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REPORT ON THE

METROPOLITAN TRANSIT AUTHORITY

TO

PAUL A. DEVER

Governor

Commonwealth of Massachusetts

By

COL. S. H. BINGHAM

New York City

FEBRUARY 1950

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REPORT ON THE

METROPOLITAN TRANSIT AUTHORITY

to

PAUL A. DEVER
Governor
Commonwealth of Massachusetts

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COL. S. H. BINGHAM
Chairman
Board of Transportation
New York City

February 1950

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February 6, 1950

His Excellency Paul A. Dever
Governor of the Commonwealth of
Massachusetts
State House
Boston, Massachusetts

Dear Governor Dever:

Transmitted herewith is a report based on the study of the Metropolitan Transit Authority made at your request.

In accordance with the thought expressed by you, the study was conducted to discover some means of achieving more efficient and economical operation of the Metropolitan Transit Authority. The report contains specific recommendations for such improvement.

The problems confronting the officials of the Metropolitan Transit Authority are much the same as those facing officials responsible for the operation of public transit systems in all the great metropolitan centers of the nation. All have been forced to cope with rising expenses and the need either for increasing fares or for obtaining additional revenue from other sources.

The recommendations contained in the report are based on a first-hand study of the equipment, methods, and practices of the Metropolitan Transit Authority and on an analysis of facts and figures supplied by the trustees of the system. Limitations of time did not permit close study of the entire area served by the Metropolitan Transit Authority or consideration of the many proposals for extension of rapid transit lines.

While it is the hope of the writer that the suggestions respectfully submitted to Your Excellency may help you to achieve your objective, it should be pointed out that the general trend throughout the country is toward a different financial setup than that under which the Metropolitan Transit Authority is now functioning.

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With that thought in mind, the report covers not only possible improvements that could be made in Metropolitan Transit Authority procedures, but also touches upon the method used in financing its operation. It should be stated that under present-day conditions it is difficult, if not impossible, to provide cheap mass transportation and still charge the entire cost against the riders, as the Metropolitan Transit Authority is required by law to do.

The report discusses, the feasibility and practicability of utilizing a modern, new bus which has helped to provide economical surface transportation in New York City and elsewhere. To obtain specific evidence whether such a bus is suited for the Metropolitan Transit Authority's needs, one was sent to Boston at your request and placed in revenue operation. The results of its trial will be found in this report.

The report should not be construed in any sense as a criticism of the officials responsible for the operation of the Metropolitan Transit Authority. It is fair to say that in view of their problems and the equipment with which they have to work, they are doing a creditable job.

This report is submitted in the same spirit with which it was requested by you, in the belief and hope that it may help to show the way to a better transit system for all the people in the area served by the Metropolitan Transit Authority.

Respectfully yours,

(signed)S. H. Bingham

S. H. Bingham
Chairman

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INTRODUCTION

This report is submitted as a result of a request made by Governor Paul A. Dever of the Commonwealth of Massachusetts to Mayor William O'Dwyer of New York City for the writer's services in a study of the Metropolitan Transit Authority.

This study could not be the exhaustive engineering and operating study that is required for a detailed report on all phases of the Metropolitan Transit Authority structure and operations. Such a detailed study in the future, developing more completely the findings of this report, undoubtedly would be advantageous and would produce beneficial results. It is important that experts with actual experience in the field of public transportation, as well as consulting engineers, be retained for such an investigation. One of the major shortcomings of many engineering reports on transit systems has been the lack of competent operating experience by the authors. Such operating experience is essential if resulting recommendations and proposals are to assure minimum operating difficulties and maximum economy and efficiency in the transit system.

The guiding purpose in making this study and in the preparation of this report has been to help the Metropolitan Transit Authority improve its equipment and operation in order to better carry out its primary function of transporting all members of the community safely, rapidly, comfortably, and as efficiently and economically as possible between their points of origin and destination. In all large transit systems, wherever

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they may be located, the extent to which this objective can be accomplished depends in large part upon the original thoroughness with which the systems were planned and the ability of the planners to anticipate developments and future extensions necessitated by public needs.

In any study of the Metropolitan Transit Authority, it should be stressed that certain of the conditions, which increase its operating cost, are deep-rooted and can be attributed to the absence of careful planning when portions of the system were originally designed and constructed. Such a weakness may be found in almost every great transit system in the United States. These systems were generally built in piecemeal fashion, with additions and extensions fanning out as the need for them developed. It is frequently impossible and invariably too expensive to correct these mistakes of past planning.

This is particularly true in the case of the Metropolitan Transit Authority. Boston is an old city as American cities go. It was the first municipality in the nation to build a subway and provide underground transportation for the public. But the various rapid transit lines were built at intervals, and apparently without any over-all plan as a guide.

As a result of this lack of long-range planning, the Metropolitan Transit Authority now presents a complex picture, with no standardization of structure or equipment. Rapid transit cars are

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of three different widths and have three different platform heights. The cost of standardization would be prohibitive unless done in connection with the proposed subway to replace the elevated to Forest Hills. Obviously the fact that cars are not interchangeable on the Forest Hills-Everett, Cambridge-Dorchester and East Boston rapid transit lines makes it impossible to purchase and maintain equipment in the most economical manner.

Because efficient and economical mass transportation is considered as essential a public service to the community as police, fire or health protection, or a school or water system, it has come to be recognized that the cost of providing such service may properly be a charge against the community itself.

Under the method of financing used in New York City, the revenue obtained from fares and from advertising and other concessions on the transit system is expected to meet only the actual operating costs of the transit system. Mayor William O'Dwyer has taken the position that payments to meet the interest and amortization on bonds issued for the construction of tunnels and subways and the purchase of rolling stock should be made from the city's general funds.

