

## **Free Transit for New York City: History, Present, Future**

By Charles Komanoff

*This document is a work in progress. This draft is being revised continually in response to comments. We welcome yours — see next-to-last page for contact info. A one-page summary sheet is included in the back. Graphics will come later.*

### **Prologue: The First Transit Revolution**

More than 40 years ago, attorney Ted Kheel called for saving mass transit by raising the tolls on New York City bridges and tunnels, and using the proceeds to fund it. Beginning in 1965, Kheel pressed the idea privately with high-level officials and publicly in newspaper interviews and other forums, creating an uproar that ultimately sparked an urban transportation revolution.

Kheel, a prominent labor lawyer and mediator, was vilified by New York's two transportation overlords, Robert Moses of the Triborough Bridge & Tunnel Authority, and Austin Tobin of the Port Authority, who for decades had used surplus toll revenues as a patronage mill for urban highways. But his idea took hold in a major way in 1968, when Gov. Nelson Rockefeller merged the TBTA with the NYC Transit Authority and the state's two commuter-rail lines. Ever since, the Metropolitan Transportation Authority, by statute, has been able to dedicate toll revenues to transit. The result was both a bigger pool for transit investments that have rejuvenated the regional transportation network, and a marked slowdown in the ruinous expansion of highway capacity in the nation's most dense metropolitan area.

Some numbers tell the story:

- Capital investment in MTA transit facilities totaled \$XX billion during 19XX-200X, a XX% increase in spending from the previous X-year period, leading to vastly improved service reliability and safety and creating tens of thousands of jobs designing, manufacturing and installing new equipment and systems.
- Transit usage, after stagnating in the 1970s and 1980s — a legacy of past neglect of transit as well as promotion of highways and suburban development — has skyrocketed. Subway ridership has risen in 16 of the past 17 years, in 2008 reaching the highest level since 1950.

### **Needed: A Second Revolution**

There is still further to go, however — much further. Notwithstanding the impressive rise in transit usage, automobile use has continued to climb. Traffic routinely reaches near-paralyzing levels not just for a few hours a day in the Manhattan Central Business District (CBD) but for long stretches of time throughout much of the regional road network. Moreover, past experience

with fare hikes indicates that the increases in bus, subway and commuter rail fares that took effect in 2009, coupled with additional fare hikes scheduled for 2011 and 2013, will lead some transit users to switch to cars. This will exacerbate gridlock that costs residents and businesses an estimated \$13 billion a year in lost time and productivity in the New York City metro region.<sup>1</sup> The fare hikes are also disproportionately impacting working-class and poor New Yorkers who are most reliant on transit but can least afford to pay, particularly in the current economic downturn. [Add text re service cuts announced since Oct. 2009.]

Kheel's 1960s vision began with funding transit through road tolls but it didn't end there. Ted viewed bus and subway service as essential civic services that, like fire, police, sanitation, libraries and schools, should not be paid for with user fees.<sup>2</sup> Public transit, he reasoned, is a true "public good" — a service that doesn't just benefit the user but also better society at large by making the city's workplaces, parks and cultural attractions available to all without compounding traffic gridlock and without burdening those least able to pay.

But if buses and subways are made free, how will the MTA make up the \$3 billion in farebox revenues? Not with agency savings from eliminating fare collection alone, since these would provide only \$200 million a year.<sup>3</sup> Ted's answer was, and is, simple, elegant and appropriate: *free transit should be financed through tolls charged on traffic entering the most congested part of the city.*

Ted reasoned that a congestion toll to drive into the Manhattan Central Business District — defined as Manhattan Island south of 60<sup>th</sup> Street — could:

- Create value in the form of time savings accruing to drivers who will pay the toll, and in the form of increased economic activity enabled and attracted by faster travel.
- Provide a revenue stream allowing transit fares to be capped, reduced and, ultimately, eliminated.
- Help finance vital transit capital improvements and expansions .
- Be paid primarily by New Yorkers more able to pay and visitors from outside the area, since the propensity to drive into Manhattan is highly correlated with income.

This toll would be levied at all twenty-three points of entry into the CBD: the fifteen north-south crossings of 60<sup>th</sup> Street (including the West Side Highway and FDR Drive); the two Hudson River tunnels (Lincoln and Holland) and two East River tunnels (Queens Midtown and Brooklyn

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<sup>1</sup> Partnership for New York City, Growth or Gridlock (2006), <http://www.pfnyc.org/publications/Growth%20or%20Gridlock.pdf>.

<sup>2</sup> Ted's background as a labor lawyer may have played a part. An experienced transit mediator, he was intimately familiar with the state's Taylor Law, which forbids strikes by public employees providing essential services. All of the services mentioned in the text are 100% government funded, whereas transit is roughly 50% user-paid.

<sup>3</sup> Most of the savings from eliminating fares would be realized in the subway system, by enabling re-assignment of personnel now responsible for farecard sales, machinery and administration. Conversely, building and operating the tolling infrastructure for congestion pricing would impose a cost. We estimate an annual cost of \$90 million to amortize and operate the cordon toll regime for the Kheel-Komanoff Plan, discussed below.

Battery), on which current tolls would be incremented by the new congestion fee; and the four East River bridges.

### **The BTA (Balanced Transportation Analyzer)**

After a hiatus of several decades in which he pursued other civic and environmental issues — including litigating the Port Authority’s bond covenants restricting its capacity to invest in mass transit<sup>4</sup> — Ted put his free-transit vision into motion in 2007. He asked George Haikalis, President of the Institute for Rational Urban Mobility (IRUM), to assemble a team of transit and traffic specialists to calculate the level of a congestion toll sufficient to replace farebox revenues. Ted also charged the team with estimating how much traffic would fall and transit use would rise as a result of driving being more costly and transit being free.

