City of Kingston
Route 32 at Fair Street Intersection Study

FINAL PLANNING STUDY

Prepared for:

Ulster County
Transportation Council

Prepared by:

CREIGHTON MANNING ENGINEERING, LLP

April 4, 2006

CME
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April 4, 2006

Mr. Dennis Doyle
Ulster County Transportation Council
244 Fair Street
Kingston, NY 12402-0080

RE: Final Planning Study - Route 32 at Fair Street Intersection Study
City of Kingston, Ulster County, New York
CME Project No. 05-119d

Dear Mr. Doyle:

We are pleased to transmit this Final Planning Study for the Route 32/Fair Street intersection in the City of Kingston. The project included extensive public involvement and represents a collaborative effort among stakeholders and agencies to understand the need, feasibility and level of support for various short and long term alternatives.

This project resulted in a number of immediate benefits including installation of all-way stop control and a commitment from the City to implement additional short-term improvements during the 2006 construction season. Several feasible long term alternatives were also explored and the study recommends advancing a capital improvement to insure the long term operational sufficiency of the intersection.

The Community generally supports the maintenance of the 5-way intersection with pedestrian and channelization improvements. The roundabout and 4-way intersection alternatives were not well supported, although the roundabout alternative is preferred from a traffic engineering standpoint. One of the key improvements with broad support is the correction of the existing Fair Street/Wall Street directional flow patterns.

Thank you for involving us in this worthwhile project and please contact us if you have any questions.

Respectfully submitted
Creighton Manning Engineering

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List of Advisory Committee Members

Dennis Doyle ..... Ulster County Transportation Council
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1.0 Introduction and Project Objective

Area residents, agencies, and City officials have expressed concerns about the NY Route 32 / Fair Street intersection. These concerns included the odd geometry of the intersection, driver confusion, the wide expanse of pavement, and perceived safety issues. As a result of these concerns, the City approached the Ulster County Transportation Council (UCTC) to fund a planning study at the NY Route 32 / Fair Street intersection to document existing conditions and to develop potential re-design alternatives to mitigate any existing problems. This report summarizes the existing conditions at the NY Route 32 / Fair Street intersection and presents potential alternatives to mitigate existing problems at the intersection. The goals for this project are as follows:

- Identify existing conditions, issues, deficiencies, constraints, and needs
- Study a range of alternatives
- Involve the community
- Identify a preferred alternative
- Define an implementation strategy

2.0 Project Location

The focus of this study is the intersection of NY Route 32 and Fair Street in the City of Kingston. The secondary study area includes a one-block radius around the intersection that includes land uses important to decisions concerning the intersection. The following diagrams show the regional and local location of this study area within the City of Kingston.

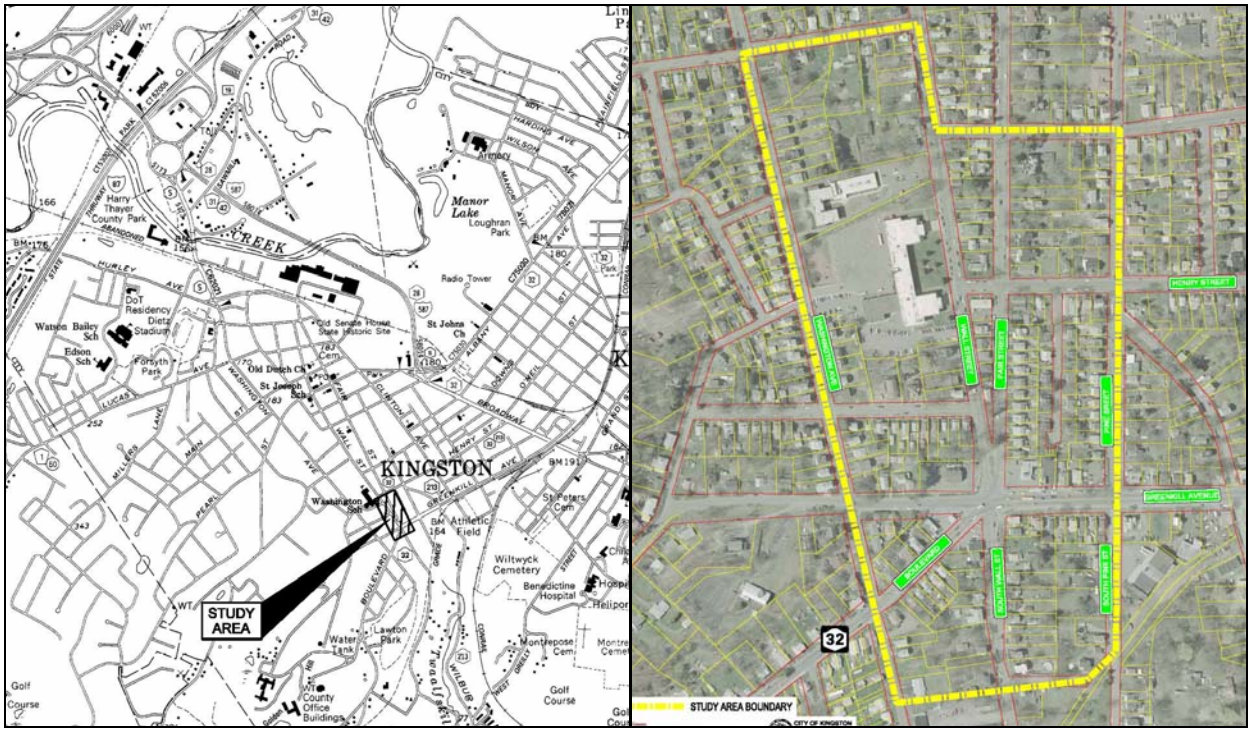

Figure 1 – Project Study Area

3.0 Public Meetings

The overall approach to the study was a collaborative process involving stakeholders at many levels. Public input was sought through three public meetings, a separate landowner meeting, and a meeting with representatives of George Washington Elementary School. The input received at these meetings is presented throughout the report with the first public meeting summarized below.

The first public meeting was held on September 28, 2005 at the George Washington Elementary School to introduce the planning study to local residents and business owners. The meeting was well attended with representation from City employees, government, and emergency response as well as local residents and business owners. The primary focuses of the meeting were to introduce the project to the community and to receive input concerning study area likes, dislikes, opportunities, and concerns. This was done through a presentation and then smaller break-out group discussions.

