay
Foxhall & Canal	D / 53 sec	D / 35.1 sec	D / 42.8 sec	D / 43.4 sec	B / 12.3 sec
Canal & Whitehurst Fwy	E / 70.9 sec	C / 24.5 sec	C / 21.7 sec	B / 11 sec	C / 20.6 sec
M St & Key Bridge	D / 47.8 sec	E / 70.4 sec	C / 25.5 sec	E / 55.7 sec	D / 52.2 sec
M St & 34th St NW	F / 103.2 sec	D / 40.5 sec	B / 16.9 sec	E / 74.6 sec	E / 60.2 sec
M St & Wisconsin Ave	F / 82.7 sec	E / 75.6 sec	C / 24.9 sec	D / 47 sec	D / 54.7 sec
Pennsylvania Ave & 28th St	D / 37.6 sec	D / 40.8 sec	A / 7.8 sec	B / 17.8 sec	A / 7.8 sec
K St & Wisconsin Ave	A / 9.7 sec	A / 9.9 sec	A / 9.1 sec	B / 14 sec	B / 12.9 sec
K St & 27th St NW	D / 42.4 sec	E / 78 sec	D / 52.7 sec	B / 16.6 sec	E / 72.2 sec
K St & 25th St NW	F / 107.5 sec	F / 155.3 sec	B / 19.4 sec	F / 143.6 sec	E / 78.9 sec
Virginia Ave & 27th St	B / 10.8 sec	B / 12.7 sec	B / 16.1 sec	B / 14 sec	B / 19 sec
M St & 28th St NW	E / 58 sec	C / 21.9 sec	B / 16.0 sec	B / 18.7 sec	C / 26 sec

Level of Service is Maintained or Improves in Comparison to No Build
 Level of Service Worsens When Compared to the No Build

For the AM peak hour the top-performing alternatives result in either maintaining or improving the level of service at the following intersections:

- Foxhall Road and Canal Road
- K Street and 27th Street
- K Street and 25th Street
- Virginia Avenue and 27th Street

The intersections at 25th and 27th Streets with K Street improve from Level of Service F conditions for the No Build Alternative to Level of Service A, B, or C condition for Alternatives 7, 8.1, 14, and 17. Alternatives 7, 8.1, and 14 also result in an improved level of service at the M Street and 34th Street intersection. However, for Alternative 17, this intersection's level of service worsens to a Level of Service F condition.

The top-performing alternatives also include several intersections where the intersection level of service for the AM peak hour worsens in comparison to the No Build condition. These include the following intersections:

- Canal Road and Whitehurst Freeway/K Street Connection
- M Street and Key Bridge
- M Street and Wisconsin Avenue
- Pennsylvania Avenue and 28th Street
- K Street and Wisconsin Avenue
- M Street and 28th Street

Alternative 8.1 results in a worsening to Level of Service F conditions at K Street and Wisconsin Avenue in the AM peak hour. Alternative 14 results in a worsening to Level of Service F conditions at M Street and Key Bridge and Alternative 17 results in a worsening to Level of Service F Conditions at M Street intersections with Key Bridge and 34th Street.

For the PM peak hour, the top-performing alternatives either maintain the same level of service or improve the level of service when compared to the No Build condition at the following intersections:

- Foxhall and Canal Road
- Canal Road and Whitehurst Freeway/K Street Extension
- M Street and 34th Street
- M Street and Wisconsin Avenue
- Pennsylvania Avenue and 28th Street
- K Street and 25th Street
- Virginia Avenue and 27th Street
- M Street and 28th Street

The M Street intersections at 34th Street and Wisconsin Avenue improve from Level of Service F conditions for the No Build to Level of Service B, C, D, or E conditions with the top-performing alternatives. Alternative 8.1 results in levels of service that are either the same or better than the No Build Alternatives for all of the intersections studied for the PM peak hour condition.

The analysis results show some worsening of level of service for Alternatives 7 and 14 at the intersection of M Street and Key Bridge, Alternatives 14 and 17 at K Street and Wisconsin Avenue, and Alternatives 7 and 17 at K Street and 27th Street.

