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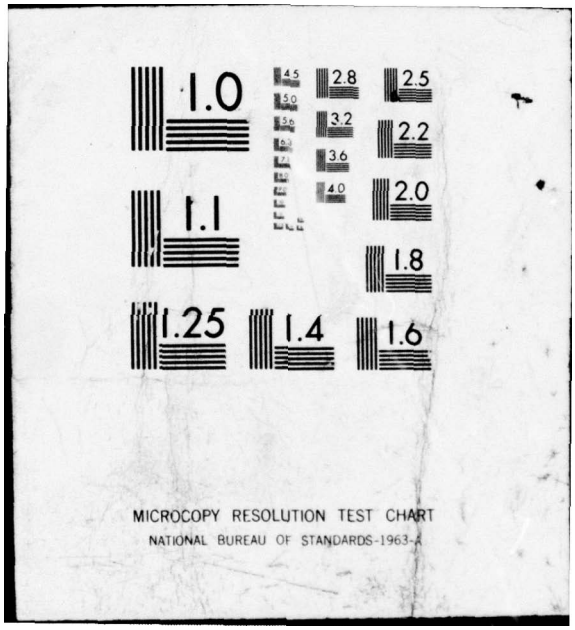
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(10) Roger J. Vaughan

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## PREFACE

The purpose of this paper is to provide an economic perspective on the problem of transporting people to Gateway National Recreation Area located in New York City and northeastern New Jersey. While it does not contain any detailed empirical calculations for the solution to this complex issue, it is hoped that some of the suggestions might be useful input into the planning process, and might open the way to more detailed research and analysis.

The research was conducted for the National Park Service and the author would like to thank those members of the Park Service who shared their ideas on the topic. Errors and misinterpretations remain the responsibility of the author.

## SUMMARY

Solving the problem of getting people to Gateway National Recreation Area requires a combination of scaled parking fees and an efficient, fast bus system. Parking fees must be scaled so that they reflect the cost of providing parking facilities and the costs of traffic congestion, as well as the feasibility of providing an alternative means of transportation. This implies that the fees will have to vary between different Gateway sites, by time of day, and also by day of the week.

The development of a public transportation system cannot be based upon the present Metropolitan Transit Authority (MTA) routes or pricing systems. The length of the trip is too great to provide sufficient incentive for visitors to switch from automobile transportation in response to a fare reduction. Instead, new bus routes, using the express bus principle, must be established. Regular buses and minibuses should be used according to the level of demand. This system would reduce the time spent traveling to a sufficient degree to make the buses a viable alternative to the automobile if the latter is faced with high parking fees. The fare schedule necessary for such a system to operate at zero loss is reasonable. A large portion of the costs could be met from the federal UMTA grants.

External travel systems and prices must be coordinated with an internal system linking key recreation areas within the complex. Relatively low fares and parking fees may be desirable during the early stages of Gateway development in order to encourage tentative first trips to the area. As development proceeds and inhabitants of the metropolitan region learn of Gateway's attractions, fare and parking fee revenues should be used instead of unpalatable entrance fees to help finance the development and operation of the facility.

Additional research, using the extensive data resources of the Tri-State Regional Planning Commission and the City Planning Commission, is necessary to develop an appropriate parking fee schedule and a sequence of bus routes. Visitor and cost data from MTA could be used to provide the appropriate inputs. A set of trial routes should be

planned and experimented with. This will yield valuable information on costs and patterns. Only through these measures can an effective way be found of making Gateway available to all area residents.

# INTRODUCTION

Gateway National Recreation Area is situated in the heart of the most populous metropolitan area in the nation.[1] The Functional Economic Area houses 18.3 million people, all of whom live within two hours of one or more components of Gateway.[2] The area is served by the most extensive transit systems in the world, including subways, surface rail and bus systems, and many miles of freeway and parkway. Unlike many of the remote National Parks in the West, access should not be a problem to planners. It is, however, one of the most crucial issues that must be faced, and the success of the area depends upon the development of a transportation system that can bring members of the local communities to the park at a minimum of time and cost.

Some indication of the importance of transportation can be found in studying patterns of use of Gateway. Fewer than 4 out of 10 families in New York City own automobiles, yet nearly 9 out of 10 of the visitors to Gateway arrived by private car. The median trip time of visitors to Jacob Riis Park (Brooklyn) using the subway was three times as long as the time taken by motorists. Since out-of-pocket costs are probably similar for both transportation modes (and are probably only 25 percent of the total trip cost--travel time plus out-of-pocket costs), this implies that the poor may pay twice as much to visit the park as do higher income groups.[3] The region contains nearly two million low-income individuals; therefore, if a way cannot be found to lower the price of Gateway to this group, a large part of Gateway's constituency will be disenfranchised.

