V. RAIL LINE EXTENSION PROCESSES AND CRITERIA

The Alaska Railbelt, the area adjacent to the Alaska Railroad (ARR), covers only a very small portion of the State. The Railbelt contains the majority of the State's population, commerce, and industry. However, the greater expanses of Alaska not within the Railbelt contain most of the State's natural resources - the coal, zinc, lead, copper, petroleum, timber and other resources that need transportation infrastructure if they are to be developed.

Now that the State owns the ARR, it anticipates that an increasing number of proposals will be advanced to extend the railroad to access these resources. Some proposals may be for the extension of the ARR into new areas of the State; others may be for new rail lines which connect the mineral resources with a tidewater port, with no interconnection being provided with the ARR. If new proposals are forthcoming, they will be added to a number of extension proposals promoted over the years.

A. The Rail Line Extension Issue

When the Federal government owned and operated the ARR, there was little inclination to consider extending the railroad to access Alaska's natural resources. As a result, there was no need to establish a mechanism whereby extension proposals could be systematically put forth, studied, and decisions made. The result was that each extension was offered and considered on an individual basis, without any type of overall program and no agreed-to evaluation criteria. Consequently, public sector deliberations were on an individual, line item budget basis, if at all.

The purpose of this Report Section is to review the process, if any, by which rail extension projects are currently considered, and suggest an orderly process -- one based on procedures and criteria which should lead to prudent investment decisions in the future.

B. Existing and Previous Rail Extension Proposals

While only the Anchorage and Fairbanks airport spurs and the Whittier and Eielson Air Force Base extensions have been built since the basic line from Seward to Anchorage to Fairbanks was completed in 1923, a number of possible extensions have been discussed, contemplated, studied and debated. Some have been given considerable study, others have received scant consideration. There has been no comparable or comprehensive analysis of the various proposals, and most linger on, with neither a decision being made to proceed nor terminate consideration.

Seven basic extension options that have been considered over the years are depicted on Figure 5-1. This map presents the principal corridor selections, and includes many of their alternative alignments. The rail lines range from the very long to the rather short, and include:

1. Alaska-Canada Transcontinental Rail Link - some 297 miles of new railroad construction in Alaska, plus the additional mileage of the Canadian portion, to connect the Alaska Railroad with the Canadian and U.S. rail networks and potential mines in the "Delta Belt" and Slate Creek. The alignment study for this route has been completed and application has been made for right-of-way.

2. North Slope Extension - a new rail line to the north, possibly all the way to the Arctic Ocean oil fields, to serve those fields and to open the area to development.