Conversation in the break-out groups was valuable and insightful, with some common themes from each of the groups. Everyone agreed that the intersection is very confusing for people who aren't from the area. Pedestrian safety, especially for children walking to and from the George Washington Elementary School, was a major point of concern. Overgrown landscaping on the Fair Street / Wall Street median and its impact on sight distance was considered a contributing factor to pedestrian and vehicle safety concerns. Unsafe travel speeds on Fair Street were also mentioned in all of the break-out groups.

Intersection recommendations from the break-out groups included installing a Stop sign on Fair Street, closing one of the streets to create a four-way intersection, installing a traffic signal, and changing the directional flow of Fair Street and Wall Street, among others. Less intrusive improvements, like pavement markings and additional signing and channelization for improved driver guidance, were generally favored. Construction of a roundabout was not a popular idea.

4.0 Existing Conditions

4.1 Land Use

NY Route 32 serves as the southern gateway to the City from the growing areas of Rosendale and New Paltz. The land use at the study intersection is retail/commercial. The specific land uses include a bakery, liquor store, convenience store with gas pumps, a restaurant, and an auto shop. Immediately adjacent to these retail/commercial uses the

land use becomes residential. George Washington Elementary School is located approximately two blocks north of the intersection on Wall Street. In addition to the retail and residential land uses located within the primary and secondary study areas, the Ulster County Jail is located south of the study intersection along Boulevard.

4.2 Roadway Geometry, Traffic Control and Access

The study intersection has five (5) approaches and encompasses a large expanse of pavement. Greenkill Avenue east of the intersection is approximately 68 feet wide. Two-way travel is provided on the Greenkill Street eastbound and westbound approaches, the Boulevard northeast approach, and the South Wall Street northwest approach to the intersection. The Fair Street/Wall Street one-way pairing is separated by a raised median and has a counter-intuitive flow pattern which defies the traditional directional patterns and is a major cause of confusion at the interrsection. Vehicles approach the intersection southbound on Fair Street on the left side of the median, rather than on the right side of the median on Wall Street as expected. The layout of the study intersection is shown on Figure 2.

Figure 2 – Study Intersection Approach Geometry

The atypical number of intersection approaches contributes to the complexity of the intersection and creates a large number of conflict points. A conflict point is any location where two vehicle paths cross merge or diverge. A typical, four-way intersection has 24

conflict points. The study intersection has 65 conflict points, lending to complexity, confusion, and the potential for increased crashes.

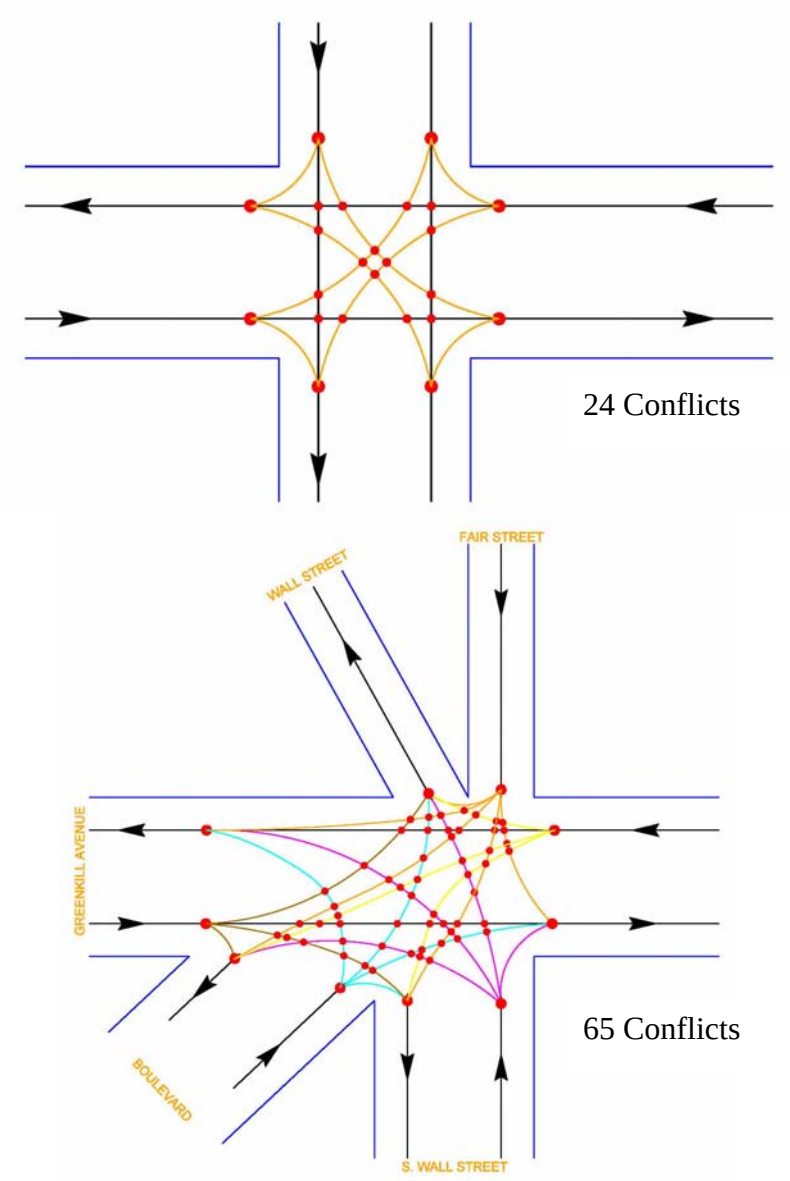

Figure 3 – Conflict Points

When this project was initiated, four of the five approaches to the intersection were controlled by Stop sign with the southbound Fair Street approach uncontrolled. This condition contributed to the speed, safety, and confusion issues raised at the public meeting. Stop signs were recently installed by the City on the southbound Fair Street approach so the intersection currently functions as an all-way Stop controlled intersection. Full access is provided to the adjacent retail land uses resulting in a large number of driveways in close proximity to the study intersection. The lack of controlled

access at the adjacent land uses, especially the Stewart's Shop parcel, contributes to the overall confusion and complexity of the intersection.