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[1] A map of the component areas is shown in Fig. 1.

[2] The Functional Economic Area, defined by the U.S. Bureau of Economic Analysis, includes parts of northern New Jersey and New York State.

[3] For a discussion of the time component of travel costs, see Frank J. Cesario, "Value of Time in Recreation Benefit Studies," *Land Economics*, Vol. 52, No. 1, February 1976, pp. 32-41.

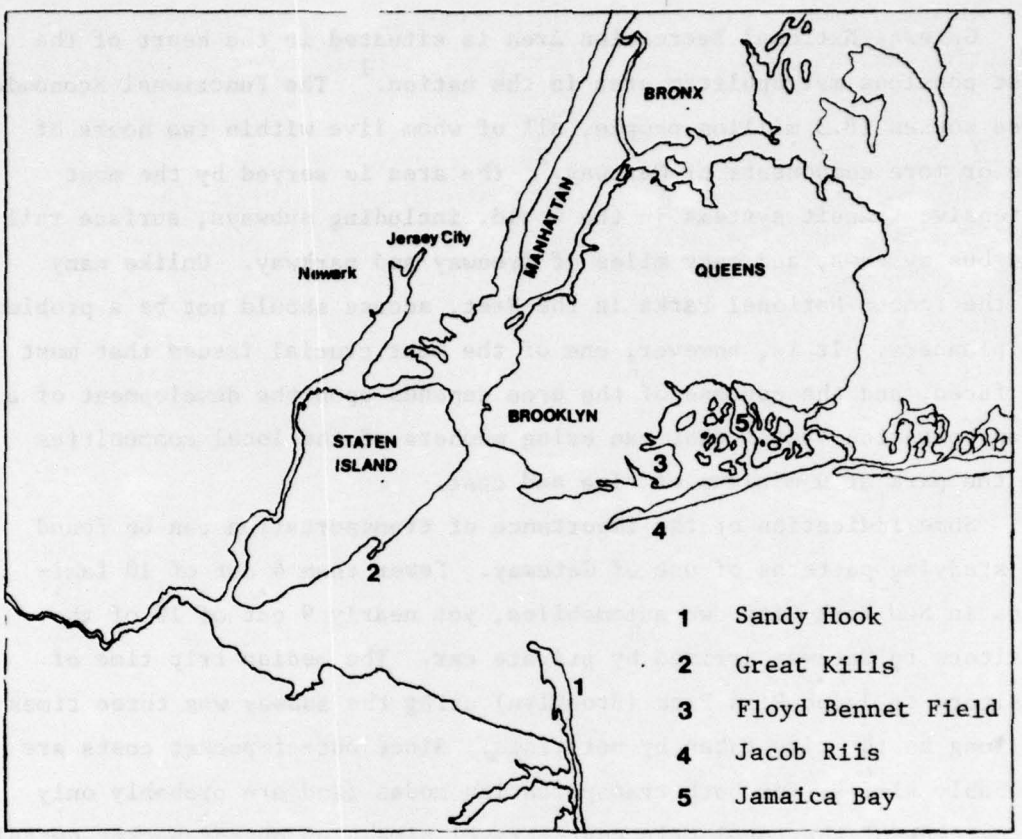


Fig. 1--The Components of Gateway National Recreation Area--
New York and Northeastern New Jersey

There are a number of other compelling reasons for developing a viable public transportation alternative to the private car as a means of getting people to Gateway, including saving energy, reducing air pollution and congestion, and cutting down on the number of parking spaces.

## ENERGY

The New York region is dependent on oil for three-quarters of its energy needs, and 90 percent of this oil comes from expensive and unreliable foreign sources. The full-size automobile averages only 15 passenger-miles per gallon (pmg), while buses average 110 pmg and the commuter train averages 100 pmg.[1] A substitution of mass transit for private automobile can therefore yield valuable savings.

## POLLUTION

The automobile is responsible for significant pollution in urban areas. A reduction in automobile use will reduce the level of hydrocarbons, nitrogen oxides, and carbon monoxide, which currently exceed federal standards in the New York area.

