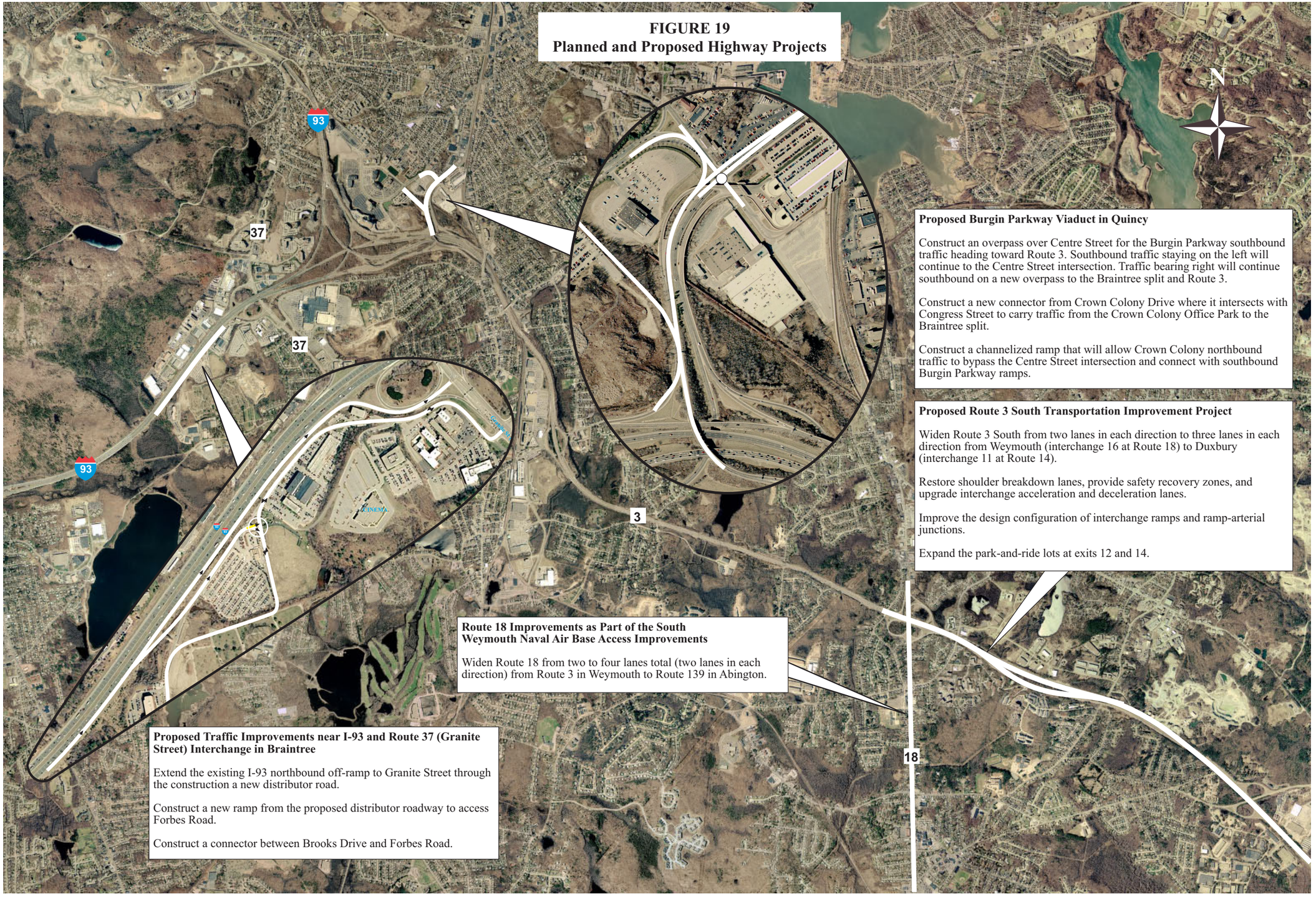
FIGURE 19
Planned and Proposed Highway Projects



Proposed Burgin Parkway Viaduct in Quincy

Construct an overpass over Centre Street for the Burgin Parkway southbound traffic heading toward Route 3. Southbound traffic staying on the left will continue to the Centre Street intersection. Traffic bearing right will continue southbound on a new overpass to the Braintree split and Route 3.

Construct a new connector from Crown Colony Drive where it intersects with Congress Street to carry traffic from the Crown Colony Office Park to the Braintree split.

Construct a channelized ramp that will allow Crown Colony northbound traffic to bypass the Centre Street intersection and connect with southbound Burgin Parkway ramps.

Proposed Route 3 South Transportation Improvement Project

Widen Route 3 South from two lanes in each direction to three lanes in each direction from Weymouth (interchange 16 at Route 18) to Duxbury (interchange 11 at Route 14).

Restore shoulder breakdown lanes, provide safety recovery zones, and upgrade interchange acceleration and deceleration lanes.

Improve the design configuration of interchange ramps and ramp-arterial junctions.

Expand the park-and-ride lots at exits 12 and 14.

Route 18 Improvements as Part of the South Weymouth Naval Air Base Access Improvements

Widen Route 18 from two to four lanes total (two lanes in each direction) from Route 3 in Weymouth to Route 139 in Abington.

Proposed Traffic Improvements near I-93 and Route 37 (Granite Street) Interchange in Braintree

Extend the existing I-93 northbound off-ramp to Granite Street through the construction a new distributor road.

Construct a new ramp from the proposed distributor roadway to access Forbes Road.

Construct a connector between Brooks Drive and Forbes Road.

7 ADDITIONAL IMPROVEMENTS FOR FURTHER CONSIDERATION

As described in the previous chapter, the PMT contains many transit projects for southeastern Massachusetts. Some are in the construction and planning stages, and others are proposals for further consideration. Because the PMT defines a vision for regional mass transportation for the MBTA and sets priorities for infrastructure investments without financial constraints, it is very comprehensive. After reviewing the PMT, it was determined that its transit projects and proposals address most of the mobility concerns in southeastern Massachusetts, and therefore no additional transit projects were proposed as part of this study.

Having accounted for the transit and highway projects in the TIP and PMT, CTPS, in conjunction with the study's Advisory Task Force and MassHighway, developed conceptual improvements for the Braintree split for further evaluation. The focus was on operational improvements that can be implemented in a short time, do not require major environmental impact studies or land takings, can be constructed within the present right-of-way, do not adversely affect residential neighborhoods, are cost-effective, and buy more time to look at long-range strategies. These are the criteria that guided the development of the improvements recommended in this study.

The recommended improvements are categorized into two packages: safety improvements and traffic flow improvements. The safety improvement package addresses problems at the high-crash locations where drivers have difficulty merging with the traffic in the main travel lanes or changing lanes. The safety improvement package consists of short-term improvements. The traffic flow improvement package addresses the bottlenecks in and around the split that prevent traffic from flowing efficiently through the split. These improvements are mostly short- and intermediate-term. Many of the traffic flow improvements also address safety problems at high-crash locations. For each package, the improvements can be implemented individually or in combination with other proposals.

At some problem locations, one or more alternatives in addition to the recommended alternative were evaluated. They include alternatives suggested by the Advisory Task Force and MassHighway. The alternatives that were found infeasible after further consultation with MassHighway are documented in Appendix C of this report along with the reasons why they are not recommended.

The following sections describe each package and its component improvements, as well as the levels of service for the 2025 no-build and build options.

7.1 SAFETY IMPROVEMENT PACKAGE

The individual safety improvements are shown in white in Figure 20 and are described in detail below. The improvements are identified by the number associated with the location of the problem, as given in Figures 2 and 3. That numbering is repeated in Figure 20 for easy reference and consistency.

7.1.1 Improvements at Location #1: Upgrade Short Deceleration Lane

This proposal was designed to address the short deceleration lane for traffic exiting onto Route 37. The proposal calls for lengthening the existing deceleration lane to provide more storage room and sufficient length for exiting vehicles to change lanes. The proposal also calls for installing signs on the Route 3 South connector instructing motorists exiting onto Route 37 to be in the rightmost lane.

7.1.2 Improvements at Location #2: Reconfigure the Ramp to Eliminate the Short Weave Distance

This proposal was designed to address the safety problems regarding the short weave distance for the on-ramp traffic proceeding from Route 37 northbound to the Expressway. The proposal calls for restricting the existing on-ramp to traffic that is heading to Route 3 South, the Burgin Parkway, or Washington Street. A median barrier or some form of separation would be required to prevent the ramp traffic from violating this restriction.

In addition, the proposal calls for constructing a double left-turn bay at the signalized ramp–arterial junction for use by traffic proceeding to the Expressway to access the south side on-ramp. The proposal also calls for installing new signs or modifying existing signs on Route 37 to guide motorists to the appropriate ramps. These modifications would increase safety at the split, as the south side on-ramp would have a longer weaving section to the Expressway. Level of service analyses for 2025 for the ramp–arterial junctions on Route 37 indicate that they would operate satisfactorily at LOS D or better during the AM and PM peak periods of travel.

Several alternatives to address the problem at this location were suggested by the task force. They were evaluated, and those found infeasible and are documented in Appendix C of this report along with the reasons why they were not recommended.

7.1.3 Improvements at Location #3: Install an Advanced Warning System for Downstream Queues

This proposal was developed to address safety problems created by traffic queues on the southbound connector ramp from the Expressway to Route 3 South during the PM peak period. The proposal calls for installing real-time sensors for queue detection, and overhead variable message signs to inform and warn motorists to reduce speed in advance of the downstream traffic queue that is obscured by the horizontal curvature of the roadway.

7.1.4 Improvements at Location #4: Enhance Access to HOV Lane for Washington Street On-Ramp Traffic

This proposal was developed to enhance access to the northbound HOV lane for travelers using the Burgin Parkway/Washington Street on-ramp during the morning peak period. The proposal calls for moving the Burgin Parkway and Washington Street northbound on-ramp connector to the Expressway further south and creating a new ramp connector with a right full auxiliary lane. The proposed ramp connector upgrade would, in effect, lengthen the weaving distance over which HOV-bound ramp traffic could change lanes to access the HOV lane. In addition, the proposal calls for installing new signs to direct HOV-bound traffic to the HOV lane.

7.2 TRAFFIC FLOW IMPROVEMENT PACKAGE

The individual traffic flow improvements are shown in white in Figure 21 and are described in detail below. The improvements are identified by the number associated with the location of the problem, as given in Figures 2 and 3. That numbering is repeated in Figure 21 for reference and consistency.

7.2.1 Improvement at Location #5: Lengthen the Acceleration Lane of the Southbound On-Ramp from Furnace Brook Parkway to the Expressway

This proposal was designed to address the afternoon peak period southbound congestion, weaving, and merging problems on the Southeast Expressway in the vicinity of the Furnace Brook Parkway interchange. The proposal calls for lengthening the acceleration lane for the southbound on-ramp connecting Furnace Brook Parkway to the Expressway. The upgrade is expected to reduce merging and weaving in the area and help on-ramp traffic from the Furnace Brook Parkway to enter the Expressway. This improvement, when combined

with Improvement #10, would facilitate traffic flow through the split during the PM peak period.

