

Congestion Management Process for the Mid-Hudson Valley Transportation Management Area: Technical Memo 2: TMA-Wide Micro-Analysis (Dutchess County Portion)

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Disclaimer

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Introduction

In accordance with the process laid out in the 2019 [Congestion Management Process for the Mid-Hudson Valley TMA](#), our Step 2 analysis is divided into four parts:

1. A [Transportation Management Area \(TMA\)-wide macro-level screening](#) to measure overall congestion levels and identify the most congested areas in the region.
2. A micro-level investigation of the congested areas identified in the TMA-wide screening.
3. A county-wide macro-level screening to measure overall congestion levels and identify the most congested areas in each county.
4. A micro-level investigation of any congested areas identified in the county-wide screening that were not already addressed in the TMA-wide analysis.

For parts one and two, the three MPOs work together to produce joint memoranda. In parts three and four, each MPO works separately to produce memoranda specific to their county.

This technical memo is Dutchess County's portion of part two. Staff from the three MPOs developed a template for evaluating congested locations identified in part one, then each MPO evaluated the congested locations in their own county.¹ The part one screening identified four locations in Dutchess:

1. I-84, Route 52, and Route 9 in Fishkill
2. Route 44/55 near Route 9 in Poughkeepsie
3. Route 55 near the Taconic State Parkway in LaGrange
4. Route 9D and I-84 in Fishkill

¹ As noted in previous reports, due to limitations of available data, the analysis focuses on the [National Highway System \(NHS\)](#). Future updates may expand to include local roads.

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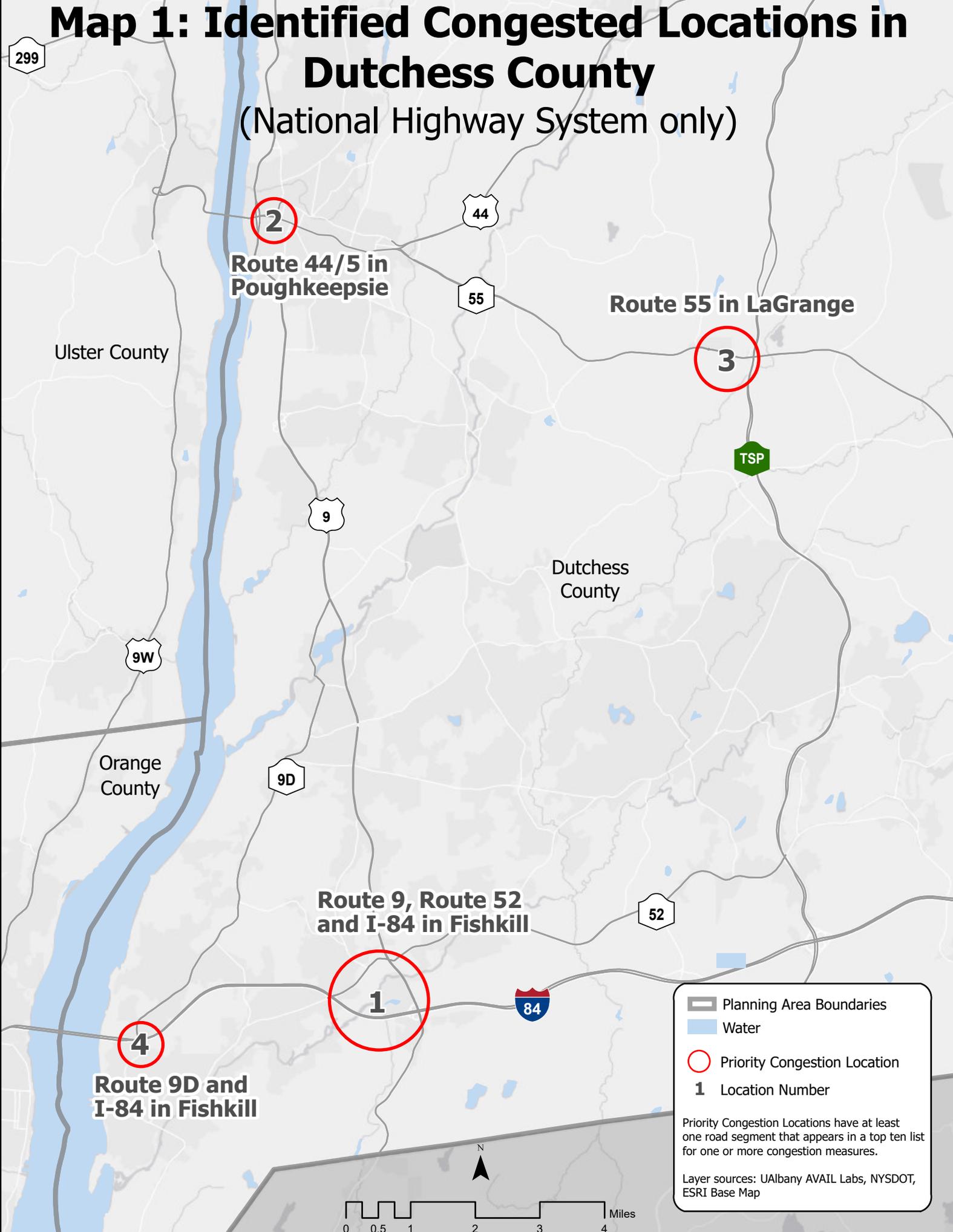
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The following pages include performance measure definitions, a map of the four locations, a brief summary of our findings, and a more detailed analysis of each location. For each we provide key background information, evaluate the causes of congestion, and make recommendations for future improvements or studies.

Table 1: CMP Performance Measures	
Performance Measure	Definition of Measure
Travel Time Index - TTI	The ratio of the average travel time during the worst peak period (weekdays, either 6-9 am or 4-7 pm) to the free-flow travel time. Free flow travel time is defined as the 15 th percentile of off-peak travel times (weekdays 9 am-4 pm and 7 pm-10 pm and weekend 6 am-10 pm).
Total Excessive Delay per mile - TED/mile (harmonic mean-based free flow)	The amount of time spent traveling below a specified threshold speed (20 mph or 60 percent of the free flow speed, whichever is greater) during all hours (weekdays and weekends). The time spent below the threshold speed is multiplied by the estimated volume on the segment during that hour. The total is divided per mile of total segment length for comparison across the network.
Level of Travel Time Reliability - LOTTR	The ratio of the 80 th percentile travel time over the 50 th percentile travel time for the worst period (weekdays 6-10 am, 10 am-4 pm, or 4-8 pm, or weekends 6 am-8 pm). This measures the extent of unreliable travel times.

Map 1: Identified Congested Locations in Dutchess County

(National Highway System only)



- Planning Area Boundaries
- Water
- Priority Congestion Location
- 1** Location Number

Priority Congestion Locations have at least one road segment that appears in a top ten list for one or more congestion measures.

Layer sources: UAlbany AVAIL Labs, NYSDOT, ESRI Base Map



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Summary

Below is a synopsis of our findings for the four locations:

1. I-84, Route 52, and Route 9 in Fishkill

This area has four congested sub-locations: westbound Route 52 between Route 9 and I-84, southbound Route 9 between Route 52 and I-84, westbound I-84 near the Route 9 and Route 52 interchanges, and the Route 9/Route 52 intersection.

- a. Westbound Route 52 has consistent late afternoon and early-evening congestion. This State Route connects Route 9 and I-84 and is also the Village of Fishkill's Main Street. Our recommendations include traffic signal optimization, access management, and possible ITS infrastructure to inform drivers of conditions.
- b. Southbound Route 9 has extended afternoon/early evening congestion stemming from the many reasons people travel on this corridor (commuting, shopping, services and industry). Better data is needed for this segment, but our initial recommendations include signal timing optimization, access management, ITS infrastructure, and working with businesses and freight operators to schedule deliveries during off-peak periods.
- c. The Route 9/Route 52 intersection shows consistent congestion in all four directions. This is simply a large, heavily traveled intersection serving commuters, shoppers, residents and travelers. There is no room for a road expansion, and in the past the community has not favored bypass routes. We recommend examining signal timing and possibly conducting an origin/destination study to determine if there are specific sources of traffic that could be addressed.
- d. The 2018 and 2019 congestion on westbound I-84 was likely the result of construction on the Newburgh-Beacon Bridge. With that work concluding, we expect travel conditions to improve. We recommend monitoring this location to see if there are other more permanent issues.

2. Route 44/55 near Route 9 in Poughkeepsie

The westbound "weave" of Route 44/55 between Civic Center Plaza and the Mid-Hudson Bridge experiences three peaks of congestion on weekday afternoons. The first and third, around 3:00 pm and 6:30 pm, relate to the opening and closing of the middle lane on the bridge. The second, around 5:00 pm, is caused by commuters leaving Dutchess, including many County government workers. We recommend expanding the hours that the bridge's middle lane is open, converting Market St/Civic

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Center Plaza to two-way traffic, considering lane reassignments on Route 44/55, and evaluating a redesign of Route 44/55 as part of the ongoing [Poughkeepsie 9.44.55](#) study.

3. Route 55 near the Taconic State Parkway in LaGrange

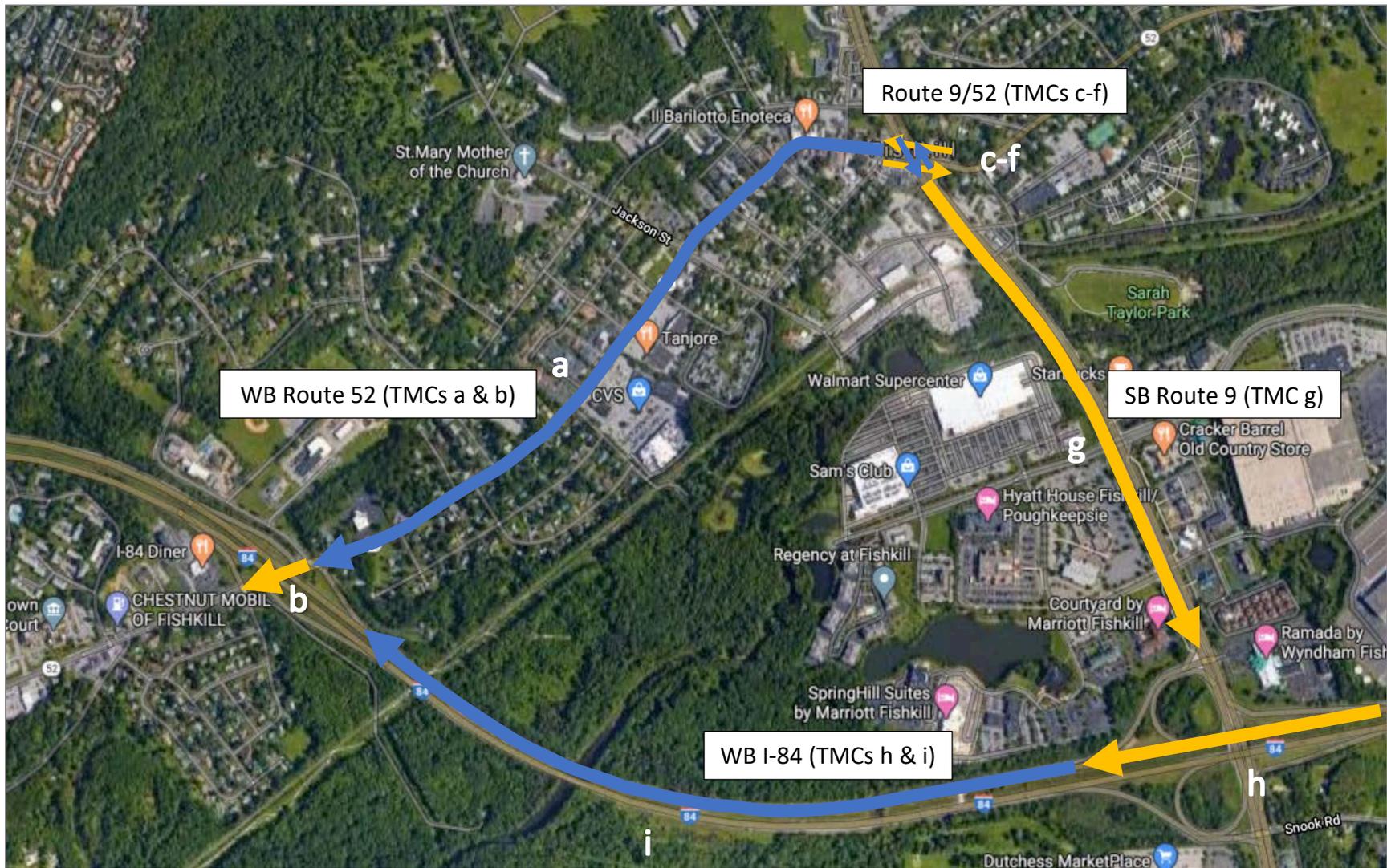
Eastbound Route 55 experiences congestion, particularly in the early morning and mid-afternoon, when school begins and ends at Arlington High School. School traffic combined with commuter traffic and multiple intersections/driveways along the corridor causes reduced speeds. More data is needed to adequately evaluate this area, but our preliminary recommendations include variable message signs to encourage alternate routes during peak periods; evaluating opportunities for access management; and investigating new connections to provide alternate routes.

4. Route 9D and I-84 in Fishkill

Route 9D experiences evening congestion in both directions; northbound congestion is amplified by traffic from train commuters leaving the Beacon station. Westbound I-84 experiences afternoon and evening congestion near the interchange, as does the I-84 eastbound exit ramp to Route 9D. The westbound I-84 congestion likely relates to Newburgh-Beacon Bridge construction work during 2018-2019. The backup on I-84 likely contributed to congestion on the Route 9D exit ramp and on Route 9D itself. However, growth in this area and the regional importance of this interchange means congestion is likely to increase in coming years. Among other recommendations, we suggest evaluating signal timing and lane assignments on Route 9D, ITS infrastructure, and improving walking and bicycling options in the area. Longer term, we suggest developing an alternative interchange design.

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Location #1: I-84, Route 52, and Route 9



Each arrow represents one TMC. Colors are only meant to help differentiate TMCs.

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Description: This location in the Town and Village of Fishkill is roughly bounded by Route 9 to the east, I-84 to the south and west, and Route 52 to the north.