## CONGESTION

Perhaps the most serious problem associated with the use of the automobile in urban areas is congestion during certain peak hours of use. While congestion has been identified traditionally with commuting to work, the size and density of the region around New York have resulted in extensive weekend congestion as outdoor recreationists leave for, and return from, nearby parks and beaches. The capacity of parking lots also creates local bottlenecks that can cost families hours of waiting time. In a study of mass transit policies for pollution reduction in the city of Chicago, a research group concluded that:

> Policies considered were congestion tolls, exclusive bus lanes, parking taxes, and fare changes. The striking thing about most of the mass-transit policies

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[1] *The Economics of Energy*, Tri-State Regional Planning Commission, February 1974.

> is that, though they were cost-effective, their effects (on pollution) were not large. In part, their attractive cost-effectiveness stems from the reduction in road congestion.[1]

PARKING SPACE

The greater the proportion of visitors that arrive at a recreation area by automobile, the greater the proportion of space in that area that must be diverted from primary recreation use to parking lots and service roads. In addition, the construction of these facilities eats into scarce development funds.

For both equity and efficiency reasons, serious attempts should be made to alter the distribution of visitors among transportation modes. How this might be effected is discussed in the following sections.

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[1] Kevin G. Croke and Richard Zerbe, *Environmental Regulations and Urban Traffic*, University of Chicago, Center for Urban Studies, 1974, p. 10.

## TRANSPORTATION POLICIES

Conceptually, there are two goals of transportation policies for Gateway: discouraging automobile use, and providing public transportation alternatives. But these twin goals must be seen as part of the overall objective of providing equitable and efficient access to all potential users. Programs must be carefully integrated to achieve this. The development of low-cost public transit alone will not seduce motorists from their cars. Gerald Kraft concluded, after reviewing a large number of studies of low-fare public transportation experiments, that "there is little hope that many auto travellers can be diverted to transit through free or reduced fares."[1]

Similarly, the imposition of parking charges alone will serve only to reduce the number of visitors. Therefore, it is necessary to develop both a scale of parking fees and a system of public transportation that together encourage visitors to behave in an efficient way.

### DISCOURAGING THE AUTOMOBILE

There are four important criteria or principles that are relevant to the structuring of an appropriate system of parking charges at the different sites within Gateway.

(1) *The greater the cost per visitor of providing a public transit linkup to a particular Gateway site, the lower should be the parking fee at that site.*

This principle has important implications. In the low-density areas around Sandy Hook and on Staten Island, the cost per passenger-mile of bus transportation will be much higher than in the much more densely populated areas of New York City. Many more households own automobiles in these outlying areas. Therefore, a bus will have to travel much

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[1] Gerald Kraft, "Free Transit Revisited," *Public Policy*, Vol. 21, No. 1, Winter 1973, p. 105.

further to collect a full load. This greatly increases the cost of the service. The value of the reduced pollution and congestion will also be lower at these sites. This is because bottlenecks and heavy automobile traffic are not as severe at Sandy Hook as at Riis Park or Jamaica Bay. In simple economic terms, the benefits of diverting a visitor from his auto to a bus at Sandy Hook or Great Kills are less than at Riis Park, while the costs are much higher. Parking charges should therefore be less.

*(2) The parking fee should reflect the external social costs of the visitor's auto trip.*

An automobile user imposes costs on society that he does not pay for; he uses air to dispose of the waste products of his trip; he slows down other road users; and the noise he emits may disturb roadside residents. A parking charge can be used to encourage the motorist to use his vehicle only if the value of the trip is equal to the private costs that he pays plus these social costs. Social costs vary both with the day on which the trip is made and also with the time of day. When traffic is already congested, an extra motorist has a much greater impact on slowing everyone down than when the traffic is relatively light.

In addition, the capacity of a parking lot is built to handle peak hours. At recreation areas, these occur on summer weekends. During the week, much of the lot remains empty. Therefore, the peak-time user should pay the capital cost of the capacity that he uses. Charges at parking lots should be higher on summer weekends than during the week.[1] There should also be a premium paid for arriving at the parking lot during peak arrival times and for leaving during the evening rush. For example, the basic daily parking rate at Riis Park on a summer Sunday might be $5, with a $0.75 discount for not arriving between 10 a.m. and noon, and a similar discount for not leaving between 4 p.m. and 7 p.m. These hours

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[1] The issue is conceptually complicated, but a rational pricing system for peak and off-peak use is easy to construct. See, for an example, Gardner Brown, Jr., "Pricing Seasonal Recreation Services," *Western Economic Journal*, Vol. 9, No. 2, 1971, pp. 218-25.

could be modified as user behavior changes. The theory would be to spread the number of vehicles using the lot evenly through the day so that frustrating jams that detract from the recreation experience do not occur. Parking rates would also differ among locations according to differences in level of congestion.

