

Left Turn Restrictions Study Results

To: Village of Hastings-on-Hudson
From: Sam Schwartz Engineering, DPC
Date: September 21, 2021
Re: Left Turn Restrictions Study Results – FINAL REPORT

Executive Summary

The goal of this study was to implement options to reduce the number of cut-through trips and identify the effectiveness of those treatments.

Implementing temporary turning restrictions and installation of four-way stop controls at three intersections on High Street successfully reduced the number of cut-through trips during the weekday AM Peak period by 85%. It is recommended that the temporary left turn restriction be made a permanent condition.

The Stop sign installations coincided with the temporary Left Turn Restriction study but were warranted to address safety concerns with sight distances at those locations and should remain in place.

Although the temporary U-Turn restriction on Broadway at Devon Way appeared to reduce cut-through trips, the reduction was not significant. The minor benefits do not outweigh the impacts to circulation and access to neighborhoods during the U-Turn restriction. Therefore, making the U-Turn restriction a permanent condition is not recommended.

1. Project Background and Overview

The Village of Hastings-on-Hudson (“the Village”) has asked Sam Schwartz Engineering, DPC (“Sam Schwartz”) to confirm vehicles were using High Street as a cut through route to Yonkers instead of the preferred route of the Saw Mill River Parkway (SMRP) and to develop measures to reduce those trips. Sam Schwartz began assessing the traffic patterns on High Street as part of a project in 2019. An Origin-Destination survey was performed on High Street for that project. The results of that survey indicated a significant portion of the AM peak traffic on High Street was traveling towards the Executive Boulevard area in Yonkers, presumably from nearby major roads such as the SMRP.

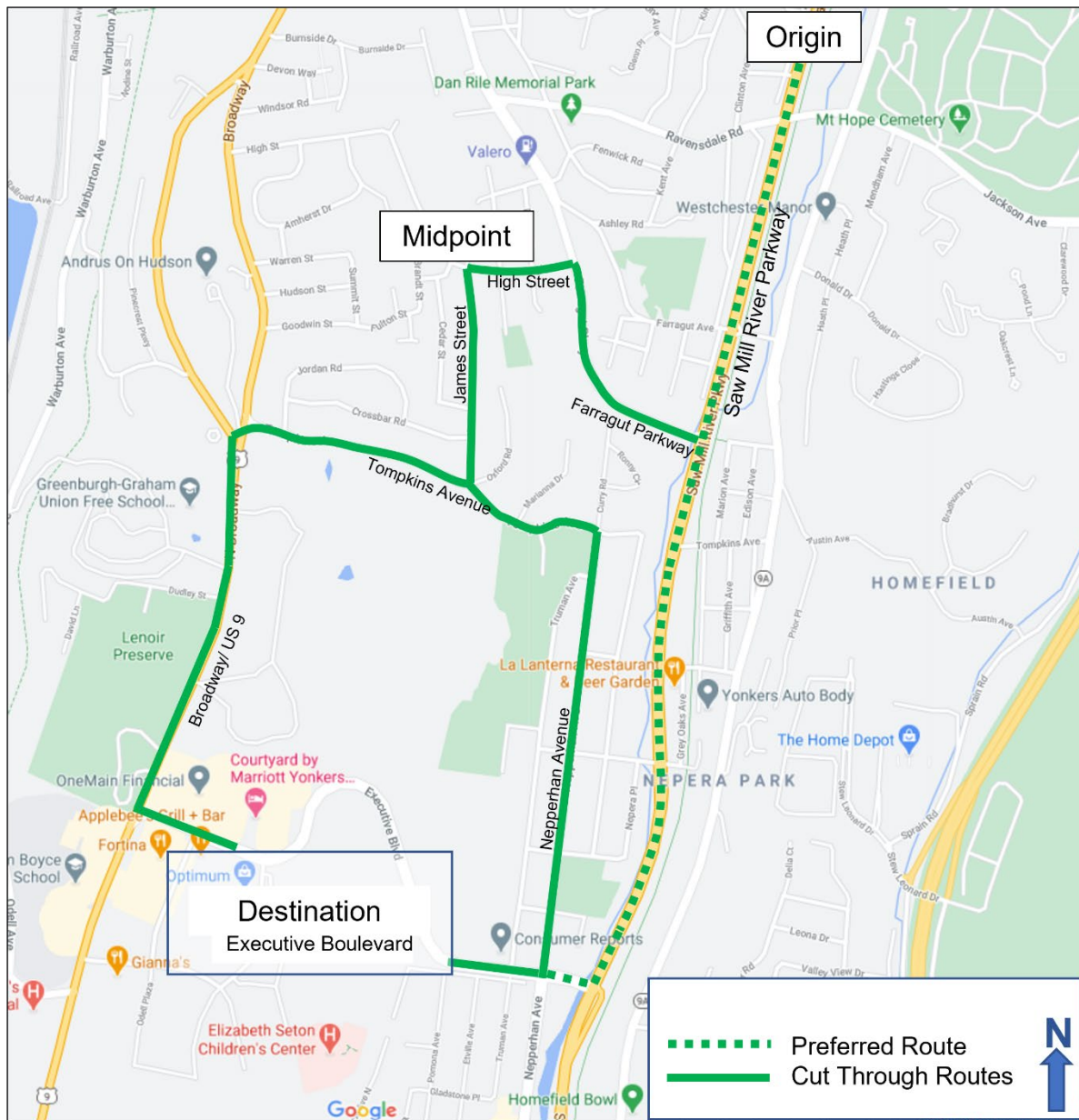
The current study seeks to identify the impacts of the improvements developed, during the previous project, to reduce the number of vehicles using the Village’s local roadway network as a cut-through during the AM peak commute period. The predominant cut-through route utilized Farragut Parkway, High Street and James Street. The measures to address cut-through traffic include temporarily prohibiting left turns from High Street onto James Street and prohibiting the use of the U-Turn on US Route 9/Broadway at Devon Way, both during the AM peak period from 7:00 AM to 9:00 AM.

