

National Park Service  
U.S. Department of the Interior

Fort McHenry National Monument and Historic Shrine  
Baltimore, Maryland



# Fort McHenry

## *Alternative Transportation Study*

### Appendix D

May 2004

John A. Volpe National Transportation Systems Center  
Research and Special Programs Administration  
U.S. Department of Transportation



## **Appendix D**

### **Gate Area and Bicycle/Pedestrian Enhancement Options**

*Detailed information—including renderings and cost estimates—prepared by Kyle Zick of Carol R. Johnson Associates.*



FORT McHENRY NATIONAL MONUMENT AND HISTORIC SHRINE  
ALTERNATIVE TRANSPORTATION STUDY  
Baltimore, Maryland

December 12, 2003

Prepared by:

Carol R. Johnson Associates, Inc.  
115 Broad Street  
Boston, MA 02110

In Association with:

Bargmann, Hendrie + Archetype  
316 Summer Street  
Boston, MA 02210

## **Fort McHenry National Monument and Historic Shrine Alternative Transportation Study**

### **I. GENERAL**

Alternative Transportation options are being studied for Fort McHenry National Monument and Historic Shrine in conjunction with the Park's efforts to replace and upgrade the visitor center. This study will review the traffic circulation at the Front Gate on East Fort Avenue, offsite parking for busses and overflowing car parking for special events as well as bicycle route alternatives connecting downtown Baltimore with the Fort property.

Fort McHenry National Monument and Historic Shrine is a 43 acre historic site located in Baltimore, Maryland. The fort played an important role during the War of 1812, when the British unsuccessfully attempted to take Baltimore during September 13-14, 1814. The 24 hour bombardment was witnessed and memorialized by Francis Scott Key in a poem, "The Star Spangled Banner." Fort McHenry became part of the National Park Service in the 1930's.

Fort McHenry is located at the end of the Locust Point peninsula. It is accessible by car, public transit, school bus, private tour operator, and ferry service. Adjacent parcels are owned by the City of Baltimore, the U.S. Naval Reserve, the U.S. Army Corps of Engineers, and private industry.

# Fort McHenry National Monument and Historic Shrine Alternative Transportation Study

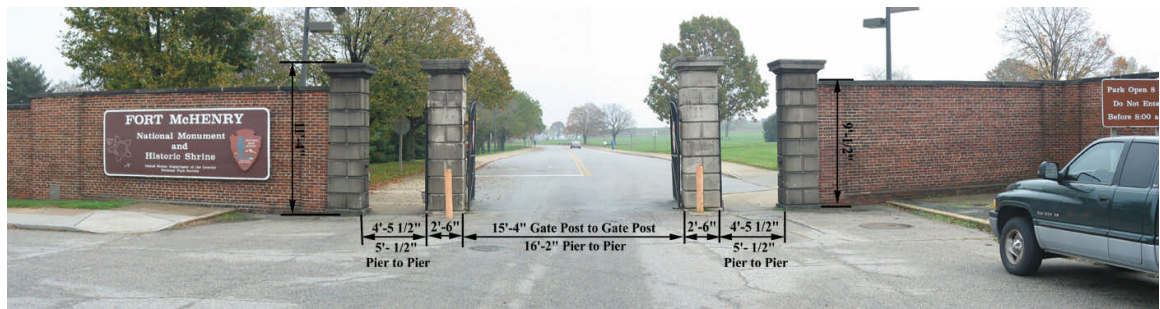
## II. GATE TRAFFIC CIRCULATION

### *Need/Purpose*

This study is being performed because the current historic gate is too narrow to accommodate two-way traffic, which leads to conflicts between vehicles entering and exiting the Fort.

### *Existing Conditions*

The primary vehicular and pedestrian access to Fort McHenry is accommodated on East Fort Avenue through the gate in the brick boundary wall. Vehicles enter the fort property through a central opening marked by two granite piers. Pedestrians enter to either side of the vehicular opening. Steel gates exist at each opening in order to secure the property.



*East Fort Avenue Gate-Existing Conditions (CRJA, 2003)*

The vehicular gate has a clear width of 15'-4" (from steel gate post to gate post). Since typically a minimum width of 22'-24' is required for two way traffic, vehicles must stagger entering and exiting to pass this narrower width. In an effort to control the traffic flow; all exiting vehicles must stop before exiting, giving the right of way to entering vehicles.

Travel lanes leading to the gate are generous in width in contrast to the gate opening. Constellation Plaza (the extension of East Fort Avenue within the Fort wall) has 17' lanes in each direction. East Fort Avenue outside the fort has 20' lanes with a 5' shoulders in each direction. There is no advanced warning on East Fort Avenue or Constellation Plaza that the travel lanes are narrowing or that two way traffic becomes one lane at the gate.

Sightlines for vehicles exiting the fort property are not ideal since Wallace Street intersects with East Fort Avenue within 15' of the exterior of the gate. The turning radii from East Fort Avenue onto Wallace Street only allow passenger vehicles and single unit trucks.

## Fort McHenry National Monument and Historic Shrine Alternative Transportation Study

The roadway paving on East Fort Avenue/Constellation Plaza is constructed from bituminous concrete and is in good condition. It appears from historic photographs that the elevation of the roadway in respect to the granite gate piers has increased by approximately 4" to 6".

Pedestrian access follows concrete sidewalks within the fort that lead to the smaller gate openings (4'-5 1/2" clear width). These sidewalks end at the boundary wall and do not continue onto city sidewalks.

### *Historic Conditions*

We understand that the gate has been in the configuration we find today since 1837. In the lithograph seen below, the gate is shown with two central granite piers marking the carriage opening and one pedestrian scaled opening on either side. A black metal gate encloses the pedestrian and carriage openings.



1865 Lithograph by E. Sanchse (Provided by the Olmsted Center for Landscape Preservation)

In the early 20<sup>th</sup> century the main gate looked very different than in did in 1865 since a gate house was constructed on top of it. Note in the photo below the gate house and the streetcar outside of the fort property.

## Fort McHenry National Monument and Historic Shrine Alternative Transportation Study



*East Fort Avenue Gate-1907-1912 (Provided by the Olmsted Center for Landscape Preservation)*

### *Gate Traffic Circulation Alternatives*

In considering improvements to the front gate and traffic circulation each scheme strives to achieve the following:

- Eliminate traffic conflicts at the Front Gate
- Make the pedestrian sidewalks continuous through the gate
- Improve the “first impression” of the visitor at the Gate

While the simplest solution may be modifying the existing gate to provide sufficient width for two way traffic, this alternative has been ruled out since this gate is basically unchanged from its 1837 configuration and is a character defining feature of the fort.

There are a number of examples of narrow gates from walled cities and fortified towns that can illustrate how narrow historic gates can be remain and accommodate vehicular traffic. In many Italian walled cities or hill towns (Assisi, Verona, Rome, etc.), they have maintained the historic gate and controlled traffic with traffic signals to allow traffic to flow one way at a time.

Continuing under the assumption that the gate on East Fort Avenue will remain in its current configuration, we pursued several alternatives to accommodate two-way traffic through this gate as well as one-way alternatives with the East Fort

## Fort McHenry National Monument and Historic Shrine Alternative Transportation Study

Avenue gate as the entrance and either the maintenance gate or Nimitz Drive as exits.

### *Improvements common to all alternatives*

Two of the three goals mentioned above for the gate circulation improvement alternatives are achieved with solutions common to each alternative. In every alternative we propose re-aligning the East Fort Avenue/Constellation Plaza roadway curblineline to align with the inside of the gate piers and therefore connecting the NPS sidewalks inside the fort with the City sidewalks outside of the fort.



*Discontinuous sidewalk at the East Fort Avenue Gate (CRJA, 2003)*

We have also proposed traffic calming in each alternative because we feel that we can reduce vehicular speeds and improve the visitor's "first impression" as well. Traffic calming as defined by the Institute of Transportation Engineers "...involves changes in street alignment, installation of barriers, and other physical measures to reduce traffic speeds and/or cut-through volumes, in the interest of street safety, livability, and other public purposes." In this case we propose the installation of speed table to physically reduce vehicular speeds and provide a visual cue to drivers approaching the narrow gate.

Installation of a speed table (a 3 to 4 inch raised area in a roadway, approx 20' long, with different texture) has shown to reduce speeds by nearly 20% and decrease accidents by almost 50% in some studies.

The speed table surface may be paved with brick or cobblestone (both materials that have precedent in this area historically) and would provide the textural change from asphalt that is desired.



## Fort McHenry National Monument and Historic Shrine Alternative Transportation Study



*Speed Table-Cambridge, MA (CRJA, 2001)*

All of the alternatives include a bicycle lane (on each side of the street) on East Fort Avenue to promote bicycle travel to and from the Fort. Bicycle accommodation is further discussed later in this summary.

### *Two-way Alternatives*

The two-way alternatives shown allow vehicles to enter and exit the gate on East Fort Avenue/Constellation Plaza by controlling traffic flow so vehicles can pass through the gate one direction at a time. We feel that in addition to the traffic calming (speed table) proposed that stopping traffic in both directions before passing through the gate can minimize conflicts. Note today that only exiting vehicles stop before the gate. It does not appear that the traffic volumes warrant a traffic signal in lieu of stop signs, but in any case each of the two-way alternatives would be appropriate with traffic control via signage or signalization.

Below are more specific descriptions of the two-way alternatives:

#### **Alternative #1: Two-way Circulation at Front Gate with reconfigured Wallace Street (all parallel parking)**

Two-way traffic will continue to flow through the gate on East Fort Avenue. In order to correct some of the traffic conflicts that occur today, we'd recommend that traffic entering and exiting come to a complete stop prior to the gate. We'd

## **Fort McHenry National Monument and Historic Shrine Alternative Transportation Study**

also recommend installation of a field of brick or cobblestone as a traffic calming measure at the gate to further delineate the gate and to slow traffic.

We have proposed re-configuring Wallace Street and the Steinweg access road because in their present configuration they are inefficient and unsafe. These roads are inefficient because they both serve two-way traffic while only separated by 38'. In this scheme we propose combining Wallace Street and the Steinweg access road to improve the land use efficiency, remove the sight line and turn radii issues when exiting the gate and turning right onto Wallace Street, and removing the grading problems as well. In all of the alternatives we have tried to maintain the same amount of parking within the study area as exists today. In this scheme we have shown parallel parking along Wallace Street since it maximized the amount of roadway that can be "reclaimed" for sidewalk or green space. In this scheme there is a net loss of one parking space.

### **Alternative #2:**

#### **Two-way Circulation at Front Gate with reconfigured Wallace Street (angled parking)**

This alternative is very similar to alternative #1 except the parking along Wallace Street is shown as angled parking versus parallel. The angled parking yields more parking (a net gain of 11 parking spaces), but there may be some conflicts with cars backing into industrial traffic even though the traffic volume on Wallace Street is low.

### **Alternative #3:**

#### **Two-way Circulation at Front Gate with Wallace Street and Steinweg Access unchanged**

In this scheme Wallace Street and the Steinweg access road are left in their current configuration. To improve the Wallace Street/East Fort Avenue intersection we've expanded the speed table with a field of brick or cobblestone to accentuate the gate and to call attention to this intersection for drivers.

### *One-way Alternatives*

The one-way alternatives shown allow vehicles to enter the gate on East Fort Avenue/Constellation Plaza and exit at either the maintenance gate or the gate on Nimitz Drive and ultimately onto Wallace Street. Even though the conflict of two-way traffic at the East Fort Avenue gate is not an issue with a one-way scheme, we still feel that slowing and stopping entering traffic is desired because of the narrow gate, and proximity to pedestrians, etc. Therefore we have included the traffic calming (speed table) as well as a stop sign prior to entering the gate in the one way alternatives as well.

## **Fort McHenry National Monument and Historic Shrine Alternative Transportation Study**

By converting Constellation Plaza into a one way roadway there is more than sufficient width to accommodate the vehicular traffic. As part of this planning, we should consider if overflow parallel parking on the north side of Constellation Plaza is desired in lieu of narrowing the roadway. Similarly including a dedicated bicycle lane along the entrance road would be desirable in lieu of narrowing the pavement.

Below are more specific descriptions of the one-way alternatives:

### **Alternative #4:**

#### **One-way Circulation with the exit at the maintenance gate with Wallace Street and Steinweg Access unchanged**

In this alternative one-way traffic enters the park along East Fort Avenue/Constellation Plaza and exits through the maintenance area gate. We assume that the new exit road will require relocation of the maintenance functions in this area at a minimum and possibly the housing as well. This alternative maintains the current layout of Wallace Street and the Steinweg access road, which does pose some limitations. This scheme is problematic because the maintenance gate opening and the width of Wallace Street only minimally allow a bus turning movement, leaving no margin of error for a bus driver.

The exit drive will need to be regraded at the gate since the existing grade is approximately 8% and most likely will cause vehicles to “bottom out.” Since in this scheme, we’d be meeting the elevation of Wallace Street the regrading will mean excavating for the proposed exit drive from the perimeter wall east approximately 40’. Also note on both schemes utilizing the maintenance gate, we’d recommend removal of the existing chain link fence and replacement with a steel fence similar to the front gate.