In addition, the feasibility of a long-term solution should be examined: extending the HOV lane on the Southeast Expressway to Route 3 South and to I-93 toward Route 24. These extensions would remove the weave and merge of southbound HOV traffic heading to Route 3 South and to I-93 toward Route 24.

7.2.2 Improvements at Location #6: Burgin Parkway/Centre Street Traffic Congestion

The Burgin Parkway Viaduct project in Quincy, already in the design stages, is underway; it addresses this problem. That project is described in detail in Chapter 6 (page 30).

7.2.3 Improvement at Location #7: Route 3 South PM Peak Southbound Congestion between the Split and Union Street

This proposal was designed to address the PM peak period southbound congestion on Route 3 South between the Braintree split and Union Street. This southbound segment of Route 3 South, with three travel lanes, is a bottleneck during the PM peak period, as it receives traffic from five lanes—two from the Expressway, two from I-93 northbound from (Route 128), and one from the Burgin Parkway southbound on-ramp to Route 3 South. The proposal calls for creating a fourth southbound travel lane on this segment of Route 3 South. The fourth lane would be an auxiliary lane beginning at the Burgin Parkway on-ramp and possibly extending just past the exit ramp at the Union Street interchange. This lane would facilitate the maneuvering of entering and exiting traffic, which would increase the capacity of this section of the roadway.

This proposal would benefit the Burgin Parkway Viaduct project, as it would facilitate traffic flow on the connector ramp to Route 3 South by reducing its merge with Route 3 South that sometimes results in traffic queuing on the connector ramp. Similarly, this proposal would improve traffic flow from the split to Route 3 South by reducing the turbulence caused by merging traffic from the Expressway and I-93 (Route 128). Additionally, this proposal is expected to improve safety.

7.2.4 Improvement at Location #8: Upgrade Ramp Acceleration Lane

This proposal was designed to address traffic safety and congestion at the merge point of the connector ramp from Burgin Parkway and Washington Street to southbound I-93. The proposal calls for lengthening the acceleration lane for the on-ramp from Burgin Parkway and Washington Street to the Route 3 South connector, which connects Route 3 South with I-93 southbound. This improvement is expected to increase safety at this location. In addition, when it is combined with Improvements #1 and #10, it would help reduce congestion at this location, as traffic congestion at locations #1 and #10 sometimes impacts traffic flow at location #8.

7.2.5 Improvements at Location #9: Design Configuration Improvements at Interchange 17 (Union Street in Braintree)

This proposal was designed to specifically address problems of on-ramp traffic to and from the Union Street rotary interchange that impacts traffic flow on Route 3 South and the Braintree split during the AM and PM peak periods. The proposal calls for upgrading the existing acceleration and deceleration lanes on the north side of the rotary.

One modification would be an upgrade of the northbound acceleration lane into an auxiliary lane, possibly ending after the exit ramp at interchange 19 (Burgin Parkway/MBTA Quincy Adams Station). The idea is to provide more room for the on-ramp traffic to merge with Route 3 South northbound traffic, and for traffic exiting to the Burgin Parkway/MBTA Quincy Adams Station, so that it will not interrupt traffic flow on Route 3 South during the AM peak period.

In the southbound direction, the modification would be an upgrade of the deceleration lane into an auxiliary lane, possibly ending after the exit ramp at interchange 17 (Union Street). The idea is to provide more storage room for the southbound traffic exiting onto Union Street and to improve traffic flow on southbound Route 3 during the PM peak period.

Additional modifications include provision of a right-turn bypass lane or slip lane at the southbound ramp–rotary junction for use by the high volume of right-turn traffic. These modifications at location #9 are expected to improve safety as well as traffic flow.

7.2.6 Improvements at Location #10: Design Configuration Improvements on the I-93 Segment between Routes 24 and 37 and Related Interchange Improvements at Interchange 6 (Route 37)

This proposal was designed to address an external problem that impacts traffic operations at the split during the PM peak travel periods; specifically, congestion on I-93 toward Routes 24 and 128 that spills back into the split. The proposal calls for the following:

- Add a travel lane on I-93 southbound, beginning south of the Route 37 interchange and ending at the diverge point to Route 24.
- Reconfigure the lane assignment at the diverge point of I-93 and Route 24 to provide two travel lanes to the two-lane connector ramp connecting to Route 24. These exclusive lanes should extend about one-half mile to prevent turbulence on I-93.
- Widen the merge point of Route 24 southbound to receive the four travel lanes from the connecting ramps. The widening should be extended about one mile to prevent traffic turbulence from spilling back onto I-93. The widening may need to be extended to the Route 139 interchange, where 300 or more vehicles per hour exit than enter southbound Route 24 during the PM peak hour.
- Install new signs or modify existing signs to guide motorists to Route 24.

These improvements would have significant congestion-reduction and safety benefits and are expected to facilitate traffic flow on southbound I-93 toward Route 24 and through the split to Route 3 South.

7.2.7 Improvements at Location #11: Traffic Congestion at the I-93/Route 37 Ramp–Arterial Junction.

The I-93/Route 37 traffic improvements that address this problem are already in either the planning or design stage. That project is described in detail in Chapter 6 (see page 30).

FIGURE 20
Safety Improvement Package

Improvements at Location #1

Upgrade deceleration lane and modify existing signs or install new signs to direct northbound Route 3 South traffic exiting at Route 37.

The upgrade would provide more storage room and sufficient length for exiting vehicles to change lanes.

Improvements at Location #2

Reconfigure the existing ramp to eliminate the short weave distance for traffic heading to the Expressway by restricting its use to traffic heading to Route 3 South or Burgin Parkway/ Washington Street.

Construct a double left-turn lane at the ramp-arterial junction for use by traffic heading to the Expressway.

The modification is expected to improve safety by providing a longer weave distance for traffic heading to the Expressway.

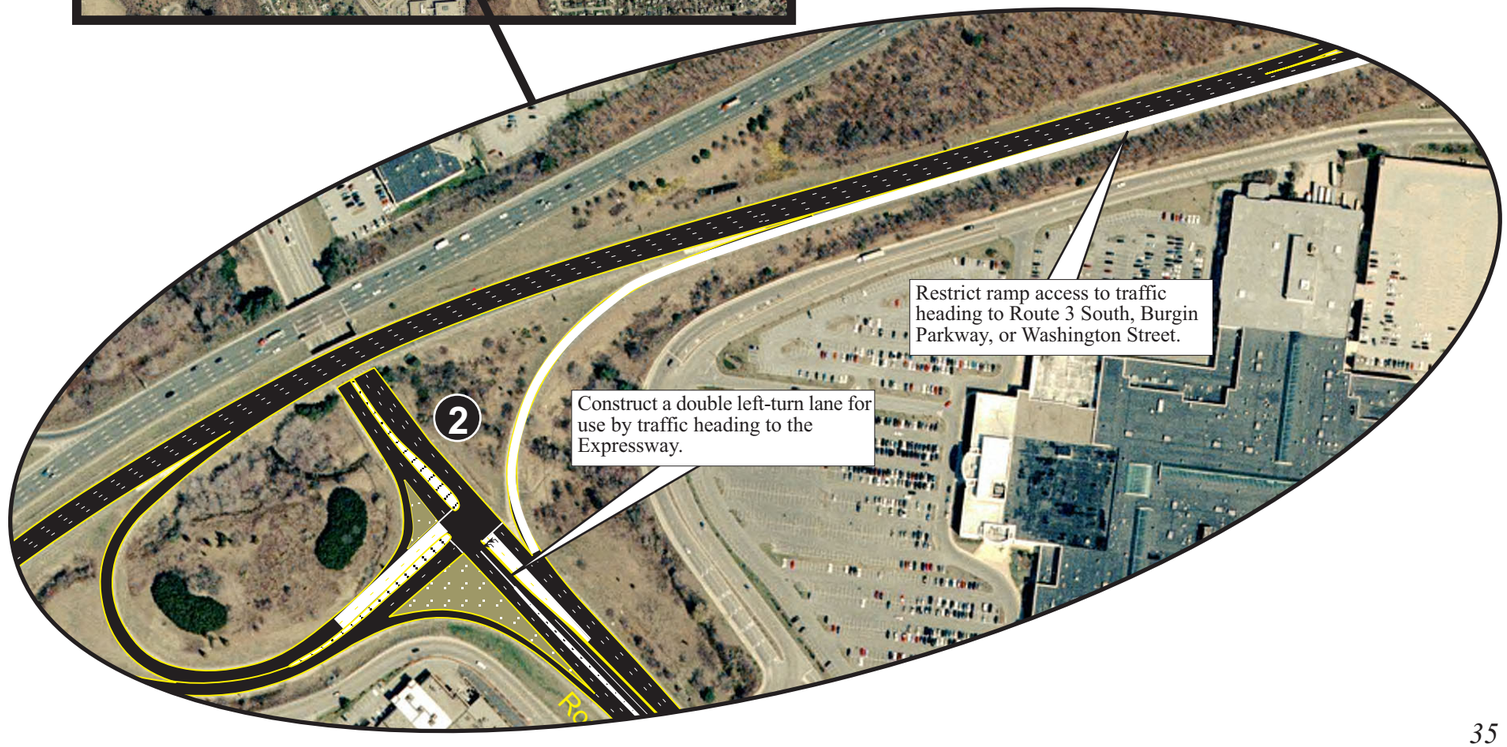
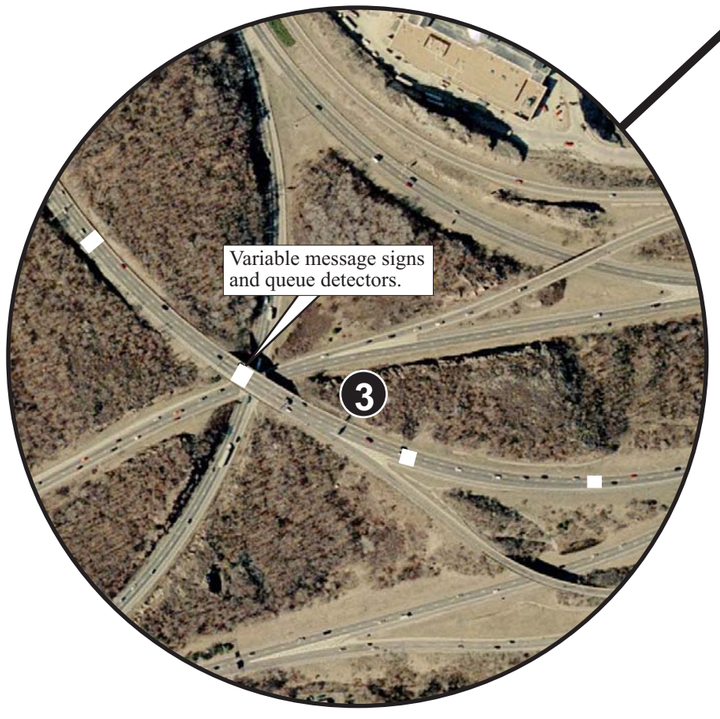


FIGURE 20 (cont.)
Safety Improvement Package

Improvements at Location #3

Install an advanced warning system for detecting a downstream traffic queue that is obscured by the horizontal curvature of the connector and variable message signs for informing motorists.

