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the methodologies used in developing, costing and assessing corridor alternatives and discuss the theories and methods underlying the evaluation parameters.

2 - CORRIDOR ALTERNATIVES

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2.1 - Corridor Issues

The Juneau Access Corridor, which currently consists of Marine Highway links between Juneau, Haines and Skagway, represents a problem within the regional transportation context on a number of fronts.

- The Lynn Canal is one of the most intensively used links in the Marine Highway system. In 1984 it carried more passengers than any other link and was second only to the combined Seattle/Prince Rupert to Ketchikan links in terms of total vehicles carried.

- Aggravating this problem, the Lynn traffic tends to be more concentrated into the peak summer months than traffic in other corridors.

- Over 35% of the traffic disembarking in the Lynn boards at either Seattle or Prince Rupert. This makes it difficult for passengers embarking within the Southeast Region to book space on the vessels.

- The Lynn ferry service represents the only surface link between Juneau, the State capital, and the rest of Alaska. For political reasons a faster, more frequent connection would be desirable.

In developing the Juneau Access Corridor alternatives, the key concerns therefore were how to provide additional capacity up the Lynn Canal and/or how to improve service (particularly travel time) between Juneau and the northern terminus.

With these factors in mind, eleven options were developed for the provision of transportation service in the Juneau Access Corridor, with nine involving service via the Lynn Canal and two involving service via the Taku River.

These are described, in terms of physical characteristics and traffic impacts, in the following sections. Figure 2 provides a map of the region showing the key points referred to in the description of alternatives.

2.2 - Base Case - Lynn Option 1

2.2.1 - Description

Option 1 involves continuation of the existing ferry service up the Lynn and serves as a base case against which other options can be evaluated. Under this option, peak season service would be provided twice weekly by the Taku, Malaspina and Matanuska, and once a week by the Columbia and the LeConte, giving a weekly total of eight trips.

The annual cost to the Marine Highway of serving the Lynn in this manner was estimated at $7.0 million for vessel operations and $0.4 million for port operations.

Capital costs associated with the existing fleet would add another $3.1 million to this cost. (These figures are based on an average Lynn transit time of 18 hours, multiplied by total hourly costs and total annual Lynn trips for each vessel.)

2.2.2 - Traffic

Under the base case scenario, tourist and resident traffic up the Lynn were assumed to grow at the rates presumed in the travel demand forecasts; viz 4.5% (to 1990) and 2.5% (1991-2005) for tourist traffic and 2.8% (to 1990) and 1% (1991-2005) for residents. Average peak daily demand within the corridor (total embarkations plus total through traffic) was projected at 965 passengers and 215 vehicles in 1990, increasing to 1340 passengers and 300 vehicles by 2005. Of these, approximately 15% were internal Haines/Skagway trips while the balance transitted the Juneau/Haines section of the corridor.

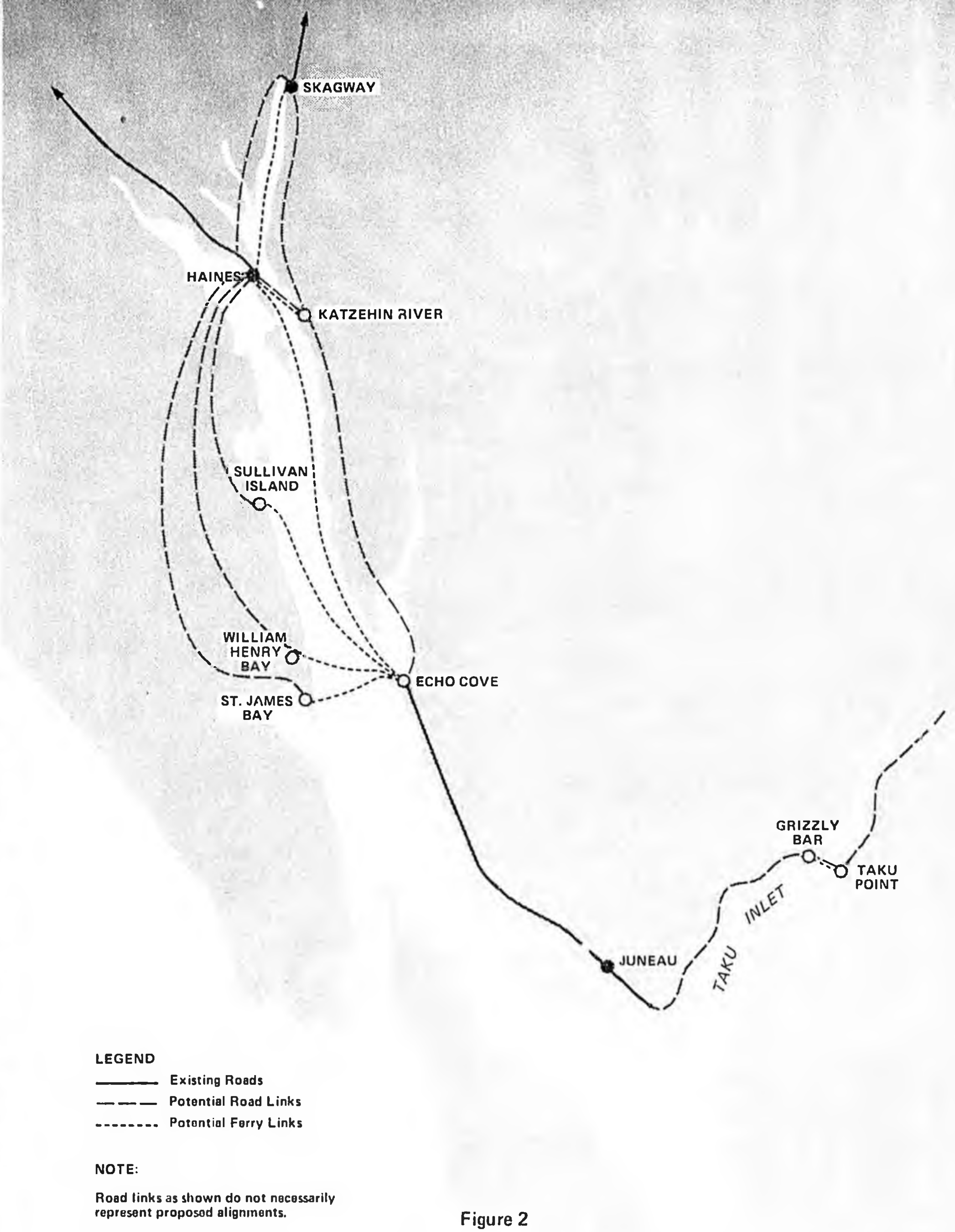

Figure 2

JUNEAU ACCESS – CORRIDOR ALTERNATIVES

Since the 2005 figures for vehicle demand, when adjusted for links and direction, would exceed the capacity of the existing ferry system, consideration had to be given to assigning the cost of a new vessel to this option when demand reaches capacity (approximately 1998). It was noted, however, that the Lynn Corridor was not the only capacity constraint in the system. In fact, demand would exceed capacity out of Seattle in the early 1990s, thus prohibiting many Lynn-bound users from entering the system. Without new capacity out of Seattle, Lynn capacity problems would not arise since demand would not materialize. With new capacity out of Seattle, Lynn problems would also be eliminated since additional vessels would be in service.

This interaction raised problems with regard to the proportion and timing of new capacity costs which should be attributed to the Lynn Canal. Since this issue was to be dealt with in the system studies, it was decided to maintain the isolated 'corridor' perspective of this analysis by adding a vessel to the Lynn system in 1999 when additional Lynn capacity was needed, and assigning its cost to the Lynn in the same proportion as that of other vessels serving the corridor.

2.3 - All-Road Options - Lynn 2 and 3

2.3.1 - Description

The second and third Lynn Corridor alternatives involved linking the communities of Juneau, Haines and Skagway by road and terminating all marine operations north of Juneau.

Lynn 2, the more costly alternative, involved extending the existing road from Echo Cove up the east side of the Lynn to Skagway and building a bridge across the Chilkoot Inlet at the mouth of the Katzehin River to link Haines to the new road. Total capital cost of this option, which involved 76 miles of new road, was estimated at $440 million of which $290 million was for road construction and the remaining $150 million for the bridge. Annual operating and maintenance costs for road upkeep were estimated at $2.07 million. Offsetting these were savings associated with closing the ferry terminals at Haines and Skagway--approximately $0.4 million per year.

Lynn 3 also involved building a road up the east side of the canal to Skagway. However, instead of a bridge crossing at Haines, a road would be built down the west side of the canal between Haines and Skagway. The total capital cost of this option, which required 109 miles of road construction, was estimated at $365 million, while road operating and maintenance costs were estimated at $2.52 million per year.

2.3.2 - Traffic

Projected Lynn traffic demand under the 'all road' options was expected to differ significantly from the 'base case' marine highway alternative. Passengers to and from points south of Juneau who were traveling with vehicles were assumed to switch to the road and continue their trip up the Lynn by car. Lynn foot passengers originating at or destined for points south of Juneau, however, were assumed, in large measure, to forego the trip up the Lynn rather than make arrangements to bring or rent a vehicle. Thus only 25% of Lynn foot passengers to and from points south of Juneau were presumed to shift to the road.

Travelers originating at or destined for Juneau were assumed more likely to have access to a vehicle and to make the trip up the Lynn even in the absence of ferry service. All Juneau O/D passengers were therefore forecast to switch to the road, and vehicle numbers were adjusted accordingly.

In addition to carrying traffic which would otherwise move on the Marine Highway, the direct road connections between Juneau, Haines and Skagway were also assumed likely to stimulate additional trips within the Lynn Corridor as a result of the lower cost and greater flexibility of road travel. These trips would largely originate among the residents of the area and would likely be related primarily to recreation/shopping/visiting activities.

Consideration was given to the possibility that some traffic might also be diverted from air but, in view of the frequency and speed of air service within the Lynn and the high proportion of business travelers on this mode, it was decided that such diversions would likely be small in number. The possibility of additional road traffic related to future resource development in the corridor was also reviewed and several potential developments were noted. However, since there are no committed plans for other development along the proposed road corridors beyond existing logging activities, this class of potential traffic, while recognized as a possible addition to demand, was excluded from the quantitative analysis.

Estimating the road-induced recreation type trips involved considerable subjective judgment. There were few data sources available which would assist in predicting the behavior of the local residents if a road were developed. Within Southeast Alaska there are no road links comparable to the proposed Lynn system either in terms of distances involved or the size and amenities of the communities at either end. Some travel propensity data were available for road developments in other parts of the United States and Canada but none represented a reasonable proxy for the Lynn Corridor.

In consequence, the travel propensity data on the two roads most comparable to the Lynn roads were reviewed (the road from Juneau to Echo Cove and the road from Petersburg to Blind Slough) and were adjusted to reflect the longer distances involved in the Juneau/Haines/Skagway trip and the high level of attractions within the Juneau community. It was judged, in light of these factors, that an average daily traffic level of .0075 vehicle trips per capita was appropriate, yielding a projected induced traffic volume of 94 000 vehicle movements in 1991 (the earliest possible time when the road could be operational) and 108 000 movements in 2005. Because of the heavy recreational focus of this traffic it was assumed that 50% of these movements would take place in the peak summer period with the balance divided equally between the shoulder and low seasons.

Total projected traffic on the Lynn roads, including the carryover from points south of Juneau, the existing Juneau/Haines/Skagway traffic, and the induced traffic would total 155 500 vehicle movements in 1991 and 189 100 vehicle movements in 2005 of which, on average, 52% would occur during the peak season. Peak average daily traffic would therefore be approximately 900 vehicle movements per day in 1991 and 1100 vehicle movements in 2005.

2.4 - West-Side Road Options - Lynn 4, 5 and 6

2.4.1 - Description

Lynn options 4, 5 and 6 assessed the potential for building roads up the west side of the Lynn Canal and linking these roads to the east side of the canal and Juneau via a shuttle ferry out of Echo Cove. Three variations of this concept were analyzed.

Lynn option 4 involved operating the shuttle ferry from Echo Cove approximately 17 miles across the canal to St. James Bay, and building a road from St. James Bay through Haines to Skagway--a total of 95 miles. Total construction cost, including ferry terminals at Echo Cove and St. James Bay was estimated at $240 million. Road maintenance and operation was estimated at $1.89 million per year and terminal operations at $0.2 million. Two 60-vehicle shuttle ferries connecting Echo Cove and St. James Bay represented an additional $7 million in capital cost, and added $4.2 million per year to operating expenses.

Lynn option 5 consisted of a shuttle ferry from Echo Cove to William Henry Bay (approximately 14 miles) and a road from William Henry Bay to Haines. Haines and Skagway would be linked by shuttle ferries similar to those operating out of Echo Cove. Total capital cost for the 45 miles of new road and the two new ferry terminals was estimated at $130 million, while road operating and maintenance costs were estimated at $1.14 million per year and terminal operations at $0.4 million. In addition, the four new shuttle ferries (2 on each link) would require an additional capital expenditure of $14 million and annual operating costs of $8.5 million.

Lynn option 6 involved running the shuttle ferry from Echo Cove north to Sullivan Island (approximately 30 miles) and building a connecting road from Sullivan to Haines. As in Option 5, Haines and Skagway would be joined by shuttle ferry. This option involved 21 miles of new road at a total cost (including ferry terminals) of $70 million. Annual road operating and maintenance costs were estimated at $0.9 million while terminal operating costs were estimated at $0.4 million. Four shuttle ferries were assumed at a total cost of $14 million capital and $8.5 million per year operations. However, under this option it is likely that, towards the end of the 1990s, an additional shuttle would be required on the Echo Cove- Sullivan Island link, since the longer voyage time significantly reduces the shuttles' daily ability to carry traffic.

