DE LEUW, CATHER & COMPANY
ENGINEERS
WESTERN OFFICE
1256 MARKET STREET
SAN FRANCISCO 2, CALIFORNIA
UNderhill 1-1302

July 15, 1965

The Chairman and Members
Auckland Regional Authority
Auckland, New Zealand

Gentlemen:

We take pleasure in submitting herewith a summary of the investigations, conclusions and recommendations completed in accordance with our assignment of July 17, 1964, to develop a coordinated transit plan for the Auckland Metropolitan Region.

Two alternative plans for future regional transit service were analyzed: an all-bus system and a coordinated bus and rail rapid transit system.

An All-Bus System

This plan envisioned an improved bus system generally similar to existing services except that routes would be coordinated and duplication of service eliminated through control of operations by a single agency. Bus lines would be extended to serve newly-developed areas where needed and express bus operation on motorways would be introduced to expedite the movement of passengers during peak periods where practicable.

Downtown Auckland constitutes the largest employment center in the region and, therefore, affords the best opportunity for planning improvements in bus services. Present routing of many buses to a terminal in the downtown district at the extreme south end of the area imposes unnecessary walking on crowded downtown sidewalks, and adds to the travel time to reach downtown destinations of the great majority of bus patrons. Since most transit passengers have destinations in the vicinity of Queen Street, it is apparent that direct delivery of passengers to Queen Street sidewalk stops would accomplish the greatest possible improvement in bus service to the downtown area.

The existing four lanes in Queen Street do not have sufficient capacity for two-way operation of all of the buses, even though parking were to be strictly prohibited during rush periods. We have, therefore, planned two downtown delivery loops with each bus routed along Queen Street only once, either on the inbound or on the outbound trip. Buses arriving from the south and the east use Symonds and Customs Streets and then south along Queen Street on their outbound journey. Buses arriving from the west and the north would deliver passengers northbound on Queen Street and then travel outbound via Customs and Albert Streets. Curb loading space on Queen Street is thus used to greatest advantage.

Although this operating plan would function with existing passenger volumes, it would substantially reduce other traffic movements along Queen Street during peak periods. Also, it would be necessary to construct a new bus terminal near Queen Street, in addition to the existing bus terminal.

It is of basic importance that public transit would play a major role in the integrated regional transportation system. Past experience in most metropolitan centers, as well as in Auckland, indicates that the proportion of transit users would continue to decline if transit services were confined to an all-bus system. The best that could be expected is that the number of transit passengers would remain constant or perhaps show a slight increase in future years.

Experience in larger cities in Western Europe and America have proven the many disadvantages of attempting to rely solely on automotive transportation to handle massive rush hour traffic loads. Such policies result in enormous financial burdens involved in acquiring rights-of-way and constructing motorways in addition to the costly parking structures required for day storage in the large focal centers.

Auckland has and will continue to experience vigorous growth. The all-bus transportation plan can be developed and will function reasonably well for a limited time. However, in a few years, congestion on Queen Street would require prohibition of motor cars from using that street during peak periods.

Analysis of the operating results of an all-bus system indicates that the annual operating revenues, based on present conditions, would be sufficient to cover the annual operating expenses. However, fixed charges on the capital investment required for modernization estimated at more than £9,000,000 require substantial annual subsidies.

On the basis of the foregoing analyses, together with a comparison to the alternative coordinated bus and rail system, we find that the all-bus system would not fulfill the transit requirements of the area. We recommend against an all-bus system in the Auckland Metropolitan Region.

Coordinated Bus and Rail Rapid Transit System

A coordinated bus and rail rapid transit system was analyzed in considerable detail and was found feasible both operationally and economically. We recommend that this system be adopted for transit service in the Auckland Metropolitan Region.

It would consist of a modern rail rapid transit facility, utilizing multiple-unit cars, each individually powered by electric motors operating along trunk lines in the several principal corridors where railway facilities are now located. The bus lines tributary to the rapid transit corridors will provide feeder services to the rail stations, thus spreading the benefits of faster service and a vastly improved delivery to downtown Auckland over a much larger section of the urban area.

Initially, the rapid transit operation would be along existing rail lines from both Puhinui and New Lynn via Newmarket to the Central Business District. The extension to downtown Auckland would be built along Beach Road connecting to an underground subway along Customs Street and Queen Street to a terminal at the Civic Center. Two new subway stations are planned in downtown Auckland, at Customs and Queen Streets and at Wellesley and Queen Streets. These routes total 18 miles of surface lines and 1.2 miles of underground, all of which would be electrified. Rehabilitation of the existing 24 outlying stations is contemplated, together with provision for parking and rubber-to-rail transfer facilities.

The second stage of rapid transit development would be the extension of the initial rapid transit operations to Henderson and Papakura. Additional coverage would be provided through a connection from Westfield to the Auckland railway station via Tamaki. An extension of the rapid transit operation from the Civic Center station southerly to connect with the existing railway line in the vicinity of the Mount Eden station may be found feasible in the next generation.

High-speed rapid transit cars are proposed - of modern design and capable of speeds up to 60 m.p.h. One-way travel time from Puhinui and from New Lynn to the Civic Center is estimated at 21 minutes and 19 minutes respectively. During

peak periods, trains would operate on 5 minute headways on each line, increasing to 10 to 15 minute headways at other times.

Many improvements have been made in bus design in recent years, aiming to provide a more comfortable ride with improved lighting, ventilation, and absence of vibration. The exterior of the vehicle has been streamlined to provide a more pleasing appearance, and interior trim and color have been made more attractive. We recommend that these desirable features be incorporated into the fleet as new buses are acquired.