5.3 Traffic Travel Time Results

The results for the travel time analysis for the AM and PM peak hours are presented in Table 5.2. The table shows estimated travel times (in seconds) for each of the top performing alternatives and the No Build Alternative for east-west travel along Canal Road and M Street from Foxhall Road to Pennsylvania Avenue and 28th Street. The table also shows the east-west travel times along Canal Road and K Street (Whitehurst Freeway for the No Build Alternative) from Foxhall Road to K Street and 25th Street. The results for the peak hour and peak traffic direction are shown in bold type in the table. These values are of particular importance since these movements generally include the highest traffic volumes and have the greatest impact on daily work trips. For the AM peak hour the peak direction for traffic is eastbound towards the employment core of DC. For the PM peak hour, the peak direction for traffic is westbound towards more residential areas of DC west of Georgetown.

Table 5.2, Travel Times For Top Performing Alternatives

AM Peak Period Travel Times (in seconds)					
Segment*	2030 No Build	Alt 7	Alt 8.1	Alt 14	Alt 17
M Street Eastbound	320	366	351	424	358
M Street Westbound	421	444	378	372	504
Whitehurst Fwy/K St/ Tunnel Eastbound	333	322	563	266	248
Whitehurst Fwy/K St/Tunnel Westbound	719	291	329	387	359
PM Peak Period Travel Times (in seconds)					
Segment*	2030 No Build	Alt 7	Alt 8.1	Alt 14	Alt 17
M Street Eastbound	432	459	291	288	282
M Street Westbound	1352	787	549	595	634
Whitehurst Fwy/K St/Tunnel Eastbound	806	435	430	200	315
Whitehurst Fwy/K St/Tunnel Westbound	445	462	343	359	273

* The M Street segment runs from the intersection of Foxhall Road and Canal Road to the intersection of M Street, 28th Street, and Pennsylvania Avenue. The Whitehurst Freeway/K Street/Tunnel segment assumes the Whitehurst Freeway for the No Build Alternatives; K Street for Alternatives 7, 8.1, and 14; and a tunnel for Alternative 17.

For the AM peak hour, it is estimated that the average driver could expect a travel time of about 320 seconds (5 minutes, 20 seconds) for the eastbound (peak direction) trip on Canal Road and M Street from Foxhall Road to Pennsylvania Avenue and 28th Street under the No Build condition. Estimates for Alternative 7 show about 366 seconds, an increase of about 46 seconds, for the same trip. Alternatives 8.1 and 17 show a more modest increase in travel time between 31 to 38 seconds, to a total travel time of 351 seconds and 358 seconds, respectively. Alternative 14 would include the highest travel time of 424 seconds.

AM peak hour travel eastbound along Canal Road and the Whitehurst Freeway from Foxhall Road to the K Street and 25th Street intersection is estimated at about 333 seconds for the No Build Condition. The same trip with Alternatives 7, 14, and 17 is estimated to have travel times that are lower than the No Build condition. These alternatives show travel times from Foxhall Road to 25th Street that would range from 248 seconds for Alternative 17 to 322 seconds for Alternative 7. These trips would utilize a combination of Canal Road, the new connection to K Street, and an improved K Street to 25th Street. Alternative 17 also includes a short tunnel

beneath K Street from 33rd Street to 27th Street. All of these alternatives do not include a connection to K Street from the Key Bridge. This has the effect of limiting congestion along K Street and allowing improved east-west travel times for traffic coming from Canal Road when compared to the No Build condition. The No Build alternative has a connection from Key Bridge to the Whitehurst Freeway which accommodates traffic from Virginia bound for downtown DC. By eliminating this connection from Key Bridge as part of Alternatives 7, 14, and 17, it reduces the volume of traffic from Virginia moving through the study area and provides additional capacity for eastbound travel in the AM peak hour coming from the Canal Road and Foxhall Road area. However, Alternative 8.1 provides a ramp connection from Key Bridge to eastbound K Street. As shown in the table, this alternative shows an increase in travel times when compared to the No Build alternative. The eastbound travel time for Alternative 8.1 is 563 seconds in the AM peak hour.