4.3 Crash Experience

Based on a review of crash data provided by the Ulster County Traffic Safety Board for the three-year period extending from 2003 to 2005, there were a total of 21 crashes at the NY Route 32 / Fair Street intersection. This represents a crash rate of approximately 1.57 accidents per million entering vehicles (MEV), which is well above the statewide average of 0.22 accidents per MEV.

4.4 Traffic Volumes

Automatic traffic recorder counts were conducted by Ulster County during August of 2005. The hourly variations data from these counts confirms that the evening peak hour is the generally the critical peak for the intersection and the intersection approaches. The exception to this is Boulevard, represented by the blue line in Figure 4. Boulevard peaks slightly earlier than the Greenkill Avenue and Fair Street approaches to the study intersection. Although individual approaches peak at different time periods, the overall intersection peaks from 4:00 to 5:00 PM.

Intersection turning movement counts were conducted at the study intersection on August 17, 2005 from 4:00 PM to 6:00 PM and on August 19, 2005 from 7:00 AM to 9:00 AM to document existing traffic volumes. The data shows that the morning peak hour occurred from 8:00 AM to 9:00 AM with approximately 830 vehicles entering the intersection, of which five percent was heavy vehicles. The evening peak hour occurred from 4:00 PM to 5:00 PM with approximately 1,100 vehicles entering the intersection, of which less than two percent was heavy vehicles. This data shows that the evening peak hour represents the critical design hour for this project.

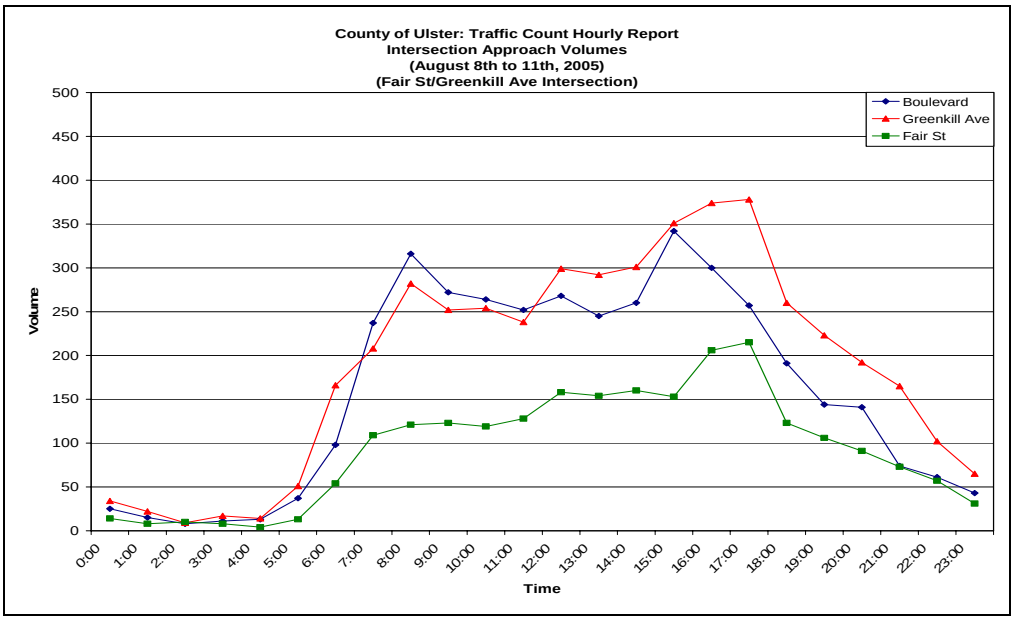

Figure 4 – Hourly Traffic Volumes

4.5 Existing Level of Service

Level of service (LOS) analysis was conducted for the study intersection using SYNCHRO and SimTraffic software. The results of this analysis show that the study intersection currently operates at LOS E with approximately 40 seconds of per vehicle delay during the PM peak hour. Level of service E generally reflects borderline operational conditions requiring consideration of intersection improvements.

5.0 Existing Issues

Investigation of the existing conditions at the intersection and input provided from local residents and business owners at Public Meeting No.1 held on September 28, 2005 resulted in the following list of existing issues:

- Complex intersection with five approach legs results in almost three times as many conflict points as a typical four-way intersection.
- Accident rate at this intersection is 1.57 accidents per million entering vehicles (MEV). This is much higher than the statewide average of 0.22 accidents per MEV.
- Very large intersection with extensive pavement.
- Pedestrian crossing accommodations are insufficient.
- The counter-intuitive flow pattern of the Fair Street / Wall Street pairing is extremely confusing, especially for drivers unfamiliar with the intersection.

6.0 Project Objectives

Based upon the concerns raised at Public Meeting No. 1 on September 28, 2005 and the results of the existing conditions data collection and analysis, several project objectives were identified. These objectives are listed below:

- Reduce intersection confusion (correct the Fair Street/Wall Street one-way flow patterns)
- Improve pedestrian conditions
- Provide adequate capacity for future growth
- Minimize pavement / channelize
- Improve safety (reduce conflict points)
- Improve driver guidance

7.0 Improvement Alternatives

Initial improvement ideas included numerous combination of geometric and traffic control options. Concept plans were developed for many of these initial alternatives. Some of these alternatives were eliminated in the early stages of this project in discussion with the Advisory Committee because they did not meet all of the project objectives. A short-term alternative and the three remaining long-term alternatives are detailed below.

7.1 Short-term Alternative – Improve Existing

The short-term alternative, shown on Figure 5, will improve the existing intersection by providing additional signing to improve driver guidance and re-enforce existing travel patterns and installing / constructing pedestrian enhancements, but will maintain the existing geometry. This alternative is not included as a long-term alternative because it does not correct the Fair Street / Wall Street one-way flow pattern and the long-term capacity sufficiency is in doubt.

Another component of the short-term alternative involves re-designating NY Route 32 at the study intersection from Fair Street and Wall Street to Greenkill Avenue. This topic has been opened for discussion with New York State Department of Transportation (NYSDOT). Conversations should continue with NYSDOT to re-designate NY Route 32 at the study intersection.

7.2 Long-term Alternatives

All of the build alternatives include features that can be interchanged between the three long-term alternatives. These features include the manner in which the Fair Street / Wall Street one-way pairing is corrected and construction of a raised median on the eastbound Greenkill Avenue approach.