TMCs: 9 TMCs were identified in the Macro screening; we grouped these into 4 sub-locations:

- a) 120+13957: Route 52 (Main St) westbound between Route 9 and I-84
- b) 120P13957: Route 52 (Main St) westbound under I-84

- c) 120P13956: Route 52 (Main St) westbound in Fishkill crossing Route 9
- d) 120N13956: Route 52 (Main St) eastbound in Fishkill crossing Route 9
- e) 120P11235: Route 9 northbound at Route 52
- f) 120N11235: Route 9 southbound just north of Route 52

- g) 120-11234, Route 9 SB between Route 52 and I-84 (transit only)

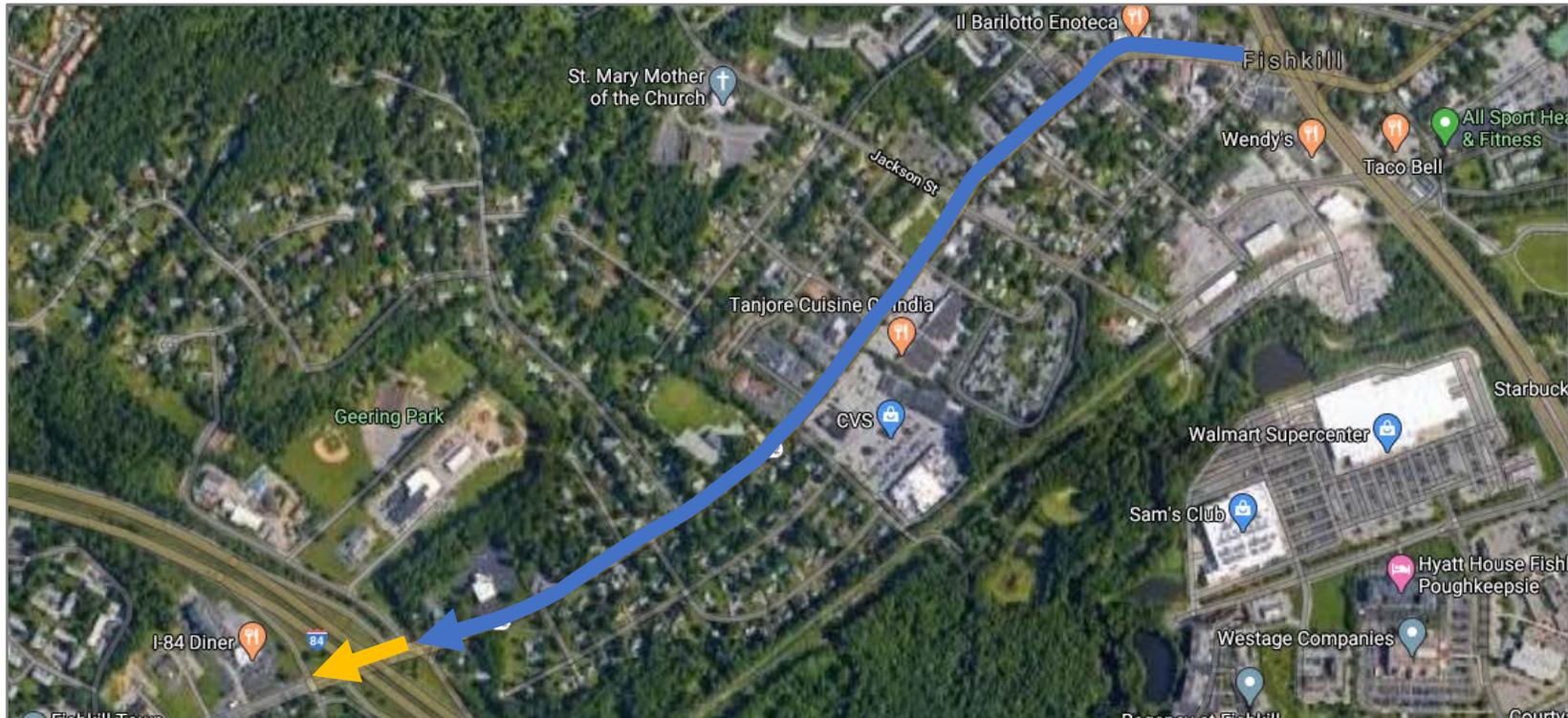
- h) 120N04135, I-84 WB between the Route 9 ramps (freight only)
- i) 120-04134, I-84 WB between Route 9 and Route 52 (freight only)

Serves Regional Transit? Y

Freight Route? Y (I-84), per NYS Freight Plan

An analysis of each of the four sub-locations follows.

1. Westbound Route 52



For this analysis, we focused on the 1.1-mile-long segment of westbound Route 52 between the southbound Route 9 slip lane and the eastbound I-84 off-ramp. We considered including the adjacent segment of Route 52 crossing Route 9 but determined that it was more closely related to issues at the Route 9/Route 52 intersection.

AADT (2018): 7,490 westbound; 3.3% heavy vehicles westbound

Speed limit: 30 mph within the Village (35 mph in the Town); 85% speed: 29-34 mph westbound

Regional Transit? Y (Coach USA)

Freight Route? N

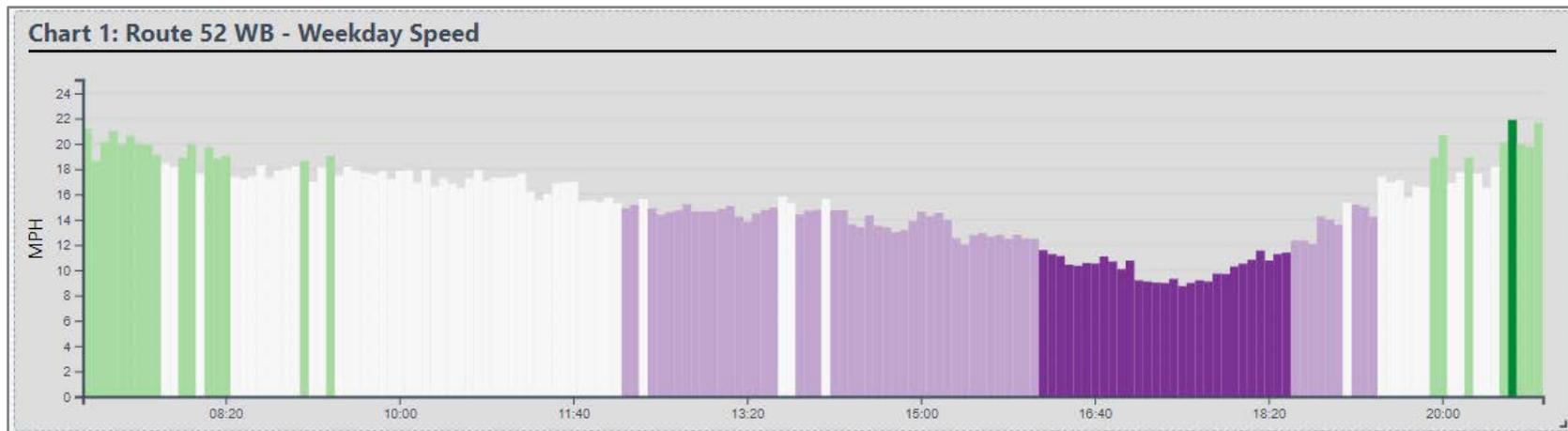
Macro screening results: This corridor was identified based on a high TTI in the pm peak period. This means that travel times during the pm peak are significantly slower than during free-flow periods.

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Micro-level analysis:

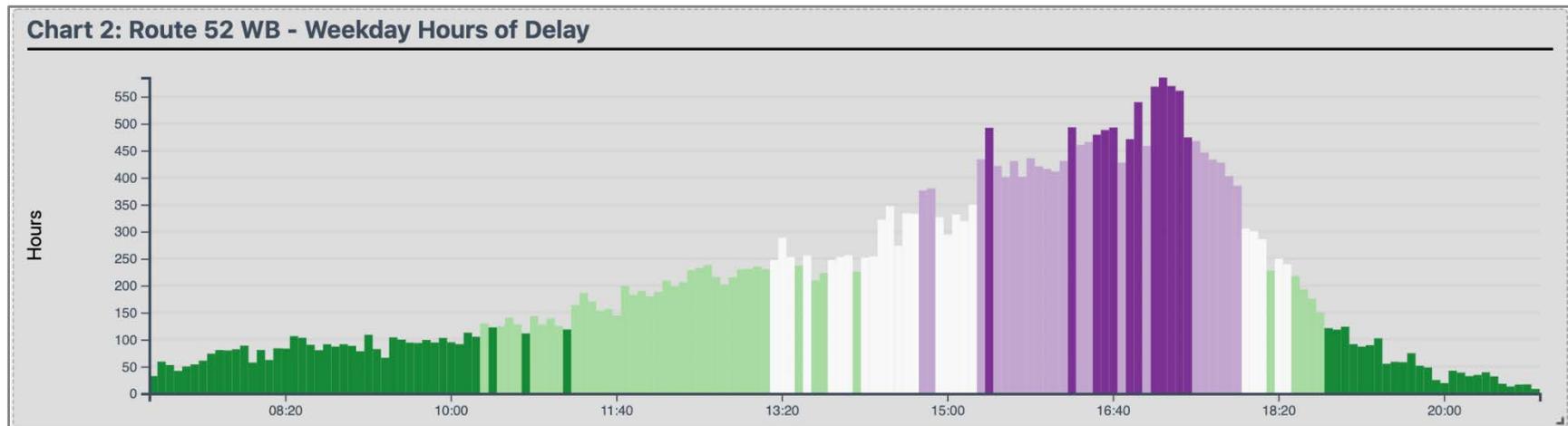
- Speeds:
 - Average speeds are 14 mph on the mainline segment and 18 mph across I-84.
 - Speeds decrease throughout the day, hitting a low around 5:30 pm, then increasing again starting around 6 pm (see Chart 1).
 - The mainline segment is slowest between 3:20 and 6:45 pm (8-12 mph).
 - The segment across I-84 is worst at 5:25 pm (~12 mph).



- Hours of delay:
 - Delay increases throughout the day, with a spike around 3:30 pm, then dropping before increasing again between 4:15-5:20 pm, then dropping off (see Chart 2).

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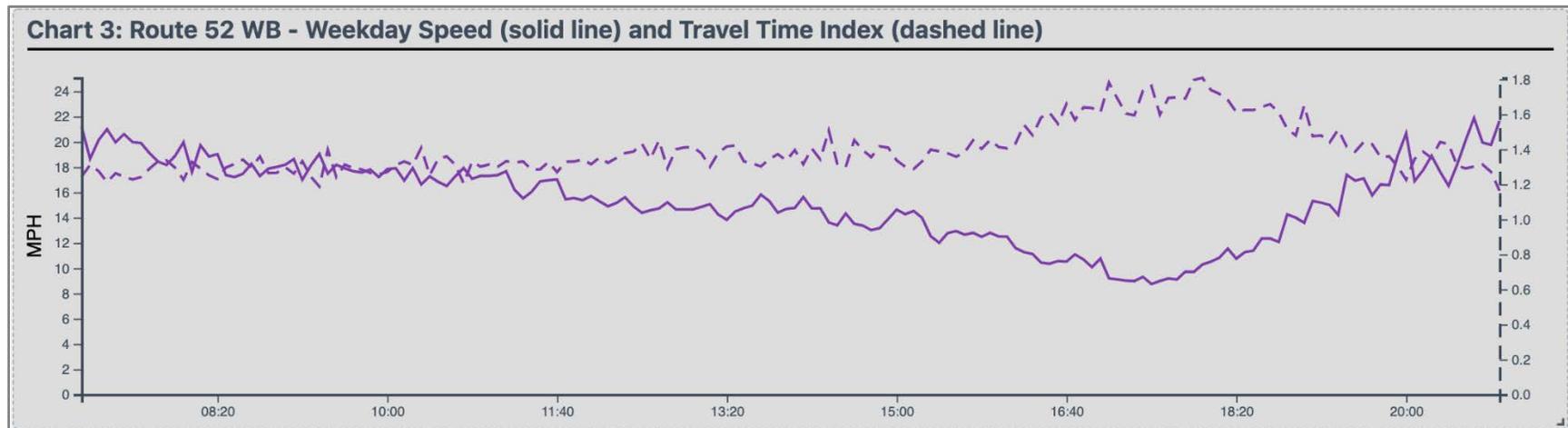
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- TTI:
 - Overall, TTI is relatively flat across the day, but increases above 1.5 around 4:15 pm until 7 pm; it peaks at 6 pm at 1.81 (see Chart 3).
 - The mainline segment is worst around 5 pm, 5:30 pm, and 6 pm.
 - The segment across I-84 is worst at 7:45 am, 4:50 pm, 6 pm and 7-7:30 pm.
- Monthly patterns: speeds are lowest and hours of delay greatest in May and June.
- Weekends: TTI is highest around 6:20 pm; speeds are lowest in the midday (around 12 noon to 2 pm, about 14-17 mph).

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Explanations:

This location exhibits a typical commute pattern, with the worst conditions during the evening commute. Route 52 provides access between Route 9 and I-84, but is also the Village of Fishkill's Main Street, with restaurants, offices, and commercial buildings (transitioning to single-family homes at the Village/Town border towards the western end). The corridor includes many intersections and driveways, on-street parking, and walking activity, as well as three signalized intersections. It has two lanes (one in each direction), and there are no alternate routes nearby. The combination of commute traffic and local activity within a limited space creates significant congestion, particularly in the evening. There are also two schools near the Route 9/Route 52 intersection, which likely contribute to slowing and delay in the mid-afternoon.

Existing plans/recommendations:

DCTC's [Fishkill Traffic Analysis](#) evaluated the Route 52 corridor and adjacent residential streets. It recommended coordinating traffic signal timing to reduce congestion on Route 52 and allow gaps for turning traffic. It also included recommendations for several residential side streets. The Fishkill Route 52 Alternatives Analysis suggested extending West Merritt Blvd to Route 52 to relieve congestion, but the proposal lacked community support.