*(3) Parking charges should vary with the cost of providing parking facilities.*

At locations where land is not at a premium or at places where parking facilities can be cheaply constructed (on the old runways at Floyd Bennet Field), all other things being equal, the cost of parking should be lower than elsewhere. The cost to the National Park Service of increasing the parking capacity at the Field is negligible--some yards of rope and a quantity of white paint. Therefore, the cost-effectiveness of diverting motorists to public transit will be lower. At other locations, the cost of using scarce land for parking may be high, so that when capacity is reached, the peak-hour surcharge should reflect this high marginal cost.

This principle also implies that, as the park areas are developed over time and the opportunity cost of land rises, the cost of peak-hour parking should be increased.

*(4) New users may wish to explore the park areas by automobile.*

The demand visits to Gateway will grow not only as a result of demographic and economic changes in the region and internal development of facilities, but also as a result of users' "learning by visiting" of the pleasures of outdoor recreation. It takes time--perhaps four or five years--for surrounding communities to learn about the park and to adjust their patterns of outdoor recreation behavior. On their first visit, the mobility that the family automobile can offer may be important. The family will wish to visit different sites in order to find

the one that best meets their particular preferences. They will wish to compare the different beaches, picnic areas, and sporting facilities. Different areas will develop to serve different economic and demographic groups. There is, therefore, an argument for the gradual introduction of a fee schedule for parking, particularly before effective internal transportation systems are introduced.

The goal of a fee schedule designed according to these four criteria is to ensure that visitors are distributed, both temporally and spatially, in an efficient manner. The correct schedule will ensure that there are neither long lines at entrances and exits nor turnaways that are unpleasant for visitors and park employees alike. Public sentiment is not as strongly opposed to such a scheme as some administrators believe. Waiting in line is less pleasant than paying a parking fee, especially a fee that the visitor can reduce by changing arrival or departure times. Acceptance would be even swifter if it were well known that the revenue were being used to develop park facilities and alternative means of transportation.

Two factors are important for the efficient working of this scheme. First, it must be well publicized. Visitors will not respond to incentives that they do not know exist. Second, cooperation with the local police is necessary if motorists are not to turn roads near park entrances into informal parking lots as they attempt to avoid paying fees.

The parking fee schedule should be coordinated with the pricing of the transport system within the park areas. For example, extensive parking facilities could be provided at Floyd Bennet Field, while parking lots are much more expensive to build at locations in Jamaica Bay. The Park Service should consider the cost-effectiveness of providing free water transportation to the islands in the bay for those that use the Floyd Bennet parking lots. Higher parking fees would be charged at Jamaica Bay parking facilities.

One policy that merits consideration, as a means for both making the fee schedule publicly acceptable and publicizing the facilities and programs available at Gateway, would be to market books of season tickets at reduced rates. These books would contain a given number

of entrance coupons (but would have to be surrendered in such a way that the incentive toward public transit and off-peak use were not removed), and also discount tickets to boat rides, sporting facilities, and perhaps even restaurants. These would allow new programs to be advertised at the beginning of the season. In addition, they would allow the collection of useful planning data concerning the relative preferences of users. Target population groups, such as the poor and the aged, could also be served with special types of season tickets.[1]

In a crowded metropolis, recreation must be marketed in much the same way as other commodities. Resources for recreation are scarce and must be utilized in an efficient way so that opportunities and public money are not wasted.

In coordination with this parking fee structure, it will be necessary to develop a public transit system, which is discussed in the following subsection.

## ALTERNATIVE PUBLIC TRANSPORTATION

There is no one solution to the problem of providing public transportation to the Gateway complex. The effectiveness of the possible alternatives depends upon the specific characteristics of the destination, the point of origin, and the time of day. The advantages and disadvantages of possible alternatives are discussed below.

### Subway

Urban mass transit systems are geared to the job of moving large numbers of people to work in the morning and back home in the evening, five days a week. A map of the New York City subway routes shows them all converging on the Central Business District. Routes are not flexible and, therefore, it is almost impossible to adapt the system to the task of moving people to Gateway's facilities. Even if the routes along Nostrand and Utica Avenues in Brooklyn are extended, Gateway will be

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[1] These groups could be reached easily through welfare, social security, and other public service offices.

poorly served.[1] Most subway users will have to endure a frustrating number of transfers to reach the parks.