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FIGURE 1 on the following page depicts the Preferred Route and the identified Cut Through Routes.

The purpose of this memorandum is to summarize the impacts of the measures developed to reduce cut-through trips, and includes the data collected, methodology for analysis, and findings.

FIGURE 1: Preferred and Cut Through Routes



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2. Study Timeline

Following a two-week deployment of a portable Variable Message Sign warning motorists of the upcoming change, the temporary left turn restriction implemented on March 4, 2020; the COVID-19 pandemic began to significantly impact traffic and travel patterns in New York, and specifically in Westchester County, including Hastings-on-Hudson and Yonkers. Due to the quick spread of COVID-19 cases, and the sequential implementation of travel restrictions and business closures, there was an immediate decline in vehicular travel, especially for commuting trips throughout the region. The temporary left turn restriction remained in place during this time.

This study establishes a timeline of conditions in four different analysis periods:

- I. Pre-Pandemic – This is the baseline condition and is the period prior to the left turn restrictions on High Street, March 2019 to February 2020.
- II. Left Turn Restrictions – This period covers March 2020 to October 2020 and represents the timeframe of the installation of the temporary left turn restrictions.
- III. Left Turn Restrictions with Stop Signs – This period includes the temporary left-turn restrictions and new Stop Signs on High Street. During this same period, permanent Stop Signs were installed on High Street (at Rose Street, James Street and Hudson Street), creating an all-way stop controlled condition. The Stop Sign installations were implemented to address sight distance concerns at the High Street intersections and were not part of original cut through traffic study. This period November 2020 to February 2021.
- IV. U-Turn restrictions – This period includes all conditions from analysis Period III with the addition of a temporary U-Turn prohibition from northbound Broadway to southbound Broadway at Devon Way, March 2021 to April 2021.

