

Strategic Response Analysis for Fire & EMS

Town of Ridgefield, CT



Rush Hour Traffic and Its Effect on Arrival Times from the Proposed Public Safety Building

April 9, 2025

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2. Executive Summary

A response time assessment was conducted to determine how relocating Ridgefield Fire Department (RFD) Headquarters from Catoonah Street, to the proposed Public Safety Building (PSB) on Old Quarry Road. The specific focus is to predict the impact of **rush hour traffic** on emergency vehicle travel through the intersection of Grove Street and Prospect Street.

Key findings include:

- Rush hour traffic introduces a **minimal delay of 20 seconds** on the primary response route.
- An **alternate route** increases travel time by an additional **14 seconds** but remains a viable backup.
- **Overall response times remain within acceptable limits**, ensuring continued emergency service effectiveness.

Based on these findings, no major operational changes are recommended. However, minor traffic management improvements, such as **signal preemption at key intersections**, could further enhance efficiency.

3. Introduction

3.1 Scope of Work

JB Consulting Group was asked by the Town of Ridgefield, Connecticut to predict the impact of rush hour traffic on RFD response times from a proposed new PSB located on Old Quarry Road. Response times will be developed from five years of RFD historic call data.

3.2 Objectives:

The objective of this analysis is to use Levrum Code3 Strategist software to develop a computer model (PSB Model) that utilizes historic call data, to predict emergency response times from the new PSB, including how rush hour traffic will impact response times to calls that occur south of the intersection of Grove Street and Prospect Street. All emergency calls, fire based, and Emergency Medical Service (EMS) based, are to be analyzed. Fire based calls that require the response of fire apparatus include structure fires, fire alarms, car fires, brush fires, hazardous material spills, and outside utility calls. EMS based calls include medical emergencies and motor vehicle crashes.

3.3 Participants / Acknowledgements

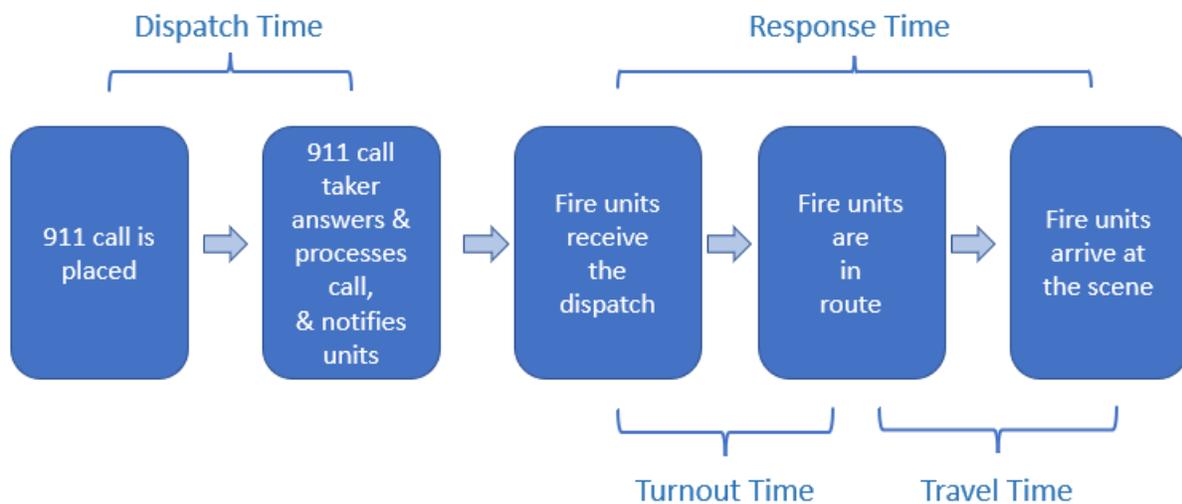
The JB Consulting Group would like to acknowledge the following individuals, for their time and cooperation, which made this analysis possible. Ridgefield Director of Public Works and Facilities,

Jacob Muller, and Ridgefield Fire Chief Jerry Myers. Both met with Blanchard in person, on Zoom webinars, and by telephone on multiple occasions.

4. Time Measurement

Time is crucial when measuring the effectiveness of emergency services. In emergency situations, every second counts, and the ability of emergency services to respond quickly can significantly impact outcomes such as saving lives, minimizing property damage, and reducing suffering (Figure 4.1).

Figure 4.1 Time Measurement



4.1 Dispatch Time

Dispatch time, also referred to as call processing time, includes the time from when the 911 dispatcher answers the phone until the dispatcher obtains information from the caller and passes it along to the firefighters in the fire station. The NFPA has established two response time objectives for dispatching in their Standard 1710. The 911 phone call must be answered (alarm answer) within 15 seconds, 95% of the time, and responders must be notified (alarm processing) within 64 seconds, 95% of the time. Dispatch time was not included in this study, as fire station location and/or staffing does not impact either of the two response time objectives.

4.2 Response Time

Response time is critically important for emergency service providers as it can directly impact the outcome of emergencies and the safety of individuals in need. The faster emergency services can arrive at the scene, the better the chances of mitigating damage, saving lives, and preventing further harm. Response time includes Turnout Time and Travel Time. Both times are within the responders' control.

4.2.1 Turnout Time

Turnout time begins once the firefighters are notified that there is a call. Turnout time includes moving to the fire apparatus or ambulance, donning the appropriate protective gear, taking a seated position within the vehicle, starting it up, and opening the overhead doors. A sample of historic call data showed an average turnout time of 94 seconds for career staff. After consulting with Chief Myers, a turnout time of 6 minutes was applied to units staffed by on-call firefighters.

4.2.2 Travel Time

Travel times for this study were calculated by using Open Street Map™ (OS) data. For each responding apparatus, simulation of response starts with the computed current location. If the responding unit has completed its previous assignment and returned to quarters, this location will be the unit's assigned station. If the unit is in service on-scene of a prior incident, the new response will start from that location. If the unit is returning from a prior incident, its position on the travel route from its last known location to its home station will be computed by estimating the total travel time and pro-rating the fraction of travel time represented by the dispatch date/time of the new incident. With the starting location computed, the street route to the new incident is computed using the OSM routing engine. Ideally, a simulated average travel speed is calculated from historical response data. In the case of this study, reliable response data with timestamps precise to seconds were not available, so travel speeds were estimated based on distance traveled from general industry figures. Simulated travel times were calculated from the street route and estimated travel speed.

4.2.3 On-Scene Time

In addition to response times, the average amount of time spent on-scene was established for both fire and EMS based calls. After the examination of historic call data, and consultation with Chief Myers, the average on-scene time for both fire apparatus and ambulances are established to be twenty minutes.