In 1949 New York City paid approximately $60,000,000 out of tax funds in fixed charges on transit debt incurred for the building of subways, the purchase of equipment and the buying of

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privately owned lines taken over by the city. The riders paid only the expense of actually operating the transit system.

In the fiscal year ended June 30, 1949, it cost the New York City Board of Transportation approximately $200,000,000 to operate the city's transit system, which carried about 2,500,000,000 passengers. To pay for all operating costs and the fixed charges now paid from the New York City general funds would have required an increase of approximately 30% in the revenue to be derived from the passengers.

This is in direct contrast with the system of financing established by law, under which the Metropolitan Transit Authority functions. That law provides, in effect, that payments for debt, whatever the purpose, as well as all operating costs, must be met from the revenue of the transit system.

This report cannot recommend any specific change in the policy of financing the operation of the Metropolitan Transit Authority. That is a question which can be decided only by the people of Massachusetts and their elected representatives. Some change, however, is indicated if the Metropolitan Transit Authority is to provide cheap mass transportation. If the Metropolitan Transit Authority had the same financial setup as the New York City Transit System, it could probably meet its operating costs with a 10¢ fare.

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Any careful analysis shows that the transit fares in either New York or Boston have not gone up in proportion to the tremendous rise in cost of other phases of present-day life. In addition, the Metropolitan Transit Authority provides more service for the riding public than it did a decade or two ago. Secondary surface lines have been established as a public convenience, carrying riders to other lines to which they formerly walked. Obviously, this additional service has resulted in increased expense, with very few additional riders.

The matter of financing comes down to the basic question of the importance to the community of mass transportation at a low fare. If it is decided that this is of paramount importance, then some means should be found of financing the operations of the Metropolitan Transit Authority other than by the present method of assessing the entire expense against the riders.

Studies were made to determine what improvements could be made in Metropolitan Transit Authority operation and equipment. The findings and recommendations resulting from those studies are presented in detail in the body of the report. Within the limitations imposed upon the Metropolitan Transit Authority by the equipment with which they are operating, they are doing a reasonably good job.

The New York City Board of Transportation is, of course, constantly confronted with the necessity for making all possible improvements to achieve a more efficiently operated transit system.

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To help achieve that objective the writer designed a new bus to provide more economical surface transportion through greater passenger capacity and lower operating costs. This bus will carry nearly double the number of passengers accommodated on the buses formerly used in New York City and presently used in Boston. This bus has proved one of the answers to problems in New York City, Chicago, Stockholm and elsewhere. It has made possible a substantial saving not only on routes where older type buses formerly were used, but also in replacing street cars.

One of these buses was sent to Boston for trial, and with the Governor's approval was placed in revenue operation on the most heavily traveled bus line on the entire Metropolitan Transit Authority system, the Dudley-Allston line. The data accumulated during this trial demonstrate that this bus will be equally helpful to the Metropolitan Transit Authority in meeting its problems. From the results of this experiment and based on experience in New York City and elsewhere, the writer is firmly convinced that the use of these new buses by the Metropolitan Transit Authority would make possible a substantial saving in expenses while providing improved service. This is discussed in detail in the report.

In most cities which do not have cheap hydro-electric power, street cars are becoming uneconomical. This newly designed and developed bus is the first to combine the carrying capacity of the street car with the flexibility of the ordinary bus.

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It is recommended that the Metropolitan Transit Authority trustees replace their oldest and least economical buses with new buses of the type which have proved so successful in New York. They should also plan for the gradual replacement of their street cars with such buses.

As a street car line is abandoned and large buses substituted, the best of the street cars should be transferred to other lines and the oldest cars scrapped. This writer recognizes that in the foreseeable future street cars will be needed on those street car lines which run into the Park Street subway. However, it is recommended that no new street cars be purchased by the Metropolitan Transit Authority except for necessary replacements for these lines.

The new bus makes possible substantial savings in operating costs. There will be a reduction of approximately $600. per year per bus in fuel cost below the expense of running the gasoline powered buses presently used, and a saving in the number of buses required to carry peak rush hour loads. It also offers added comforts and conveniences for the riding public, and greater ease of operation for the bus driver. In New York City patronage has increased on almost every line where the attractive new buses have been placed in operation.

Studies have indicated that station stops in the Park Street subway can be shortened and running time reduced by altering the

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physical layout of the cars to allow passengers to get to and from the doors more easily, and to enter and leave the cars more rapidly. This is discussed and explained later in the report.

In New York City one guard is employed on rapid transit trains up to eight cars in length. The Metropolitan Transit Authority employs one guard for each two cars. This is done not because it is better or safer, but because it is required by State law. For many years the old Boston Elevated had one guard on its trains. The law requiring one man for each two cars apparently was enacted as a job-creating measure. A study of the available statistics indicates that the safety record on the old Boston Elevated trains was better when one man was responsible for operating the doors of a six-car train, than it is now when three men do the same job. No transit system whether it is the Metropolitan Transit Authority, the New York City Transit System, or any other, can afford any unnecessary jobs under present-day conditions. In view of these facts, the report respectfully suggests that the Governor consider recommending the repeal of the existing statute requiring the assignment of one man for each two cars on a rapid transit train.

It is also suggested that the Metropolitan Transit Authority officials explore the possibility of obtaining increased revenues from the leasing of vending machine concessions which have proved effective revenue producers in New York City. The Metropolitan

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Transit Authority is already receiving a very substantial income from various concessions, but further sources of revenue should be tapped through use of the other concessions listed in the report.

The writer wants to stress that he does not recommend the discharge or layoff of any of the present Metropolitan Transit Authority personnel. Where fewer workers would be needed as a result of the adoption of the various proposals contained in the report, staff reductions should be achieved by a continuation of the no-hiring policy instituted about a year ago by the Metropolitan Transit Authority officials, and vacancies left unfilled as they occur until the proper level is reached. In this way substantial savings may be realized within a comparatively short period of time without dropping any employee.