For the PM peak hour, travel time along a combination of Pennsylvania Avenue, M Street, and Canal Road from 28th Street to Foxhall Road is estimated at 1,352 seconds (22 minutes, 30 seconds) for the No Build alternative. All of the top performing alternatives show a substantial reduction in travel times for westbound movements along this route for the PM peak hour. The alternatives provide the option of using either M Street or an improved K Street and connection to Canal Road accommodate through trips as well as access from Georgetown businesses and employment centers to points further to the west. The westbound travel times for Pennsylvania Avenue, M Street, and Canal Road from 28th Street to Foxhall Road for the top performing alternatives range between 549 seconds for Alternative 8.1 to 787 seconds for Alternative 7. Westbound PM peak hour travel times along the Whitehurst Freeway and Canal Road from 25th Street to Foxhall Road are estimated to be about 445 seconds (7 minutes, 25 seconds). Westbound PM peak hour travel times for the same trip from 25th Street to Foxhall Road using K Street and Canal Road as part of Alternatives 8.1, 14, and 17 show a potential reduction in travel times. The estimated travel times for these alternatives range from 273 seconds for Alternative 17 to 359 Seconds for Alternative 14. A travel time estimate of 462 seconds for Alternative 7 indicates a slight increase (17 seconds) when compared to the No Build Alternative.

6.0 KEY FINDINGS

The purpose of the Whitehurst Freeway Deconstruction Feasibility Study is to identify feasible options for the removal the Whitehurst Freeway that warrant additional consideration and more detailed study as part of the future steps in the project development process. The goal of the study is to evaluate the feasibility of removing the Whitehurst Freeway to provide better access to Georgetown and to the future waterfront park and to provide traffic relief to M Street NW corridor. The study considered a range of evaluation criteria that addressed potential impacts to traffic operations, neighborhood character, and cost. The criteria were developed in consultation with the project technical review committee and the general public through a series of design workshops and public meetings in 2005 and 2006. The evaluation process and results are described in Sections 3.0 and 4.0 of this report. As shown in Section 5.0, the best-performing alternatives from the evaluation were also subjected to a detailed traffic simulation analysis to determine the potential traffic impacts associated with these alternatives.

This section summarizes key findings based on the results of the evaluation of alternatives and the traffic simulation analysis. These findings are summarized as follows.

1.) Evaluation of Alternatives Results

The evaluation of alternatives indicates that there are several alternatives that include the removal of the Whitehurst Freeway that perform better than the No Build Alternative based on the objectives, evaluation criteria, and weighting of the criteria that were established for the project. These alternatives include:

- Alternative 7: At-grade K Street without a connection to Key Bridge
- Alternative 8.1: At-grade K Street with Canal Road connection and short ramp connection to Key Bridge
- Alternative 8.2: At-grade K Street with Canal Road connection and long ramp connection to Key Bridge
- Alternative 8.3: At-grade K Street with Canal Road connection and connection to Key Bridge via 34th Street
- Alternative 9.1: At-grade K Street without a connection to Key Bridge and maintaining ramps to K Street at the eastern end with an added right lane from eastbound K Street to southbound 27th Street
- Alternative 9.2: At-grade K Street without a connection to Key Bridge and maintaining ramps to K Street at the eastern end
- Alternative 10: Depressed K Street without a connection to Key Bridge
- Alternative 11: At-grade K Street with Canal Road connection and both eastbound and westbound connections to Key Bridge
- Alternative 12: At-grade K Street with connection to Canal Road moved further to the west without a connection to Key Bridge
- Alternative 13: At-grade K Street with connection to Canal Road moved further to the west and both eastbound and westbound connection to Key Bridge
- Alternative 14: At-grade K Street without a connection to Key Bridge with enhancements to the K Street and 27th Street intersection
- Alternative 15: At-grade K Street with a modified westbound ramp at 27th Street
- Alternative 16: At-grade K Street with connection to Canal Road and eastbound and westbound spiral ramp connection from Key Bridge
- Alternative 17: Short tunnel beneath K Street
- Alternative 18: Long tunnel beneath K Street

Additional study of the No Build Alternative and these alternatives should be undertaken in greater detail as part of an Environmental Assessment or Environmental Impact Study that would be necessary to advance the project forward.