The proposal is expected to increase safety at the split.



Improvements at Location #4

Enhance access to the HOV lane for Washington Street on-ramp traffic by moving the ramp to the Expressway further south and creating a new ramp with a full auxiliary lane.

The upgrade will increase the weave distance over which HOV-bound traffic can change lanes to access the HOV lane.

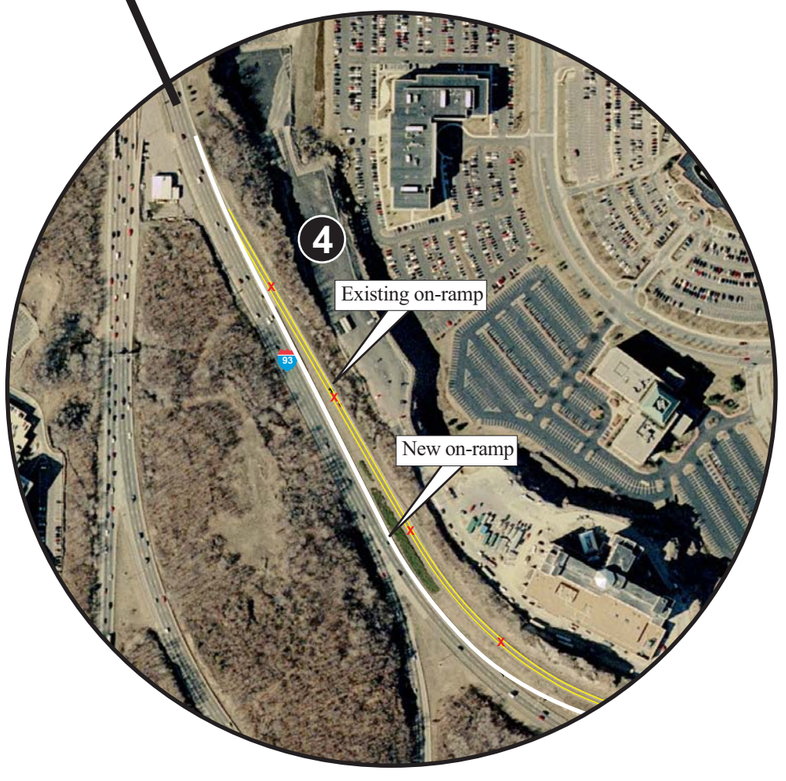
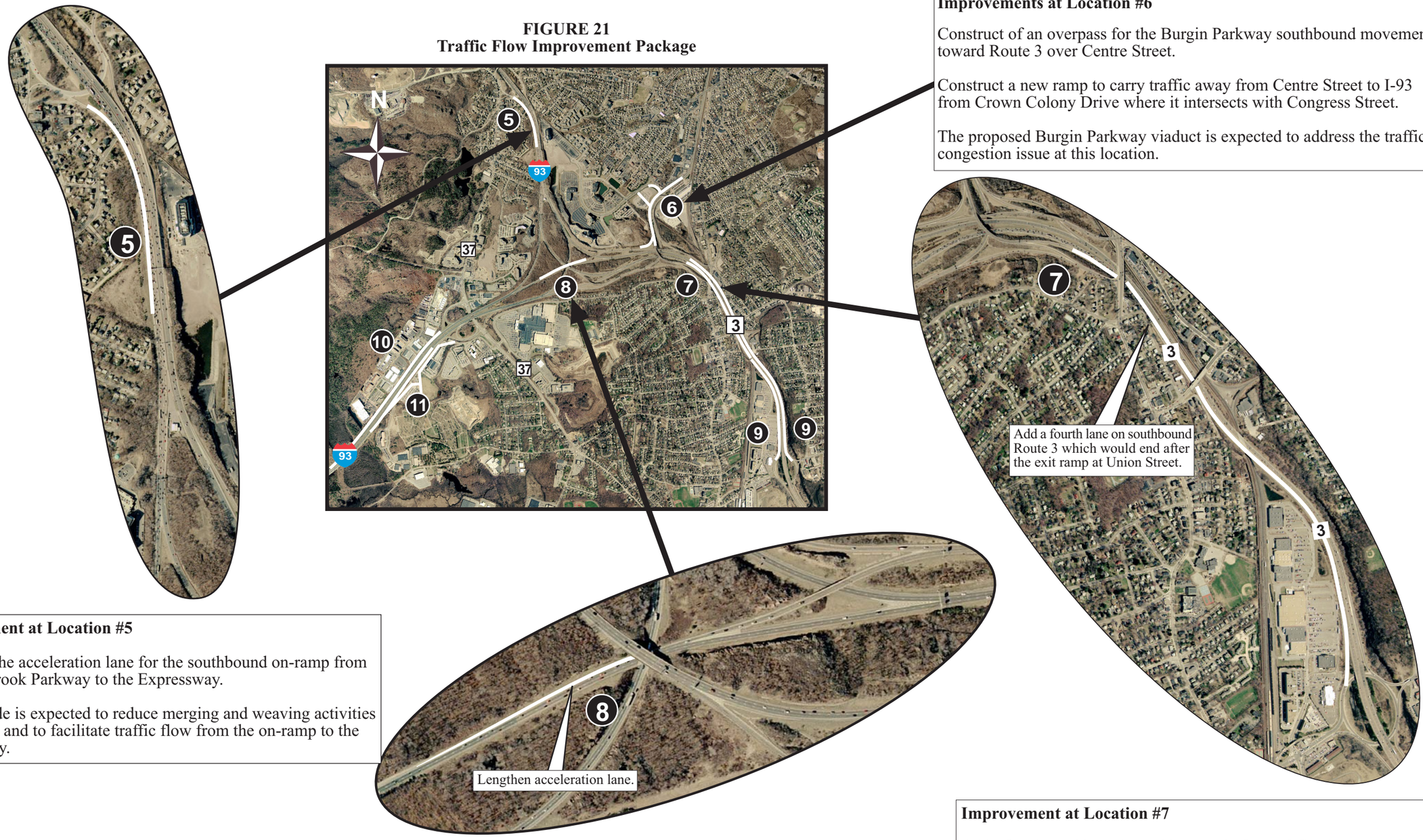


FIGURE 21
Traffic Flow Improvement Package



Improvements at Location #6

Construct of an overpass for the Burgin Parkway southbound movement toward Route 3 over Centre Street.

Construct a new ramp to carry traffic away from Centre Street to I-93 from Crown Colony Drive where it intersects with Congress Street.

The proposed Burgin Parkway viaduct is expected to address the traffic congestion issue at this location.

Improvement at Location #5

Lengthen the acceleration lane for the southbound on-ramp from Furnace Brook Parkway to the Expressway.

The upgrade is expected to reduce merging and weaving activities in this area and to facilitate traffic flow from the on-ramp to the Expressway.

Improvement at Location #8

Lengthen the acceleration lane of the ramp from Burgin Parkway/ Washington Street to provide more space for merging with Route 3 South traffic.

The proposed downstream improvements at Route 37, Route 24, and the Route 128 Transportation Improvement Project are expected to help reduce the queuing that extends into this area.

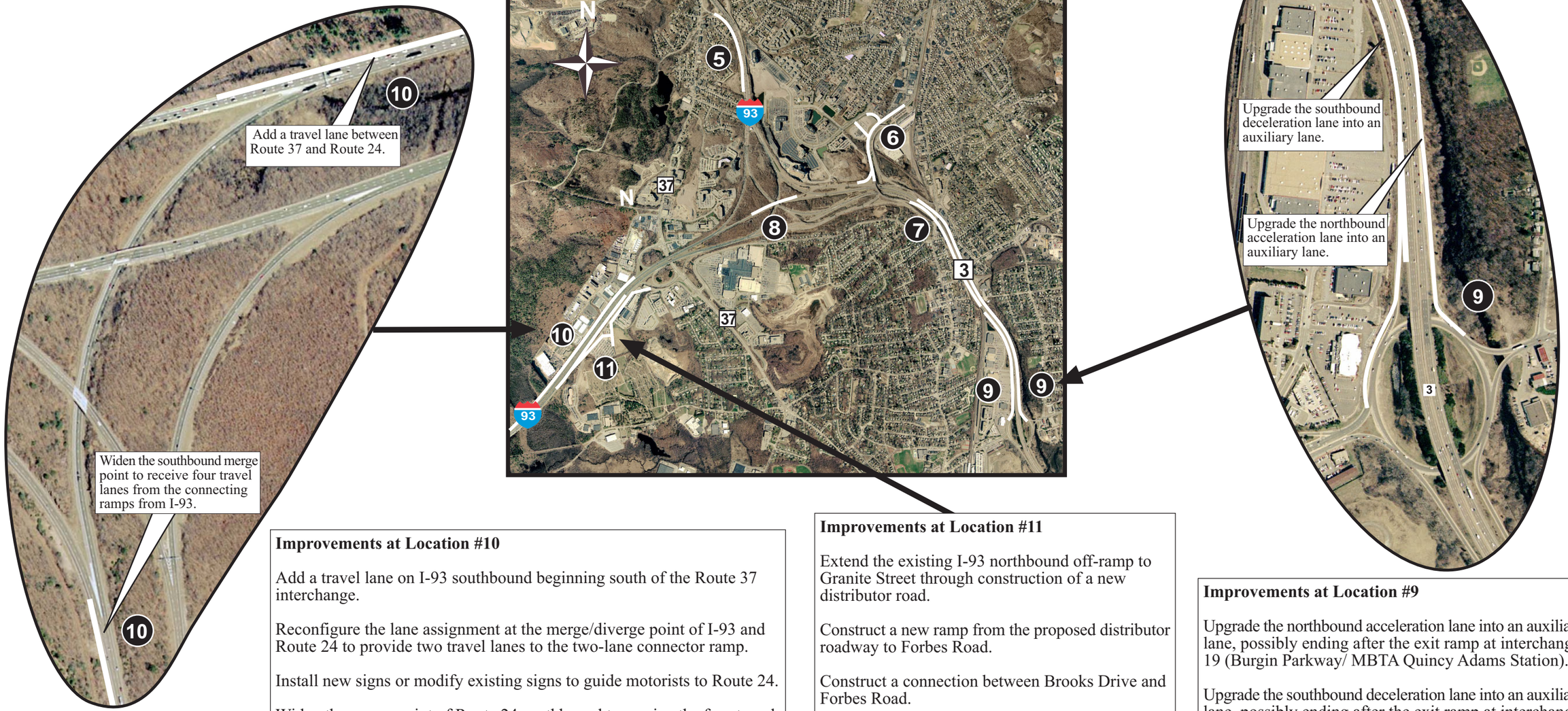
Improvement at Location #7

Add a fourth southbound travel lane on the Route 3 South segment beginning at the Burgin Parkway on-ramp and possibly ending after the exit ramp at the Union Street interchange.

The proposed improvement is expected to facilitate traffic flow from the Expressway and I-93 to Route 3 South during the PM peak period of travel.