2.4.2 - Traffic

In projecting demand on the three west side road options, the same assumptions were made regarding the diversion of existing ferry traffic as under the 'all-road' options; that is:

- all Lynn passengers with vehicles originating at or destined for points south of Juneau would divert to the road

- 25% of Lynn foot passengers to/from points south of Juneau would divert to the road while 75% would forego the trip

- all internal Lynn passengers (i.e., those traveling between Juneau, Haines and Skagway) would divert to the road/shuttle.

The ability of the road/shuttle options to generate new traffic, however, was judged to be lower than under the all road options. The main deterrent to high volumes of induced traffic was felt to be the potential delay associated with the shuttle ferry. With two ferries operating across the Lynn, the minimum interval between departures would be 1.5 hours on the William Henry Bay option, rising to as much as 2.75 hours on the Sullivan Island route. While this could be tolerable if the road trip could be timed so as to just connect with the ferry, in peak travel periods (e.g., on a summer weekend) when as much as half the daily traffic may want to travel within a span of a few hours, a vehicle may have to wait for two or three ferries in order to be accommodated.

This peaking problem, together with the relatively long ferry trips, was felt to detract from the three road/shuttle options in terms of generating additional traffic within the Lynn Canal. It was therefore assumed that, under these three options, total induced traffic would amount to 23,500 vehicle trips in 1991, and 27,000 trips in 2005, or roughly one-quarter of the volumes induced under the all-road options.

Total projected traffic including carry over from the existing system and new induced travel would amount to 85 000 vehicle movements in 1991 and 108 000 movements in 2005, of which slightly over 50% would occur during the peak season. Average daily traffic in the peak would therefore be 490 vehicles per day in 1991 rising to 625 by 2005.

2.5 - East-Side Road/Shuttle Options - Lynn 7 and 8

2.5.1 - Description

Since the operational attractiveness of the all-road options (Lynn 2 and 3) was offset in part by the high cost of linking Haines to the road system (either through a bridge at Chilk. t Inlet or a road from Haines to Skagway), it was decided to examine the possibility of building a road up the east side of the canal and connecting it to Haines via a shuttle ferry. A shuttle to Haines was considered to be potentially more attractive than an Echo Cove crossing first because of the shorter crossing time and secondly because the greater distance from Juneau might dissipate some of the peaking problems before the ferry crossing was reached.

Two variations o, this concept were examined. In the first, Lynn 7, a road would be built to the Katzehin River with a shuttle ferry connection to Haines. Haines and Skagway would be linked by another ferry shuttle. Total capital cost for 52 miles of new road and a terminal at Katzehin River was estimated at $210 million while road operating and maintenance costs were estimated at $1.56 million per year and terminal operating costs at $0.4 million. In addition, four shuttle ferries would be required at a total capital cost of $14 million plus $8.5 million per year for operations.

Lynn option 8 also involved a road to Katzehin River and a shuttle to Haines but under this option the road was continued up the east side of the canal from Katzehin to Skagway. Total road capital cost (including a Katzehin River shuttel ferry terminal) was estimated at $270 million while road maintenance and operations would require $1.94 million per year and terminal operations would require $0.2 million annually. Two shuttle ferries would also be required but it was felt that, with the road running direct to Skagway, the traffic demand on the shuttle would be lower than under other cross-canal options and smaller vessels could be used. Total ferry capital cost was therefore estimated at $4.0 million while total annual operating costs would be $3.0 million for the two vessels.

2.5.2 - Traffic

Total Lynn traffic under the east-side road shuttle options was predicted to reach the same levels as under the all-road alternatives (Lynn 2 and 3); that is, the standard share of carry over from existing ferry traffic and a high level of induced traffic in the corridor. It was felt that the induced traffic would be less deterred than in the west-side road shuttle options due to the short and frequent shuttle connection to Haines and to the reduced peaking problems associated with the greater distance from Juneau and the potential for intervening stopovers.

The distribution of induced traffic was assumed to differ somewhat from the all-road options. Under Lynn 7, where Haines and Skagway are connected by shuttle ferry, most of the induced traffic was presumed to travel between Juneau and Haines. Under Lynn 8, where the east road continued to Skagway, induced traffic was assumed to be spread more evenly between the two northern terminals.

2.6 - High-Speed Shuttle - Lynn Option 9

2.6.1 - Description

The final alternative considered for Lynn Canal service was the use of high-speed ferries to link Juneau, Haines and Skagway out of a terminal at Echo Cove. Echo Cove was chosen as the southern terminus both to avoid conflicts in operations at Auke Bay and because the lesser marine distances allowed higher utilization of the vessels.

Because of the large traffic volumes involved, it was judged that the most appropriate type of craft would be a large (40 vehicle, 180 passenger) high speed (46 mi/h) vessel of the surface-effect-ship class. The Bell-Halter 350B SES was selected as representative of this type of ship.

These ferries were conservatively assumed to make three round trips each during a 16 to 18-hour day in the peak season and two round trips per day over a 10 to 12-hour day in the off peak. Two ferries would be required during the early years, with a third being added in the mid-1990s as traffic volumes increase. Each ferry would cost approximately $12 million to purchase and approximately $4.2 million per year to operate. The capital cost of upgrading the road to Echo Cove and constructing a terminal there was estimated at $7 million. Road maintenance and operations would add approximately $0.6 million per year to the cost, while ferry terminal operations were estimated at $0.6 million annually.

2.6.2 - Traffic

Total projected traffic under the high-speed shuttle option was assumed to be the same as under the west-side road shuttle options (Lynn 4, 5 and 6); that is, the standard level of carry over from existing traffic and the lower level of induced traffic. This assumption may be somewhat optimistic since, with a 3-hour arrival interval between vessels during the early years, this option is particularly sensitive to peaking problems. On the other hand, the high-speed shuttle option is also more adaptable to a reservations system than a cross-canal shuttle would be, and some peak-spreading should therefore be possible.

2.7 - Taku Corridor Options - Taku 1 and 2

2.7.1 - Description

In additon to the Lynn Canal routes, two other options were considered under the heading of "Juneau Access". These involved construction of road links up the Taku Inlet and Taku River valley to connect Juneau with the existing Yukon/British Columbia road out of Atlin, B.C.

The first option (Taku 1) involved extending the existing Thane Road up the west bank of Taku Inlet to Grizzly Bar, constructing a bridge to the east bank (Taku Point) and continuing along the east bank to the Canadian border. A total of 50.4 miles of new road would be required at a capital cost of $202.5 million. Road operating and maintenance cost would add a further $1.2 million per year.

The second option (Taku 2) followed the same route as the above. However, instead of building a bridge across the inlet at Grizzly Bar, two shuttle ferry terminals would be built and a small ferry used to cross to Taku Point. This option would involve 49.9 miles of new road at a capital cost (including terminals) of $143 million. Annual road maintenance and operations were estimated at $1.1 million. Capital cost for a small shuttle ferry would be in the order of $2 million while annual ferry operating costs would be in the order of $1.5 million.

While the Taku River options would provide competitive connections for travellers between Juneau and points in Yukon and Central Alaska, they would represent a poor alternative to the Marine Highway for travellers between Juneau and Haines/Skagway. Overland distances from Juneau to Skagway under these options would be approximately 300 miles (versus 93 by water) while overland distances to Haines would be almost 500 miles (versus 78 by water). Accordingly, in order to serve Haines and Skagway and provide them with adequate links to the rest of the Southeast Region, it would probably be necessary to continue Marine Highway operations in the Lynn Canal either at or near existing levels. Thus, the Taku Corridor options, unlike the Lynn alternatives, would not provide any offsetting marine cost savings in the regional systems context.

It should also be noted that the road cost figures quoted earlier in this section cover only the portion from Juneau to the Canadian border. An additional 85 miles of new road would be required in British Columbia in order to connect the Taku Road with the road out of Atlin. In discussions with the B.C. Government, it was indicated that further road connections into the Atlin area were not regarded as a priority, particularly in light of government spending constraints and the more urgent needs for development funding elsewhere in the Province. Accordingly, there is some question with regard to the feasibility of a Taku connection, at least until such time as the B.C. Government indicates a positive interest in developing such a link.

2.7.2 - Traffic

Potential traffic on the Taku Corridor was difficult to estimate due to the lack of data with regard to the proportion of existing Lynn Corridor traffic which originated at or was destined for points north of Haines and Skagway and which hence might be induced to transfer to the road. Even if this were known, there is some question as to the portion which would divert to the Taku Road, particularly if they also embarked or disembarked at a point south of Juneau and hence were obliged to make part of the trip by ferry.

The most probable market for the Taku River road would likely consist of current vehicle traffic between Juneau and points north of Haines and Skagway. Some portion of this traffic might be captured by the road link. In addition, some induced traffic out of Juneau might be expected to use the new road. The volumes of both categories of traffic, however, are likely to be lower than those attracted to a new Lynn Canal route for two reasons. First, a Taku Road would be obliged to compete with ongoing Lynn ferry service for traffic out of Juneau and secondly, it would not serve as an inducement factor for traffic out of Haines and Skagway but only for traffic out of Juneau.

2.8 - Summary of Costs

Table 2.1 presents a summary of the capital and operating cost associated with each of the Juneau Access options. For purposes of the summary, capital costs are presented both in total and on an annualized basis with the latter being calculated using a 5% - 30 year capital recovery factor for roads and terminals and a 5% - 15 year factor for vessels.

TABLE 2.1

JUNEAU ACCESS OPTIONS - SUMMARY OF COSTS

		TOTAL CAPITAL				ANNUALIZED COSTS				
		Roads		Vessels	Terminals	Road/Terminal Capital	Road/Terminal Operatic	Vessel Capital	Vessel Operations	Total
		(mi)	($millions)	($millions)	($millions)	($millions)	($millions	($millions)	($millions)	($millions)
L1	Existing System	-	-	32.4[1]	-	-	0.4	3.1	7.4	10.9
L2	East Road/Bridge	76	440.0	-	-	28.7	2.1	-	-	30.8
L3	East Road/Road	109	365.0	-	-	23.8	2.5	-	-	26.3
L4	West-St. James Bay	95	231.5	7.0	8.5	15.7	2.1	0.7	4.2	22.7
L5	West-William Henry Bay	45	119.0	14.0	11.0	8.5	1.5	1.4	8.5	19.9
L6	West-Sullivan	21	61.5	14.0/17.5	8.5	4.6	1.3	1.4/1.7	8.5/10.7	15.8/18.3
L7	East to Katzehin	52	204.0	14.0	6.0	13.7	2.0	1.4	8.5	25.6
L8	East Road/Shuttle	70	264.0	4.0	6.0	17.6	2.1	0.4	3.0	23.1
L9	High Speed Ferry	-	2.0	24.0/36.0	5.0	0.5	1.2	2.3/3.5	8.4/12.6	12.4/17.8
T1	Taku Road/Bridge[2]	56	202.5	32.4[1]	-	13.2	1.6	3.1	7.4	25.3
T2	Taku Road/Shuttle[2]	55	141.0	34.4[1]	2.0	9.3	1.5	3.3	8.9	23.0

[1] $32.4 million represents Lynn Canal share of total capital value of existing mainline fleet (based on replacement cost).
[2] Presumes continued ferry service up Lynn Canal.

3 - EVALUATION OF ALTERNATIVES

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In order to assess the preferred options for service in the Juneau Access Corridor, a detailed assessment was carried out with regard to the financial and user impact implications of the various alternatives. The two Taku Corridor options were not included in this assessment primarily because they were very close, in cost terms, to the Lynn alternatives yet would serve lower traffic levels and would require extensive investment on the part of the British Columbia Government in order to be implemented.

3.1 - Financial Evaluations

The nine Lynn corridor alternatives were each evaluated from the viewpoint of financial impacts on the Marine Highway, on the State and on the users. Details of the methodologies and the basis for cost and revenue figures used in this analysis are outlined in Appendix A.

The findings of the financial analysis are summarized in Table 3.1. The table outlines the net present value of the 20-year total of costs and revenues associated with each option. Costs are categorized for the Alaska Marine Highway System, the State government (including the AMHS deficit) and the users. (Care should be taken in interpreting the 'costs to user' figures, however, since they relate to different levels of traffic and different types of demand. A more detailed analysis of 'cost to user', which adjusts for changing traffic levels and for the different characteristics of traffic served, is given in Section 3.2 which follows.)

As Table 3.1 indicates, from the State's viewpoint the least costly option for serving the Lynn Corridor is Lynn 1, the continuation of existing ferry service. The only ongoing cost which the State must bear is the Marine Highway deficit associated with the service. Furthermore, since the deficit shown includes an allowance for capital cost of the vessels, any federal contributions towards capital replacement would serve to further reduce the State's costs.