2.) Top-Performing Alternatives

Based on the results of the evaluation of alternatives, the top five performing alternatives included the following:

- Alternative 17: Short tunnel beneath K Street
- Alternative 7: At-grade K Street with a Canal Road connection but without connection to Key Bridge
- Alternative 8.1: At-grade K Street with a Canal Road connection and short ramp connection to Key Bridge
- Alternative 18: Long tunnel beneath K Street
- Alternative 14: At-grade K Street with a connection to Canal Road but without a connection to Key Bridge with enhancements to the K Street and 27th Street intersection

3.) Strengths of the Top Performing Alternatives

All five of the top performing alternatives generally outperformed the No Build Alternative for the following criteria:

- *Improving the Visual Environment by Minimizing Visual Barriers at the Waterfront*— The removal of the elevated Whitehurst Freeway would eliminate the visual barriers between the Georgetown business district and the Potomac River waterfront. Alternatives 7, 14, 17, and 18 that do not include a ramp connection from the Key Bridge to K Street performed the best relative to this objective. Alternative 8.1 includes some improvement over the No Build Alternative with the removal of the freeway but there is some partial visual impact from the ramp connection from Key Bridge to K Street.
- *Improving Vehicular Access to Georgetown Businesses, Parking Facilities, and Waterfront*— Expansion of K Street and new connections from K Street to Canal Road (and Key Bridge for Alternative 8.1) increase accessibility of the Georgetown waterfront, businesses located south of M Street, and many of the parking garages along and adjacent to K Street.
- *Improving Traffic Operations on M Street NW During Peak Hour Periods*— The addition of a new connection from Canal Road to K Street provides an alternative route to access Georgetown businesses and parking facilities that avoids the congested portions of M Street. The new connection between Key Bridge and K Street provided by Alternative 8.1 also provides an alternative route for Georgetown bound traffic to and from Virginia that avoids congested portions of M Street.
- *Improving Pedestrian and Bicycle Access to Georgetown Businesses and Waterfront Area*— The top performing alternatives include the creation of an enhanced pedestrian environment with the removal of the visual barrier and

opportunities to include improved pedestrian signals, facilities, and amenities along K Street and at the intersection of 27th Street and K Street. The tunnel alternatives would also minimize potential conflicts between through traffic and pedestrians and bicyclists accessing the waterfront and area businesses.

- *Positive Impacts on Property Values*— Possible increase in property values along K Street due to increased accessibility and visual appeal of underutilized Georgetown waterfront properties. Alternatives are estimated to have a neutral impact on property values in Foggy Bottom and Palisades.
- *Enhancing Transit Operations*—New connections between K Street and Canal Road provide options for improved bus transit service to the study area while avoiding slow travel times and delays along congested M Street.

4.) **Weaknesses of the Top Performing Alternatives**

The top five performing alternatives performed worse than the No Build Alternative for the following criteria:

- *Travel Times for Maryland and Virginia Residents and Freeway Users*— Could increase travel time for Virginia drivers during the peak periods. This may cause some Virginia drivers to divert to other bridge crossings to access the District. It would also eliminate uninterrupted access to the E Street Expressway for Virginia drivers using the Key Bridge.
- *Ability for Drivers to Make Certain Movements Without Stops*— Alternatives 7, 14, 17, and 18 add up to four possible stops with the removal of the Whitehurst Freeway and its connection to and from the Potomac Freeway, requiring the connection from the Potomac Freeway to L Street to pass through a signalized intersection at K Street, and eliminating the Whitehurst Freeway and its connection from the northbound Key Bridge. Alternative 8.1 could add up to three stops with the removal of the Whitehurst Freeway and its connection to and from the Potomac Freeway and requiring connection from the Potomac Freeway to L Street to pass through a signalized intersection at K Street.
- *Disruption of Existing Land Uses*—The new north-south connection between K Street and Pennsylvania Avenue at 27th Street for Alternatives 7, 8.1, 14, 17, and 18 could disrupt the land uses in this area. The new ramp from Key Bridge down to K Street for Alternative 8.1 could potentially disrupt land uses along the waterfront near the bridge.
- *Impacts on the Natural Environment*— All of the top performing alternatives have some potential to impact the open space around K Street and 27th Street intersection with the proposed improvements to that intersection. The tunneling associated with Alternatives 17 and 18 also have some potential to impact the natural environment.
- *Impacts on Existing Utilities from Transportation Improvements*— All of the top-performing alternatives have some potential to impact existing utilities due to the roadway improvements and possible tunneling along K Street. The construction

of a new ramp from Key Bridge to K Street also has the potential to impact existing utilities.