The team concluded that a \$16 one-way toll to drive into the CBD would finance free transit and cut traffic in the heart of Manhattan by 25%. More significant, perhaps, than this precise finding was the analytical tool used to derive it: a computer model that captured the interactivities between toll payments and time savings and also reflected New Yorkers’ propensities to switch travel modes as their relative costs and durations changed. Ted dubbed the model the Balanced Transportation Analyzer, or BTA, in recognition of its capacity to weigh simultaneously the competing influences of time, money and travel mode and to point the way toward a more even-handed transportation system. Indeed, the team’s January 2008 report was entitled “Balancing Free Transit and Congestion Pricing” for this very reason.<sup>5</sup>

Nevertheless, the report was constrained by a limitation in the architecture of the BTA: the software could only accommodate a constant, unvarying CBD-entry fee. Thus, even though congestion levels fluctuate enormously across the 24-hour cycle in which cars and trucks are driven into Manhattan (with further weekday-weekend variations), the Kheel team at first could only analyze, and propose, a one-size-fits-all toll. Imposing a \$16 toll to drive into the CBD during the morning traffic peak might or might not be politically manageable, but charging the same toll at 2 a.m., when the impact of an additional trip on traffic is an order of magnitude less, was guaranteed to be untenable.

Restructuring the software to overcome this limitation was a complex matter, and required months of painstaking labor. The outcome, however, is a truly “enhanced” Balanced Transportation Analyzer. Dubbed BTA 1.1, the model can trace all of the key implications — fiscal, traffic, and transit — of tolls to drive into Manhattan that vary with time, as well as time-varying subway fares. (Discounting subway fares in non-peak times could combat rush-hour train crowding by shifting some trips off-peak.) The exciting findings and policy proposals emanating from the new BTA are discussed further below.<sup>6</sup>

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<sup>4</sup> See Corporate Social Responsibility press release, Feb. 7, 2007, <[http://www.csrwire.com/press/press\\_release/16208-Kheel-To-Speak-On-New-Transit-Initiatives-To-Address-Global-Warming](http://www.csrwire.com/press/press_release/16208-Kheel-To-Speak-On-New-Transit-Initiatives-To-Address-Global-Warming)>.

<sup>5</sup> The report is available at <<http://www.nyn.org/kheelplan/Full%20Kheel%20Report%20for%20web%20-%202023%20Jan%202008.pdf>>.

<sup>6</sup> The enhanced (Version 1.1) BTA is available at <[http://www.nyn.org/kheelplan/BTA\\_1.1.xls](http://www.nyn.org/kheelplan/BTA_1.1.xls)>.

## **The Failure of the Bloomberg and Ravitch Plans**

During the 2007-09 period in which the Kheel team was developing its analytical tools, two congestion pricing plans were advanced amid great fanfare. In April 2007, as part of his “PlaNYC” for greening New York City, Mayor Bloomberg proposed an \$8 fee to drive into the Manhattan CBD between 6 a.m. and 6 p.m. on weekdays. In December 2008, a state commission headed by former MTA board chair Richard Ravitch and charged with closing the MTA deficit called for round-trip tolls of \$9 on the four East River bridges and \$4 on the smaller and more numerous Harlem River bridges.

The Bloomberg proposal was strongly backed by organized labor, environmental and transit advocates, and Manhattan-based business groups with a common interest in reducing traffic congestion and tapping new revenue sources to finance mass transit expansions. The Ravitch proposal was supported by the same coalition but primarily out of concern over an MTA deficit that ballooned alarmingly as the economic recession worsened.

Both proposals died in the State Legislature. Other than Bloomberg and Ravitch themselves, and, for the latter plan, Gov. Paterson (*ex officio*), not a single city or state representative championed either proposal. Such political support as emerged was largely halting or even grudging, while opposition was fervent. Though interpretations vary, our view is that the two plans shared a fatal flaw: *neither offered transcendent benefits that could match the transformational change that congestion pricing and bridge tolls would inflict on city traditions*. A further flaw was geographic inequity: an outsized share of the benefits (less traffic, cleaner air) would adhere to the rich precincts of Manhattan, whereas residents of the “outer boroughs” and surrounding suburbs would be saddled with most of the toll costs.<sup>7</sup>

## **Traffic Pricing “Done Right”**

Campaigning in 2008 to unseat a veteran state senator from lower Manhattan and downtown Brooklyn, insurgent candidate Daniel Squadron called for “congestion pricing done right.” What he wanted, Squadron told us shortly after assuming office, was a pricing plan that offered off-peak travelers toll discounts, that didn’t penalize any county or region, and that delivered genuine benefits to transit riders with no strings attached.

Squadron’s call coincided with the advent of the enhanced Balanced Transportation Analyzer (BTA 1.1), with the capacity to model virtually any toll schedule for vehicle trips into the Manhattan CBD. As noted, the BTA automatically calculates, for any set of CBD-entry tolls and transit fares, the likely decreases in traffic volumes, increases in travel speeds, expansion in bus and subway ridership, and gains or losses to agency revenues — as well as environmental benefits such as less pollution and fewer car crashes.

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<sup>7</sup> Our assessment of the failure of the Bloomberg congestion pricing plan was published in Grist as [Machiavelli Meets the Big Apple](#). For its epitaph, the article invoked *The Prince*: “There is nothing more difficult to take in hand than to take the lead in the introduction of a new order of things ... the innovator has for enemies all those who have done well under the old conditions, and lukewarm defenders in those who may do well under the new.”