In the absence of new lines to serve Gateway, it is doubtful if the subway can contribute significantly to solving recreation transportation problems. A number of improvements can be instituted that might marginally increase use.[2] These include:

(a) More extensive use of bus-subway transfers to reduce out-of-pocket costs;[3]

(b) Weekend passes allowing unlimited travel on MTA systems (similar to the present "night-on-the-town" tickets);

(c) Shuttle services from the stops near the park to the different Gateway sites.

The cost-effectiveness of such measures would have to be carefully monitored since there is considerable a priori evidence that such schemes would cost more to implement than they would be worth, and resources would be better spent developing other transit systems.

In general, neither the subway nor surface rail lines are likely to provide solutions to any of the mass transit problems that beset

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[1] The present budgetary problems of New York City have caused the almost indefinite postponement of construction. The possibility of a Staten Island line that would make Great Kills accessible to Manhattanites is now so low as to make it irrelevant in planning for Gateway public transit.

[2] An excellent discussion of potential improvements, as well as of the present inefficiencies, is contained in William Vickerey "New Systems Versus Better Use of Old Systems: Criteria and Cases," paper presented at the annual meeting of the Econometric Society, San Francisco, December 1974.

[3] Reducing these costs by 50 cents for a one-way trip would represent no more than a 15 percent reduction in total costs for the average subway-using visitor. With an elasticity of demand of no more than 0.3 (Kraft, op. cit.), this would only increase the number of visitors using subways to Riis Park by about 4.5 percent, or about one-half of 1 percent of the total number of visitors. In addition, MTA subway revenues would decline. This would increase the already huge deficit, which would make the proposal unwelcome at MTA and at City Hall. There is little justification for the measure.

densely populated urban regions. They are too costly, too inflexible, and subject to too much political manipulation at the planning stage. After a detailed cost comparison of alternative transportation modes, Hayden Boyd concluded:

> It is difficult to rationalize the new rapid transit systems of the sort constructed in San Francisco or Washington, D.C., or about to be started in Baltimore or Atlanta. The Federal capital grants program, which reduces the locally-perceived capital costs of new rail rapid transit systems, apparently provides part of the explanation for the rebirth of popularity of this alternative. But operating costs per passenger are also much higher, and the quality of service, measured by user time costs, is hardly better than the expressway bus.[1]

Conventional Bus

The bus offers considerable promise for moving people to Gateway. First, it is not dependent on routes that are expensive to maintain and fix. Second, there is excess capacity within the MTA system when it would be needed for Gateway visitors, since peak-hour travel to Gateway does not not coincide with peak-hour work commuting. *Third, the operating costs* per passenger-mile for a bus are lower than for the subway or for the automobile. Fourth, the bus can deliver passengers inside park areas, thereby minimizing the number of transfers, the waiting time, and the walking distance that visitors have to endure. Fifth, the capacity of a given route can be changed rapidly in response to a heavy demand.

In determining the way in which a bus is to be routed, there are two basic alternatives. First, the route can be linear, with stops every two or four blocks. This is the approach used by most MTA routes. This alternative is ideally suited for high-density areas, such as Manhattan, where passengers have numerous points for boarding and

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[1] Hayden J. Boyd, "Non-Technological Innovation in Urban Mass Transit: A Comparison of Some Alternatives," paper presented at the annual meeting of the Western Economic Association, Claremont, California, August 1973, p. 5. This paper is one of the most readable cost comparisons available for urban mass transit alternatives.

departure spread evenly over the route. For transportation to Gateway, where there are only two or three possible destinations, this alternative would be inappropriate for most routes. Journeys from northern Manhattan to Riis Park, or from Freehold, New Jersey, to Sandy Hook, would be a time consuming and uncomfortable proposition.

A much more attractive alternative would be to use express buses that would make a number of local stops in a community and then proceed directly to Gateway. This would probably halve the trip time for many of the travelers. Figure 2 illustrates how the system might work. Route A buses would collect passengers from a number of stops in Hamilton Heights and Morningside Heights, and then proceed directly to Floyd Bennet Field, Jamaica Bay, and Jacob Riis Park, allowing passengers to alight where they wished within these areas. Route B originates in Bedford-Stuyvesant, and Route C operates from the Bayside area of Queens.

The points of departure could be traditional MTA stops at important interchanges in the communities. These are difficult for potential riders to identify and the waiting area is limited by the width of the sidewalk. An alternative would be to place stops at local schools. These would have a double advantage. Most households would be familiar with the location of the school, and the schoolyard would provide a better waiting environment for a family with energetic children. Special bus stop signs, using a Gateway symbol, would help identify the exact spot.

