



October 11, 1995

TO: MTA BOARD OF DIRECTORS

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SUBJECT: AUTOMATION OF METRO GREEN LINE - RESPONSE  
TO FOLLOW-UP QUESTIONS

This board box report has been prepared at the request of Supervisor Deane Dana in response to a list of questions he submitted regarding Green Line automation (see attached letter). The questions and the responses have been summarized in the following report.

### ISSUE

The issue is whether the Board should adopt the staff recommendation to maintain manual operation of the Metro Green Line or elect to exercise the contract option to automate the Green Line operations. Staff's recommendation to not automate the Green Line and supporting documentation is presented in the Board report dated September 7, 1995. This item will be presented at the October 19, 1995 Cost Containment Committee meeting.

### BACKGROUND

Responses to summarized questions posed by Supervisor Dana's office follow below (questions are in italics):

1. **QUESTION:** *Has MTA staff developed Green Line operating plans (headways and train consist) which cannot accommodate*

*additional passenger demand without significant increases in Green Line operating expenses?*

No, Green Line operating plans will easily accommodate additional passenger demand with no increase in the operating budget.

Green Line operating plans, developed and funded as part of the Long Range Plan, provide more than adequate capacity through FY 2015. While forecasts of Green Line passenger demand require peak period headways of 11.5 minutes, a 6 minute "policy" headway was recommended in order to efficiently interface with the Long Beach Blue Line schedule. This immediate improvement in Green Line service provides the excess capacity required to accommodate unanticipated passenger demand and special event service. Since, in the Long Range Plan each peak period on the Green Line is assumed to be three hours long in the future, considerably longer than today's peak period service, Green Line operating revenues set aside in the Long Range Plan will be sufficient to fund planned service changes.

With respect to improvements in Long Beach Blue Line service, peak service periods are proposed in the Long Range Plan to be extended to three hours each in the future, similar to the Green Line. This service expansion, combined with the planned opening of the Harbor Transitway, is expected to provide more than adequate transit capacity in the Blue Line corridor through FY 2015.

2. **QUESTION:** *Why has MTA staff assumed higher load factors (passenger to seat ratio) for the Green Line than for the bus system, and won't this act as a disincentive for customers to ride the Green Line?*

MTA staff has not assumed higher load factors for the Green Line than for the bus system. In fact, Green Line load factors are slightly less than for the bus system and may act as an incentive to ride the Green Line.

Bus and rail load factors are used for scheduling purposes to assure that adequate transit capacity is available during the peak period at the maximum load point in the peak direction. Load factors used by the MTA are derived from the design standards for each vehicle type. In general, design standards specify a minimum area (level of comfort) for each standee. Thus, a 1.4 load factor for buses assures that each standee has approximately the same level of comfort as light rail standees with a 2.0 load factor (the Red Line heavy rail load factor is 2.86).

While a 2.0 load factor is used for planning purposes to develop "demand-based" light rail operating plans, Green Line operating plans were based on policy decisions to efficiently interface with the Long Beach Blue Line schedule. The Green Line's proposed 6 minute peak headway/2 car train consist results in a maximum load factor of 1.01, or approximately 1 seat for every passenger. The average load factor for the Green Line is 0.53, lowest of all the rail lines proposed in the Long Range Plan. Patronage impacts associated with operating policy-based headways have been incorporated into the Green Line's patronage forecasts.

3. **QUESTION:** *Did the Long Range Plan assume COLA increases for operating and maintenance staff as part of the rail operating cost projections? and*
  
4. **QUESTION:** *Did the Long Range Plan assume increases in inflation as part of the rail operating cost projections? If so, which price index was used?*

Yes, increases in inflation were included in the rail operating cost projections. Green Line Operations costs in the Long Range Transportation Plan were escalated on an annual basis based on the CPI rate from the September, 1994 UCLA Forecast for Los Angeles County. Costs were escalated 4.08% annually for the first decade and 3.89% during the second decade.

It was assumed that these inflation factors would be sufficient to cover increases in operators' salaries (such as COLAs, maintenance cost, and overhead/general costs). All operating and staffing costs in the Long Range Plan were escalated with these same inflation factors.