## Fort McHenry National Monument and Historic Shrine Alternative Transportation Study



*Maintenance Gate-Existing Conditions (CRJA, 2003)*

### **Alternative #5:**

#### **One-way Circulation with the exit at the maintenance gate with Wallace Street reconfigured**

In this alternative the one way exit at the maintenance gate intersects with a reconfigured Wallace Street/Steinweg access road. As described earlier above, combining Wallace Street and the Steinweg access road can make the land use more efficient allowing the landscape surrounding the front gate to be improved and more in keeping with a National Park. Since this alternative reconfigures Wallace Street, the exit driveway will be regraded (and raised) to meet the new elevation of Wallace Street. An additional bus access driveway off Wallace Street has been shown for the potential of the #1 bus looping through the fort and dropping off at the East Fort Avenue bus stop. This additional driveway is not required for the busses to physically be able to access the bus stop, but make the turning movement less complicated.

### **Alternative #6:**

#### **One-way Circulation with the exit at Nimitz Drive with Wallace Street and Steinweg Access unchanged**

## Fort McHenry National Monument and Historic Shrine Alternative Transportation Study

In this alternative one-way traffic enters the park along East Fort Avenue/Constellation Plaza and exits through the Nimitz Drive gate. In both Nimitz Drive alternatives access may be restricted by the Navy with changes in National security levels. The existing gate at Nimitz Drive accommodates two-way traffic, which means that the proposed exit drive will have to yield to and cross incoming traffic at some point. We have proposed increasing the curb radii at the Nimitz Drive/Wallace Street intersection for bus turning. We recommend that additional curb be installed and landscape be included on the northern edge of the proposed exit to improve the aesthetics of the area. The Nimitz Drive exit alternatives are negatively affected by the abutting cement block buildings and other industrial architecture. Note that no bike lane can be accommodated along Wallace Street, bicyclists and motorists will share the pavement.



*Nimitz Drive Gate-Existing Conditions (CRJA, 2003)*

### **Alternative #7:**

#### **One-way Circulation with the exit at Nimitz Drive with Wallace Street reconfigured**

This alternative is similar to alternative #6 except that Wallace Street/Steinweg access road has been reconfigured. This allows a bicycle lane to be added to Wallace Street as well as additional green space. Nimitz Drive will have to be regraded to meet the new grade of Wallace Street. We have also proposed relocating the driveway location for the Maryland Port Administration parking lot to align with Nimitz Drive since overflow vehicle and bus parking may occur on this property.

### **III. OVERFLOW PARKING**

*Need/Purpose*

The existing visitor center parking lot has capacity for approximately 160 cars and 6 busses. During peak times it is not unusual for 40-50 busses to access the site per day. This often causes busses to drop off visitors and to find alternative parking outside of the Fort property. Similarly during peak times there is insufficient capacity in the parking lot for all of the cars that visit the site. For the purposes of this study (based on rough estimates of need) we have studied offsite parking alternatives accommodating 12 busses and 100 vehicles.

*Existing Conditions*

When the 160 car parking lot at the visitor center is at capacity, the Park utilizes a grassed area adjacent to the parking lot. This grassed area has a capacity of approximately 100 cars. Like any grassed overflow parking area, its use must be managed by Park staff to organize the car parking efficiently and to direct travel in and out of the overflow area onto the Park access road. The grassed overflow area is bounded by specimen trees on 2 sides and Park housing and maintenance buildings on one side.



*Overflow Parking-Existing Conditions (CRJA, 2003)*

## Fort McHenry National Monument and Historic Shrine Alternative Transportation Study

This overflow parking works well because of its close proximity to the visitor center and parking lot. The drawbacks of this location are the proximity to the Fort and its impact on the cultural landscape and ultimately the compaction on the grassed area and the adjacent trees.

The one way traffic alternatives that are being considered for the Park access road would decrease the size of the overflow parking or prevent its use.

### *Offsite Overflow Parking Alternatives*

The Park has an informal agreement with the Maryland Port Administration (MPA) to utilize the large paved parking lot adjacent to East Fort Avenue outside of the Fort walls. We understand the Park uses that parking lot only during the heaviest visitation. In its current configuration the MPA parking lot has a capacity of approximately 230 cars.

The Maryland Port Administration property outside of the fort property is a large underutilized parking lot. The lot is paved, lighted, and has a perimeter chain link fence with access off the Steinweg access road.



*Aerial Photograph of Fort McHenry and Off-site Parking Area (MPA, 2002)*

The two alternatives studied assume a portion of the MPA property will be used for the NPS overflow parking program and the remaining land will continue to be

## **Fort McHenry National Monument and Historic Shrine Alternative Transportation Study**

used by the MPA. The two alternatives differ in what portion of the MPA land is used for NPS overflow parking: alternative #1 utilizes the western portion of the site for NPS use and alternative #2 utilizes the eastern portion of the site for NPS use.

### **Alternative #1: NPS Use of Western Portion of MPA Property**

Utilizing the western portion of the MPA property, this alternative accommodates 110 cars and 12 busses. By using the western portion of the site, the NPS could improve the East Fort Avenue frontage with street trees and other landscaping to enhance the approach to the fort. We assume that chain link fence along East Fort Avenue would be removed.

This scheme is appropriate for the two-way or one-way gate circulation alternatives, although vehicles exiting the fort property looking for overflow parking would have to make more turns to find the parking area therefore visitors will depend on signage for wayfinding. Similarly since the overflow parking would be seen prior to entering the fort, some people may utilize the overflow parking when parking is available on-site. In this alternative bus parking is “pull in” and not “pull through” because it requires less space. Because the busses will have to back up when leaving the parking spaces we have organized the parking lot so busses are generally separate from vehicles therefore limiting any traffic conflicts.

The remaining land on the MPA property can accommodate 81 parking spaces, with access off the Steinweg access road. Please note that the 81 parking spaces are calculated as they are configured today, which is not appropriate for public use, but more suited for storage since the access aisles are all “deadend.”

### **Alternative #2: NPS Use of Eastern Portion of MPA Property**

Utilizing the eastern portion of the MPA property, this alternative accommodates 93 cars and 12 busses. This alternative is better suited for the one-way gate circulation alternatives since exiting vehicles looking for off-site parking will be able to cross Wallace Street and enter the parking area. Bus parking is “pull in” versus “pull through” in this scheme similar to alternative #1. This scheme will create an opportunity to expand the landscaped area around the bus stop, which will improve the entrance experience for the Park visitor.

The remaining land on the MPA property can accommodate 61 spaces, accessed off East Fort Avenue.



## **IV. BICYCLE ROUTES FROM BALTIMORE INNER HARBOR TO FORT MCHENRY**

### *Need/Purpose*

No defined bicycling route exists to the Fort from downtown Baltimore. The NPS would like to encourage bicycling for those visitors who desire to travel by these means. Increased bicycle use may also decrease vehicular travel to the Park and therefore ease demand for parking etc.

### *Existing Conditions*

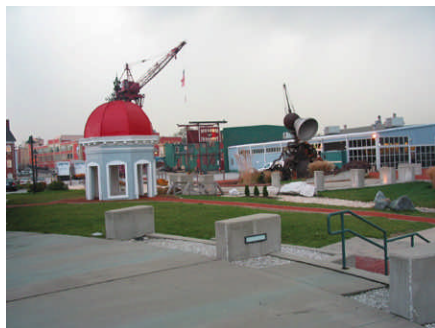
Bicyclists today, if traveling from the Inner Harbor to the Fort, would follow existing segments of the Promenade at the Inner Harbor and/or city streets to travel to the Fort. The lack of such a route therefore limits and hinders bicycle travel to the fort and also makes bicycle travel to the Fort less safe than it could be. Designating a bicycle route from the Inner Harbor to the Fort would capitalize on a large number of tourists who visit the waterfront and would also allow some of the adjacent neighborhoods to access the fort in a more efficient and safe way.



*Harborplace (Provided by the City of Baltimore)*

The Inner Harbor promenade is continuous connecting the Power Station, the Harborplace, Clipper City and Science Center and the Visionary Art Museum. This promenade allows pedestrians, bicyclists, roller bladers, etc. to enjoy the water's edge and to travel between these attractions. South of the Art Museum the promenade is discontinuous and exists in limited locations (Harbor View Drive, Baltimore Museum of Industry) although there are other segments under construction today that will make the promenade more continuous. There is little potential for the promenade to continue further south than the Museum of Industry due to the active industrial uses that exist.

## Fort McHenry National Monument and Historic Shrine Alternative Transportation Study



*Museum of Industry (CRJA, 2003)*

The existing road network leading from the Inner Harbor to the Fort is quite varied ranging from Key Highway (a four lane divided highway) to steep residential streets like Warren Avenue found in Federal Hill.

No bicycle lanes exist in the City of Baltimore today, although several are in the planning stages with construction potentially in 2004.

It doesn't seem there is potential for bicycle paths to follow railroad lines at this point because the rail lines are heavily used and the alignment would not be as direct as other alternatives.

### *Bicycle Route Alternatives*

Fort McHenry is a short bicycle ride from the Inner Harbor (approximately 2.4 miles), which makes the opportunity for bicycle use between these two destination very desirable. In addition the two adjacent Baltimore neighborhoods can further attract bicyclists to the Fort due to their proximity (2.0 miles to Federal Hill and 0.9 miles to Locust Point). The alternatives discussed aim to capitalize on the number of visitors to the Inner Harbor and the adjacent neighborhoods to attract them to the fort via bicycle in a clear and safe manner.

In the alternatives studied we strived to provide continuous two-way bicycle travel from Baltimore Inner Harbor to Fort McHenry, following guidelines established in the *Guide for the Development of Bicycle Facilities, AASHTO, 1999*. Bicycle facilities vary in definition as outlined in this guide. Below are the descriptions of the applicable facilities as well as design guidelines:

- Shared Roadway (no bikeway designation)-current condition, bicycle travel occurs on streets without bikeway designation. A minimum of 14' shared lane width is needed. In instances where there are steep grades, a 15' wide shared lane is preferred.

## **Fort McHenry National Monument and Historic Shrine Alternative Transportation Study**

- Signed Shared Roadway-bicyclist would have an advantage to use this route compared to alternative routes. Signing is there to advise drivers and cyclists. This designated a preferred route where there is high demand. A minimum of 14' shared lane width is needed. In instances where there are steep grades, a 15' wide shared lane is preferred.
- Bike Lane-established along streets where there is sufficient demand, and are designated with signage and pavement markings. Bike lanes delineate the right of way and offer more predictable movements. A minimum 12' wide parking and bike lane is required, so there is sufficient space to avoid car mirrors, opening car doors, vehicles exiting parking, etc. The bike lane should be signed every ¼ mile and delineated with a 6" wide solid white line, separating the travel lane from the bike lane. An additional 4" solid white line between the parking and bike lane can be used to encourage parking closer to the curb. At intersections the pavement striping should not be installed across crosswalks or intersections. With right turning vehicles the bike lane should be delineated with a broken line composed of 2' dots with 6' spaces. The dashed line is typically 50 to 200 feet long).
- Shared Use Path-are able to serve corridors not served by streets or where the street system is not appropriate for cycling. Shared use paths tend to be more recreational and less commuter focused. (8' minimum width:Two- way, 12' width preferred)

### **Alternative #1**

#### **Waterfront Promenade and East Fort Avenue Alignment**

Typical to most urban environments, it is not possible due to the numerous competing land uses, to dedicate a bicycle path separate from roadways from the Inner Harbor to the Fort. In this case we are fortunate that an existing waterfront promenade originating at the Inner Harbor provides a setting removed from vehicular traffic for half of the distance to the Fort. The remaining distance can be accommodated on existing roads that have sufficient width for bicycle lanes.

We have included a long term and short term routes in this alternative because the promenade from the Inner Harbor is being extended presently, which may continue for some time. In the interim we have identified alternative routes on city streets that would allow cyclists to still have a continuous route from the Inner Harbor to the Fort.

Below are more specific descriptions of the long term and short term alternatives for this bicycle route:

## Fort McHenry National Monument and Historic Shrine Alternative Transportation Study

### Long Term

In this scenario, the promenade from the Inner Harbor would be continuous to the Museum of Industry. This assumes that the current construction projects and other future ones as well make this happen. Although the promenade is a mixed use facility allowing pedestrians, roller blades, bicyclists etc. there is sufficient width (a 8' minimum) for the length in this study area to accommodate the proposed bicycle use. (It should be noted that bicycle use of the promenade is not allowed on the northern edge of the harbor.) In this alternative the promenade would be continuous from Inner Harbor to the Museum of Industry without any street crossings.



*Proposed Bicycle Route on Promenade (CRJA, 2003)*

To complete the alignment, a bicycle lane starts at the Museum of Industry streets along Key Highway to Lawrence Street and then finally to East Fort Avenue. We selected Lawrence Street as the North/South street because it has sufficient width to include bicycle use and is currently two-way. Other streets in the area such as Webster, Stevenson, and Jackson do not meet these criteria. East Fort Avenue is fairly wide, varying from 36' wide at railroad bridges to 48' wide in more typical conditions. The street is this wide because historically there were trolley lines running in the street in addition to traffic. Because of the generous width of East Fort Avenue, a bicycle lane can be added in both directions from Lawrence Street to the Fort gate. The bicycle lane would be adjacent to parallel parking along the street and would require a minimum combined bicycle lane/parking lane width of 12 feet. This bicycle lane would be delineated with continuous white pavement markings separating the travel lane and

## Fort McHenry National Monument and Historic Shrine Alternative Transportation Study

the bicycle lane. In addition, directional arrows and the bicyclist graphic will be added. Bicycle route signage will be included at ¼ mile intervals in each direction.