(cont.)

FIGURE 21 (cont.)
Traffic Flow Improvement Package



Improvements at Location #10

Add a travel lane on I-93 southbound beginning south of the Route 37 interchange.

Reconfigure the lane assignment at the merge/diverge point of I-93 and Route 24 to provide two travel lanes to the two-lane connector ramp.

Install new signs or modify existing signs to guide motorists to Route 24.

Widen the merge point of Route 24 southbound to receive the four travel lanes from the connecting ramps.

The proposed improvements are expected to facilitate traffic flow on I-93 southbound toward Routes 24 and 128 during the PM peak period of travel.

Improvements at Location #11

Extend the existing I-93 northbound off-ramp to Granite Street through construction of a new distributor road.

Construct a new ramp from the proposed distributor roadway to Forbes Road.

Construct a connection between Brooks Drive and Forbes Road.

The proposed traffic improvements for roadways near the interchange of Route 37 and I-93 described in this report are expected to address the traffic congestion issues at this location.

Improvements at Location #9

Upgrade the northbound acceleration lane into an auxiliary lane, possibly ending after the exit ramp at interchange 19 (Burgin Parkway/ MBTA Quincy Adams Station).

Upgrade the southbound deceleration lane into an auxiliary lane, possibly ending after the exit ramp at interchange 17 (Union Street).

Provide a right-turn bypass lane or slip lane at the rotary for the southbound off-ramp, which has a high right turn volume.

The proposed improvements are expected to improve traffic safety and flow on Route 3 South.

7.3 TRAFFIC SIMULATION MODEL

The purpose of the traffic simulation modeling was to provide detailed information about future traffic operations of the Braintree split network. This was done to examine the merging and queuing phenomena that take place at the end of the HOV lane and those that take place at ramp–freeway junctions, interrupting the freeway's traffic flow. Another purpose of the traffic simulation was to evaluate the performance of the no-build and build options; specifically, how they improve traffic flow in the Braintree split area.
The CORSIM traffic simulation model was used in this study to evaluate the impacts of alternatives. CORSIM was developed by the Federal Highway Administration and has gone through several improvements and enhancements over the years. It consists of an integrated set of two simulation models that represent the entire traffic environment: NETSIM represents traffic on surface streets and FRESIM represents traffic on freeways.

CORSIM accounts for queuing, weaving, merging, and diverging through the car-following model, driver-behavior model, and vehicular characteristic and performance model. In CORSIM, vehicles are moved according to car-following logic in response to traffic control devices and other demands. Thus each time a vehicle is moved, its position and relationship to other vehicles nearby is recalculated, as is its speed, acceleration, and status. This data is accumulated every "time step" (every second), and at the end of the simulation, the accumulated data is used to produce measures of effectiveness to estimate the performance of the highway system. Travel speed and time are two of the primary performance measures from the model.

The simulation model was calibrated to 2003 peak-hour conditions using available ground counts by adjusting CORSIM calibration parameters to match existing conditions (speeds, travel times, and observed queues). After calibration, CORSIM was used to perform the 2025 analyses. There were two scenarios, the 2025 no-build option and the 2025 build option.

The 2025 no-build option was the baseline used in assessing the impacts of the build option. The no-build option in this study includes the highway and transit projects that were included in the 2025 build scenario for the 2004–2025 Regional Transportation Plan (RTP). The highway and transit projects in the study area that were included in the regional planning model for the RTP's 2025 build scenario are the Burgin Parkway Viaduct Project, Route 3 South Transportation Improvement Project, Route 18, Naval Air Station Access Improvements, and the Old Colony/Greenbush Commuter Rail.

The 2025 traffic volume forecasts from the regional planning model were used in the traffic simulation model to assess the benefits and impacts of the no-build and build options. In the simulation model, the highway network for the build option contains the proposed traffic operations improvements near I-93 and Route 37 (Granite Street) described in Chapter 6, and the additional operational improvements recommended for further consideration. On the other hand, the highway network for the no-build option contains none of these proposed improvements.

7.4 MEASURES OF EFFECTIVENESS

The benefits and impacts of the proposed improvements were assessed using the following performance measures from the traffic simulation: travel speeds, traffic queues, and the removal of traffic flow bottlenecks. The safety and traffic flow improvement packages were analyzed together. This was done in order to account for the effect of one set of improvements on the other. The impacts of each improvement were not analyzed individually at this stage of the planning process. Later in the planning stages when all of the improvements have been reviewed and a plan of action has been advanced, the individual impacts can be assessed separately or in new packages.

The following sections briefly describe the results of the traffic simulations in terms of travel speeds, the impacts on bottlenecks, and the extent of traffic queues for the no-build and build options. In addition, the differences in travel speeds between the build and no-build options are presented for comparison.

7.4.1 No-Build Option

Travel Speeds

The average travel speeds produced from the 2025 traffic simulation for the no-build option are shown in Figures 22 and 23 for the AM and PM peak hours, respectively. In 2025, increased traffic volumes would significantly reduce travel speeds below 2003 levels (see section 3.1.6 of this study) and would increase the extent and duration of traffic congestion at the following locations if the no-build option is implemented.

- Braintree split (AM peak direction, 35–40 mph; PM peak direction, 15–20 mph).
- Southeast Expressway (AM peak direction, 10–15 mph; PM peak direction, 25–30 mph).
- Route 3 South from Route 18 to the split (AM peak direction, 25–30 mph; PM peak direction, 45–50 mph).
- I-93 from the split to Route 24 (AM peak direction, 20–25 mph; PM peak direction, 25–30 mph).

Traffic Bottlenecks/Traffic Queues

The 2025 no-build option does not remove the traffic bottlenecks around the split. The peak period traffic queues on Route 3 South from Union Street to the split, on the I-93 stretch from Route 24 to the split, and on the Expressway are expected to increase.

The traffic bottlenecks around the split caused by weaving, merging, and diverging traffic would restrict traffic flow through the split during peak periods, particularly, during the PM peak period, the flow of southbound traffic from the Expressway to Route 3 South and to I-93 (Route 128).

The bottlenecks on Route 3 South, due to merging and exiting traffic at Union Street, the Quincy Adams MBTA Station/Burgin Parkway/Crown Colony ramps, and the lane drop on the I-93 northbound connector to Route 3 South, would restrict traffic flow on Route 3 South to the split during the AM peak period and from the split to Route 3 South during the PM peak period.

On I-93 southbound, the traffic bottleneck at the diverge to Route 24 would create a traffic queue that would spill back into the split, reducing traffic flow from the Expressway to Route 3 South and I-93 during the PM peak period. During the AM peak period, the traffic bottleneck at the I-93 northbound diverge to Route 3 South and the Expressway, and ramp merge and diverge activities at Route 37, are expected to restrict traffic flow to the Expressway and to Route 3 South/Burgin Parkway, causing traffic queues to spill back into the I-93/Route 24 interchange.

Safety

The safety problems at the high-crash locations where drivers have difficulties merging with the traffic in the main travel lanes or changing lanes will persist in the no-build option. With increased traffic volumes, there would be more stop-and-go travel conditions

and more lane changing and weaving, all of which would be expected to impact traffic safety.

Ramp-Arterial Junctions

CORSIM, in conjunction with Synchro and aaSIDRA, was used to evaluate the 2025 no-build levels of service of the ramp-arterial junctions presented in Figure 24 and discussed below.

Furnace Brook Parkway Interchange

This interchange would operate satisfactorily, at LOS D, during the AM peak period. However, during the PM peak period, it would operate at LOS F, due to congestion on the Expressway and the high volume of southbound traffic exiting and entering the freeway at this location.

I-93/Route 37 Interchange

At the I-93/Route 37 interchange, the west side ramp-arterial junction would operate at LOS D or better during the AM peak period. During the PM peak period, it would operate at LOS E or F, due to the high traffic volumes at the junction. Ramp traffic queues during the PM peak period would be expected. The east side ramp-arterial junction would operate at LOS E. However, the approach receiving the northbound I-93 off-ramp traffic would operate at LOS F, due to the high volume of traffic that would be exiting at this location. This is expected to cause a ramp traffic queue that would spill back onto the freeway.

Route 3 South/Union Street Interchange

This interchange would operate at LOS F during the AM and PM peak periods. During the AM peak period, the high volume of northbound on-ramp traffic would spill back into the rotary, affecting its traffic operations, especially Union Street westbound traffic and traffic going to the MBTA Braintree Station. In the PM peak period, the high volume of southbound Route 3 traffic exiting at this location would cause a traffic queue on the ramp that would extend onto the freeway.

Burgin Parkway Centre/Street Intersection

At this intersection, the AM and PM peak period levels of service would be C and D, respectively, based on the assumption that the Burgin Parkway Viaduct would be built before 2025. During the AM peak period all of the major movements would operate at LOS D or better. Construction of the Burgin Parkway Viaduct would allow more green time to be allocated to the high volume of northbound left-turning traffic going to the Crown Colony Office Park, as well as to those continuing onto the Burgin Parkway. During the PM peak period, all of the major movements would operate at LOS E or better.

7.4.2 Build Option

Travel Speeds

The travel speeds produced from the 2025 traffic simulation for the build option are shown in Figures 25 and 26 for the AM and PM peak hours, respectively. The following are the AM and PM peak-direction travel speeds for the build option.

- Braintree split (AM peak direction, 35–40 mph; PM peak direction, 40–45 mph).
- Southeast Expressway (AM peak direction, 10–15 mph; PM peak direction, 40–45 mph).
- Route 3 South from Route 18 to the split (AM peak direction, 40–45 mph; PM peak direction, 50–55 mph).
- I-93 from the split to Route 24 (AM peak direction, 40–45 mph; PM peak direction, 45–50 mph).

Traffic Bottlenecks/Traffic Queues

The 2025 build option would reduce the impacts of bottlenecks at the split: on Route 3 South from Union Street to the split, and on the I-93 stretch from Route 24 to the split.

The bottlenecks at the split, caused by weaving, merging, and diverging traffic, that restrict the flow through the split during the PM peak period of southbound traffic from the Expressway to Route 3 South and I-93 would be reduced significantly by Improvement #5.

On Route 3 South, the bottlenecks caused by merging traffic from Union Street and traffic exiting to the MBTA Quincy Adams Station/Burgin Parkway/Crown Colony restrict traffic flow from northbound Route 3 to the split during the AM peak period. Also, the lane drop on the I-93 northbound connector to southbound Route 3 and merging traffic from the MBTA Quincy Adams Station/Burgin Parkway/Crown Colony restrict traffic flow to Route 3 South during the PM peak period. Both the AM and PM problems would be reduced significantly by Improvements #7, #8, and #9.

On I-93, the impacts of the bottleneck at the diverge to Route 24 that causes a traffic queue back into the split, thus reducing traffic flow from the Expressway to Route 3 South and I-93 during the PM peak period, would be reduced by Improvements #1 and #10. Also, during the AM peak period, the impacts of bottlenecks at the northbound I-93 diverge to Route 3 South and the Expressway and of the ramp merge/diverge activities at Route 37 would be reduced by Improvements #2 and #11.