3. StreetLight Data Service

As part of this study, the use of StreetLight Data Service (StreetLight) was contracted to provide travel pattern data throughout the Village. StreetLight uses anonymized Location-Based Services (LBS) information obtained through smartphone apps. The LBS information is tracked, time-based, user location data in the physical world. Data that can be obtained includes Origin/Destination patterns locally and regionally. The benefit of using a data platform such as StreetLight is that it can provide an understanding of travel patterns over a large area with the ability to focus on specific routes. In today's world, where 85% of the country's population uses a smartphone, performing a similar study using traditional methods would require significantly more resources with less granular results and smaller sample sizes. The StreetLight database is updated monthly.

Although travel data can be evaluated with narrow parameters, as focused as date and time, the volumes are aggregated for a particular time. As an example, an analysis could be performed to identify the number of vehicles traveling on a roadway segment for a specific Tuesday, from 9:00 AM to 10:00 AM, but the data would be an average of all previous Tuesdays during the same time as opposed to providing an exact number of vehicles on a specific day. Similarly, turning

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movements are expressed as percentages of vehicles, as opposed to the exact number of vehicles. As part of the data estimation, StreetLight factors in available hard data points from other state and regional sources, as available.

In the StreetLight platform, travel routes are formed by establishing roadway segments or “gates” which act as analysis points. Information about travel patterns between up to three gates at one time can be analyzed. These gates were strategically placed throughout the Village to obtain an understanding of the traffic patterns and number of vehicles that use Hastings-on-Hudson as a cut through commute route. This data is the metric by which the effectiveness of the measures to reduce traffic on High Street and James Street, during the weekday AM peak period, were evaluated.

4. COVID-19 Pandemic Impacts on Traffic

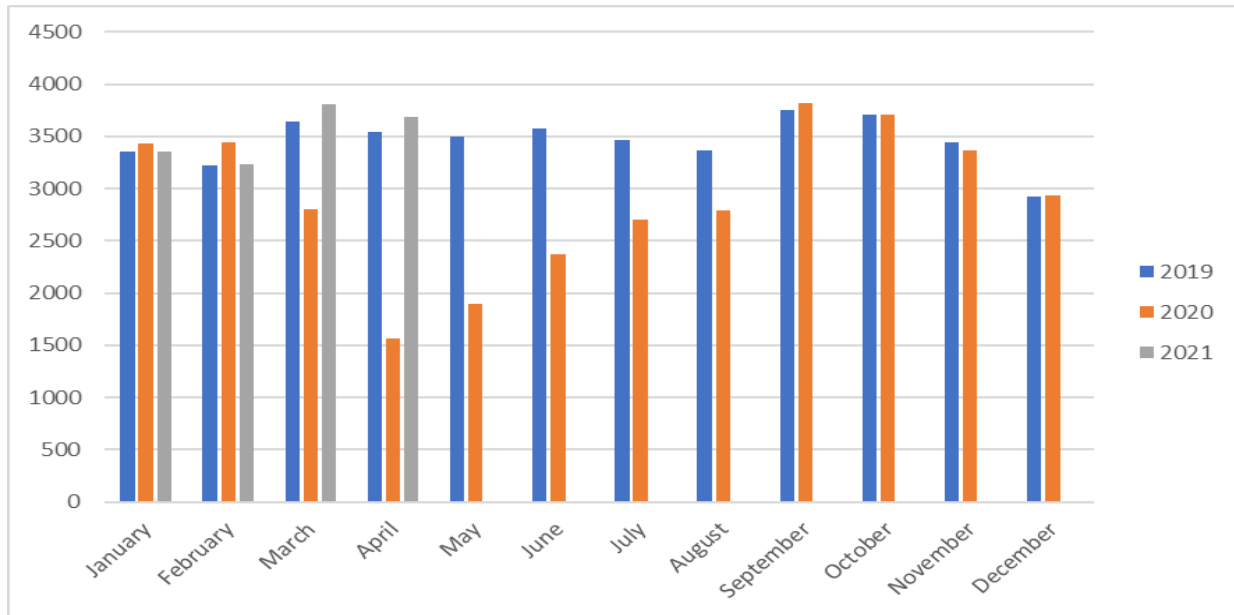
It is widely understood that the COVID-19 Pandemic impacted traffic and travel patterns nationally. This section provides an analysis of how the Pandemic impacted traffic in the Hudson Valley and specifically in and around Hastings-on-Hudson. For this analysis, southbound Saw Mill River Parkway (SMRP) volumes were used as an indicator of the regional impacts to traffic volume. Traffic volumes on the southbound SMRP, between Ravensdale Road and Executive Boulevard, were obtained from January 2019 to April 2021.