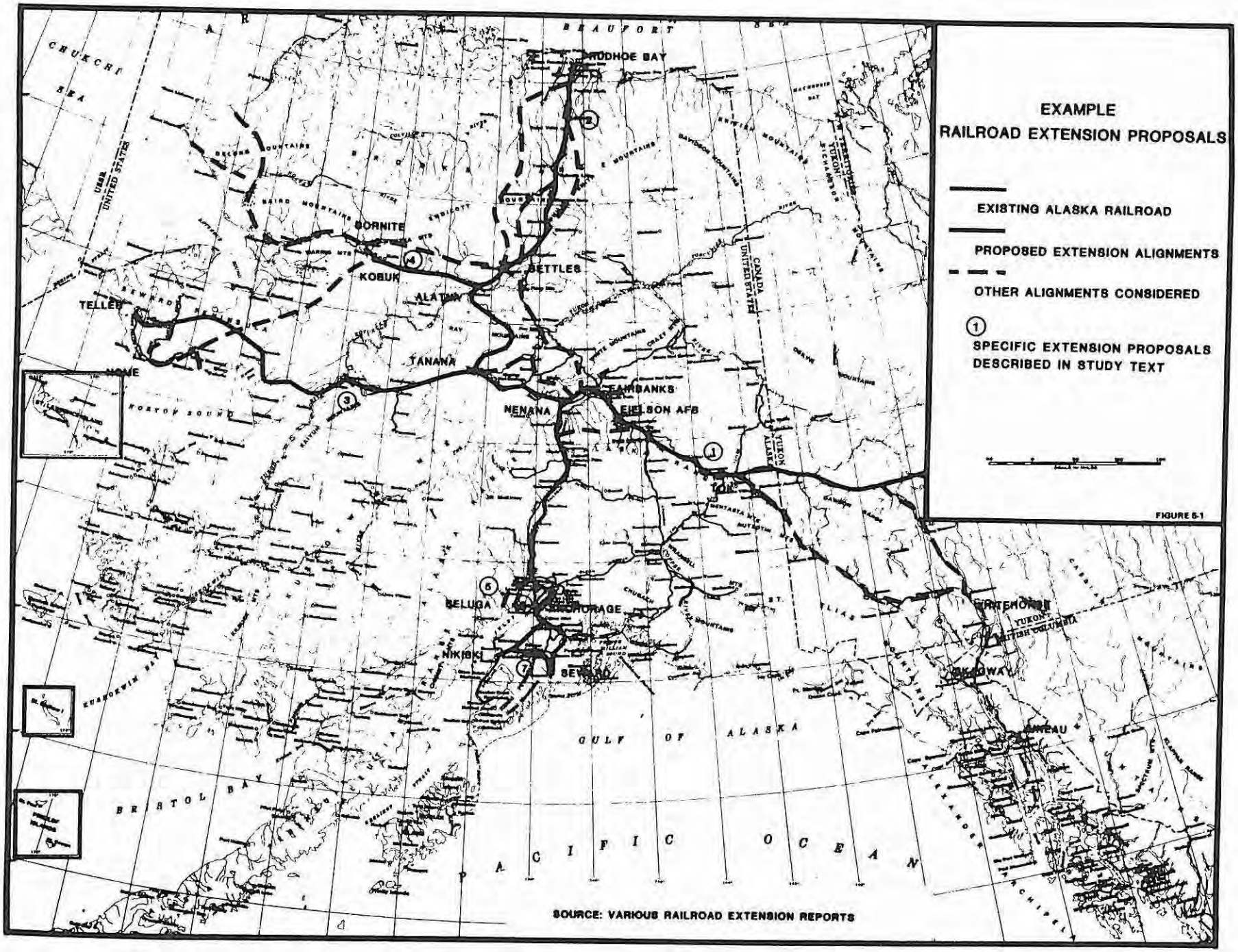


FIGURE 5-1

SOURCE: VARIOUS RAILROAD EXTENSION REPORTS

3. Extension West to Seward Peninsula - an 880 mile extension west through Tanana and on to a west coast port, intended to both open the area to resource development and to create a new shipping port.

4. Extension Northwest to Ambler District - a new line to penetrate a major potential ore mining area near Picnic Creek, Bornite, and Kobuk.

5. Beluga Coal Fields Rail Link - a rather short extension to the west of Anchorage that would penetrate a major to-be-developed coal field.

6. Knik Arm Crossing - The addition of a rail crossing to the planned highway crossing of Knik Arm, to create operating efficiencies for the Alaska Railroad.

7. Nikiski Extension - A new line from Seward or Moose Pass to the refinery/petroleum/industrial area near Nikiski and Kenai.

Other extension proposals have been advanced, but these seven reflect the major ones that have been proposed over the years. If an extension evaluation process and evaluation criteria are to be established, such techniques should be capable of evaluating all extension types -- hardrock mineral and petroleum resource penetration; efficiency extensions; access to ports; connections with other railroads and/or with other transportation systems; and regional access/development rail lines.

Following is a brief description of the major extension proposals including the studies that have been conducted relative to each and a review of the deliberation and consideration

process utilized in each study. This review is intended to explain the procedures that have been followed. The review should not be viewed in any way as an evaluation or an opinion regarding the feasibility of any specific rail line extension.

1. Alaska - Canada Transcontinental Rail Link

The Alaska Railroad does not physically connect with railroads in Canada or the "Lower 48" except by barge connections. There has long been interest in providing such a railroad connection; an interest that has heightened since the mid-1970's.

In 1942, a military alignment reconnaissance was made for a 1,417 mile railroad connecting Prince George, British Columbia, with Fairbanks to be known as the Trans-Canada, Alaska Railroad. The line, which was to be constructed for military purposes, was actually given the go-ahead in February, 1943 with construction beginning in May of that year. Meanwhile, military successes diminished the need for the line with the result that the project was placed on hold and has since not been reactivated.