Safety

The safety improvements (Improvements #1 through #4) address problems at the high-crash locations where drivers have difficulty merging with the traffic in the main travel lanes or changing lanes. These improvements are expected to improve safety at the split.

Ramp-Arterial Junctions

As in the no-build case, CORSIM, in conjunction with Synchro and aaSIDRA, was used to evaluate the 2025 build option's levels of service at the ramp-arterial junctions, presented in Figure 27 and discussed below.

Furnace Brook Parkway Interchange

This interchange would operate satisfactorily, at LOS D, during the AM peak period. However, during the PM peak period, it would operate at LOS E or better. The auxiliary lane (Improvement #5) suggested for the southbound on-ramp and Improvements #1 and #10 would facilitate traffic flow at the rotary interchange onto the Expressway and would reduce its interaction with traffic on the Expressway.

I-93/Route 37 Interchange

At this interchange, the west side ramp-arterial junction would operate at LOS C or better during the AM peak period. During the PM peak period, it would operate at LOS D or better. As a result of the improvements suggested for this location (Improvements #1 and #10), the ramp traffic queue spilling back onto the freeway or interrupting flow on I-93 during the PM peak period would be reduced significantly.

At the east side ramp-arterial junction, the overall junction would operate at LOS D during the AM and PM peak periods. Improvement #11 would reduce the volumes of traffic arriving from northbound