7.2.1 Five-way Intersection

This alternative includes closing Fair Street immediately adjacent to the intersection and opening Wall Street to two-way traffic. The existing one-way travel pattern on Wall Street will be maintained from Elizabeth Street north. Improvements also include providing sidewalks and crosswalks on all intersection approaches, intersection channelization curb bump-outs and reduction of pavement width. Full access to the adjacent land uses would be maintained. The Five-way Intersection Alternative can be seen on Figure 6.

7.2.2 Single-lane Roundabout

This alternative includes constructing a single-lane roundabout. As shown on Figure 7, the Fair Street / Wall Street flow is corrected by closing Wall Street adjacent to the intersection and opening Fair Street to two-way traffic. Improvements also include sidewalks and crosswalks on all intersection approaches. Access to adjacent land uses would be limited to right-in right-out only driveways on the intersection approaches and full access on the intersection exits. This condition is to prevent a motorist from stopping to make a left-turn immediately after exiting the roundabout. A noticeable impact from this alternative is the loss of direct access to Boulevard Liquors, thereby requiring convenient on-street parking in its place.

7.2.3 Four-way Intersection

This intersection improvement involves retro-fitting a more typical four-way intersection within the five-way intersection footprint. As Figure 8 shows, this involves providing one-way travel toward the intersection from Boulevard and providing one-way travel

away from the intersection on Greenkill Avenue west of the intersection. One way travel could be provided only between the Stewart's driveways and the study intersection or could be maintained from Washington Avenue to the study intersection. Improvements also include sidewalks and crosswalks on all intersection approaches. Under this alternative existing full access to adjacent parcels is envisioned. The possibility of a raised median on Greenkill Avenue is also shown on this alternative.

7.2.4 Switch Fair/Wall Streets Flow Five-Way Intersection

This alternative was developed during the 3rd public meeting held on March 21, 2006. It includes switching the Fair Street/Wall Street flow between the study intersection to either Henry Street or for the entire length of the streets to North Front Street. Improvements also include providing sidewalks and crosswalks on all intersection approaches, intersection channelization, curb bump-outs and reduction of pavement width. Full access to the adjacent land uses would be maintained. The alternative from the 3rd public meeting can be seen on Figure 9.

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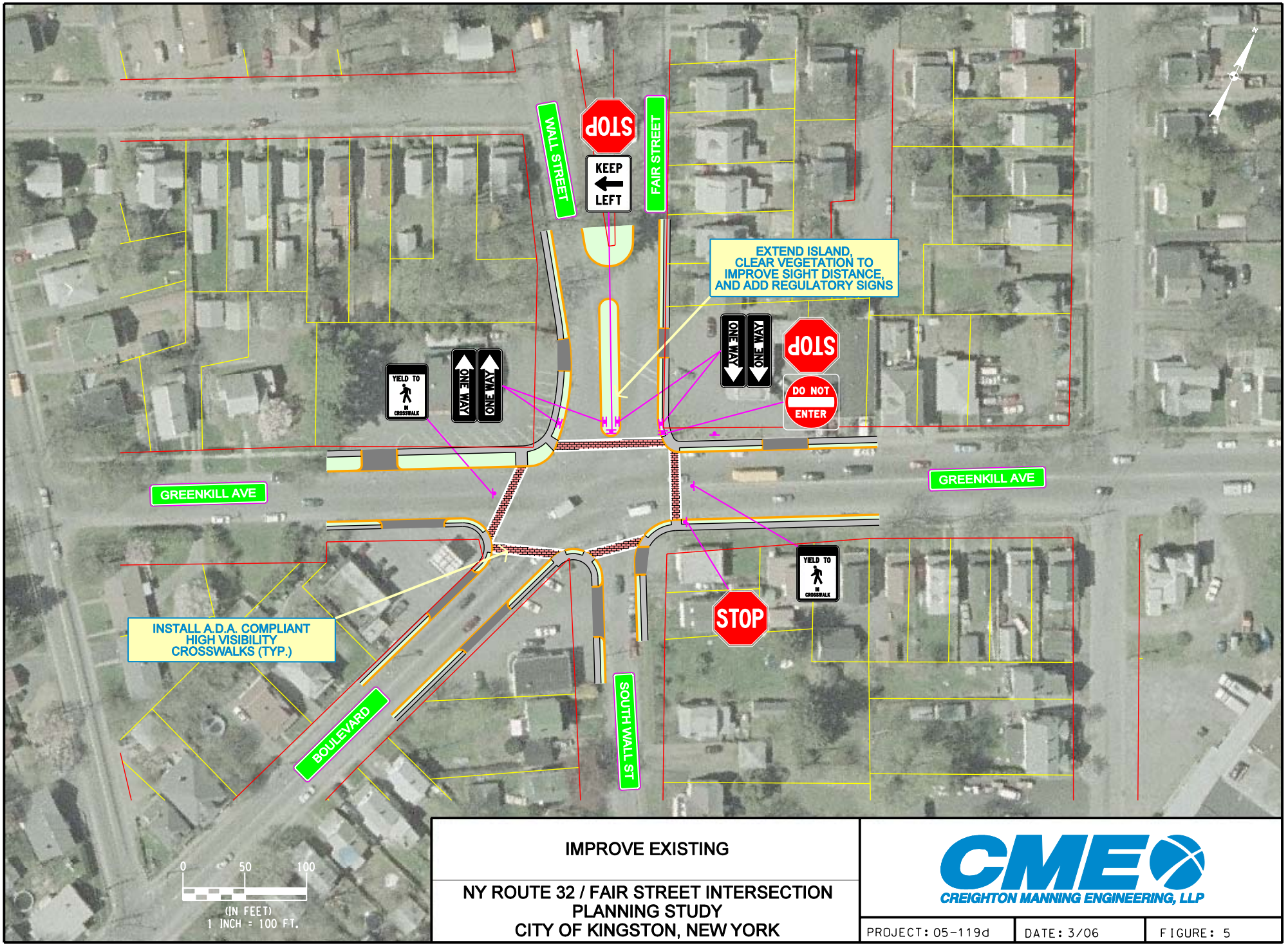