We therefore set out to devise a pricing plan that met Squadron's requirements, which we broadened into this set of criteria:

### **Five Criteria for Traffic Pricing**

1. *Toll Proportionality*: There should be a nearly constant relationship (ratio) between the toll charged in any period and the traffic congestion burden that a trip in that period imposes on other trips. That is, the disincentive (toll per trip) should fit the harm (the involuntary theft of time from other road users caused by the trip).
2. *Toll Simplicity*: While tolls should vary by period of day and between weekday and weekend, the rate structure should be simple enough to be remembered easily. In addition, to hold both transaction costs and drivers' confusion to a minimum, the toll should be charged in only one direction, inbound.
3. *Strategic Fare Relief*: Transit fare reductions should prioritize cuts that can speed or otherwise improve service and, thus, attract more riders.
4. *Geographic Equity*: No borough or county should be disproportionately benefited or burdened. Care should be taken to make the share of tolls paid by residents of Manhattan commensurate with Manhattan's share of the benefits from reduced traffic.
5. *Pragmatic Politics*: Opportunities to implement traffic tolls are contingent on "the art of the possible" — politics. This argues for a pragmatic, incremental approach. On the other hand, setting the bar too low may constrict the benefits and make it difficult to amass political support. The right balance must be struck.

We also considered a sixth criterion:

6. *Revenue Neutrality*: Total agency revenues should neither fall nor rise. This rule would help forestall suspicion that toll revenues will enrich the MTA or other bureaucracies that some citizens regard as hopelessly inefficient or corrupt. In our recent (2009) advocacy, we chose to fulfill it by proposing that 100% of new toll revenues be dedicated to reduce transit fares — a step that would powerfully and tangibly benefit millions of New Yorkers of limited means. However, notwithstanding public mistrust of the MTA, there are still compelling arguments for dedicating some revenues to capital investment in system improvements and expansions, as we discuss below.

### **Traffic's Time Costs**

From the early days of motorization, it has been painfully apparent that each car or truck trip into the Manhattan Central Business District (or any other congested area) slows down other traffic. But by how much, and at what cost, has never been known — until now, with the advent of the BTA.

The Balanced Transportation Analyzer lets us pinpoint how much each additional motor vehicle trip into the CBD increases traffic densities and thus slows down vehicular travel within the CBD and on the regional highway network. Geographically this will be an average figure, since the BTA can't distinguish between trips into Manhattan from, say, New Jersey vs. Long Island or Westchester. But, importantly, the delay figures available via the BTA *are* differentiated by time of day. (We divide the 24 weekday hours into seven periods, based on traffic patterns.)

With the BTA, then, it's a simple matter to express the impacts on travel speeds on a per-trip basis — the extent to which just one trip slows down all other drivers in the aggregate; and, finally, since most drivers experience being stuck in traffic as a *monetary cost* to them or their businesses, to translate these seconds and minutes into *dollars*, as we do in the table below.

At first blush, the figures in the table may appear wildly, even outlandishly, high. Can a single auto trip into and out of the Manhattan Central Business District really delay the combined progress of all other vehicles by several hours, with a resultant cost of around a hundred dollars in lost time absorbed by the people in those vehicles? Moreover, how is it possible for one auto trip to the CBD during the 11 pm – 5 am graveyard shift to generate delay costs of almost \$60?

#### **Aggregate Delays to All Traffic Caused by One Car Round-Trip into the CBD (Weekdays)**

<b>Period in which Car Enters CBD</b>	<b>Delay caused by trip</b>	<b>Delay cost due to trip</b>	
Graveyard	11 pm - 5 am	1.45 hours	\$ 58.00
A.M. Pre-peak	5 am - 6 am	1.77 hours	\$ 70.00
A.M. Peak	6 am - 9 am	3.25 hours	\$129.00
A.M. Post-peak	9 am - 10 am	2.79 hours	\$111.00
Midday Peak	10 am - 2 pm	2.46 hours	\$ 98.00
P.M. Peak	2 pm - 8 pm	3.58 hours	\$142.00
P.M. Post-peak	8 pm - 11 pm	2.37 hours	\$ 94.00
<b>TOTAL</b>		<b>2.87 hours</b>	<b>\$114.00</b>

For delays and delay costs per *truck* trip, multiply figures in table by 2.5 (which is itself an average encompassing the spectrum of trucks sizes from vans to 18-wheelers). To adjust for a 5% fall-off in traffic in (our rough estimate for the 2009 economic downturn), reduce figures in table by 14%. Note that *outbound* legs of inbound trips are assumed to be distributed randomly over the 24-hour cycle, in proportion to the overall distribution of vehicle trips out of the CBD. For separate delay costs of inbound and outbound legs, see "Delays" worksheet of the BTA. For weekend delays, see "Delays Weekend" worksheet.

The answer to the first question is a resounding Yes and is rooted in several factors: the spatial concentration of Manhattan streets and the surrounding road network, the considerable space occupied by each auto, and the sheer intricacy of the traffic system which causes each vehicle to impinge upon others nearby (and sometimes not so near). While by themselves these factors don't dictate the figures in the table — these depend heavily on baseline traffic speeds (the slower the traffic, the greater the incremental delay due to a single trip) — they do give them context and plausibility.

Let's consider one such trip. Among our baseline assumptions in the BTA, we posit that a typical "work trip" by auto to the CBD and back home spans 22.6 miles, round-trip, and consumes an average of one hour and 16 minutes. Now picture how many other cars (and trucks and buses) are slowed down in *their* journeys due to the presence of this vehicle over the course of its journey. A handful of vehicles will be delayed by the vehicle by several seconds on a highway entrance ramp and another handful by a few seconds at a traffic signal. Other vehicles will be delayed by the vehicle whenever several lanes of highway traffic merge into one. Now multiply these delays by all of the ramps, signals, merges and other forced interactions during the vehicle's trip. Although few if any single vehicles are delayed more than a dozen seconds at any one time, the sum total of all such delays over all vehicles over the course of the 76-minute trip is

bound to be significant.<sup>8</sup> Indeed, to bring about the delays shown in the table, it's only necessary that each minute of the vehicle's round-trip result in around two minutes of aggregate delay for all other vehicles in its traffic "force field." That's certainly plausible, given the sheer number of such vehicles on the road.