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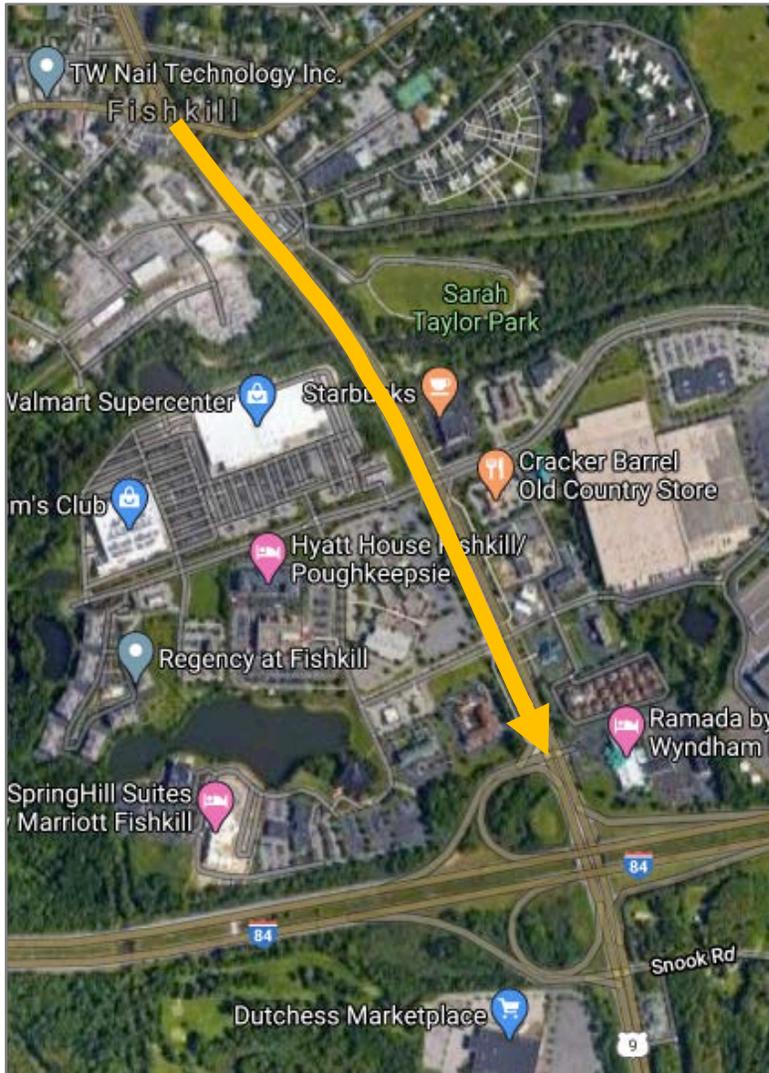
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[Moving Dutchess 2](#), DCTC's 2016 long-range transportation plan, recommends examining signal timing or other changes to improve traffic flow on Route 52 through the Village of Fishkill. The Plan also recommends installing a sidewalk on Route 52 in the Town from Jeanette Drive to the existing sidewalks in the Village.

Recommendations:

- Examine traffic signal timings and optimize if possible.
- Network: provide cross-parcel access and consolidate driveways to reduce traffic and conflict points on Route 52.
- Infrastructure: extend the sidewalks that end near the Village line into the Town portion of Route 52 (and continue at least to Jeanette Dr).
 - Note: a NYSDOT signal improvement project will replace two traffic signals, add pedestrian signals, and install sidewalks, ramps and crosswalks at the Route 52 intersections with the I-84 eastbound and westbound ramps at Geering Way and Heath Road.
- Work with commercial establishments and freight companies to schedule deliveries during off-peak hours if feasible.
- Expand ITS options to alert travelers of planned construction as well as incidents and direct them to adjust travel plans if feasible.
 - Note: NYSDOT has installed variable message signs on I-84 just west of Route 52.

2. Southbound Route 9



For this analysis, we focused on the 0.75-mile-long segment of southbound Route 9 between Route 52 and the westbound I-84 on-ramp. We considered including the adjacent segment of southbound Route 9 approaching Route 52 but determined that it was more closely related to issues at the Route 9/Route 52 intersection.

AADT (2017): 19,650 southbound; 4.3% heavy vehicles southbound (count was taken north of Merritt Blvd)

Speed limit: 45 mph; 85% speed: 53 mph southbound

Regional Transit? Y (Coach USA and Leprechaun Lines)

Freight Route? N

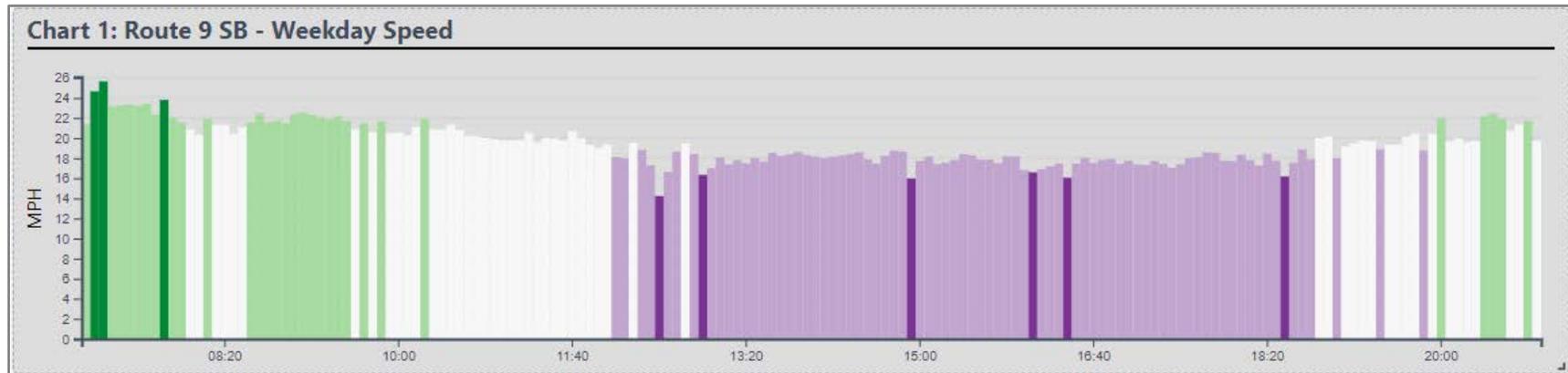
Macro screening results: This corridor was identified based on TED/mile for regional transit routes. This means that there was significant volume experiencing delay, but it did not rise to the level of the locations identified for highway congestion.

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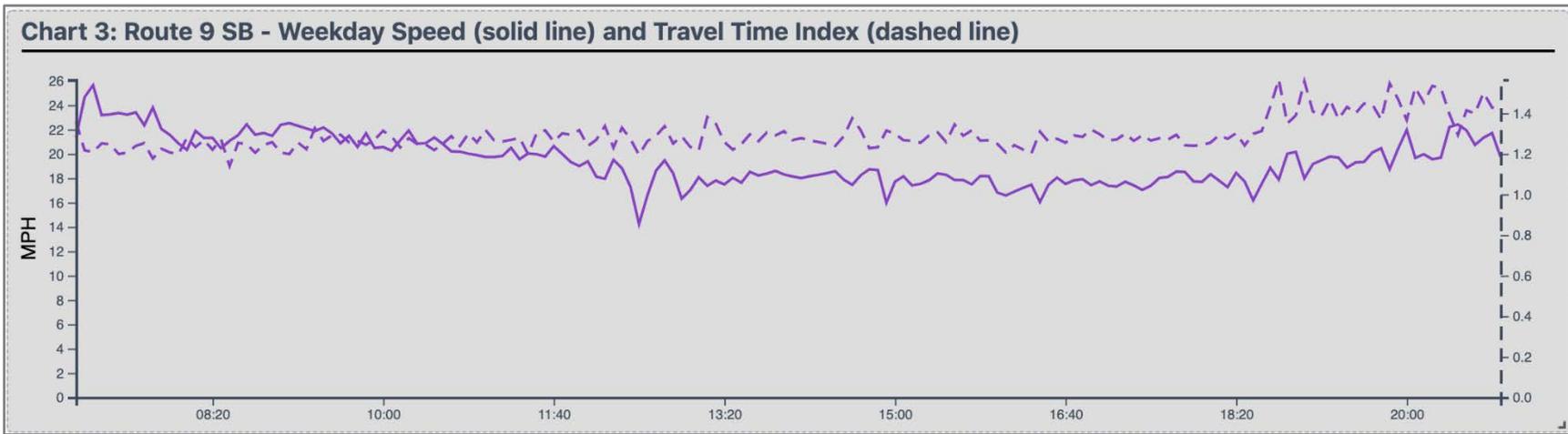
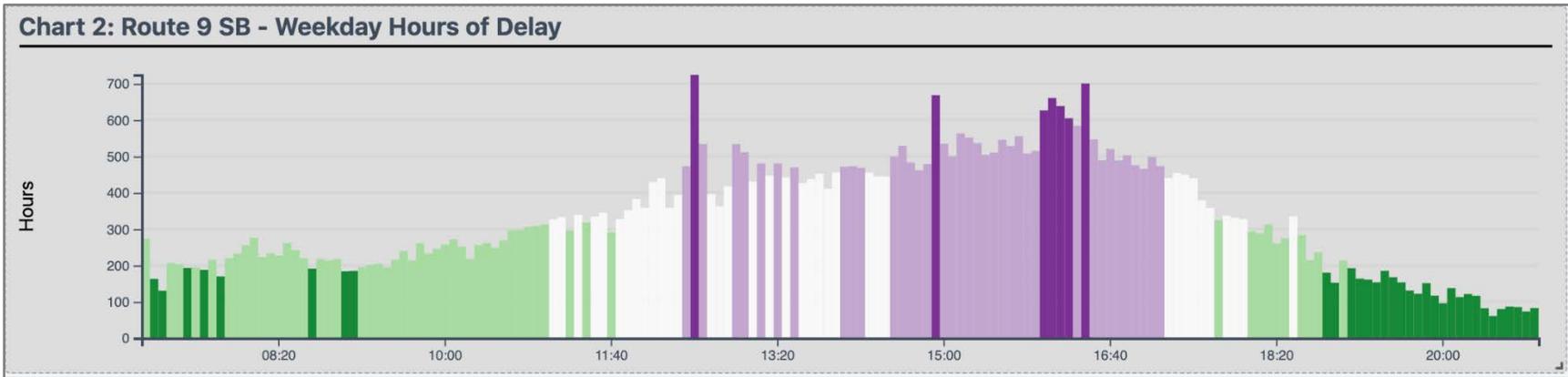
Micro-level analysis:

- Speeds:
 - Average speeds overall are about 19 mph.
 - Speeds decline throughout the morning, with lows around 12:30-1 pm, 3:00 pm, 4:30 pm, and 6:30 pm (see Chart 1).



- Hours of delay are highest at 12:30 pm and also high at 3 pm and 4-4:30 pm, then decline (see Chart 2).
- TTI is fairly consistent until about 6:30 pm, then spikes above 1.5 and stays somewhat high until 8:30 pm (see Chart 3).
- Weekends overall appear similar to weekdays in terms of average speed, travel time and TTI, but have many fewer hours of delay (likely due to lower volumes).
- Weekend speeds are fairly consistent most of the day, with some mid-day to early evening slowing.
- Monthly data shows that speeds are lowest in December, while hours of delay are greatest in May, June, August, and October.

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Explanations:

Route 9 to I-84 is a key commuting corridor, and also includes significant traffic generators, including big-box retail (Walmart and Sam’s Club), a large medical/office complex (Westage), several hotels, chain restaurants, a movie theater, a large apartment complex, and the Gap distribution center. These have different patterns of activity: restaurants mid-day, evenings, and weekends; medical and other offices during the weekday; retail mid-day, early evening, and weekends; movie theater evenings and weekends;

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distribution center all hours (including late night). This contributes to the varying patterns shown in the data: slow speeds mid-day and early evening, delay mid-day, and congestion in the later evening.

While Route 9 is not part of a State freight route, there are likely a lot of trucks on this corridor, especially between Merritt Blvd and I-84, accessing the retail businesses and distribution center. This may contribute to congestion. Unfortunately, the traffic data is from north of the Fishkill Creek, so it does not capture truck traffic between the creek and I-84.

The southbound direction has three lanes, which expand to four south of the bridge, then back to three after the I-84 WB entrance. There are also multiple turn lanes at intersection approaches. There are four signalized intersections (Elm St, Merritt Blvd, Westage Dr, and at I-84). These intersections have long cycle lengths to accommodate the various movements, but these long cycles mean longer queues at the signals.

The nearest alternate access for southbound traffic to I-84 is via Route 52, but that corridor is more constrained and has more congestion.

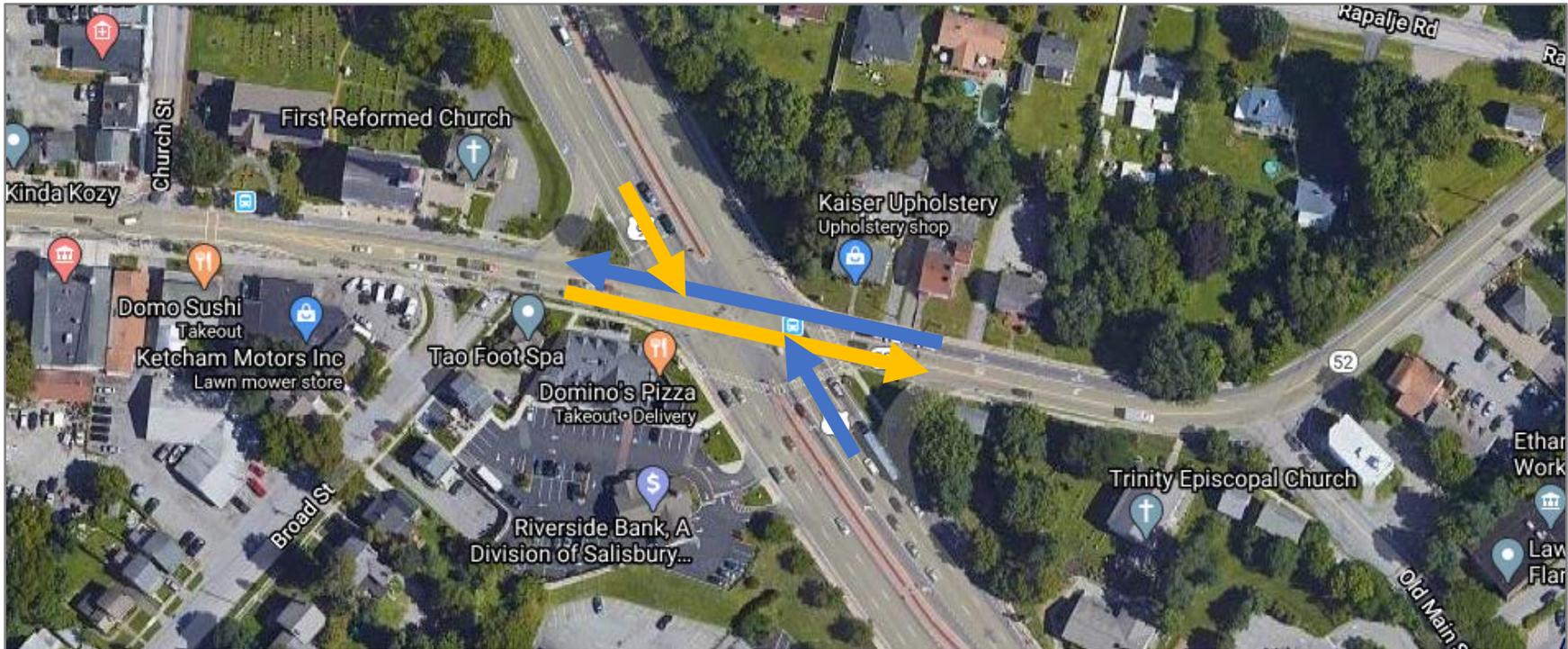
Existing plans/recommendations:

[Moving Dutchess 2](#) recommends evaluating and coordinating traffic signal timings on Route 9 between I-84 and Route 44/55 in Poughkeepsie. It also recommends implementing access management on Route 9 by removing traffic signals where feasible, providing left turn lanes, consolidating driveways to reduce conflict points, and providing access between commercial parking areas. The plan also lists Route 9/Route 52, Route 9/Elm St, and Route 9/Merritt Blvd as high-crash intersections, based on the total number of crashes.