*Proposed Bicycle Lane on East Fort Avenue (CRJA, 2003)*

The extension of Key Highway, which is planned would allow bicyclists to travel further into the Locust Point neighborhood on Key Highway before connecting to East Fort Avenue via a small residential street.

### Short Term

In the short term while additional segments of the Promenade are being planned and constructed, an alternative route will be needed between the Art Museum and the Museum of Industry. Key Highway can be utilized with bicyclists and vehicles sharing the pavement as far as Lawrence Street. Restriping of the travel lanes and shoulders may be required for this interim solution because 14 feet wide travel lanes are recommended for shared use.

## Fort McHenry National Monument and Historic Shrine Alternative Transportation Study



*Proposed Bicycle Lane on Lawrence Street (CRJA, 2003)*

### **Alternative #2: Light Street and East Fort Avenue Alignment**

East Fort Avenue is wide enough to accommodate bicycle lanes from the Fort to Hanover Street. In this alternative we have identified an inland route that follows East Fort Avenue to Light Street. The City of Baltimore is currently planning this alignment and hopes to implement it in late 2004 or early 2005. This alignment has the advantage that it better accesses the Federal Hill neighborhood. The use of Light Street may be a longer term scenario since there are other projects planned there that allow bicycle use of “contra-lanes” or trolley lanes. In lieu of using Light Street for its full length, Riverside Avenue and William Street could lead bicyclists to Warren Street and then to Light Street. This route will follow narrow city streets that could not accommodate bicycle lanes, but since the volume and speed of vehicular traffic is low a signed shared roadway is sufficient. The drawback of this alternative is the fairly steep grades that bicyclists would traverse. This alignment will also connect via West Street to a planned bicycle route with the Gwen Falls trail (a 14 mile hiking/bicycling trail heading west of Baltimore and terminating at a Park and Ride facility along Interstate 70).



Main Gate-Existing

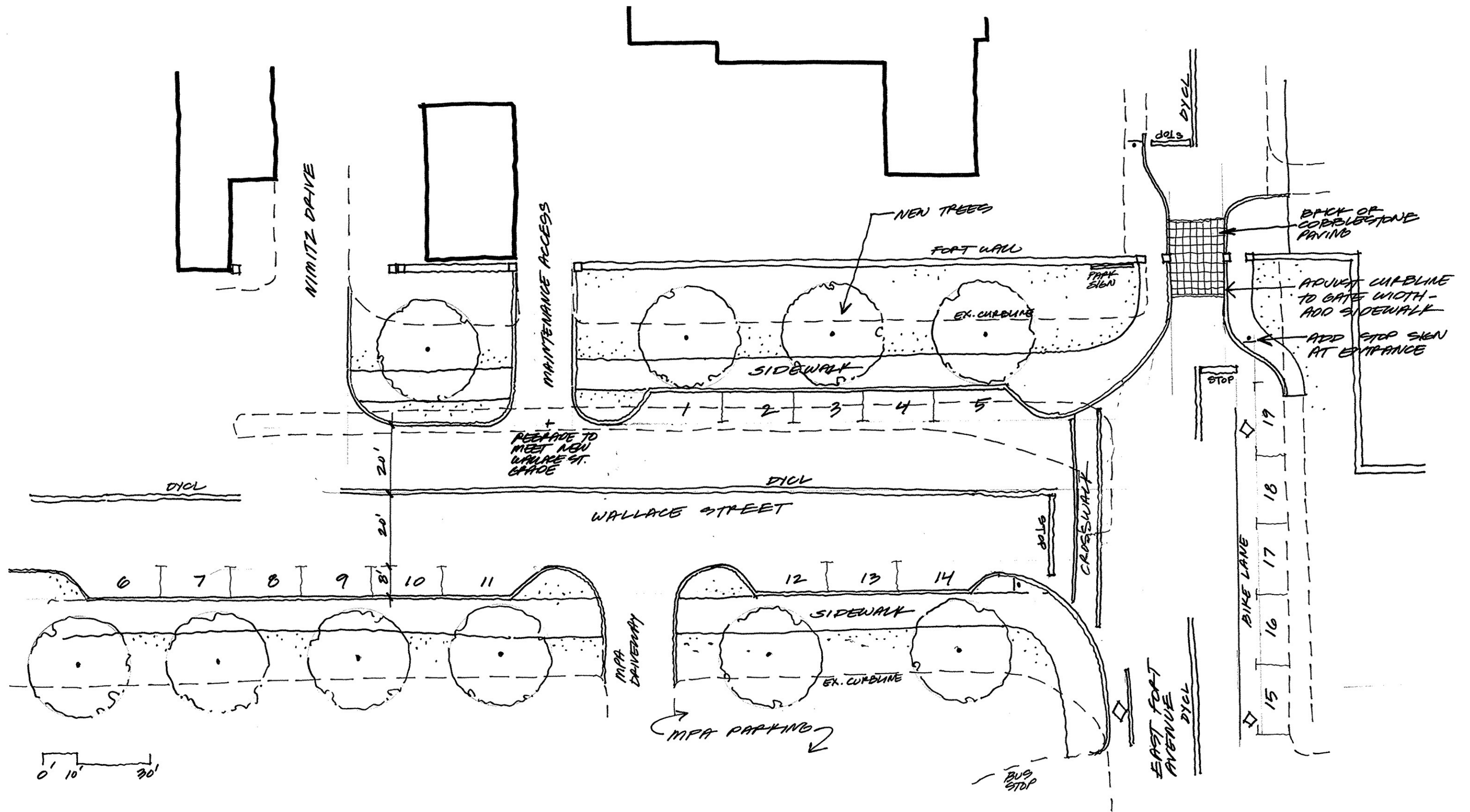


Maintenance Gate-Existing C

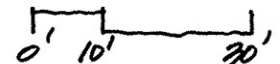
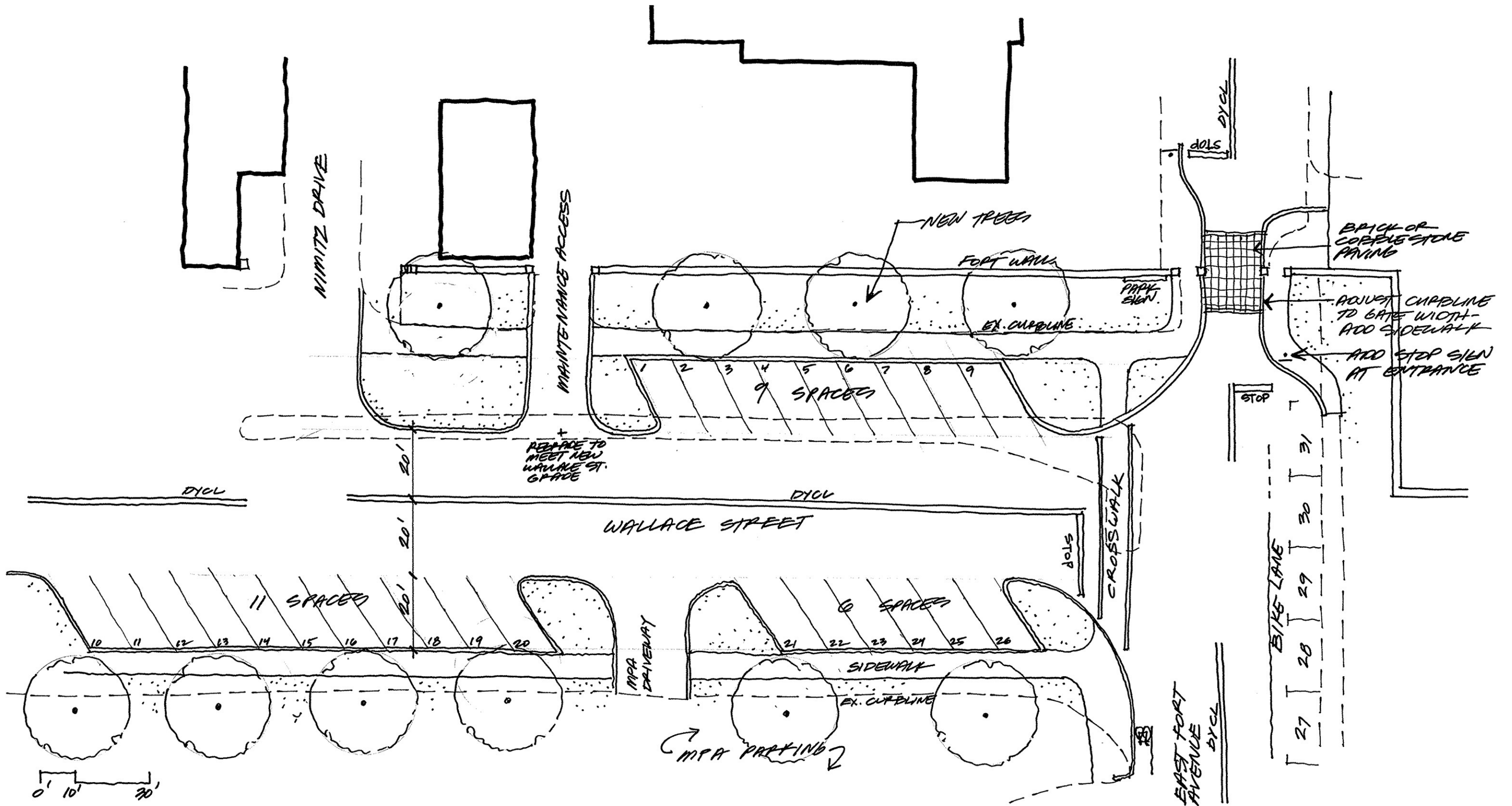




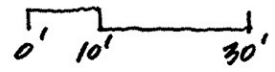
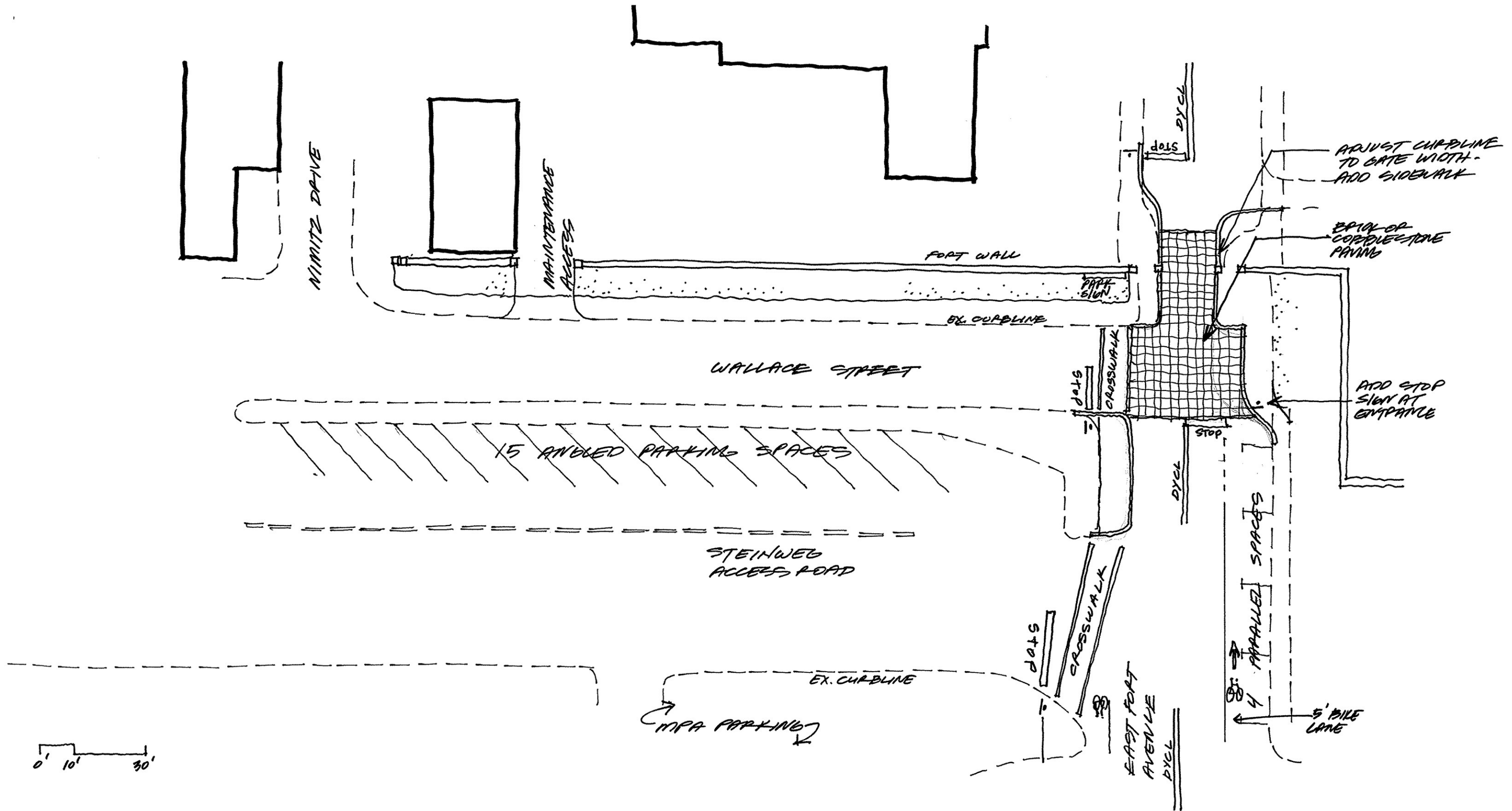
Nimitz Drive Gate-Existing