For analytical purposes, the costs shown on Attachment 2A of the 9/7/95 Board report are in current year dollars. The cost information provided in the Green Line Automation Board Report was expressed in current dollars to provide a constant base for comparison.

The transit inflation rate, as measured by the APTA proposed Transit Price Index (TPI), is worth investigating. However, currently this index is not being maintained and is not used by the transit industry.

5. **QUESTION:** *Please clarify the staffing estimates associated with Green Line automation, i.e., explain the reason for the significant difference*

*between the range in staffing, and the calculation of personnel expenses associated with each range.*

Staffing levels are correlated to risk levels assumed by the MTA for passenger safety, security, and service reliability.

#### Lower Risk Transit Agent Staffing Level

The Transit Agent staffing level of one Agent for every two stations is derived using the following formula:

- 14 stations X  $\frac{1}{2}$  station coverage X 2 ten-hour shifts = 14 shifts
- 14 shifts X 7 days per week coverage = 98 shifts
- 98 shifts ÷ 4 work days (ten hour shifts) = 24.5 Transit Agent Positions
- 24.5 Transit Agents + 10% vacation/sick allowance = 27 Transit Agent staffing level

#### Higher Risk Transit Agent Staffing Level

The Transit Agent staffing level of one Agent for every three stations is derived using the following formula:

- 14 stations X  $\frac{1}{3}$  station coverage X 2 ten-hour shifts = 9.333 shifts
- 9.333 shifts X 7 days per week coverage = 65.333 shifts
- 65.333 shifts ÷ 4 work days (ten hour shifts) = 16.333 Transit Agent Positions
- 16.333 Transit Agents X 10% vacation/sick allowance = 18 Transit Agent staffing level

Both Transit Agent staffing levels represent restrictive sick and vacation assumptions. Historical data has shown higher sick and vacation usage; however, given that these positions would most likely be new hires, staff believes that a 10% vacation/sick allowance is reasonable.

#### Other Staffing Level Differences

Eight UTU Train Operators would be required, under automated conditions, to move trains from the non-automated shop to the automated yard. These moves could also be achieved with four ATU Specialists instead of UTU Train Operators. This requires changes to current ATU and UTU contracts.

The lower risk "Top Range" identifies an increase of six vehicle specialists (one position added to three eight hour shifts, seven days per week) to repair and maintain added vehicle components associated with automated technology. The higher risk "Bottom Range" adds the equipment without adding vehicle staff to maintain it.

The lower risk staffing level adds five CCTV Observer positions to remotely monitor activity at the stations, field passenger information calls from the passenger assistance phones at the stations and remotely input messages on the message signs. This increase will provide two CCTV Observers each shift, seven days per week to monitor two banks of CCTV monitors on separate walls at the CCF. The high risk "Bottom Range" staffing level provides no increase in CCTV Observers, resulting in only one CCTV Observer per shift.

Lastly, the Lower Risk staffing level adds three Communication Inspectors to repair and maintain the wayside automated equipment, the High Risk staffing only adds one Communications Inspector.

**6. QUESTION:** *Please discuss the derivation of the average salary used to estimate marginal Green Line operating expenses.*

A report prepared by MTA Human Resources entitled the RP-11 report was used to approximate an average wage for comparative analysis between low and high risk staffing levels. The purpose of the RP-11 report is to ascertain average salaries of each position for budgeting purposes. The \$50,000 average was intended to identify an order-of-magnitude difference between the various ranges. If that figure is changed to reflect actual salaries, estimates and averages will still be required for use in identifying the cost associated with the currently nonexistent job classification of a Transit Agent.

7. **QUESTION:** *Please summarize all Green Line operating and capital cost projections, the range of projected passenger revenue, and estimated staffing expenses on one table. Calculate the net cost (or savings) associated with each alternative staff/patronage projection.*

The attached table provides the range of costs and savings for the Green Line should the Board elect the automation option. The variances depend on the level of staffing applied in each case.

The table shows that given the range of operating costs/savings and range of projected revenues, the bottom range staffing scenario indicates a \$34.7 million net benefit over 30 years if automation is adopted. The top range staffing scenario indicates \$4.3 million cost increase if automation is adopted. An additional scenario was also presented at the request of Supervisor Dana's office. This scenario places a Transit Agent at every other station for a staffing increase of 9 transit agent positions over the bottom range but adopts the bottom range staffing levels for the remaining positions. This scenario indicates a net benefit of \$21.2 million if automation is adopted.