In 1949, Congress sought negotiations with Canada for economic surveys. In 1957, the Alaska International Rail and Highway Commission was established and by law was required to make "a thorough and complete study of the economic and military advantages of additional highway and rail transportation facilities connecting the continental U.S. with Central Alaska". In 1977, the Alaska Legislature directed that the Alaska Railroad evaluate an extension to the Canadian Border. In 1981, the State legislature directed that an environmental study be conducted and that right-of-way be acquired or reserved. Earlier the State sponsored a conference dealing with an Alaskan Canadian rail connection and, more recently, several brief overview studies have been conducted (listed on the next page).

a. Previous Studies and Deliberation Procedures

A variety of studies have been made of the Alaska-Canada Corridor, with most being either brief and somewhat inexpensive or overview studies. There appears to be no definitive study analysis available. Those that are available are:

* Military Railroad Reconnaissance (U.S Army) -- 1942.
* "Alaska-Canada Transcontinental Rail Connection to Contiguous United States" (State of Alaska) -- 1977
* "Through Rail Route to Alaska" (Ward & Associates, Ltd.) -- 1977.
* "The Alaska Railroad Connection" (B.C. Railway) -- 1977.
* "Alaska Railroad Extension: Eielson to Canadian Border, Project X20089" (State of Alaska) -- 1979.
* "The Alaska Railroad" (Alaska Senate, Committee on Transportation) -- 1979.
* "Transportation Systems Planning for Alaska" (University of Alaska) -- 1979.
* "Feasibility Study, Proposed Extension of the Alaska Railroad from Eielson AFB to the Canadian Border" (Legislative Affairs Agency, State of Alaska) -- 1980.
* "Interior Alaska Transportation Study" (State of Alaska) -- 1982.
* "Alaska Railroad Extension: Eielson to the Canadian Border, Environmental Assessment" (State of Alaska) -- 1983.

The early 1942 military study comprised only a field evaluation of railroad alignments. It sought to depart from the existing Alaska Railroad at Rex, proceed to Tok, and to continue to Watson Lake, Canada. The more recent studies, however, have moved the point of connection with the Alaska Railroad to the Eielson Air Force Base and Fairbanks area rather than to the Rex area. This route would entail the construction of some 297 miles of track in Alaska, 568 miles in the Yukon, and about 100 miles in British Columbia. The 1977 "Alaska - Canada Transcontinental Report" presents an excellent non-quantified overview of the route and its pros and cons. "Project X20089" by the DOT/PF in 1979 summarizes a much more in-depth study of possible rail line alignments to the Canadian Border. That

alignment study by the DOT/PF was conducted at the request of the Tenth Alaska Legislature (House Bill 47 and 48), and the study used map study, photogrammetric mapping, ground control survey, and the like -- all intended to explore for the best alignment. There was no study of need, or economics, or impact -- at this point. As a result of this alignment study, it was concluded that right-ofway through public lands be reserved, and right-of-way through private lands be acquired. "The Alaska Railroad" report of 1979 apparently supported the view that a rail line should be built to connect with the Lower 48.

One of the first economic studies concerning whether such a rail link should be built was the University of Alaska's 1979 "Transportations System Planning for Alaska" study. That study explores the cargo traffic implications of the rail extension, inclusive of costs and cost comparisons with and without the rail link. That study indicates that cargo originating or terminating in Alaska would find it difficult to warrant the rail link. The 1980 study for the State Legislative Affairs Agency carries the analysis one step further in that it attempts to identify cargo that might be carried on the Transcontinental rail route. However, the cargo estimates are really assumptions rather than estimates. The next analysis "Interior Alaska Transportation Study" of 1982 conducted a comprehensive benefit-cost study of a variety of railroad extensions and found that an extension from Eielson to the Delta Belt (along the proposed transcontinental route) is the best of the various rail proposals in Alaska's Interior since there is some reason for the line and its costs are within reason. It also suggests that this extension is still infeasible at present. That study did not analyze the extension all the way to the Canadian Border. The study also tied the extension's economic benefits only to the immediate and known users or user types -- mining companies

and agriculture. The final study conducted relative to the transcontinental rail link is an environmental assessment conducted in 1985 by the Alaska DOT/PF. It is a good comprehensive review of the environmental issues and potential impacts, and it represents the first serious environmental review done relative to any of the currently envisaged rail line extensions.

b. Transcontinental Rail Link Extension Processes

The transcontinental issue is complex, given that two nations (the United States and Canada) are involved. It also appears that there has never been an in-depth study of the "who will benefit most" issue. Rather, there have only been limited scope and somewhat specialized studies, some of which merely rewrite what other studies previously discovered. Despite this lack of major study, or analytically detailed work, attempts to make decisions and to proceed have occurred. It would appear that the political process was in the lead, followed somewhat distantly by the study and professional investigation process. It appears that the transcontinental rail link was not subjected to unbiased in-depth study and was not assessed in accordance with objective evaluation criteria or procedures.