4.3 Turnaround time

Turnaround time is the time an ambulance crew spends at the hospital transferring patient care, restocking medications and supplies, and placing the ambulance back in service. Turnaround time is important as it impacts how quickly ambulances can be back in their community, ready to respond to the next emergency.

5. Data Import:

Historic emergency response data for the Ridgefield Fire Department, 16672 calls occurring between 1/1/2020 and 12/27/2024, were imported to Levrum Code3 Strategist software. Of these, 16,367 calls occurred with the Town of Ridgefield, and 305 were to provide mutual aid. Mutual aid calls are requests for emergency services from nearby communities.

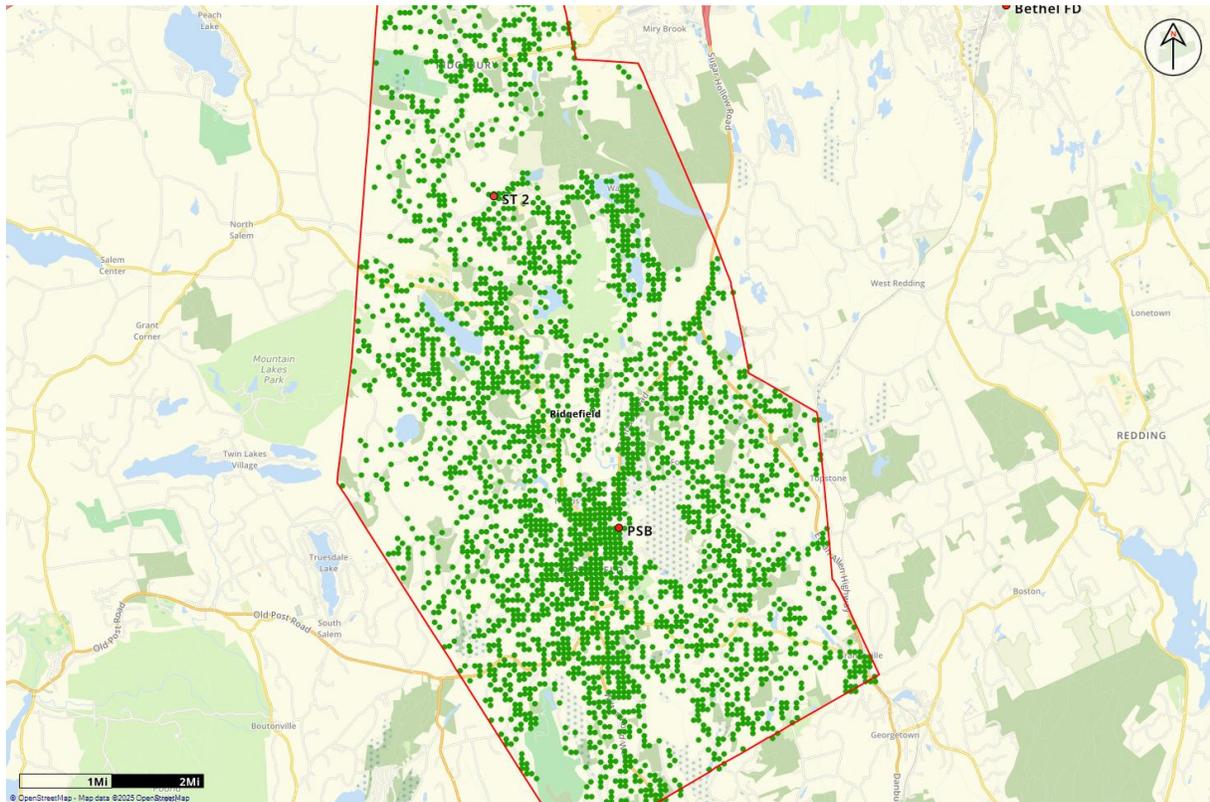
6. Historic Call Data Analysis

Historic emergency response data for the Ridgefield Fire Department, 16672 calls occurring between 1/1/2020 and 12/27/2024, were imported to Levrum Code3 Strategist software. Figure 6.0 shows the distribution of calls with green dots representing locations where calls occurred.

6.1 Emergency Call Distribution

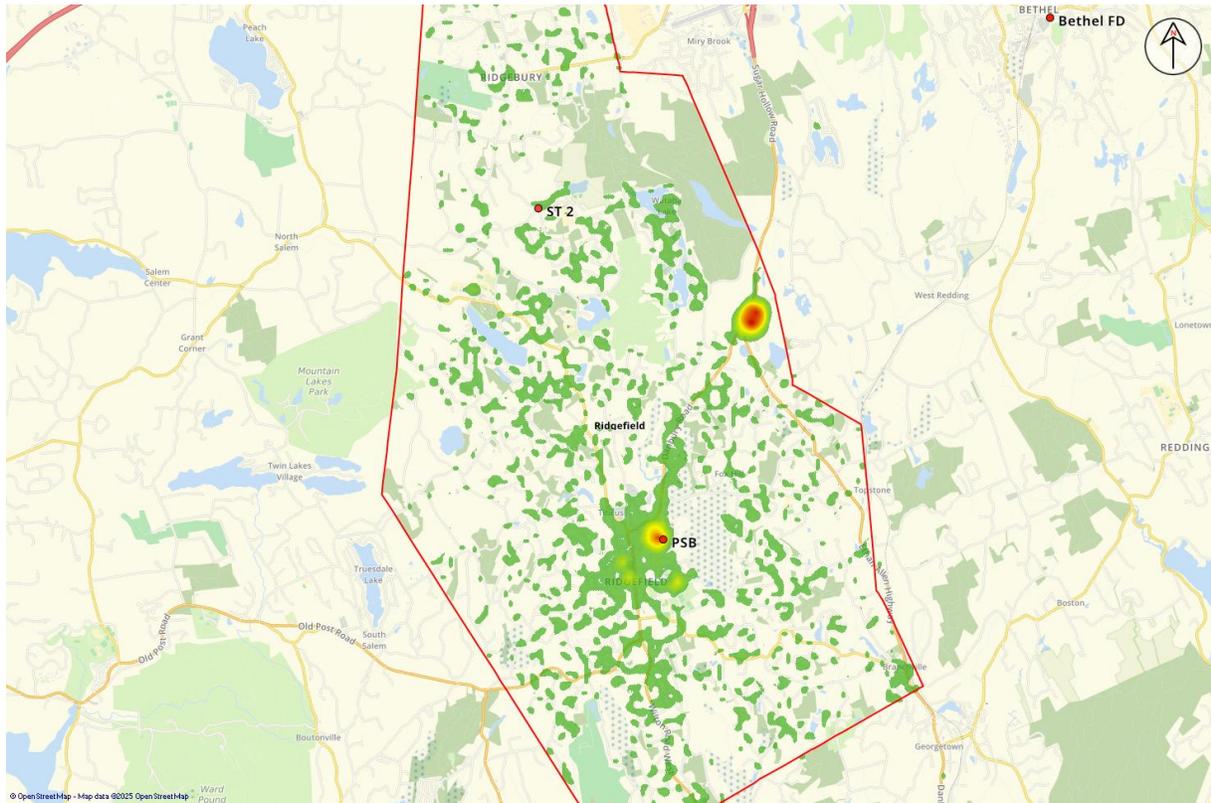
An analysis of the distribution of emergency calls within Ridgefield shows that the downtown area creates the greatest call volume, as shown in Figure 6.1.1