The final element in these calculations, the monetization of time costs in dollars, builds on the estimated value of time for the many categories of drivers and vehicles in the traffic mix. These time values vary widely, from an estimated \$16 per hour for an empty ("cruising") taxicab to \$238 an hour for an 18-wheeler big rig. (These figures apply within the Central Business District; time values on the approaches are assumed to be a third less, to reflect lower average earnings and wage rates outside the CBD.) The weighted-average value of a "vehicle-hour" lost in weekday traffic comes to a little under \$41 (the comparable weekend figure is around \$23).<sup>9</sup>

As for the second question — how can one auto trip to the CBD during the graveyard shift generate delay costs of \$58 when so few cars are on the road? — the reason is that trips *into* the CBD must *come out* as well; if these outbound legs are made during high-traffic times, they can easily generate considerable congestion costs. As noted in the small print under the table, we have assumed in the BTA that outbound trips follow the same distribution regardless of the time the trip entered the CBD. Under this assumption, many trips that enter during the graveyard shift nonetheless generate considerable congestion via their outbound leg. If not for this "outbound" issue, the congestion costs for the respective weekday periods would differ by as much as a 100 or more, rather than by only two or three.

[Added March 2010: For a detailed treatment of the time costs caused by each additional vehicle trip to the CBD, see "Time Thieves: A New Computer-Driven Traffic Model Reveals the "Time Costs" of Traffic," by Charles Komanoff and Will Fisher, in the Winter 2010 edition of the New York Transportation Journal, published by the NYU-Wagner Rudin Center for Transportation Policy & Management.<sup>10</sup>]

### **Designing a Toll Plan**

To satisfy our first criterion for designing a CBD toll program — Toll Proportionality — we consulted the above table of delay times and costs. Note that delay costs due to trips entering the CBD during off-peak hours are around a third of those entering during the peak. It stands to reason, then, that tolls for vehicles entering mid- or lower Manhattan during the graveyard

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<sup>8</sup> Trips into the CBD during the 11 pm to 5 am "graveyard shift" add little to traffic delays since most streets and roads are uncongested (and, for the same reason, there are few other vehicles around to suffer those handful-of-seconds delays). However, the *outbound* legs of many of them occur during high-traffic times. See subsequent text.

<sup>9</sup> By comparison, the time value imputed to airline passengers in a recent study by the Brookings Institution for the New York City Comptroller is more than twice our weighted average, which encompasses commercial vehicles as well as private autos. The air traffic analysis, "Grounded: The Impact of Mounting Flight Delays on New York City's Economy and Environment," is referenced and parsed in the "Value of Time" worksheet of the BTA. Figures in text may have changed slightly between this Oct. 2009 draft and current reposting (March 2010).

<sup>10</sup> The link for the article is: <http://wagner.nyu.edu/rudincenter/journal/2010/02/time-thieves-a-new-computer-driven-traffic-model-reveals-the-%E2%80%9Ctime-costs%E2%80%9D-of-traffic/>.

(overnight) hours should be set at roughly one-third of peak tolls (with “shoulder” hours tolled at an intermediate rate). In this way, the extent to which a toll will offset a trip’s “time theft” from the drivers of other vehicles will be reasonably uniform across the 24-hour daily cycle.<sup>11</sup>

Based on the same criterion, the average weekend toll should be a good deal less than weekday tolls. This is on account of lower weekend congestion as well as lesser values of vehicle-users’ time on weekends. At the same time, the fare structure mustn’t be overly complex (criterion #2).

The third criterion, Strategic Fare Relief, suggests dedicating the first installment of toll revenues to eliminate bus fares. This is because abolition of fare collection is predicted to work wonders for bus travel by dispensing with the “human gridlock” at bus entrances during boarding. Our analysis suggests that free buses would speed up the average trip by 20% (see the BTA’s “Bus Boarding” worksheet).

Any toll revenues left over should be used to relieve fares on: (i) off-peak subway trips, since the cost of providing for additional off-peak trips is close to zero, and discounting them may attract some trips out of peak hours and thus diminish rush-hour crowding; (ii) express buses, to provide a further benefit (beyond free NYC Transit bus service) to residents commuting to the CBD from outside Manhattan; and (iii) intra-city commuter rail service, to confer a similar benefit and perhaps reduce crowding on subway lines that parallel Metro-North and the L.I.R.R.

The fourth criterion, Geographic Equity, is best satisfied through a surcharge on medallion taxi fares. Manhattan residents consume 70-75% of medallion taxi service, with another 5-10% used by tourists and others from outside the metropolitan area. A hefty surcharge on medallion taxi fares — not just on the “drop” (initial rate) but also on the mileage and time charges, so as to roughly “track” each trip’s congestion causation — can ensure that Manhattan leads the region in toll “incidence.” (Under the Ravitch Plan, Manhattan residents would have paid a piddling 7% of tolls, as discussed below.) The surcharge will also forestall an upsurge in taxi use drawn by faster travel speeds. All taxi surcharge revenues would be deposited in the transit fare-reduction pot, save for a modest share to be shared by taxi owners and drivers.<sup>12</sup>

## **A Bare-Bones Plan**

The basic contours of a fair and effective CBD toll should now be clear:

- a roughly 3-to-1 ratio between peak and off-peak tolls
- medallion taxis aren’t tolled to drive into the CBD, but their fares are surcharged
- trucks are charged more than autos (we propose twice as much)
- free transit-bus service

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<sup>11</sup> An alternative is to bifurcate the cordon toll into inbound and outbound legs and charge separate tolls to drive into and out of the CBD. In this scenario, the tolls for each leg would vary by one or more orders of magnitude between peak and graveyard periods. Modeling this approach would require some retooling of the BTA. Extra administrative costs of bidirectional tolling would probably be relatively modest — on the order of \$40-\$50 million a year.