FIGURE 22
AM Peak Hour Travel Speeds and Times:
2025 No-Build Option

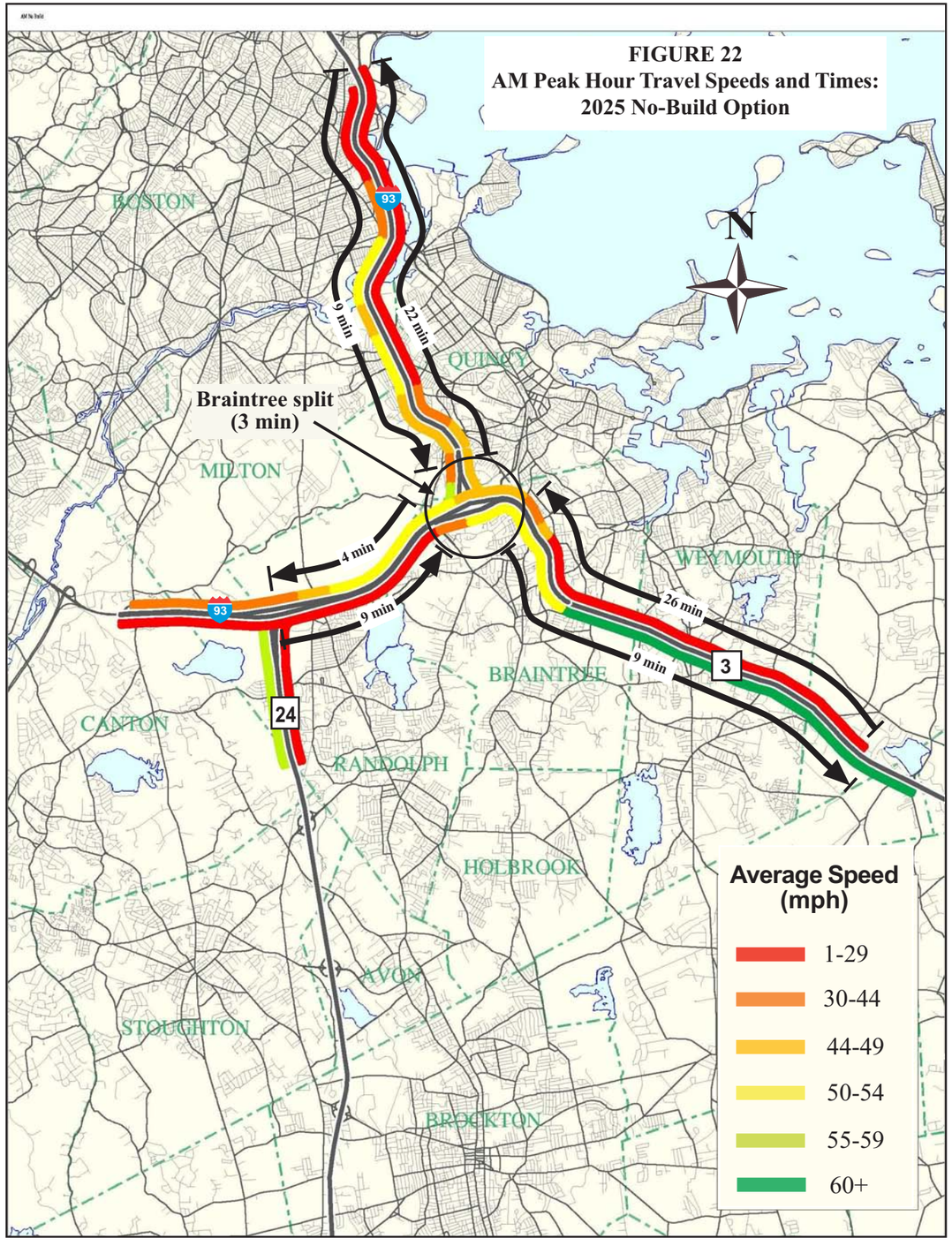


FIGURE 23
PM Peak Hour Travel Speeds and Times:
2025 No-Build Option

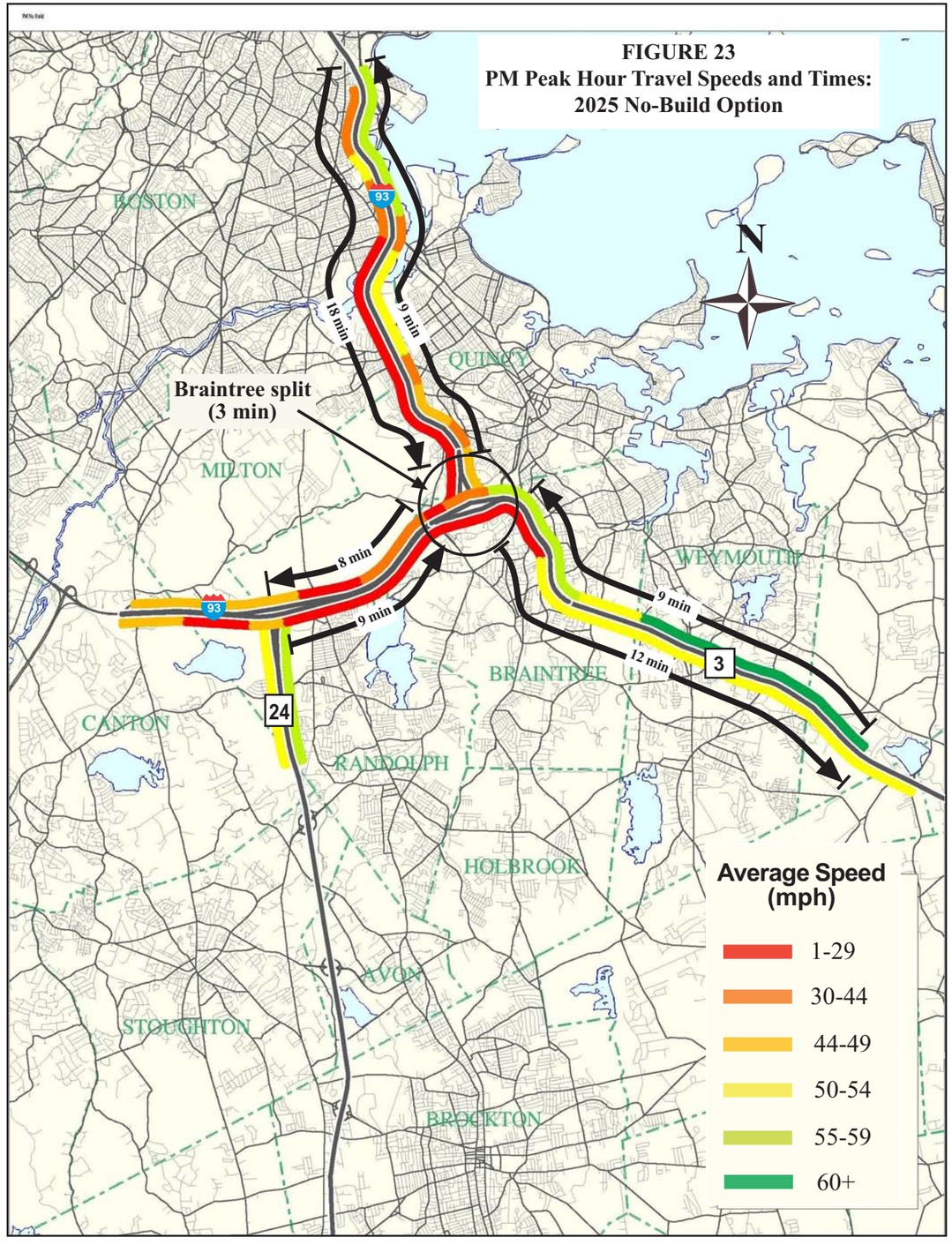


FIGURE 24
AM and PM Peak Period Levels of Service: 2025 No-Build Option

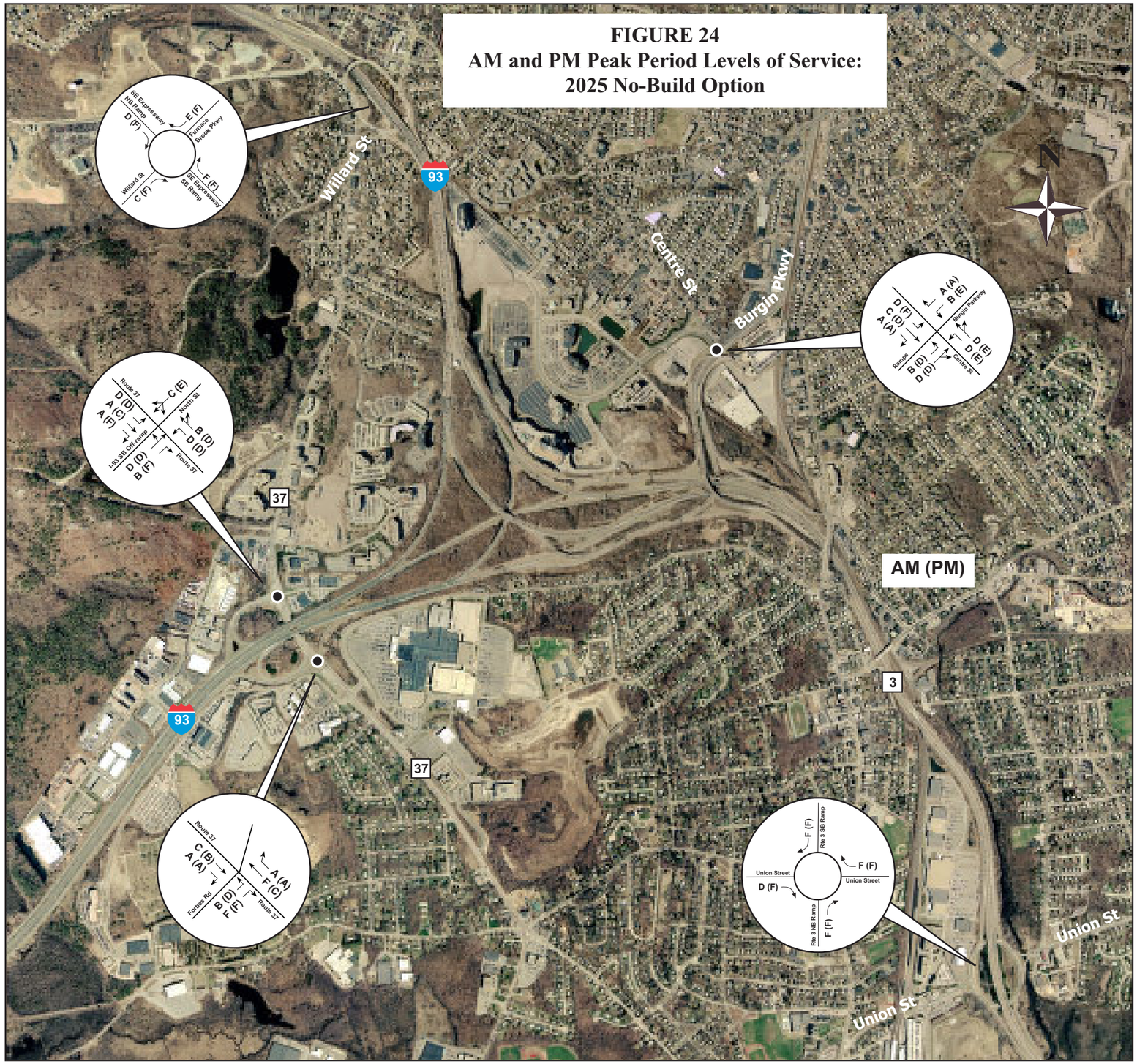


FIGURE 25
AM Peak Hour Travel Speeds and Times: 2025 Build Option

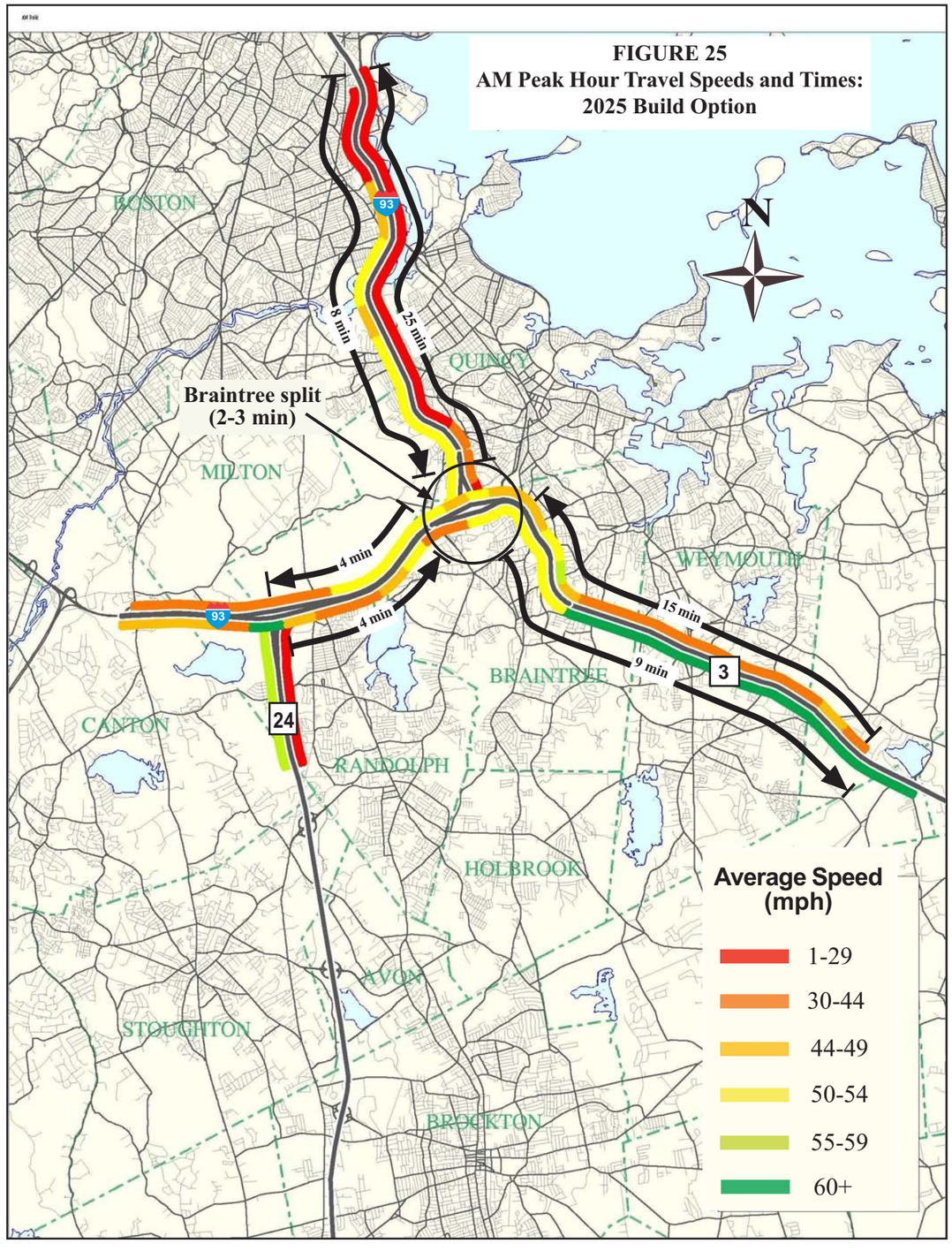


FIGURE 26
PM Peak Hour Travel Speeds and Times: 2025 Build Option

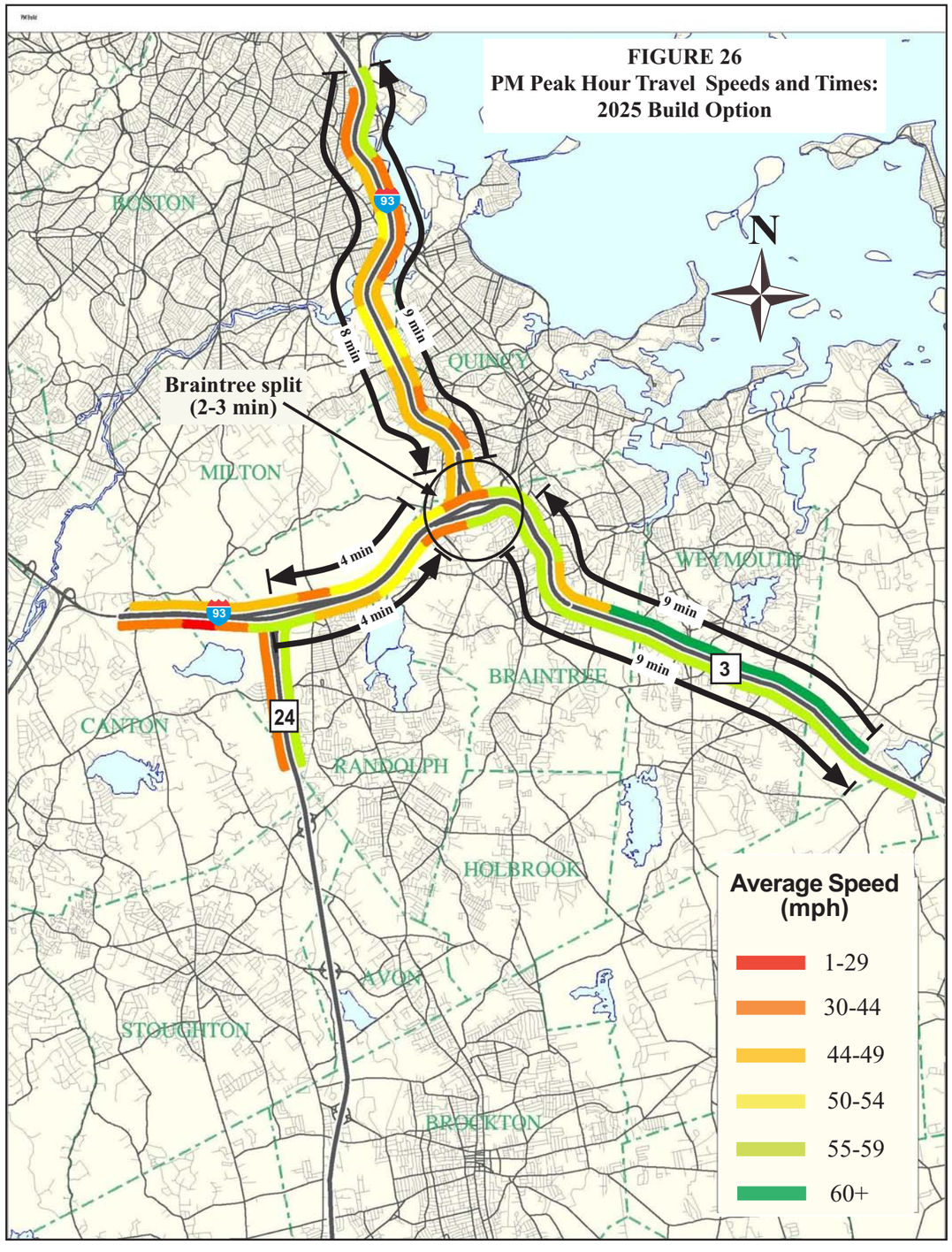
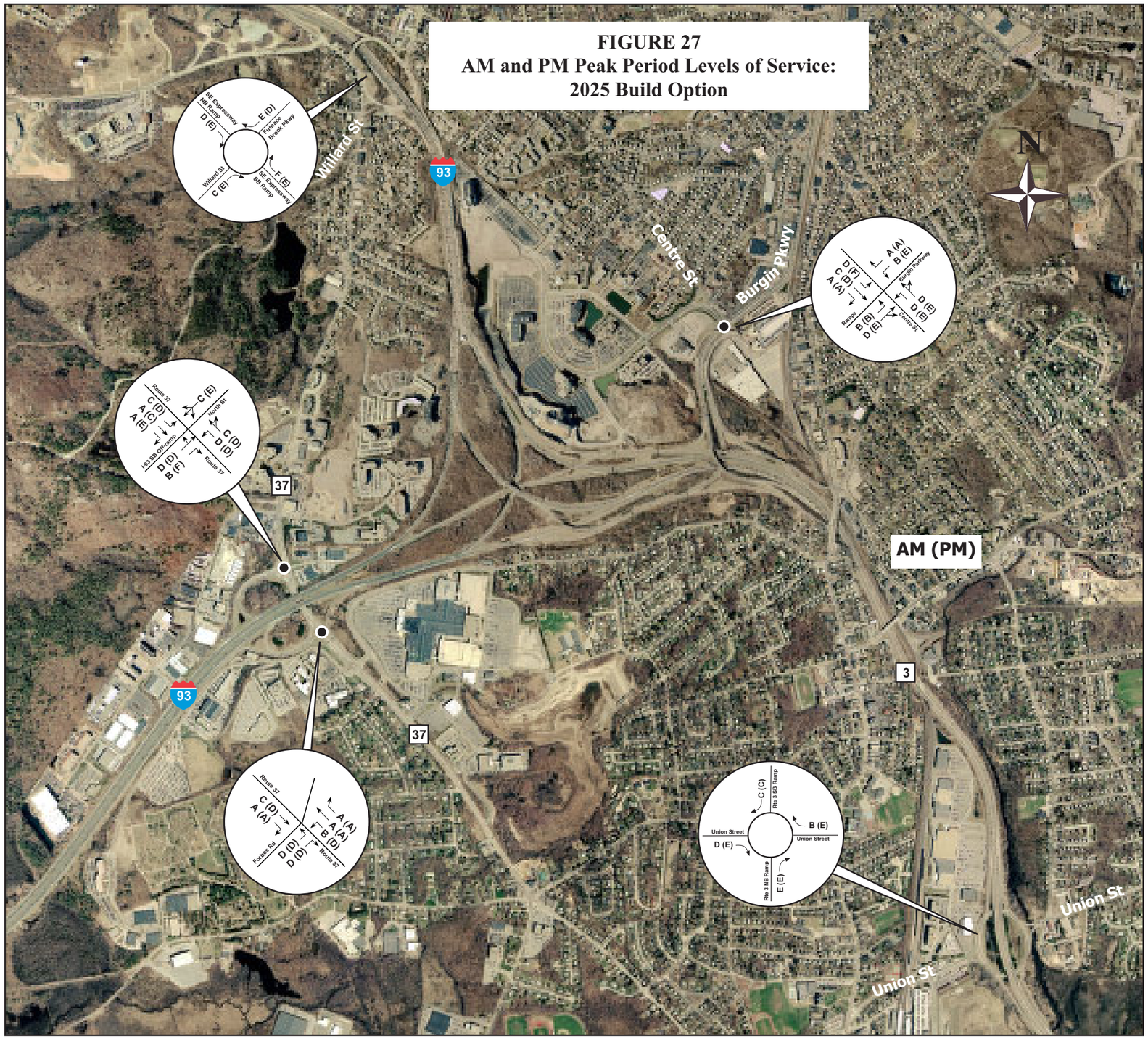