Figure 6.1.1 Call Locations for Calls Occurring Between 1/1/2020 and 12/31/2024



A heat map showing where the greatest concentration of calls occurs is shown in Figure 6.1.2. Both areas with the greatest frequency are health care related occupancies that create a high demand for EMS.

Figure 6.1.2 Heat Map of Calls Occurring Between 1/1/2020 and 12/31/2024



6.2 Creating Regions for Analysis

JB Consulting Group broke down Ridgefield into regions in order to allow for a more focused assessment of emergency call activity as shown in Table 6.1.1 and Figures 6.1.2 and 6.1.3. The focus of this study is on Regions 1A and 1B which combined account for 27.2% of call volume.

Table 6.2.1 Total Calls and Percentage of Total Calls By Region

2020-2024 Ridgefield - All In Town Calls		
Region	# of Calls	% of Calls
Region 1 A	2147	13.1%
Region 1 B	2301	14.1%
Region 1 C	9605	58.7%
Region 2 A	759	4.6%
Region 2 B	862	5.3%
Region 2 C	693	4.2%
Total	16367	100.0%

Figure 6.2.1 Total Calls by Region



6.3 Percentage of all calls that occur in Regions 1A and 1B during rush hour.

The number of all calls during rush hour are small. Only 2.4% of the total calls in Ridgefield occur in Regions 1A and 1B combined, 1% in Region 1A and 1.4% in Region 1B.

Table 6.3.1 *Percentage of all Calls in Regions 1A and 1B Calls that Occurred During M-F Rush Hour*

2020-2024 Total Rush Hour Calls by Region		
Region	# of Calls	% of Total Calls
Region 1A	166	1.0%
Region 1B	235	1.4%
Total	401	2.4%

7. Model Development.

A base model, Model 0, was developed in Code3 Strategist to accurately simulate RFD's current deployment model and response times. The model includes current resources, (station locations, apparatus locations, and staffing), and dispatching rules. Resources for the most frequently utilized mutual aid partners are also included in the model.

Model 0 performed response time calculations for each call utilizing Open Street Map (OSM) data. The base model's response time data was verified for accuracy with Chief Myers. Random calls from each district were selected to confirm that the base model sending the appropriate apparatus for each call type, that the apparatus was taking the appropriate route to the call and that the total response time was as close as possible to the actual response time. Many of the calls that were sampled during the validation process of Model 0 had arrival times within 10 seconds of the actual call.

Once it was verified that the base model was sending an appropriate response, a new model was created (PSB Model) by moving Station 1's apparatus and staff to the proposed site of the new Public Safety Building on Old Quarry Road.

8. Predictive Modeling

8.1 Simulations and Mapping

Models depicting fire station location, the apparatus they house, the assigned staff, and dispatch protocols were created. Each model then simulated a proper response to each call. Proper responses ranged from a single unit, to low aquity fire based and EMS calls, to a full compliment of three engines, a tanker, medic unit, Rescue 7 and Truck 8 for structure fires. To create realistic

unit availability, time spent on scene, traveling to the hospital, transferring patient care, and returning from the hospital were calculated, if applicable.

A map showing the the location of each call, to the nearest 100 block for each street address. For example, a call to 128 Main Street is located at 100 Main Street on the map. A call to 175 Main Street would be located at 200 Main Street. This provides a measure of anonymity for utilizers of emergency services.

8.2 Region Affected By Rush Hour Delay

To better analyze the effect of rush hour on response times, the area affected was divided into two regions. Region 1A includes the Southwestern Ridgefield and Region 1B includes the Southeastern Ridgefield.

Figure 8.2.1 Region 1A and Region 1B.



8.3 Simulation Results For Five Years Of Calls, 2020-2024

Two sets of Simulation Results for response times were created for each of the 16,672 emergency calls occurring between January 1, 2020 and December 31, 2024. The results were filtered to include only the 4448 calls that occurred in Regions 1A and 1B.

The first set of results let units utilize the Grove Street and Prospect Street intersection as if it was the quickest route to the call.

The second set of results had units avoid that intersection, taking a right off of Old Quarry Road onto Grove Street, heading north to the intersection of Danbury Road. In most instances units take a left onto Danbury Road and continue south onto Main Street. In a few instances the shortest alternate route has units take a right onto Old Quarry Road continuing along Ligi's Way to a right onto Farmingville Rd, to Cains Hill Rd to Ethan Allen Hwy (Route 7). Units turned right onto Ethan Allan Hwy and continued south into the Branchville area.

Table 8.3.1 Average Arrival Times Regions 1A and 1B by Route

4448 Total Calls - First Unit Arrival Time				
Route	Region	# Calls	Avg. Arrival	Delay
2025 Ridgefield CT - 2.1 PSB Using Grove to Prospect Street	1A	2147	6:22	
2025 Ridgefield CT - 2.1 PSB Alternate Route - Rush Hour Delay	1A	2147	6:48	0:26
2025 Ridgefield CT - 2.1 PSB Using Grove to Prospect Street	1B	2301	6:01	
2025 Ridgefield CT - 2.1 PSB Alternate Route - Rush Hour Delay	1B	2301	6:43	0:42

Figure 8.3.1 Average Predicted Responses Times for All Calls – Using Grove to Prospect St