There was a significant drop in volumes from March 2020 to April 2020. From April 2020 to September 2020, volumes gradually rebounded to 2019 levels. **FIGURE 2** graphically represents the average weekday volumes from 7:00 AM to 9:00 AM travelling southbound on the SMRP from January 2019 through April 2021. Unlike many other areas of the State and Country, traffic impacts due to COVID-19 lasted for six months in this area.

Note that in this section, traffic was expressed in “volume”, denoting the number of vehicles passing through a defined roadway segment, regardless of starting and end points. In this case, This is an important distinction for the following sections.

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FIGURE 2: Saw Mill River Parkway Southbound Volumes, January 2019 through April 2021



5. Origination - Destination Survey

As part of this study, commuting travel patterns were recorded in an expanded Origin-Destination (O-D) survey using Streetlight to determine the effectiveness of the left turn restrictions and installation of Stop signs on High Street, and the U-Turn prohibition on Broadway. Travel pattern data during the four analysis periods were compared to one another, identifying the change in percentages, and ultimately measuring the effectiveness of the network changes in the analysis periods.

For this discussion, note that O-D results are expressed as “trips” with a known starting and end point.

5.1 Origination-Destination Route Assignment

To analyze the AM period travel patterns, the Origin-Destination Study established route beginning and end points.

The Origin points (beginning points) mark the start of the analysis area:

- Southbound on the SMRP north of Clarence Avenue
- Westbound on Jackson Avenue east of Saw Mill River Road
- South on Saw Mill River Road north of Jackson Avenue.

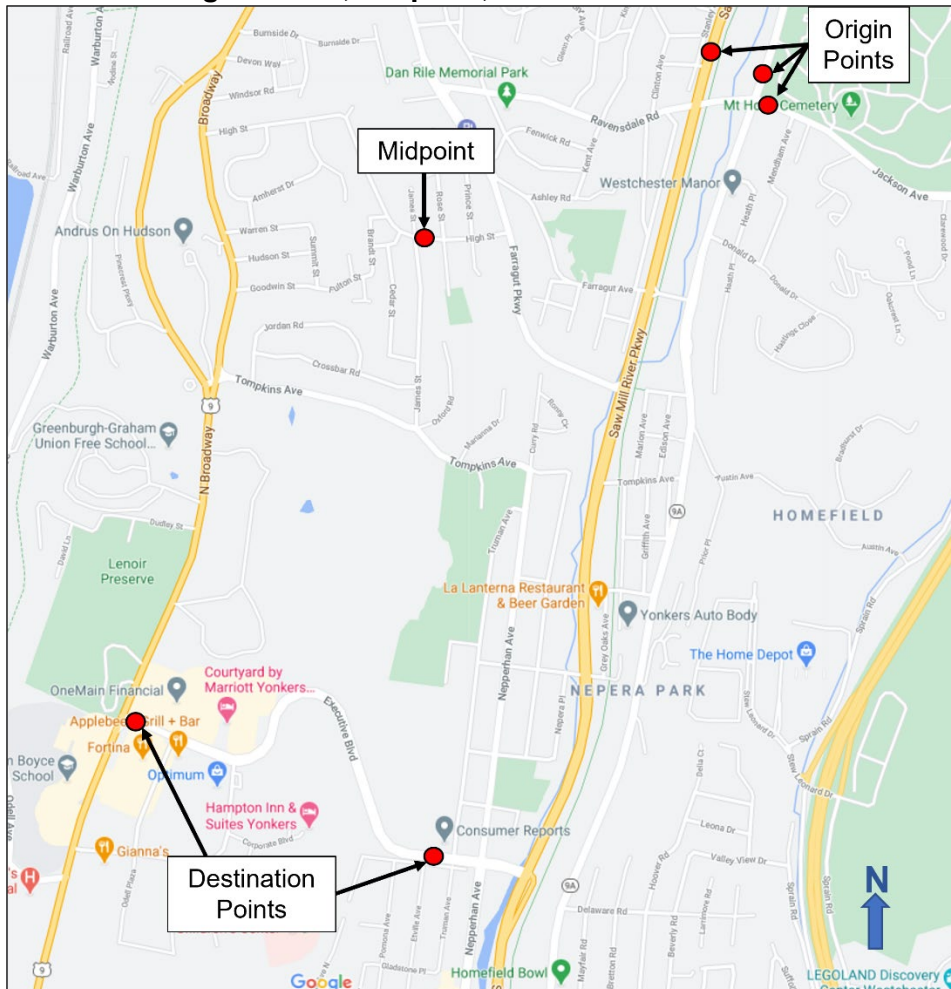
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The Two Destination points (end points) mark the termination of the analysis area. These points were located at the following intersections:

- Executive Boulevard and Route 9, capturing trips from the west
- Executive Boulevard and Truman Avenue, capturing trips from the east

A Midpoint was established at the intersection of High Street and James Street. Unless commuters navigate between the Origin and Destination points using the SMRP Executive Boulevard exit, these trips must pass through the midpoint intersection. **FIGURE 3** shows the Origin Points, Midpoint and Destination Points used as part of the StreetLight Analysis.

FIGURE 3: Origin Points, Midpoint, and Destination Points



5.2 Origination-Destination Survey

The goal of the implemented traffic restrictions in the Village was to reduce the cut-through trips at the High Street and James Street intersection in the AM Peak period. Based on previous

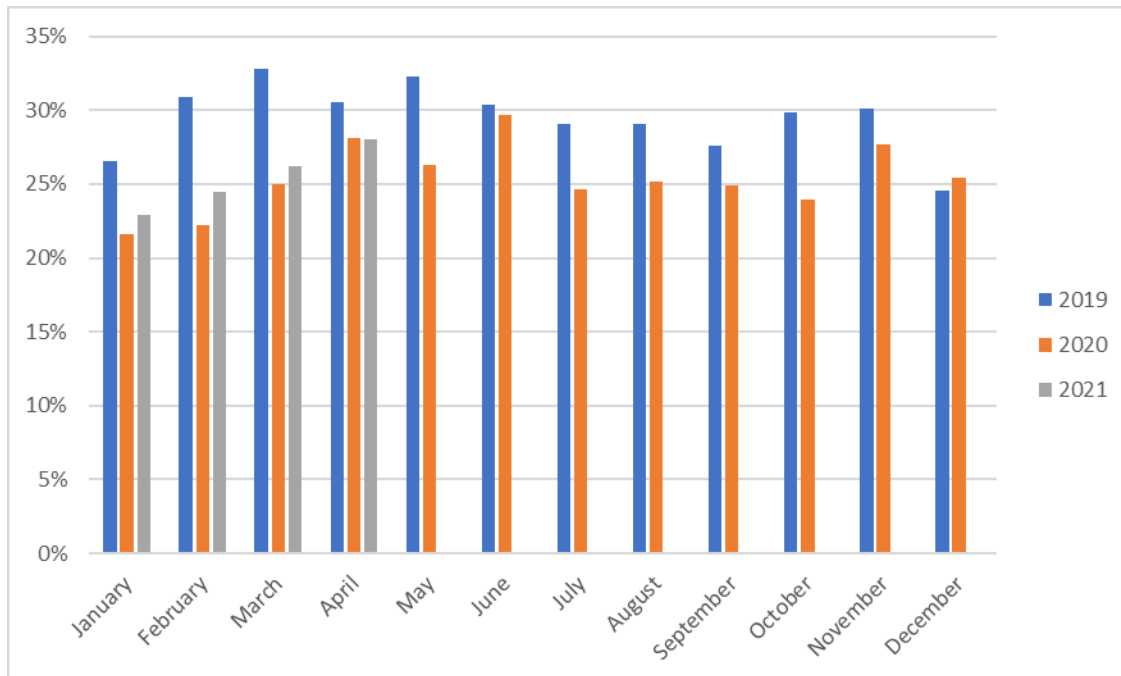
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analyses and observations of this area, the cut-through trips originates from north of Ravensdale Road and terminates at the corporate and commercial areas on Executive Boulevard.