2. North Slope Extension

Beginning in the late 1960's, attention was focused on the North Slope oil, the methods of carrying it to market, and the transportation system needed to support the petroleum facilities. Several transportation facilities (the Alyeska pipeline, the pipeline service road, and Deadhorse Airport) were built to service Prudhoe Bay. No rail line has been built, and the discussion concerning the appropriateness of such a railroad has declined considerably since the pipeline's construction and operation.

a. Previous Studies and Deliberation Procedures

Several studies and groups have pursued a railroad extension to the north, with the following being the most notable:

* "Report of the NORTH Commission" (State of Alaska) -- 1970.
* "Alaska Transportation Corridor Study" (U.S. Department of Transportation) -- 1970.
* "Western and Arctic Alaska Transportation Study" (State of Alaska) -- 1981.

The earlier works sought to extend the Alaska Railroad to the north. The most recent transportation study plan for the region discounts rail as a non-viable mode to serve the region.

The NORTH Commission in 1970 recommended to the Governor that "... the federal government should extend the Alaska Railroad north over the Brooks Range to the oil and gas fields..." The Commission aggressively sought a railroad rather than a pipeline; however, the NORTH Commission's views on North Slope Transportation were not followed. Then, in 1970 - 1972, the "Alaska Transportation Corridor Study" was conducted. This in-depth study dealt with the engineering/alignment feasibility and options related to building a rail line directly to the north and on to the North Slope area. This study found that it is technically feasible to construct a railroad to the north since it is definitely feasible from the engineering standpoint. The line would represent 581 miles of new railroad and would cost well in excess of $1 billion to implement. The study found what it believes is the best rail alignment to the north, and suggests that "It is feasible, from an engineering standpoint, to construct and maintain both railroad and highway facilities."

Despite these pro-railroad extension entities, several examinations indicated that rail is not the best mode. The Alyeska

Pipeline Service Company decided that a service road was superior to a rail line for its purpose, and that construction cost savings did not justify a railroad. Furthermore, the 1982 Western and Arctic Alaska Transportation Study did not even consider a rail line to the north as a subject worth studying (it did study the rail option up to the Ambler District and to the west). In other words, it would appear that a rail line extension north to the Arctic region has been superceded by pipeline construction events. The specific rationale for such a rail extension no longer exists -- unless one considers the benefits of opening new lands for development, which studies to date do not seem willing to do. Instead, the benefits of rail in these previous investigations typically are assigned to the currently expected use (e.g., a mineral, or oil, or coal) and if that use is insufficient to pay for the rail, the mode is eliminated.

b. North Slope Extension Processes

The process of considering the northward rail extension appears to have been of a political consideration early in the process, and then to have been a private sector consideration (the pipeline companies) who apparently discarded rail very early in the process, and finally the conduct of a very detailed, very expensive government study. The detailed government study was not completed until it was too late (1970 - 72), and even that study dealt with physical items such as alignments and the like, rather than an alternatives analysis or a rail road-oriented economic development analysis. In other words, it would appear that the subject of a North Slope-oriented rail extension was never given serious study relative to need and appropriateness -- only an alignment study was done, and done too late to resolve any of the pipeline or pipeline construction issues.

3. Extension West to Seward Peninsula

An Alaska Railroad extension from the vicinity of Nenana west to the Seward Peninsula, to Nome and/or Teller, has long been a subject of study, although most recently it has not been a subject of current debate. Such an extension, which would require some 880 miles of new railroad construction and the crossing of the Yukon River, would be one means of enabling access to a west coast port; another method would be to build rail access to Tanana on the Yukon River.

a. Previous Studies and Deliberation Procedures

The early studies of this corridor were principally for military reasons, were concerned with the delivery of war material to the west coast (Teller) port, and only examined possible rail line alignments. There was little thought given to the rail extension's rationale (other than military), its economic impacts, or other Alaskan concerns.

Studies and consideration given to a rail extension to the Seward Peninsula include:

* "The Richardson Study" (U.S. Army) -- 1906
* "Reconnaissance for Railroad or Highway West from Fairbanks" (U.S. Army) -- 1942
* "Berryhill Report" (U.S. Army) -- 1943
* "Fairbanks to Nome Study" (State of Alaska) -- 1967
* "Western and Arctic Alaska Transportation Study" (State of Alaska) -- 1981

The Richardson Study of 1906 entitled "Reconnaissance and Survey for Land Routes from Fairbanks to Council City, Alaska" comprised an on-ground field survey of possible rail routes, as requested by Congress. The study found a route that could be built, but the rationale for such a route was never examined or

studied. The 1942 U.S. Army study entitled "Reconnaissance for Railroad or Highway West of Fairbanks" had a purpose in mind for the rail extension - to find a method of delivering war material to Siberia via a port to be built in the Norton Sound - Kotzebue Sound area. This survey was also merely an on- ground examination of alignments, supplemented with aerial reconnaissance, but without consideration of other types of "feasibility" criteria. The Berryhill Report of 1943 was another on-ground reconnaissance from Nenana to Nulato and to the Seward Peninsula.

