Sam Schwartz Transportation Consultants | Hudson Square Business Improvement District

Executive Summary

At the request of the Hudson Square Business Improvement District, Sam Schwartz Engineering, DPC (*Sam Schwartz*) has completed a technical analysis of various congestion pricing and/or tolling scenarios that might have an effect on Hudson Square. The scenarios studied include restoring two-way tolling on the Verrazzano Narrows Bridge (VNB) and implementing congestion pricing as recommended by MoveNY and the Fix NYC Panel, which propose to charge motorists for entering Manhattan's Central Business District (CBD) – defined here as Manhattan south of 60th Street – in an effort to reduce traffic volumes and the related traffic congestion.

These scenarios would benefit Hudson Square by reducing the amount of traffic traveling westbound across Manhattan to access the outbound Holland Tunnel. As tolls are collected in the eastbound (inbound) direction only, a "bridge shopping" phenomenon occurs where vehicles[1] can travel westbound from Long Island and Brooklyn, across one of the free East River bridges, and then westbound through the Holland Tunnel to reach New Jersey without paying any tolls.

The analysis methodology utilizes the Balanced Transportation Analyzer (BTA), an area-wide model developed by Charles Komanoff to estimate the impacts of possible congestion charges in Manhattan. The Fix NYC panel relied on the BTA to estimate the traffic impacts of the various congestion charging and tolling scenarios it presented in its January 2018 report.

The analysis results demonstrate that the various congestion pricing proposals, with or without restoring two-way tolling to the VNB, would reduce daily outbound volume at the Holland Tunnel that originates from east of the East River and send them to alternate routes such as the VNB (I-278). The majority of these vehicles would be removed from Hudson Square streets and its perimeter.

Five congestion pricing and tolling scenarios were studied, as shown in **Table 1**. This table also presents the range of expected reductions in traffic volumes in vehicles per hour (vph) during the PM peak hour for three key Holland Tunnel approaches that travel through or along the perimeter of Hudson Square. Note that the results incorporate a "rebound effect," which is to say that as conditions at the Holland Tunnel improve due to a congestion pricing/tolling scheme, new vehicles would be attracted to the tunnel as it becomes a new "fastest route." This bounce-back phenomenon is even more prevalent with the widespread use of apps such as Google Maps and Waze.

Table 1: Range of PM Peak Reductions in Traffic Volumes by Scenario (in vph)

Scenario	Canal St westbound right	Watts St westbound thru	Houston St westbound left
Two-way VNB toll	65 - 97	22 - 32	5 - 8

[1] This does not apply to commercial vehicles and trucks in classes 4, 5 and 6 (four-, five-, and six-axle trucks), tractor-trailers, and trailers and towed vehicles, all of which are prohibited from using the Holland Tunnel.

MoveNY	117 - 176	39 - 59	10 - 15
MoveNY + Two-way VNB toll	159 - 238	53 - 79	13 - 20
Fix NYC	86 - 129	29 - 43	7 - 11
Fix NYC + Two-way VNB toll	153 - 230	51 - 77	13 - 20

Congestion Pricing and Tolling Plans

This section provides background on the various congestion pricing and tolling plans analyzed in this memorandum.

Verrazzano Narrows Bridge Tolls

The Verrazzano Narrows Bridge (VNB) was opened in 1964 and connects Staten Island and Brooklyn via I-278. Originally, tolls were collected in both the eastbound (towards Brooklyn) and westbound (towards Staten Island) directions, but under provisions of a federal law, one-way westbound tolling (i.e., doubling the rate of each one-way toll) was instituted in March 1986. As predicted in environmental reviews performed by the State and the Metropolitan Transportation Authority (MTA), one-way tolls have increased traffic – especially commercial traffic – in Lower Manhattan as drivers diverted to other untolled routes (primarily across Manhattan) to avoid paying the "double toll" in the westbound direction.

The cross-Manhattan route is generally much slower in speed, and thus adds time to the trip. Nevertheless, following the conversion of the VNB toll to a double-toll for westbound traffic, the additional travel time experienced while traveling across Manhattan has tended to be outweighed by the shorter, tolled route via the VNB. The result has been a marked increase in the number of Long Island and Brooklyn to New Jersey that use the cross-Manhattan route. The BTA model indicates that even when considering the time costs of slower traffic, the Canal Street route has a lesser total cost than the I-278 (VNB) route for 70% of all westbound auto and truck trips.