TABLE 3.1

LYNN CORRIDOR OPTIONS -
FINANCIAL ANALYSIS
($ millions - Net Present Value of
20 year Total Discounted at 5%)

Alternative	Existing System L1	East Road-Bridge L2	East Road-Road L3	West-St. James Bay L4	West-William Henry Bay L5	West-Sullivan L6	East Road to Katzehin L7	East Road-Shuttle L8	High-Speed Ferry L9
Costs to AMHS									
Vessel Capital*	40.8	13.5	13.5	19.0	23.1	26.6	24.5	16.6	36.5
Vessel Operating	90.9	31.9	31.9	64.9	100.9	123.4	99.6	54.9	120.5
Port Capital*	-	-	-	5.1	7.3	5.6	3.6	3.6	3.4
Port Operating	5.2	1.9	1.9	3.4	5.0	5.0	5.0	3.4	6.6
Less Vessel Fares	(68.2)	(20.3)	(20.3)	(39.8)	(57.4)	(70.1)	(57.8)	(33.8)	(69.6)
Net Cost	68.7	27.0	27.0	52.6	78.9	90.5	74.9	44.7	97.4
Costs to State									
AMH Deficit	68.7	27.0	27.0	52.6	78.9	90.5	74.9	44.7	97.4
Road Capital*	-	294.4	244.3	154.9	83.6	43.2	136.5	176.7	1.5
Road Operating	-	16.8	20.5	15.3	10.2	8.1	12.7	15.8	5.8
Less Fuel Tax Revenue	-	(0.5)	(0.6)	(0.3)	(0.3)	(0.2)	(0.4)	(0.5)	(0.1)
Net Cost	68.7	337.7	291.2	222.5	172.4	141.6	223.7	236.7	104.6
Costs to User									
Vehicle Operating	-	19.8	25.7	11.9	10.1	7.5	17.8	19.5	4.9
Vessel Fare	68.2	20.3	20.3	39.8	57.4	70.1	57.8	33.8	69.6
Total	68.2	40.1	46.0	51.7	67.5	77.6	75.6	53.3	74.5
Total Costs (State + User)	136.9	377.8	337.2	274.2	239.9	219.2	299.3	290.0	179.1
Effective Passenger Miles (millions)	282.4	547.5	547.5	316.7	319.0	319.0	528.8	547.5	321.4
Cost per Effective Passenger Mile ($)	0.48	0.69	0.62	0.87	0.75	0.69	0.57	0.53	0.56

*Adjusted to reflect residual value at end of planning period.

As noted earlier, however, the continuation of existing service is expected to handle only the growth in existing corridor traffic, generating a total of 282.4 million effective passenger-miles of travel over the 20-year planning period. (Effective passenger-miles are calculated by multiplying the number of passengers on each link by the travel miles over the most direct route rather than over the actual route between two points. This eliminates the distortions which might arise in cases where a more circuitous route would appear to generate a greater number of passenger-miles of service.)

Lynn option 9, the high-speed ferry service, represents the next most attractive option from the viewpoint of State finances, followed, at some distance, by Lynn 6 (shuttle to Sullivan Island) and Lynn 5 (shuttle to William Henry Bay). All three provide roughly the same effective passenger-miles of service. The fourth of these 'medium-traffic' options, Lynn 4 (shuttle to St. James Bay), is considerably less attractive financially, chiefly due to the high cost of the road link between Haines and Skagway.

Turning to the four 'high-traffic' east road options, all are more costly than the 'medium-traffic' alternatives. Lynn 7 (road to Katzehin River, shuttle to Haines and Skagway) represents the least costly of these options from the viewpoint of State costs, followed closely by Lynn 8 (road to Skagway, shuttle from Katzehin River to Haines). Lynn options 2 and 3 (the all-road options) are the most costly from the State's perspective.

Table 3.1 also provides figures for the total combined cost (to users and State) and total combined cost per passenger-mile associated with each corridor option. Again from a financial perspective, the existing system appears to be the most attractive option, followed by the east road-shuttle to Haines (L8), the high-speed ferry (L9) and the east road-shuttle to Haines and Skagway (L7) options.

3.2 - Evaluation of Service/Cost Effectiveness

As noted earlier and explained in detail in Appendix A, the figures for cost per passenger mile do not represent a complete basis for comparison of the alternatives. First of all, by treating all passenger-miles on an equivalent basis, they fail to reflect the different types of demand being served, and hence the different values which users assign to the trips involved. Secondly, by considering only the financial aspects of the options, the cost figures do not reflect the different service characteristics of the corridor alternatives in terms of service frequency, flexibility and travel time.

In order to overcome these difficulties, a more comprehensive supplementary basis was developed for evaluating transportation alternatives which attempted to measure the net benefits to users in terms of cost and service and compare these benefits with the additional cost to the State associated with providing the new transportation service. This assessment of service-cost effectiveness for the Lynn Corridor options is described in the following sections.

3.2.1 - User Costs

The first component of user impacts was the potential benefit associated with lower user costs. The costs incurred by users of the Lynn systems were computed, for each option, by dividing the discounted user costs by the effective passenger-miles of service provided. Each option was then compared with the base case (option L1) to determine the user saving per mile of travel.

Savings accruing to 'base' users (i.e., those who would use the system under all options) were calculated by multiplying the saving per passenger-mile by the number of passenger miles of service provided under the base case, Lynn option 1. Savings to incremental users (i.e., those induced to use the system as a result of the improved service and/or cost) were calculated by multiplying the difference between total passenger-miles and 'base' passenger miles by one-half the cost saving associated with the alternative.

The resultant discounted cost savings associated with each alternative (per passenger mile and in total) are shown in Table 3.2. As would be expected, the highest total savings arise under those options which minimize ferry travel, both because of lower per-mile costs and higher traffic volumes.

Table 3.3, however, compares user cost savings with the increase in costs incurred by the State. This alters the perspective somewhat with Lynn option 8 (road to Skagway, shuttle to Haines) clearly offering the highest user savings per dollar of government expenditure, followed respectively by options 3 (road/bridge), 2 (road/road) and 7 (road to Katzehin).

3.2.2 - User Time Benefits

Table 3.3 also indicates that, on a user cost savings basis alone, none of the Lynn options generates benefits equal to the additional costs incurred by government. However, the various corridor options do give rise to other user benefits, the most apparent and readily quantifiable of these being the time savings associated with improved speed and service frequency.

Table 3.4 shows the total estimated travel time over the three Lynn links under each option and the travel time savings relative to the base case (existing service). Travel times include road time (at 40 mph average speed), ferry port and sailing times, and delays associated with the interval between ferry arrivals. Option 9, the high-speed ferry, shows two travel times, one for a 2-vessel service and one for a 3-vessel service with the difference reflecting the higher service frequency in a 3-vessel operation.

Since it is difficult to establish a defensible value of time, particularly for a market as diverse as that using the Lynn Corridor, an 'imputed value' approach was used to assess time benefits associated with the corridor alternatives. Under this approach, the total travel time savings were calculated in terms of hours for each option. Next, the difference between

TABLE 3.2

LYNN CORRIDOR OPTIONS -
COMPARISON OF USER COST SAVINGS

Option	Description	Discounted Cost per Pax-Mile ($)	Savings per Pax-Miles* ($)	Total User Savings ($ million)
L1	Existing System	0.242	-	-
L2	East Road/Bridge	0.073	0.169	70.1
L3	East Road/Road	0.084	0.158	65.6
L4	West-St. James Bay	0.164	0.078	23.4
L5	West-William Henry Bay	0.212	0.030	9.0
L6	West-Sullivan	0.243	(0.001)**	(0.3)**
L7	East to Katzehin	0.143	0.099	40.2
L8	East Road/Shuttle	0.097	0.145	60.2
L9	High Speed Ferry	0.232	0.010	3.0

* As ompared with existing system (option L1).

**Brackets denote negative; i.e., costs rather than savings.

TABLE 3.3

LYNN CORRIDOR OPTIONS - COMPARISON OF USER SAVINGS VERSUS COST TO THE STATE

Option	Description	Total Cost to State ($ millions)	Increase Over Base Case ($ millions)	User Cost Savings ($ millions)	User Saving per Dollar of State Expenditure ($)
L1	Existing System	68.7	-	-	-
L2	East Road/Bridge	337.7	269.0	70.1	.261
L3	East Road/Road	291.2	222.5	65.6	.295
L4	West-St. James Bay	222.5	153.8	23.4	.152
L5	West-William Henry Bay	172.4	103.7	9.0	.087
L6	West-Sullivan	141.6	72.9	(0.3)	-
L7	East to Katzehin	223.7	155.0	40.2	.259
L8	East Road/Shuttle	236.7	168.0	60.2	.358
L9	High Speed Ferry	104.6	35.9	3.0	.084

TABLE 3.4

LYNN CORRIDOR OPTIONS -
TRAVEL TIME AND TIME SAVINGS
(Hours per Trip)

		Juneau/Haines		Juneau/Skagway		Haines/Skagway	
Option	Description	Travel Time	Saving	Travel Time	Saving	Travel Time	Saving
L1	Existing System	11.00	-	12.50	-	7.5	-
L2	East Road/Bridge	2.50	8.50	2.75	9.75	0.6	6.9
L3	East Road/Road	3.75	7.25	2.75	9.75	1.0	6.5
L4	West-St. James Bay	5.10	5.90	6.10	6.40	1.0	6.5
L5	West-William Henry Bay	4.50	6.50	6.75	5.75	2.3	5.2
L6	West-Sullivan	5.90	5.10	8.10	4.40	2.3	5.2
L7	East to Katzehin	3.80	7.20	6.10	6.40	2.3	5.2
L8	East Road/Shuttle	3.80	7.20	2.75	9.75	1.9	5.6
L9-2	High Speed Ferry-2	4.40	6.60	5.30	7.20	2.4	5.1
L9-3	High Speed Ferry-3	3.90	7.10	4.80	7.70	1.9	5.6

government costs and user cost savings was calculated to determine the value which user time savings would have to have in order for combined user cost and time savings to equal government costs. This 'required time value' was then divided by the hours saved in order to determine the required hourly value of time savings. As long as the actual value of time is assumed to exceed this rate, total user benefits will exceed government costs. Thus, the lower the required time value, the more likely it is that benefits will exceed costs.

Table 3.5 shows the results of these calculations. Required time values range from a low of $2.57 per hour under Lynn option 9 (high-speed ferry) to a high of $13.31 per hour under option 4 (St. James Bay). Several of the options require time values which appear reasonable relative to average hourly incomes (1983 Alaska per capita income converts to an equivalent of $8.50 to $10.00 per work hour). It should be noted, however, that many of the expected trips are recreation-related and that time value under these circumstances may be only a small proportion of hourly income.

In terms of comparative ranking, the analysis indicates that the options most likely to yield benefits in excess of costs are Lynn 9 (the high speed ferry) and Lynn 8 (east road to Skagway, shuttle to Haines). Both show imputed time values which are reasonable relative to incomes, although the high-speed shuttle shows a significant advantage in this regard.

3.2.3 - Other Considerations

While the above analysis presents an assessment of the quantifiable impacts associated with each corridor option, there are a number of other non-quantifiable issues which should be considered in selecting among the alternatives. Some of these are highlighted below.

Capacity is an issue which, while it has been taken into account in planning and defining the corridor options, warrants some further comment. The various system options have been costed on the basis of the minimum expenditure required to meet forecast demand. In the case of the road options, this results inevitably in considerable excess capacity since the minimum

TABLE 3.5

LYNN CORRIDOR OPTIONS - TIME SAVINGS AND IMPUTED TIME VALUES

Option	Description	(1) Total User Time Savings (Mh)	(2) Increase in Government Cost ($million)	(3) User Cost Savings ($million)	(4) Required Time Benefits (2)-(3) ($million)	(5) Required Value of Time (4)÷(1) ($ per hour)
L2	East Road/Bridge	20.0	269.0	70.1	198.9	9.95
L3	East Road/Road	18.4	222.5	65.6	156.9	8.53
L4	West-St. James Bay	9.8	153.8	23.4	130.4	13.31
L5	West-William Henry Bay	10.4	103.7	9.0	94.7	9.11
L6	West-Sullivan	8.4	72.9	(0.3)	73.2	8.71
L7	East to Katzehin	15.4	155.0	40.2	114.8	7.45
L8	East Road/Shuttle	18.2	168.0	60.2	107.8	5.92
L9	High Speed Ferry	12.8	35.9	3.0	32.9	2.57

road is capable of carrying much higher traffic levels than those expected. If traffic levels were to exceed projections, however, the road options could accommodate this traffic without significant additional cost to the State. In the shuttle and high-speed ferry options, however, State costs would increase substantially if more capacity were required during the planning period.

A second consideration is flexibility which, in this context, refers to the ability of the transportation option to adapt to different traffic levels. Here the advantage lies with the existing system and the high-speed shuttle options since capacity can be tailored more closely to demand. If traffic growth does not meet expectations, vessels can be laid up, sold or diverted to other routes. In addition, cost savings can be obtained by reducing service in off-peak seasons. The road options represent a fixed link which can not be adapted, to a significant degree, to changes in the locations or level of demand.

Comfort and reliability are a third consideration. On this issue it is difficult to choose among the options. Comfort is a subjective issue and, while some would prefer driving themselves, others would prefer being carried on the ferry. On the other hand, the road options enable the user to stop en route and take advantage of intervening recreational opportunities--a choice not available to ferry users. All options are subject to delays due to inclement weather although the marine modes may have a slight advantage in winter.

Environmental impact should also be a consideration in assessing the various options. The road options are likely to create the most severe impacts in this regard since they infringe on the semi-wilderness nature of the Lynn's banks. However, intensive ferry operations out of Echo Cove (either high-speed or shuttle) will also impact on the existing environment there.