The number of trips cutting through Hastings-on-Hudson via High Street (from the origination points to the destination points on Executive Boulevard) are expressed as a percentage of the total trips which start at the origination points and terminate at the destination points. As the implementation of the restricted left turns coincided with COVID-19, it is crucial to have a means of comparing pre-pandemic and current travel data. By using the percentage of cut-through trips from the SMRP/ Saw Mill River Road/ Jackson Avenue to Executive Boulevard as a reference in each time period, Sam Schwartz can compare patterns during various COVID-19 travel restrictions to data before the pandemic.

Based on the data obtained, despite the pandemic travel patterns from the origin points to the destination points did not experience the same significant drop off that traffic volumes had from January 2019 to April 2021. While there are some variations in percentages, particularly in January, February and March, the differences are not greater than 10% and are relatively consistent. **FIGURE 4** represents the percentage of trips which traveled from the origination points to the destination points compared to the southbound volumes on the SMRP.

FIGURE 4: Percentage of Origin-Destination Trips compared to the SB Volumes on the Saw Mill River Parkway



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5.3 Origin - Destination Results by Analysis Period

The Pre-Pandemic condition (March 2019 to February 2020) is considered the baseline or existing condition. During this period, the Origin-Destination (O-D) survey indicated that of a total of 862 trips started at the Origin points, 62 trips cut through Hastings-on-Hudson, using the intersection of High Street and James Street. These cut through trips account for 7.2% of the total O-D trips.

The Left-Turn Restrictions (March 2020 to October 2020) during the AM Peak period on High Street were implemented on March 4, 2020. Within two days of implementation, Westchester County and New York State instituted travel restrictions. Traffic volumes and vehicles making the left turning movements during the prohibited times were significantly reduced along High Street; 890 trips started at the Origin points, with only 11 trips using the Villages local roadways, nearly an 82% reduction in cut through trips, and only 1.2% of the total O-D trips, a reduction of 6%.

In November 2020 Stop Signs were installed on High Street at Rose Street, James Street and Hudson Street. This period covers November 2020 to February 2021. Combined with the Left Turn Restrictions, cut through traffic was further reduced. Of the 1,050 trips which began at the Origin points, only nine trips were routed through High Street and James Street. This represents nearly an 85% decrease in cut through trips from period 1 and less than 1% of the total O-D trips.

The U-Turn Restriction during the AM Peak period is the timeframe from March 2021 to April 2021. Just before the beginning of March, use of the U-Turn facility at Devon Way was prohibited from 7:00 AM to 9:00 AM. This U-Turn restriction prohibited northbound US 9 trips to access US 9 southbound. It was believed that motorists unable to make left turns on High Street would utilize this facility to head south to Yonkers. Under this condition, 951 trips started at the Origin points, with five trips using the intersection of High Street and James Street as a cut through. This number represents a 92% reduction in cut through trips from the base condition, and 0.5% of the O-D trips during this period.

These findings indicate that, compared to period 1, the number of cut through trips has decreased during each analysis period. Importantly, these cut through trips have decreased while the total number of O-D trips are greater than those during the baseline condition. A summary of these results is provided in **TABLE 1** below.