**COST/BENEFIT ANALYSIS**  
**OF AUTOMATING THE GREEN LINE VEHICLES**  
**(30-Year Projection in Present Value \$)**

(\$000)

	STAFFING WITH AUTOMATION (Bottom Range Scenario)	STAFFING WITH AUTOMATION (Bottom Range with add'l Station Attendants Scenario)	STAFFING WITH AUTOMATION (Top Range Scenario)	STATUS QUO STAFFING WITHOUT AUTOMATION	
<b>CAPITAL COST OF AUTOMATION</b>					
LA Car Cost of Automation	\$ 14,300	\$ 14,300	\$ 14,300	\$ -	
Total Remaining Cost of Automation	\$ 14,300	\$ 14,300	\$ 14,300	\$ -	
<b>BENEFITS OF AUTOMATION</b>					
Staffing Requirements (# of people)	49	58	75	61	
Staffing Impacts	\$ 18,000	\$ 4,500	\$ (21,000)	\$ -	The staffing plans vary depending on the level of risk the MTA is willing to assume (see responses to Questions 5 and 10).
Estimated Additional Fare Revenues	\$ 31,000	\$ 31,000	\$ 31,000	\$ -	The analysis assumes 9,000 additional passengers per day x average revenue per boarding. Assumes zone fares.
Total Benefits	\$ 49,000	\$ 35,500	\$ 10,000	\$ -	
<b>NET BENEFITS (COSTS) OF AUTOMATION</b>	<b>\$ 34,700</b>	<b>\$ 21,200</b>	<b>\$ (4,300)</b>	<b>\$ -</b>	

8. **QUESTION:** *Has staff assumed fare increases as part of their passenger revenue projections? If not, why not?*

The Long Range Plan assumes that fares keep pace with inflation. This means that fare increases will occur to keep fare revenues in pace with inflation. The rail farebox revenues are calculated by multiplying the estimated fare per boarding by the projected annual ridership.

9. **QUESTION:** *What is the estimate of passenger revenue over a 30 year period, instead of a 20 year period, including fare increases?*

The estimate of net passenger revenue due to Green Line automation over a 30-year period instead of a 20-year period results in an added revenue increase of nearly \$31 million, rather than \$23 million as reported in the September 7, 1995 Board report. This potential increase in fare revenues does not assume continued increasing ridership in the last 10 years of the 30-year period because the long range plan model does not project ridership beyond the year 2015.

10. **QUESTION:** *Please substantiate staff's statement that the "level of risk associated with automation is unclear since operational knowledge of a fully automated system is limited".*

The application and working knowledge of fully automated systems is limited in North America. As such, assumed risk must be considered when evaluating a policy introducing automated technology to the Los Angeles County light rail network.

Real and perceived risks to passenger safety and service reliability have contributed to the development of protective barriers (i.e., WIDS and PIDS) for automated systems. However, WIDS and PIDS are not impermeable. For example, a non-detected intrusion occurred during the first month of Green Line revenue operation.

On August 23, 1995, at 10:25 p.m., train 73 departed Long Beach Station and approached a female trespasser sitting between the tracks. This trespasser entered the right-of-way such that no PIDS or WIDS alarms were sounded. Fortunately, the on-board Train Operator saw the woman and was able to stop the train before striking her.

On May 10, 1995, at approximately 7:14 a.m., the protective barrier separating the Green Line from freeway traffic was breached by a gasoline tanker truck. The track right-of-way was littered by fencing



and debris from the breached barrier. As the WIDS alarm was activated, this situation would have certainly stopped trains mid-route. The response time to assist and/or evacuate passengers is improved with on-board operators.

When looking to Vancouver as the automated example, their own accounts indicate that rapes, assaults and other felonious crimes have occurred at both their stations and aboard automated trains. This has contributed to Vancouver's recent efforts to increase their police efforts on their line. In an on-board operator environment, Train Operators have a view of the stations upon approach, providing an extra set of eyes in addition to the cameras on the platform. Because BART is comparable with the Red Line Heavy Rail, as they are both semi-automatic systems requiring an on-board Train Operator for revenue operation, automated experiential knowledge cannot be derived.