The State of Alaska 1967 "Fairbanks to Nome Study" again suggested possible alignments, and was based on extensive use of USGS maps, aerial photography, and aerial reconnaissance. Once again, it comprised a study of alignments rather than a study of whether to build, or why to build, a rail extension. The 1981 "Western Arctic Alaska Transportation Study" analyzed the transportation needs of the western region only, but did not examine regional ties to the rest of Alaska and therefore did not consider a rail extension from the ARR. It did consider several intra-regional rail projects that would be mineral extraction oriented, but found them to be insufficient to warrant the construction of a new rail line. In this last study, feasibility was considered first, rather than first looking for possible alignments.

b. Seward Peninsula Extension Processes

Considerable expense has been invested in considering a rail extension to the Seward Peninsula. Nearly all has been expended on alignment studies - intended to answer the questions "can a rail line be built, and on what alignment?" It appears that there has never been a good examination of why such a rail extension should be built, what it might accomplish, how economically

or financially feasible it would be, how it might be funded, what cargo it would carry, or whether it might develop the area.

The reason for these deficiencies likely lies with the fact that the most serious consideration of the corridor was given many years ago, and principally by the Army for military reasons. It appears to be feasible, from the engineering perspective, to build such a line. There has been no attempt, however, to justify the extension on economic, financial, economic development, environmental or other bases. If a Seward Peninsula extension is to receive serious consideration currently, it would need a thorough feasibility study with less attention given to alignment and more attention given to whether it should be built.

4. Extension Northwest to Bornite, Kobuk, Ambler District

Unlike some rail extension proposals, an extension to the Bornite/Kobuk/Ambler District west of Bettles and Alatna would have a known purpose -- to transport the region's considerable copper, lead, and zinc ores and concentrates. Comprising the Bornite, Arctic, Sun and Smucker deposits, mineral extraction suffers from lack of transportation. Therefore, rail access is proposed and studied from time to time. Most proposals suggest a new rail line from Nenana to Tanana to Alatna and then on to either Kobuk or to Bornite via Bettles. The Alaska Railroad Corporation Act, Sec. 42.40.355 indicates that the railroad "... may not apply for a right-of-way across, or exercise eminent domain in, the Western (Kobuk River) unit of the Gates of the Arctic National Preserve..." This prohibition requires a southern route to the Ambler District unless the State were to be the applicant (the restriction applies only to the ARR).

a. Previous Studies and Deliberation Procedures

Since the discovery of these massive mineral deposits, a number of studies of a possible rail link have been undertaken.

* "Reconnaissance for Railroad or Highway West From Fairbanks (U.S. Army) -- 1942.
* "Extension of the Alaska Railroad, A Report to the North Commission" (State of Alaska) -- 1967.
* "Report of the NORTH Commission" (State of Alaska) -- 1970.
* "Alaska Transportation Corridor Study" (U.S. Department of Transportation) -- 1970.
* "Western and Arctic Alaska Transportation Study" (State of Alaska) -- 1981.
* "Interior Alaska Transportation Study" (State of Alaska) -- 1982.
* "Alaska Railroad Study" (Harvard Business School) -- 1982.

The subject of a rail extension to the Ambler minerals area was initially viewed in engineering terms (can a railroad be built, and at what cost?), although the most recent examinations also considered financial feasibility.

The 1967 extension study by EBS Management Consultants accepted the 1942 U.S. Army route, and then explained in comprehensive, but not analytically detailed, terms why the railroad should be built. The study reviewed the development possibilities, the ores and marketability of the ores of the Kobuk area, and examined railroad operation costs. The study is an excellent overview, but is not at all sufficient to enable prudent policy decision since detailed analysis work is not present in a comprehensive fashion. The study suggests a rail line extension from Dunbar to Alatna to Kobuk. The NORTH Commission in 1970 suggested that the construction of a railroad to the North Slope Oil Field through Alatna would "...provide an already- built transport route to Alatna, the natural point where a surface transport route should swing westward toward Kobuk...." In this sense, the NORTH Commission tied the 139 mile Alatna to Kobuk

extension to its proposed rail line to Prudhoe Bay. Also in 1970 was the "Alaska Transportation Corridor Study" by the Federal Highway Administration. This study explored routes to Kobuk and suggested the Nenana- Alatna-Kobuk route. This study comprised an exhaustive engineering study of alignments, construction issues and costs. It depicted construction feasibility from the engineering standpoint, but did not address whether such an extension should be considered or built.

