UNIVERSITY TRANSPORTATION RESEARCH CENTER

RESEARCH BRIEF

PROJECT TITLE: AIR QUALITY IMPACT OF TRAFFIC CONGESTION IN MIDTOWN MANHATTAN

PRINCIPAL INVESTIGATOR(S): DR. MASOUD GHANDEHARI

INSTITUTION: POLYTECHNIC INSTITUTE OF NYU

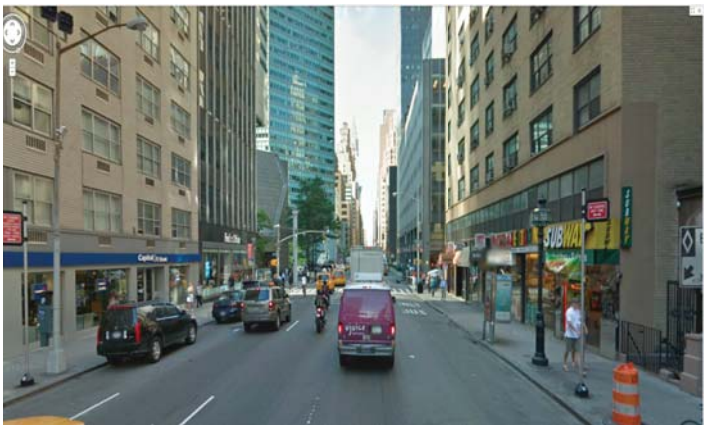
COMPLETION DATE: JANUARY 2014

SPONSOR: UNIVERSITY TRANSPORTATION RESEARCH CENTER (UTRC)

Exposure to fine particle pollution can cause premature death and harmful cardiovascular effects such as heart attacks and strokes, and is linked to a variety of other significant health problems. NYC, one of the most populous urban areas in the US has been mentioned frequently both as problematic in terms of concentrations of particulate matter and asthma rates, and as a success story in terms of air quality management. Faced with the challenge of urban population growth and the corresponding traffic congestion, many cities around the world have adopted intelligent transportation technologies, carbon taxes on vehicles, congestion pricing and other approaches for dealing with the impact of mobility in cities. It is now agreed that both the performance criteria of traffic flow and related health issues need be considered in the design of traffic management systems. Detailed and quantifiable measures for the correlation of air quality and traffic is key to establishing performance criteria.

A pilot project was commissioned by the University Transportation Research Center (URTC) to develop a methodology for studying the air quality impact of traffic congestion. The study which is being carried out by the Polytechnic School of Engineering of NYU and the Center for Urban Science and Progress is using the NYC Midtown Manhattan as the study site incorporating traffic flow instruments as well as street level air quality monitors. The traffic data includes volume and speed. The air quality data includes fine particulate matter (PM2.5) and Black Carbon (BC), pollutants which are formed by the atmospheric reaction of fossil fuel combustion gases and by insufficient combustion of fuels, respectively.

Both pollutants are very fine and are considered highly hazardous due to ease of penetration into human lungs. Prescribed by US EPA, the critical limit for the 24 hour levels of PM2.5 is 35 □g/m3, and the annual average limit is 12 □g/m3. There is currently no EPA standards for BC.



The pilot study was carried out on Lexington Avenue near 55th street from 6am to midnight. Results indicated a close correlation of speed with PM2.5 levels. It was also shown that peak levels of the particulate pollutants at times exceeded the EPA 35□□g/m3 daily limits. It should be noted that the combination of spatial and temporal variation of the pollutants pose certain limits on drawing concise conclusions on the traffic vs pollution correlation and hence on the exposure levels to pedestrians. For this reason we commissioned the development of miniature particulate meters, which can be deployed with high spatial distribution. Testing of the mini monitors is nearing completion. The deployment of highly distributed network of such air quality sensors can be possible within a few months.