While comparisons to other operating properties employing automated technologies may be useful, they inadequately represent the diverse and dissimilar operating environments found in Los Angeles County. The lack of an on-board operator could cause increased corporate exposure to damages resulting from passenger injury during emergency evacuations. In fact, the Green Line elevated structures have been designed and constructed to meet strict building codes, and would most likely survive significant earthquake activity. During a major earthquake, civil unrest or simply activation of the fail-safe WIDS/PIDS system, a train could remain stranded between stations on an elevated structure without electric power while awaiting response from a station attendant.

11. **QUESTION:** *Please explain staff's statement that "Green Line automated staffing plans do not assume multi-tasking" and "assumes Transit Police staffing at its current level".*

The decision to pursue greater flexibility in job duties must be made as a part of an overall collective bargaining strategy. Fewer operating staff would be required, whether or not the Metro Green Line is automated, if staff had more flexible job definitions. Because most rail operating positions are represented by collective bargaining units, job duties are defined through the collective bargaining process. Two areas identified for potential labor negotiations are the Transit Agent and Vehicle Specialist positions. For example, Transit Agents might perform fare inspections as part of their duties thereby potentially reducing Transit Police staffing requirements. Vehicle Specialists

might be allowed to move trains within the yard area, rather than requiring an operator to be available for that purpose.

- 12. QUESTION:** *Please clarify staff's reference to Vancouver's staffing levels as a bench mark.*

The Board report addresses the current staffing levels during the majority of the day. The staffing levels are reduced during off-peak hours when ridership and service are reduced. The Vancouver roving assistants have additional duties assigned in comparison with MTA current plans.

The Vancouver Roving Assistants perform a number of duties that are currently planned for the MTA Transit Police for the Metro Green Line. They include; crowd control, fare checking, initial interface with the public regarding undesirable behavior and contacting the 2-4 special constables assigned to Skytrain or other police agencies. There are a number of union issues that will need to be worked out prior to realization of staffing savings available in Vancouver.

- 13. QUESTION:** *Please clarify whether the level of security and staff presence is an issue independent of automation. Also, please clarify how the presence of communication systems (cameras and radios) provide added safety and security.*

Staff agrees that the level of security is largely unrelated to automation. However, the level of operating and maintenance staff is a policy issue which must be addressed if the Green Line is automated (please see response to question #5). As discussed in response to Question #11, flexible job descriptions are the key to minimizing potential staffing needs.

With respect to the operator's ability to respond to customer needs, a two-way intercom is available for passengers to communicate a need to the operator. Because the operator is physically present on the train, (s)he can respond more immediately and assess the situation and appropriate response more quickly than would be possible remotely from the command center. There are no cameras on the vehicles, so a dispatcher would only have voice communication with a passenger to assess a situation. This is a significant difference between automated and manual operation. Response to an emergency on a train will happen much sooner with manual operation. This could be a critical factor in a life-threatening emergency.

**14. QUESTION:** *Please summarize past MTA (LACTC or SCRTD) Board actions regarding Green Line automation.*

<u>Date</u>	<u>Board Action</u>
07-15-87	RCC Committee considered but did not direct consultant to investigate Automated Vehicle Technology.
04-22-88	RCC Committee recommended approval of Automation.
04-27-88	LACTC Board considered but did not direct staff to investigate impacts of technology issues associated with Automation. Staff to schedule workshops.
05-11-88	LACTC Board approved automation of Metro Green Line.
10-11-89	Automation discussed at RCC Meetings in relation to Budget issues. No change in direction.
10-25-89	Commission approved on a roll-call vote.
10-23-91	Due to budgetary considerations, the automation of the Metro Green Line was again considered by the Commission Board who reaffirmed the commitment. At this time, expenditure for automation could have been significantly minimized. Instead, additional funds were made available.
12-18-91	Contract for P1900 Automated Cars and H1100 Automated Train Control approved. Metro Green Line budget adjusted upward to pay for cost.
01-22-92	Following controversy regarding overseas purchase of cars, P1900 with Sumitomo Corporation of America (SCOA) canceled and H1100 with Union Switch and Signal placed on hold.
01-22-92	Ad Hoc Vehicle Committee formed by Board action consisting of RCC and LACTC board members, to formulate recommendation on replacement car.
04-22-92	LACTC Board released H1100 from hold. Staff proceeded with design and construction which can be either automated (driverless), or semi-automated (driver can control car or can just