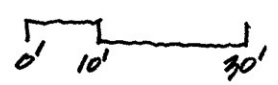
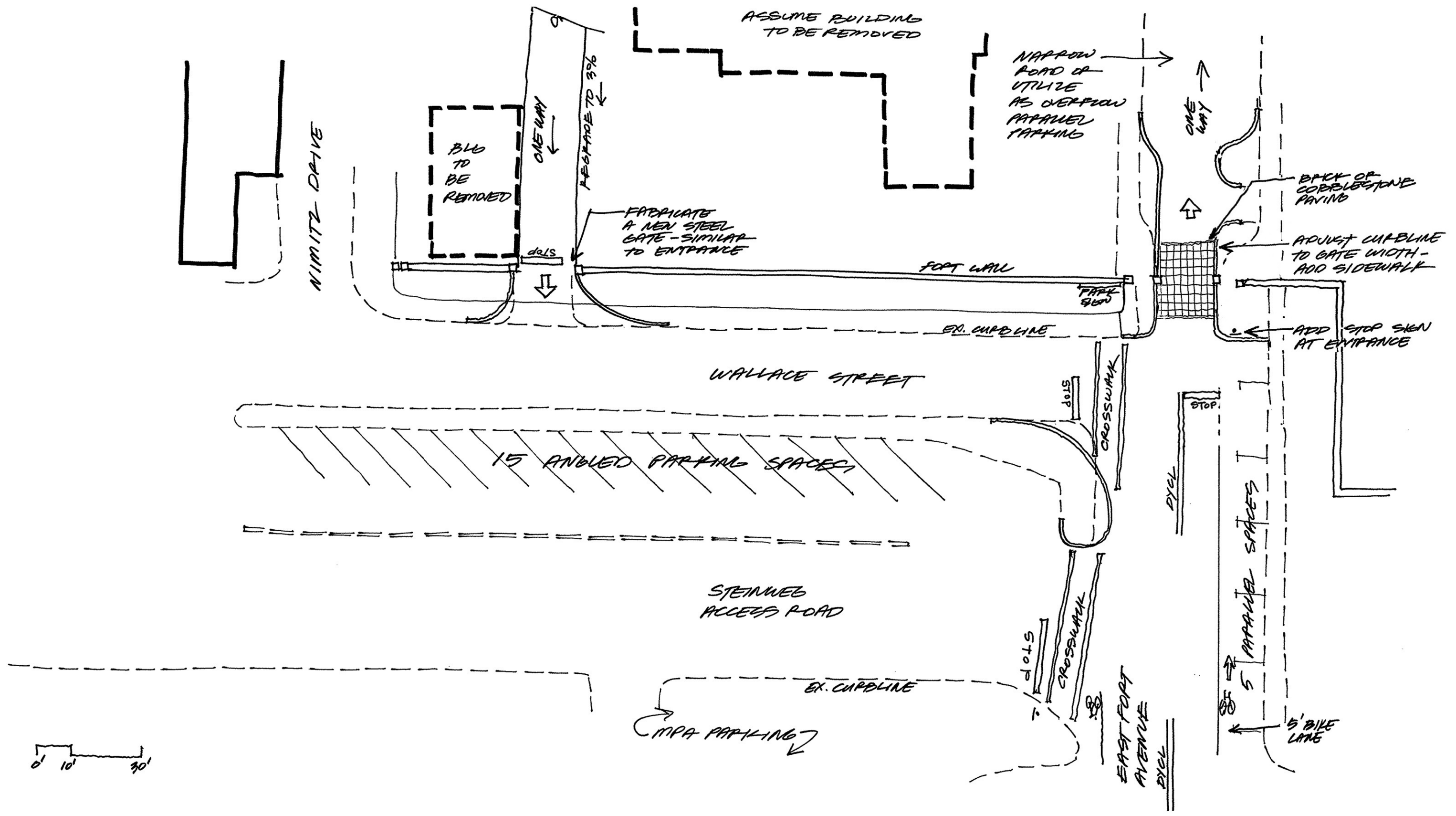
**FOMC GATES**  
**TRAFFIC CIRCULATION STUDIES**  
**ALTERNATIVE #1**  
 CRJA 12/10/03



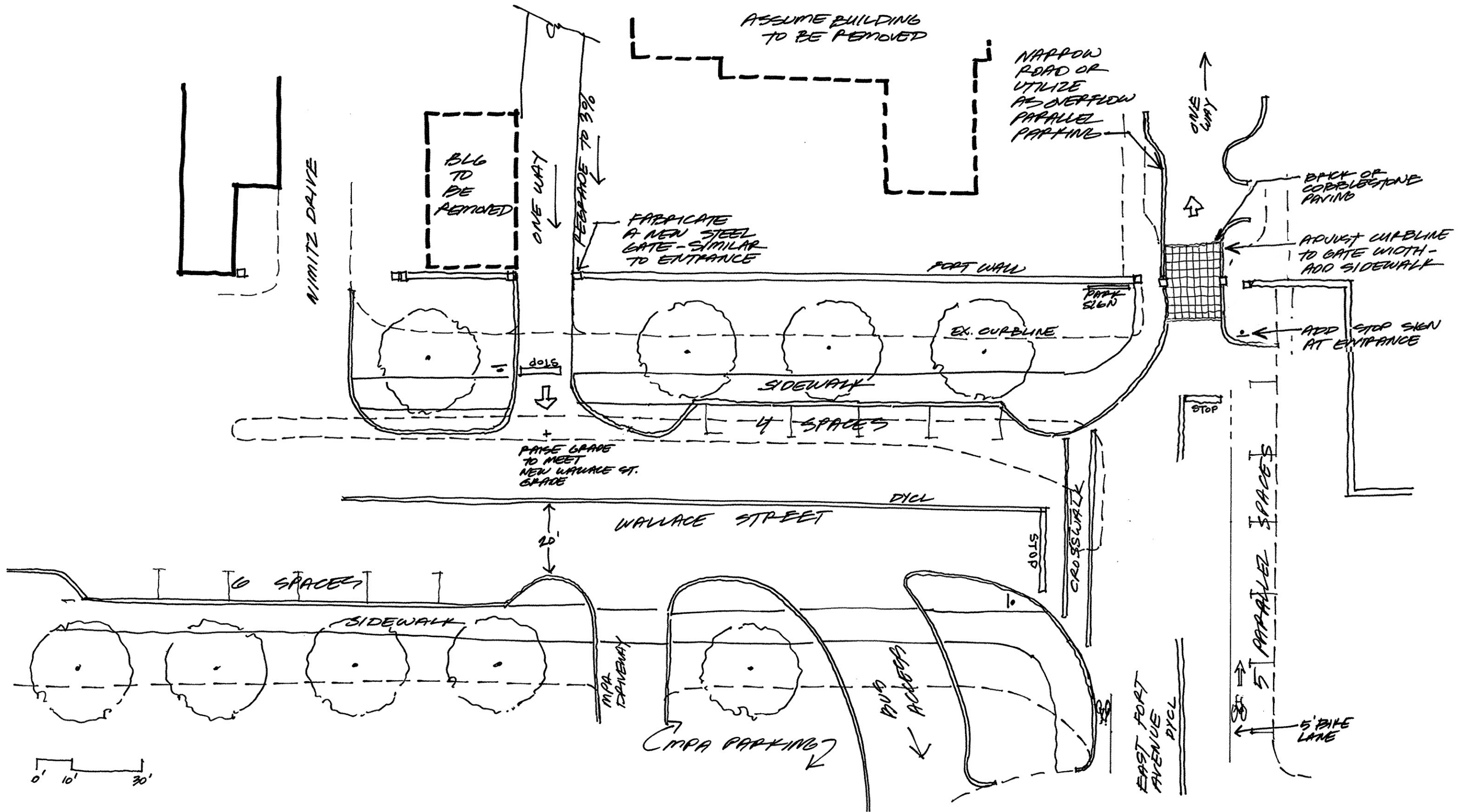
**FOMC GATES**  
**TRAFFIC CIRCULATION STUDIES**  
**ALTERNATIVE #2**  
**CRJA 12/10/03**



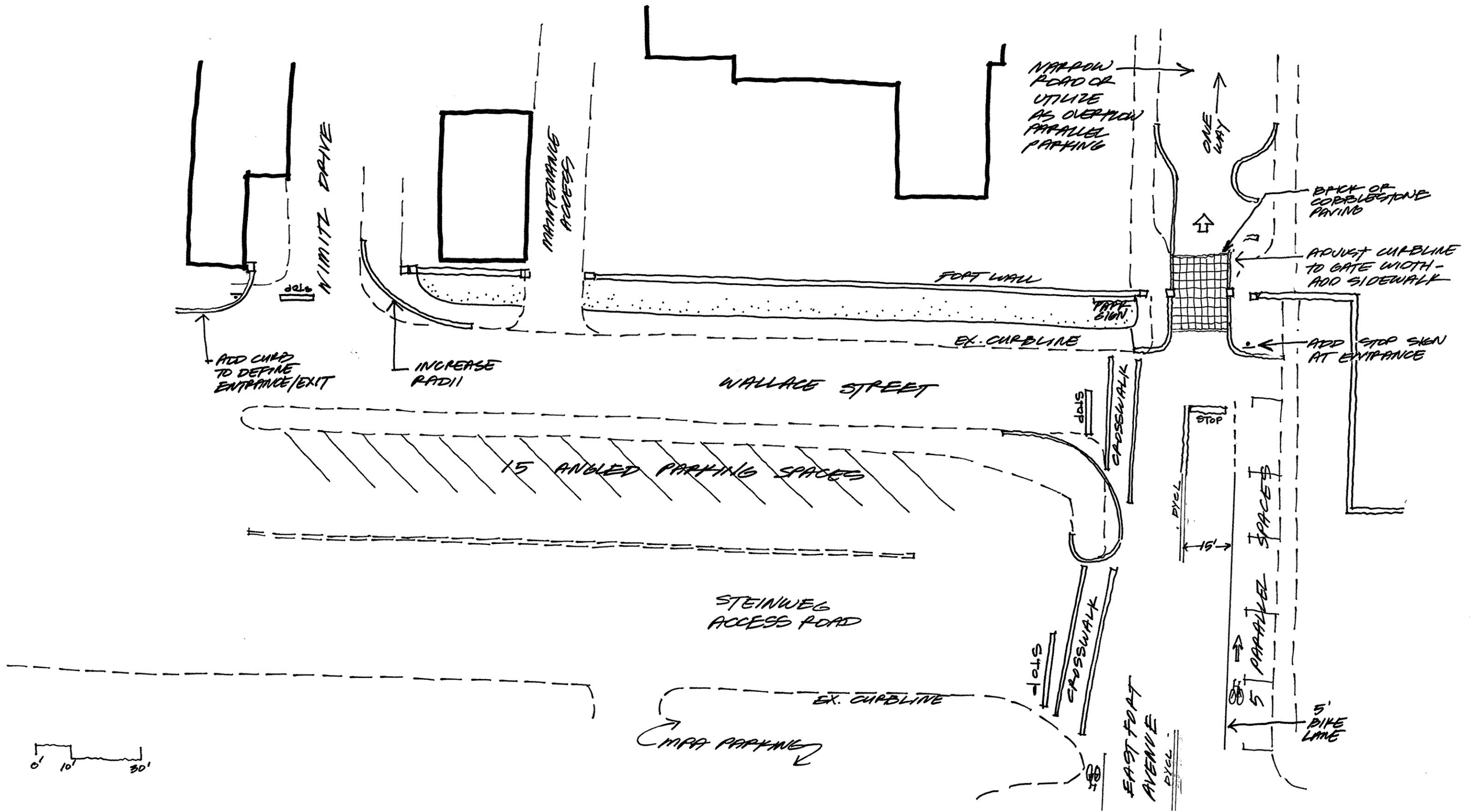
**FOMC GATES**  
**TRAFFIC CIRCULATION STUDIES**  
**ALTERNATIVE #3**  
**CRJA 12/10/03**