A final consideration which might be included in assessing the alternatives is the socioeconomic impact associated with construction and operation of the different options. This includes direct impacts such as employment, labor income and tax revenues, and also indirect impacts associated with purchases of goods and services, income multiplier effects, and induced activity, if any, arising from the new transportation service. While a complete assessment of these impacts would require a separate and detailed analysis, it would be expected that higher levels of government expenditure on local labor and supplies would generate higher positive impacts. In consequence the road options, with their higher costs, are likely to rank higher than the ferry options in terms of socioeconomic benefits. On the other hand, there may be ways in which the government could spend the monies saved in the lower cost options which would generate higher socioeconomic returns than the road alternatives.

4 - SUMMARY AND CONCLUSIONS

4 - SUMMARY AND CONCLUSIONS

There are several options available for providing and improving transportation service in the Juneau Access Corridor. Of the alternatives examined, continuation of the existing service is the least costly from a government cost perspective.

The other corridor options, however, while more costly in financial terms, offer significant benefits to users in terms of travel cost and/or travel time savings.

The most attractive options appear to be option 9 (a high-speed ferry operating between Echo Cove, Haines and Skagway) and option 8 (a road up the east side of the Lynn to Skagway with a shuttle ferry operating between Haines and the Katzehin River). Both of these options could potentially generate benefits equal to their costs and both are superior to the other alternatives in this regard.

A closer examination of the two preferred options indicates some significant differences in the source and allocation of impacts. For example, the road-shuttle option shows only a small advantage over the high-speed ferry in travel time between Juneau and Haines and between Haines and Skagway, but a substantial saving on trips between Juneau and Skagway. The road-shuttle option also serves a greater number of passengers and generates higher cost savings to users both on a per-mile basis and in total. However, the road-shuttle option involves a significantly higher government outlay (an increase of $168 million over the base case versus an increase of only $38 million for the high-speed shuttle). As a result, it appears less attractive overall than the high-speed shuttle alternative.

The differences in the level and flow of benefits associated with these two options, together with the overall benefit potential which each showed in the analysis suggested that the limited corridor analysis was not a sufficient basis on which to choose between these alternatives. Accordingly it was recommended that options 8 and 9 should both be retained for more detailed evaluation in the context of the total Southeast system.

APPENDIX A

EVALUATION METHODOLOGY

APPENDIX A

EVALUATION METHODOLOGY

A1 - GENERAL

The general method used to assess corridor alternatives consisted of five main steps

- o Forecast expected travel demand in the corridor over the next 20 years;
- o Define a range of possible methods of meeting this demand, and the equipment and/or infrastructure necessary to serve the traffic under each method;
- o Determine the associated capital and operating costs and revenues;
- o Calculate the financial impacts of each alternative from the viewpoint of the operator, the government and the user;
- o Calculate the service/cost effectiveness of each alternative and select the preferred option(s).

Each of these steps is described in greater detail in the following sections.

A2 - TRAVEL DEMAND

The forecasting of travel demand both within the Southeast Region as a whole and within particular corridors of the Region involved first analyzing the existing patterns of traffic for both surface (marine, road) and air modes and identifying the factors which would cause this traffic to grow and change in the future.

Since the data regarding existing travel patterns was limited, this analysis was kept at a relatively simple level. Three factors were identified as the key issues impacting future travel demand. These were: regional population growth, growth in tourism, and changes in transportation service. The first two factors were deemed to cause general growth within the existing patterns of travel demand (or growth in 'base traffic') while the third was deemed to either increase or decrease the 'base traffic' demand within particular corridors.

To forecast "base traffic" demand (i.e., demand in the absence of service changes) existing travel was separated, on the basis of survey data, into tourist and nontourist traffic. This separation was done on a seasonal basis (in order to reflect the higher summer peaking in tourist travel) for both marine highway and air services. Tourist and nontourist components of existing traffic were then forecast, the former on the basis of expected growth in tourism travel to Alaska and the latter on the basis of expected population growth in the Southeast Region.

The growth rates assumed for tourism travel and for regional population were based on historic growth rates, tempered by concerns that with declining revenues and potential declines in government spending, these growth rates could not be maintained over the long-term. Consequently, tourism was assumed to grow at 4.5% annually to 1990 and at 2.5% annually thereafter. Regional population was assumed to grow at 2.8% per year to 1990, tapering off to 1% thereafter.

Over and above these population and tourism based growth rates, there was a special additional growth applied to air traffic, amounting to 1.4% per year. This additional growth reflected the long-term increase in the propensity of travelers to use the air mode--an increase which has generated growth in air traffic above and beyond that which can be explained by population and tourism growth alone.

The origin-destination patterns of this future 'base traffic' demand were assumed to follow the existing pattern of movements to, from and within the region. Therefore a growth in marine highway tourist demand, for example, would cause a corresponding percentage growth in traffic on all marine highway tourist-serving routes.

Once this 'base traffic' load had been calculated for the system and for the various corridors, adjustments were made to corridor demand to reflect the different service levels associated with corridor alternatives. These adjustments included diversion of traffic to a different port, loss of traffic, transfer between modes, and increases in traffic due to improved access depending on the service scenario. The particular adjustments associated with each corridor option are outlined in detail as part of the description of alternatives (Section A3).

A3 - DEFINITION AND DESCRIPTION OF CORRIDOR ALTERNATIVES

Having established the potential traffic demand within a corridor, the existing surface transportation service was reviewed and alternative road and marine options proposed which would increase capacity and or reduce operations costs. These alternative options were drawn from community suggestions, proposals put forward by the Department of Transportation, and new proposals put forward by the consultant.

An effort was made to develop a wide variety of corridor options in order to provide a range of costs and impacts for comparison purposes. Both capital (new roads, new ferries) and operational (new schedules) options were included when appropriate. In all cases the alternatives included a base-case 'no change' option against which new options could be assessed.

Once the corridor options had been defined, a detailed operating and investment schedule was laid out for each alternative specifying the traffic to be served, the way in which it would be served, the timing of new road and new vessel requirements, and the operating schedules and procedures within the corridor. Traffic and operating procedures were both specified on a seasonal basis.

A4 - DEVELOPMENT OF COST DATA

Capital Costs - Roads

Capital costs for new road links were based on the Department of Transportation's per-mile costs of construction over various types of terrain. Routes were specified through detailed analysis of relief maps, through discussion with DOT/PF engineers and, where possible, through inspection of the area. Road links were then broken down into segments based on the severity of terrain and degree of construction difficulty, and the appropriate per-mile costs were applied.

Special structures such as bridges, tunnels, snowsheds, etc, were costed independently and included in total cost where required.

Capital Costs - Marine

Capital costs for marine facilities and equipment included costs of new terminal facilities, capital costs associated with the existing ships, and capital costs associated with new shuttle ferries, mainline ferries and high-speed craft. In the first two cases capital costs were based on Marine Highway data regarding terminal construction costs and expected replacement value of the existing fleet. In the case of new vessels, typical current construction costs for the type of vessel required were developed through discussions with shipyards, brokers, and manufacturers.

Operating Costs - Road

Operating costs for the road links included regular maintenance and winter snow removal. They were based on the actual costs per mile incurred by the DOT/PF.

Operating Costs - Marine

The operating costs for existing vessels and terminal facilities were based on the actual experience of the Marine Highway. Vessel costs were segregated into annual costs (major maintenance, overheads) seasonal costs (crew, stores and supplies) and daily costs (primarily fuel).

Operating costs for new vessels were based on Marine Highway experience in the case of mainline ferries, and on discussions with builders and other operators in the case of shuttle ferries and high-speed craft.

User Costs

Costs to users fall into three main categories: fares on existing ferries, fares on new ferries or new ferry routes, and vehicle operating costs on road links.

Fares on the existing ferry system were based on the current summer and winter rates for the Marine Highway. For new routes on existing vessels, fares were assumed to be the same per-mile as on current routes.

For new types of equipment (shuttle ferries, high-speed craft) it was initially assumed that fares would be set on the same basis as current ferry charges; that is, that fares would have to cover at least half of the total operating costs (excluding capital) of the new vessels. However, later analysis indicated that new vessels serving as a substitute for existing vessels generated sufficient savings elsewhere in the system that their fares could be maintained at existing fare levels and still lead to an overall improvement in the system operating cost recovery.

Accordingly current fare levels were used for traffic on these new vessels.

Vehicle operating costs on road links were based on the variable portion of average per-mile operating costs for mid-size automobiles. This was felt to be a fair representation of the mix of vehicles likely to be using the road. In actual fact, owners of vans and campers would pay more while owners of small cars would pay less.

In cases where corridor options required vehicles to divert from one port to another, vehicle operating costs were increased to include overnight accommodation if the diversion involved more than 12 hours driving time.

A5 - FINANCIAL ANALYSIS

The traffic, operating and cost data bases described above were then drawn together into a year-by-year financial analysis of each corridor alternative. Capital costs for roads, vessels and terminal facilities were assigned to the years in which they would be incurred. Road operating costs were based on miles of road in service, while marine operating costs were derived from the proposed Marine Highway schedules under each option.

User costs for each year were determined by first calculating the number of vehicles using the road links (either as a result of being diverted to another port and/or as a result of a new road link being available), and multiplying this number by the cost per vehicle over the relevant distance. A revised ferry demand matrix was then calculated (taking into account diverted and/or lost ferry traffic) and multiplied by the fares matrix to determine total fares paid to the Marine Highway.

The annual financial flows were then discounted at an interest rate of 5% to determine the net present value of capital, operating and user costs under each scenario.

A6 - EVALUATION OF SERVICE/COST EFFECTIVENESS

The financial evaluations provided an indication of the total costs to operators and users associated with the various corridor alternatives. They did not, however, reflect the differences among alternatives in terms of ability to serve demand and the quality of service provided.

In order to account for these differences, each corridor alternative was compared with the corridor 'base case' (which represented continuation of existing service) with respect to the number of passengers and vehicles served, the cost per user served, and the average travel time (including delays related to frequency of service). Appropriate values were assigned to the 'service' differences between the alternatives and the base case to represent the incremental benefit (cost) to the user. These user benefits (or costs) were then compared with the incremental cost (or cost saving) to the government to form a basis for evaluating service/cost effectiveness.

The approach to assigning values to 'service' differences varied somewhat between corridors due to the different focuses of the corridor alternatives. In the Lynn corridor, for example, the focus was on improving service through new modes and on generating traffic over and above existing demand. Measures were therefore required for the value of time and cost savings to existing and to new traffic. In the Ketchikan corridor, the focus was on the existing ferry system and on trying to adjust schedules so as to meet a higher portion of current demand in a cost-effective manner, and measures were primarily required for the costs of not meeting traffic needs or of meeting needs by diverting traffic to other ports.

In general, the following principles were used in assigning values to service differences.

- Cost savings to existing traffic - include the full dollar value of saving.

- Cost savings to new traffic - include half of the difference between the fare (or travel cost) under the new option and the fare applicable under the base case (this presumes that traffic attracted as a result of less expensive service assigns a lower value to the trip).

- Cost of failing to meeting demand - include the average surplus which the user would have enjoyed if space had been available. Surplus was calculated by postulating the shape of the demand curve for service and calculating the average difference between the maximum which users would have been willing to pay for the trip and the fares which would normally have been charged. (This is discussed in greater detail in Appendix B.)

- Costs to diverted traffic - assume that users diverted to another port attribute a cost to the diversion equivalent to any out-of-pocket savings associated with using the new port. Thus users moved from one port to another were assumed to incur neither benefits nor costs. This assumption was necessary because the total trip cost from Seattle was lower via road to Prince Rupert than via direct ferry, yet demand continues to be strong out of Seattle. There is, therefore, some nonmonetary advantage to the direct ferry trip which offsets cost savings associated with diverting to Prince Rupert. This nonmonetary advantage could best be accounted for by assuming that diverted passengers assigned equal cost to trips out of either port.

- Time savings to existing traffic - include the full number of hours saved in total travel time (sailing time, port time and delays related to schedule frequency).

- Time savings to new traffic - include one half of the difference between total travel time under the new option and total travel time under the base case.

The user cost impacts (whether positive or negative) were calculated for each corridor option relative to the corridor base case. Total savings (or increases in user costs were then compared with the total additional cost (or saving) to the government associated with the new service.

If an option showed both lower user costs and lower government costs than the corridor base case, it was clearly preferable to both parties. If it showed higher costs to both users and the state, it would not be attractive to either party. If one group's costs increased while the other group's cost declined, then the preferred options were deemed to be those which yielded the highest user benefits (or lowest user costs) per dollar of government expenditure (or government cost saving).

Where time savings were a major factor in the benefits, an imputed value of time saved was calculated by comparing the number of hours saved with the net cost of providing the saving. This provided a measure of the value which must be assigned to time savings in order for project benefits to equal costs. The options which required the lowest hourly values to be assigned to time savings were chosen as the preferred options. (Additional discussion of the calculation of time savings is provided in Appendix B.)

APPENDIX B

EVALUATION OF USER IMPACTS – CORRIDOR AND SYSTEM ALTERNATIVES

APPENDIX B

EVALUATION OF USER IMPACTS - CORRIDOR AND SYSTEM ALTERNATIVES

B1 - COSTS OF UNMET DEMAND

In analyzing both short-run and long-run system options we are faced with a situation where the predicted level of demand for ferry service is not being met to the same degree in the various cases.