- open/close doors and authorize car to depart station - similar to Red Line design)
- 05-03-92 Following two attempts to procure an interim car for Metro Green Line, direction given to negotiate sole-source procurement of 15 additional Blue Line cars from SCOA. (P2020)
- 06-24-92 Ad Hoc Vehicle Committee recommended and Board approved the procurement of the L.A. car with 2 cars designated as prototype cars capable of automated operation and testing the Advanced Transit Products Development Program (ATPDP). The contract also has requirement for design of the cars automated configuration and an option to purchase the last 34 additional cars in the automated configuration. Additionally, the Board authorized reduction of the Green Line budget by \$155 million to be reprogrammed to the LA Car project.
- 07-28-93 Contract P2000 for the L.A. car advertised and awarded to Seimens Duewag Corporation configured as the Ad Hoc Vehicle Committee had recommended.
- 02-25-94 Notice to Proceed was issued to Seimens Duewag Corporation for P2000. The approved project cost was \$254 million.
- 05-25-94 Staff negotiated a no-cost change order with Seimens for an option to procure the first 34 cars in the automation configuration.

**15. QUESTION:** *Please discuss the (financial) cost/benefit of automating the Green Line in the context of spending \$717 million in construction costs.*

As shown in the table provided in response to question #7, the financial analysis shows that Metro Green Line automation could be financially beneficial to the MTA, depending upon the level of staffing the Board approves for the line. However, the financial benefit to be gained over 20 years must be weighed against the immediate value of the \$14.3 million expenditure during a time of scarce resources.

The staff recommendation of not automating the Metro Green Line is based on the forecast that the Metro Green Line will operate with excess capacity for the next 20 years. Therefore, the expenditure to automate the line is not warranted based on demand and capacity.



**BOARD OF SUPERVISORS  
COUNTY OF LOS ANGELES**

822 KENNETH HAHN HALL OF ADMINISTRATION / LOS ANGELES, CALIFORNIA 90012

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## DEANE DANA

Supervisor, Fourth District  
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October 4, 1995

Mr. Joe Drew  
Chief of Staff  
Metropolitan Transportation Authority  
818 West 7th Street  
Los Angeles, CA 90017

**PRIORITY**

Dear Joe:

As you know, one must move forward carefully when making any type of policy decision that impacts the ability of an organization to provide a high quality of service. MTA is at such a crossroad with the decision on how the Green Line will be operated for the next 10 years as well as for the next 100 years. That is why my staff and alternate have been so involved with this issue; we want to make sure the MTA Board is aware of all the impacts to the quality of service before deciding on whether or not to automate the Green Line.

In the staff report, my staff has pointed out a number of items that appear to need further clarification. These items are attached for your review. I would appreciate your assistance in making sure the issues are fully clarified and explained in writing by October 10 and discussed at the October 11 briefing. I am sure this information will be valuable for the rest of the Board as well.

*Response  
October*

Please feel free to contact Don Knabe, Shane McLoud or my Alternate, Bob Arthur, for any follow up information you may need.

Thank you for your assistance.

Sincerely,

DEANE DANA  
Supervisor, Fourth District  
County of Los Angeles

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smg@entln.la

Attachment

c: Mr. Franklin White  
MTA Board Members and Alternates

Post-It™ brand fax transmittal memo 7871		# of pages
To	Joe Drew	5
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1) Operating costs assume there will be no improvement to both the headways and the hours of operation over the next 20 years. The present headways of 6 minutes peak and 12 minutes off-peak and the present 4:00 am to 11:00 pm hours of operation represent the best level of service that Los Angeles will see for the next 20 years. This seems unrealistic as the Blue Line has improved its headways from 10-15 minute headways in 1991 to present 6-10 minute headways. Are there plans to improve the Blue Line level of service in the next 15 years? Won't the costs to improve headways and hours of operation be dramatically more under manual conditions rather than automated conditions? For instance, if MTA wanted to improve the headways and increase service to possibly 1:00 am for special events (Concerts, Laker games, weekend activities downtown) by the year 1998 when Hollywood is connected via the Red Line, will MTA be able to afford to add more operators, pay overtime, and make schedule changes in a flexible manner? More specifically, how much will it cost to increase hours of operation 2 hours three times a week manually and in an automated mode?