The routing would be flexible. If one sequence of stops consistently failed to provide a capacity load for the buses serving it, the number of stops on adjacent routes could be extended and the separate route dissolved. In developing and defining routes, it is important to remember that there is a trade-off between the frequency of service and the trip time. If the buses are to be run at or near capacity in order to minimize costs per passenger-mile, then routes must be designed to provide sufficient passengers. The load can be increased either by extending the number of stops, which increases trip time, or by reducing the frequency of service, which will increase average waiting time. There is some empirical evidence that suggests that the cost of each minute spent waiting is valued at five or six times the cost of each minute spent

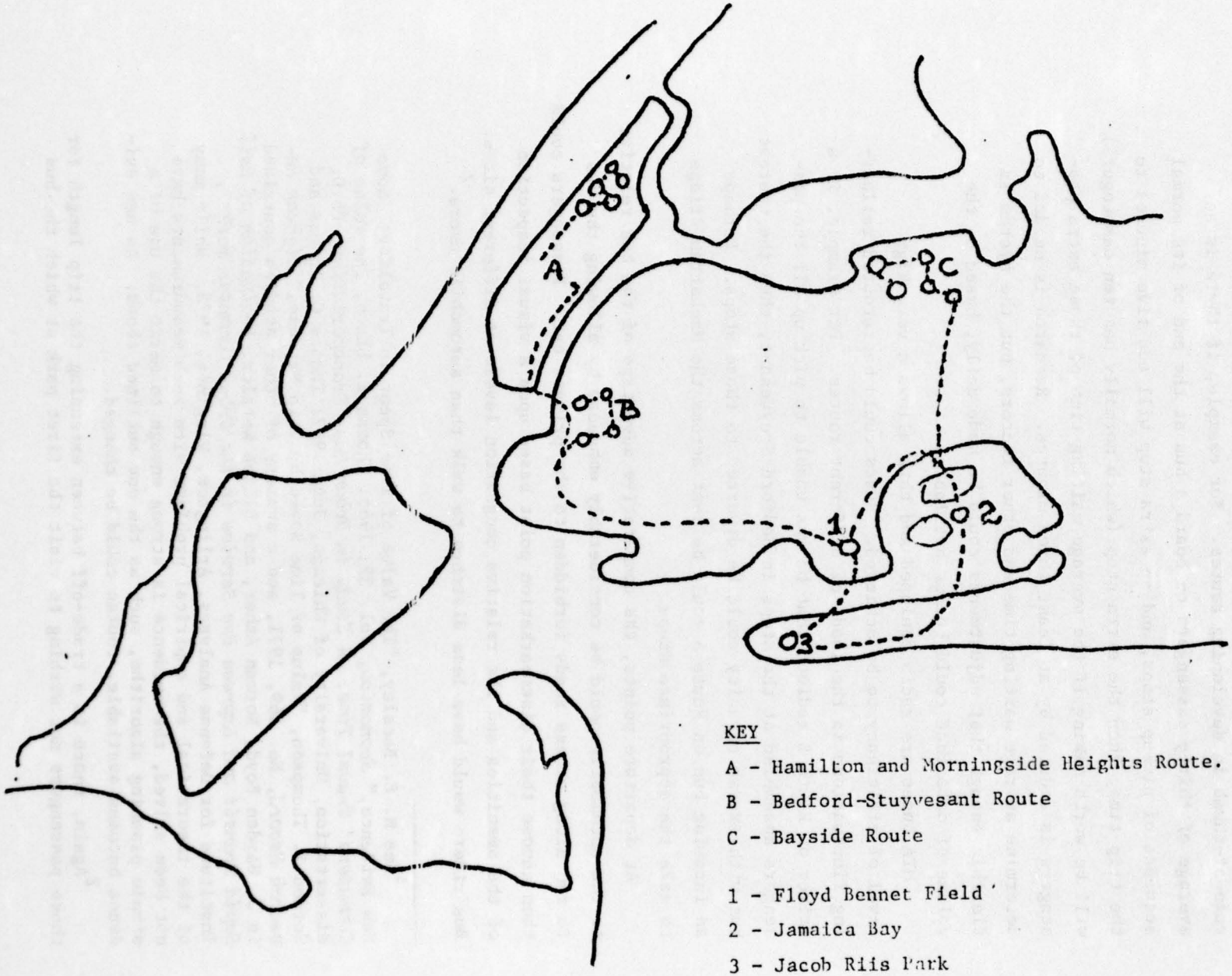


Fig. 2--Express Bus Routes to Gateway

traveling by transit users.[1] This would provide the basis for a simple rule-of-thumb in developing routes. For example, if there is an average of thirty passengers on board a bus at the end of its normal sequence of pickup stops, and an extra stop will add five minutes to the trip time, then the extra stop (which normally has ten passengers) will be worth making if the average waiting time of those extra passengers is reduced by at least three minutes. Research is needed to determine average waiting time and other factors, but the system is flexible enough that adjustments could be made daily, based on the volume of data that could become available.