To assess the impact of system options on users and potential users in terms of the costs and/or benefits they incur under the various alternatives, it was therefore necessary to find some means of assigning a value to these differences in ability to meet demand. The method used was to derive an economic measure of the costs incurred by users (where users are defined as the total numbers requesting ferry service) as a result of changes in the ferry system. To assess these impacts, users were divided into three categories for the purpose of calculating costs: those served as requested, those served by diversion to alternate ports, and those not served under the particular option.

Those passengers who are served under all systems are indifferent between the options. Because the fare structure remains constant, they incur neither costs nor savings as a result of system changes and hence do not figure in the analysis.

Those passengers who are served by diversion to another port (normally from Seattle to Prince Rupert) are in a somewhat different category. If their costs were higher out of Prince Rupert they would be said to incur a cost as a result of the diversion--presumably a disbenefit of the system which forced them to divert. In actual fact, however, it was found that their out-of-pocket costs were lower as a result of the diversion--that in fact there appeared to be a benefit to the user associated with systems which forced them to Prince Rupert for service. The difficulty with this hypothesis, however, was that despite the difference in cost, Seattle demand was consistently strong, and users were not making the seemingly logical decision to travel via Prince Rupert in preference to Seattle. It was therefore concluded that diversion to Prince Rupert involved some nonmonetary disbenefit to users which more than offset the cost savings. Thus, in the minds of users, it was "more costly" to travel via Rupert.

Unfortunately, to determine the extent to which diversion represents an increased cost to users would require an analysis of the price elasticities of demand for ferry services (i.e. how much dollar discrepancy would there have to be between costs out of Seattle and costs out of Prince Rupert before passengers would voluntarily shift to Rupert). In the absence of any data regarding price/demand relationships, it was decided to take a conservative approach and assume that the nonmonetary disbenefit of diversion would merely offset the monetary advantages. As such, users would be indifferent between Seattle and Prince Rupert departures and passengers would incur neither benefits nor costs as a result of diversion.

This left a third class of users to be dealt with in terms of user costs--those passengers who, as a result of lack of capacity, could not be served by the system. These passengers (and vehicles) may be presumed to incur some cost associated with the loss of ferry service. The question is what cost do they incur?

The generally accepted approaches to defining the cost of capacity shortfalls all relate to the concept of opportunity cost--what does the potential user forego, in dollars and/or utility, as a result of not being able to make the ferry trip? Obviously the answer to this lies in what the user is forced to do as an alternative. If he is planning a vacation and finds that he can substitute a trip to another destination which gives him the same pleasure for an equivalent cash outlay, he incurs no cost as a result of not getting on the ferry. Alternatively, if he chooses to go to Alaska via some other routing or mode (assuming alternatives are available), his cost is the sum of the additional dollars, time and nonmonetary costs he incurs as a result of having to accept alternative transport. A third possibility would be that the user would decide not to make the trip in which case the cost he incurs is the loss of utility which he associated with the ferry trip.

Determining which definition of opportunity cost is most applicable to the unserved marine highway demand is a difficult task, and generalizations must be applied. Our choice for this study was to calculate opportunity cost based on the third concept; i.e. that the trip would not be made and the loss was therefore equivalent to the utility the user would have enjoyed had he been able to get on the ferry. A major factor in selecting this concept, particularly as opposed to the "cost of alternatives" method, was the absence of a clearly comparable alternative means of transport. The alternatives available (cruise ship, air, road) differ from the marine highway service in so many nonquantifiable aspects that an assessment of cost differences would entail substantial subjective judgments which could be difficult to establish and to defend.

The calculation of opportunity cost based on lost utility required an estimation of the value which potential users would assign to the trip. A base approximation of this utility is the price they would have been willing to pay--in this case the marine highway fare for passenger and vehicle trips. Accordingly, the opportunity cost associated with unserved traffic consists in part of the fares they would have paid had they been able to get on the ferry. Offsetting this opportunity cost, however, is the fact that the potential user can retain the monies he would otherwise have spent. (In our analytical process the loss associated with unpaid fares is borne by the marine highway.)

The fare level, however, represents only a part of the customer's lost utility. Assuming an elastic demand for ferry services (i.e. a sloping demand curve) some of the traffic demand would have been willing to pay more for the trip than the price set by the marine highway. In other words, they would assign a utility to the trip which exceeds the fare they would have to pay. This "surplus" utility is also lost when a potential user cannot be served.

To calculate this surplus, it is necessary to know the shape of the demand curve, or the relationship between the price of the service and the number of users willing to purchase it. Since no data was available on this subject, we adopted a conservative hypothesis that demand for marine highway services would fall to zero at the point where the price was equal to the cheapest cruise package over the same route. The average surplus per user is, therefore, one half the difference between the cruise price and the marine highway fare.

The lost surplus was calculated by multiplying average surplus by the number of unserved passengers under each system option, to give the net opportunity cost of unsatisified demand. (Annual figures were discounted to net present value so that they could be compared with AMH costs on a consistent basis.)

The above calculations account for the surplus associated with foregone passenger trips, but do not cover the surplus associated with vehicles which cannot be accommodated in the system. In order to estimate this lost vehicle-related surplus, it was assumed that the demand curve for vehicle trips has the same slope as that of passenger trips--in other words, that a proportionate increase in the price of each would lead to a proportionate decrease in demand. This assumption was used to calculate the average surplus associated with vehicle trips and hence the lost surplus as a result of unmet vehicle demand.

In summary, user costs under the various system alternatives were calculated only for those potential users who could not be accommodated by the system. Users who were either served as requested or served via diversion were assumed to incur neither benefits nor disbenefits from a cost viewpoint.

The cost assigned to the unsatisfied demand was calculated on the basis of net foregone utility which was in turn approximated by the total additional surplus utility which would have been enjoyed had demand been met by the system.

B2 - TRAVEL TIME DIFFERENCES

A second aspect of user impacts which had to be dealt with in the evaluation of alternatives was the level of service provided. The major significant differences among alternatives in terms of service quality related to travel time and frequency of service out of various ports.

In order to measure these differences we developed a travel time model which converted ferry schedules into a travel time matrix for all O/D combinations in the system. The model calculated the sum of sailing time (based on a weighted average speed for ships operating on the route), port time, and waiting times. Waiting times were related to frequency of service over a given link and transfer requirements

The frequency-related delay time was set at one-quarter of the average interval between ship calls, while the delay associated with transferring from one vessel to another was set at 12 hours (with the exception of the Columbia shuttle where passengers transferring at Ketchikan were assumed to be delayed an average of 36 hours due to shortage of capacity on vessels out of Prince Rupert).

Because of differences in traffic levels, it was not possible to merely compute the differences in total travel time among the system options. We therefore segregated travel times for those routes where traffic levels varied and calculated the average time per passenger on those routes and within the balance of the system. Peak, shoulder and low travel times were computed separately.

The average travel times under each alternative were compared with the base case times to determine time saved or lost per passenger served as a result of the new system.

To calculate total travel time impacts of a scenario, transferred passengers were eliminated since they are presumed to be indifferent to the combined time and cost effects of transferring. The remaining passengers carried over the various routes were multiplied by the appropriate travel time changes to give gross time impacts (provided these passengers constituted part of the base demand for the system and did not represent induced traffic), while the passengers whose demand was not met by the system were multiplied by the change in travel time and the result deducted from gross impacts. This latter adjustment reflected the impact of the changed service level on the overall attractiveness of the voyage which the potential user could not take.

Finally, where new passenger traffic was induced on a particular link because of system changes (e.g. as in the long-run Lynn alternatives), the total time savings accruing to the induced passengers were divided in half on the principle that savings to marginal users represented a lower benefit than those accruing to "base demand" users.

The annual streams of net time impacts were discounted to present value at a 5% rate in order that they would be comparable with discounted cost figures.

DRAFT

DEPARTMENT OF TRANSPORTATION
&
PUBLIC FACILITIES
ALASKA MARINE HIGHWAY SYSTEM
BELLINGHAM ASSESSMENT

REPORT TO THE LEGISLATURE

STEVE COWPER, GOVERNOR
MARK S. HICKEY, COMMISSIONER

JANUARY, 1988

I. Introduction

This report was produced by the Alaska Marine Highway System (AMHS) in response to legislative intent accompanying Chapter 95, SLA 87 (CHSSHB75, page 99). The issue identified by the legislative intent language, evaluation of Bellingham, Washington as an alternative to Seattle, Washington for the AMHS southern terminus, has been examined and the results are presented in this report.

Several general assumptions were made which underlie the analysis of all of the issues addressed here. For the purpose of comparison and in the absence of an actual traffic study, it was assumed that there would be no change in traffic level, passenger or vehicle, resulting from relocation of the AMHS southern terminus from Seattle to Bellingham. Obviously, relocating the terminus will have an effect, but the direction and magnitude of the effect could not be accurately determined absent a thorough study, although we know of no reason that would indicate that the overall impact would be large. Thus, for purposes of a fair comparison, the "no change" assumption was made.

Similarly, it was assumed that no change would be made in tariffs or fares as a result of any of the potential actions implicated in the issues raised by the legislative intent. A fair comparison of Seattle versus Bellingham as the System's southern terminus also requires that terminal facilities be assumed to be equivalent in quality and cost for purposes of present comparison. However, both facilities have existing advantages and disadvantages and these have been noted. While acknowledging a cooperative stance on the part of AMHS labor bargaining units, a conservative analysis requires that the labor agreements presently in force be used as the basis for cost estimation and assessment of operational constraints. Finally, it was assumed that there is a continuing public mandate to provide service to Puget Sound. This final assumption may warrant more scrutiny prior to any final decision regarding southern terminus location.

It is important to bear in mind that the potential impact of the decision as to the location of the AMHS southern terminus operations in relation to AMHS operations overall is small. The annual expenditures for the Seattle facility including lease payments and head tax average approximately $210,000 per year. Using 1986 (when two vessels were in operation in the summer) as an example, Seattle embarkations represented 6.26% of the System's annual passenger load and 7.07% of its vehicle load. The revenue and expense contributions of the ships on this route are larger than these percentages of traffic would indicate. However, the revenue and expense data is not presently kept in a form that permits identification of specific revenue and expense contributions of each port in a route structure.

II. Fuel savings:

The last few years have seen considerable instability in oil and fuel prices and markets. Historic fuel prices were evaluated in an attempt to ascertain whether there were any consistent price or stability advantages to fuel delivered in either Seattle or Bellingham. Actual data that has been collected to date indicates that delivered fuel price at Bellingham has been consistently higher than at Seattle which tends to be a more competitive market, although the ARCO representative from Bellingham claims just the opposite. ARCO has as yet provided no actual historic price data.

From 1983 through 1986 data available to AMHS shows that fuel price ranged from $.0165 to $.0225 higher at Bellingham averaging $.02 higher. In 1987 as prices continued to destabilize the range of difference was even greater, varying from $.01 to $.0225 and averaging $.0149

Fuel costs were analyzed using actual 1987 operations and currently available fuel price quotes. Only one fuel supplier (Texaco) was available to provide price quotes for fuel in both Seattle and Bellingham so those prices were used in calculating fuel cost estimates. ARCO has promised a fuel price quote in the near future and fuel cost calculations will be reviewed when that quote is received.

AMHS vessels were scheduled for 74 trips to Seattle in FY 87, the M/V Columbia for 22 trips, the M/V Matanuska for 44 trips and the M/V Malaspina for 8 trips. Using Bellingham as the AMHS southern terminus reduces the steaming distance by 66 miles each way or 132 miles per round trip for a total annual mileage saving of 9,768 miles. The shorter distance translates into an average time saving of approximately eight hours per round trip (using the scheduled speeds of the vessels—17.3 kts for the Columbia, and 16.5 kts for the Malaspina and Matanuska) as shown in the accompanying table. Time required for refueling in Seattle has no direct effect on time savings, since it is accomplished during the normal layover time.