As a result, the one-way toll collection on the VNB has led to an imbalance in traffic patterns on the bridge, as shown in **Table 2** below.

Table 2: Verrazzano Narrows Bridge, Average 24-Hour Traffic Volumes (2014-2016)

	Eastbound (EB) (Towards Brooklyn)	Westbound (WB) (Towards Staten Island)	Difference (EB vs. WB)
Verrazzano Narrows Bridge	102,523	93,505	9,017

Source: *New York City Bridge Traffic Volumes*, NYCDOT, 2014-2016

Similarly, the one-way toll collection has led to comparable imbalances in traffic patterns at the Holland and Lincoln Tunnels, as shown in **Table 3** below.

Table 3: Average 24-Hour Traffic Volume (2014-2016)
Holland and Lincoln Tunnels

	Eastbound (EB) (Towards Manhattan)	Westbound (WB) (Towards New Jersey)	Difference (EB vs. WB)
Holland Tunnel	41,938	45,197	3,259

Lincoln Tunnel	46,396	52,202	5,806
TOTAL	88,334	97,399	9,065

Source: Hub Bound Travel data tables, NYMTC, 2014-2016

In March 2017, Congressman Daniel Donovan, representing the 11th Congressional District that includes Staten Island and South Brooklyn, formally requested that the Metropolitan Transportation Authority (MTA) estimate the effects of restoring the two-way toll on the VNB and implementing cashless tolling (i.e., all-electronic tolling without the need for toll booths), which was unavailable in the 1980s when the toll was made one-way. Under this request, the MTA has agreed to consider the extent to which a two-way toll on the VNB would:

- discourage drivers in New Jersey from entering New York City through Staten Island
- encourage Long Island and Brooklyn drivers to travel to New Jersey through Staten Island instead of through the Manhattan tunnels
- impact traffic on Staten Island and South Brooklyn
- impact MTA revenue

The results of this study have not yet been released.

MoveNY Plan

A plan proposed by MoveNY would redistribute the tolling structure for the various crossings serving Manhattan and other boroughs and incorporate other general tolling elements as follows:

- Charge a cordon toll for all vehicle trips entering Manhattan south of 60th Street, except for for-hire vehicles (FHVs), which would be tolled based on time and distance traveled within the Manhattan taxi zone, defined as Manhattan south of 96th Street
- Implement new tolls on four East River Bridges and across the 60th Street cordon, collected electronically, either as a single, flat cordon toll or a variable toll by time of day (i.e., higher tolls during peak periods and lower tolls off-peak, designed to be revenue-equivalent to the flat-toll plan)
- Reduce tolls on crossings with non-CBD origins or destinations, including the VNB.

The MoveNY plan is intended to reduce vehicle trips into the CBD, largely eliminate “bridge shopping” (i.e., traveling longer distances to use untolled bridges), and raise money for investments in transit.

For the purposes of this study, it was assumed that the MoveNY plan would implement a flat toll rather than a variable toll.

Fix NYC Plan

In October 2017, Governor Cuomo assembled a panel of public and private stakeholders to consider means for improving traffic and transit conditions in New York City. Their recommendations were presented to the Governor in January 2018[2].

The various individual elements proposed within the Fix NYC plan imply over a hundred possible combinations of measures; to simplify things, the BTA uses three sets of assumptions that represent of the range of Fix NYC options: a lower-range plan (i.e., fewer hours for the flat-fee congestion pricing toll and a lower surcharge for for-hire vehicles), a higher-range toll plan (longer hours for the flat-fee toll and a higher surcharge for for-hire vehicles), and a variable-price plan (higher tolls during peaks and lower tolls off-peak).

[2] http://www.hntb.com/HNTB/media/HNTBMediaLibrary/Home/Fix-NYC-Panel-Report.pdf

This study utilizes the higher-range toll plan for estimating impacts on travel choices by motorists and would generally include charging all vehicle trips entering or exiting Manhattan south of 60th Street, except for for-hire vehicles (yellow cabs, Ubers, etc.), which would pay a flat surcharge. While the East River bridges themselves would not be tolled, all westbound (Manhattan-bound) vehicles would be charged as they exit the crossings into the CBD, effectively tolling the vast majority of cars and trucks using the bridges.