We have estimated the capital outlay required to put the recommended transit system in operation at £21,000,000 on the basis of present day costs. Approximately £15,000,000 would be required for the rail rapid transit system including the downtown subway extension, the improvements to existing railway facilities and the purchase of 114 new cars. The remaining £6,000,000 would cover the investment over a period of years in 545 new buses and new bus depots.

Considering the time required for organization, legislation, negotiations, financing and acquiring and constructing the necessary facilities, we have assumed 1970 as the earliest year of initial rapid transit operation. Therefore, estimates of financial results of operation were prepared for that year. For the purpose of computing revenues, we assumed that the transit system would continue to operate on a zone-fare basis. The present weighted-average fare per passenger was established at 11 d. as the basis for estimating revenues. The gross annual revenues were computed on the basis of this average fare and an estimated 87,000,000 passengers, producing a total of £3,990,000 in the year 1970.

Operating expenses for the bus portion of the transit system were based on present experience on bus operations throughout the region. The average of £1 - 16 - 0 per bus hour applied to the estimated hours to be operated in 1970 produced annual operating expenses of £2,380,000. Annual operating expenses on the rail rapid transit system were estimated with the assistance of the New Zealand Government Railways at £1,240,000 - a grand total for the system of £3,620,000.

The financial results for the initial year of operation, 1970, are summarized as follows:

Operating Revenues	£3,990,000
Operating Expenses	3,620,000
Operating Income	£ 370,000

Based on experience on similar transit systems, operating income may be expected to increase in future years by from 1 to 2 per cent per annum.

Based on present day levels of costs, wages and fares, our studies show that the proposed transit system would produce an operating income and, therefore, would be self-supporting except for fixed charges. Annual fixed charges on the capital investment would range from £1,000,000 in 1970 to approximately £1,400,000 in 1982, based on an interest cost of 5-1/2 per cent per annum. The operating income of some £370,000 could be used to defray a portion of the annual charges.

Financing

This financial problem is typical of virtually all American and most European rapid transit operations which have used a number of ingenious means of financing. The 1964 Urban Mass Transportation Act allows the United States Government to contribute up to two-thirds of the capital investment in rapid transit facilities. Several states, such as California, Illinois, New Jersey, Massachusetts, New York, Pennsylvania, and the Provinces of Ontario and Quebec in Canada have various programs for assisting in financing rapid transit facilities in metropolitan areas. A number of large cities aid in financing transit through general or special taxes and these include Boston, Chicago, New York, Philadelphia, San Francisco and Seattle. In other centers, such as Cleveland and Chicago, revenue bonds and equipment trust certificates have been used to finance rapid transit. The State of California has allocated surplus funds from toll collected on the San Francisco Bay Bridge to finance the construction of a rapid transit tube under the Bay - a sum of about $200,000,000. Other means of subsidizing transit facilities, on a year to year basis have been used by various public agencies. In Boston, a 2 cent tax on each package of cigarettes was imposed.

Benefits of a Modern Coordinated Transit System

Major improvements in convenience to the public will develop from the coordinated bus and rapid transit operation. Major benefits to patrons of the combined transit operations will result through time savings, clocklike regularity of service and vastly improved delivery throughout the central area. Benefits would flow to all motorists through a reduction in the number of buses and automobiles on the surface streets.

Increases in land values and construction of new housing and commercial buildings would add substantially to the development of the entire region. Experience elsewhere indicates that increases in tax values in the area, directly involved, attributable solely to construction of the recommended rail rapid transit, might well be sufficient to repay the entire cost of the project in a period of 15 to 20 years.

Rail rapid transit is competitive to the private automobile because it provides faster, safer, less expensive, more dependable and almost as convenient service, especially during peak periods of travel to and from the downtown area. The comparatively small central business district contains a concentration of daytime population and activities which requires maximum access facilities during peak periods. Most of the persons who work in the downtown area do not require an automobile during the day. It is more economical to provide attractive rapid transit facilities to serve this major business and commercial center than to provide the additional highway and parking facilities otherwise required. While it is difficult to estimate the cost of such additional facilities, preliminary estimates indicate the added cost would be substantially greater than the cost of the recommended rail rapid transit system.

A consideration of the many anticipated direct and indirect benefits to the various groups and to the community as a whole, leads to the conclusion that there is full economic justification for this important project.

Water Transportation

It is also recommended that water transportation services be continued. When the ferries have reached their useful life, it may be found desirable to replace them with smaller crafts having a seating capacity of some 150 passengers and capable of faster speeds.

Management and Control of Regional Transit

We recommend that the Auckland Regional Authority be responsible for the management and control of all operations of the recommended regional transit system. The Authority should be empowered to determine routes, service standards, type of

equipment and the fare schedules for all transit services. It should, moreover, have the right to contract for any of the services, bus, rail or water, with other public agencies or with private operators. It is logical that the New Zealand Government Railways operate the proposed rapid transit system under contract, and that certain private bus operations be continued, also under contract with the Auckland Regional Authority.

May we express our deep appreciation for the effective cooperation extended to us by the capable staffs of your Authority, in particular the Planning Division and the Passenger Transport Division. We also wish to acknowledge the assistance of the officers and staffs of the New Zealand Government Railways, the numerous bus companies in the region, and the other public and private agencies. With the assistance and support of these agencies, we have obtained all of the data required to reach the conclusions as set forth in detail in our report.

It has been a great pleasure to participate in the solution of this important and interesting problem and we sincerely hope that constructive action may follow expeditiously.

Respectfully submitted.

DE LEUW, CATHER & COMPANY

Charles E. DeLeuw
President