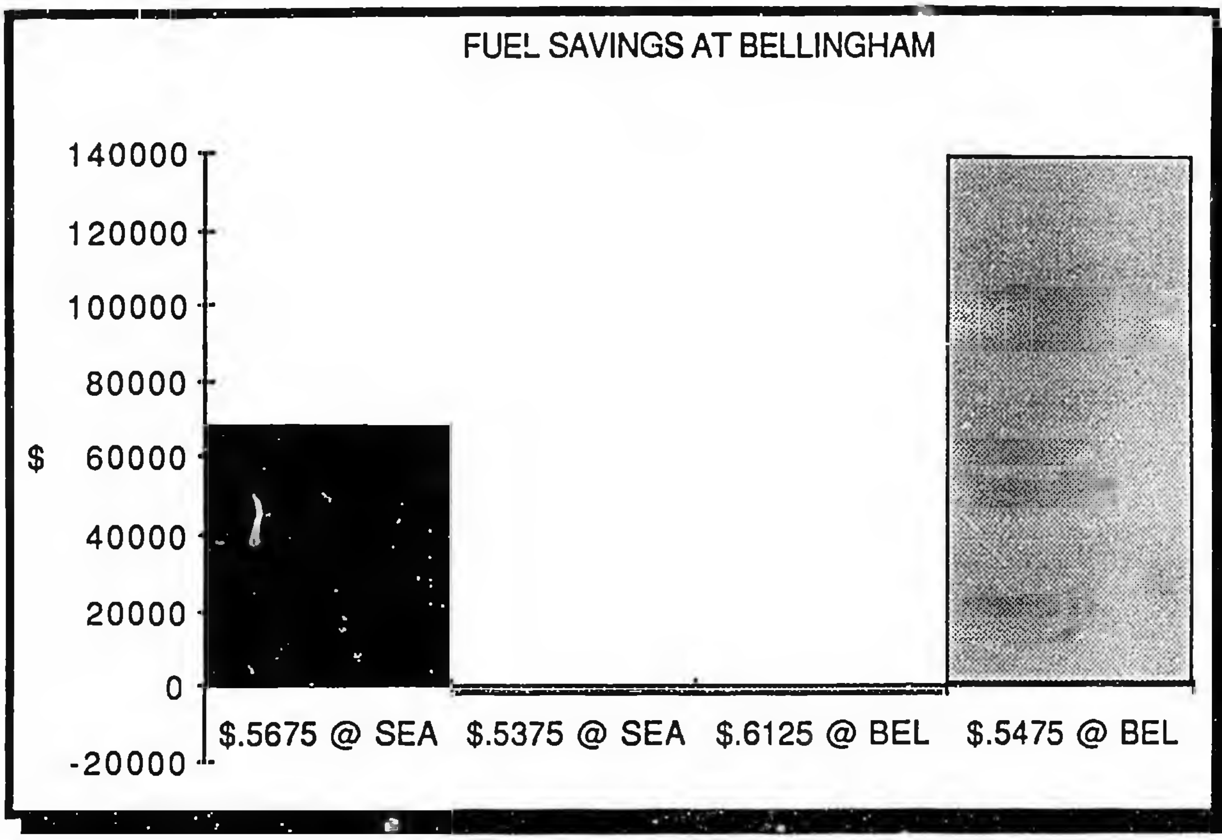
Based on the vessels used in FY 87, their scheduled speeds and fuel consumption rates used for the AMHS financial model (Columbia 413.5 gals./hr., Matanuska 241 gals./hr, and Malaspina 213.4 gals./hr.) this would save approximately 167,900 gallons of fuel each year or 2.4% of annual 1987 system fuel consumption. Based on fuel prices obtained in October 1987 the 2,337,834 gallons of fuel purchased in FY 87 in Seattle would cost

$1,326,721(at the then quoted price of $.5675). Using Bellingham the 2,169,934 gallons of fuel needed would cost $1,258,562 (at the then quoted price of $.58), for a savings of $68,159 or 1.6% of annual system fuel expense for 1987.

MILEAGE AND TIME SAVINGS AT BELLINGHAM

Ship	Trips	Dist Saved	Hrs Saved	Hrs/Trip	Fuel Saved
COL	22	2904	167.861	7.6	69410.6
MAT	44	5808	352	8.0	84832
MAL	8	1056	64	8.0	13657.6
Total	74	9768	583.861	7.9	167900

Fuel savings to be realized from using Bellingham, Washington as the System's southern terminus are very small in relation to the System's annual fuel budget ($4,359,000 in 1987). A factor far more influential than distance in the System's fuel cost structure is the price paid. A three cent decrease in the price of a gallon of fuel at Seattle eliminates any advantage in fuel savings at Bellingham (2,337,834 gals. X $.5375 = $1,256,585 at SEA vs. $1,258,562 at BEL, a difference of $2113 in favor of SEA). Conversely, an increase in price of two and one eighth cents at Bellingham negates any savings resulting from terminating at Bellingham (2,169,934 gals. X $.6125 = $1,329,084 at BEL vs. $1,326,721 at SEA for a difference of $2303 in favor of SEA).



If the time saved by terminating at Bellingham (approximately eight hours) is used to increase service there is no fuel saving, since vessels will be running additional trips using the time savings. Thus, if Bellingham is used as the System's southern terminus any large savings in fuel cost will have to be realized from a significantly lower delivered price for fuel at Bellingham which, historically, has not occurred.

III. Labor savings:

No significant labor cost savings have been identified from using Bellingham as the System's southern terminus under present labor agreements. Labor costs for shoreside operations would not change under the assumption that traffic levels remain constant. Only a major change in the present vessel labor contracts would provide an opportunity for realization of labor cost savings resulting from the time saving to be had by terminating routes at Bellingham.

During the years that the existing AMHS labor agreements have evolved AMHS has operated on a 7 day cycle. Because this was generally taken as a given as new contract provisions were written, there are many clauses of the contracts which make it extremely expensive to depart from the 7 day cycle.

The existing contracts are based on 26 payperiods of 14 days (168 hours) in each year. AMHS crews in the Southeast System work seven 12 hour days each payperiod (84 hours), and are then off duty for the remaining 7 days in each payperiod. There are two crews for each vessel (an "A" crew and a "B" crew) consisting of two shifts each (one shift on duty and the other off duty), the ships being manned and operable on a twenty-four hour basis.

There are four clauses of the contracts that come into effect when crews are scheduled for more or less than 7 days. They are presented here only to assist in understanding the AMHS cost structure used for comparison of Seattle and Bellingham as southern terminus locations and the effects of variance from the present seven day route cycle. These contract provisions do not affect operating costs under the existing schedule (based on a seven day route cycle) as much as they affect costs under shorter or longer route cycles. The Inland Boatmen's Union (IBU) has acknowledged that these provisions would have to be renogiated if the time savings using Bellihgham were to be used to best advantage.

1. The labor contracts guarantee most employees 84 hours of pay each

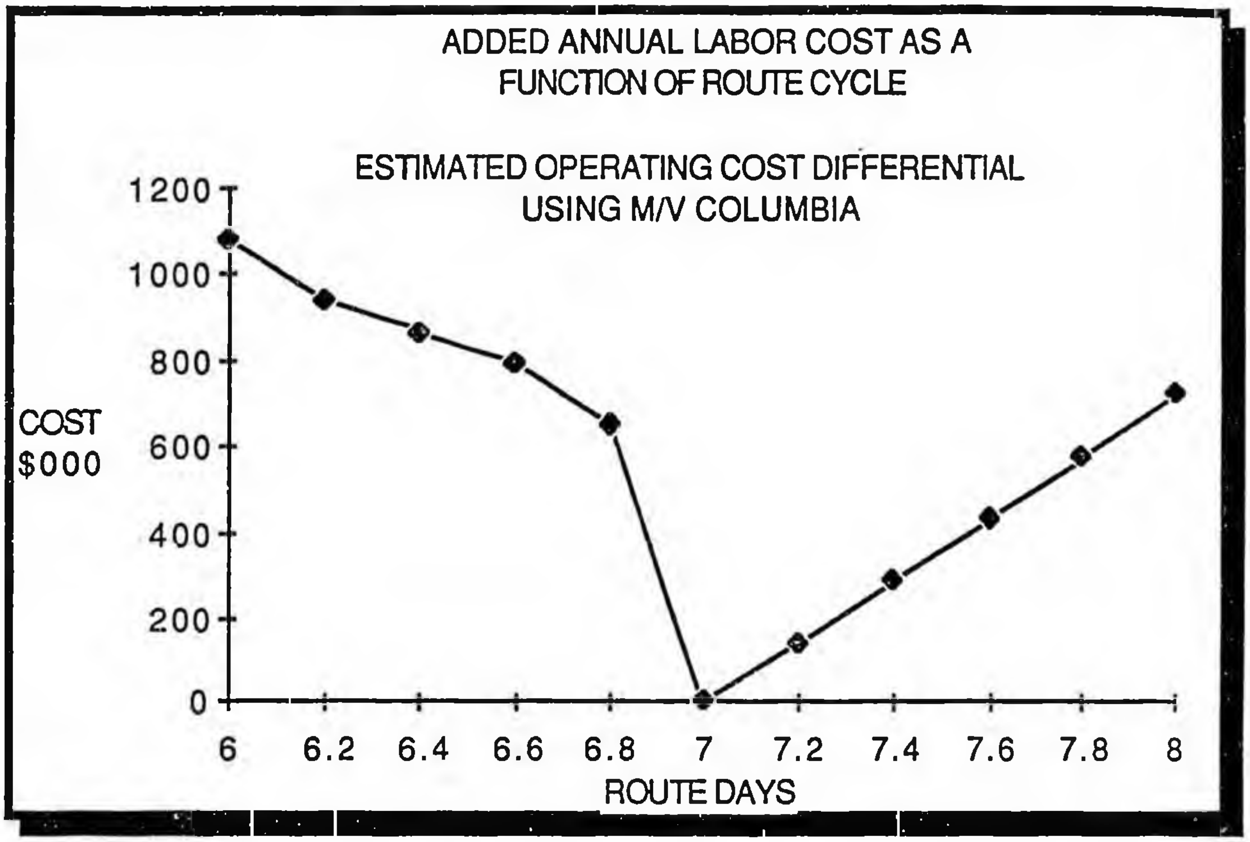
payperiod. This provision is referred to as "minimum guarantee" pay.

2. Overtime: For crewmembers working more than 84 hours in each payperiod the time above 84 hours is paid at 1.5 times the hourly rate.

3. Late Arrival: If a vessel is late in arriving for a crew change (i.e., more than one hour late), the crew is paid "late arrival" pay. The crewmembers "on watch" (actually working) are paid 1.5 times their regular pay. "Off watch" crewmembers (not actually working, but on the ship) are paid at their regular rate of pay, as if they were working, over and above their minimum guarantee. In addition, the other crew is being paid minimum guarantee (regular time), so the actual labor cost of operating the vessel is well in excess of the normal labor cost.

4. Early Callback: If a crewmember is assigned to begin work less than 7.0 days from the end of his/her previous assignment, he/she is paid "early callback" pay (1.5 times the regular rate), with a minimum of 12 hours of pay. This applies to both the "on watch" and the "off watch" crew members and is in addition to minimum guarantee pay.

It is important to note that these contract provisions often interact or compound raising labor costs significantly. Take, for example, the M/V Columbia operating on a regular 6.2 day route time. In any given payperiod one crew (say the "A" crew) will work 7.8 days while the "B" crew works 6.2 days. The "A" crew will be paid for late arrival, since it is 0.8 days over its normal 7 day work week. The "B" crew will be paid early callback since it had only 6.2 days off. In addition, the time over 7.0 days (0.8 days) for the "A" crew will be paid at overtime (1.5 times the hourly rate). The "B" crew will also be paid at the early callback rate for 0.8 days (with a minimum of 12 hours at this rate), since there was only 6.2 days between trips. In addition, the "B" crew is paid minimum guarantee for 0.8 days, since it is scheduled for only 6.2 days. As the route time moves further from the seven day cycle, labor costs escalate significantly as illustrated in the accompanying chart.



On an annual basis these added costs would become significant. Assuming the previous example, if the time savings advantage of Bellingham is used to provide a slight increase in service (two additional trips in summer and two in winter for a total of four annually) the shorter route cycle out of Bellingham is estimated to cost an additional $2,244,500 over existing service to Seattle (or to Bellingham), not attempting to use the time saving.

Although the various labor agreement clauses were not adopted to institutionalize the seven day route cycle, the effect has been to make deviation from such a cycle extremely expensive. While the labor agreements provide for re-negotiation of these issues at the time that they arise, absent such a re-negotiation of this structure, labor savings to be had in vessel operations with routes terminating at Bellingham are very small. In fact, it is very difficult to realize any service improvements (except longer Southeast Alaska port layovers discussed later) available from the time saved by terminating at Bellingham without triggering significant increases in vessel operating expense inherent in this labor structure. Thus, the structure of the current AMHS labor agreements do not add to the desirability of Bellingham as a port of call. The time saved on each trip by terminating at Bellingham would present the opportunity of reducing the risk of late arrivals for crew changes and would, thus save a small amount if service levels and route cycles remain as they presently exist.

IV. Lease savings & relative quality of passenger facilities offered by Bellingham vs. Seattle:

As of the date of this report lease costs for a terminal facility at Bellingham are unknown. The Port of Bellingham has allocated $2,000,000 for site improvements to accommodate AMHS use of its facility. As presently understood the Port does not intend to recover this investment directly from AMHS, although it must be assumed that a return on investment is expected in some manner, perhaps through a head tax or some other form of user fee. The lease with the Port of Seattle for the present facility expires in 1989, and costs for a renewal of the lease are also presently unknown. As mentioned previously in section I, the annual expenditures for the Seattle facility, including lease payments and head tax, average approximately $210,000 per year. At one time there were plans by the Port of Seattle for improvements to the Pier 48 area, but none have been presented recently. The Port of Seattle has expressed a willingness to work with the State and is currently making some structural improvements to the existing facility. (For details of the earlier Port of Seattle proposal see Development Feasibility of Pier 48, April 1985, prepared for the Port of Seattle by Leland & Hobson, Urban Land Economics.)

Each of the ports presently under consideration has certain advantages and disadvantages. Pier 48 at the Port of Seattle is a presently functional facility providing immediate access to downtown Seattle and to the rest of the greater Seattle area via public transportation. Although by no means optimum, all operational requirements are in place at Seattle including mooring and transfer structures, staging area, passenger ticketing and waiting facilities, longshoring arrangements, fueling arrangements, crew licensing requirements, coast guard regulatory requirements, etc. Pier 48 has its disadvantages as well. There are structural problems, some of which are in the process of being corrected by the Port of Seattle. The facility as a whole is aging and becoming increasingly difficult to maintain in an attractive manner consistent with the expectations of the traveling public, the waiting area in particular is only marginally acceptable. The location of the facility is a disadvantage as well as an advantage that it is in a traffic congested area of downtown Seattle that makes it difficult for the traveler to find and get to the facility. The present location also prevents expansion of the parking and staging area to accommodate future traffic growth. There is no dockside fueling capability, requiring that the vessel be moved to the fuel dock for fueling and then back to Pier 48 prior to departure, a more expensive process than if fueling were available at dockside.