FIGURE 27
AM and PM Peak Period Levels of Service: 2025 Build Option



I-93, improving traffic operations at the junction. Thus Improvement #11 would support Improvement #2, allowing the junction to operate satisfactorily. As a result, there would be no ramp traffic queue spilling back onto the freeway.

Route 3/Union Street Interchange

This interchange would operate at LOS E or better during the AM and PM peak periods. The improvements suggested for this location (Improvement #9 and to a large extent, Improvement #7) would facilitate traffic flow within the rotary as well as on Route 3 South during the AM and PM peak periods. The analysis indicates that the northbound on-ramp traffic queue that spills back into the rotary, affecting its traffic operations as well as traffic operations on Route 3 South during the AM peak period, would be reduced significantly. Also, the southbound off-ramp traffic queue that spills back onto Route 3 South would be reduced significantly, as the proposed right-turn bypass or slip lane would increase the approach capacity of the southbound off-ramp to the rotary.

Burgin Parkway/Centre Street Intersection

The Burgin Parkway Viaduct project was part of the no-build option, and therefore there was no change in LOS at this intersection. However, the improvements suggested for Route 3 South (Improvements #7, #8, and #9) enhance the benefits of this project by allowing traffic from Burgin Parkway, the MBTA Quincy Adams Station, and Crown Colony Office Park to enter Route 3 South without interrupting its traffic flow and by reducing queues on the on-ramp.

At the Burgin Parkway/Center Street intersection, the AM and PM peak period levels of service for the intersection would be C and D, respectively. During the AM peak period, all of the major movements would operate at LOS D or better. Construction of the Burgin Parkway Viaduct would allow more green time to be allocated to the high volume of northbound left-turning traffic going to the Crown Colony Office Park, as well as motorists continuing onto Burgin Parkway. During the PM peak period, all of the major movements would operate at LOS E or better.

7.5 SUMMARY

In 2025, the increased traffic volumes would reduce travel speeds significantly below 2003 levels and would increase the extent and duration of congestion if the no-build option is implemented. In 2025, the proposed improvements (all together) comprised by the build option would increase travel speeds at the Braintree split and its connecting highways, as shown on the maps illustrating speed differences between the build and no-build options (Figures 28 and 29). The proposed improvements would reduce the impacts of bottlenecks in and around the split and would be expected to increase traffic safety in the study area, as summarized in Table 8.

7.5.1 AM Peak Period Benefits of the Build Option

The AM peak period benefits of the build option (which are detailed in Figure 28 and Table 8) may be broadly described as follows:

- The improvements in travel time and speed on northbound Route 3 South are due to the effects of Improvement #9, which reduces the impacts of bottlenecks on northbound Route 3 South from Union Street to the Burgin Parkway/Quincy Adams Station off-ramp.
- The improvements in travel time and speed on I-93 northbound are due to the combined effects of Improvements #7 and #11, which reduce the impacts of bottlenecks on I-93 northbound and its connector to southbound Route 3 South.
- The improvements in travel time and speed on the Expressway southbound are due to Improvement #5, which reduces the impacts of merging traffic from the Furnace Brook Parkway southbound on-ramp and diverging traffic heading to Route 3 South and I-93 southbound.

7.5.2 PM Peak Period Benefits of the Build Option

The PM peak period benefits of the build option (which are detailed in Figure 29 and Table 8) may be broadly described as follows:

- The improvements in travel time and speed on southbound Route 3 South are due to the combined effects of Improvements #7 and #9, which reduce the impacts of bottlenecks on Route 3 South, particularly at the merge points of the connector from I-93 northbound and of the on-ramp from Burgin Parkway/Quincy Adams Station/Crown Colony, and at the Union Street rotary interchange.
- The improvements in travel time and speed on I-93 southbound are due to the combined effects of Improvements #1 and #10, which reduce the impacts of bottlenecks on I-93 southbound, specifically the bottlenecks at the diverge area to Route 24 from I-93 and at the Route 37 interchange.
- The improvements in travel time and speed on the Expressway southbound are due to the combined effects of Improvements #1, #5, and #10. These improvements reduce the impacts of merging traffic from the Furnace Brook Parkway southbound on-ramp as well as diverging traffic to Route 3 South and I-93 southbound. They also reduce the impacts of bottlenecks at the diverge area to Route 24 from I-93 and at the Route 37 interchange, allowing traffic to flow efficiently onto southbound I-93 and southbound Route 3 South.

7.5.3 Transit Improvements

Both highway and transit solutions are needed to address 2025 traffic demand. The transit projects described in Chapter 6 (commuter rail to Greenbush, New Bedford/Fall River, and Wareham; Suburban Commuter Rail Feeder Bus Service; parking enhancements, etc.), if implemented, would attract new transit riders diverted from non-transit trip modes such as drive-alone. As a result, these transit projects have congestion reduction benefits, as well as improve regional transit system capacity, mode choice, and connectivity.

7.5.4 Next Steps

The proposed operational improvements described in this report are conceptual in nature. They address primarily the safety problems and traffic bottlenecks in the highway system. Although preliminary analysis indicates that the improvements have significant safety and operational benefits, they would have to undergo further review and analysis before final recommendations are made. Such review and analysis would include but not be limited to environmental and right-of-way issues, public support and participation, benefit and cost analysis, design, and prioritization of the improvements. In all cases, MassHighway would be the implementation agency.

Long-term solutions to address safety, congestion, and mobility, including transit solutions, parking solutions, and travel demand management, should also be examined.

In addition, the feasibility of another long-term solution should be examined: extending the HOV lane on the Southeast Expressway to Route 3 South and to I-93 toward Route 24. These extensions would remove the weave and merge of southbound HOV traffic heading to Route 3 South and to I-93 toward Route 24 that contribute to the congestion on the Expressway.

FIGURE 28
Travel Speed Change and Travel Time Savings:
Difference between 2025 No-Build and Build Options
AM Peak Hour

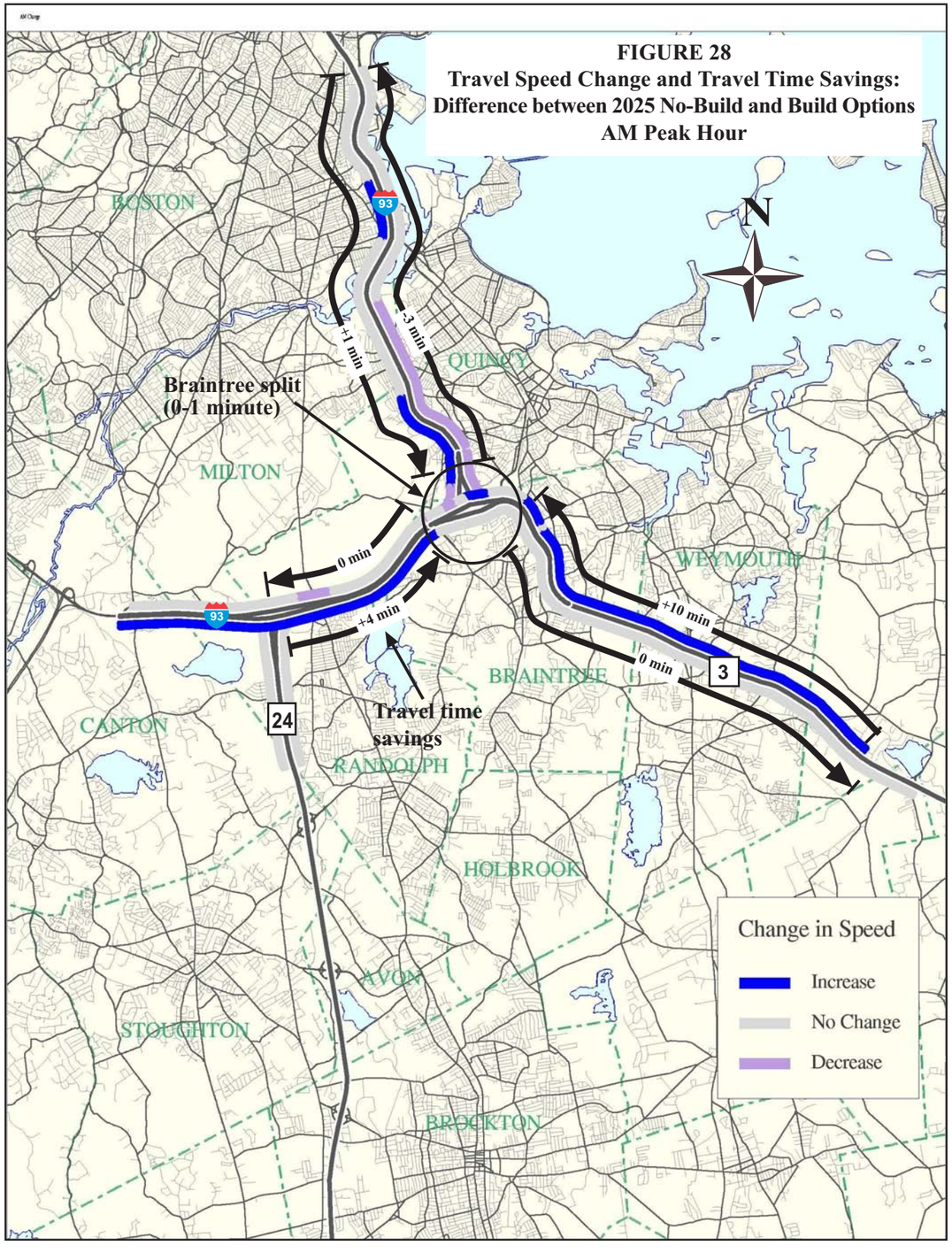


FIGURE 29
Travel Speed Change and Travel Time Savings:
Difference between 2025 No-Build and Build Options
PM Peak Hour

