

# Proposal to Reduce Building Vibrations Caused by Interstate 278

By

Concerned Resident of Brooklyn Heights

## Summary

The purpose of this document is to propose that the Brooklyn Heights neighborhood and their representatives petition the Department of Transportation to lower speed limits on Interstate 278 (BQE) between exit 27 and 29B to 30 mph for vehicles classified by FHWA<sup>1</sup> as class 3 and above in order to significantly decrease traffic-induced vibrations in buildings, a major complaint of local residents.

## The Issue

Poor road conditions and the speed of large vehicles on Interstate 278 through Brooklyn Heights has a significant impact on the quality of life in Brooklyn Heights, specifically when it comes to vibrations in buildings. Resident complaints are rampant as described in The New York Times<sup>2</sup> and Brooklyn Heights Blog.<sup>3</sup> Logically speaking, vibrations make it more difficult to live in the neighborhood, rent properties for higher rents, and sell properties at higher prices. It also increases maintenance on historical buildings<sup>4</sup>. Maintenance on the road is carried out occasionally but the fair conditions only last a short period of time before the large vehicles pound the roads back into disrepair. Insignificant budgets and an increase in the weight of vehicles over time are compounding the problem. Residents and even those very motorists are affected emotionally and monetarily<sup>5</sup>.

## The Solutions

There are many solutions under consideration to resolve the issue, such as building a tunnel under Brooklyn Heights, repairing the BQE more often, or increasing the structural integrity of the road itself. Some states, in an effort to fund road projects, have legislated to tolling their interstates<sup>6</sup>. Unfortunately these solutions are decades away from becoming a reality, are only short lived maintenance fixes or simply lack the funding or support. From my research, the easiest, lowest cost solution is simply to **lower the speed limit** for vehicles with FHWA class 3 and higher to a reasonable 30 mph from exit 27 to exit 29B, resulting in an estimated 2.4 minutes of extra travel time for those vehicles<sup>7</sup> and a significant decrease in building vibration. In a study by the Institute for Research in Construction<sup>8</sup> differences in speed were shown to have significantly different vibration levels on buildings, in some cases around 300% higher as illustrated in the chart below.

Location	25 km/h		50 km/h	
	Bus	Truck	Bus	Truck
Ground in front of house	20.5	19.9	64.5	33.2
External foundation wall	11.2	10.1	30.9	15.7
Mid-point of floor in 1 <sup>st</sup> storey	20.3	20.8	62.9	30.1
Mid-point of floor in 2 <sup>nd</sup> storey	35.0	37.3	96.2	46.7
* Bus had air-bag suspension system; truck had multi-leaf steel spring suspension system.				

Source (National Research Council of Canada. June 2000. ISSN 1206-1220)

### Proposed Speed Limit Signs

The most practical places to inform drivers of the speed limit change are on the lower part of the BQE between exit 26 and 27 when heading northbound and in the southbound direction, signs could be placed on both sides of the BQE directly after the Tillary exit signs (29B).

### Compliance

If the new speed limit is enacted, speed limit notification and speed monitoring of vehicles is vital to the success of the project. Using existing camera technology, monitoring and processing of violators is extremely effective<sup>9</sup>. Failure to comply with the new speed limit will result a traffic violation with monetary consequences, which in turn could raise funds to fix and maintain road conditions<sup>10</sup>.



### References:

1. [www.fhwa.dot.gov/policy/ohpi/vehclass.htm](http://www.fhwa.dot.gov/policy/ohpi/vehclass.htm)
2. [http://www.nytimes.com/2012/01/05/nyregion/on-the-bqe-road-work-ahead-forever.html?\\_r=1](http://www.nytimes.com/2012/01/05/nyregion/on-the-bqe-road-work-ahead-forever.html?_r=1)
3. <http://brooklynheightsblog.com/archives/34475>
4. <http://www.nrc-cnrc.gc.ca/eng/ibp/irc/cbd/building-digest-232.html>
5. [http://roughroads.transportation.org/RoughRoads\\_FullReport.pdf](http://roughroads.transportation.org/RoughRoads_FullReport.pdf)
6. <http://www.governing.com/topics/transportation-infrastructure/states-take-closer-look-interstate-tolling.html>