2) The report states that "passenger demand is never projected to be more than 50% of the design capacity". This leads one to think that the rail cars will always be half empty. However, capacity is defined as 76 seated passengers and 76 standing passengers. How can MTA assume service will be attractive when every other person may be standing? The bus passenger ratio is 1.4 persons per seat. Why is rail service at 2.0? Isn't attracting customers to mass transit difficult enough without being subjected to a 30-45 minute standing commute? Also, the Blue Line should be used as a comparison: during peak periods, there are no seats available even before the Green Line passengers board the car. Routinely standing for a 30-45 minute commute is a disincentive for people to use the service, yet requests for increased service have been denied due to lack of funds. How is MTA planning on ensuring that the Green Line will be avoiding the Blue Line scenario of being unable to afford to improve the level of service (available seating, improved headways and hours of operation).

3) The operational costs which are projected over 20 years assume NO increase in operator salaries (including COLA's), maintenance costs, or overhead/general costs. How is this a practical projection?

4) The operational costs assume NO increases in inflation over the next 20 years. How is this practical? Doesn't this omission hide true costs? Even if the analysis used the Consumer Price Index (CPI) as a model to project rising costs, it would be underestimated. In this month's APTA magazine, it is pointed out that transit service costs have historically increased more than general consumer inflation. It states: "From 1980 to 1993, transit inflation, measured by the Transit Price Index (TPI), increased 98.7%, compared to 75.4% for the CPI and 72.7% for the GDP Deflator. The costs of transit items grew 31% faster than the costs of consumer goods during this period". How can MTA objectively compare automated costs versus manual costs without at least projecting inflation, let alone a more realistic transit inflation?

5) The two staffing ranges of Top Range and Bottom Range appear to be misleading. Top range is defined as one roving attendant (RA) every other station and while Bottom Range is defined as one RA every three stations. Top Range is reported to cost MTA \$700,000 per year and Bottom Range is reported to save MTA \$600,000 per year in staffing costs. However, the difference between one RA at every other of the 13 stations versus one at every third station is 2.2 personnel. Based on the staff's \$50,000 reported average salary, this computes to only \$120,000 per year difference. Yet, the range is \$1.3 million. In Attachment 2A, the staffing clarifies that the actual difference between the Top and Bottom Ranges is about 26 personnel, not 2.2. If the Board elected to place RA's at every other station to ensure a high visible staff presence, and they adopted the Construction Department's Bottom Range, the operational savings to MTA would still be \$480,000 per year. There also needs to be a clarification as to why Operations' Top Range and Constructions' Bottom Range are so far apart. The Operational range estimated the need for 53% more personnel than the Construction range. Lastly, it needs to be clarified why the Operational range claims the need for more personnel with automation (75) than presently exists manually (61), and the Top Range inclusion of needing 8 operators for an automated line. As a comparison, if Lille's automated line were to place drivers in the cars and maintain the same level of service, they would need to increase personnel by 250 (an increase of 130%), not decrease personnel.

6) Operational analysis assumes an average salary cost that is less than actual. The average salary used in the analysis is \$50,000 for all the drivers, mechanics and other specialists (again, the analysis assumes no increases in salaries and COLA's in the next 20 years). The average salary for the Green Line driver is \$57,000 when including fringe benefits and an overtime average based on Blue Line experience. The average salary for the Green Line maintenance personnel is \$60,000 when including fringe benefits and an overtime average based on Blue Line experience. The 35 operators and the 18 maintenance/vehicle specialists, presently assigned to the Green Line (53 of the total 61 employees) represent an underestimation in salaries of \$425,000 per year (again, without the assumption of salary increases and COLA's). Over 20 years, that underestimation equals \$8.5 million, which more than pays for the capital investment to automate the line if the State were to pay for half.