Comparison of MoveNY and Fix NYC Plans

The key similarities and differences between the MoveNY and Fix NYC plans are as follows:

Key Similarities

- Both plans create a digital cordon encompassing Manhattan Island south of 60th Street, which drivers of cars and trucks pay to enter.
- Both plans exempt FHVs (taxis, Ubers, etc.) from the cordon fee but charge FHV's for travel within the "Manhattan taxi zone," which ranges at least to 60th Street and perhaps as far north as 110th St (West side) and 96th St (East side).
- Both plans have options for higher cordon tolls and FHV surcharges during peak hours.
- Both plans have an expected average cordon toll of $11.52 round-trip, matching the toll on the MTA's major crossings.
- Both plans charge vehicles for only one round-trip per day into the cordon zone.
- Both plans propose allocating the majority of net revenues to capital improvements that enhance transit.

Key Differences

- FHV surcharges in the MoveNY plans are based on miles and minutes driven within the Manhattan taxi zone, whereas in Fix NYC the FHV surcharges do not vary with time and distance traveled.
- MoveNY reduces tolls on the seven MTA bridges by $2.50 in each direction (for the major bridges) and $1.00 (minor bridges). The funds to reduce these charges are provided, in effect, by the higher cordon tolls under the MoveNY plans; this means the VNB becomes 40-45% cheaper.
- MoveNY charges trucks on a sliding scale based on the number of axles, whereas Fix NYC charges all trucks at a uniform rate (which is 2.2 times the auto rate).

Methodology and Assumptions

The major approaches to the Holland Tunnel from Brooklyn, Queens, and other points of origin on Long Island and elsewhere are primarily accessed via the Manhattan and Williamsburg Bridges. The main route from the Manhattan Bridge to the Holland Tunnel takes motorists to westbound Canal Street, although additional access exists via northbound Sixth Avenue and westbound Broome Street/Watts Street. Primary access to the Holland Tunnel from the Williamsburg Bridge follows westbound Delancey Street/Kenmare Street to Broome Street/Watts Street. Other westbound routes to the Holland Tunnel include westbound Houston Street to southbound Varick Street and, to a lesser extent, Hudson Street northbound or Canal Street eastbound, perhaps for trips that use the Brooklyn Bridge and approach the tunnel from the south.

The analysis focuses on the weekday PM peak period, when congestion at approaches to the Holland Tunnel is most prevalent, as well as a typical 24-hour time period, for the following critical movements within or adjacent to Hudson Square:

- Canal Street at Hudson Street, westbound right-turn movement into tunnel
- Watts Street at Varick Street, westbound through movement into tunnel
- Houston Street at Varick Street, westbound left-turn movement

Baseline data for our analysis was obtained primarily from "Hub Bound Reports" published by the New York Metropolitan Transportation Council (NYMTC) for the years 2014, 2015, and 2016, as well as from traffic counts performed in June 2017 for the New York City Department of Transportation's (NYCDOT) ongoing "Hudson Square/West Village Transportation Study" and other NYCDOT reports. Also consulted were recently completed Environmental Impact Statements for 550 Washington Street (St. John's Terminal) and other projects in the area.

The key steps and assumptions used in this analysis include the following:

- The BTA makes assumptions for average travel times/speeds using Google Maps and for the value of time, with different assumptions used for autos and trucks. Based on these assumptions and current tolling levels, the model finds that 70.5% of westbound drivers who could choose between traversing Manhattan and taking I-278 over the VNB and Goethals Bridge currently find the Manhattan routes to be the lower-cost route.

- The BTA then calculates how changes in tolls would alter the cost equation between the two routes and send more drivers to the I-278 route.

- The BTA assumes a 33% "rebound effect," by which abandonment of a route by some drivers improves speeds along the route and, thus, reattracts some trips lured away by the new cost advantage for the I-278 route.

- Once the BTA has adjusted the percentage split between the two routes (Lower Manhattan vs. I-278), it was assumed that 10% of this traffic would not use the Holland Tunnel to complete the "through Manhattan" trip, perhaps using another crossing such as the Lincoln Tunnel. The remaining 90% of trips through Lower Manhattan were then assigned to various Holland Tunnel approaches using the following assumptions (note that these are assumed to be vehicles coming from an East River bridge and traveling through Lower Manhattan to access the Holland Tunnel; it is not the split of all vehicles entering the Holland Tunnel from other origins):
    - Canal Street westbound right-turn movement into tunnel = 60%
    - Watts Street westbound through movement into tunnel = 20%
    - Varick Street southbound right-turn movement into tunnel = 5%
    - Other approaches such as the Canal Street eastbound left and Hudson Street northbound through = 5%

- Traffic volume reductions for the first three movements noted above (i.e., the movements that travel through or adjacent to Hudson Square) were calculated by applying the resulting percentage drops in traffic to latest available existing PM peak period traffic count data obtained from the sources noted earlier.