IMPROVE EXISTING

NY ROUTE 32 / FAIR STREET INTERSECTION PLANNING STUDY
CITY OF KINGSTON, NEW YORK

CREIGHTON MANNING ENGINEERING, LLP

PROJECT: 05-119d	DATE: 3/06	FIGURE: 5

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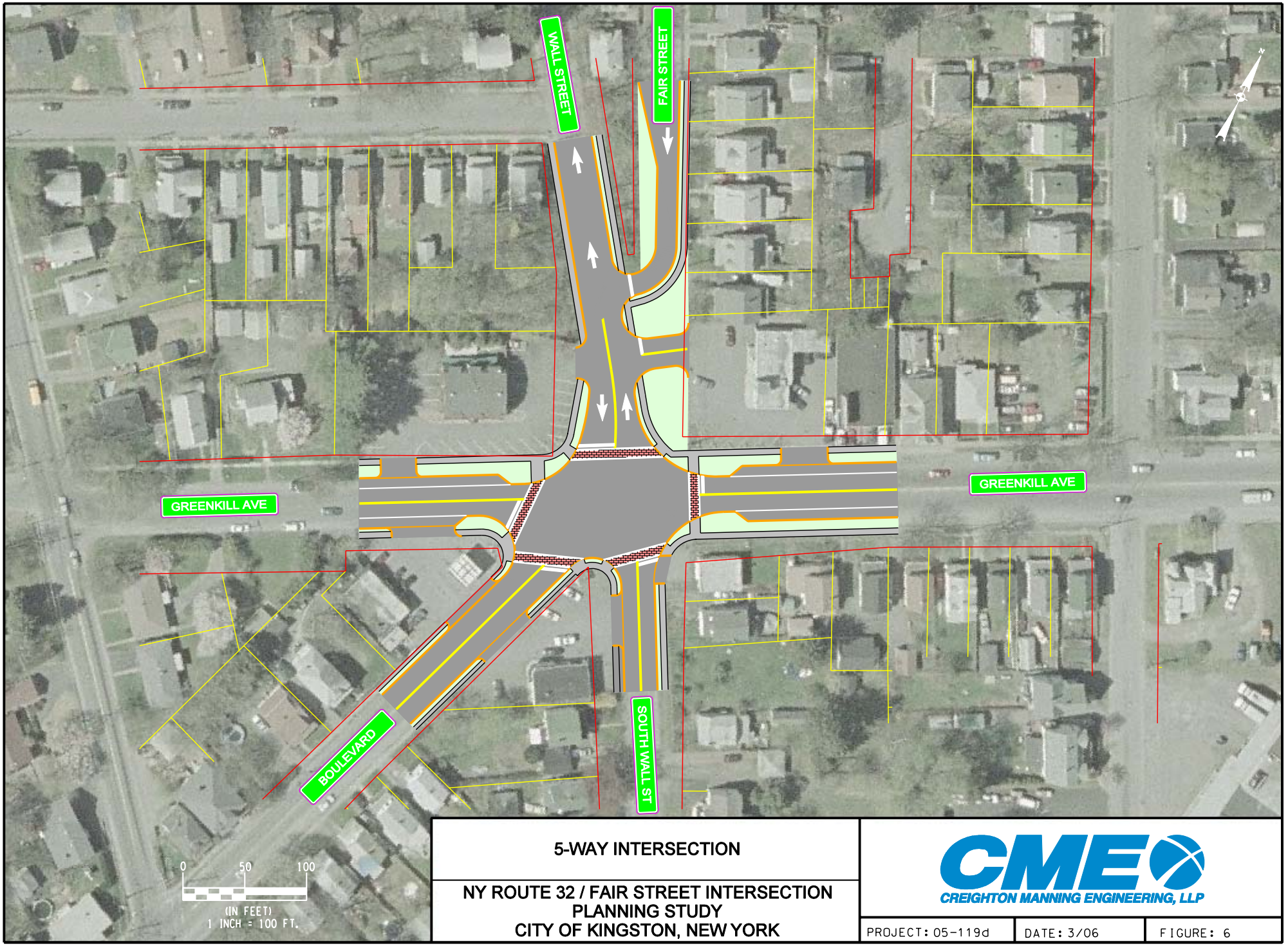

5-WAY INTERSECTION

NY ROUTE 32 / FAIR STREET INTERSECTION
PLANNING STUDY
CITY OF KINGSTON, NEW YORK

CREIGHTON MANNING ENGINEERING, LLP

PROJECT: 05-119d | DATE: 3/06 | FIGURE: 6

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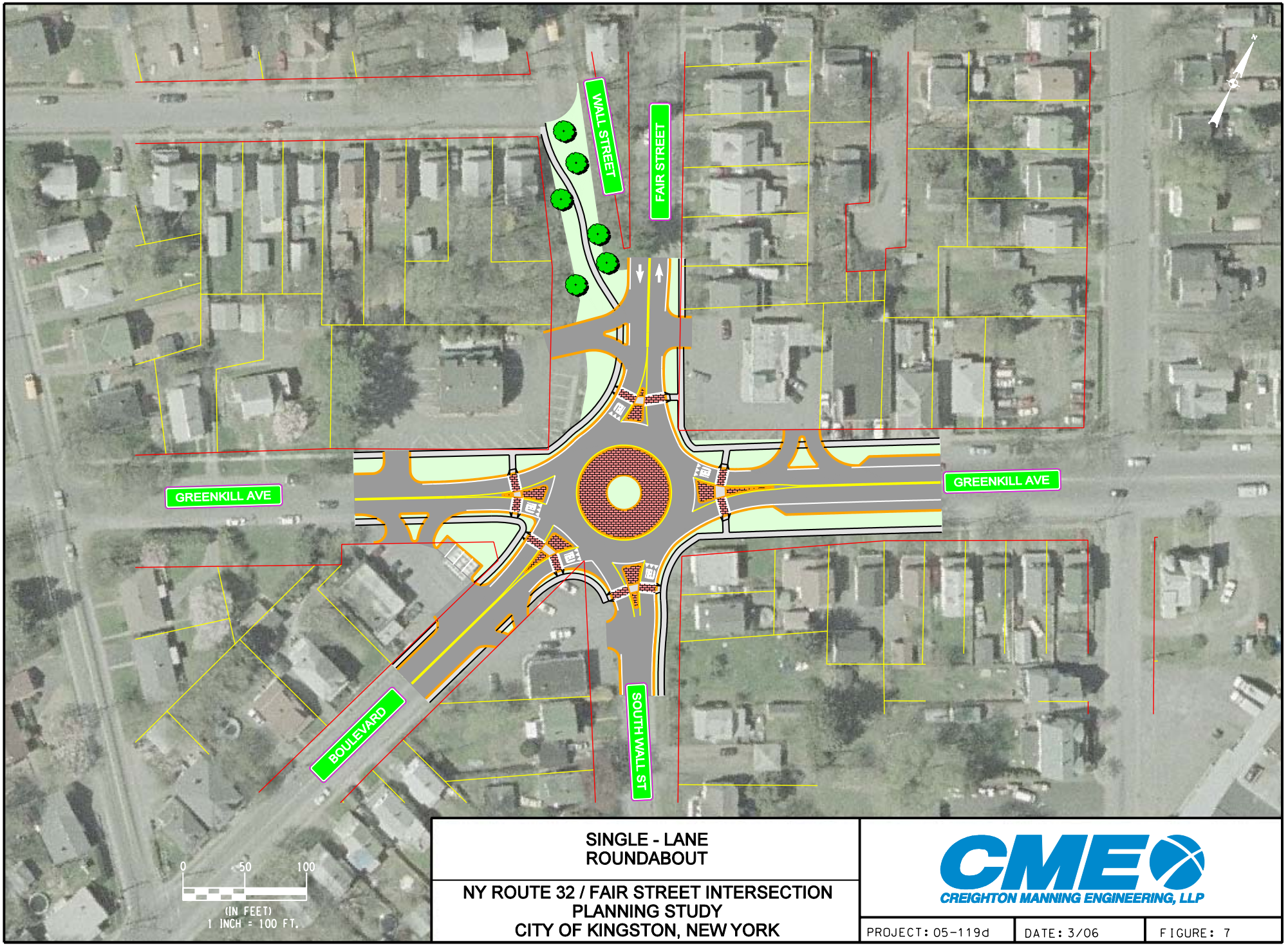