MTA buses are radio equipped and this allows a very high level of efficiency to be achieved. Buses could be rerouted reflecting fluctuations in the loads of different routes. For example, if a driver on Route B radioed that he was unable to pick up all the passengers assembled at the stops in Bedford-Stuyvesant, then the nearest bus with excess capacity could be diverted to those stops. Perhaps an incoming bus on Route A could be sent across the Manhattan Bridge to make the appropriate stops.

At departure points, the comparative advantage of the bus relative to the automobile could be considerably enhanced by allowing the bus to run along access roads forbidden to the private car. Passengers could then choose their disembarkation point based upon a visual inspection of the amenities and the relative congestion levels at different sites. Bus riders would have less distance to walk than automobile users.[2]

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[1] See M. E. Beesley, "The Value of Time Spent in Traveling: Some New Evidence," *Economica*, Vol. 32, 1965; Thomas E. Lisco, *The Value of Commuters' Travel Time: A Study in Urban Mass Transportation*, Ph.D. dissertation, University of Chicago, June 1967; Thomas C. Thomas and Gordon I. Thompson, "Value of Time Saved by Trip Purpose," *Highway Research Record*, No. 369, 1971, and a summary of other studies contained in J. Hayden Boyd, Norman Asher, and Elliot Wetzler, *Evaluation of Rail Rapid Transit and Express Bus Service in the Urban Commuter Market*, Institute for Defense Analyses, Arlington, Virginia, 1973. While many of the theoretical and empirical problems with such measurements have not been solved, the evidence is strong enough to merit the use of a simple planning algorithm, such as the one outlined above. As new evidence becomes available, routes could be changed.

[2] Again, there is a trade-off between extending the trip length for those passengers not wishing to visit the first park at which the bus

Visitors could be provided with brochures on the bus describing the range of recreational opportunities at different Gateway sites. Radio contact would also allow them to be given up-to-date information concerning the availability and congestion of recreation facilities. If a National Park Service employee were to ride the bus, reservations could be made over the radio for use of specific facilities at various recreation centers--boat rides, tennis courts, barbecue equipment, for example.

The development of computer-based dispatching algorithms would allow the system to operate cheaply and efficiently. Routes could be altered in response to demand changes. On weekdays, routes could be combined--Route A in the illustration above might be extended to include Inwood and Washington Heights (with fewer stops in each community). Since much of the equipment is already operating in the New York area, the costs to the Park Service would be minimal. On peak summer days, it might also be possible to use school buses to increase capacity. Where additional capacity is needed, federal capital grants greatly reduce costs.

The express bus also minimizes the potential problems posed by the existence of local private bus companies in New York and New Jersey. Since the express buses will not be stopping in these areas, the local franchises will not be affected. For those areas in southern Brooklyn, southern Queens, and Monmouth County, local companies might have their franchises extended so that they could bring passengers to the parks. Express buses would not be utilized for trips of fewer than two or three miles.

There will be "set-up" costs associated with the development of this transit system. Dispatching programs must be researched and made operational, and full efficiency cannot be expected immediately. However, the plan would be eligible for funds from the Urban Mass Transportation Administration (UMTA) of the U.S. Department of Transportation. The Federal Highway Act of 1974 specifically urged UMTA to release money

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stops (Floyd Bennet Field for Route A), and the waiting time of those who would have to change to an internal bus to reach the beach. The problem can be solved in the same manner as pickup stops are planned.

for the development of recreation-oriented transit systems. The size, novelty, and scope of the Gateway system would make it a prime candidate for such funds.

A major issue that must be faced is how the service should be priced. Ultimately this is as much a political question as an economic question. There are some important considerations that are relevant to the pricing decision.