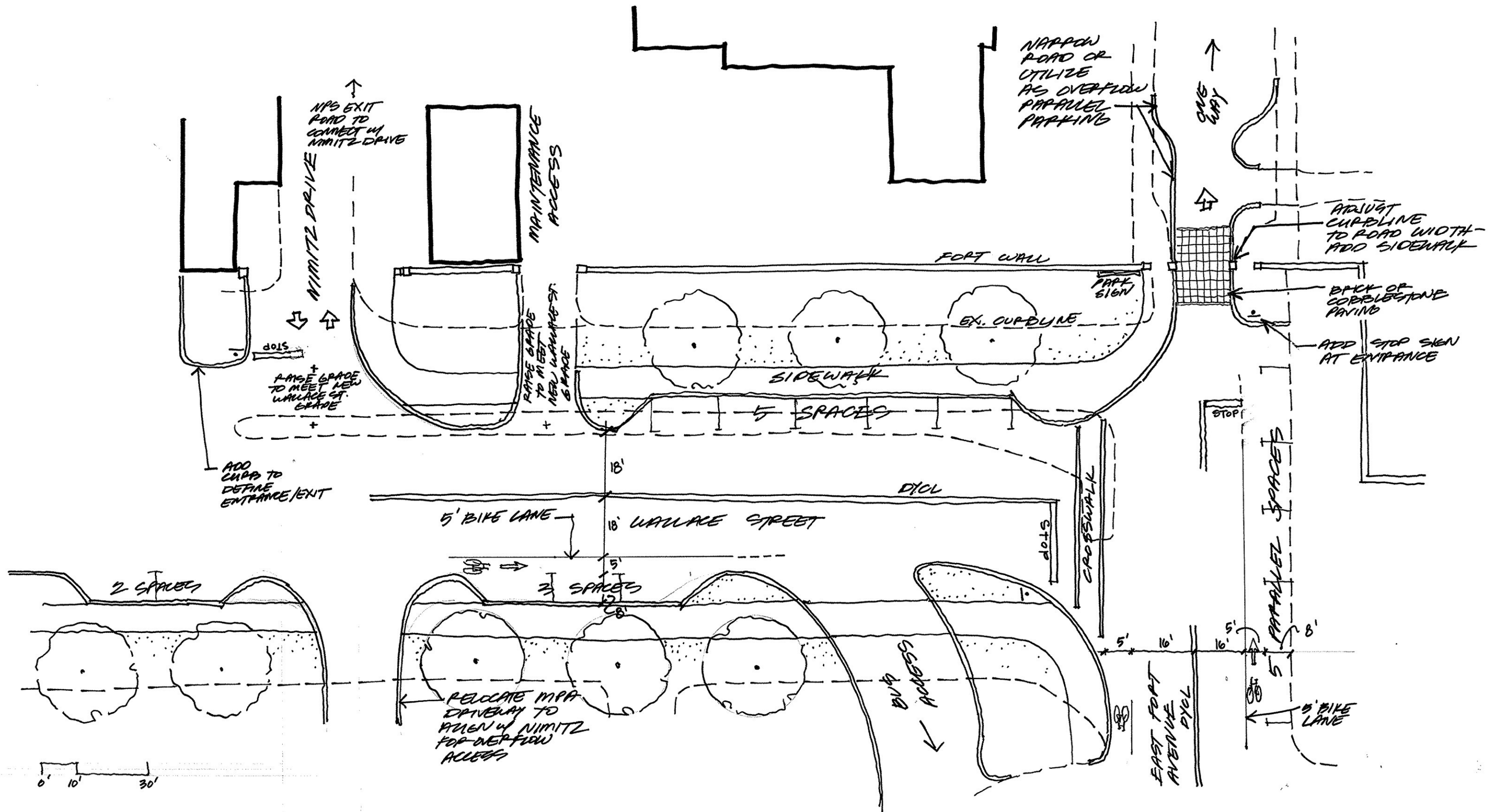


**FOMC GATES**  
**TRAFFIC CIRCULATION STUDIES**  
**ALTERNATIVE #4**  
 CRJA 12/10/03



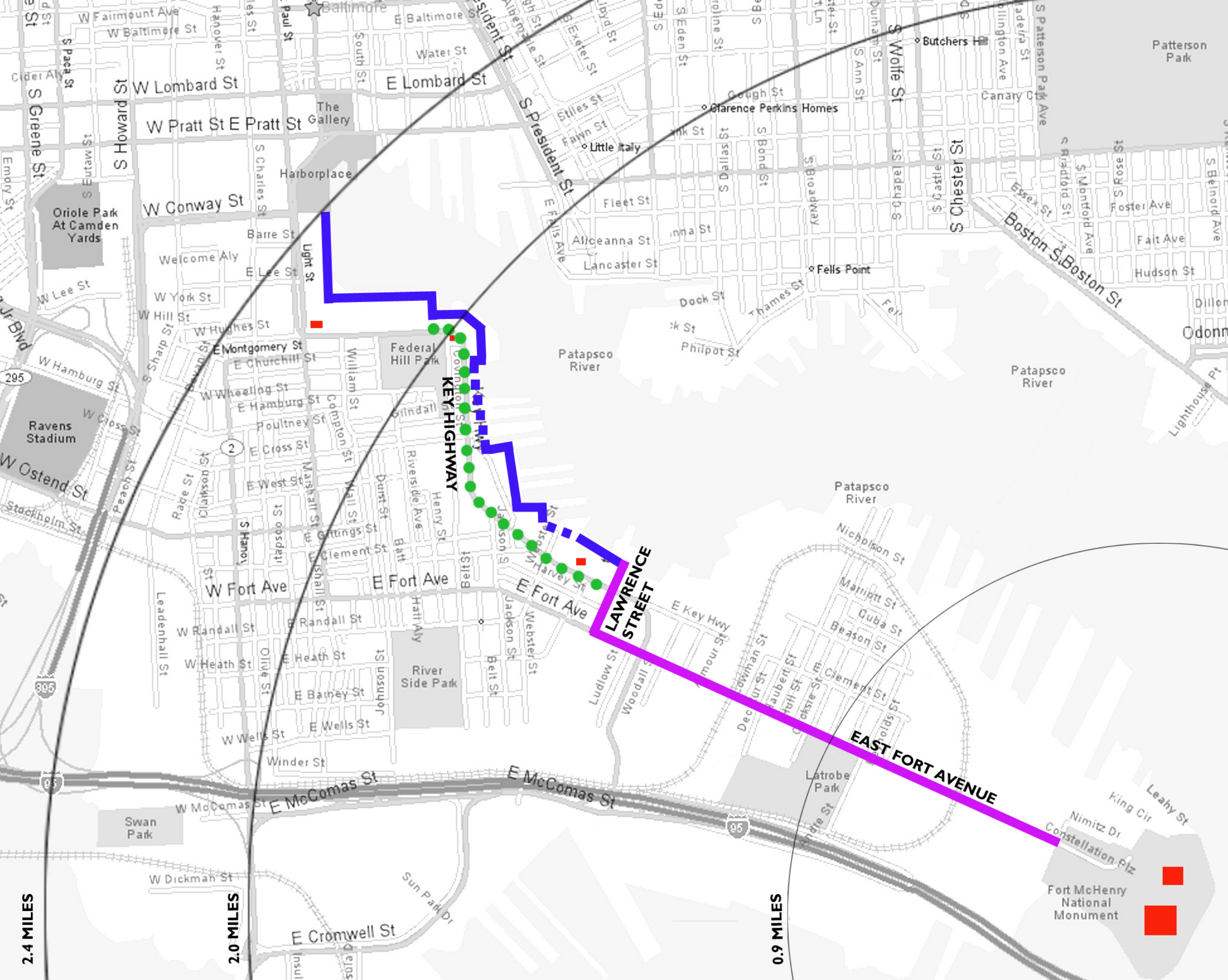
**FOMC GATES**  
**TRAFFIC CIRCULATION STUDIES**  
**ALTERNATIVE #5**  
**CRJA 12/10/03**





FOMC GATES  
 TRAFFIC CIRCULATION STUDIES  
 ALTERNATIVE #7  
 CRJA 12/10/03





**LEGEND**

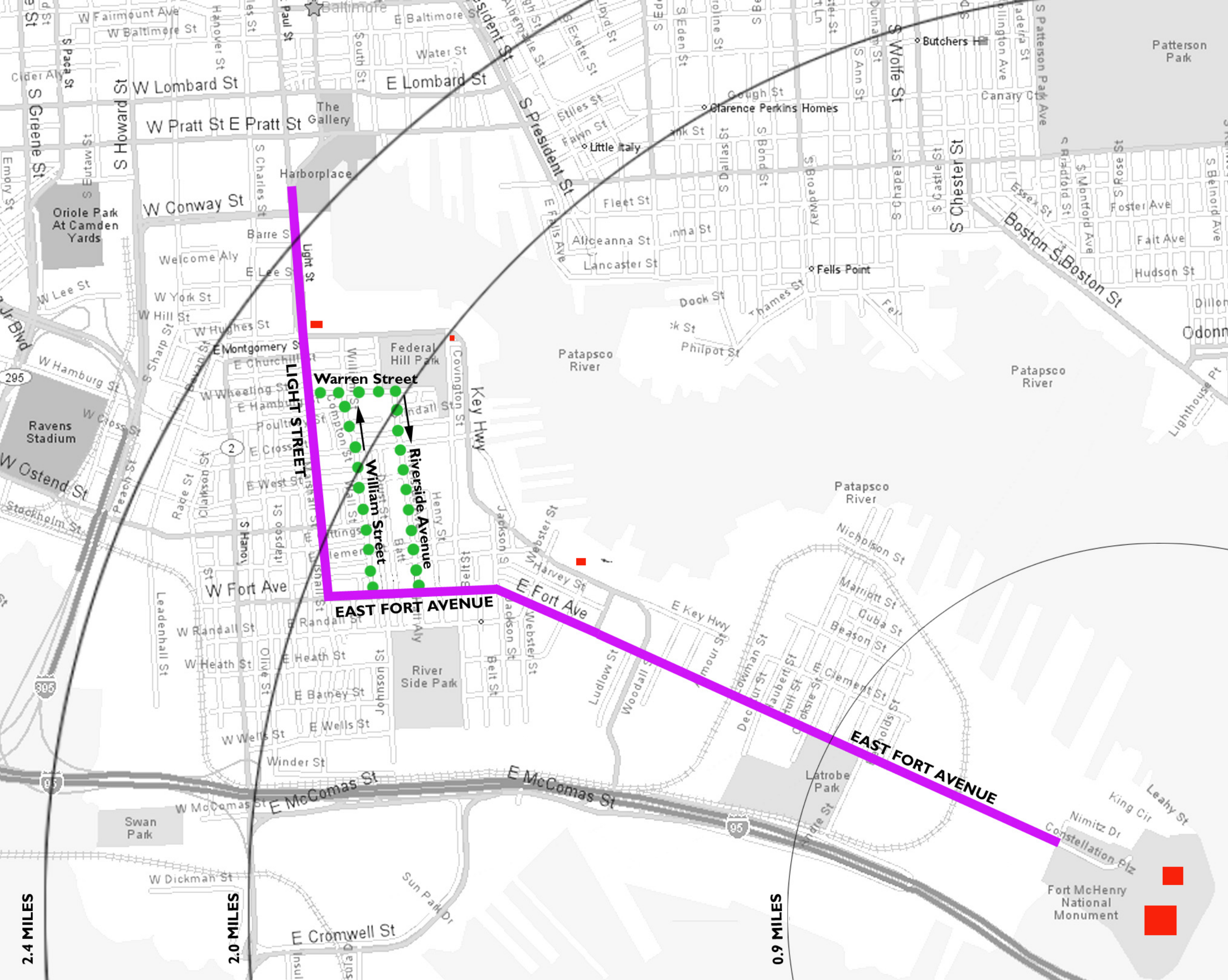
- █ EXISTING PROMENADE-PEDESTRIAN & BICYCLE USE
- █ FUTURE PROMENADE-PEDESTRIAN & BICYCLE USE
- █ BICYCLE LANE-TWO WAY ON EXISTING STREETS
- SHARED PAVEMENT-INTERIM ALIGNMENT