<sup>12</sup> In 2009 the legislature implemented a taxi surcharge along with the regionwide payroll tax proposed by the Ravitch Commission. The surcharge of 50¢ per ride will generate only approximately \$80-85 million a year, however, or less than 20% of the revenues from the more comprehensive (mileage- and time-based) surcharge envisioned as part of the Kheel-Komanoff Plan discussed below.

- if possible, free commuter buses, free intra-city commuter rail service, and reduced off-peak subway fares.

None of this dictates *how high* the congestion tolls should be set, however. So let's experiment. We'll start with a three-tier weekday cordon toll of \$1.50-\$2.50-\$3.50, with weekend charges ranging from free in some hours to a maximum of \$2.00, supplemented by a 15% surcharge on medallion taxi fares.

Using the BTA, we see that these cordon tolls would generate sufficient revenue to eliminate NYC Transit bus fares. Under this scenario, travel speeds increase by an average of 8% within the CBD on weekdays, largely because the toll discourages some car trips into the heart of Manhattan. Speeds also increase on the Brooklyn, Queens, Bronx and New Jersey approaches to the CBD, but only modestly, by an estimated 1% on average, because CBD-bound trips (and their "return legs") make up such a small percentage of trips on these perimeter roads. Bus speeds improve far more, with an average citywide gain of at least 20%, primarily because waiving fare collection slashes "dwell time" at bus stops.

The value of these time savings for truckers, auto commuters, other car users and bus riders is impressive, totaling \$1.4 billion annually, or almost twice the overall toll of \$820 million — of which \$600 million would come from the cordon toll and \$220 million from the taxi surcharge. (Of course, juxtaposing the time savings vs. the toll expenditures is a facile comparison, since, under this scenario and others below, the toll/taxi revenue would be flowed through to bus riders via free fares.<sup>13</sup>)

This scenario would be a major improvement over the status quo in which bus service isn't free but driving into the CBD is (save for the four tunnels: Lincoln, Holland, Brooklyn-Battery and Queens-Midtown). Nevertheless, it is relatively unambitious. A top toll of \$3.50, charged on trips into the CBD made during fewer than one-quarter of the hours of the year, barely amounts to 3% of the \$130-\$140 in time costs imposed by these trips. A toll several times greater — with sufficient revenues to finance much more than free buses alone — could, we believe, be more appealing, despite the higher charge on driving. Indeed, we believe that many New Yorkers would deem the benefits transformational.

#### **A More Ambitious Plan: Kheel-Komanoff<sup>14</sup>**

This more ambitious plan has been dubbed the Kheel-Komanoff Plan, since it is a joint creation of Ted Kheel and the Kheel team's lead traffic modeler, Charles Komanoff. The plan proposes weekday toll rates of \$3, \$6 or \$9, depending on when the vehicle crosses into the CBD. Weekend tolls would also vary over a 24-hour cycle, with levels of \$2, \$3, or \$4. With these tolls, drivers into the CBD would be paying between 6% and 10% of the congestion costs caused

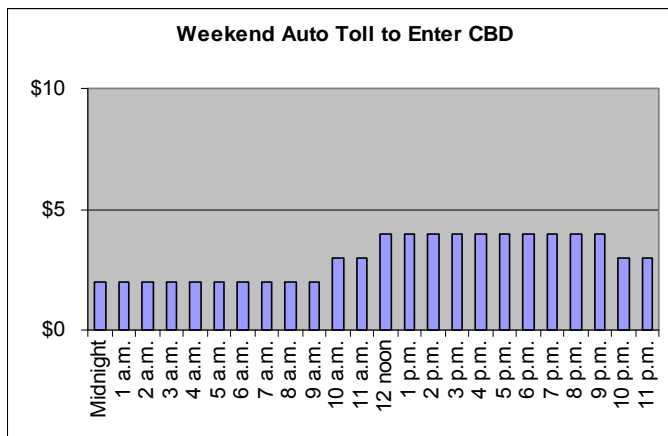
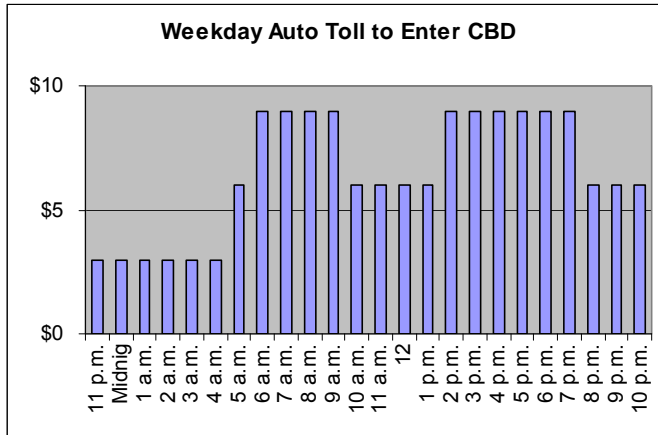
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<sup>13</sup> With the minor exception that one-tenth of the \$220 million taxi surcharge, \$22 million, would be allocated to taxi owners and drivers.

<sup>14</sup> The complete toll schedule for the Kheel-Komanoff Plan is shown in the Balanced Transportation Analyzer, in the worksheet tab "Our Plans." The BTA has been written to default to Kheel-Komanoff input parameters.

by each trip. This is several times more than the 3% levy in the “bare-bones” plan above, but still a strikingly low fraction of the costs.