7) Cost projections, capital expenses, and revenue projections are not brought together to project the overall cost to MTA. How can Board members make the best decision when all costs and revenues are separated? The report states there is range between either a cost of \$700,000 per year or a savings of \$600,000 per year. This range, presented separate from capital and revenue, appear to lead one to believe these are overall costs. Can staff bring the costs together?

8) The revenue projections assume NO fare increases for the next 20 years. This is a departure from the 20 Year Plan which does include fare increases. The report points out that the improved service frequency created by automation will increase ridership by 9000 (35%) passengers per day in the next 20 years. The revenue brought in by the extra passengers is projected to be between \$12 and \$23 million over 30 years. Both ranges assume NO fare increases. The \$12 range assumed fares will be the same in 20 years as they are today. The \$23 million range assumes the implementation of distance based fares but no fare increase. How can revenue estimates assume MTA will not increase its fares over the next 20 years when both the 20 Year Plan and the Board intention are to do so? What would the revenue be if MTA raised its fares according to the conservative CPI rate as well as the TPI rate?

9) The revenue projections are inaccurate. The analysis projected the revenues raised by increasing passengers 35% over 20 years, but states the period of 30 years. What is the additional revenue from automation over 30 years with fare increases?

10) The report states that the "level of risk associated with automation is unclear since operational knowledge of a fully automated system is limited." It also states that "automation presents real and perceived impacts to passenger safety". How can staff assume safety is a concern without substantiating any real evidence of unsafe conditions on existing automated systems? There are over a dozen automated people movers in the United States as there are many automated rail lines throughout the world that have safety data available for comparison. In fact, automated lines tend to have better safety and reliability records than manual lines (e.g. Lille, France: 125,000 passengers per day; 1-3 minute headways, opened 1983; no accidents or fatalities). BART's safety and reliability records should also be part of the review, as their line is partially automated (drivers only call out stations and monitor the track), and it travels down the middle of the freeway as the Green Line does. It appears to be irresponsible to suggest automation is unsafe without support.

11) The operations estimate state that "the Green Line automated staffing plans do not assume multi-tasking" and "assumes Transit Police staffing at its current level". Automation will never be cost effective unless roles are by and large combined (e.g. ticket checking, customer service, system and equipment review, assisting in security), as other automated lines have done. LACTC reports from (Manwell Padrone) have validated this point. Why is MTA ignoring this practice and avoiding the chance to reduce costs? If the roles were shared, doesn't an opportunity exist to provide a higher level of service, save operational dollars, and provide a high staff presence of both roving assistants and transit security?



12) The comparison of Vancouver's roving assistant level needs to be clarified. The report uses Vancouver's staffing level of one agent per station as a bench mark. However, this is misleading as this is only a maximum staffing level. On off peak hours, a minimum of 14 staff are used for the 20 stations, and more importantly, these agents provide the role of security as well. As pointed out earlier, MTA is not assuming the roving assistants will assist with security. Vancouver has 2-4 transit police at any given time for the sole purpose of providing security. This needs to be clarified.

13) It needs to be clarified that the level of security and staff presence is an issue independent of whether or not the line is automated. Automated cars will still have transit police and roving assistants surveying the cars and stations between every other station or every third station. These roving assistants can potentially maintain multiple roles such as customer service, checking fares, providing security, and operating the cars in case of an emergency. Manually operated cars presently have drivers and transit police. The ability of the driver to see or assist with customers also needs to be clarified. Given the location of the driver (in the front compartment of just the front car), how able is the driver to see or assist most passengers throughout all the cars. It should also be clarified that the automated cars have two way radio devices and the stations are with cameras.

14) The mentioning of past Board positions, either with the RTD or LACTC need to be clarified to present a historical background. This is clearly not a new issue. Much time and analysis has already been invested.

15) The report states that automation would encourage an increase of 35% in ridership. MTA just spent \$717 million for a rail line and is now presented with the possibility of spending 2% of that investment to increase customers by 35%. If the State pays for half the costs, MTA's cost is reduced to 1% or \$7 million. In the private industry, there would be no hesitation if the customer base could be improved by 35% for a 1 or 2% capital increase. How can MTA reject this opportunity given it has already spent \$30 million in preparation for the automation system?