Recommendations:

- Collect volume, speed, and vehicle class data closer to I-84.
- Examine traffic signal timing and optimize if possible.
- Evaluate opportunities for access management.
- Work with commercial establishments and freight companies to schedule deliveries during off-peak hours if feasible.
- Expand ITS options to alert travelers of planned construction as well as incidents and direct them to seek alternate routes or adjust travel plans if feasible (Note: NYSDOT has installed variable message signs on I-84 just west of Route 52).
- Consider queue jumps and signal prioritization for transit vehicles.

3. Route 9/Route 52 Intersection



For this analysis we focus on four small segments at the Route 9/Route 52 intersection. The eastbound and westbound segments on Route 52 cross the intersection, while the northbound and southbound segments on Route 9 end at the intersection. We also evaluated these segments together with longer adjacent segments to evaluate how the short segment length might be affecting the analysis.

AADT (2018): 53,000 (total entering intersection); 20,000 northbound, 17,000 southbound, 8,000 westbound, 8,000 eastbound.

Speed limit: 30 mph (Route 52); 40 mph (Route 9)

Regional Transit? Y (Coach USA and Leprechaun Lines)

Freight Route? N

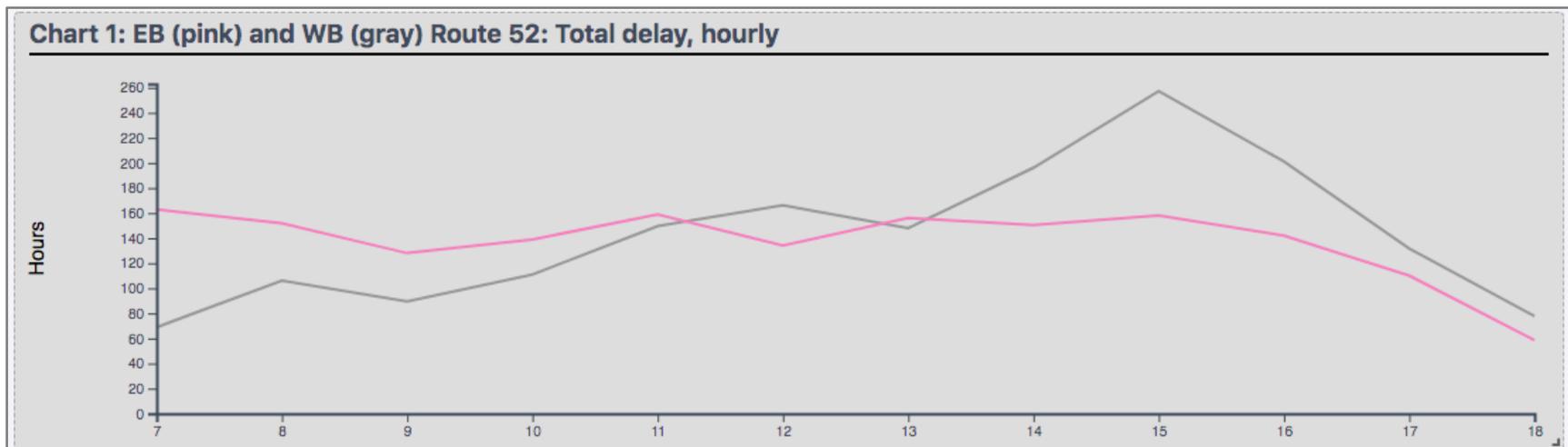
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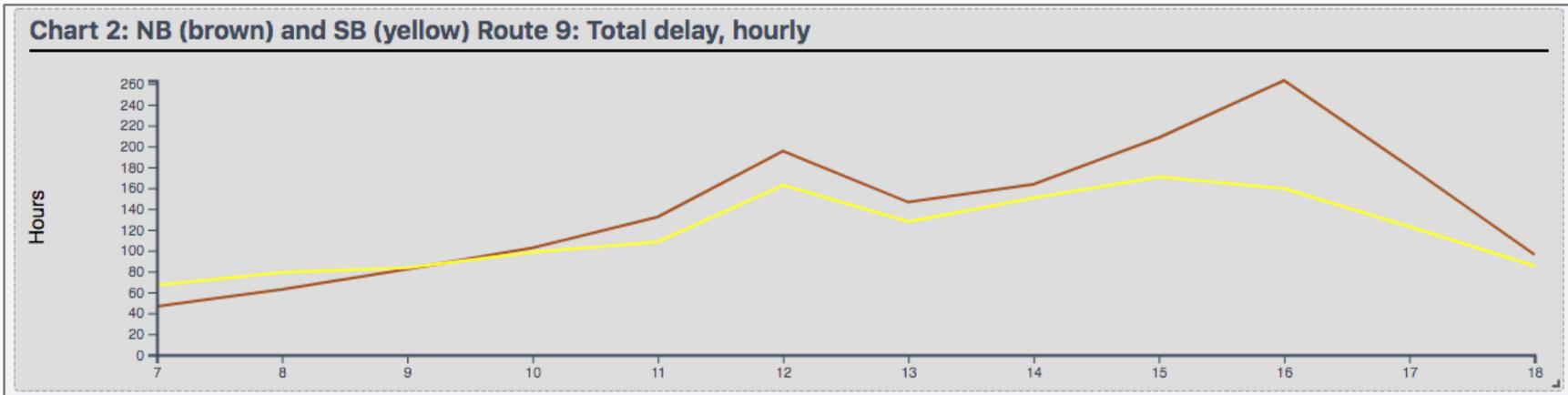
Macro screening results: The four very short TMCs at this intersection (one for each travel direction) have high scores for several congestion measures. Northbound Route 9 and westbound Route 52 are in the top ten lists for TTI, TED/mile, and LOTTR; eastbound Route 52 is on the list for TED/mile and LOTTR; and southbound Route 9 is on the list for TED/mile. The LOTTR scores are highest on the weekend but are also high during the PM and off-peak periods for northbound Route 9, and during the AM, PM, and off-peak periods for eastbound and westbound Route 52. These results tell us that there is regular congestion here that affects a lot of traffic, and that on all except the southbound approach it varies quite a bit throughout the day and between days. With that said, reliability measures like LOTTR and TTI are magnified on short segments like these because they measure the percentage difference in travel time during different periods. If it takes eight seconds to pass through the intersection at noon and 15 seconds at 5:00 pm, the additional delay is small but the percentage change is high. TED/mile, the overall congestion measure, is normalized by the length of the segment, but the reliability indicators are likely skewed.

Micro-level analysis (2018 data):

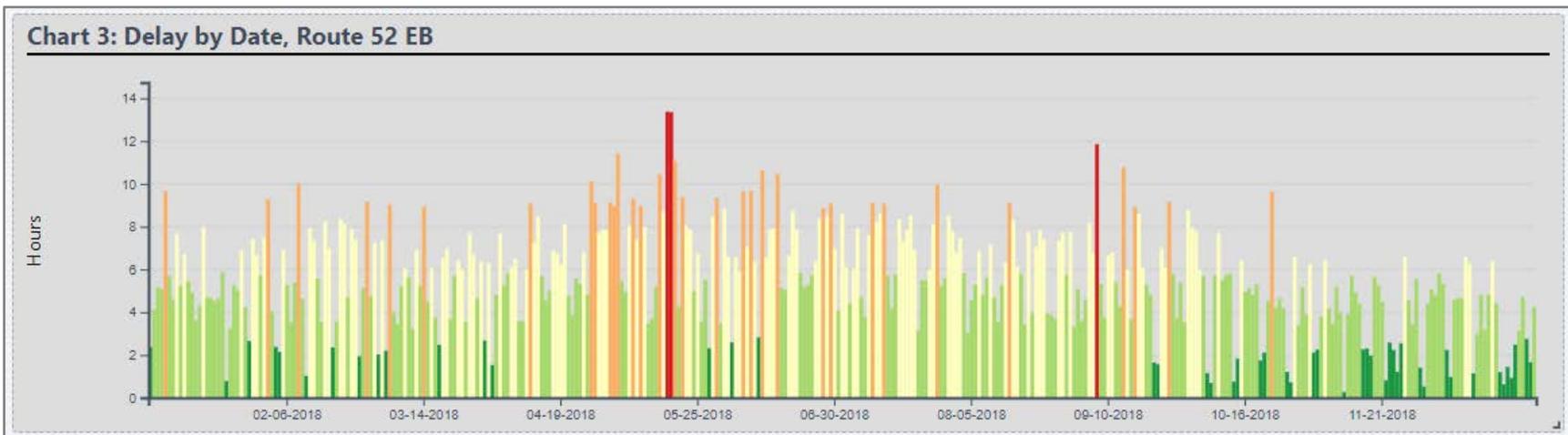
- Westbound and northbound delays increase sharply in the PM peak, while southbound and eastbound delay appear more consistent throughout the day and experience less delay than westbound and northbound in the PM peak (see Charts 1 and 2).



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- Congestion appears to be slightly worse in the summer, though this pattern is not consistent across multiple years. Delay does not appear to be a product of a few very bad days, but rather a near-daily reality (see Chart 3).



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Explanations:

This area serves residents, commuters, shoppers, and some longer-distance traffic related to nearby I-84. At this major intersection, traffic signal cycles can be long and queues often form. Car-dependent development has grown over the years, and space constrictions limit the ability to expand the road. There are limited alternate routes for drivers passing through the area, but past proposals for bypass routes have not been favored by the community.

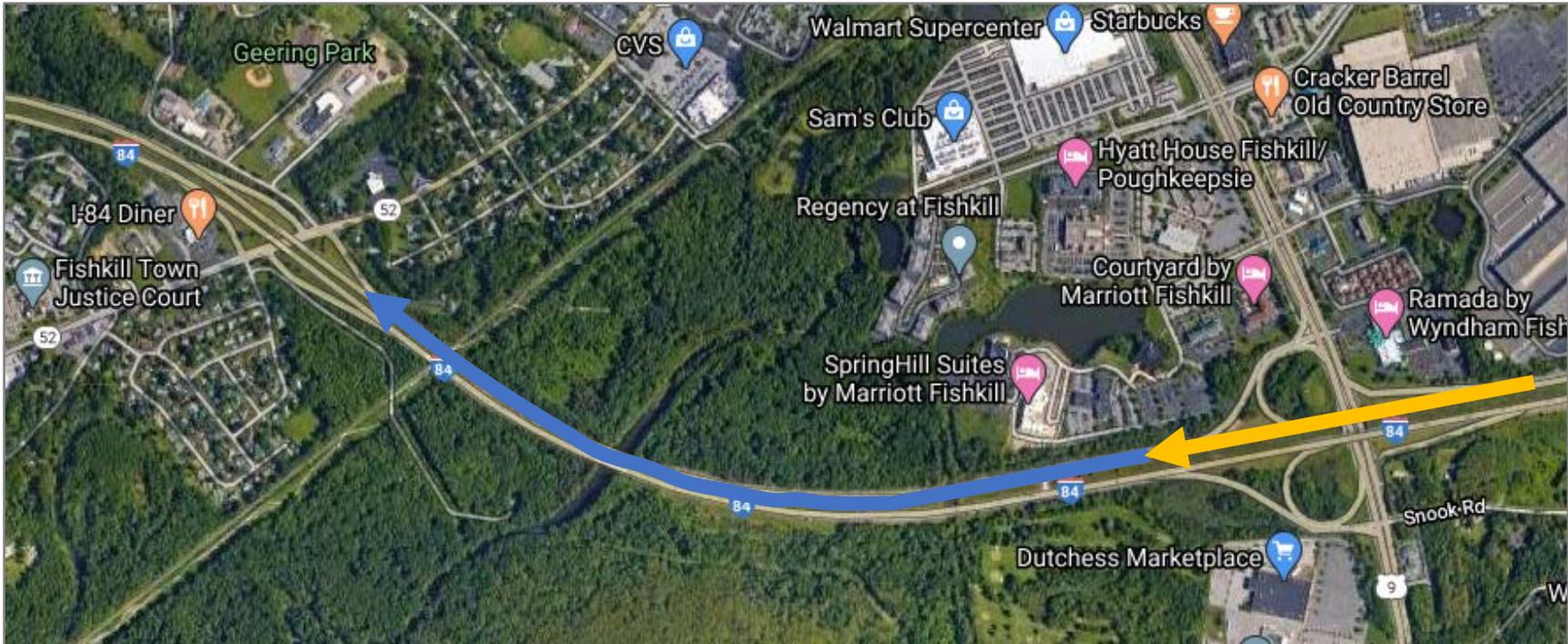
Existing plans/recommendations:

This intersection is addressed in the Mid-Hudson TMA's Regional Transit Plan, [Connect Mid-Hudson](#). The plan recommends evaluating signal improvements (including active transit signal priority) and adding transit queue jump lanes.

Recommendations:

- Evaluate traffic signal timing and coordination along both Route 9 and Route 52 in this area.
- Conduct an origin/destination study of the village to determine where significant traffic is coming from. These sources could then be addressed through redirection of traffic or encouragement of off-peak travel.
- Improve options for walking, bicycling, and transit use in this area.