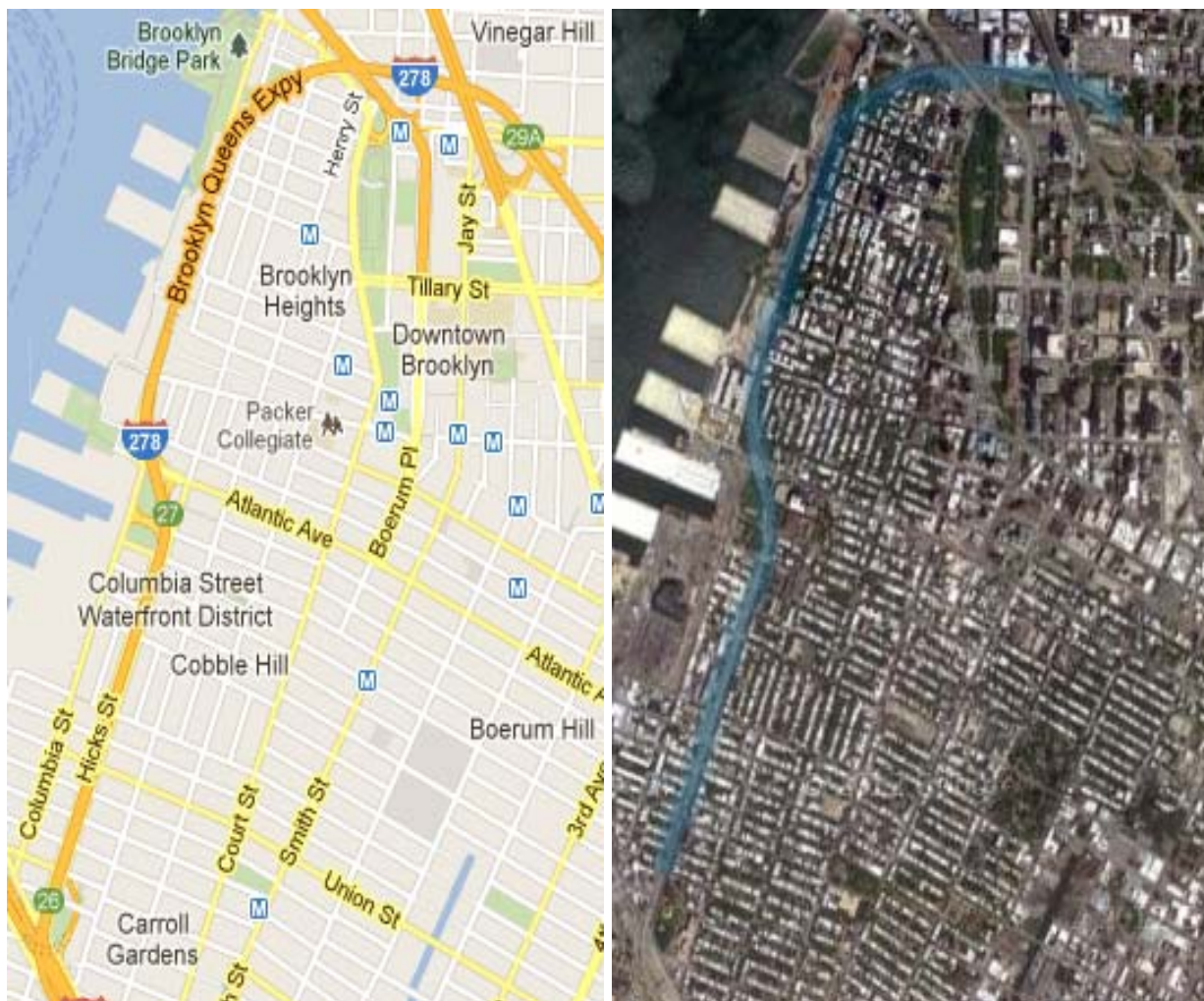
7. Travel distance from exit 27 to 29B is roughly 3 miles. Using distance=rate\*time, a vehicles traveling at 50 mph makes the route in 6 minutes. A 30 mph traveler makes the route in 3.6 minutes.