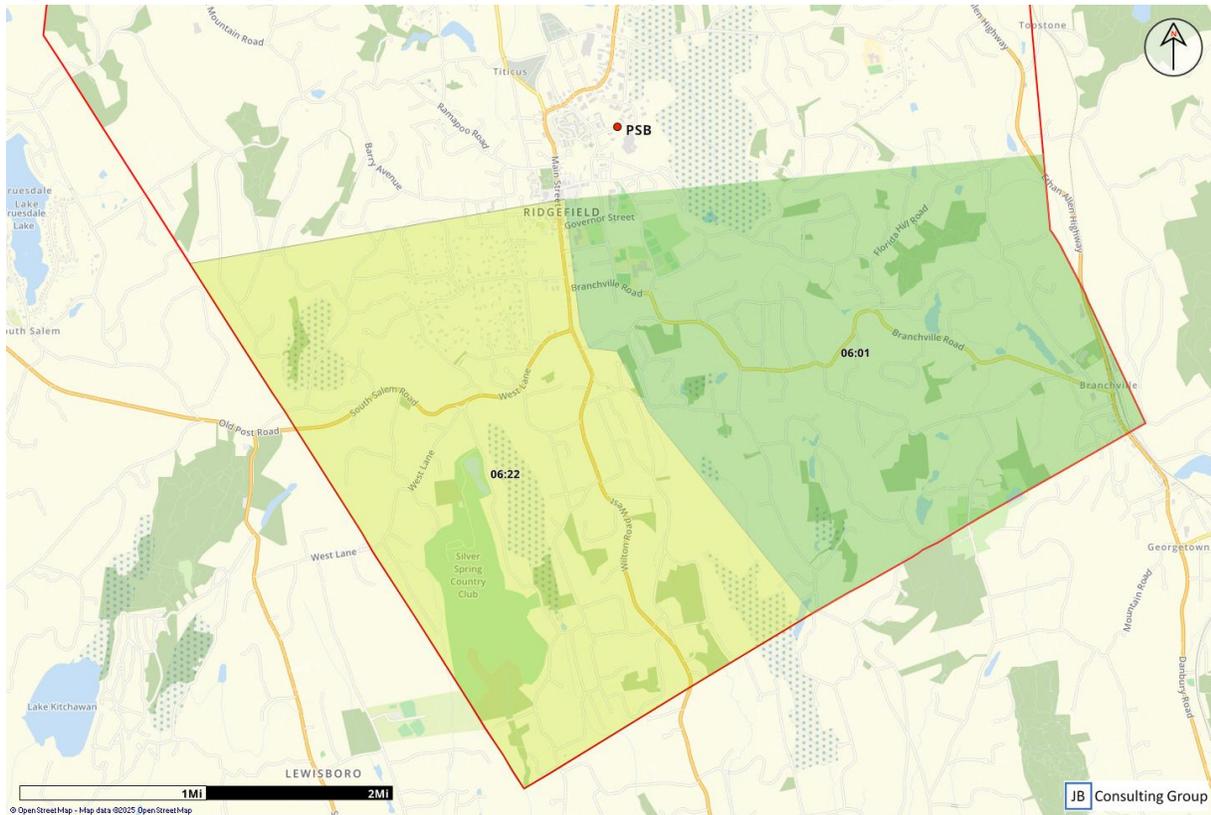
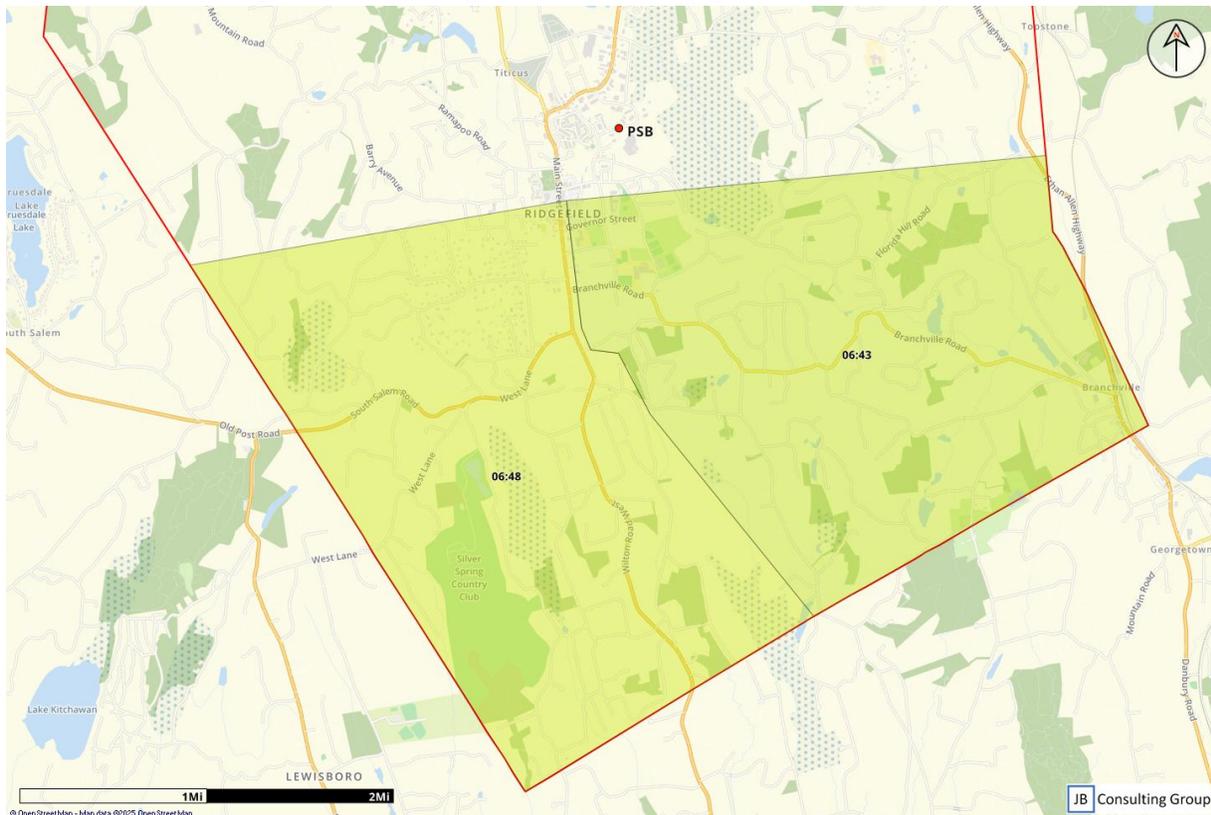


Figure 8.3.2 Average Predicted Response Times – Using Alternate Route (Rush Hour Delay)



8.4 Simulation Results for Five Years Of Rush Hour Calls, 2020-2024 – Regions 1A and 1B

The previous results were filtered further to include only the 401 calls occurring Monday through Friday, between the hours of 2:30 pm and 5:00 pm.