Bellingham offers the advantage of slightly less trip distance from Alaskan ports than Seattle, potentially reducing travel time for AMHS users, offering the potential of fuel savings due to the shorter distance and/or slower vessel speeds and scheduling flexibility. If AMHS labor contracts were changed to eliminate or significantly reduce the cost impacts of variances from the seven day route cycle, some additional service could be realized by the shorter running time to Bellingham.

Even if the time savings at Bellingham cannot be used to provide additional service due to increased labor cost, the time saved can be applied to minimize the risk of late arrival or to increase port time in Alaskan ports to the economic benefit of Alaskan communities. Dockside fueling is permissible at the existing Bellingham facility. Absent facility improvements, specific arrangements would have to be worked out, and it is understood that fuel delivery would be by common carrier (truck). Based on obtainable information from one supplier, this delivery method could increase the cost of fuel by as much as $.03 per gallon over the standard delivered price due to the increased cost of compliance with environmental regulations.

Disadvantages also exist at Bellingham but are not prohibitive. Shorter travel time will result in lower stewards revenues as those revenues are tied directly to the length of time that passengers spend on board the vessel. There are presently no terminal facilities available at Bellingham and it is not clear that the docking facility at the Port of Bellingham adequately meets operational requirements for vehicle and passenger transfer. There are use conflicts at the existing Bellingham facility which would also have to be resolved. Priority of use of the dock face among the various Port users (AMHS and commercial) would have to be resolved. Similarly, the dockside, presently used for cargo staging would have to be scheduled in such a way as to accommodate AMHS vehicle parking and staging. Warehousing space in Bellingham would have to be acquired at an as yet undetermined cost. All operational requirements would have to be established at Bellingham including mooring and transfer structures, staging area, passenger ticketing and waiting facilities, longshoring arrangements, fueling arrangements, crew licensing requirements, coast guard regulatory requirements, etc.

Analysis of this issue shows that the most reliable way to evaluate potential lease costs at either Bellingham or Seattle, or, for that matter, at any other potential southern terminus port, is to invite proposals from all qualified parties for the provision of southern terminus facilities. In the alternative, another approach would be to enter into detailed negotiations with the ports which have presently expressed an interest (Seattle and Bellingham). To either end, an initial draft statement of the basic requirements for a southern terminus facility for AMHS has been prepared and is attached as Appendix A.

V. Other Issues:

A number of issues with cost impacts have been identified, but have not yet been resolved. Time required to fuel ships at Bellingham is unknown, as are any other incidental fueling costs (i.e., moving the ship for fueling, special fuel handling equipment or modifications to the vessels, personnel procedures or training requirements, etc.). Longshoring costs at Bellingham are unknown, but brief discussions with ILWU representatives indicate that such costs would be competitive with Seattle. Pilotage costs would be incurred in the first year until pilotage endorsements could be obtained by AMHS licensed crews. A U.S. Coa[illegible]ard certificate of adequacy would have to be obtained before the facili[illegible]posed for use at Bellingham could be used. Head tax assessments at

Bellingham are unknown as are such taxes at Seattle under a renewed lease. While such taxes are not a net cost to AMHS (being passed on to users through the fare structure) they could potentially influence fares to a degree that would adversely affect traffic.

Impacts to commercial users are unknown as well, although initial indications are that there would be at least a temporary adverse impact to such users from having to move goods, trailers, containers, etc. from central supply points in Seattle to Bellingham. These users will incur additional costs and time which may adversely affect product and service quality as well as add to Southeast Alaska consumer costs.

Generally speaking, Bellingham is not an end destination for the great majority of users of the AMHS Puget Sound service, whereas Seattle is the end destination for many such users. Thus terminating at Bellingham would result in a need to continue a trip by some other mode for almost all AMHS travelers. One of the primary origins or destinations for AMHS users, Seattle-Tacoma International Airport, is an additional ninety-six road miles from Bellingham or approximately two hours driving time (and longer during rush hours), with other Seattle area destinations being somewhat less.

AMHS passenger loads disembarking at Seattle average approximately 500 passengers and 90 vehicles with a peak of approximately 750 passengers and 140 vehicles. Of these passengers approximately 30% to 35% of the average load is without a vehicle and approximately 40% to 50% of peak loads are without vehicles. This translates into a demand on the public transportation system of 150 to 175 passengers on average and a peak of 300 to 375 passengers disembarking from the ferry and seeking transportation into or out of Bellingham. Public transportation into and out of Bellingham and the Whatcom County area consists of air and bus service. Greyhound bus service provides five southbound and six northbound trips per day. Air service is provided from Bellingham airport to Seattle, Vancouver, Portland, and the San Juan Islands. PSA provides three jet flights to Seattle daily (except Sunday), Horizon Air provides nine commuter flights to Seattle daily, and San Juan provides nine Seattle commuter flights daily on weekdays and five flights a day on weekends. Thus there are twenty one flights per day to Seattle on weekdays. San Juan also provides five flights per weekday to Vancouver, two flights to Portland and one flight per weekday to the San Juan Islands. Both Bellingham airport and the Greyhound bus terminal are served by the Whatcom Transportation Authority, the agency which would also serve the proposed ferry terminal.

It is not expected that relocation to Bellingham would have much impact on tourist vehicle traffic, either north or southbound, since these travelers have the means (their vehicles) to reach either Bellingham or Seattle or to continue their journey upon arrival at either port. Likewise, tour groups traveling by bus would not likely be seriously affected. Operating from Bellingham would improve access to Canadian walk on traffic, being much closer to British Columbia ferry terminals.

A significant adverse impact may occur to tourist and Alaskan travelers without vehicles. For these travelers, the Seattle location is more conveniently accessed by public transportation (notwithstanding air, bus and rail access to Bellingham which must be obtained by making a change of some sort in Seattle in any event). Specifically for this group of Alaskan travelers, the present Seattle location makes a wide range of big city goods and services immediately accessible upon arrival. Relocation to Bellingham would force this group of travelers to attempt to duplicate those goods and services in Bellingham, to change modes and continue their trip to access those goods and services in Seattle potentially requiring additional expense and inconvenience, or simply to choose direct air travel to Seattle for the same purpose. This group of travelers is a small percentage of overall traffic, especially in summer, but a larger portion in winter and is also the group most dependent on AMHS service. However, it should be remembered that the mission of the AMHS is efficiently delivered basic transportation and not necessarily the most convenient transportation as seen from the perspective of any individual user group.

Taking all of these factors into consideration and recognizing that a market assessment has not been performed, there would very likely be little or no overall negative impact on passenger or vehicle traffic resulting from the relocation of the southern terminus operations from Seattle to Bellingham. This conclusion should be confirmed by a more detailed investigation of the impacts to AMHS traffic that would be incurred by relocation.

Even with its attendant access difficulties, the present location at Pier 48 in Seattle is a known quantity, and a certain "good will" (in the business sense) has been established at and because of that location. Relocating will abandon that "good will" and trigger expenses for its reestablishment at the new location. On the positive side of this issue Bellingham has expanded its port operations in recent years through an aggressive and continuing marketing effort and there is a good potential for AMHS to benefit from this effort, somewhat offsetting the cost involved in reestablishing itself in the new location.

An operational impact that is real but as yet unquantifiable, is the impact on supply operations if the southern terminus is located at Bellingham. Supplies presently delivered to the terminal at Seattle for use throughout the System would have to be delivered at Bellingham. It is not certain at this time whether such a change in delivery point would have an overall positive or negative impact on price or timeliness of delivery of necessary parts, tools and supplies.

Relocation expenses would be incurred (which are presently not known) for moving the furniture, equipment and supplies presently used or stored at the facility in Seattle. Seattle personnel will either have a long daily commute or will have to relocate to continue their employment. For those who choose to do neither, their will be a hidden cost to AMHS of acquiring and training replacements as well as the cost to the employees of replacing their jobs.

VI. Conclusion:

Based on this analysis, Bellingham is found to be an acceptable alternative location for AMHS southern terminus operations pending resolution of previously noted unresolved issues and clarification of the cost and quality of terminal facilities. Likewise, Seattle is and will remain an acceptable location for the AMHS southern terminus. Other alternative locations might also be workable, but have not been analyzed as part of this review.

Using Bellingham as the AMHS southern terminus could provide a small fuel cost saving if no additional service were attempted using the available time savings but such savings are very small in relation to the overall AMHS operational cost.. Bellingham also offers some additional scheduling flexibility. Seattle offers the convenience of proximity to city goods and services and an established location, but the detractions of the aging structure and traffic congestion force a reexamination of the location and a look at other useable locations.

It is sufficient to say that Seattle and Bellingham both qualify as locations for AMHS southern terminus operations, though they both carry deficiencies that must be remedied before any long-term commitment is made in either location. Invitations for proposals from all qualified locations for the provision of southern terminus facilities is one reliable way of resolving these issues. Another way would be to enter into detailed negotiations with the ports which have presently expressed an interest (Seattle and Bellingham).

User desires, especially the desires of the users of the Puget Sound service, will be solicited and considered, though the final decision will not be made on the basis of this factor alone. One of the first tasks for the newly appointed AMHS Advisory Council will be to ascertain and communicate to DOT&PF management the needs and desires of the users of the Seattle service.

The following are the key factors which will weigh heavily in the decision as to which port will best serve AMHS needs: (1) the quality of facilities to be provided as well as the cost of those facilities, direct and indirect; (2) preferences of the users of the service as elicited by the AMHS Advisory Council and through other means; and (3) reasonable resolution of the issues relating to the needs of commercial users and walk-on passengers. The issue of AMHS southern terminus location, while not the most significant issue facing the AMHS this session deserves serious consideration by all. The Department will proceed with the solicitation of proposals or negotiations on a schedule which will accommodate public review of the results of the proposal or negotiation process and render a choice as to which port will be used by late summer or early fall of 1988.

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BASIC TERMINAL REQUIREMENTS

Basin

Water Depth - -25 to -30 MLLW
Width - 250' Min
Length - 500 Min

Berth

Berth and Approach - Oriented such that last ¼ mile of approach and longitudinal axis of vessel in berth is nearly parallel to major wind and waves.

Moorings

Berthing Energy - Selected in accordance with rational design criteria and modified appropriately for exposure, etc.

Mooring Line Loads - 50 kips min.

Line Handler Access - Continuous throughout tie up points.

Transfer Structures

A) Layout to accommodate stern load.
B) All tidal flexibility with max. grade at ELW not to exceed 15% and max grade at EHW not to exceed 4%.
C) Capacity - AASHTO HS-20 with impact.
D) 16'0" min roadway width.
E) Separated and covered passenger access to upper passenger deck of vessel.

Electrical Power & Illumination - Adequate power should be provided to accommodate existing and future loads. Auxiliary power generation should be provided to power essential facilities in case of utility outage.

Illumination of parking, staging, and security areas should be at a level consistent with accepted standards for facility type. Linehandler accesses and mooring points shall be well illuminated and take into consideration potential conflicts with visibility of ships operators during berthing and approach maneuvers.

Parking and Staging

A) Area sized to accommodate 100 passenger vehicles and 20 vans (i.e., 20' - 40').

B) Vehicle staging area to have access control to accommodate orderly staging and maneuvering of embarking traffic, isolate staging operations from transient traffic and provide necessary staging security.

C) Staging lanes to be parallel and number required to be determined by ports served.

Parking: A) Facility should provide:

1) 20 short term parking spaces.
2) 10 long term parking spaces.
3) Employee parking - Based on number of shoreside employees and be totally separate from long or short term spaces provided.
4) Transient, bus and taxi, spaces should be provided to accommodate percentage of foot traffic anticipated and verified by real time analysis.

Traffic Flow

Embarking Traffic: Separate entrance with adequate traffic lanes to divert traffic to respective terminal operations (e.g., embarking, transient, short term, long term, etc.).

Disembarking Traffic: Separate exit lanes that do not conflict with embarking vehicle traffic and allows easy access to major transportation networks. Foot passenger access should be provided to a separate area that provides adequate ground transportation and information.

Passenger Terminal and Ticketing

Architecture and Landscaping: Alaskana, incorporating major elements of statewide culture and development, so as to provide a well rounded first impression of Alaska, its history and its people.

Baggage Handling - Provisions should be included to accommodate loading and unloading of passenger baggage via the existing ship baggage cart.

Ticketing and Waiting Area -	Areas required to accommodate passenger waiting and ticketing should be proportioned in accordance with accepted criteria and based on a current operational analysis of anticipated demand along with projections for future demand. An information center should be provided to answer questions regarding vessels, ports of call and general system information. Short term security storage should be provided.
Warehousing and Administration	Separate areas shall be provided to accommodate the existing port administration functions, as well as marshalling areas to accommodate existing provisioning requirements and general port storage volume.

House Trans
wrk Session on
AK. Marine Highway

Southeast Alaska Transportation Plan

June 1986

State of Alaska
Alaska Department of Transportation
and Public Facilities
Southeast Region

Southeast Alaska Transportation Plan

June 1986

State of Alaska
Alaska Department of Transportation and Public Facilities
Southeast Region

SOUTHEAST ALASKA TRANSPORTATION PLAN

JUNE 1986

Department of Transportation & Public Facilities

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SOUTHEAST ALASKA TRANSPORTATION PLAN

EXECUTIVE SUMMARY

Introduction

Since 1980, when the previous Transportation Plan for Southeast Alaska was adopted, many changes have occurred in both the needs and opportunities for transportation development within the Region. The Alaska Department of Transportation and Public Facilities therefore undertook, early in 1985, to prepare a formal update of the Transportation Plan in order to ensure that the planned policies and directions fully reflected the existing and anticipated needs and concerns with regard to regional transportation services.