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FINANCING

In our large cities -- Boston and New York City are no exceptions -- urban transportation and city growth have been permitted to go on without any careful planning. In the field of transportation there has been even less planning than in other municipal functions such as education, sanitation, and the like. This disregard of transportation has resulted not from any decision that it is of lesser importance than the other functions but because transportation has generally been regarded as a private matter between the transit company and the passenger.

It is now agreed that mass transportation is an essential public service, whether furnished by private or public operators. Without the development of mass transit facilities our modern urban development would be impossible.

The city of today as we know it consists of a large central area of high land cost and tremendous daytime population. Most of the large business, commercial, entertainment and cultural activity is concentrated in a comparatively small area. Surrounding this core are the residential areas containing the homes of the vast number of workers needed to operate this complex structure. In our larger cities this peripheral residential area almost always extends beyond the political boundaries of the central city.

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The activity and life of the city depend on the ability of the workers to get to and from their jobs, and on the ease with which the customers of all the other enterprises in the center can get to them. The outlying communities, with their smaller local enterprises and community activities are similarly dependent upon the transportation system that carries the workers to their jobs. These political jurisdictions, regardless of any local jealousies or other considerations, are in reality absolutely dependent one upon the other. Neither could continue a healthy existence without the other. Both are dependent upon the transportation system that serves them. The political separations are the result of political development not keeping pace with cultural development.

We are gradually realizing in this country that many of our urban problems disregard historical political boundaries and are metropolitan in nature. Agencies are slowly developing that attack the problems on area-wide bases. Transit is only one of these problems, and metropolitan area agencies are just coming into being, probably because of the large private interest in the transit industry. New York has had the Port of New York Authority for many years. Similarly, water districts, sewage districts, park districts and the like are common. Massachusetts has been a pioneer in the establishment of a Metropolitan Transit Authority that operates beyond the borders of a single city.

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Although there is universal realization that transit in large urban areas is a regional problam of the greatest public importance, there is still debate about how the costs of this essential service shall be apportioned. Opinion ranges from the extreme where the rider pays the total cost, to the suggested (but so far never accepted) scheme that all costs be assumed by the community and the service be provided without fare.

In this country we started with a private transit industry and the rider paying the total cost. There has always been some public assistance, in the form of land grants, franchises to use the public streets and public assistance in constructing some facilities. But in the main the rider bore the cost in the early days. The fare in the cities was generally fixed at 5¢ and this was enough to cover costs. In those days labor and material costs were lower, hours of work were longer and there was no competition from automobiles. Also, in the early days of urban transit the 5¢ fare was a high rate of fare when compared with average earnings of the riders.

But with the growth of the city and with increasing costs, the private operator has found it increasingly difficult to continue in business while charging a low rate of fare. In a growing number of communities the government has had to take over the transportation system to assure continuity of service.

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Transit operating costs have increased with improvements in the wages and working conditions of transit workers. Costs of construction of transit systems and the cost of new transit equipment have similarly increased.

There has also been a change in the character of transit riding. While rush hour peaks have remained high, riding during the middle of the day and on Saturdays and Sundays has decreased. This results from the widespread adoption by industry of the 5-day week, and from the increased use of private automobiles. This changed character of the traffic has worked a double hardship on the transit system. It has decreased the total amount of riding, but since the rush hour peaks have remained high it has not decreased the amount of equipment required to meet service needs.

The tremendous capital investment in structures and vehicles is used to capacity for only 4 to 5 hours per day, 5 days per week. For the rest of the time it is largely idle. The riding public has also become accustomed to much better and more convenient service than that furnished years ago. The passenger who used to regard a walk of up to a mile to a transit line as no undue hardship now expects to find a bus line within a couple of hundred feet of his door.

The result of this trend has made it impossible for transit systems in our largest cities to operate at a low rate of fare -- say 10¢ -- and expect fare revenue to pay for all operating and capital costs. The experience of New York City, Chicago,

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Detroit and Boston, and other cities, gives evidence of this.

The community in the case of a government-owned and operated system -- and in our largest cities the systems are government-owned -- must make the choice. If the people want a low rate of fare they must make some contribution through taxes to the cost of supplying modern rapid transit service. It is not a question of efficient management, or large private profits. Even with the most efficient operation, a modern large city transit system cannot pay operating as well as fixed charges with receipts from a low fare, under present costs and standards of service.

This has brought the question of allocation of cost to the immediate foreground. It has become a political and economic issue of major importance. Since the development of the city and its surrounding communities has been a direct result of the concentration of enterprise which urban transit has made possible, it is becoming increasingly acknowledged that it is quite proper to place a charge upon the taxpayers of the community for a portion of the transit costs.

Another factor of primary importance, bearing upon this issue, arises from the competition between the private automobile and the urban transit system. The increasing use of private automobiles has created a traffic problem in our cities that is thwarting our best efforts to find a solution.

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Our cities cannot contain all the private automobiles of those who might want to drive their cars into the city and park there. Already the traffic load is choking our city streets and creating a definite trend towards decentralization. This is true in almost every great city. And with most of our city revenues dependent on real estate taxes any serious large scale decentralization would have ruinous effects on municipal finances, besides changing our whole pattern of doing business and living. The private automobile has also increased municipal expenses by requiring express highways, traffic control systems, and the newly proposed public parking garages.

High transit fares increase the use of private automobiles and add to the city's financial burdens and traffic problems. The city and its established suburbs therefore have a vital stake in keeping transit fares low, and in providing a mass transit service that can compete with the private auto.