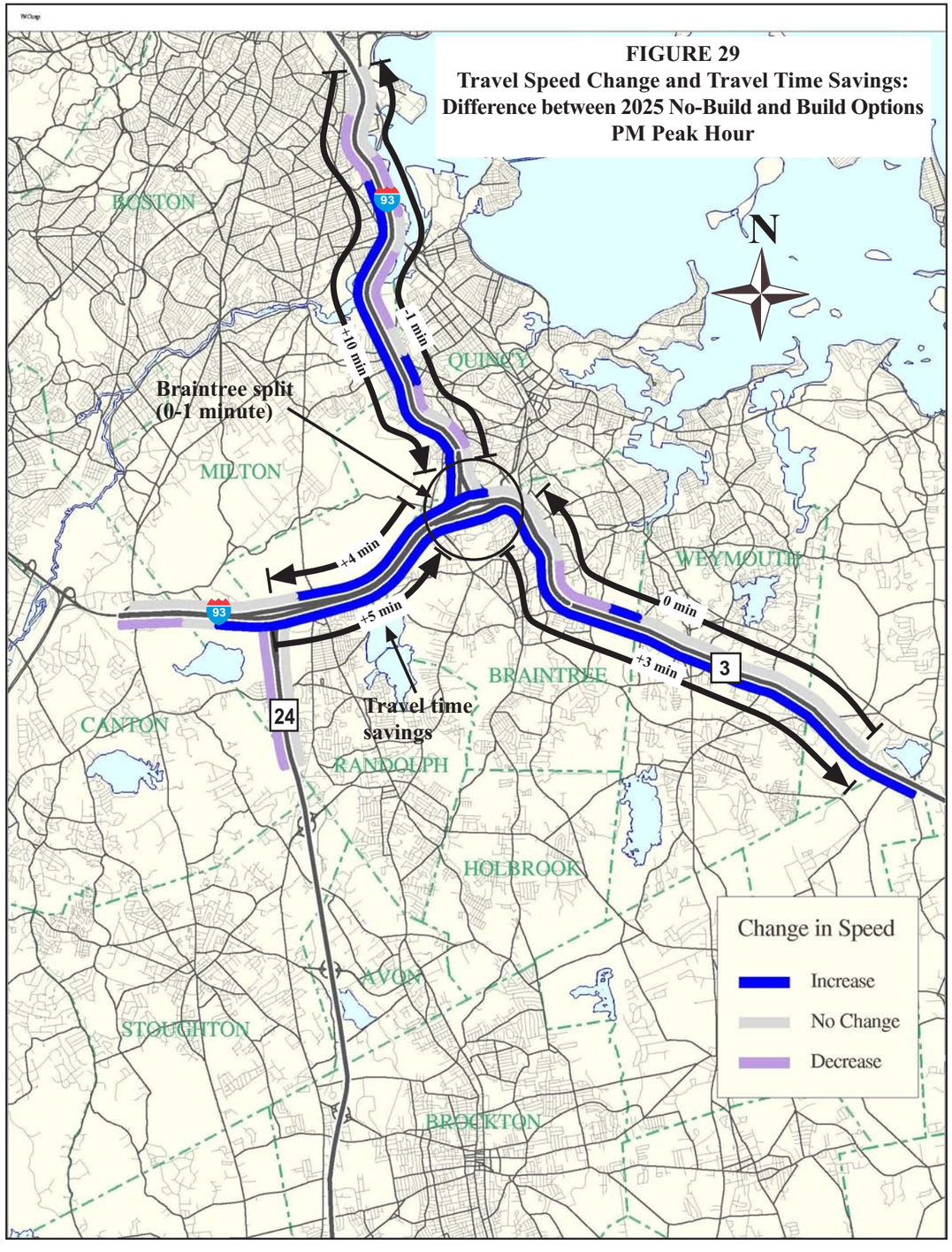


TABLE 8
Summary of Impacts: Build Option vs. Existing Conditions and No-Build Option [1]

Scenario	Traffic Safety	Average Travel Speed (mph)	Traffic Bottlenecks	Traffic Queues	Overview
2003 Existing Conditions	• Existing safety problems regarding short acceleration/deceleration lanes, merging and weaving, and short sight distance. • Seven high-crash locations.	Peak period travel speeds: AM peak direction • Braintree split: 40–45 mph. • Southeast Expressway: 20 mph. • Route 3 South from Route 18 to the split: 26 mph. • I-93 from the split to Route 24: 55 mph. PM peak direction • Braintree split: 30–35 mph. • Southeast Expressway: 45 mph. • Route 3 South from Route 18 to the split: 52 mph. • I-93 from the split to Route 24: 35 mph.	Peak period bottlenecks due to on-ramp traffic restrict traffic flow: AM peak direction • Southeast Expressway: Granite Avenue, Route 3A, HOV exit, and Columbia Road. • Route 3 South: Union Street, Route 18, and Derby Street. • I-93 (Route 128): Route 24, Route 37. • Burgin Parkway connector/Centre Street intersection. PM peak direction • Southeast Expressway: Furnace Brook Parkway, HOV exit. • Route 3 South: Burgin Parkway and Union Street. • I-93 (Route 128): Route 24, Route 37.	Peak period traffic queues: AM peak direction • Southeast Expressway: from Columbia Road in Boston up to East Milton Square. • Route 3 South: from the off-ramp to the MBTA station up to Exit 14, Route 228 in Hingham. • I-93 (Route 128): from Granite Street to the Braintree Split. • Burgin Parkway: from the connecting ramps to Centre Street. PM peak direction • Southeast Expressway from Braintree split to East Milton Square. • Route 3 South: from the Braintree split to Union Street, Exit 17 in Braintree. • I-93 (Route 128): from the Braintree split to Route 24. • Burgin Parkway ramp: from Centre Street to Route 3 South.	• Congestion. • No construction costs.
2025 No-Build[2]	• In 2025, increased traffic volumes would bring about worse safety problems than 2003 conditions if the no-build option is implemented. • The high-crash locations would not change, except for the Burgin Parkway/Centre Street intersection, which would be reconstructed as part of the Burgin Parkway Viaduct project.	In 2025, increased traffic volumes would reduce travel speeds to significantly below 2003 speeds and would increase the extent and duration of congestion if the no-build option is implemented. AM peak direction • Braintree split: 35–40 mph. • Southeast Expressway: 10–15 mph. • Route 3 South from Route 18 to the split: 25–30 mph. • I-93 from the split to Route 24: 20–25 mph. PM peak direction • Braintree split: 15–20 mph. • Southeast Expressway: 25–30 mph. • Route 3 South from Route 18 to the split: 45–50 mph. • I-93 from the split to Route 24: 25–30 mph.	In 2025, increased traffic demand would significantly increase the impact of bottlenecks from 2003 conditions at: AM peak direction • Southeast Expressway: Granite Avenue, Route 3A, HOV exit, and Columbia Road. • Route 3 South: Union Street, Route 18, and Derby Street. • I-93 (Route 128): Route 24, Route 37. PM peak direction • Southeast Expressway: Furnace Brook Parkway, HOV exit. • Route 3 South: Union Street. • I-93 (Route 128): Route 24, Route 37.	In 2025, increased traffic demand would significantly increase the extent and duration of the peak period traffic queues at the following locations, if the no-build option were implemented. AM peak direction • Route 3 South: from Exit 17, Union Street, to Exit 19, Burgin parkway/MBTA Quincy Adams Station. • I-93 (Route 128): from Route 24 to the Braintree split. PM peak direction • Southeast Expressway from Granite Avenue to Braintree split. • Route 3 South: from the Braintree split to Exit 17, Union Street. • I-93 (Route 128): from the Braintree split to Route 24).	• Congestion would be worse than 2003 conditions. • No construction costs.
2025 Build[3]	• In 2025, the proposed safety improvement package would be expected to improve safety through the upgrade of ramp acceleration/deceleration lanes, elimination of weaving areas, and provision of advanced queue detection and warning systems. • The safety improvement package would also be expected to improve traffic flow.	In 2025, the proposed improvements would increase travel speeds or maintain 2003 conditions at the Braintree split and its connecting highways. AM peak direction • Braintree split: 35–40 mph. • Southeast Expressway: 10–15 mph. • Route 3 South from Route 18 to the split: 40–45 mph. • I-93 from the split to Route 24: 40–45 mph. PM peak direction • Braintree split: 40–45 mph. • Southeast Expressway: 40–45 mph. • Route 3 South from Route 18 to the split: 50–55 mph. • I-93 from the split to Route 24: 45–50 mph. The improvements would not improve the AM peak direction travel speed on the Expressway.	The proposed improvements would significantly reduce the impacts of peak period bottlenecks. • On the Expressway, the improvements would significantly reduce the PM peak bottleneck at the split. • On Route 3 South, the improvements would significantly reduce the bottlenecks at the southbound on-ramp from the Crown Colony Office Park and Burgin Parkway, at the northbound off-ramp to the MBTA Quincy Adams station and Burgin Parkway, and at the Union Street interchange. • On I-93, the improvements would significantly reduce the bottleneck at the entrance to Route 24, as well as on I-93 itself. The improvements would not address AM bottlenecks on the Southeast Expressway,	The proposed improvements would significantly reduce the extent and duration of peak period traffic queues at the following locations. AM peak direction • Southeast Expressway: from Columbia Road in Boston up to Braintree split. PM peak direction • I-93 (Route 128): between Route 24 and Route 28. The proposed improvements would not reduce the extent or duration of AM peak period traffic queues on the Southeast Expressway.	• Proposed improvements are expected to reduce congestion, as shown in Figures 28 and 29. They would reduce the bottlenecks in the study area. • Construction costs.

[1] The measures of effectiveness are based on average conditions.
[2] Projects included in the 2025 no-build option: Route 3 South Transportation Improvement Project, Route 18 Additional Lanes, Burgin Parkway Viaduct, and Greenbush Commuter Rail.
[3] Projects included in the 2025 build option: improvements near I-93/Granite Street (Route 37) interchange, the additional improvements recommended, and the no-build projects.