4. I-84 WB near Route 9 and Route 52 interchanges



For this analysis we focus on two segments on westbound Interstate 84. The first runs 0.66 miles between the Route 9 exit ramps, and the second runs 0.82 miles between the Route 9 and Route 52 ramps.

AADT (2018): 25,000 (westbound only)

Speed limit: 65 mph; we do not have speed data for this location

Regional Transit? Y (Coach USA)

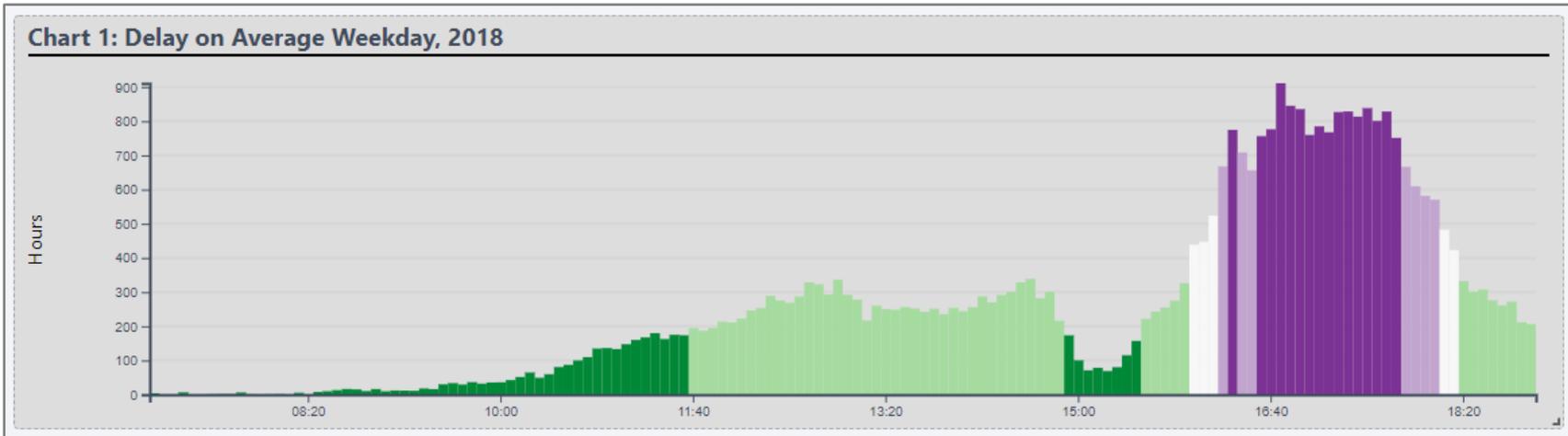
Freight Route? Y

Macro screening results: I-84 near the Route 9 and Route 52 interchanges was identified as a top congested location based on TED/mile and TTTR for freight routes. TED is a measure of the total delay experienced by all drivers, so it implies a high-volume road with regular congestion, but does not reveal anything about the patterns of that congestion. TTTR uses only truck data and implies unpredictable travel times at a level that may not adversely impact the average driver but could impact truck drivers on schedules.

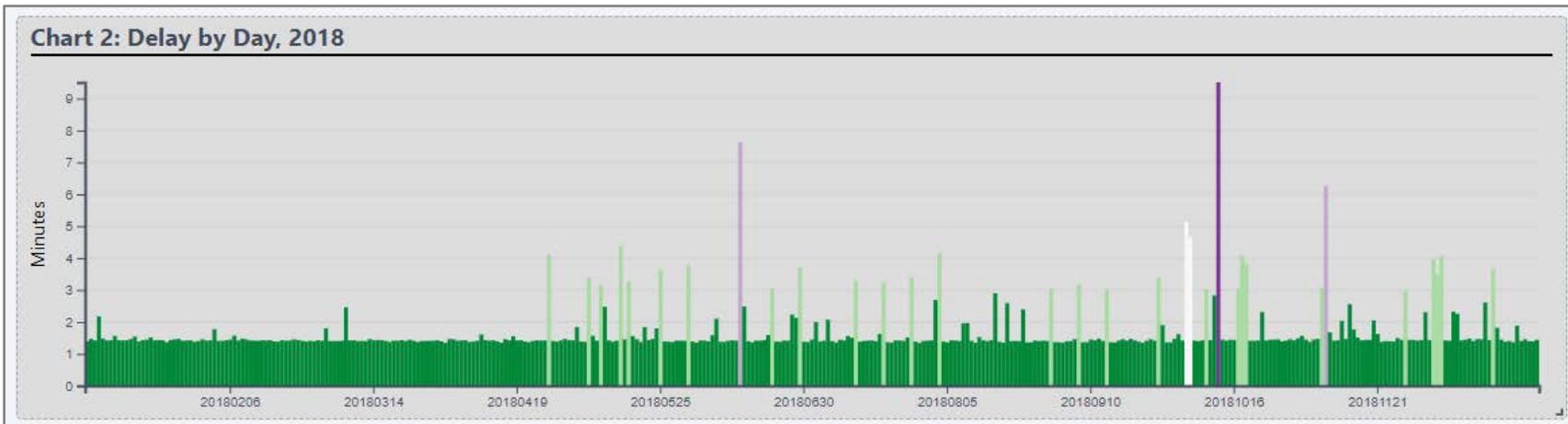
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Micro-level analysis:

- Congestion on this highway is generally an evening issue, with delay spiking between 4:00 and 6:00 PM (see Chart 1).



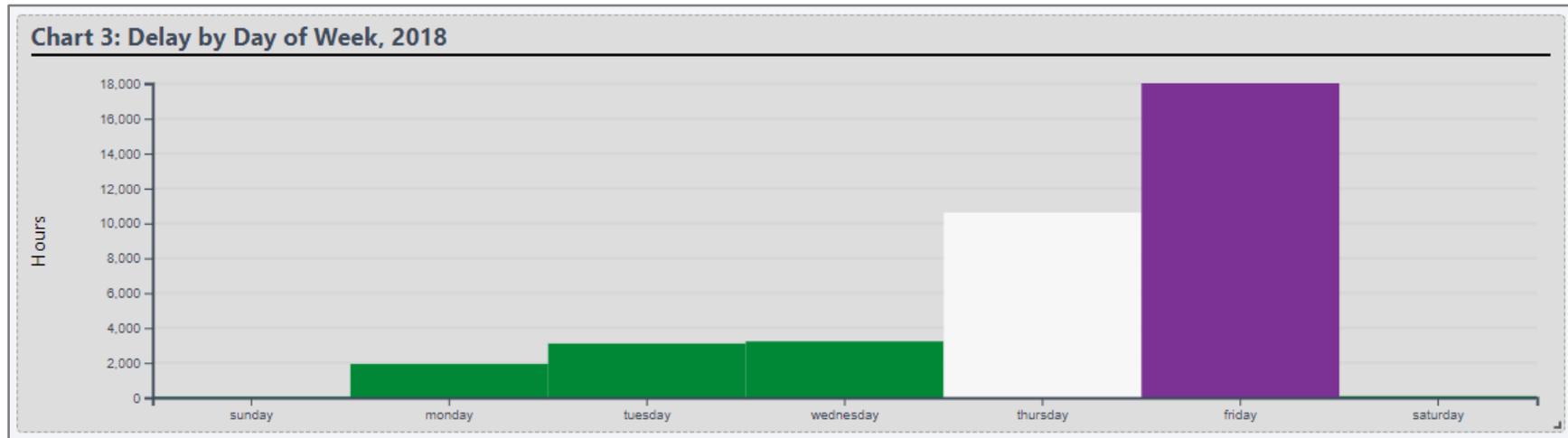
- There is very little evidence of congestion before May of 2018. At that point, individual days show spikes of delay and/or unreliability (see Chart 2).



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- Delay increases throughout the week and is much higher on Fridays. There are no congestion issues on weekends (see Chart 3).



Explanations:

Congestion on these segments matches congestion seen further west, near the Newburgh-Beacon Bridge and the Route 9D interchange. According to the NYS Bridge Authority, reconstruction of the I-84 bridge over Route 9W in Orange County in 2018-2019 “caused up to 7-mile backups on Thursday/ Friday evening rush hours.” The congestion seen here appears to be related to that work. With that project ending, westbound congestion should decrease, though a new project (re-decking the north bridge span) is likely to cause backups in eastbound traffic on the Orange County side of the bridge over the next few years.

Existing plans/recommendations:

Current plans for I-84 include repaving, sign replacement, and variable message sign installation. Bridges over the former Beacon Line railroad bed were replaced in 2018-2019 (with little to no impact on traffic, per NYSDOT).

Recommendations:

This corridor is worth monitoring to ensure that other, more permanent issues do not exist, but initial analysis indicates that the congestion seen here is the result of temporary construction. For future projects, better advance warnings and information about

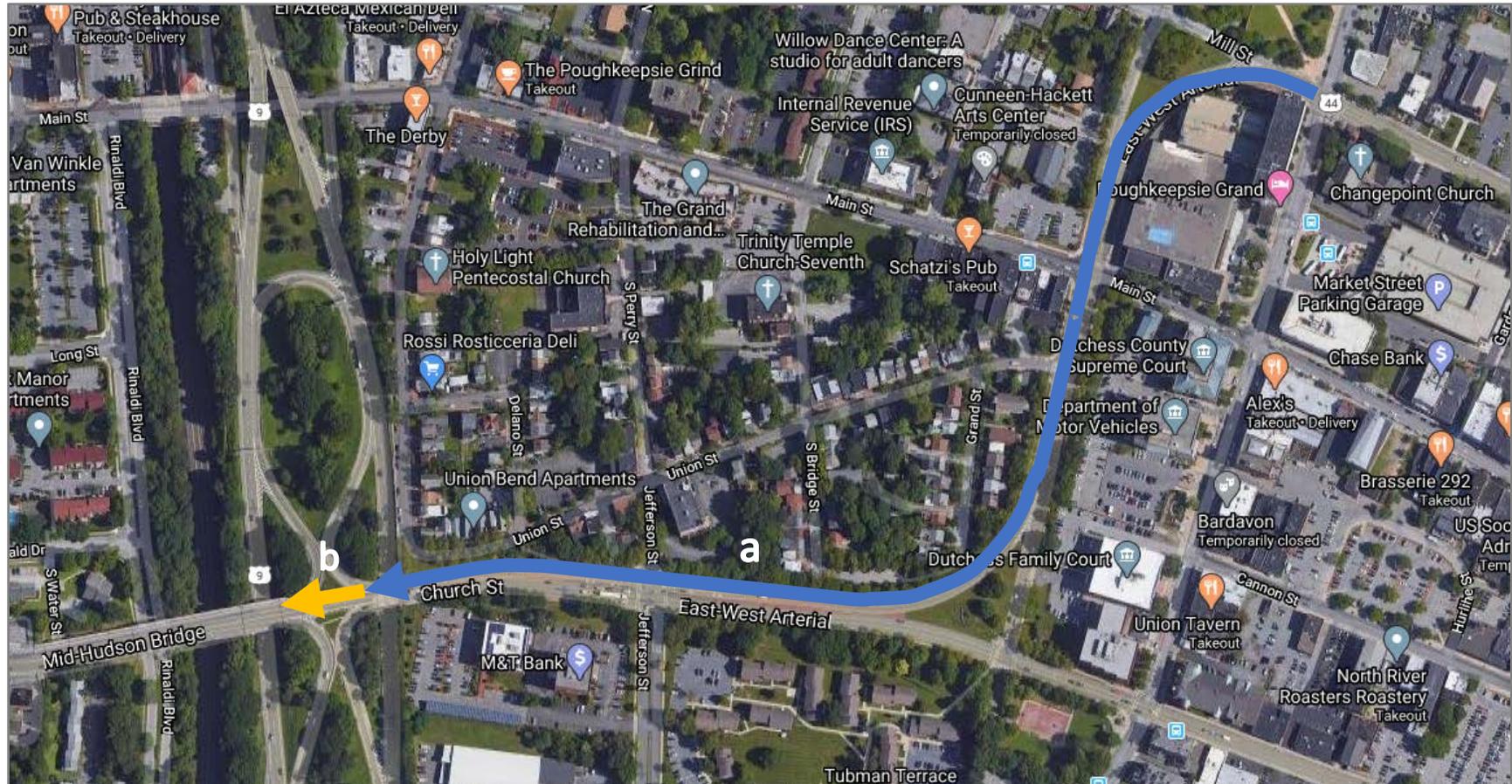
Congestion Management Process for the Mid-Hudson Valley Transportation Management Area

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alternative routes and congested time periods could encourage drivers to vary the time and manner of their trip, or at least ease the psychological toll of the congestion.

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Location #2: Route 44/55 near Route 9 in Poughkeepsie



Each arrow represents one TMC. Colors are only meant to help differentiate TMCs.

Description: This location includes two westbound segments of Route 44/55 (the Poughkeepsie Arterials) between Civic Center Plaza and the Mid-Hudson bridge. This section of road, known colloquially as “the weave,” transitions from three lanes to four, then two, then one, and includes numerous intersections.