Finally, the 1981 "Western and Arctic Alaska Transportation Study" addressed the economic/financial feasibility of a rail line into the Kobuk Valley/Ambler District area. It found that "None of the proposed scenarios regarding mineral transportation (by rail) and access routes have proven to be financially or environmentally viable." This study also looked at other options for transporting the minerals (modal as well as rail destination options). However, the study assumed all rail costs to be borne by the initial users (the minerals) in its conclusion. It also recommended that a detailed feasibility study be conducted (cost $686,000) to include socioeconomic, cultural and environmental impacts and, if the feasibility study results are positive, then a detailed survey of the selected alignment (cost $2.8 million). The most recent study, comprising a brief overview and opinion, is the 1982 Harvard Business School study which suggests that public investment in the Ambler rail extension will be necessary if it is to proceed, and encourages government to make that investment.

b. Ambler District Extension Processes

In the case of the Kobuk/Bornite area, the reason for a rail extension is known -- the carriage of minerals. Also, an alignment is established in a generalized sense. What has not

been established, however, is whether or not the extension is feasible in the economic/fiscal/environmental sense. While the world prices for the minerals remains depressed, it is likely that there will be no pressure to build the extension. However, if mineral prices climb, the rail extension could become a project worthy of detailed consideration.

However, the initial beneficiaries of the railroad would likely be only a few mining companies, which raises the issue of a proper role for the State of Alaska relative to resources based rail extension projects. Without question, much more exhaustive feasibility analysis is needed before any decision is made.

5. Beluga Coal Fields Rail Link

The Beluga Coal Fields west of Anchorage will require a means of moving coal from mine to tidewater, since market assessments indicate that the coal's major destination will be Asia and tidewater port access is therefore requisite. The coal mines and supporting facilities are currently in various stages of planning; no construction has taken place to date.

a. Previous Studies and Deliberation Procedures

The Beluga Coal Field is being developed by several private coal firms led by the Diamond Alaska Coal Company and Placer U.S. This group has undertaken a number of studies relative to specific development issues, among which was transportation. Several modal alternatives were considered including a coal haul road, a railroad, and conveyors. These studies found that conveyors were the superior mode to carry up to 12 million tons of coal per year. Rail transport was found to be more expensive than conveyor. This was based on constructing a bridge over the

Susitna River to connect the extension with the ARR, as well as making allowance for use of an existing tidewater port. In addition, it was concluded that a rail route would raise a number of environmental issues. The present plan is to move coal from the mines to a to-be-built coal port on Cook Inlet via an 11-mile conveyor.

b. Beluga Coal Link Extension Processes

The coal field development is being handled by the private sector, subject to requisite government permits and regulations. As such, the study of transport access and the transport (non-rail) decision was effectuated within the private sector based on cost effectiveness and environmental and other issues expected to surface as the process moved to the public sector review stage.

If rail had been the selected mode, it is likely that this would have been a private, single purpose railroad, not affiliated with the Alaska Railroad. If so, it is doubtful whether State government would have had any role other than the permit and regulatory process.

6. Knik Arm Crossing

A highway crossing of the Knik Arm has represented a possible major roadway project for quite a number of years. The project has always been envisaged as a highway, and rail has not been a key component in the studies or in the deliberation process.

a. Previous Studies and Deliberation Procedures

Since the crossing is intended to be a highway, the studies phase and consideration process are in the public sector -- the State, Federal government, and local jurisdictions. Quite a number of analyses have been done, such as the following:

* "Knik Arm Highway Crossing" (State of Alaska) -- 1972
* "Knik Arm Crossing: Survey Report" (State of Alaska) -- 1983
* "Knik Arm Crossing: Economic Feasibility" (State of Alaska) -- 1983
* "Knik Arm Crossing: Final Corridor Alternatives Analyses" (State of Alaska) -- 1984
* "Knik Arm Railroad Crossing Feasibility Study" (State of Alaska) -- 1984
* "Knik Arm Crossing: Draft EIS" (State of Alaska) -- 1984