Table 8.4.1

401 Rush Hour Calls - Regions 1A and 1B M-F 2:30pm to 5pm				
Route	Region	# Calls	Mean Initial	Delay
2025 Ridgefield CT - 2.1 PSB Using Grove to Prospect Street	1A	166	6:56	
2025 Ridgefield CT - 2.1 PSB Alternate Route - Rush Hour Delay	1A	166	7:21	0:25
2025 Ridgefield CT - 2.1 PSB Using Grove to Prospect Street	1B	235	6:03	
2025 Ridgefield CT - 2.1 PSB Alternate Route - Rush Hour Delay	1B	235	6:45	0:42

Figure 8.4.1 Average Response Times to Regions 1A and 1B – Calls During Rush Hour No Delay

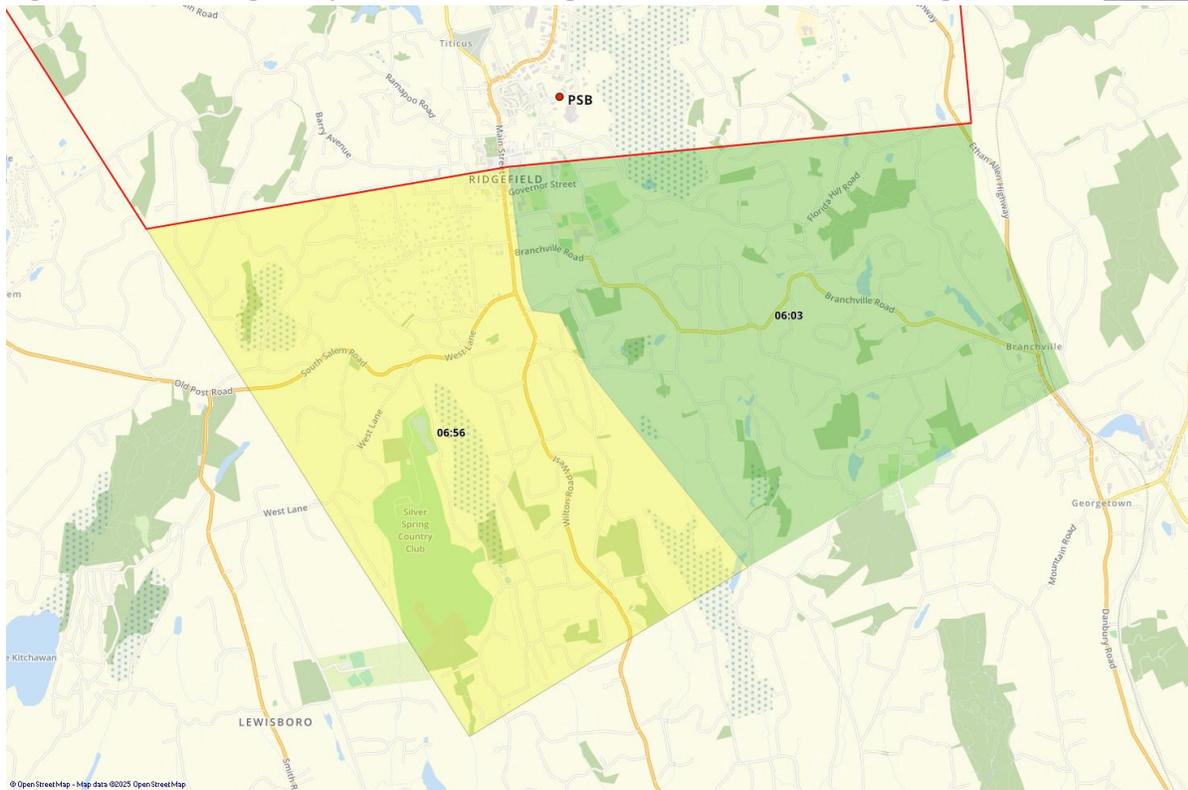
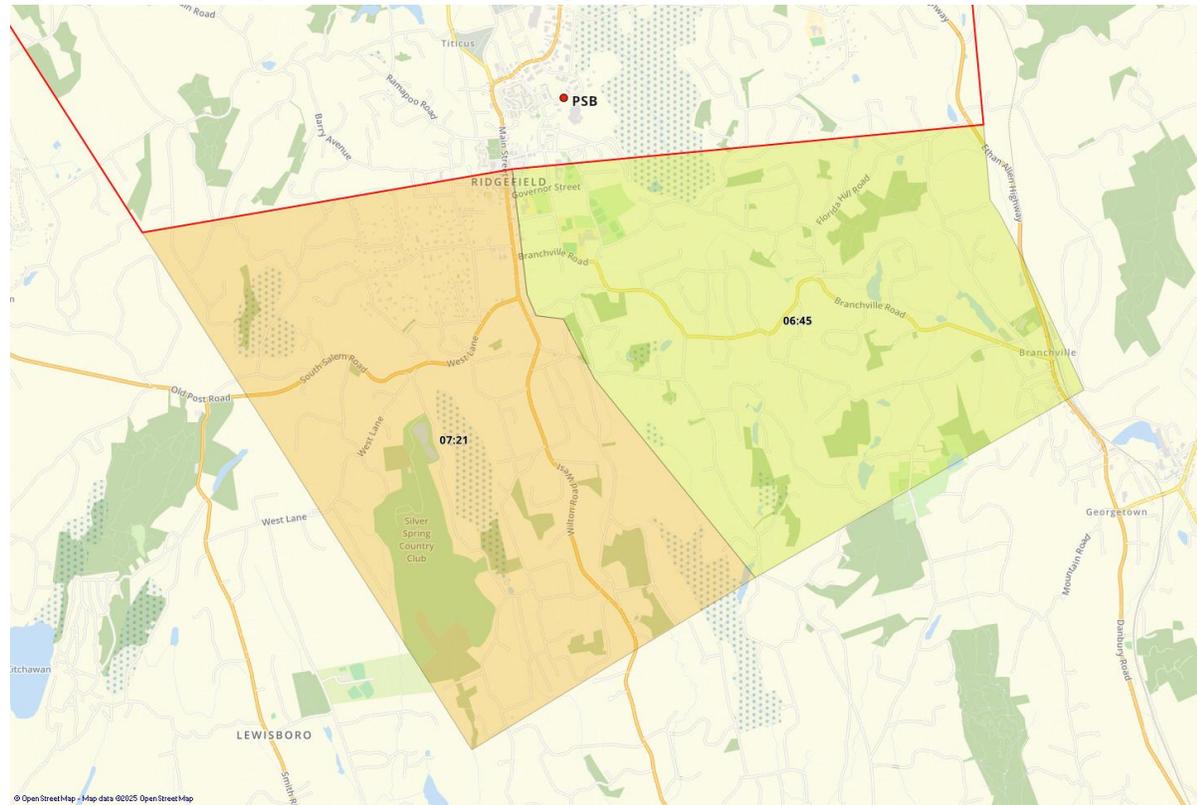


Figure 8.4.2 Average Response Time to Regions 1A and 1B – Alternate Route



8.5 Response Examples

Below are three examples of the predicted response times in Regions 1A and 1B. Each call occurred during the Monday thru Friday predicted rush hour timeframe. Each is also a fire alarm call where the first arriving unit is a pumping engine.