**FOMC BICYCLE ROUTE STUDY  
FUTURE ALIGNMENT  
ALTERNATIVE #1  
CRJA 12/10/03**

2.4 MILES

2.0 MILES

0.9 MILES



**LEGEND**

- █ **BICYCLE LANE-  
TWO WAY ON  
EXISTING STREETS**
- ● **SHARED PAVEMENT-  
ALTERNATIVE ROUTE**

**FOMC BICYCLE ROUTE STUDY  
FUTURE ALIGNMENT  
ALTERNATIVE #2  
CRJA 12/10/03**

2.4 MILES

2.0 MILES

0.9 MILES



Bicycle Lane on East Fo



Bicycle Lane on East Fo



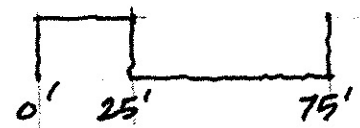
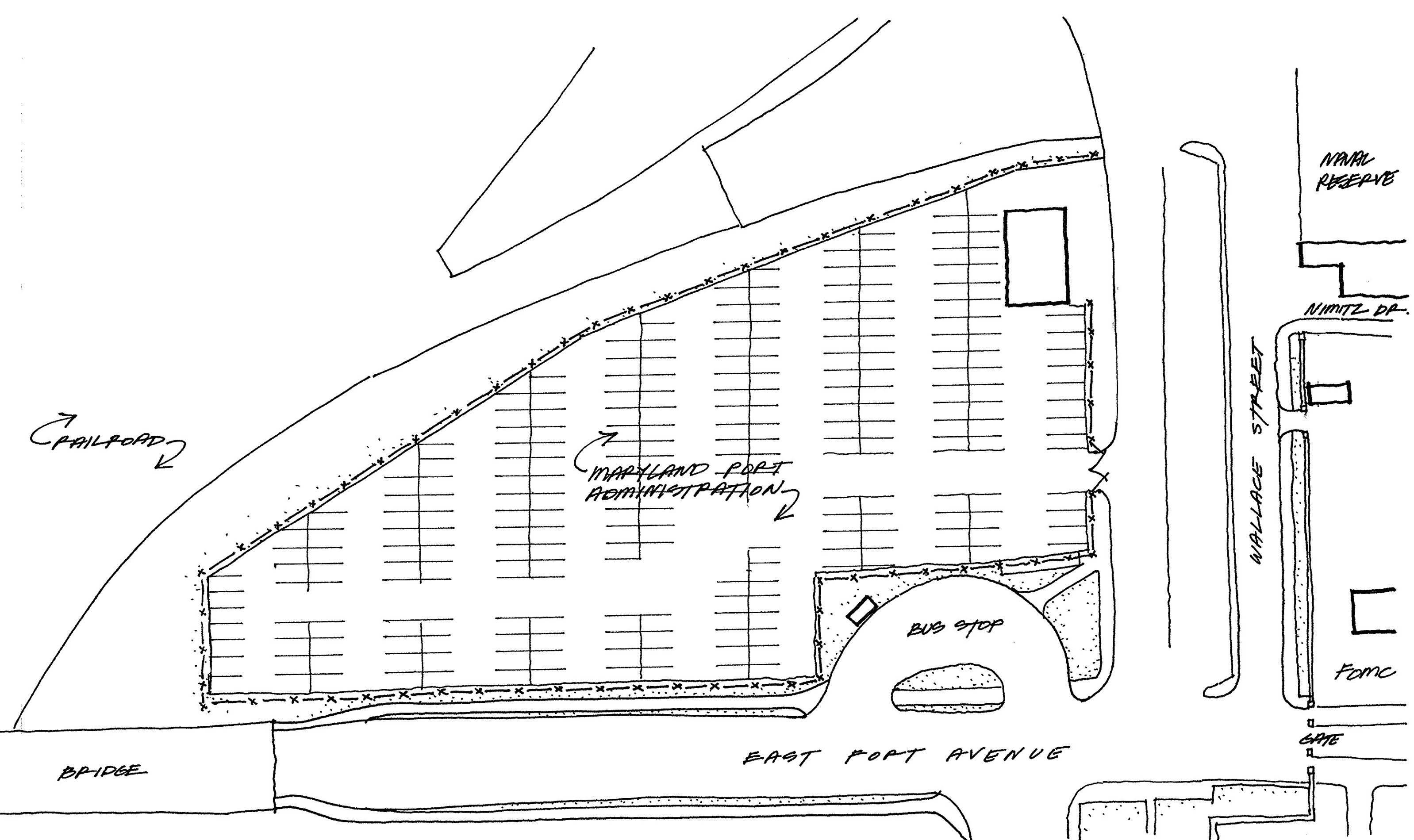
Bicycle Lane on East Fo...



Bicycle Lane on Lawrence

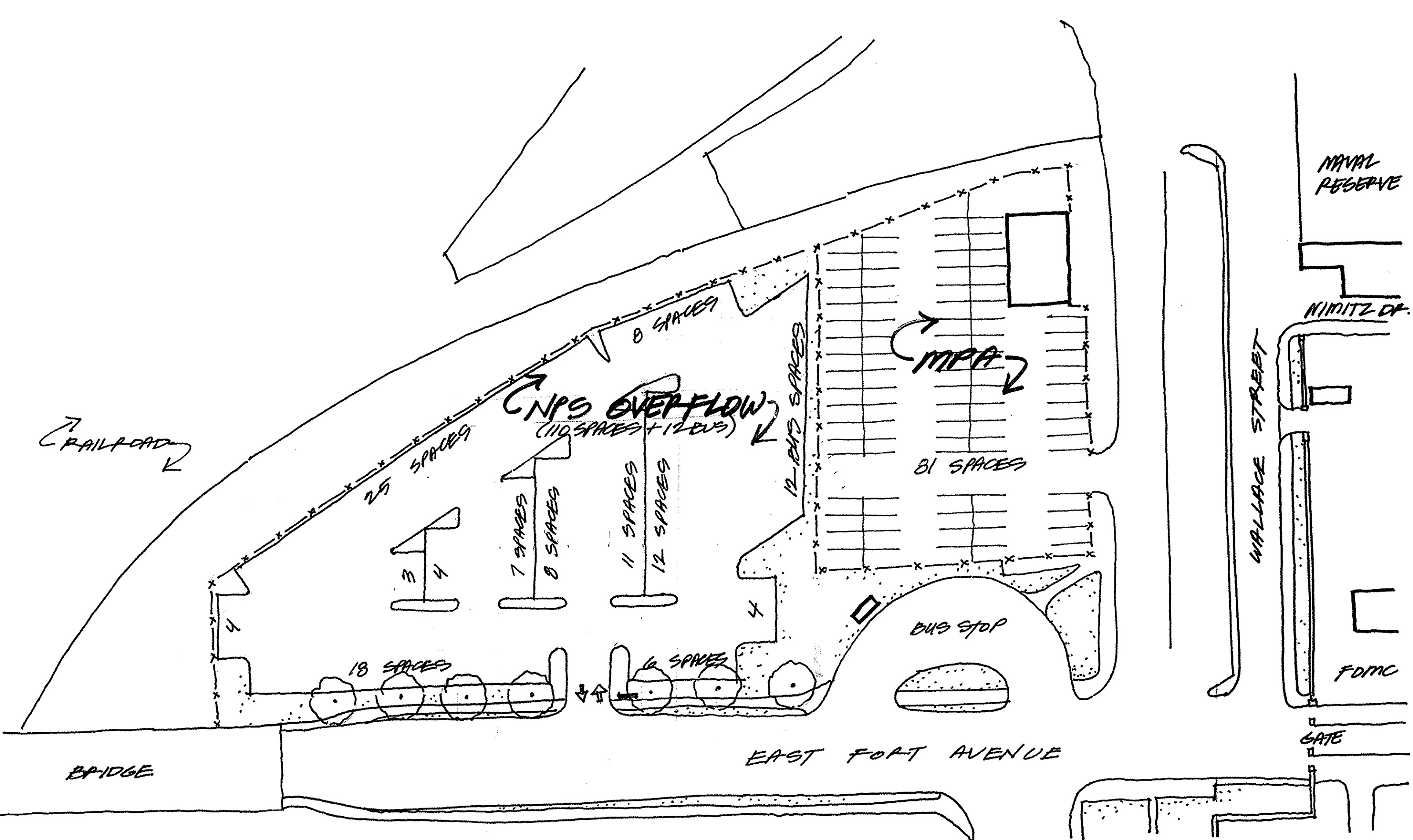


Bicycle Route on Promenade

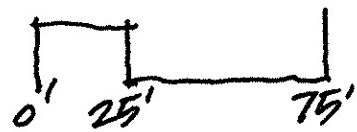
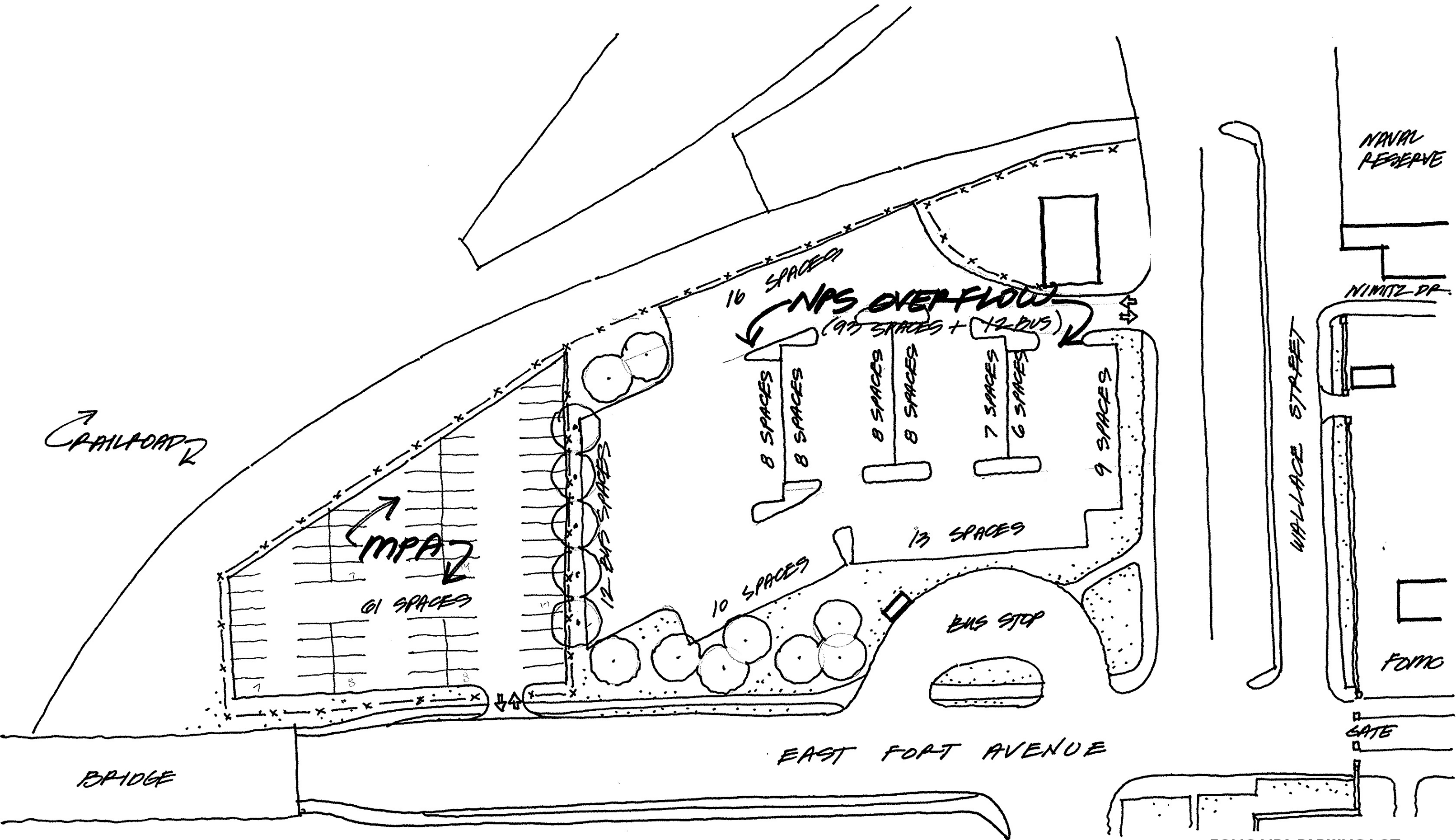


FOMC-MPA PARKING LOT  
 OVERFLOW PARKING STUDIES  
 EXISTING CONDITIONS  
 CRJA 12/10/03





FOMC-MPA PARKING LOT  
 OVERFLOW PARKING STUDIES  
 ALTERNATIVE #1  
 CRJA 12/10/03



FOMC-MPA PARKING LOT  
OVERFLOW PARKING STUDIES  
ALTERNATIVE #2  
CRJA 12/10/03

# C R J : A

COST ESTIMATE

Project Name: FOMC Alternative Transportation Study  
 Submission: Value Analysis  
 Date: December 12, 2003

Summary

Item/Task	Total
<u>Gate Traffic Circulation Studies</u>	
Alternative #1-Two-way Circulation at Front Gate with reconfigured Wallace Street (all parallel parking)	
NPS Costs	\$51,538.03
Other Costs	\$303,714.01
Alternative #2-Two-way Circulation at Front Gate with reconfigured Wallace Street (angled parking)	
NPS Costs	\$51,538.03
Other Costs	\$281,628.22
Alternative #3-Two-way Circulation at Front Gate with Wallace Street and Steinweg Access unchanged	
NPS Costs	\$93,117.21
Other Costs	\$0.00
Alternative #4-One-way Circulation with the exit at the maintenance gate with Wallace Street and Steinweg Access unchanged	
NPS Costs	\$80,290.83
Other Costs	\$0.00
Alternative #5-One-way Circulation with the exit at the maintenance gate with Wallace Street reconfigured	
NPS Costs	\$55,413.07
Other Costs	\$292,032.70
Alternative #6-One-way Circulation with the exit at Nimitz Drive with Wallace Street and Steinweg Access unchanged	
NPS Costs	\$66,495.69
Other Costs	\$0.00
Alternative #7-One-way Circulation with the exit at Nimitz Drive with Wallace Street reconfigured	
NPS Costs	\$56,575.58
Other Costs	\$303,714.01

Item/Task	Total
<u>Offsite Overflow Parking Studies</u>	
Alternative #1-NPS Use of Western Portion of MPA Property	
NPS Costs	\$146,319.96
Other Costs	\$0.00
Alternative #2-NPS Use of Eastern Portion of MPA Property	
NPS Costs	\$163,873.89
Other Costs	\$0.00

Item/Task	Total
<u>Bicycle Route Studies</u>	
Alternative #1-Waterfront Promenade and East Fort Avenue Alignment	
NPS Costs	\$34,410.36
Other Costs	\$0.00
Alternative #2-Light Street and East Fort Avenue Alignment	
NPS Costs	\$0.00
Other Costs	\$62,264.14

Note:

1. Estimates escalated to 2004 construction costs
2. Building demolition costs are not included
3. Costs for construction of a one way roadway is not included
4. Offsite overflow parking-existing pavement crack sealed, sealcoated, and restriped--not repaved
5. Land acquisition costs for offsite overflow parking are not included.