The exact distribution of charges between the taxpayer and the rider will probably always be a matter of debate and compromise. New York City has found what is believed to be a fair allocation that may be of interest to the trustees of the Metropolitan Transit Authority and the citizens of the Commonwealth.

In New York City all capital costs -- that is, costs of construction and for the purchase of new equipment -- are charged to the community. These are provided for in the Capital Budget of the city and are a charge upon all the taxpayers. Since about half of the

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city revenue comes from the real estate tax these charges are mainly paid for out of this tax. The definite relation between the real estate values and the availability of transit facilities makes this no more than just.

Operating expenses are paid for directly by the rider in New York City. There is no charge on the rider for depreciation of the properties; still on the theory that when the present capital equipment can no longer be economically maintained, its replacement is a proper charge upon the community.

This method is believed to be an equitable method of financing, fair both to the community and the rider. Further, it enables the system to keep the fare low enough to offer some competition to the private cars and keep the streets from becoming publicly supported outdoor garages.

It is believed that not only is this allocation of costs fair in proportion to the benefits received by the various elements of the community, but that it also assists in achieving a well managed and efficiently operated transit system. It gives the rider a stake in the enterprise, both as rider and taxpayer. It also places upon the management economic responsibilities which can readily be lost sight of in an enterprise which is entirely tax supported. There is no danger of the management coming to believe that it has unlimited public resources to draw upon.

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The question of the allocation of costs between the rider and the community is settled by statute in the Metropolitan Transit Authority area and can be changed only by the elected representatives of the people. No detailed analysis was therefore made of the costs of the Metropolitan Transit Authority. However, from inspection of the records it appears quite likely that the operating costs of the Metropolitan Transit Authority, excluding fixed charges and depreciation, could be met with the revenues from a 10¢ fare.

A reduction of fare would increase mid-day and general non-rush hour riding. These off-peak riders can be carried at no additional cost, since there is ample vehicle capacity at these hours, without increasing the service.

A large part of It-lie solution of the city's traffic problem, and of the urban transit system's general problems, lies in stimulating off-peak transit riding.

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PROPOSED PLANS FOR NEW SUBWAYS AND RAPID TRANSIT LINE EXTENSIONS

The Massachusetts State Legislature has authorized a program for the construction of a subway to replace the existing elevated structure between Broadway and Forest Hills and from a point near North Station to Sullivan Square. This is a desirable objective. It will present an opportunity to improve operations on the Everett-Forest Hills line and make possible the removal of the elevated structure. This structure is detrimental to the development of the streets over which it runs and is a serious impediment to traffic.

Before the building of this new subway can be undertaken, complete engineering studies will have to be made to determine the best route and the cost of the project. It is recommended that these engineering studies include a determination of the cost of changing the present Washington Street tunnel to accommodate wider and longer cars. The new subway construction would be a replacement for approximately eight miles of the present route of nine miles. It would be inconsistent with good engineering practice to allow the one mile of existing subway to limit the design of all cars in the future.

The proposed construction program presents a golden opportunity to provide more economical service. Engineering studies should be made of the possibility of using a car ten feet wide

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and the construction of a physical connection with the Cambridge subway. If short radius curves and other limiting features are avoided it would be possible to bring the Cambridge subway cars over the new line to the repair shops at Everett.

By using a car ten feet wide and sixty feet long, a better seating arrangement could be achieved, and the number of cars needed to meet peak requirements would be reduced. This would result in lower operating and maintenance costs.

If all these changes were made it would mean that the existing elevated cars could no longer be used. Since it may well be ten years or more before completion of the new subway there could be no real objection to disposing of these cars. Cars now in service on the main line elevated are from 22 to 29 years old and would be at least 32 to 39 years old before the program of construction is complete.

In the past, several ambitious plans have been proposed for extension of all rapid transit lines. In general, extensions of rapid transit lines are only justified where traffic density throughout the year is high and constant enough to warrant large investment in structure and equipment. Extensions to outlying suburban areas are not profitable unless local population and feeder lines can generate heavy traffic loads at way stations and terminals.

The development and extension of the East Boston Tunnel line to Orient Heights and possibly to Revere Beach is a logical move. When the extension is completed, surface feeder lines

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should be converted to bus operation and removed from Maverick Square to stations farther East. This would not only serve to ease traffic congestion in the most heavily traveled section of East Boston, but would also provide improved service. Whether the construction of this extension beyond Orient Heights would be a profitable step for the Metropolitan Transit Authority is a question that could be covered in a future survey.

Extension of the Cambridge subway should also be decided upon only after detailed traffic studies.

Extensions into any area, when and if undertaken, should be made by the most direct feasible route in order to keep construction costs as low as possible. For example, there seems to be little justification for the devious route for extension of the Cambridge subway from Harvard Square to East Watertown proposed in the 1945 Report of the Legislative Commission on Rapid Transit.

In the past suggestions have been made that rapid transit and trolley car line extensions be over rights-of-way now used by the New York, New Haven, and Hartford; the Boston and Albany; and the Boston and Maine railroads. These schemes appear attractive because construction costs would be low. However, they should be carefully studied from all aspects by experts in public transportation.

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RAPID TRANSIT EQUIPMENT

Inspection of the cars shows a diversity of car models within the three car types on the rapid transit lines. These cars, despite such undesirable features as outside hung doors, uncomfortable wooden seats and poor lighting, appear to be in good operating condition. The rapid transit cars show that very little attention has been given to appearance. Most are badly in need of paint, both inside and out. It is also evident from an examination of the shops and equipment that money available for maintenance has been expended on the essentials required to provide safe operation.

While this is commendable it is also desirable to improve the appearance of the vehicles. There is little possibility of improvement under the present financial setup. If legislative action is taken to relieve the Metropolitan Transit Authority of the necessity of using passenger revenues for fixed charges then a program of rehabilitation could be undertaken. This does not mean spending large sums of money to rebuild or re-equip old cars. It should be mainly a cleaning and painting program.