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TMCs:

- 120-10157 (0.55 miles, Route 44/55 westbound between Civic Center Plaza and the Route 9 exit ramp)
- 120N10157 (0.04 miles, Route 44/55 westbound between the Route 9 ramps)

AADT (2014): 13,170 (westbound only)

Speed Limit: 30 MPH; no speed data is available at this location

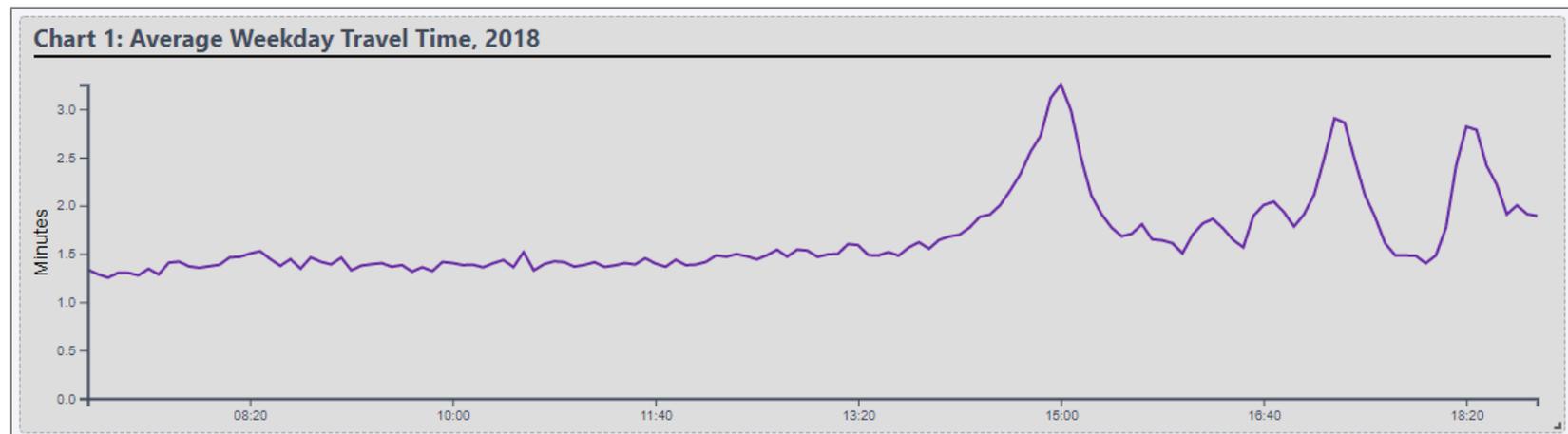
Serves Transit? Y, Coach, Ulster County Area Transit, Leprechaun, Dutchess County Public Transit (local routes)

Freight Route? Y, per NYS Freight Plan. Approximately 3.2% of traffic is heavy vehicles.

Macro screening results: Route 44/55 westbound between Civic Center Plaza and Route 9 was identified as a top congested location based on TED/mile for freight routes (TMCs 120N10157 and 120-10157). TED is a measure of the total delay experienced by all drivers, so it implies a high-volume road with regular congestion, but does not reveal anything about the patterns of that congestion.

Micro-level analysis:

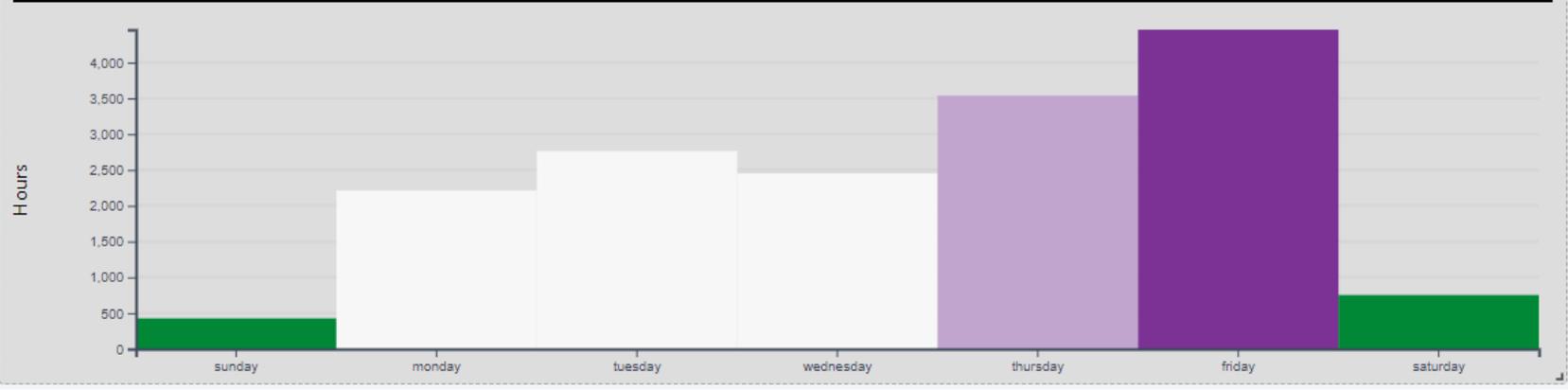
- Travel times on this one-way road experience a series of spikes and dips on weekday afternoons, with the worst travel times at 3:00, 5:15, and 6:20 pm (see Chart 1). This pattern holds true over multiple years. In 2018 it took nearly three minutes to traverse this corridor at 5:15 pm—more than double the travel time during the midday hours.



- Delay increases throughout the work week (see Chart 2). Friday is consistently the most congested day, with the increased congestion (relative to other days) around 3:00 pm and in the evening.

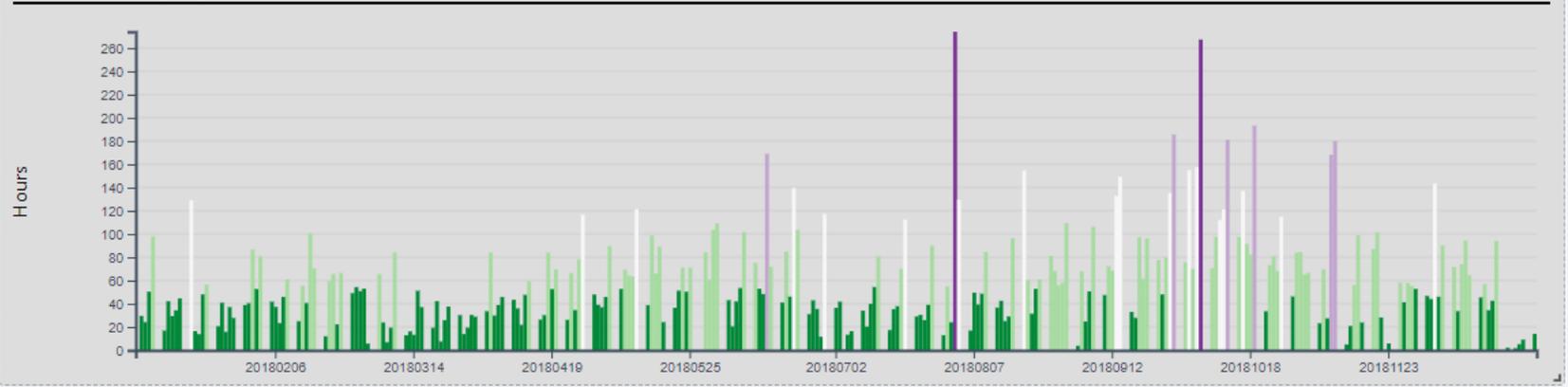
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Chart 2: Delay by Day of Week, 2018



- Although the consistent afternoon congestion on this corridor keeps its LOTTR score relatively low (1.45 and 1.42 for the two TMCs in 2018), the corridor is clearly susceptible to incidents: in 2018, eight days accounted for more than 10% of the year’s reported delay (see Chart 3).

Chart 3: Delay by Date, 2018



- No seasonal patterns are evident, and there are no congestion issues on weekends.

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Explanations:

Route 44/55 is the primary east/west corridor through the City of Poughkeepsie, and provides access between downtown, Route 9, and the Mid-Hudson Bridge. It is a heavy commuter route, both for those coming through the city to access the bridge and for those coming to and from jobs in the downtown. Traffic is heavier eastbound in the morning and westbound in the afternoon and evening. The westbound section between Civic Center Plaza and Route 9 includes two 90 degree turns, a substantial merge, and two major intersections. Each lane serves only a few destinations, necessitating significant weaving. Only one lane ultimately serves the bridge. Any incidents on or near the bridge can bring traffic to a standstill.

The New York State Bridge Authority manually opens the bridge's middle lane to westbound traffic around 3:00 pm, which backs up traffic and likely accounts for the 3:00 pm spike in travel times. The 5:15 pm spike is attributable to commuters leaving Poughkeepsie for Ulster County and Route 9. The middle lane is closed around 6:30 pm, likely accounting for the third peak in travel times.

Existing plans/recommendations:

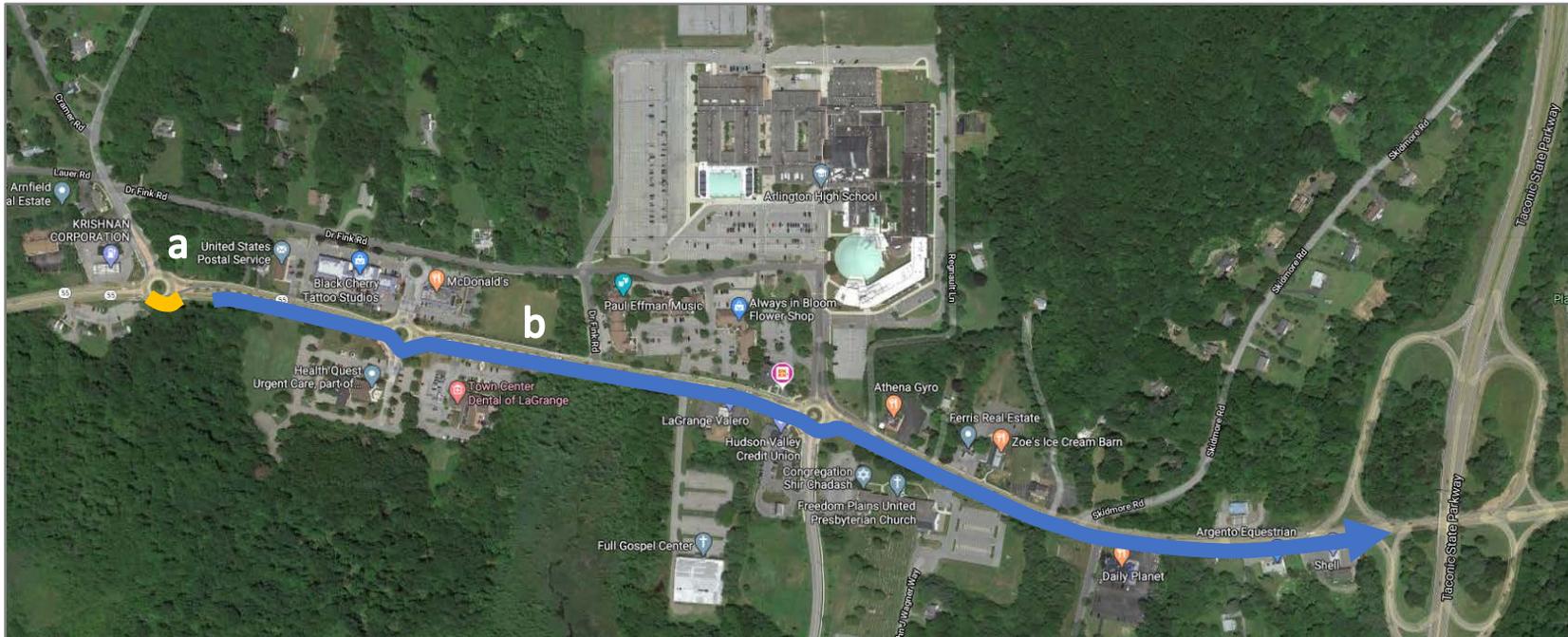
This corridor has been cited as an issue in numerous transportation and downtown improvement plans and is currently part of a large study of the Route 9/44/55 interchange and Route 44/55, [Poughkeepsie 9.44.55](#). Previous recommendations include slowing traffic, transforming the curve at Mill St and Columbus St into a traditional intersection, and reducing lanes at the Main St intersection.

Recommendations:

- As recommended in a 2018 New York State Bridge Authority study, consider opening the reversible middle lane on the Mid-Hudson Bridge to westbound traffic by 2:30 pm.
- Continue analyzing options to redesign the corridor for improved safety and access as part of the broader Poughkeepsie 9/44/55 study.
- As recommended in the 2018 Poughkeepsie City Center Connectivity Project, pursue two-way traffic on Market St/Civic Center Plaza to provide alternate options to access eastbound Route 44/55 and Route 9 south.
- Consider short-term changes to mitigate congestion, including reconfiguring the lanes on this section of Route 44/55 to improve access to the Mid-Hudson Bridge.

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Location #3: Route 55 near the Taconic State Parkway



Each arrow represents one TMC. Colors are only meant to help differentiate TMCs.

Description: This is a 0.79-mile eastbound segment on Route 55 between Freedom Rd and the Taconic State Parkway ramps. This segment has one lane in each direction and a series of three roundabouts.

TMCs:

- a) 120P12473 (0.01 miles, short fragment within western-most roundabout)
- b) 120+10169 (0.78 miles, from western-most roundabout to Taconic State Parkway ramps)

AADT (2017): 8,500 eastbound (per count station 1.5 miles west)

Speed limit: 35 mph in the study area. Speed data not available at this location.

Serves Regional Transit? N (does serve school buses)

Freight Route? Y, per NYS Freight Plan. Approximately 4% of traffic is heavy vehicles.

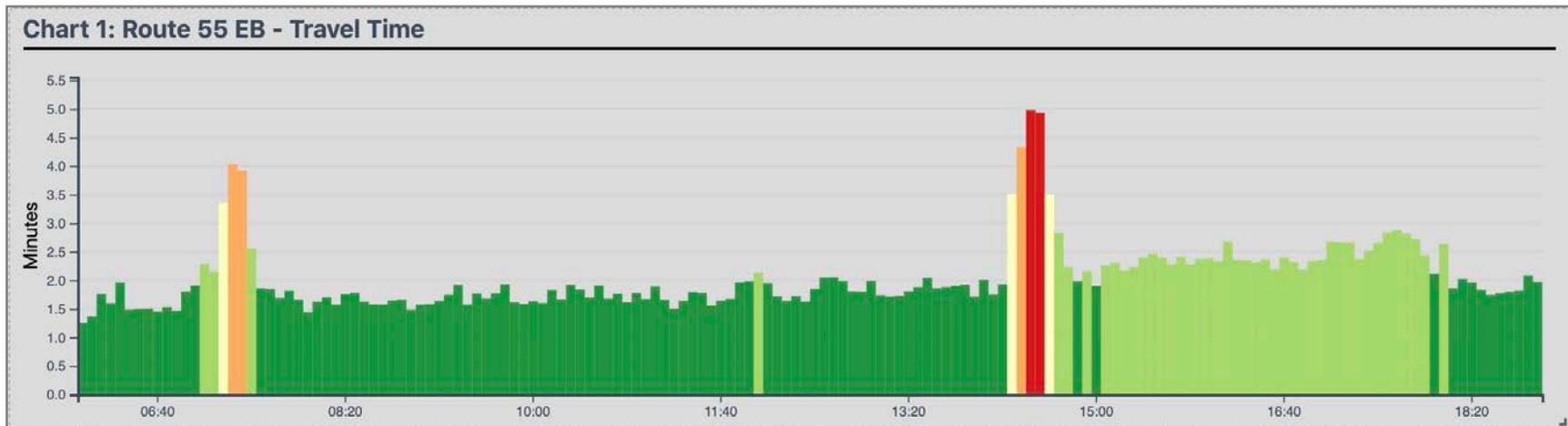
Congestion Management Process for the Mid-Hudson Valley Transportation Management Area

Technical Memo: TMA-Wide Micro-Level Screening (Dutchess Portion)

Macro screening results: This segment was identified based on a high LOTTR score, both for all vehicles and for freight (TMC 120P12473, 1.86 in AM and 1.57 in off-peak; TMC 120+10169, 1.56 in PM) as well as a high TTI for freight (TMC 120+10169, 2.07 in PM). This implies inconsistent travel times at various periods as well as PM peak period congestion. However, these are broad measures and do not describe more detailed congestion patterns.