All of the above, except for the "Railroad Crossing Feasibility Study" of July 1984, deal exclusively with highway matters. They are in great detail and follow standard Federal Highway Administration (FHWA) procedures. The rail analysis, on the other hand, comprises a brief overview of the economic feasibility of a new route which would reduce rail distances by 23 to 28 miles, thus reducing operating and maintenance costs plus serving potential mineral and other traffic. The study indicated that the rail crossing, whether on or separate from the highway bridge, was infeasible. The methods and criteria used to determine this conclusion are the same as that used for the road -- savings in car or train miles, car or train hours, etc. The principal economic benefit used in the rail analysis is that of the operating cost savings that might accrue to the ARR. Such savings were found to be meager when compared with the cost of building a separate railroad bridge or adding a railroad capability to the proposed highway bridge.

b. Knik Arm Rail Crossing Processes

The rail link across Knik Arm apparently never received much consideration. The analysis was done almost as an afterthought, and was conducted in a manner used on highway projects. The work was done entirely within the domain of the public sector, funded presumably with public highway funds. The process was to see if the rail could be added to the highway crossing, thereby presumably sharing costs. The study concluded with a resounding "no".

7. Nikiski Extension

This proposal would create a rail line between the Port of Seward and the petrochemical facilities at Nikiski on Cook Inlet via Moose Pass. This extension had some support a decade ago, but more recently has not been a subject of consideration.

a. Previous Studies and Deliberation Procedures

No studies were found that included the assessment of a Nikiski rail extension. It appears that this extension prospect was limited to talk and speculation, rather than analysis. The extension certainly had a rationale -- connect the Nikiski industrial area to a deep water port via a railroad. However, it apparently never got beyond the discussion phase.

b. Nikiski Extension Procedures

The Nikiski extension never reached the stage of entering into any set of procedures.

C. Need for Extension Processes and Criteria

Because no major rail extension has been constructed since the Alaska Railroad was built, (other than the Whittier and Eielson Air Force Base extensions built for military reasons and the extensions to the airports), and because none of the extension proposals made during the last 30 years has progressed much beyond the discussion stage, an established extension evaluation process does not exist. As a result, each extension proposal has been discussed; some have been considered by one entity, but not by other entities; and so on. With the transfer of railroad ownership to the State, an issue that has already arisen is what type of process and structure should be used by the State for considering extension proposals.

1. Observations Concerning Past and Current Extension Processes

The review of the seven rail line extension proposals found that none of the extensions have been implemented, and each is somewhat unique in that it has its own positive and negative features. Despite these variations, there are summary findings that should be useful in the consideration of extension assessment procedures and criteria.

(1) There are currently in Alaska no established and utilized processes or criteria that are used to consider extension proposals. Instead, each extension proposal is considered independently of the others, utilizing evaluation methods and promotional techniques that are unique to the specific proposition.

(2) While the ARRC might consider railroad extensions that are in the railroad's best interest, the railroad is not charged with the specific responsibility of considering extension proposals when such extensions are in the state's best interest. This responsibility, according to the legislature, lies with the DOT/PF.

(3) Very little attention has been given in the evaluation stage to the extension's economic/financial feasibility, economic development potential, or impact. Instead, the early consideration phases seem only oriented to alignment options and whether a rail line can be constructed in the engineering perspective. The studies tend to address whether a line can be built (alignment) rather than whether a line should be built (feasibility).

(4) There appears to have been no comprehensive, in-depth feasibility studies. Instead, single purpose studies are the norm which address alignments, or environment, or overview discussions. In the latter instance, many studies do little more than to repeat previously studied information, thereby shedding little new information. The studies that were reviewed are typically insufficient to enable a proper and final decision regarding any extension.

(5) When a study has considered the feasibility of an extension, the analysis has sought to determine whether the single known prospective user (a mine for example) will have sufficient volume to warrant rail line construction. When the single user is found to not have enough volume, the rail line is concluded to be infeasible. No weight is given to the possibility that the rail line will open terrain, could generate other traffic of currently unknown origins, and could be shared by many users (eventually). In fact, no extension has been investigated to determine whether there would be benefits of simply creating ground access to currently inaccessible regions of the State. Other than oil, it is doubtful that any single Alaskan natural resource is sufficiently valued by the market to be able to afford its own transportation (rail) system. Certainly none have been found to date with that capability. If this is true, then it would follow that there will never be any rail line extensions unless the perspective is revised to look beyond the single known user. Such a perspective and process are presented in Report Section VI.