An exception to this is the proposed program for modifying the East Boston Tunnel cars so they can operate at the same speed as the new cars to be purchased. This is discussed later in detail.

If the major part of the main line elevated is replaced by a new tunnel there will be a possibility of standardizing equipment

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for cars to be purchased in the future for use in the new tunnel and on the Cambridge subway. The difference in car body dimensions is no bar to standardization of component parts.

In New York City two sizes of subway cars are required because of differences in tunnel dimensions established under private management early in the twentieth century. No attempt was made to standardize at that time but the latest New York City cars have identical motors, controls, doors, and brakes, etc., even though two different sizes of cars were purchased.

The Metropolitan Transit Authority has sent specifications to car builders for a car design which they propose to use on the East Boston Tunnel line upon completion of the extension to Orient Heights. The physical dimensions of this car are governed by the size of the existing tunnel and the loop at Bowdoin Station. If some of these limiting features of the old structures were modified a longer car could be used. The cost of modifying the structure was estimated and found to be so high that the decision was made to continue to use a short car. This appears to be a sound decision.

There are, however, some features of the new car that the writer believes to be undesirable. It is generally agreed that the life of rapid transit cars is 50 years. A new car should therefore be carefully designed to avoid past mistakes and result in a vehicle that will not be outmoded while still physically useful.

Long experience has shown that the outside hung door is not satisfactory. It is more difficult and more expensive to maintain

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than an enclosed door and detracts from the appearance of a car. On lines that operate on an elevated structure or an embankment the door is subject to all the vagaries of weather. In the winter snow and sleet collect between the door and the body and in the bottom door track.

Doors working in pockets within the body of the proposed cars would require only minor changes in design. The horizontal length of the windows would have to be slightly reduced. This reduction is not great enough to destroy the pleasing appearance that the large windows give to the car.

Some needed aisle space is sacrificed in the Metropolitan Transit Authority design by the seat arrangement. Cars in New York City with similar longitudinal seats have an aisle six inches wider than the Metropolitan Transit Authority designed car. In outside width the New York City cars are only two and a half inches wider than the Metropolitan Transit Authority car. This is accomplished by placing the seat back against the inside sheet of the car, and making the back cushion more nearly vertical.

A similar seat design could be adopted for the Metropolitan Transit Authority car to increase the aisle widths and permit greater freedom of passenger movement within the car and saving time now spent loading and unloading and shortening the over-all running time.

Photographs of the interior and exterior of the latest New York City subway cars follow.

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NEW N. Y. C. SUBWAY CAR - INTERIOR

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NEW N. Y. C. SUBWAY CARS - EXTERIOR

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The proposed car specifications are for semi-permanently coupled two-car units. After many years of experience with various combinations of semi-permanently and permanently coupled car units in New York City it has been decided that operating and maintenance costs are greater than with the use of single cars. Furthermore, such units present difficulties in arranging regular or emergency schedules. A greater number of cars are needed for spares, because if any section of a unit becomes inoperative the whole unit must be removed from service. With single cars only the unit affected need be removed.

The proposed two-car units have a high-voltage cable between the two cars to carry power to the car without a pantograph. The use of high-voltage cables between cars of a train has not been considered good practice for years. While some older cars are still operating with high-voltage cables between cars none have been built with this installation for many years.

The car design should be reviewed and consideration given to building complete single operating units that can be coupled in any order in trains of any desired length. Such units will require, a pantograph on each car, and a motorman's cab and automatic coupler at each end of each car. This will provide the maximum flexibility for operation.

If the plans are altered to this extent it would be well to go one step further and install door operating equipment in each motorman's cab. This has been done on the latest cars purchased in

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New York City and was based on fifteen years' experience with a group of twenty-five cars. Such an installation gives the guard a protected space from which to operate the doors.

When a train is made up of two or more cars there are two door operating stations at each coupling point. The guard can operate all doors on one side of the train from any cab on that side. To operate the doors on the other side the guard has only to cross to the motorman's cab in the near end of the next car. This arrangement is particularly desirable for use on cars that run in the open.

It is recommended that serious consideration be given to the changes suggested above in order to provide a real "car of tomorrow."

Together with the proposed purchase of new cars for the East Boston extension, plans are now being considered for changing the present cars and equipment to provide a faster car to match the speed of the new cars. Cost studies indicate the necessary changes can be accomplished for approximately $ 10,000 per car. Generally it is better to maintain cars as they are rather than spend huge sums for rehabilitation especially as they approach the end of useful life. The East Boston cars still have enough expected service life to warrant the investment. In the discussion of operations later in this report the matter of the number of cars required is considered. Based on the practice on other systems the number of spare cars in Boston is high. Recalculation of the number required for the Last Boston line indicates that either fewer of the existing cars should be changed to provide higher speed or the initial estimate of 40 new cars should be reduced.

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STATIONS AND CONCESSIONS

Most stations show the effects of years of usage without being repainted and properly cared for. If the stations were brighter and more cheerful there would be greater good will on the part of the passengers and increased possibility of renting space to revenue producing concessions. It may be possible to provide funds for station painting and rehabilitation by increasing revenues from concessions located within the stations. The program of renting space to the highest bidder for all types of concessions should be actively followed, and old contracts for existing installations should be reviewed to get the best terms possible for the Metropolitan Transit Authority.

The newer shops, such as the Baked Goods Shop at Everett, are very attractive. Older shops should be encouraged to modernize and to locate more new shops at terminal stations.

The Metropolitan Transit Authority could add to its revenue by experimenting with concessions for the installation in stations and elsewhere of the newer type vending machines. These include machines for selling all kinds of hot and cold drinks, packaged crackers and candies, disposable tissues and other small items. New machines are being developed constantly and their sponsors have been quite anxious to install such machines in the New York City subway.