- *Construction Impacts*— Removal of the Whitehurst Freeway would create construction impacts along K Street for all of the alternatives. Alternative 14 would also include potential construction impacts at the intersection of K Street and 27th Street NW. Alternative 8.1 would include the potential for construction impacts on Key Bridge during the construction of a new ramp down to K Street. Alternatives 17 and 18 would include impacts associated with the excavation activities necessary for tunnel construction along K Street.
- *Cost*— Alternative 18, the long tunnel option, has the highest costs which exceed \$150 million, followed by Alternative 17, the short tunnel option, with costs of nearly \$100 million. These costs are two to three times higher than the other top performing alternatives. Alternative 14 would cost nearly \$50 million, followed by Alternative 8.1 at nearly \$40 million, and Alternative 7 at about \$25 million.

5.) Impacts on Intersection Level of Service

The intersection level of service analysis shows that the top-performing alternatives would result in improving the AM and PM peak hour intersection level of service at some intersections while worsening level of service at other intersections when compared to the No Build Alternative. Alternatives 7 and 8.1 tend to perform the best at maximizing the number of intersections that either maintain or improve intersection levels of service when compared to the No Build Alternative. For the PM peak hour condition, Alternative 8.1 resulted in maintaining or improving the level of service at all of the 11 key intersections that were studied. This included improving three intersections (M Street and 34th Street, M Street and Wisconsin Avenue, and K Street and 25th Street) from Level of Service F under the No Build Alternative to Levels of Service B and C. However, for the AM peak hour condition, Alternative 8.1 results in a worsening of level of service at four intersections, including one intersection (K Street and Wisconsin Avenue) from Level of Service C under the No Build Alternative to Level of Service F conditions.

For both the AM and PM peak hour condition, Alternative 7 results either maintaining or improving the intersection level of service at 9 of the 11 intersections that were studied. However, Alternative 7 results in a worsening from Level of Service D to Level of Service E at the M Street and Key Bridge intersection for both the AM and PM peak hour condition, and results in the same change at the K Street and 27th Street intersection in the PM Peak. This alternative also shows a worsening from Level of Service B to C at the M Street and 28th Street intersection in the AM peak hour.

6.) Impacts on Travel Time

Based on the results of a traffic simulation analysis for east-west travel through the study area along Canal Road, M Street and Pennsylvania Avenue and along Canal Road and K Street (or Whitehurst Freeway for the No Build Alternative), all of the top-performing alternatives resulted in a reduction of travel time for PM peak hour peak direction (westbound) travel along the Canal Road, M Street, and Pennsylvania Avenue route by between 565 to 803 seconds. For the PM peak hour peak direction

(westbound) travel along the new K Street and Canal Road route travel times also decrease for Alternatives 8.1, 14, and 17 by between 86 and 172 seconds for the average driver when compared to the No Build condition which includes the Whitehurst Freeway. Alternative 7 results in an increase in travel times for this route of about 17 seconds when compared to the No Build Alternative.

Estimated travel times for the AM peak hour peak direction (eastbound) travel along the Canal Road, M Street, and Pennsylvania Avenue route show an increase in travel times for the top performing alternatives when compared to the No Build. For this route AM peak hour eastbound travel times would increase by between 31 and 104 seconds for the average driver when compared to the No Build Alternative. For the Canal Road and new K Street Route, AM peak hour eastbound travel times would decrease for Alternatives 7, 14, and 17 by between 11 and 85 seconds for the average driver. However, Alternative 8.1 results in a 230 second increase in travel times along this route in the AM peak hour eastbound direction. Alternative 8.1 provides a ramp for traffic from the northbound Key Bridge to eastbound K Street. This additional traffic increases the delay along K Street resulting in longer travel times than the other alternatives.