Nevertheless, the tolls would raise an estimated \$1,310 million a year, even allowing for the reduction in auto trips prompted by the tolls. Another \$430 million in net revenues would come from a medallion taxi surcharge of 33%. The total revenue, \$1,740 million, is more than twice the revenues from the “bare-bones” plan, enabling a commensurately broader and steeper reduction in transit fares, as follows:



**Kheel-Komanoff Plan — Fare Reductions**

- Free service on all NYC Transit buses and all in-city express buses
- Free service on all Metro-North and L.I.R.R. intra-city commuter rail service
- Off-peak subway fare reductions, with a top toll of \$2 charged during 8-9 a.m. and 5-6 p.m., a \$0.50 to \$1.50 toll range at other hours between 5 a.m. and 11 p.m., and completely free subway service overnight (11 p.m. – 5 a.m.) weekdays and during all 24 hours on weekends and holidays. This fare schedule would result in an average 50% drop in fares overall

*This combination of nearly free transit and a congestion charge would, we believe, change the face of transportation in New York City.* Following are the key benefits the BTA predicts for the Kheel-Komanoff Plan:

**Kheel-Komanoff Plan — Transportation/Travel Benefits**

- 16% fewer car and truck entries into the Manhattan CBD
- 23% higher weekday travel speeds within the CBD (on a 24-7 basis: 21% higher)
- 2-3% higher travel speeds on the approaches to the CBD
- More than \$2.5 billion worth of time savings to motor vehicle users each year
- 28% increase in bus ridership (drawn by both faster service and free fare)
- 7% higher subway ridership, despite declines of 5% during the 8-9 a.m. morning peak and 9% in the 5-6 p.m. evening peak (as some subway trips time-shift for lower fares)

How does Kheel-Komanoff perform with respect to our criteria for traffic pricing? Rather well:

**1. Toll Proportionality** — Tolls charged for all trips would be within a narrow band — between one-tenth and one-fifteenth — of the congestion costs caused by an average trip in that period.

**2. Toll Simplicity** — With just three toll levels on weekdays or weekends, all set at “round” numbers — \$3-\$6-\$9 on weekdays, \$2-\$3-\$4 on weekends — the tolls should be easy to remember. The time periods are less straightforward, however, as indicated in the charts below. We are open to the possibility of “straightening” some toll periods, although this could work against toll proportionality (criterion #1).

**3. Strategic Fare Relief** — Free buses, free in-city commuter rail, and an overall 50% cut in subway fares certainly qualifies as fare relief. Concentrating these savings among transit buses (allowing faster boarding), express buses (a break for distant NYC commuters), commuter rail (relieving subway overcrowding) and off-peak subway use (ditto) achieves two key strategic objectives: winning political buy-in and better managing system resources.

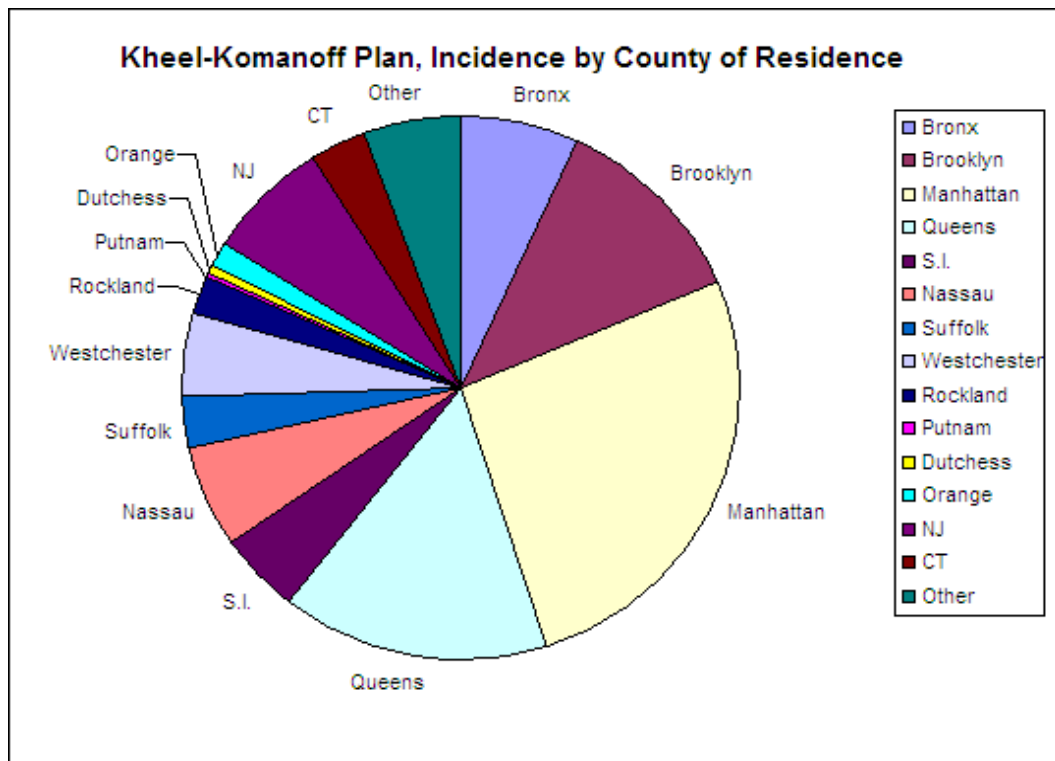
**4. Geographic Equity** — The Kheel-Komanoff Plan fulfills the mandate to draw a plurality of toll and taxi-surcharge revenues from residents of the borough that will enjoy the greatest reduction in traffic. Under the plan, Manhattanites will pay as much in new tolls as residents of the city’s two most populous boroughs, Brooklyn and Queens, combined. (See Toll Incidence chart, below.) While some might want that share to go higher still, Manhattan’s percent of the total toll under the Ravitch Plan would have been four times less.

*Tolling Geography* — The Ravitch Plan drew fire for tolling the Harlem River bridges, which connect hard-pressed neighborhoods (upper Manhattan and the South Bronx) and don’t relate directly to the Manhattan CBD. The Bloomberg Plan came under attack from residents of Brooklyn and Queens for neglecting to increment tolls now paid to cross the Hudson River. Our plan fixes both failings.

*Time of Day Choice* — Neither the Bloomberg nor Ravitch Plans varied the congestion toll by time of day. Our plan offers drivers a time-based choice of tolls while aligning the disincentive to drive with the congestion costs from driving in each time period.