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SURFACE VEHICLES

On January 5, 1950, a new large bus with a carrying capacity of 130 passengers was placed in actual operation on the Dudley-Allston run. The results of its operation were closely observed for the purpose of presenting factual data in the report.

Three major conclusions have been reached as a result of this trial operation:

1) A bus of this size can be successfully operated on the Metropolitan Transit Authority system.
2) It is more economical to operate than the ordinary size buses now in use for two reasons:
    a) Fuel costs are less per bus mile.
    b) Fewer buses would be needed.
3) Buses of this size can be utilized to advantage.

The large bus has been able to cover the route without interfering with traffic and maintain a schedule made for smaller buses, while carrying larger passenger loads, even though it is bigger than any bus previously used in Boston.

On a very conservative estimate a saving of at least $654. per bus per year would be realized on fuel costs.

This estimate is based on the assumption that the cost of Diesel fuel, purchased for the large bus, would be the same as is now paid for gasoline. Actually, the New York City Transit

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System pays about 1½¢ less per gallon for Diesel fuel than for gasoline. Diesel fuel also will cost the Metropolitan Transit Authority less than gasoline if purchased in large quantities. This would make possible a saving of more than $654. per bus per year.

This estimate of savings in fuel cost is based on a comparison of the test bus with the regular Metropolitan Transit Authority buses now in operation on the Dudley-Allston line. In the period from January 5, 1950 to January 29, 1950 the large bus ran 1957 miles and used 589 gallons of Diesel fuel. Comparison with the fuel costs of the regular Metropolitan Transit Authority buses on this route during December 1949 is as follows:

Fuel Cost Data - Dudley-Allston Line

	Large Test Bus Diesel Engine	41-Passenger M.T.A. Buses Gasoline Engines
Average Miles per Gallon	3.32 miles	2.20 miles
Cost of Fuel, per gallon	14.2¢	14.2¢
Cost of Fuel, Cents per Mile	4.277¢	6.455¢
Cost of Fuel, per Year (30,000 miles)	$1283.	$1937.

The test clearly indicated that fewer buses would be needed in the peak rush hour periods with the larger bus in service.

Passenger counts showed 125 persons carried at one time by this bus on the Dudley-Allston run. In New York City similar large buses daily carry 130 passengers at one time.

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It seems evident from all the evidence compiled that this bus could provide more economical service on all heavily used bus lines within the Metropolitan Transit Authority system.

For example, the Dudley-Allston line is now served by 36 buses. These buses seat 41 passengers and have a maximum carrying capacity of 70 passengers when fully loaded.

To provide the same number of seats during the rush hour would require only 30 of the large buses.

To provide the same maximum carrying capacity only 20 of the large buses would be needed.

The number actually required to handle the rush hour needs would be somewhere between those two figures. But even with 30 of the larger buses a substantial saving would be realized.

Similar savings could be achieved on other heavily traveled bus lines by substitution of the larger buses.

The principal economy through the use of the large buses would be realized during the morning and evening peak travel periods which determine the total number of buses required to meet public needs. The difference between the cost of operating the large and ordinary size buses during the off-peak periods would be negligible.

Pictures of the bus are shown on the following pages.

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LARGE SIZE BUS IN FRONT OF STATE HOUSE, BOSTON

Word Searchable Version not a True Copy LARGE SIZE BUS OF TYPE TESTED BY M. T. A. - SHOWING WIDE DOORS

The Metropolitan Transit Authority's fleet of surface vehicles outnumbers its rapid transit vehicles and presents a different problem. Surface vehicles in general have a shorter life and greater flexibility in use. These factors are taken into account in the following observations.

The Metropolitan Transit Authority's trolley car fleet consists of 917 cars; 271 are the P.C.C. cars, 4 to 10 years old; of the remaining 646, 59 are 14 years old and the rest are over 22 years old; 19% of all the cars have exceeded their depreciation life of 25 years.

The Metropolitan Transit Authority's trackless trolley fleet consists of 315 vehicles seating from 38 to 44 passengers, and purchased from 1936 to 1949.

The Metropolitan Transit Authority's fleet of 593 buses consists of a variety of 10 sizes seating from 26 to 44 passengers; of 5 makes and 22 models, manufactured between 1936 and 1949; 14% of these buses have exceeded their depreciation life of 10 years.

The need for the replacement of the obsolete vehicles with modern equipment is obvious.

When replacing these obsolete vehicles the modern large buses of the type tested on the Allston-Dudley run should be purchased. This is the most economical surface vehicle we have today, handling a large passenger load at low cost, with minimum capital investment and great flexibility.

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In any program for replacing the older street cars which do not run into the subways, plans should be made for using the newly developed buses.

This would accomplish two objectives. It would develop a surface transit system of greater flexibility and one that could follow expanding residential development with the least investment. Electric power that would be required for trolley cars or trackless trolleys could be made available for rapid transit line extensions.

Extensions of rapid transit lines will create new terminal areas. To provide the necessary track and overhead for trolley cars or the overhead for trackless trolleys is not warranted. The state of flux of residential growth and building makes the long term investment for such installations extremely risky. Buses and bus routes can be shifted quickly to meet developing needs.

Figures supplied by the Metropolitan Transit Authority show that in 1948 costs per vehicle mile (exclusive of depreciation) were 61.53¢ for motor bus lines and 74.21¢ for trolley car operation. It is obvious that a substantial reduction in operating costs would result from the substitution of any buses for trolley cars where possible, and an even greater saving would result if the 50-passenger size Diesel engine bus were used. This bus will carry as many passengers as a street car and at less cost.