8.5.1: Fire Alarm In The Area Of 200 Branchville Road

An example of a call that would have units normally take Grove Street to Prospect Street occurred during March 2023. Units were dispatched to an emergency call in the area of 200 Branchville Road. The predicted response time from the PSB with no delay would have been 5:46. If you were to add the 0:20 observed delay from December 3, 2024, the arrival time would have been 6:06. The predicted response time from the PSB with units using the alternate route was 6:20, a 0:34 delay.

Table 8.5.1.1

Area of 200 Branchville Road - March of 2023				
Route Taken	Region	# Calls	Arrival Time	Delay
2025 Ridgefield CT - 2.1 PSB Quickest Route (Grove St. No Delay)	1A	1	5:46	
2025 Ridgefield CT - 2.1 PSB Alternate Route - Rush Hour Delay	1A	1	6:20	0:34

Figure 8.5.1.1 Quickest Route (No Delay) to the area of 200 Branchville Road

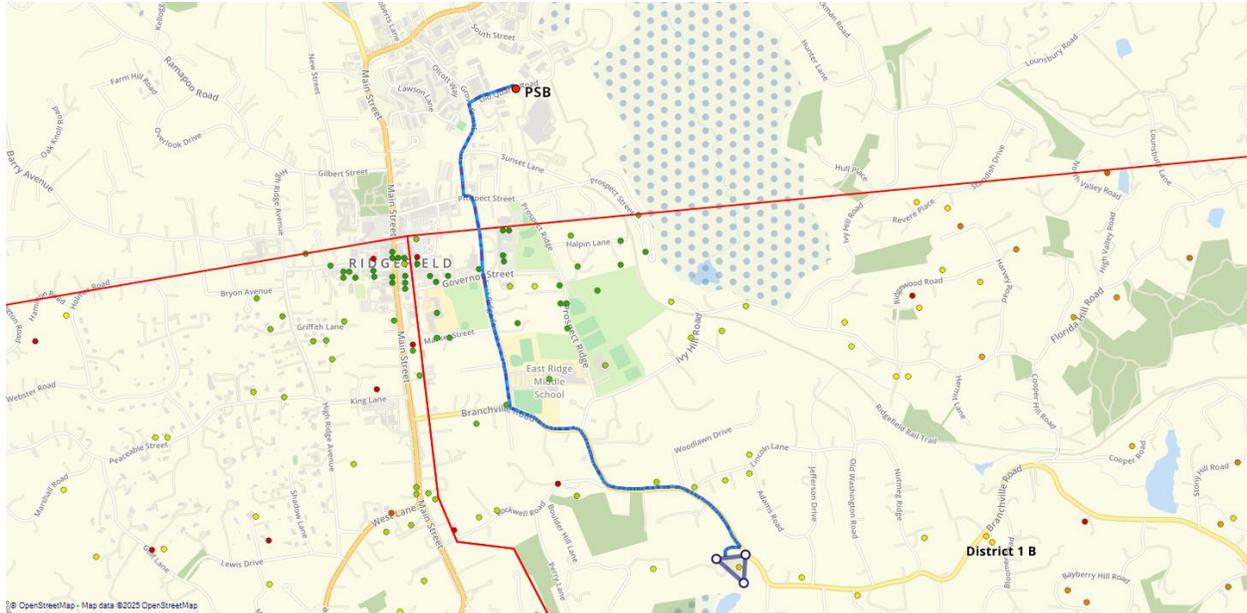
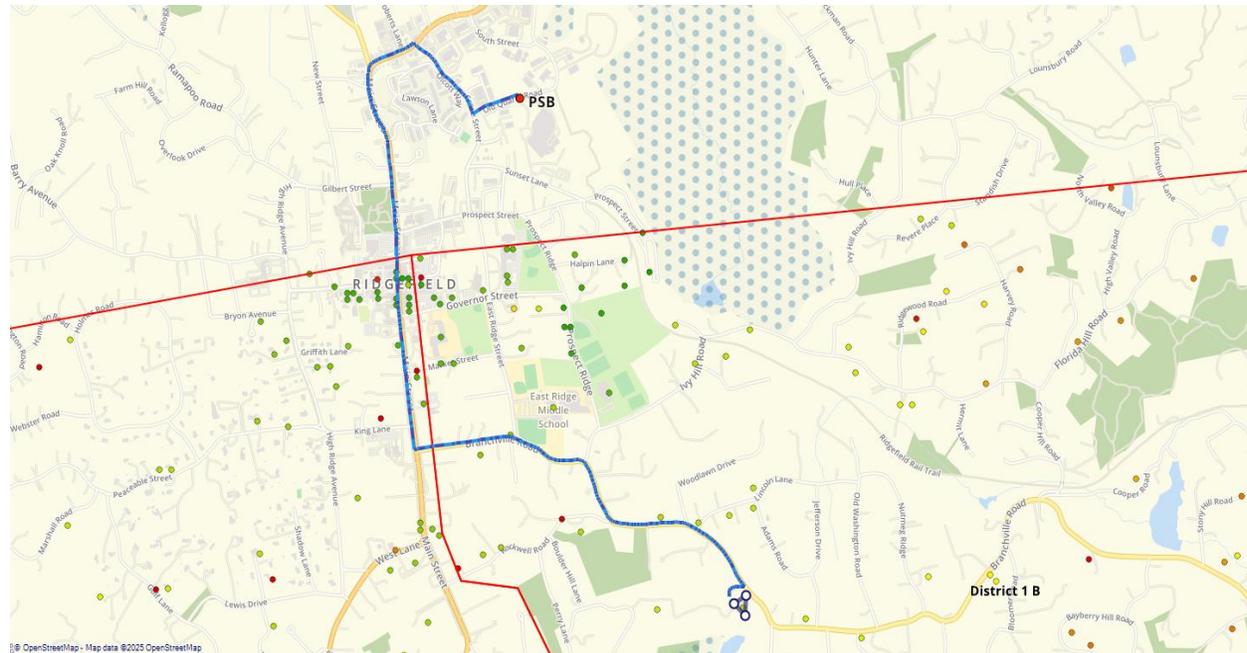


Figure 8.5.1.2 Alternate Route (RushHour Delay) to the area of 200 Branchville Road



8.5.2 Response Example 2: Fire Alarm on West Branchville Road
 During November of 2020 units responded to a fire alarm. The predicted response time, using the most direct route through the Grove St. and Prospect St. intersection is 8:19. The predicted response time using the alternate route is 9:26, or 1:07 longer.