Analysis Period	Total O-D Trips	Cut-Through Trips	% Reduction from Base Condition	% Cut-Through Trips
Pre-Pandemic	862 veh	62 veh	-	7.2%
Left turn Restrictions	890 veh	11 veh	82%	1.2%
Left Turn Restrictions with Stop Signs	1050 veh	9 veh	85%	0.9%
U-Turn Restrictions	951 veh	5 veh	92%	0.5%

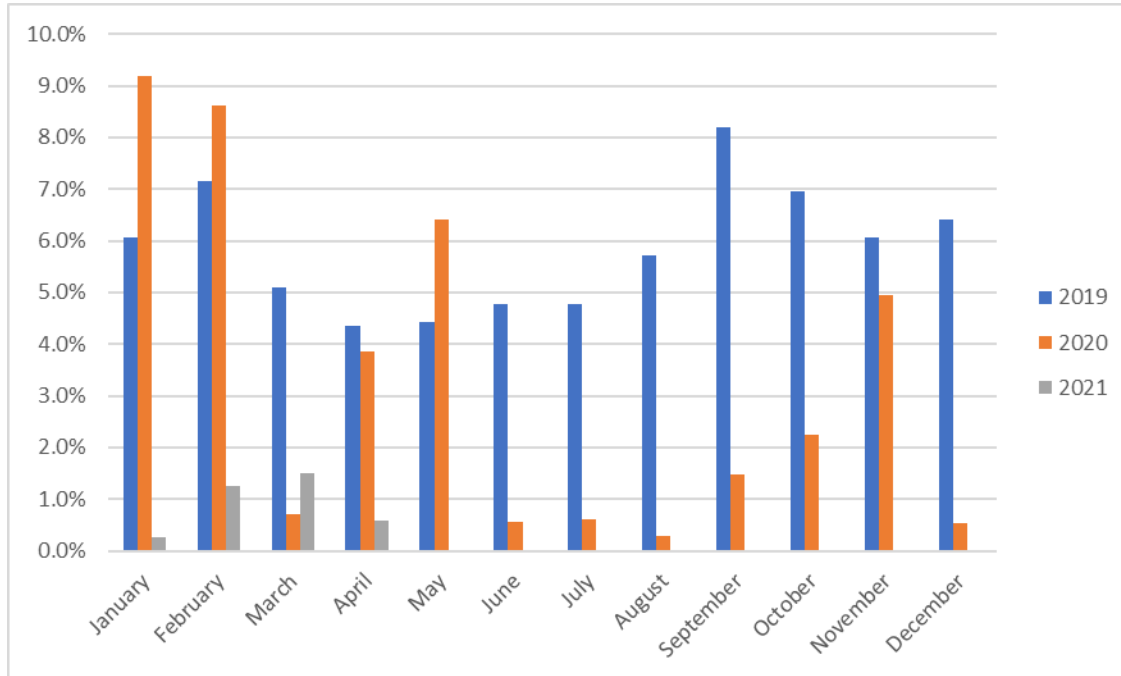
TABLE 1: Weekday Cut Through Trips, between 7:00 AM and 9:00 AM

5.4 Origination - Destination Results by Month

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To further demonstrate the effectiveness of the various measures over time, the following graphs represent the number of trips which utilized High Street and James Street. **FIGURE 5** represents those trips, expressed as a percent of the total number of origin – destination trips.