1. *'Free' transportation is not free.* There is no reason for the system to operate at a loss, or even to simply make zero profit. Since any form of entrance fee is unlikely, any surplus generated by the combination of parking fees and transit fares could be regarded as a way of ensuring that the users of the park contribute toward its costs. This would cut down on the implicit subsidy from non-users to users that is present in any freely provided public service. The fares do not necessarily have to cover the cost of the transit system, since a subsidy from parking fees could be arranged. A simple decision rule might be to determine a fraction (perhaps between 25 and 50 percent) of the net parking revenues (net of the operating and capital costs of the lots) that will be used as a subsidy and then to derive a scale of fares that cover the remaining costs. From the calculations shown below, it can be tentatively concluded that fares that cover full costs would not be unacceptably high.
2. *A flat fare, regardless of distance, is probably not desirable.* Costs do not rise proportionately with distance, but average costs per passenger for long trips are higher than for short trips. A flat fare would lead to the undesirable side effect of a resident from the Bedford-Stuyvesant district subsidizing someone from the Bronx. Providing price incentives toward efficient behavior also implies that if an alternative recreation site is cheaply available, it should be used. Society does not gain by subsidizing a Bronx resident by $2 so that

he can reach Gateway for only $1 when he could have used Van Cortland Park for only $1.50. Fares based upon distance traveled seem more equitable.

The full costs of the bus service, assuming that buses run with 75 percent or more of their seats occupied, should be between four and five cents per passenger mile.[1] The exact cost would depend upon the share of the trip time spent making local stops and the share spent traveling along expressways. For longer trips, the four cents per mile estimate is likely to be more accurate; for shorter trips, the five cents per mile estimate. These costs include both operating and capital costs. The latter represent about 33 percent of the per passenger-mile costs and yet are met by the federal government in large part, rather than by the MTA. Together with the subsidy from parking fees, this federal subsidy means that the system could operate at no loss with an average round-trip fare for park visitors of about 75 cents, for which they would get a speedy door-to-door service. While the private automobile would probably still be 15 minutes quicker on an average one-way trip, when faced with a three or four dollar parking fee, the automobile would not have a strong advantage over the bus.

Jitney

The regular 50-seat bus loses its cost advantage on short trips or on routes that serve relatively few passengers. On such routes, the introduction of the jitney, or rather the reintroduction of the jitney, might prove an efficient solution. Minibuses with a capacity of between 8 and 15 passengers have low operating expenses. They could operate on flexible routes in low-density areas.[2] They would charge fares similar to the buses' and operate on basically the same principle.

Since there are no publicly available minibuses that the NPS might use, the cost-minimizing solution for the Gateway administration would be to allow private companies to operate local franchises, paying these

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[1] J. Hayden Boyd, op. cit., p. 9.

[2] Where the population density is so low that there is no way of developing a series of local stops that serve the majority of the local population, jitneys could operate on the "dial-a-ride" principle.

companies a subsidy per visitor served that is equal to the average subsidy implicit in the bus fare schedule. This system would be especially valuable in the low-density areas in northern New Jersey.

Perhaps the largest problem that jitneys would create would be opposition from the very powerful lobby of taxi companies. However, there is a precedent for jitney-type services in the limousine routes run from both Kennedy and La Guardia airports. The fact that jitneys would carry passengers only to Gateway, and would not make any other disembarkation stops may overcome some of the objections. This issue can only be resolved through negotiation.

The minibuses would also provide an excellent means of transportation within the park. Since they would carry fewer passengers than conventional buses, the number of stops that they would have to make and, hence, the average trip times, would be lower.

## CONCLUSIONS

The transportation of people to Gateway efficiently and effectively requires a combination of scaled parking fees and express bus and jitney services. These measures should be introduced gradually in a series of experimental routes so that the level of use and the operating costs can be assessed. Before this is done, further research is necessary. The conclusions reached in this paper are only tentative and are not based upon a detailed examination of population distribution or of MTA costs. Many questions still remain to be answered. These include:

- How much excess bus capacity does the MTA have on summer weekends?
- What are MTA's operating costs?
- How many extra buses would have to be purchased to satisfy the needs of Gateway transportation during the week when there is no MTA excess capacity?
- Which routes should be selected for test runs?
- Can jitney services be set up? How efficient would a "dial-a-ride" system be? How many minibuses should be purchased?
- How should the disembarkation points within Gateway be arranged?
- How much funding would be available from UMTA?
- What is the appropriate scale of parking charges? How will the public react?
- How often should the buses run from communities? How many stops should be made?

It is recommended that discussion be implemented between Tri-State Regional Planning Commission, which has an excellent set of travel data, the City Planning Commission, and the Metropolitan Transit Authority (as well as with private transit companies) in order to prepare a detailed application for an UMTA grant for a demonstration project to begin next year. The results of such a plan would provide invaluable information for the development of a full system during the following

years. Many problems, foreseeable and unforeseeable, will be encountered. The sooner the trial system is set up, the sooner will residents of the New York metropolitan region have access to Gateway National Recreation Area.