SINGLE - LANE ROUNDABOUT

NY ROUTE 32 / FAIR STREET INTERSECTION PLANNING STUDY
CITY OF KINGSTON, NEW YORK

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PROJECT: 05-119d	DATE: 3/06	FIGURE: 7

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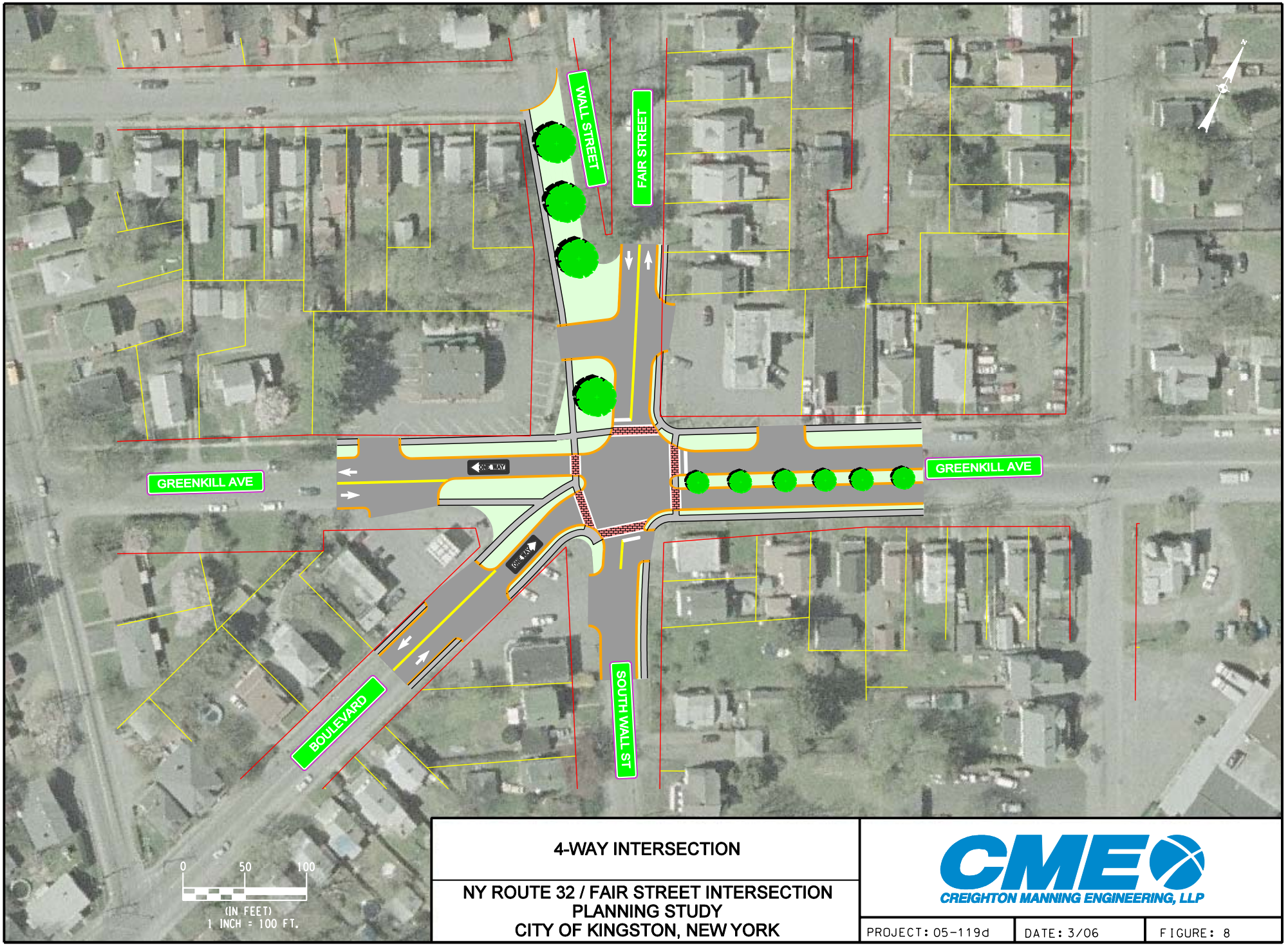