Operating results for the current fiscal year in New York City show a lower operating cost per vehicle mile for buses than for trackless trolleys. It is quite likely that with the use of the large bus

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a similar result would be achieved by the Metropolitan Transit Authority.

Another factor that has not been adequately considered in making comparisons between buses and trolley cars or trackless trolleys is the progress being made in equipment design and development. Trolley cars and their track and overhead are expensive long term investments. Trackless trolley overhead installations require an equally long service life to be economically justifiable. Any vehicle purchased today will probably be technologically outmoded in five to ten years. If a vehicle or its needed right-of-way structures have a life of 15 to 25 years, the operator cannot economically justify scrapping it for new developments.

By purchasing buses for replacement of both street cars and trackless trolleys the Metropolitan Transit Authority would be making the smallest possible capital investment and be in a position to take full advantage of future improvements in vehicle design and development.

Street cars and trolley coaches are limited to the overhead wire power system and therefore cannot have the flexibility which is becoming more and more important with the present-day congested traffic. The danger of serious interruption to service through a power failure is much greater with a centralized power system than with a bus which has its own engine. This has been proven many times. It is not unusual to find buses used on street car or trolley coach lines to maintain service when the overhead power is out of

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service for any number of reasons, such as power failure, ice on wire, a water main break, fire, fallen trees, traffic accidents, etc., which necessitate blocking a section of the street. The bus can be directed around the obstruction and continued in service.

The advantage of flexibility in the bus was so outstanding in London during the war that they now plan to use all buses instead of trolley cars (trams) or trackless trolleys.

To supplement its underground (subway) system, Stockholm, Sweden plans to purchase 200 buses built to the writer's specifications.

In addition to the economies the new bus would make possible, its use should stimulate increased patronage and by so doing, produce added revenue. That has been the experience in New York City on lines where the bus has been placed in use.

It has a number of new and unique features which not only speed up service but also offer special riding comfort for the passenger and driver alike.

For the passenger it has comfortable staggered seats, wide, easy moving windows, sliding standee windows, fluorescent lighting, double exit and entrance doors, a smooth ride and a generally attractive appearance.

The seats are of a new staggered design for more comfort and convenience. The two halves of a double seat are not in line, the half next to the aisle being offset five inches behind the half next to the window. This permits passengers' shoulders to overlap, and results in a four or five-inch increase of usable aisle space. This

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makes for more comfortable seating and greater ease of movement within the vehicle. A picture of these seats follows this page.

In designing the bus, special provisions were made to ease the work of the driver. The larger bus is easier and less fatiguing to operate than the regular 41-passenger bus. The Metropolitan Transit Authority employees who have driven this bus have displayed enthusiasm over its hydraulic power steering.

It is recognized that the operation of street cars will be necessary on the lines running into the subway and that they cannot be replaced by buses. These cars now require long station stops because of congestion near the center doors. This slows up service unnecessarily. In the P.C.C. cars this is due to the lack of aisle space adjacent to the step wells on both sides. By using longitudinal or single seats in this area, as has already been done on some of the cars, a greater pooling area would be created to facilitate passenger movement and decrease station stop time. The reduction in seating capacity would create no greater hardship than that caused by the present crowded conditions because the heavy riding is for short distances.

The older trolley cars using the subways have a maze of stanchions and door operating mechanisms located in the center step well. If these cars must be retained in service this should be corrected. Replacement with P.C.C. cars designed to provide more rapid loading and unloading would be even more desirable.

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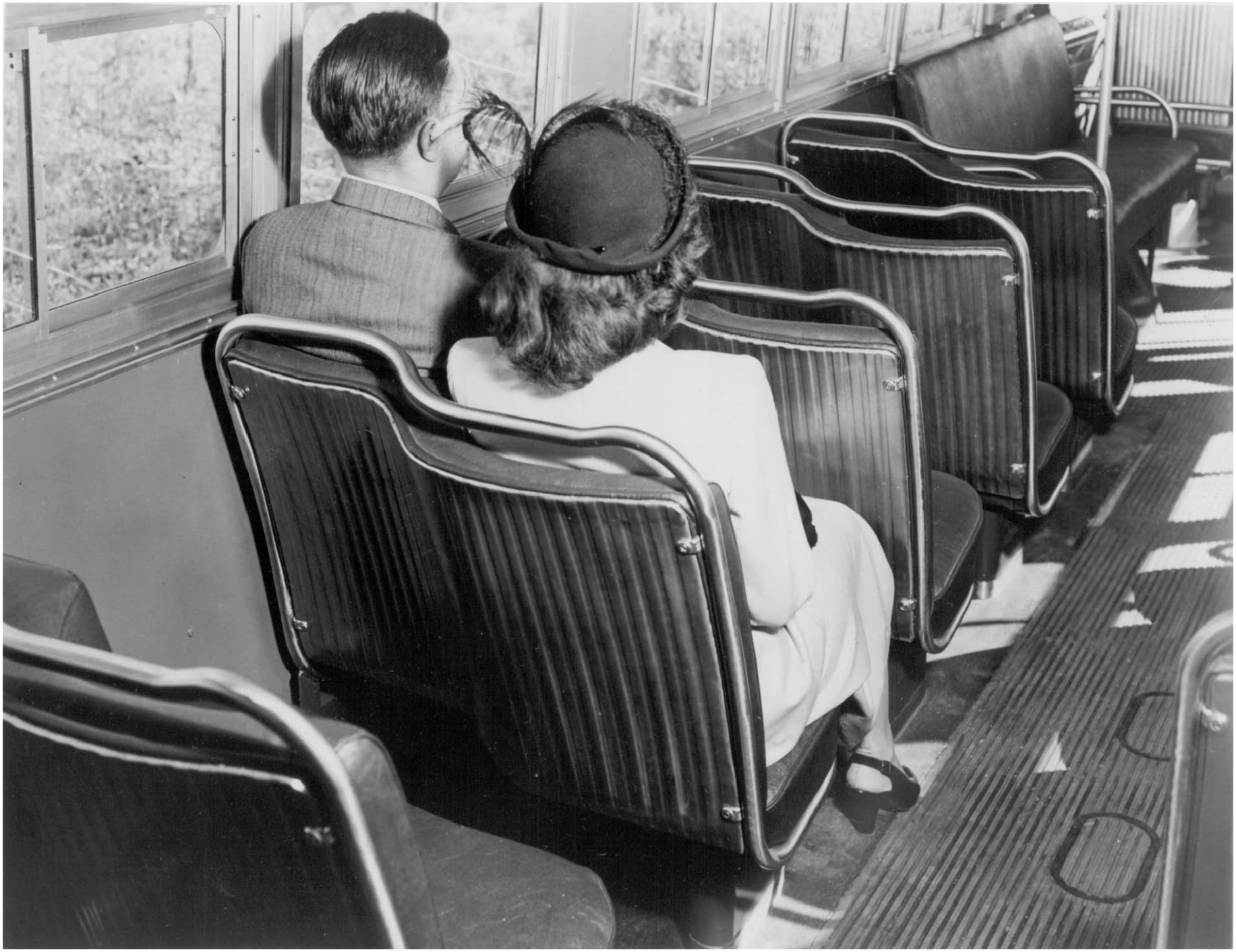