Table 8.5.2.1

West Branchville Road	Region	# Calls	Arrival Time	Delay
Route Taken				
2025 Ridgefield CT - 2.1 PSB Quickest Route (Grove St. No Delay)	1A	1	8:19	
2025 Ridgefield CT - 2.1 PSB Alternate Route - Rush Hour Delay	1A	1	9:26	1:07

Figure 8.5.2.1 Quickest Route (No Delay) to West Branchville Road

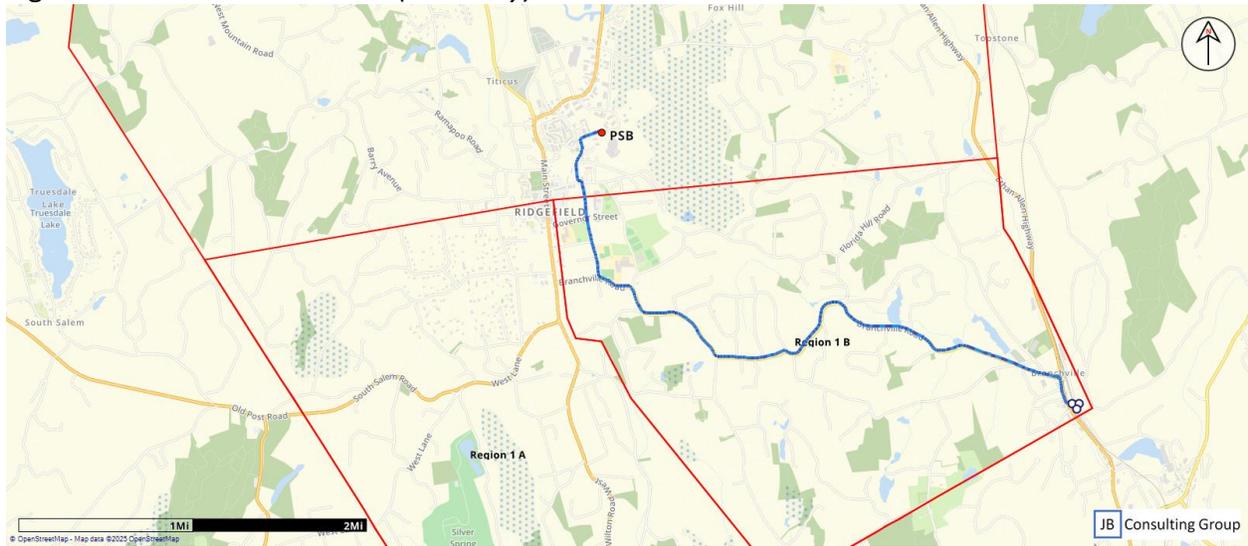
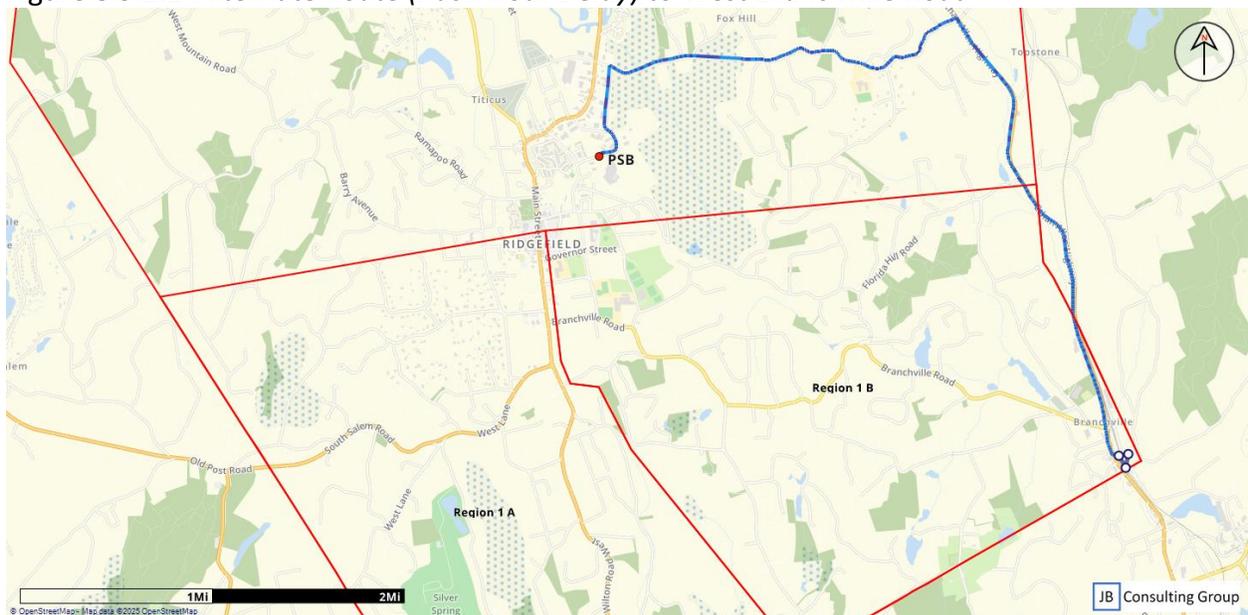


Figure 8.5.2.2 Alternate Route (Rush Hour Delay) to West Branchville Road



8.5.3 Response Example 3: Fire Alarm on Wilton Road West

In November of 2023 RFD responded to a fire alarm on Wilton Road West at the Wilton Town Line. Using the quickest route units are predicted to arrive on scene in 5:46. Using the alternate route it is predicted that units would arrive on scene in 6:20, or 0:44 longer.