# C R J : A

## COST ESTIMATE

### Gate Traffic Circulation Alternative #1

Two-way Circulation at Front Gate with reconfigured Wallace Street (all parallel parking)

Project Name: FOMC Alternative Transportation Study

Submission: Value Analysis

Date: December 12, 2003

Item/Task	Quantity	Unit	Unit Price	Subtotal
NPS Costs-Gate Improvements				
Remove and dispose existing curb	160	lf	\$5.00	\$800.00
Excavate bit. conc. and conc. pvmt at gate	110	cy	\$15.00	\$1,650.00
Misc. drainage preparation	1	ls	\$1,000.00	\$1,000.00
Signage removal	1	ls	\$100.00	\$100.00
Traffic control-drums, barriers, etc.	1	ls	\$1,000.00	\$1,000.00
Police detail	1	ls	\$4,800.00	\$4,800.00
Install new concrete curbing	160	lf	\$15.00	\$2,400.00
Bituminous concrete pavement	1,200	sf	\$2.50	\$3,000.00
Catch basins and piping	1	allow	\$10,000.00	\$10,000.00
Pavement markings	1	allow	\$500.00	\$500.00
Traffic Signage	1	allow	\$500.00	\$500.00
Cobblestone pavement	330	sf	\$20.00	\$6,600.00
Flush granite curb	30	lf	\$30.00	\$900.00
<i>Subtotal</i>				<i>\$33,250.00</i>

Design Contingency (20%) \$6,650.00

General Conditions (8%) \$3,192.00

GC Overhead and Profit (15%) \$6,463.80

*2003 CONSTRUCTION COST SUBTOTAL* \$49,555.80

Escalation to 2004 Construction Costs (4%) \$1,982.23

*2004 NET CONSTRUCTION COST TOTAL* \$51,538.03

Item/Task	Quantity	Unit	Unit Price	Subtotal
<b>Gate Traffic Circulation Alternative #1</b>				
Other Costs-Wallace Street Re-configuration				
Pulverize existing roadways	3555	sy	\$2.50	\$8,887.50
Remove and dispose existing curb	680	lf	\$5.00	\$3,400.00
Remove and dispose concrete wheelstops	16	ea	\$50.00	\$800.00
Excavate bit. conc. pvmt at gate	110	cy	\$15.00	\$1,650.00
Remove and dispose concrete sidewalks	1760	sf	\$3.00	\$5,280.00
Misc. drainage preparation	1	ls	\$2,000.00	\$2,000.00
Signage removal	1	ls	\$400.00	\$400.00
Light fixture removal	8	ea	\$500.00	\$4,000.00
Fire hydrant relocation	1	ea	\$4,000.00	\$4,000.00
Traffic control-drums, barriers, etc.	1	ls	\$4,000.00	\$4,000.00
Police detail	1	ls	\$8,000.00	\$8,000.00
Fill	1	allow	\$7,000.00	\$7,000.00
Install new concrete curbing	705	lf	\$15.00	\$10,575.00
Light fixtures-include conduit, etc.	7	ea	\$5,000.00	\$35,000.00
Bituminous concrete pavement	30,000	sf	\$2.50	\$75,000.00
Catch basins and piping	1	allow	\$9,000.00	\$9,000.00
Pavement markings	1	allow	\$1,500.00	\$1,500.00
Traffic Signage	1	allow	\$1,500.00	\$1,500.00
Loam	170	cy	\$30.00	\$5,100.00
Seed	9,000	sf	\$0.15	\$1,350.00
Trees	10	ea	\$750.00	\$7,500.00
<i>Subtotal</i>				<u>\$195,942.50</u>

Design Contingency (20%)	\$39,188.50
General Conditions (8%)	\$18,810.48
GC Overhead and Profit (15%)	\$38,091.22
	<u>2003 CONSTRUCTION COST SUBTOTAL</u> <u>\$292,032.70</u>
Escalation to 2004 Construction Costs (4%)	\$11,681.31
	<u>2004 NET CONSTRUCTION COST TOTAL</u> <u>\$303,714.01</u>

# C R J : A

## COST ESTIMATE

### Gate Traffic Circulation Alternative #2

Two-way Circulation at Front Gate with reconfigured Wallace Street (angled parking)

Project Name: FOMC Alternative Transportation Study

Submission: Value Analysis

Date: December 12, 2003

Item/Task	Quantity	Unit	Unit Price	Subtotal
NPS Costs-Gate Improvements				
Remove and dispose existing curb	160	lf	\$5.00	\$800.00
Excavate bit. conc. and conc. pvmt at gate	110	cy	\$15.00	\$1,650.00
Misc. drainage preparation	1	ls	\$1,000.00	\$1,000.00
Signage removal	1	ls	\$100.00	\$100.00
Traffic control-drums, barriers, etc.	1	ls	\$1,000.00	\$1,000.00
Police detail	1	ls	\$4,800.00	\$4,800.00
Install new concrete curbing	160	lf	\$15.00	\$2,400.00
Bituminous concrete pavement	1,200	sf	\$2.50	\$3,000.00
Catch basins and piping	1	allow	\$10,000.00	\$10,000.00
Pavement markings	1	allow	\$500.00	\$500.00
Traffic Signage	1	allow	\$500.00	\$500.00
Cobblestone pavement	330	sf	\$20.00	\$6,600.00
Flush granite curb	30	lf	\$30.00	\$900.00
<i>Subtotal</i>				<i>\$33,250.00</i>

Design Contingency (20%) \$6,650.00

General Conditions (8%) \$3,192.00

GC Overhead and Profit (15%) \$6,463.80

*2003 CONSTRUCTION COST SUBTOTAL* \$49,555.80

Escalation to 2004 Construction Costs (4%) \$1,982.23

*2004 NET CONSTRUCTION COST TOTAL* \$51,538.03

Item/Task	Quantity	Unit	Unit Price	Subtotal
<b>Gate Traffic Circulation Alternative #2</b>				
Other Costs-Wallace Street Re-configuration				
Pulverize existing roadways	3555	sy	\$2.50	\$8,887.50
Remove and dispose existing curb	680	lf	\$5.00	\$3,400.00
Remove and dispose concrete wheelstops	16	ea	\$50.00	\$800.00
Excavate bit. conc. pvmt at gate	110	cy	\$15.00	\$1,650.00
Remove and dispose concrete sidewalks	1760	sf	\$3.00	\$5,280.00
Misc. drainage preparation	1	ls	\$2,000.00	\$2,000.00
Signage removal	1	ls	\$400.00	\$400.00
Light fixture removal	8	ea	\$500.00	\$4,000.00
Fire hydrant relocation	1	ea	\$5,000.00	\$5,000.00
Traffic control-drums, barriers, etc.	1	ls	\$4,000.00	\$4,000.00
Police detail	1	ls	\$8,000.00	\$8,000.00
Fill	1	allow	\$7,000.00	\$7,000.00
Install new concrete curbing	770	lf	\$15.00	\$11,550.00
Light fixtures-include conduit, etc.	7	ea	\$5,000.00	\$35,000.00
Bituminous concrete pavement	23,800	sf	\$2.50	\$59,500.00
Catch basins and piping	1	allow	\$9,000.00	\$9,000.00
Pavement markings	1	allow	\$1,500.00	\$1,500.00
Traffic Signage	1	allow	\$1,500.00	\$1,500.00
Loam	150	cy	\$30.00	\$4,500.00
Seed	8,175	sf	\$0.15	\$1,226.25
Trees	10	ea	\$750.00	\$7,500.00
<i>Subtotal</i>				<i>\$181,693.75</i>

Design Contingency (20%) \$36,338.75

General Conditions (8%) \$17,442.60

GC Overhead and Profit (15%) \$35,321.27

*2003 CONSTRUCTION COST SUBTOTAL* \$270,796.37

Escalation to 2004 Construction Costs (4%) \$10,831.85

*2004 NET CONSTRUCTION COST TOTAL* \$281,628.22

# C R J : A

## COST ESTIMATE

### Gate Traffic Circulation Alternative #3

Two-way Circulation at Front Gate with Wallace Street and Steinweg Access unchanged

Project Name: FOMC Alternative Transportation Study

Submission: Value Analysis

Date: December 12, 2003

Item/Task	Quantity	Unit	Unit Price	Subtotal
NPS Costs-Gate Improvements				
Remove and dispose existing curb	175	lf	\$5.00	\$875.00
Excavate bit. conc. pvmt at gate	110	cy	\$15.00	\$1,650.00
Remove and dispose concrete sidewalks	1050	sf	\$3.00	\$3,150.00
Misc. drainage preparation	1	ls	\$1,000.00	\$1,000.00
Signage removal	1	ls	\$200.00	\$200.00
Traffic control-drums, barriers, etc.	1	ls	\$1,000.00	\$1,000.00
Police detail	1	ls	\$12,800.00	\$6,400.00
Install new concrete curbing	200	lf	\$15.00	\$3,000.00
Bituminous concrete pavement	1,500	sf	\$2.50	\$3,750.00
Catch basins and piping	1	allow	\$19,000.00	\$10,000.00
Pavement markings	1	allow	\$1,000.00	\$1,000.00
Traffic Signage	1	allow	\$1,000.00	\$1,000.00
Cobblestone pavement	1240	sf	\$20.00	\$24,800.00
Flush granite curb	75	lf	\$30.00	\$2,250.00
<i>Subtotal</i>				<i>\$60,075.00</i>

Design Contingency (20%) \$12,015.00

General Conditions (8%) \$5,767.20

GC Overhead and Profit (15%) \$11,678.58

*2003 CONSTRUCTION COST SUBTOTAL* \$89,535.78

Escalation to 2004 Construction Costs (4%) \$3,581.43

*2004 NET CONSTRUCTION COST TOTAL* \$93,117.21



# C R J : A

## COST ESTIMATE

### Gate Traffic Circulation Alternative #4

One-way Circulation with the exit at the maintenance gate with Wallace Street and Steinweg Access unchanged

Project Name: FOMC Alternative Transportation Study

Submission: Value Analysis

Date: December 12, 2003

Item/Task	Quantity	Unit	Unit Price	Subtotal
NPS Costs-Gate Improvements				
Remove and dispose existing curb	305	lf	\$5.00	\$1,525.00
Excavate bit. conc. pvmt at gate	110	cy	\$15.00	\$1,650.00
Excavate bit. conc. pvmt at maintenance gate	55	cy	\$15.00	\$825.00
Remove and dispose concrete sidewalks	1050	sf	\$3.00	\$3,150.00
Misc. drainage preparation	1	ls	\$1,000.00	\$1,000.00
Signage removal	1	ls	\$200.00	\$200.00
Traffic control-drums, barriers, etc.	1	ls	\$1,500.00	\$1,500.00
Police detail	1	ls	\$12,800.00	\$6,400.00
Install new concrete curbing	270	lf	\$15.00	\$4,050.00
Bituminous concrete pavement	2,800	sf	\$2.50	\$7,000.00
Catch basins and piping	1	allow	\$19,000.00	\$10,000.00
Pavement markings	1	allow	\$1,000.00	\$1,000.00
Traffic Signage	1	allow	\$1,000.00	\$1,000.00
Cobblestone pavement	330	sf	\$20.00	\$6,600.00
Flush granite curb	30	lf	\$30.00	\$900.00
New steel gate at maintenance gate	1	ls	\$5,000.00	\$5,000.00
<i>Subtotal</i>				<i>\$51,800.00</i>

Design Contingency (20%) \$10,360.00

General Conditions (8%) \$4,972.80

GC Overhead and Profit (15%) \$10,069.92

*2003 CONSTRUCTION COST SUBTOTAL* \$77,202.72

Escalation to 2004 Construction Costs (4%) \$3,088.11

*2004 NET CONSTRUCTION COST TOTAL* **\$80,290.83**

# C R J : A

## COST ESTIMATE

### Gate Traffic Circulation Alternative #5

One-way Circulation with the exit at the maintenance gate with Wallace Street reconfigured

Project Name: FOMC Alternative Transportation Study

Submission: Value Analysis

Date: December 12, 2003

Item/Task	Quantity	Unit	Unit Price	Subtotal
NPS Costs-Gate Improvements				
Remove and dispose existing curb	160	lf	\$5.00	\$800.00
Excavate bit. conc. and conc. pvmt at gate	110	cy	\$15.00	\$1,650.00
Misc. drainage preparation	1	ls	\$1,000.00	\$1,000.00
Signage removal	1	ls	\$100.00	\$100.00
Traffic control-drums, barriers, etc.	1	ls	\$1,000.00	\$1,000.00
Police detail	1	ls	\$4,800.00	\$4,800.00
Install new concrete curbing	300	lf	\$15.00	\$4,500.00
Bituminous concrete pavement	1,360	sf	\$2.50	\$3,400.00
Catch basins and piping	1	allow	\$10,000.00	\$10,000.00
Pavement markings	1	allow	\$500.00	\$500.00
Traffic Signage	1	allow	\$500.00	\$500.00
Cobblestone pavement	330	sf	\$20.00	\$6,600.00
Flush granite curb	30	lf	\$30.00	\$900.00
<i>Subtotal</i>				<i>\$35,750.00</i>