*Traffic Relief* — The Bloomberg Plan promised 6% higher traffic speeds in the Manhattan CBD and 1% citywide. The Kheel-Komanoff Plan’s 20% or greater gain in CBD traffic speeds (2-3% citywide) roughly triples these improvements. The difference is due to our time-of-day toll structure, our taxi surcharge, and, of course, our provision of free transit. The Ravitch Commission did not offer an estimate of its plan’s travel benefit, but it would almost certainly have been even less than that for the Bloomberg Plan.

*Fare Relief* — The Kheel-Komanoff Plan provides actual and immediate fare relief; indeed, we would seek to bind one to the other, with the drop in fares taking effect no later than (and perhaps slightly preceding) the initiation of the CBD toll., The Ravitch tolls at best would only have helped limit a fare hike while the Bloomberg Plan allocated its modest net revenues to unspecified capital improvements rather than fare relief.



*Better Transit Service* — The Kheel-Komanoff Plan liberates mass transit’s neglected stepchild, bus travel, with a 20% boost in travel speeds due largely to eliminating fare collection. Rush-hour subway crowding will diminish as well due to time-varied subway fares and, secondarily, provision of free intra-city commuter rail. These gains are more concrete than the generalized service improvements promised for transit in the Bloomberg Plan.

*Game Changer?* — Do these benefits add up to a transformational change? Will the public view the Kheel-Komanoff Plan’s promise of nearly-free transit and a 20% drop in Manhattan gridlock as enough of a “game changer” to warrant tolling car and truck traffic on presently free portals into the heart of the city? No one can say at this point, prior to the public unveiling of such a plan

and the start of public debate. Hopefully, the discussion will extend to the ultimate goal of 100%-free transit.

### **Modifying Kheel-Komanoff to Support Transit Capital Spending**

As noted, the Kheel-Komanoff Plan dedicates 100% of new net revenues to eliminating or reducing transit fares. The motivation is two-fold: to maximize fare relief for hard-pressed New Yorkers (and maximize incentives to choose transit over autos or taxicabs); and to neutralize the criticism of congestion pricing that flared up in the debate over the Bloomberg plan, that toll revenues would end up being “thrown down the MTA rathole.”

The drawback of revenue-neutrality is that it provides zero revenues to fund capital spending for transit, in the face of the huge, perennial need to invest in transit long-term maintenance, upgrades and service expansions. A more nuanced approach should also be considered that would set aside a portion of the revenue stream from congestion tolling to transit capital improvements.

Using the BTA, we tested a number of possible re-allocations, including one in which an annual, ongoing revenue stream of approximately \$500 million is dedicated to transit capital spending. This is effected by reducing most of the proposed subway fare cuts by 50 cents a ride: instead of free service, weekend/holiday and overnight subway service would be charged at 50 cents; some other non-peak fares that were slated to drop to 50 cents would be set at one dollar, while some \$1.00 fares would be set at \$1.50.

Under this altered fare schedule, the average subway fare would be 30% less than current fares, rather than 50% less as provided in the Kheel-Komanoff Plan. (Buses would still be free, and intra-city rides on Metro-North and the L.I.R.R. would be discounted by 75%.) This would restore \$450 million a year in farebox revenues, while another \$60 million in additional revenue would come from a rise in the congestion tolls. (That is because the slightly higher subway fare structure would reduce car-to-transit mode shifts and thus increase the amount of toll-paying car trips into the CBD.) This altered plan would generate net revenue of just over \$500 million a year, which could and should be applied to the MTA capital plan. The improvements in traffic would still be impressive: 14% fewer vehicular trips into the CBD each day, and an average 18% improvement in travel speeds within the heart of the city.

[Note added March 2010: The traffic improvements would be somewhat greater than just indicated, since capital investments in keeping transit in a state of good repair would attract new (or maintain current) transit trips, some of which would otherwise take place in autos. This linkage has just (March 19, 2010) been added to the Balanced Transportation Analyzer spreadsheet model and will be incorporated into the next draft of this paper.]

### **Completely Free Transit via Congestion Pricing?**

We saw above that “nearly-free transit” could be paid for by variable tolls in the single digits (i.e., with a peak CBD-entry toll of \$9) along with a 33% medallion-taxi surcharge. The question

arises: *how much higher must the toll schedule be to go the whole distance — to provide enough revenue to drop the subway fare not just by 50% (as in the original Kheel-Komanoff Plan) but all the way to zero and usher in completely free transit in New York City?*

The initial answer to this question is daunting: from the BTA, it appears that financing 100% free transit via CBD tolls (and a taxi surcharge) alone requires roughly *tripling* the weekday CBD-entry tolls from those in the Kheel-Komanoff Plan and doubling the weekend charges, along with raising the surcharge on medallion cab fares by half to 50% (from 33%).

The toll schedule — \$10-\$20-\$30 on weekdays, \$4-\$7-\$10 on weekends — is certainly steep. Yet it isn't quite as punitive as it may appear. These tolls would “capture” less than a quarter of CBD trips' congestion costs (the ratio of any trip's toll to the congestion costs it imposes would average 23% for weekdays, 21% weekends). Moreover, the tolls would be on a par with typical Manhattan car-parking rates. Nevertheless, tolls of these magnitudes would be hard for some New Yorkers to swallow, particularly in one fell swoop. So too would be the predicted shrinkage in traffic trips into the CBD — roughly 30% on weekdays and almost 50% on weekends.<sup>15</sup>

Two conclusions follow. One, the ascent to completely free transit might best be made in stages, perhaps beginning with the Kheel-Komanoff Plan outlined above. Not only is a \$30 peak toll potentially more palatable when the starting point is \$9 rather than zero. In addition, once an almost-free transit plan is up and running, the benefits of free transit and less traffic will have advanced from hypothetical to concrete, perhaps making it easier to “sell” progressively higher tolls.