Micro-level analysis:

- Travel time for the eastbound route was highest around 2:30 pm, followed by 7:20 am (see Chart 1). On weekends, travel times were consistent with weekday free flow travel times.

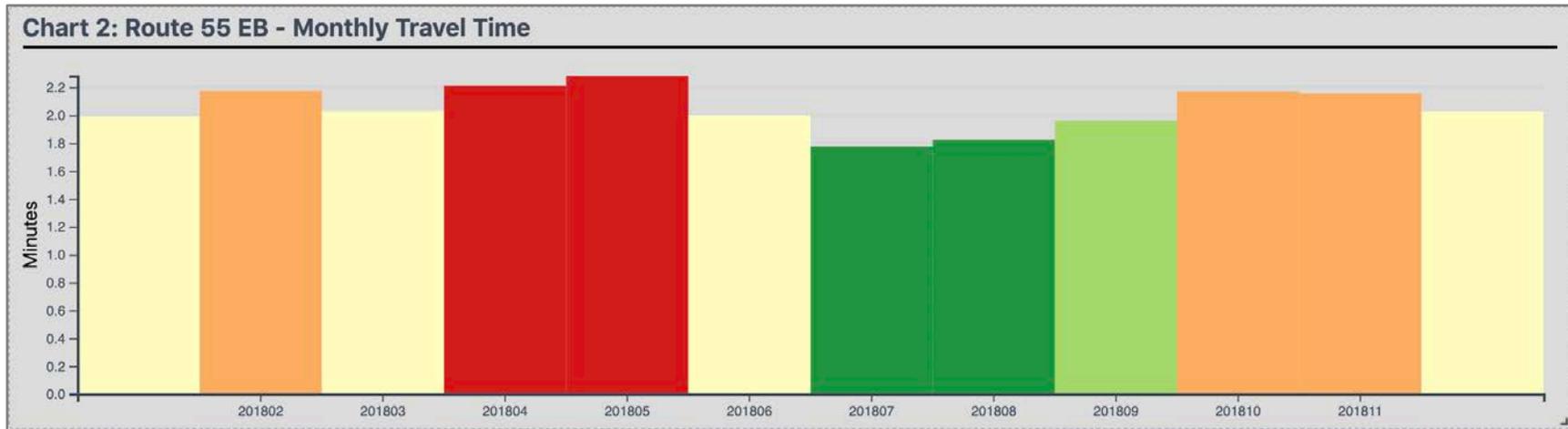


- The travel time index was also highest around 2:30 pm, followed by 7:20 am.
- Hours of delay was consistent with the pattern for travel time and travel time index, with a primary spike at 2:30 pm, followed by 7:20 am.
- Monthly data shows May to have the most hours of delay, followed by April and then June. Travel times are highest during April and May, and lowest in July and August (see Chart 2).
- Looking at 2016-2019 data, total hours of delay was highest in 2019, followed by 2017, then 2018 and 2016 (note that 2019 data was not complete as the time of this writing).

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- Incidents contribute to travel time variation.



Explanations:

Route 55 is a primary east-west route across Dutchess County and provides a direct connection to a full interchange at the Taconic State Parkway. This section just west of the Taconic serves Arlington High School, with about 3,000 students and 200 staff, and has multiple commercial plazas, with a total of 12 driveways and intersections over the 0.8-mile eastbound segment. Three signals were replaced with roundabouts in 2014 to improve traffic flow and safety. NYSDOT's Design Report for the roundabout project noted that there were 700 daily bus trips in and out of the high school, as well as buses on Route 55 from LaGrange Middle School (south on Stringham Rd).

The travel time delays coincide with the high school schedule (which starts at 7:30 am and ends at 2:15 pm) and the evening commute. While some school buses use a parallel road to access areas to the north and west, many use Route 55. In addition, some students and most staff drive to school. There are limited alternate routes, and they do not provide full access to the Taconic.

Existing plans: none (the roundabout project was completed in 2014).

Congestion Management Process for the Mid-Hudson Valley Transportation Management Area

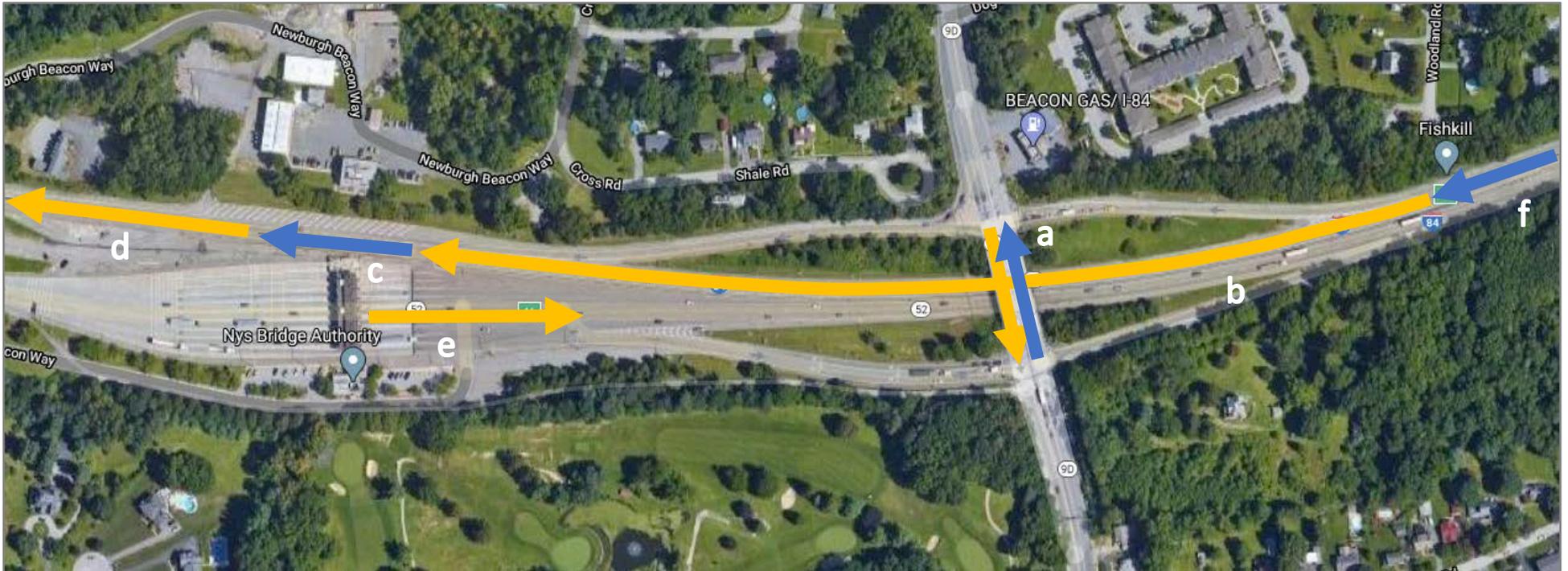
Technical Memo: TMA-Wide Micro-Level Screening (Dutchess Portion)

Recommendations:

- Data: Collect volume, speed, and vehicle class data closer to the congested segment. Collect turning movement counts at key intersections, including the three roundabouts.
- Incident management: Consider variable message signs to direct traffic to alternate routes where feasible.
- School traffic: Analyze bus and vehicle circulation; encourage school to work with NYSDOT and Town on alternate routes, if feasible. Consider reducing the number of students allowed to drive (or be driven) to school.
- Freight: work with freight companies to avoid peak/congested hours and use alternate routes if feasible.
- Access management: connect parking lots and consolidate driveways.
- Road network: Consider connecting the middle roundabout to Dr. Fink Rd; consider connecting Mandalay Rd (via Vail Rd Ext) to Cramer Rd to create another north-east option.
- Conduct further analysis and field observations.

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Location #4: Route 9D and I-84



Each arrow represents one TMC. Colors are only meant to help differentiate TMCs.

Description: This location is just north of the City of Beacon and south of several large residential complexes in the Town of Fishkill. It includes several segments of I-84 near Route 9D, and Route 9D between the I-84 ramps in the Town of Fishkill. I-84 under Route 9D has two lanes in each westbound and eastbound direction. Route 9D over I-84 has three northbound lanes and two southbound lanes. One lane in each direction is a left turn only lane onto I-84.

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TMCs:

- a) 120N29714 and 120P29714 (both 0.09 miles, Route 9D southbound & northbound crossing I-84)
- b) 120N04133 (0.41 miles, I-84 westbound between the Route 9D ramps)
- c) 120-04132 (0.01 miles, I-84 westbound west of Route 9D- at ramp merge)
- d) 120-04131 (0.41 miles, I-84 westbound west of Route 9D – further west)
- e) 120+04133 (0.05 miles, I-84 eastbound past the bridge toll booths to the Route 9D exit)
- f) 120-04133 (2.88 miles, I-84 westbound east of Route 9D)

AADT:

- I-84: approximately 50,000 (25,000 in each direction), per count station 2.5 miles east. Traffic on the Newburgh-Beacon Bridge is close to 70,000 vehicles per day.
- Route 9D: approximately 20,000 (10,000 in each direction).

Speed Limit:

- I-84: 55 mph (45 mph westbound for work zones in 2018-2019). Speed data not available at this location.
- Route 9D: 30 mph (45 mph north of the interchange). Speed data not available at this location.

Serves Regional Transit? Y

Freight Route? Y on I-84, per NYS Freight Plan. Approximately 15% of traffic on I-84 is heavy vehicles.

Macro screening results: This location was identified in all the Top 10 listings for Highway, as well as Transit and Freight, based on the following measures and segments:

- TTI – 9D northbound & southbound crossing I-84 (both PM)
- TED/mile - 9D northbound & southbound crossing I-84, and I-84 westbound west of Route 9D; I-84 eastbound past the bridge toll booths (for freight)
- LOTTR - I-84 westbound west of Route 9D (both segments) and I-84 westbound between the Route 9D ramps (all PM); Route 9D northbound & southbound crossing I-84 (weekend)
- TTTR - I-84 westbound east of Route 9D (PM)

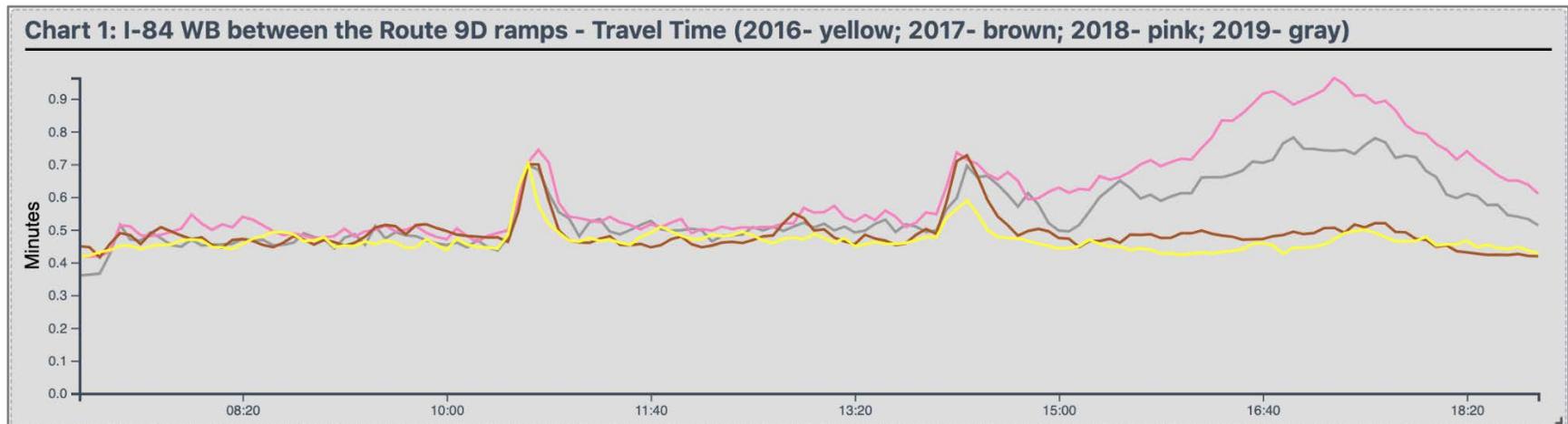
These results indicate slow travel times in the PM peak, substantial delay overall, and travel time variability, particularly during the PM peak.