- The traffic volume reductions were further discounted to account for another "rebound effect" of 50% to 75% to allow for vehicles that might be newly attracted to the Holland Tunnel due to improvements in traffic flow. For example, a driver in Chelsea who currently uses the Lincoln Tunnel may in the future switch to the Holland Tunnel if traffic conditions improve there.

- Average hourly traffic volume reductions during the PM peak period were converted to reductions in queue lengths by assuming 20 feet per vehicle in a queue and distributing that queue over the effective number of lanes that feed into those movements, which assumes some non-compliance by drivers (e.g., while the Canal Street westbound right-turn into the tunnel is a two-lane movement, vehicles waiting in the queue tend to queue over more than two lanes as the queue extends back along Canal Street).

Analysis Results

Various scenarios were analyzed based on the methodology and assumptions represented above. As stated earlier, the BTA model indicates that with the current one-way toll collection, the Canal Street route has a lesser total cost than the VNB route for 70% of all westbound auto and truck through trips. **Table 4** shows how the 70% would change under each of the different scenarios analyzed.

Table 4: Percent of Trips that Choose the Westbound Manhattan Route over the I-278 Route

Scenario	Autos	Trucks	Average
Baseline (Existing)	**72.7%**	**68.3%**	**70.5%**
Change w/ two-way VNB toll	-11.4%	-8.5%	-9.9%
Change w/ MoveNY	-22.6%	-13.2%	-17.9%
Change w/ MoveNY + two-way VNB toll	-29.8%	-18.8%	-24.3%
Change w/ Fix NYC	-16.7%	-9.4%	-13.1%
Change w/ Fix NYC + two-way VNB toll	-28.5%	-18.4%	-23.4%

Based on the percent changes in traffic volumes noted above, **Table 5** summarizes the estimated ranges for the weekday PM peak period reductions in traffic volumes in vph for critical traffic movements approaching the Holland Tunnel (it can be assumed that the daily (24-hour) reductions in traffic volumes are approximately 10 times the PM peak hour volume). **Table 6** presents the estimated ranges in reductions in queue lengths (in feet) for the same movements.

Table 5: Range of PM Peak Reductions in Traffic Volumes for Critical Movements (in vph)

Scenario	Canal St westbound right	Watts St westbound thru	Houston St westbound left	**Total**
Two-way VNB toll	65 - 97	22 - 32	5 - 8	**92 - 137**
MoveNY	117 - 176	39 - 59	10 - 15	**166 - 250**
MoveNY + Two-way VNB toll	159 - 238	53 - 79	13 - 20	**225 - 337**
Fix NYC	86 - 129	29 - 43	7 - 11	**122 - 183**
Fix NYC + Two-way VNB toll	153 - 230	51 - 77	13 - 20	**217 - 327**

Table 6: Range of PM Peak Period Reductions in Queue Lengths for Critical Movements (in feet)

Scenario	Canal St westbound right	Watts St westbound thru	Houston St westbound left
Two-way VNB toll	473' - 709'	193' - 289'	72' - 108'
MoveNY	852' - 1278'	347' - 521'	130' - 195'

MoveNY + Two-way VNB toll	1156' - 1734'	471' - 706'	177' - 265'
Fix NYC	623' - 935'	254' - 381'	95' - 143'
Fix NYC + Two-way VNB toll	1116' - 1674'	455' - 682'	177' - 265'

The estimated reductions in traffic volume and queue lengths would improve operating conditions for these critical movements within or along the perimeter of Hudson Square during the 4 to 7 PM peak period. While traffic volumes would still be at or even in excess of capacity, the length of the queues of vehicles approaching the intersections as well as blocks upstream would be shortened. This would lead to a reduction in overall traffic delay within Hudson Square approaching the Holland Tunnel.

While the benefits of reduced traffic volumes approaching the Holland Tunnel are most substantial during the peak congestion periods, we anticipate that based on the net reduction in traffic resulting from each scenario during the 24-hr time period, improvements would also be experienced during other times of day.

Conclusion

The study demonstrates that any of the scenarios analyzed, whether individually or in combination, would reduce traffic volumes in Hudson Square. While traffic congestion on roadways approaching the Holland Tunnel would remain during certain times of the day, the severity and duration of the traffic congestion would be reduced.