4-WAY INTERSECTION

NY ROUTE 32 / FAIR STREET INTERSECTION PLANNING STUDY
CITY OF KINGSTON, NEW YORK

CREIGHTON MANNING ENGINEERING, LLP

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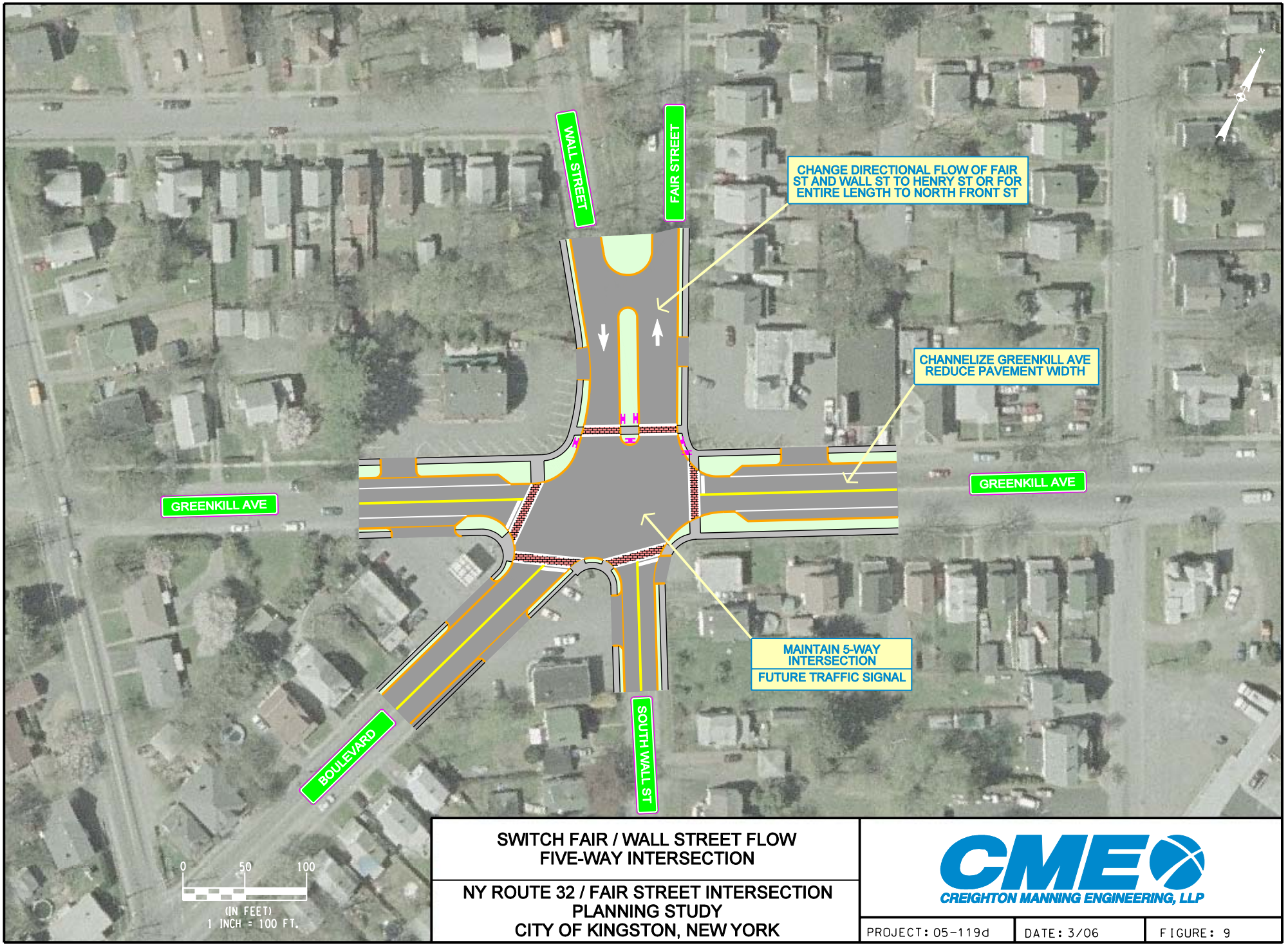

SWITCH FAIR / WALL STREET FLOW FIVE-WAY INTERSECTION

NY ROUTE 32 / FAIR STREET INTERSECTION PLANNING STUDY CITY OF KINGSTON, NEW YORK

CREIGHTON MANNING ENGINEERING, LLP

PROJECT: 05-119d	DATE: 3/06	FIGURE: 9

8.0 Evaluation of Alternatives

As discussed, the future improvements for this corridor should:

- Reduce intersection confusion (correct the Fair Street/Wall Street one-way flow patterns)
- Improve pedestrian conditions
- Provide adequate capacity for future growth
- Minimize pavement / channelize
- Improve safety (reduce conflict points)
- Improve driver guidance

In addition, an improvement at the study intersection could provide the opportunity to create a gateway feature.

Table 1 compares the intersection improvement alternatives based upon the outlined objectives. Alternatives evaluation is provided in greater detail below in section 8.1

Table 1 – Comparison of Intersection Improvement Alternatives

Alternative	Provide Adequate Capacity (LOS/Delay)	Correct Fair/Wall Flow	Improve Pedestrian Conditions	Minimize Pavement / Channelize	Improve Safety	Improve Driver Guidance	Access	Public Comments
Improve Existing (All-Way Stop)	F (66)	-	+	-	-	+	0	+
Improve Existing (Signal)	D* (40)	-	+	-	-	+	0	+
Five-way Intersection	C (30)	+	+	+	-	+	0	0
Single-lane Roundabout	A (5)	+	+	+	+	+	-	-
Four-way Intersection	B (12)	+	+	+	+	+	0	-
Switch Fair/Wall Sts Flow Five-way Intersection (Signal)	C (30)	+	+	+	-	+	0	+

* = The intersection operates at overall LOS D with several approaches operating at LOS E or LOS F.
+ = Positive impact on objectives
0 = No change
- = Does not address objective or has a negative impact on criteria

8.1 Alternative Objectives

8.1.1 Reduce Intersection Confusion

Each of the long-term alternatives will reduce the overall intersection confusion by correcting the counter-intuitive Fair Street / Wall Street one-way flows. This can be accomplished only at the intersection level as shown on the Five-way Intersection layout on Figure 6, or through a more extensive flow change as shown in the Single-lane Roundabout, Four-way Intersection, and Switch Fair/Wall Streets Flow layouts on Figures 7 through 9. The Four-way Intersection alternative further reduces the confusion

at the intersection by eliminating an access and egress point, thereby reducing the number of options available to drivers.