INTERIOR OF LARGE BUS SHOWING STAGGERED SEATS

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OPERATING PROCEDURES

A study of present operating procedures shows a high proportion of spare vehicles on all lines of the Metropolitan Transit Authority. The figures are shown in the table below.

Assignment of Vehicles for Service

Type of Vehicle	Number of Vehicles Assigned	Required for Max. Service	Spares	% Spares
Rapid Transit Cars				
Elevated	260	204	56	22%
Cambridge Subway	155	120	35	23
East Boston Tunnel	48	32	16	33
Trolley Cars				
P.C.C. Cars	271	234	71	26
Other Cars	646	410	236	37
Trackless Trolleys	315	254	61	19
Buses	593	491	102	17

Conservative operating practice on other transit systems requires about 8% spares for rapid transit cars; 10% spares for trolley cars; and 12% spares for trackless trolleys and buses.

One factor governing the number of spare vehicles is the frequency of regular mileage inspections. If vehicles are inspected at low mileages the frequency of inspection will be high and more spare vehicles will be required. This increases the total number of vehicles that have to be purchased.

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The frequency of mileage inspections for the Metropolitan Transit Authority equipment is high in comparison with generally accepted practice. This is particularly true for the rapid transit cars. However, schedules for inspection on any transit system are based on experience and are arranged to assure maximum safety of operation. For the older existing equipment the frequent inspections are probably necessary. For new equipment the trend is to increase operating mileage between inspections. This should apply to P.C.C. cars, trolley coaches and motor buses purchased in recent years.

For new equipment to be purchased the specifications should include all newly developed design features that require less frequent inspection. Lengthening the interval between inspections is one way to help achieve operating economy.

Vehicles listed as spares and not used regularly deteriorate rapidly and should be disposed of when no longer required for service. Maintenance of an abnormal number of spares is an unwarranted expense. Before new equipment is purchased, studies should be made to determine whether the number to be purchased can be reduced by shifting excess spares from one line to another.

The present plans for the East Boston Tunnel extension include the purchase of 40 new cars and the modification of the 48 existing cars at a cost of $10,000 each to bring them up to the speed of the new cars. The actual requirements for service should be carefully calculated. This line when extended will be approximately four miles long with a total running time including layover time of

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about 16 minutes each way. With a headway of two minutes this means that 16 trains are required for maximum service. With four cars per train, requirements will be 64 cars. Operating practice provides for two extra four-car trains for rush hour use increasing requirements by an additional eight cars. Allowing the usual 8% for spares this figure would be increased by six cars. The total required for full service and shop spares would then be 78 cars. The present plans provide for 88 cars for this line.

Unless there is some thought that extension beyond Orient Heights will be consummated in the near future, the total of 88 cars appears too high. Either fewer new cars should be purchased or fewer of the old cars rehabilitated. If all the old cars are remodeled then 30 new cars would suffice; if it is decided to purchase 40 new cars then only 38 old cars need be modified.

The new cars will require less frequent inspection and the mileage inspection of the remodeled cars can be substantially extended, so that the suggested number of spares should be sufficient.

Due to the continued rise in labor costs one of the main items of expense in operation of a transit system is that for guards. Existing rapid transit cars of the Metropolitan Transit Authority are equipped for multiple unit door operation, and the proposed new cars for the East Boston Tunnel extension are to be so equipped. One guard could therefore operate all the doors of a train.

At one time the trains in Boston were operated with one guard per train. It is interesting to note that the door accident

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record at that time was better than at present with a man between each two cars.

The present system was brought about by legislative action, presumably to make more jobs, and now adds greatly to the expense of operation. With a guard stationed between each two cars a train of six cars requires a complement of three guards. With use of existing multiple unit door controls on trains up to eight cars in length, one guard can safely operate the doors.

Multiple unit door control has been used for years in New York City with one guard for trains of up to eight cars.

Neither good operating procedure nor safety requires one guard for each two cars. From this point of view the present Metropolitan Transit Authority practice is an unnecessary expense. However, the existing legislation has made this a matter of public policy, and relief must come from legislative action. For greater economy such relief should be sought.

Reduction in the number of guards should not require any increase in the number of men on the station platforms, except perhaps at busy stations on sharp curves. By standing on the guard's platform at the door operating position in the center of the train the single guard can see his doors all along the train. He can be sure that all passengers are clear before closing the doors.

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