Second, a free-transit plan may need to tap supplemental revenue sources rather than resting solely on cordon pricing. Following is a possible list.

### **Beyond CBD Tolls Alone: Possible Revenue Supplements for Free Transit**

- Non-CBD traffic pricing. This could entail tolling vehicle entries into other, smaller cordons in congested “satellite” downtowns such as Flushing or Downtown Brooklyn; or “area-wide” per-mile road tolls in larger parts of the city and metropolitan area. Presumably, such tolls would be varied with respect to place as well as time in order to reflect spatial as well as temporal variations in traffic congestion. Needless to say, revenues from any supplemental tolls would be coveted for other uses than zeroing out New York City transit fares. One logical application is improved and/or fare-reduced commuter rail service.<sup>16</sup>

<sup>15</sup> This shrinkage of traffic helps explain why tolls needed to finance completely free transit must be so much greater than the Kheel-Komanoff tolls, even though the required toll *revenues* are only 70% greater. Note also that the anticipated average toll of around \$18 for all CBD auto entries (a weighted average of the effective average tolls of approximately \$24 on weekdays and \$8 on weekends) exceeds somewhat the conclusion in our January 2008 “Balancing” report that a \$16 “one-size-fits-all” toll would be sufficient to finance universal free transit. The difference is largely because our current plans don't count revenues from possible curbside parking fees.

<sup>16</sup> As a very rough-cut, an average 1¢/mile charge on the 100 billion miles a year driven in the 12-county MTA region plus the 4 nearest New Jersey counties would generate \$1 billion a year. Ideally, “VMT fees” would vary by place (higher in dense regions) and road type (higher for major highways), but the figures here indicate considerable

- Parking charges, as New York City moves to encourage parking turnover and generate revenue by instituting electronically mediated market-rate curbside parking (caveat: parking charges will diminish CBD commuting and thus reduce cordon-toll revenues, so revenues from parking charges aren't necessarily additive to cordon toll revenues).
- Federal infrastructure funding for NYC transit. Although this likely would be limited to capital spending, there may be ways to restructure operating budgets to take advantage of such funding.
- Increased city and/or state operating support, funded through general revenues or a dedicated source such as a surcharge on high incomes or new market-rate parking fees.
- "Value capture" surcharge on CBD real estate tax rates, reflecting the improved quality of life and resulting increased property values due to less traffic and improved transit.
- Other?

These ideas are preliminary and require analytical development along with political vetting. The need for incubation suggests segmenting free transit rather than adopting it all at once.

\* \* \* \* \*

*We welcome your criticisms, suggestions, questions. No comment is too minor. Please direct feedback to Charles Komanoff, [kea@igc.org](mailto:kea@igc.org), 212-260-5237. Thank you.*

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revenue potential. Our VMT source, [http://www.epa.gov/ttn/naaqs/pm/docs/2005\\_vmt\\_county\\_level.xls](http://www.epa.gov/ttn/naaqs/pm/docs/2005_vmt_county_level.xls), shows 78.4 billion miles driven for MTA counties and 22.0 billion for Bergen, Essex, Hudson and Union Counties in 2005.

### **“Modified” Kheel-Komanoff Plan (modified to provide funds for capital spending)**

#### *Plan Components*

- Free service on all NYC Transit buses and all in-city express buses.
- 75% fare reduction for service on Metro-North and L.I.R.R. commuter rail trips that start and end within NYC (e.g., Fordham – Grand Central, Woodside – Penn).
- Off-peak subway fare reductions resulting in an average 30% fare cut:
  - \$2.00 fare for rides during the two peak hours (8-9 a.m. and 5-6 p.m.).
  - \$0.50 fare overnight (11 p.m. – 5 a.m.) and all times on weekends and holidays.
  - \$1.00 - \$1.50 fares all other times.
- Weekday tolls of \$3, \$6, or \$9 to drive an auto into the Manhattan Central Business District (CBD), depending on time of day (the average will be a little over \$7).
- Weekend/Holiday tolls of \$2, \$3 or \$4, also depending on time of day.
- No charge to drive out of the CBD.
- Trucks pay twice as much as cars.
- Medallion taxicabs enter CBD for free, but each element of the fare (mileage, waiting time and “drop”) is surcharged by 33%; nine-tenths of the surcharge revenue goes into the revenue pot (the other one-tenth is retained by drivers and owners).

#### *Plan Results*

- Net revenue stream of \$530 million a year to be invested in MTA capital program (no such revenue stream is included in “straight” Kheel-Komanoff Plan)
- Weekday subway ridership rises 5% despite drops of 3% and 6% in the two peak hours.
- Bus usage rises 28% due to both free fare and much faster (20%) rides.
- Average speeds at which cars and trucks move within the CBD increase 18%, producing time savings worth \$800 million to drivers and truckers.
- Travel speeds improve by more than 2% on the approaches to and from the CBD, producing additional time savings worth \$1,100 million.
- An overall 4% decline in traffic citywide.

#### *Other Plan Positives*

- Manhattan residents will pay much more in tolls and higher taxi fares than any other borough or county (largely due to the taxi surcharge).
- Residents of four “outer boroughs” pay less than 40% of the tolls + taxi fares.

#### *Plan Caveats (features of the plan, as currently envisioned, that should be understood)*

- Every entrance point to the Manhattan CBD (Manhattan south of 60<sup>th</sup> Street) will be tolled. This includes the four East River bridges.
- The new tolls will be *in addition to* any tolls currently paid to drive into the CBD, i.e., on the Lincoln, Holland, Queens-Midtown and Brooklyn-Battery Tunnels.
- Clean-fuel trucks receive no toll discounts.
- Underlying traffic-pricing model (BTA) is benchmarked to 2007 conditions; hence, figures here do not reflect recession or 2009 fare hike.
- BTA treatment of transit price-elasticity may need modification to reflect bulk-fare discounts.