8. National Research Council of Canada. June 2000. ISSN 1206-1220  
[www.nrc-cnrc.gc.ca/obj/irc/doc/ctu-n39\\_eng.pdf](http://www.nrc-cnrc.gc.ca/obj/irc/doc/ctu-n39_eng.pdf)

9. <http://newyork.cbslocal.com/2011/01/10/nyc-wants-to-use-speed-cameras-to-catch-lead-foot-drivers/>

10. <http://www.mcclatchydc.com/2008/08/11/47592/cop-cameras-dont-just-catch-speeders.html>

Map of Brooklyn Heights with exit numbers and proposed area of speed limit reduction



Source: Google Maps

## FHWA Vehicle Classes with Definitions

1. **Motorcycles** — All two or three-wheeled motorized vehicles. Typical vehicles in this category have saddle type seats and are steered by handlebars rather than steering wheels. This category includes motorcycles, motor scooters, mopeds, motor-powered bicycles, and three-wheel motorcycles. *Note that this vehicle class is now required.*
2. **Passenger Cars** — All sedans, coupes, and station wagons manufactured primarily for the purpose of carrying passengers and including those passenger cars pulling recreational or other light trailers.
3. **Other Two-Axle, Four-Tire Single Unit Vehicles** — All two-axle, four-tire, vehicles, other than passenger cars. Included in this classification are pickups, panels, vans, and other vehicles such as campers, motor homes, ambulances, hearses, carryalls, and minibuses. Other two-axle, four-tire single-unit vehicles pulling recreational or other light trailers are included in this classification. *Because automatic vehicle classifiers have difficulty distinguishing class 3 from class 2, these two classes may be combined into class 2.*
4. **Buses** — All vehicles manufactured as traditional passenger-carrying buses with two axles and six tires or three or more axles. This category includes only traditional buses (including school buses) functioning as passenger-carrying vehicles. Modified buses should be considered to be a truck and should be appropriately classified.
5. **NOTE:** In reporting information on trucks the following criteria should be used:
  - a. Truck tractor units traveling without a trailer will be considered single-unit trucks.
  - b. A truck tractor unit pulling other such units in a "saddle mount" configuration will be considered one single-unit truck and will be defined only by the axles on the pulling unit.
  - c. Vehicles are defined by the number of axles in contact with the road. Therefore, "floating" axles are counted only when in the down position.
  - d. The term "trailer" includes both semi- and full trailers.
6. **Two-Axle, Six-Tire, Single-Unit Trucks** — All vehicles on a single frame including trucks, camping and recreational vehicles, motor homes, etc., with two axles and dual rear wheels.
7. **Three-Axle Single-Unit Trucks** — All vehicles on a single frame including trucks, camping and recreational vehicles, motor homes, etc., with three axles.
8. **Four or More Axle Single-Unit Trucks** — All trucks on a single frame with four or more axles.
9. **Four or Fewer Axle Single-Trailer Trucks** — All vehicles with four or fewer axles consisting of two units, one of which is a tractor or straight truck power unit.
10. **Five-Axle Single-Trailer Trucks** — All five-axle vehicles consisting of two units, one of which is a tractor or straight truck power unit.
11. **Six or More Axle Single-Trailer Trucks** — All vehicles with six or more axles consisting of two units, one of which is a tractor or straight truck power unit.
12. **Five or fewer Axle Multi-Trailer Trucks** — All vehicles with five or fewer axles consisting of three or more units, one of which is a tractor or straight truck power unit.
13. **Six-Axle Multi-Trailer Trucks** — All six-axle vehicles consisting of three or more units, one of which is a tractor or straight truck power unit.
14. **Seven or More Axle Multi-Trailer Trucks** — All vehicles with seven or more axles consisting of three or more units, one of which is a tractor or straight truck power unit.