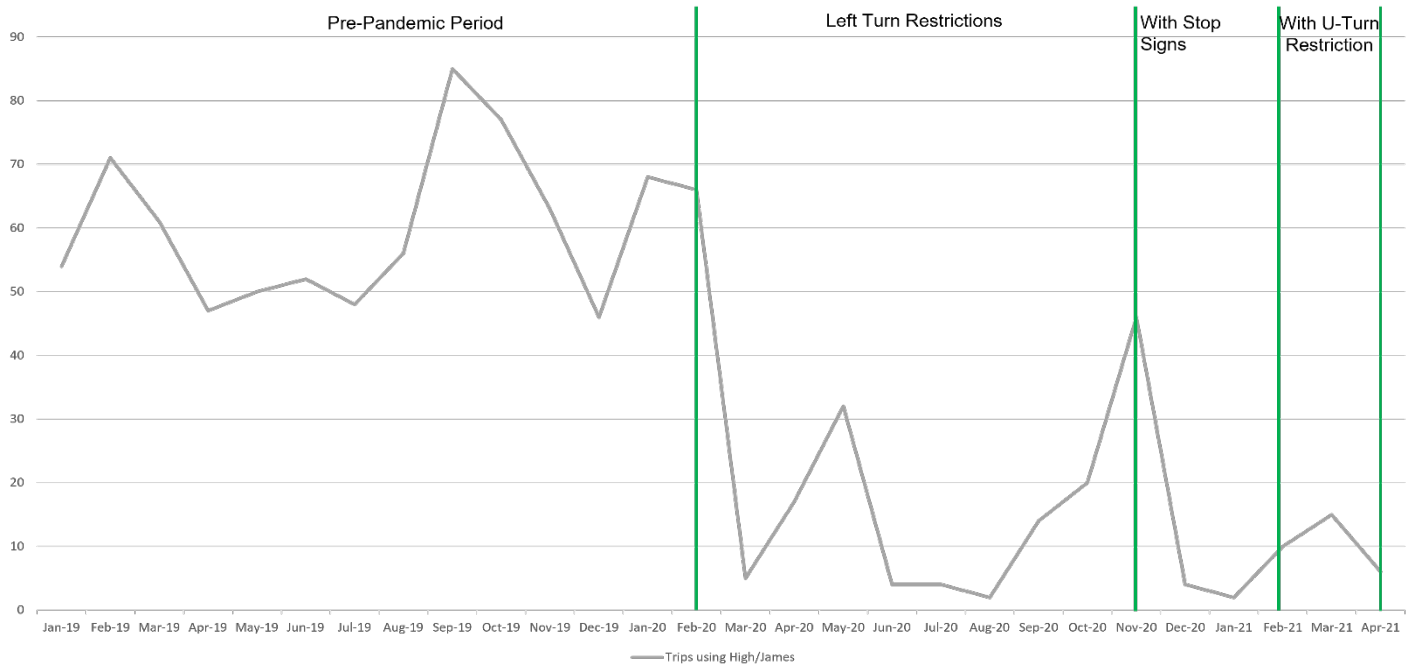
FIGURE 5: Percentage of O-D Trips Utilizing the intersection of High St. and James St.



Shown over the course of 26 months, the number of cut-through trips that utilized the High and James Street intersection, can be seen in **FIGURE 6** on the following page. There is a significant decrease in cut-through traffic following the left turn restrictions on High Street and with the installation of the four-way stop signs on High Street at Rose Street, James Street and Hudson Streets. The U-Turn restrictions did reduce the number of trips, the reduction appears to be negligible.

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FIGURE 6: Cut Through Trips, from January 2019 through April 2021



6. Conclusions

The COVID-19 Pandemic had an immediate and significant impact on regional traffic in and around Hastings-on-Hudson. However, the pandemic did not have a significant impact on travel patterns from the origin points at the Saw Mill River Parkway and Ravensdale Road, terminating at Executive Drive in Yonkers, with the number of trips remaining fairly consistent throughout the study.

Implementing temporary turning restrictions and installation of four-way stop controls at three intersections on High Street reduced the number of cut through trips attempting to bypass delays at the Saw Mill River Parkway at Executive Boulevard during the weekday AM Peak period. These measures create additional delays for cut through traffic, making these routes no longer preferred by vehicles seeking a faster route or recommended by wayfinding apps such as Google Maps or Waze. As a result, overall cut through volume and percentage of cut through trips have been reduced. Based on the collected data, the left turn restrictions had the greatest impact, reducing the number of cut through trips by approximately 82% during that analysis period. It is recommended that the temporary left turn restriction be made a permanent condition.

Although the temporary U-Turn restriction on Broadway at Devon Way appeared to reduce cut through trips, the reduction was not significant. The minor benefits do not outweigh the impacts to circulation and access to neighborhoods during the U-Turn restriction. Therefore, making the U-Turn restriction a permanent condition is not recommended.