Planning Process

The Department established a joint Technical Committee with representation from the Southeast Region Planning Division and the Alaska Marine Highway System, and engaged the consulting firm of Acres International Corporation to assist in defining and evaluating alternative transportation schemes.

The Department also solicited ongoing community involvement in the planning process through the distribution of newsletters and the insertion of newspaper advertisements advising of the planning effort and requesting comments and suggestions. Responses to these advertisements, as well as community comments put forward during other recent workshop/hearings processes, played a vital role in the formulation and assessment of transportation alternatives.

Plan Development

An initial step in the planning effort was to carry out a careful review of the goals which the revised Plan should strive to achieve. These were ultimately defined as:

- meet resident demands for travel to and within the Region;
- facilitate development of the regional economy by providing supporting transportation services;
- maintain fiscal responsibility through judicious allocation of public funds.

Unfortunately, the goals are not mutually compatible and, within the present economic environment, are not collectively achievable. One of the tasks in developing the proposed plan was to suggest a compromise that would enable a balance to be achieved between demands for services and the current and likely future fiscal environment.

The steps taken in developing the revised Transportation Plan involved first updating the projections for future transportation needs to, from and within the Region; reviewing the existing transportation system; and reviewing future prospects (technological and operational) for the provision of transportation services.

A wide range of alternatives were then postulated for both air and surface transportation services. Options were defined for both specified corridors nd for the Region as a whole and were defined for both the short-term and long-term planning horizons. These options were evaluated from a number of viewpoints including cost to the State, cost to the user, capacity to meet demand, service level, and service/cost effectiveness.

On the basis of these assessments, a proposed plan was formulated which attempted to balance between the anticipated needs of the residents in terms of transportation and economic development and the constraints imposed by the need for fiscal responsibility.

This proposed plan was laid out in a Draft report and distributed to communities throughout the Southeast Region. A series of community workshops were conducted in 20 regional communities to present the plan, respond to questions and obtain residents' opinions on the plan and its components. Written comments from residents were also solicited. Community response to the Draft Plan was carefully assessed and, where possible, modifications were incorporated into the Final Plan in response to residents' concerns.

Regional Transportation Plan

The final Regional Transportation Plan foresees an ongoing role for both air and surface transport in the Region. In terms of aviation, the short-term focus is on completing current airport runway extensions at Klawock, Kake and Hoonah, on maintaining and improving existing airport facilities, on upgrading existing seaplane floats and on improving air navigation and safety through additions and improvements to navigation aids. In the longer-term, the focus is on maintaining options for further development of wheeled-aircraft facilities up to and including commuter aircraft standards.

In terms of marine transportation, the short-term focus is on improving marine highway services and revenues by scheduling a second mainline vessel to Seattle (where demand is strong) and providing initial high-speed ferry services in the Ketchikan-Prince of Wales-Clarence Straits region.

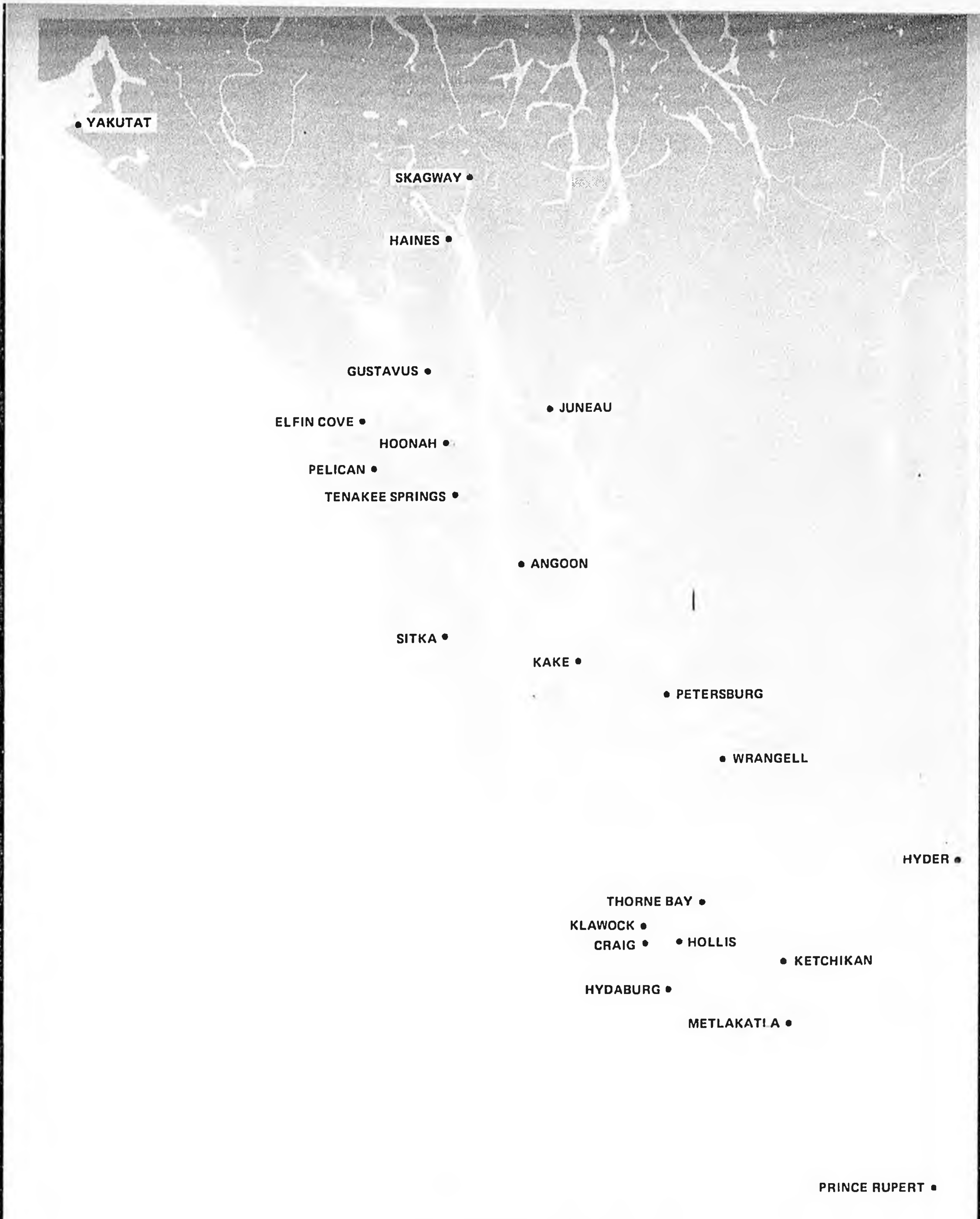
The longer-term plan focuses on additional use of high-speed ferries for intra-regional travel, particularly in the Sitka-Juneau and Juneau-Skagway corridors, thus providing improved access to residents and freeing up the mainline vessels to offer additional service and capacity out of the southern termini (Prince Rupert and Seattle). In addition, private operators would be encouraged to supplement peak season service out of Seattle by providing vessels with vehicle capacity.

In terms of road transportation, the short- and long-term focus is on maintaining and upgrading existing road links. While several new inter-community links were evaluated, it was concluded that, under current prospects for traffic growth, these links could be served in a more cost-effective manner by the Marine Highway. It was recommended, however, that the concept of a road up the east side of the Lynn Canal, connecting Juneau with either Haines or Skagway or both, be periodically re-evaluated, particularly once high-speed ferry service has been introduced.

Role of the Regional Plan

The Southeast Alaska Transportation Plan described in this document presents the Department of Transportation and Public Facilities' goals, policies, and general overall plan for maintaining and improving the State's regional air, land and marine transportation services and facilities. The Regional Plan recognizes the statewide aviation policies and standards established in the Alaska Aviation System Plan. The Regional Plan evaluates and compares air, land and marine alternatives to develop an integrated multi-modal transportation plan, which provides general direction to specific modal planning efforts such as airport master plans and the Alaska Marine Highway System plan.

These plans, together with community plans, provide direction in establishing regional transportation priorities and in developing the Department's 6-year Capital Improvement Program, which itemizes specific projects to be undertaken. Those projects which are scheduled in the first 1 or 2 years of a Capital Improvement Program are then submitted annually to the Legislature for funding.



SOUTHEAST ALASKA REGION

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1 - INTRODUCTION

1.1 - Background

In 1980, Southeast Alaska developed a long-range plan for the provision of transportation services within the Region. The plan defined operating concepts and facilities requirements and drew extensively on input from residents and research dating from 1977. In the period of time that has elapsed since this review, much has changed relative to the basic assumptions and concepts embodied in this plan.

The 1980 Plan, for example, saw increasingly scarce and expensive fuel impacting significantly on transportation both in and to Southeast Alaska. There were high expectations relative to resource development, growth in visitor travel and the ability of Alaska to fund new equipment to meet the needs of both resident and tourist. In addition, the possibility of a move the State capital gave an aura of uncertainty to perceived needs.

Since the implementation of the 1980 Plan, the move of the capital has been shelved, resource development has been constrained by lack of demand in world markets, and oil is readily available and relatively cheap. The change in fortune of the oil industry, while beneficial to the traveler, has seriously eroded State revenues. Thus, Southeast Alaska is faced with increasing demand for travel, but limited resources with which to meet that demand.

While the original Transportation Plan was always envisaged as a flexible planning tool that could, and would, be changed to adapt to different circumstances, the extreme changes that have occurred necessitated a formal update to review policies and direction and to determine the likely direction of transport within the region to the end of the century.

Accordingly, early in 1985 the Alaska Department of Transportation and Public Facilities undertook to update the 1980 Regional Transportation Plan in order to ensure that the planned development of transportation facilities fully reflected the existing and anticipated needs and concerns within the region. A joint Technical Committee was established, comprised of representatives from the Southeast Region Planning Division and the Alaska Marine Highway System, and given the mandate to update and modify, as necessary, the 1980 Plan. In addition, the consulting firm of Acres International Corporation was engaged to assist the Technical Committee in defining and evaluating alternative transportation systems for the Region, and in formulating and presenting the updated Transportation Plan.

1.2 - Role of the Regional Plan

The Regional Transportation Plan is intended to present the Department of Transportation and Public Facilities' goals, policies, and general overall plan for maintaining and improving the State's regional air, land and marine transportation services and facilities. The Southeast Region Plan recognizes the statewide aviation policies and standards established in the Alaska Aviation System Plan.

In general terms, the Regional Plan evaluates and compares air, land and marine alternatives to develop an integrated multi-modal transportation plan, which provides general direction to specific modal planning efforts such as airport master plans and the Alaska Marine Highway System plan. These plans, together with community plans, provide direction in establishing regional transportation priorities and in developing the Department's 6-year Capital Improvement Program which itemizes specific projects to be undertaken. Those projects which are scheduled in the first 1 or 2 years of a Capital Improvement Program are then submitted annually to the Legislature for funding.

1.3 - Goals and Objectives

As part of the planning process, a careful review was carried out with regard to the goals which the updated Transportation Plan should strive to achieve. These were ultimately defined as:

- meet resident demands for transportation to and within the Region;
- facilitate development of the regional economy by providing supporting transportation services;
- maintain fiscal responsibility through judicious allocation of public funds.

Unfortunately, within the present economic environment, these goals are not collectively achievable, and one of the tasks of the proposed plan was to suggest a compromise that would enable a balance to be achieved within the current and likely future fiscal environment.

1.4 - Community Involvement

A key policy recommendation in the original Transportation Plan was to provide the opportunity for effective public participation in transportation decisions. In the past few years, the Department of Transportation and Public Facilities, Southeast Region and the Division of Alaska Marine Highway System have both maintained a program of community involvement in the ongoing planning process. In 1982, anticipating an update of the Regional Plan, the planning section held a series of community workshops to solicit opinions and concerns on the current transportation system. In addition, community hearings were held in conjunction with the studies of the 1984 Governor's Task Force on the Marine Highway.

As part of the present plan update, the planning team carefully reviewed the comments and issues which were raised at these community workshops and hearings. In order to ascertain whether additional concerns had arisen since that time, a newsletter was sent to all parties who had previously expressed ongoing interest in the transportation system. The newsletter advised that the plan update was underway and requested that they inform the consultants of their current concerns and suggestions with regard to regional transportation. In addition, notices were inserted in all community newspapers throughout the Region advising the public of the planning effort and requesting their input. Many letters were received in response to these requests and the comments carefully noted in developing the plan revisions.

Once the Technical Committee and consultants had completed their evaluations, a 'Draft' updated Regional Transportation Plan was developed and distributed to the communities in February 1986. The Department and consultants then carried out a series of workshops in 20 communities throughout the Region during the latter half of April in order to present the Draft Plan to residents, respond to any questions, and solicit community reactions to the proposed Plan components. Subsequent to the workshops, communities and individuals were given the opportunity to provide additional comments in writing to the Department of Transportation up to the end of the first week in May.

Community reactions obtained through the workshops and through written replies were thoroughly reviewed and analyzed. In general, public response to the Plan was favorable with 80% of the participating communities according it an overall average rank of approval. Where negative comments and alternative suggestions were raised, they were carefully assessed and, insofar as possible, reflected in the final Regional Transportation Plan.

2 - PLANNING FRAMEWORK