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Micro-level analysis:

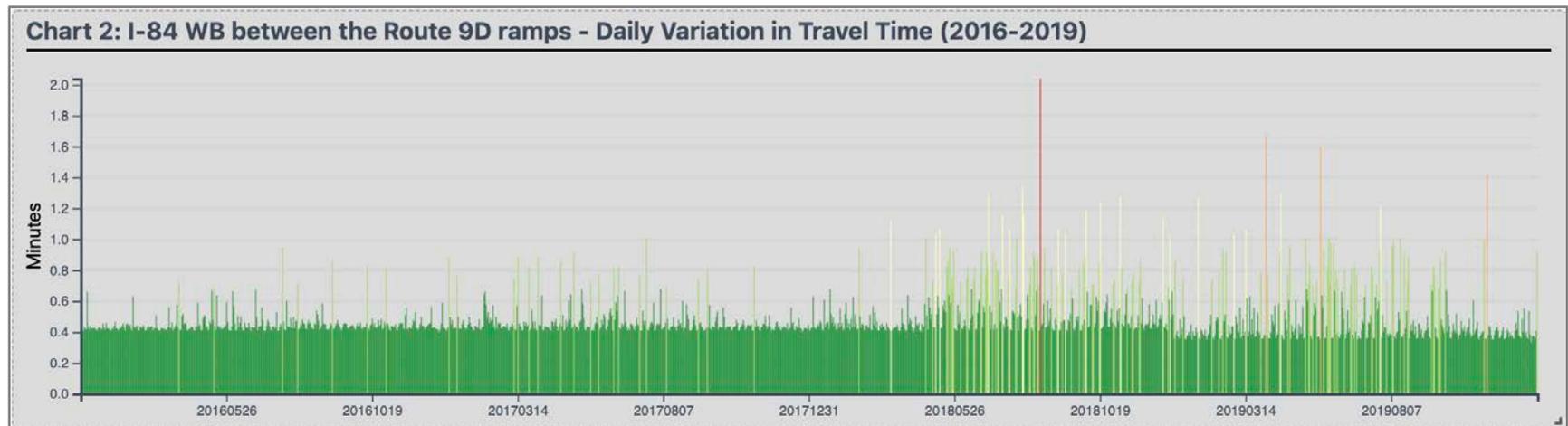
- Route 9D:
 - Speeds on the two short segments of Route 9D vary between 10-20 mph, with the lowest speeds southbound around 6:30-7:30 am and 4:30-6:30 pm. Northbound speeds are slowest at 4:30 pm. On longer segments of 9D northbound and southbound in the vicinity of I-84, speeds are lowest around 5:00 pm, at about 20 mph, and slow speeds are concentrated at the I-84 intersection.
 - In both directions, hours of delay are greatest on Fridays and peak around 4:30-5:00 pm. In the immediate vicinity of I-84, northbound appears to experience more delay than southbound. There is substantially less delay on weekends.
 - Travel time reliability is poor, with frequent spikes in travel time on certain days (possibly due to incidents).
 - Looking specifically at I-84 eastbound exiting at the interchange and traveling north on 9D, overall hours of delay are greatest on weekdays in the pm peak, but travel time and travel time index is highest on weekends around 3:00 pm. Hours of delay and travel time are worse on Sundays than other days.
- I-84 westbound:
 - Speeds drop (and travel time spikes) at two mid-day points (about 10:40 am and 2:10 pm). Delay spikes at those same times and shows a more prolonged peak between 4:30 and 5:30 pm (see Chart 1). Travel time reliability shows a similar pattern, evidence of congestion during those times.



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- Looking at four years of available data, travel time spiked in all four years at the mid-morning and mid-afternoon periods described above. However, in 2018 and 2019 travel time was highest in the PM peak, while in 2016 and 2017, travel times were highest during the mid-morning (see Chart 1).
- Delay has increased over the four-year period, with much more delay (and lower speeds) in 2018 and 2019 compared to 2016 and 2017.
- Delay is substantially greater on Fridays than other weekdays, and very low on weekends.
- Travel time is unreliable, with frequent spikes in travel time on certain days (possibly due to incidents). These incidents appear to have become much more frequent in 2018 and 2019 (see Chart 2).



- I-84 eastbound (tollbooth to end of 9D ramps):
 - Travel time on weekdays is fairly consistent, with a slight bump from 2:00 to 4:00 pm. Weekends show a more dramatic increase in travel time, especially around 4:00 pm.
 - Hours of delay during the week are greatest at 2:00 and 3:00 pm (see Chart 3). Weekend hours of delay are concentrated at 4:00 and 5:00 pm, but is overall lower than weekdays, due to lower traffic volumes (see Chart 4).
 - In general, eastbound travel time appears more reliable than westbound, with only a few spikes on certain days.
 - Sundays have more delay than other days of the week. This held true for all four years: 2016 – 2019 (see Chart 5).

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Chart 3: I-84 EB (tollbooth to end of 9D ramps) - Weekday Hours of Delay by Hour

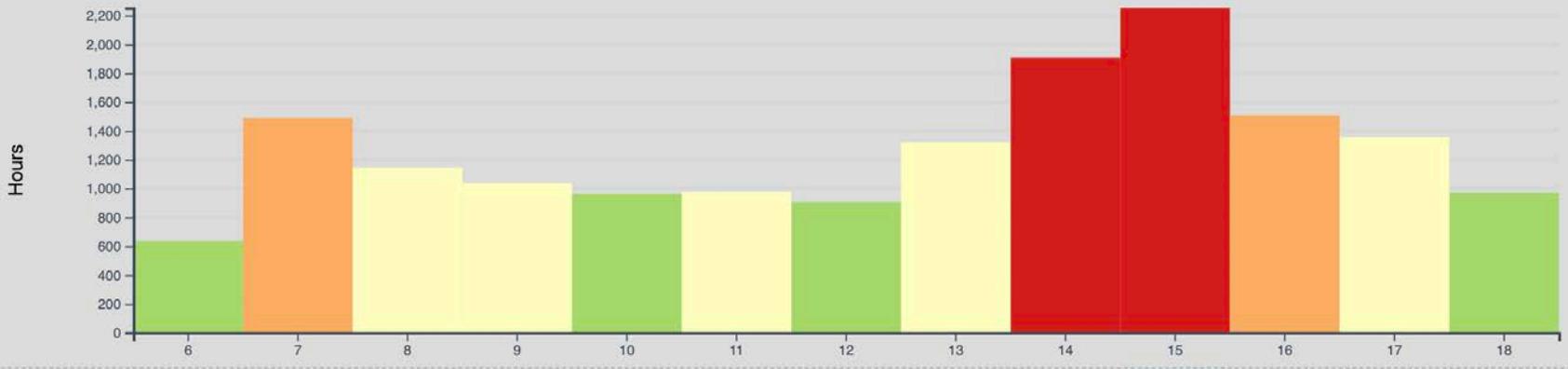
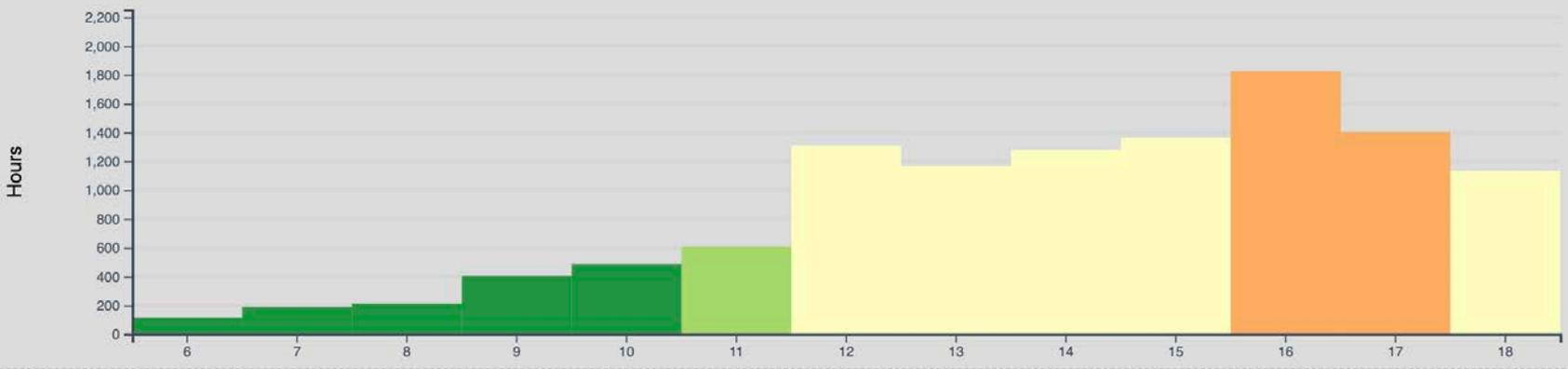
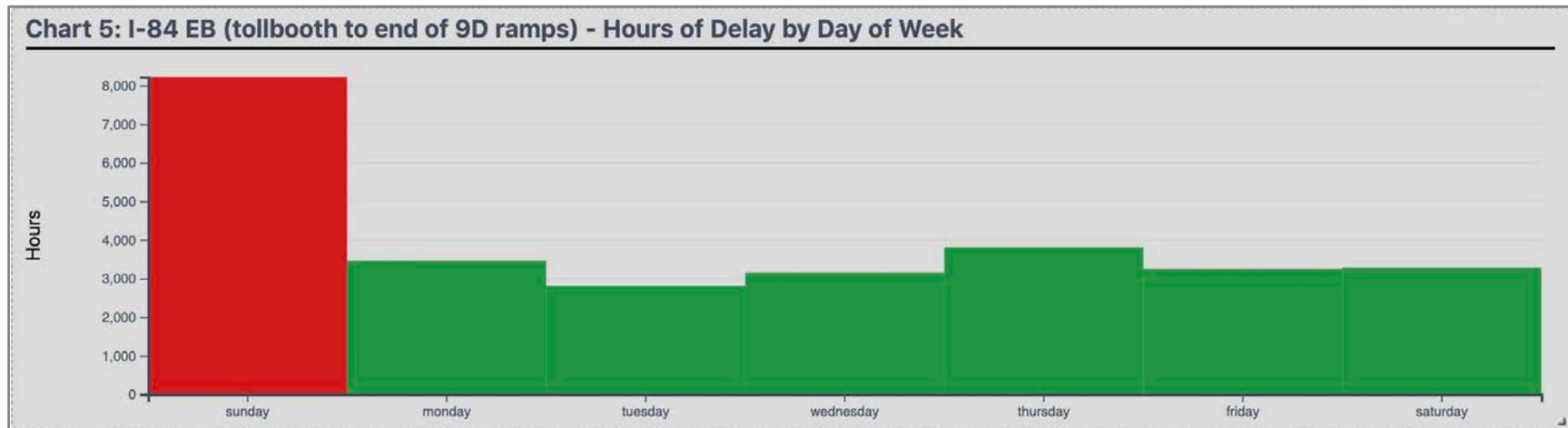


Chart 4: I-84 EB (tollbooth to end of 9D ramps) - Weekend Hours of Delay by Hour



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Explanations:

This interchange handles a very high volume of traffic, as it provides access to an Interstate and a State highway, one of the three Hudson River bridges in Dutchess County, and two major cities in our region, Beacon and Newburgh. Traffic in the area is growing, as Beacon has developed substantially in the past several years. Large residential projects are also planned near Route 9D in the Town of Fishkill.

On Route 9D, the two closely spaced intersections contribute to vehicle queuing. Delays on 9D correspond with peak commute times. Train arrivals at the Beacon train station, about one mile to the southwest, create pulses of traffic as people leave the station and head north on Route 9D. Northbound Route 9D is also affected by traffic exiting I-84 and heading north.

On I-84, the toll booth creates some delays eastbound, as vehicles must slow or stop and then merge or weave to either continue on I-84 or exit at Route 9D (westbound vehicles entering I-84 from Route 9D have their own lane, so there is no need to merge). Construction projects on I-84 have added substantial congestion and delay, especially given the volume of traffic and lack of alternate routes. In 2015, the south span of the Newburgh-Beacon Bridge was re-decked. In 2018-2019, the NYS Bridge Authority (NYSBA) replaced the I-84 over Route 9W deck, which reduced the number of westbound lanes from three to two, causing substantial delays on I-84 and on Route 9D, particularly in the pm peak. It is also possible that construction of the Mario Cuomo Bridge in 2017-2018 brought more traffic to the Newburgh-Beacon Bridge. Beginning in late 2020 through 2023, NYSBA plans to

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replace the north span bridge deck. This will again cause delays, as all traffic except that from Route 9D will use the south span (shared, with 2 lanes for each direction; traffic from Route 9D will use one lane on the north span).

The geometry of I-84 westbound may also contribute to incident-related delays. There is a substantial downhill curve before the interchange (and a speed limit reduction from 65 to 55 mph). If vehicles are not prepared to slow sufficiently, the combination of the curve, speeds, and congestion around the interchange could contribute to crashes. We know that I-84 near Route 9D a high number of crashes: 2015-19 data shows 377 crashes eastbound and 153 crashes westbound on I-84 between the County line and Route 9D (in terms of crashes per mile, these segments rank first and seventh of all State road segments in the county; the eastbound direction ranks ninth in terms of crashes per million vehicle miles, while westbound is 59th).

The Sunday delays on eastbound I-84 coincide with travelers returning from weekend trips and is consistent with local experience. The westbound I-84 mid-day delays are explained by NYSBA's policy (prior to 2020) to escort over-weight and over-width vehicles across the bridge by themselves at about 10 am and 2 pm every day. This requires NYSBA to slow traffic on I-84. Starting in 2020, NYSBA changed the policy so that most of these vehicles can pay for a permit online and avoid having to stop at the toll booth.

Existing plans/recommendations:

[Moving Dutchess 2](#) recommends redesigning this interchange to improve safety and operations while also incorporating safe pedestrian and bicycle access. This would be an extremely costly project and would require substantial federal and/or State funding. The Plan also suggests evaluating and coordinating traffic signal timings at the interchange and considering a second left-turn lane on Route 9D northbound onto I-84. Another specific suggestion cited is to provide more time for left turns out of the Beacon train station between 3 pm and 7 pm. The Plan highlights Route 9D between the I-84 ramps and both directions of I-84 between the Orange County line and toll booths near Route 9D as high-crash segments.

DCTC's [City of Beacon - Beekman Street Complete Streets Analysis](#) recommends a series of walking and bicycling improvements between the Beacon Train Station and Main Street, which would reduce vehicular traffic to and from the train station. The improvements include a protected bike lane on Beekman Street, secure long-term bike parking at the train station, and sidewalk and crosswalk improvements, among others. In addition, during research for the [Multi-Modal Accessibility Analysis](#) portion of this CMP, staff noted that the nearby Park & Ride at Dutchess Stadium is not well utilized and could be a partial solution to congestion and parking issues at the Beacon station.

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Recommendations:

- **Data:** Collect volume, speed, and vehicle class data on I-84 and Route 9D closer to the interchange. Collect turning movement counts at the two intersections on Route 9D.
- **ITS:** Expand ITS options to alert travelers of planned construction as well as incidents and direct them to seek alternate routes or adjust travel plans if feasible.
- **Freight:** work with freight companies to avoid peak/congested hours and use alternate routes if feasible.
- **Bridge:** Implement cashless tolling (planned for 2021, per NYSBA).
- **Signal timing:** evaluate signal timings at the interchange; improve timing and coordination as feasible.
- **Road network:** Evaluate the feasibility and effectiveness of a second left-turn lane on Route 9D northbound onto I-84.
- **Multi-modal options:** improve walking and bicycling options in Beacon, particularly for the train station area (see DCTC's [City of Beacon - Beekman Street Complete Streets Analysis](#)), as well as for new developments planned in Beacon and Fishkill.
- **Design:** Longer-term, develop concepts to redesign the interchange to improve safety and operations, while incorporating safe pedestrian and bicycle access.