8.1.2 Improve Pedestrian Conditions

Pedestrian conditions are improved in all four long-term alternatives by installing sidewalks and crosswalks and channelizing the intersection and therefore reducing pedestrian crossing distances. With signalized traffic control, pedestrian conditions are further improved by installing pedestrian push buttons and indicators to control vehicular movement when pedestrians are crossing the street. Pedestrian conditions are further improved with a single-lane roundabout by reducing the amount of pavement that a pedestrian has to cross between refuge points, reducing the travel speed of the vehicular traffic, and because a roundabout only requires the pedestrian to contend with one direction of traffic flow.

8.1.3 Capacity and Level of Service

Traffic volumes at the study intersection were increased by 1.50 percent for ten years to develop the 2015 traffic volumes. Level of service analysis was conducted at the study intersection for the intersection alternatives with the 2015 traffic volumes. The following table summarizes the results of the level of service analysis.

Table 2 – 2015 Horizon Year Level of Service Summary

Improvement Alternative	Level of Service	Overall Average Delay
Improve Existing All-Way Stop	F	66 seconds
Improve Existing Signalized	D*	40 seconds
Five-way Signalized	C	30 seconds
Single-lane Roundabout	A	5 seconds
Four-way Signalized	B	12 seconds
Switch Fair/Wall St Flow Five-way Signalized	C	30 seconds

* Several intersection movements operate at LOS E or F though overall the intersection operates at LOS D.

This Table shows that from a level of service standpoint, the short-term alternative of improving existing conditions and maintaining the existing geometry and traffic control results in the intersection operating at overall LOS F conditions. By maintaining the existing geometry and providing traffic signal control, the intersection operates at overall LOS D conditions with several intersection movements operating at LOS E and F conditions. The Table also shows that all of the long-term alternatives can accommodate the future traffic volumes with generally good levels of service, although there are differences in the level of service provided by each alternative. The signalized and unsignalized intersections were analyzed using SimTraffic simulation software. The roundabout was analyzed using the New York State-approved methodology (RODEL software), and simulated using Vissim.

8.1.4 Minimize Pavement

All of the long-term alternatives reduce the overall pavement at the intersection by channelizing intersection approaches.

8.1.5 Improve Safety

All of the long-term alternatives for the intersection have the potential to improve overall safety by reducing confusion and by improving pedestrian conditions. However, additional safety benefits will be seen with reduction in the number of conflict points at the intersection. The Four-way Intersection alternative reduces the number of conflict points from 65 to 24. The Single-lane Roundabout alternative further reduces the number of conflict points to 10. The Five-way Intersection and Switch Fair/Wall Streets Flow Five-way Intersection alternatives do not reduce the number of conflict points at the intersection.

8.1.6 Improve Driver Guidance

All of the potential alternatives will improve driver guidance. The short-term alternative will improve guidance with the installation of additional signing and some intersection channelization. The long-term alternatives will improve driver guidance by removing a problem – namely the counter-intuitive Fair Street / Wall Street one-way flows.

8.2 Access

Current access to the existing land uses will be maintained with the Five-way, Four-way, and Switch Fair/Wall Street Intersection alternatives. Access to the existing land uses will be limited to right-in right-out only on intersection approaches under the Single-lane Roundabout alternative. However, the design of the roundabout ensures that a vehicle approaching the intersection can access any parcel from any approach. Access to Boulevard Liquors would be adversely affected by the roundabout alternative because the current access from South Wall Street would need to be closed, and the site would need to be served by on-street parking.

The location of the Stewart's Shop gas pumps can cause problems on the adjacent Greenkill Avenue and Boulevard. Stewart's headquarters is currently exploring the option of removing the gas pumps on this parcel. This study supports removal of the gas pumps because it would improve conditions along the adjacent roadways.

8.3 Public Comments

Comments received from the public during the February 21, 2006 Public Meeting indicate that the public preference is to implement the short-term improvements. Support for longer term, more comprehensive reconstruction alternatives was mixed. The Switch Fair/Wall Streets Flow Five-way Intersection alternative was developed at the third public meeting held on March, 21, 2006. This long-term alternative received the greatest support from the public. Specific comments on the long-term alternatives included the following:

- Representatives of George Washington Elementary School are opposed to a broad change of the Fair Street / Wall Street flow pattern as it would disrupt their drop-off and pick-up.
- Representatives of Boulevard Liquors were opposed to the Single-lane Roundabout because it limits access their land.
- A representative from Stewart's Shops was in favor of the Single-lane Roundabout because he believed that it would improve flow into and out of the intersection. One written comment was received after the March 21, 2006 public meeting also in support of the roundabout alternative.
- Comments from the public meetings held on February 21, 2006 and March 21, 2006 indicated opposition to opening Fair Street to two-way traffic and supported a more universal change to the Fair Street/Wall Street flow.

9.0 Conclusion / Implementation

The short-term alternative can provide immediate benefits to the existing intersection and the City has already begun to implement these improvements with the all-way stop control which was installed shortly after the first public meeting. The City has also committed to provide additional pavement striping during the 2006 construction season. The striping will include extending the island between Fair Street and Wall Street to improve sight distance at this location. It is recommended that the City pursue the additional traffic control and driver guidance components contained in the short-term plan. The City should also consider further pedestrian improvements, specifically completion of the short sidewalk link to Elizabeth Street along Wall Street, as these would provide additional benefit at the intersection. Removal of the gas pumps on the Stewart's Shop parcel would also improve conditions at the intersection.

The existing conditions and issues at the study intersection indicate the need for a capital improvement project at this location. Therefore, implementation of a long-term intersection improvement is also recommended, although public support for such a project is mixed. However, with the increase in traffic volumes anticipated at the study intersection, the existing geometry and traffic control at the intersection will be inadequate. Installation of a traffic signal with the existing geometry will have a limited life-span and would also result unacceptable operations at the study intersection by the 2015 horizon year.

The long-term alternatives discussed in this report will all address the project objectives. Although the roundabout is preferred from a traffic engineering standpoint, support for this alternative from the public and local officials appears to be limited. The Switch Fair/Wall Streets Flow Five-way Intersection alternative received support from the public as a long-term alternative. However, it should be noted that representatives of George Washington Elementary School opposed any changes to traffic flow patterns in front of the school.

The initial and final design phases of a capital improvement project should be used to identify a preferred alternative. The findings of this planning study indicate that each of the four long-term alternatives can be considered feasible alternatives.