Table 8.5.3.1

Wilton Road	Region	# Calls	Arrival Time	Delay
Route Taken				
2025 Ridgefield CT - 2.1 PSB Quickest Route (Grove St. No Delay)	1A	1	5:46	
2025 Ridgefield CT - 2.1 PSB Alternate Route - Rush Hour Delay	1A	1	6:58	1:12

Figure 8.5.3.1 Quickest Route (No Delay) to the area of 100 Wilton Road

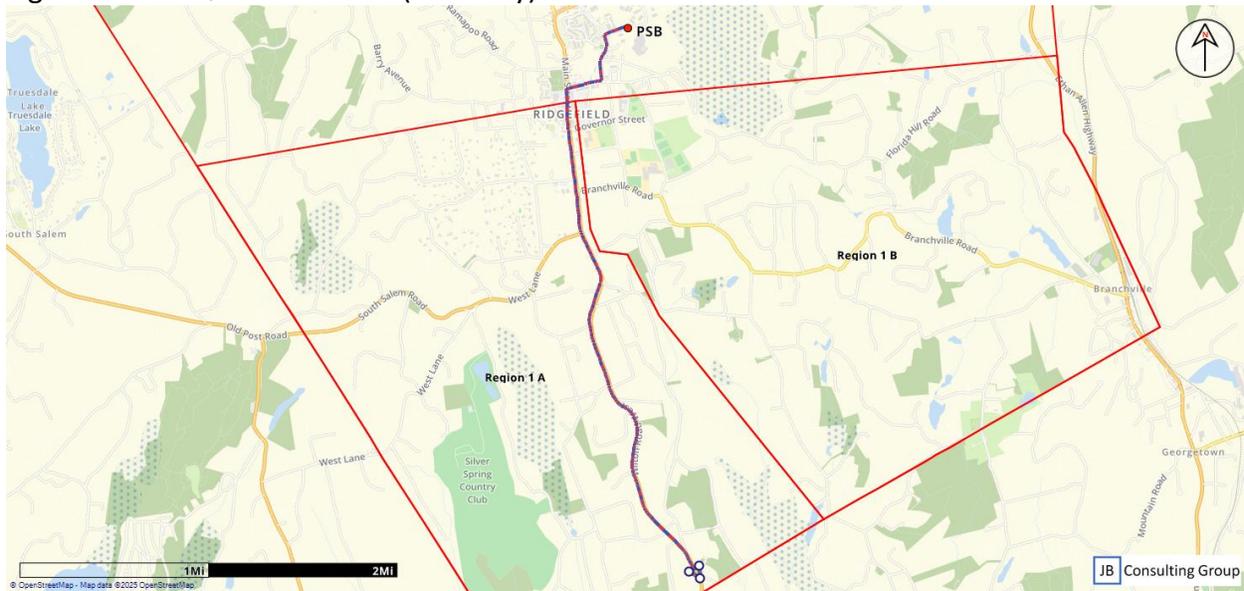


Figure 8.5.3.2 Alternate Route (Rush Hour Delay) to the area of 100 Wilton Road



9. Conclusions

The findings confirm that the relocation of Ridgefield Fire Department Headquarters from Catoonah Street to Old Quarry Road into the **new PSB location is strategically sound** and *ensures reliable emergency response even during peak traffic hours.*

- *Rush hour traffic adds an average delay of 20 seconds.*
- *The alternate route is a backup option but introduces an additional 14-second delay.*
- **Response times remain within NFPA guidelines**, supporting the proposed PSB location.

Operational Recommendations

- No major modifications are needed.
- Consider the installation of **traffic signal preemption at Grove & Prospect** to mitigate occasional heavy congestion.
- Conduct further **worst-case scenario testing** to validate long-term trends.

There is heavy traffic at the Grove and Prospect Street intersection Monday through Friday, during morning rush hour and in the afternoon between the hours of 3PM and 5PM. Rush hour traffic combines with arrival and dismissal traffic from the nearby school.

Fire Chief Myers indicated that an alternative route to reach the southern portions of Ridgefield would be to take a right and travel North on Grove Street from Old Quarry, to the intersection of Route 35, take a left and continue to travel south along Main Street.

Historic emergency response data for 16,672 calls that the Ridgefield Fire Department responded to between 1/1/2020 and 12/27/2024 were imported to Levrum Code 3 Strategist software. The 16,672 emergency call response results for the PSB Model were filtered so that analysis could be conducted on only the calls occurring Monday through Friday, between the hours of 3PM and 5PM. **Analysis of this specific data set validates response times remain within NFPA standards.**

10. Appendix

10.1 Levrum Code3 Strategist

The Code3 Strategist 2.10.0.7489-beta software system was used to perform most of the analyses in this study. Code3 Strategist is a discrete event simulation system that models the behavior of staff, apparatus, and dispatching systems, given operational models defined by the planners. Code3 Strategist “pretends” to be each staff member assigned to each piece of apparatus on each call, according to the definitions supplied with the model being evaluated to include, personnel qualifications, apparatus capabilities and roles, incident classifications, dispatch policies, geographical variations, and street networks. The model accounts for cross-staffing of units, unavailability due to concurrent calls, part-time staffing, alternate turnout times for career vs. on-call staff and other “real-world” factors that influence system performance. Integrated analytics enable planners to evaluate effects of proposed changes in response times (initial unit response, full complement, or effective response force), unit workload, apparatus mileage, incident delays and other metrics.

10.2 Rush Hour Delay Calculations

10.2.1 Observed Delay

JB Consulting Group observed the intersection between 1pm and 1:30pm on Tuesday, December 3, 2024. During this time no more than 4 cars were cued up on Grove Street at the stop sign.

At approximately 3:00 PM, Chief Myers had a pumping engine travel, with warning devices activated, from the proposed PSB location on Old Quarry Road, to Grove Street, taking a left onto Grove Street and travelling to the stop sign at Grove Street and Prospect Street. The few cars that were traveling south on Grove Street pulled to the right and the pumper reached the stop sign with little or no delay. The time recorded to travel that route was one minute and fifteen seconds (1:15).

At approximately 3:30 PM, Chief Myers had the pumping engine repeat the trip when between 8 and 10 vehicles were cued up at the stop sign at Grove and Prospect Streets. The pumping engine, travelling with warning devices activated, reached the stop sign at Grove and Prospect Streets in one minute and thirty-five seconds (1:35), a delay of twenty seconds (0:20). A few cars that were at the stop sign proceeded to make their left or right turn to get out of the way, and other cars moved to the right shoulder of the roadway as far as possible. There will be times when more vehicles are backed up at this intersection, resulting in longer delays.

10.2.2 Alternate Routes

Chief Myers indicated that units could avoid the rush hour backup on Grove Street by using an alternate route to reach the southern portions of Ridgefield. Responding units could take a right on Grove Street from Old Quarry, and travel north to the intersection of Route 35. There they would take a left onto Danbury Road and continue to travel south onto Main Street.

For calls in the Branchville area of town, an alternative route might be to turn right onto Old Quarry Road and continue onto South Street, bearing right onto Ligi's Way continuing to Farmingville Road, turning right onto Farmingville Road, continuing onto Cains Hill Road, taking a right onto Eathan Allen Highway and heading South into the Branchville area.

To obtain response times to the southern portions of Ridgefield, the Model ran the call data using a modified OSM file that redirected units to avoid the Grove Street and Prospect Street intersection and seek the quickest alternate route.