Design Contingency (20%) \$7,150.00

General Conditions (8%) \$3,432.00

GC Overhead and Profit (15%) \$6,949.80

*2003 CONSTRUCTION COST SUBTOTAL* \$53,281.80

Escalation to 2004 Construction Costs (4%) \$2,131.27

*2004 NET CONSTRUCTION COST TOTAL* \$55,413.07

Item/Task	Quantity	Unit	Unit Price	Subtotal
<b>Gate Traffic Circulation Alternative #5</b>				
Other Costs-Wallace Street Re-configuration				
Pulverize existing roadways	3555	sy	\$2.50	\$8,887.50
Remove and dispose existing curb	680	lf	\$5.00	\$3,400.00
Remove and dispose concrete wheelstops	16	ea	\$50.00	\$800.00
Excavate bit. conc. pvmt at gate	110	cy	\$15.00	\$1,650.00
Remove and dispose concrete sidewalks	1760	sf	\$3.00	\$5,280.00
Misc. drainage preparation	1	ls	\$2,000.00	\$2,000.00
Signage removal	1	ls	\$400.00	\$400.00
Light fixture removal	8	ea	\$500.00	\$4,000.00
Fire hydrant relocation	1	ea	\$4,000.00	\$4,000.00
Traffic control-drums, barriers, etc.	1	ls	\$4,000.00	\$4,000.00
Police detail	1	ls	\$8,000.00	\$8,000.00
Fill	1	allow	\$7,000.00	\$7,000.00
Install new concrete curbing	705	lf	\$15.00	\$10,575.00
Light fixtures-include conduit, etc.	7	ea	\$5,000.00	\$35,000.00
Bituminous concrete pavement	30,000	sf	\$2.50	\$75,000.00
Catch basins and piping	1	allow	\$9,000.00	\$9,000.00
Pavement markings	1	allow	\$1,500.00	\$1,500.00
Traffic Signage	1	allow	\$1,500.00	\$1,500.00
Loam	170	cy	\$30.00	\$5,100.00
Seed	9,000	sf	\$0.15	\$1,350.00
Trees	10	ea	\$750.00	\$7,500.00
<i>Subtotal</i>				<u>\$195,942.50</u>

Design Contingency (20%)	\$39,188.50
General Conditions (8%)	\$18,810.48
GC Overhead and Profit (15%)	\$38,091.22
	<u>2003 CONSTRUCTION COST SUBTOTAL</u> <u>\$292,032.70</u>
Escalation to 2004 Construction Costs (4%)	\$11,681.31
	<u>2004 NET CONSTRUCTION COST TOTAL</u> <u>\$303,714.01</u>

# C R J : A

## COST ESTIMATE

### Gate Traffic Circulation Alternative #6

One-way Circulation with the exit at Nimitz Drive with Wallace Street and Steinweg Access unchanged

Project Name: FOMC Alternative Transportation Study

Submission: Value Analysis

Date: December 12, 2003

Item/Task	Quantity	Unit	Unit Price	Subtotal
NPS Costs-Gate Improvements				
Remove and dispose existing curb	295	lf	\$5.00	\$1,475.00
Excavate bit. conc. pvmt at gate	110	cy	\$15.00	\$1,650.00
Remove and dispose concrete sidewalks	1050	sf	\$3.00	\$3,150.00
Misc. drainage preparation	1	ls	\$1,000.00	\$1,000.00
Signage removal	1	ls	\$200.00	\$200.00
Traffic control-drums, barriers, etc.	1	ls	\$1,500.00	\$1,500.00
Police detail	1	ls	\$12,800.00	\$6,400.00
Install new concrete curbing	285	lf	\$15.00	\$4,275.00
Bituminous concrete pavement	1,500	sf	\$2.50	\$3,750.00
Catch basins and piping	1	allow	\$19,000.00	\$10,000.00
Pavement markings	1	allow	\$1,000.00	\$1,000.00
Traffic Signage	1	allow	\$1,000.00	\$1,000.00
Cobblestone pavement	330	sf	\$20.00	\$6,600.00
Flush granite curb	30	lf	\$30.00	\$900.00
<i>Subtotal</i>				<i>\$42,900.00</i>

Design Contingency (20%) \$8,580.00

General Conditions (8%) \$4,118.40

GC Overhead and Profit (15%) \$8,339.76

*2003 CONSTRUCTION COST SUBTOTAL* *\$63,938.76*

Escalation to 2004 Construction Costs (4%) \$2,557.53

*2004 NET CONSTRUCTION COST TOTAL* *\$66,495.69*

# C R J : A

## COST ESTIMATE

### Gate Traffic Circulation Alternative #7

One-way Circulation with the exit at Nimitz Drive with Wallace Street reconfigured

Project Name: FOMC Alternative Transportation Study

Submission: Value Analysis

Date: December 12, 2003

Item/Task	Quantity	Unit	Unit Price	Subtotal
NPS Costs-Gate Improvements				
Remove and dispose existing curb	160	lf	\$5.00	\$800.00
Excavate bit. conc. and conc. pvmt at gate	110	cy	\$15.00	\$1,650.00
Misc. drainage preparation	1	ls	\$1,000.00	\$1,000.00
Signage removal	1	ls	\$100.00	\$100.00
Traffic control-drums, barriers, etc.	1	ls	\$1,000.00	\$1,000.00
Police detail	1	ls	\$4,800.00	\$4,800.00
Install new concrete curbing	350	lf	\$15.00	\$5,250.00
Bituminous concrete pavement	1,360	sf	\$2.50	\$3,400.00
Catch basins and piping	1	allow	\$10,000.00	\$10,000.00
Pavement markings	1	allow	\$500.00	\$500.00
Traffic Signage	1	allow	\$500.00	\$500.00
Cobblestone pavement	330	sf	\$20.00	\$6,600.00
Flush granite curb	30	lf	\$30.00	\$900.00
<i>Subtotal</i>				<i>\$36,500.00</i>

Design Contingency (20%) \$7,300.00

General Conditions (8%) \$3,504.00

GC Overhead and Profit (15%) \$7,095.60

*2003 CONSTRUCTION COST SUBTOTAL* \$54,399.60

Escalation to 2004 Construction Costs (4%) \$2,175.98

*2004 NET CONSTRUCTION COST TOTAL* \$56,575.58

Item/Task	Quantity	Unit	Unit Price	Subtotal
<b>Gate Traffic Circulation Alternative #7</b>				
Other Costs-Wallace Street Re-configuration				
Pulverize existing roadways	3555	sy	\$2.50	\$8,887.50
Remove and dispose existing curb	680	lf	\$5.00	\$3,400.00
Remove and dispose concrete wheelstops	16	ea	\$50.00	\$800.00
Excavate bit. conc. pvmt at gate	110	cy	\$15.00	\$1,650.00
Remove and dispose concrete sidewalks	1760	sf	\$3.00	\$5,280.00
Misc. drainage preparation	1	ls	\$2,000.00	\$2,000.00
Signage removal	1	ls	\$400.00	\$400.00
Light fixture removal	8	ea	\$500.00	\$4,000.00
Fire hydrant relocation	1	ea	\$4,000.00	\$4,000.00
Traffic control-drums, barriers, etc.	1	ls	\$4,000.00	\$4,000.00
Police detail	1	ls	\$8,000.00	\$8,000.00
Fill	1	allow	\$7,000.00	\$7,000.00
Install new concrete curbing	705	lf	\$15.00	\$10,575.00
Light fixtures-include conduit, etc.	7	ea	\$5,000.00	\$35,000.00
Bituminous concrete pavement	30,000	sf	\$2.50	\$75,000.00
Catch basins and piping	1	allow	\$9,000.00	\$9,000.00
Pavement markings	1	allow	\$1,500.00	\$1,500.00
Traffic Signage	1	allow	\$1,500.00	\$1,500.00
Loam	170	cy	\$30.00	\$5,100.00
Seed	9,000	sf	\$0.15	\$1,350.00
Trees	10	ea	\$750.00	\$7,500.00
<i>Subtotal</i>				<u>\$195,942.50</u>

Design Contingency (20%)	\$39,188.50
General Conditions (8%)	\$18,810.48
GC Overhead and Profit (15%)	\$38,091.22
	<u>2003 CONSTRUCTION COST SUBTOTAL</u> <u>\$292,032.70</u>
Escalation to 2004 Construction Costs (4%)	\$11,681.31
	<u>2004 NET CONSTRUCTION COST TOTAL</u> <u>\$303,714.01</u>

# C R J : A

## COST ESTIMATE

Offsite Overflow Parking Alternative #1  
 NPS Use of the Western Portion of the MPA Property

Project Name: FOMC Alternative Transportation Study  
 Submission: Value Analysis  
 Date: December 12, 2003

Item/Task	Quantity	Unit	Unit Price	Subtotal
NPS Costs-Parking lot re-configuration				
Remove and dispose bituminous concrete	175	cy	\$15.00	\$2,625.00
Curb cut (paving and curbing)	1	allow	\$7,500.00	\$7,500.00
Crack sealing and sealcoating of parking lot	78,300	sf	\$0.20	\$15,660.00
Pavement markings	4,400	lf	\$0.50	\$2,200.00
Chain link fence	200	lf	\$25.00	\$5,000.00
Loam	110	cy	\$30.00	\$3,300.00
Seed	5760	sf	\$0.15	\$864.00
Trees	7	ea	\$750.00	\$5,250.00
Signage	1	allow	\$2,000.00	\$2,000.00
Relocate light fixtures	10	ea	\$5,000.00	\$50,000.00
<i>Subtotal</i>				<i>\$94,399.00</i>

Design Contingency (20%) \$18,879.80

General Conditions (8%) \$9,062.30

GC Overhead and Profit (15%) \$18,351.17

*2003 CONSTRUCTION COST SUBTOTAL* \$140,692.27

Escalation to 2004 Construction Costs (4%) \$5,627.69

*2004 NET CONSTRUCTION COST TOTAL* **\$146,319.96**

# C R J : A

## COST ESTIMATE

Offsite Overflow Parking Alternative #2  
 NPS Use of the Eastern Portion of the MPA Property

Project Name: FOMC Alternative Transportation Study  
 Submission: Value Analysis  
 Date: December 12, 2003

Item/Task	Quantity	Unit	Unit Price	Subtotal
NPS Costs-Parking lot re-configuration				
Remove and dispose bituminous concrete	400	cy	\$15.00	\$6,000.00
Curb cut (paving and curbing)	1	allow	\$7,500.00	\$7,500.00
Crack sealing and sealcoating of parking lot	78,300	sf	\$0.20	\$15,660.00
Pavement markings	4,400	lf	\$0.50	\$2,200.00
Chain link fence	200	lf	\$25.00	\$5,000.00
Loam	200	cy	\$30.00	\$6,000.00
Seed	5760	sf	\$0.15	\$864.00
Trees	14	ea	\$750.00	\$10,500.00
Signage	1	allow	\$2,000.00	\$2,000.00
Relocate light fixtures	10	ea	\$5,000.00	\$50,000.00
<i>Subtotal</i>				<i>\$105,724.00</i>

Design Contingency (20%)		\$21,144.80
General Conditions (8%)		\$10,149.50
GC Overhead and Profit (15%)		\$20,552.75
	<i>2003 CONSTRUCTION COST SUBTOTAL</i>	<i>\$157,571.05</i>
Escalation to 2004 Construction Costs (4%)		\$6,302.84
	<i>2004 NET CONSTRUCTION COST TOTAL</i>	<i>\$163,873.89</i>



# C R J : A

## COST ESTIMATE

Bicycle Route Alternative #1  
Waterfront Promenade and East Fort Avenue Alignment

Project Name: FOMC Alternative Transportation Study  
Submission: Value Analysis  
Date: December 12, 2003

Item/Task	Quantity	Unit	Unit Price	Subtotal
NPS Costs-Bike Route				
Bike lane pavement markings	12,200	lf	\$1.00	\$12,200.00
Bike route signage (1/4 mile intervals)	25	ea	\$300.00	\$7,500.00
Street cleaning	1	allow	\$1,500.00	\$1,500.00
Traffic police	1	allow	\$1,000.00	\$1,000.00
<i>Subtotal</i>				<u>\$22,200.00</u>

Design Contingency (20%)		\$4,440.00
General Conditions (8%)		\$2,131.20
GC Overhead and Profit (15%)		\$4,315.68
	<i>2003 CONSTRUCTION COST SUBTOTAL</i>	<u>\$33,086.88</u>
Escalation to 2004 Construction Costs (4%)		\$1,323.48
	<i>2004 NET CONSTRUCTION COST TOTAL</i>	<u>\$34,410.36</u>

# C R J : A

## COST ESTIMATE

Bicycle Route Alternative #2  
 Light Street and East Fort Avenue Alignment

Project Name: FOMC Alternative Transportation Study  
 Submission: Value Analysis  
 Date: December 12, 2003

Item/Task	Quantity	Unit	Unit Price	Subtotal
Other Costs				
Bike lane pavement markings	26,670	lf	\$1.00	\$26,670.00
Bike route signage (1/4 mile intervals)	30	ea	\$300.00	\$9,000.00
Street cleaning	1	allow	\$2,500.00	\$2,500.00
Traffic police	1	allow	\$2,000.00	\$2,000.00
<i>Subtotal</i>				<u>\$40,170.00</u>

Design Contingency (20%)		\$8,034.00
General Conditions (8%)		\$3,856.32
GC Overhead and Profit (15%)		\$7,809.05
	<i>2003 CONSTRUCTION COST SUBTOTAL</i>	<u>\$59,869.37</u>
Escalation to 2004 Construction Costs (4%)		\$2,394.77
	<i>2004 NET CONSTRUCTION COST TOTAL</i>	<u>\$62,264.14</u>