(6) It would appear that public sector decisions have been hindered (or made impossible) by the lack of detailed and comprehensive feasibility analysis, lack of a specific review or consideration process, and a lack of evaluation criteria.

(7) Of the few investigations that have examined economic or financial feasibility, they have typically used different analysis methods and cannot therefore be readily

compared one with the other. Those that have examined feasibility are typically not true railroad studies, but instead are the more comprehensive studies sponsored by DOT/PF (all-mode, regional studies).

(8) There appears to be a tendency to conduct "railroad" studies rather than "alternatives analysis." If the purpose is to create access to a region, any of several modes should be considered. The recent regional studies of the DOT/PF somewhat overcome this problem.

(9) The reasons for building an extension vary considerably -- access to coal, or mineral ores, or agriculture, or a port, or for military reasons, or to provide operating efficiencies for the existing railroad. An evaluation process with appropriate criteria, to be useful, should be capable of equitably handling this diverse range of rail extension purposes.

(10) It would appear that some extension proposals linger in the public eye and in the governmental sector well after they have been discounted and are no longer candidates in the eyes of the private sector. Some of the studies seem oriented to the creation of a holding pattern, leading to no decision, just further delay without any action.

(11) There appears to be a tendency to avoid speculation. If the known potential user of the line cannot justify the line, it is not built. While this may be prudent in the short-term, it also avoids the opening of new lands and resources. It appears that no research has been conducted on any of the extensions relative to their potential role in enabling economic development. Without such evidence, there is uncertainty which apparently leads to the status quo, and ultimately to no decision.

(12) There are established State and Federal programs and funds that can be used to study and to then build highways and airports. As a result, construction occurs. In the case of the rail mode, there is no funding program for railroad construction and very little money except for planning. Therefore, if anything major is to be done by the State, in all probability it requires special legislative appropriations, general fund use or innovative financing techniques.

2. Rationale for Extension Process and Criteria

If the State were to adopt a process whereby extension proposals could be reviewed, and were to adopt criteria to assess them, such processes and criteria need not dilute the important roles played by the State Legislature, the DOT/PF, the Alaska Railroad Corporation, and others. Rather, such processes and criteria would only seek to structure the evaluation process. Such a structuring process could have the following example advantages.

* Extension proposers would have available to them an outline of the phases and items that must be considered before an extension can be built. Their understanding and perhaps their realism would thereby be enhanced.

* The proposers would know who to contact relative to the extension proposal, who would review the proposition, and who to contact for data, comparable studies, and the like. A more informed and more complete proposal could therefore be developed.

* A mechanism could be set up that would keep a file on every extension possibility, for the use of all relevant entitites.

* A mechanism could exist to ensure that all relevant parties are notified of the proposition. Such sharing of information should lead to greater debate and understanding.

* The key issues could be exposed early. This is especially important, since the key implementation issues could decide the ultimate fate of the expansion.

* The expediture of vast sums on detailed studies could be avoided by a sound approach earlier in the process.

* The legislature, DOT/PF and ARRC would have a structured approach, which should be more informative, less misleading, and more cost-effective.

* A set of analysis methodologies could be developed, so that extension studies are comparable and properly done.

These arguments in favor of a process would appear to be even more valid now that the State owns the railroad. Many people and groups feel that the railroad must extend to other corridors, for a multiplicity of reasons. If this thinking is translated into extension proposals, the State will be thankful for a process by which such proposals can be considered.

D. Suggested Process and Criteria

It is recommended that the State adopt a process which provides some structure and order to the rail extension evaluation process. Within this context, however, the State could adopt any of a variety of methods.

1. Railroad Extension Implementation Process

Before a possible State role or process can be established, it is requisite that the rail implementation process be understood. The overall process, from project identification through construction, is presented in Table 5-1. This table seeks to place the process into five distinct and sequential phases. Each phase is intended to achieve specific purposes, and the desire is to provide an orderly sequence to the overall process, to avoid needless expenditures on Phase III studies when the proposed extension is still in Phase I or II.

* Phase I: Project Identification - This phase is intended to be informational, to let various agencies and entities know that an extension may be in the formative stages, and to identify various aspects of the extension proposition. At this point, there is no thought of studies or other public expenditures.

* Phase II: Pre-Feasibility - This phase entails brief studies and analyses, intended to see if the extension warrants detailed review. At this stage, the work is still of a preliminary nature, with low expenditures involved.

The purpose is to see if the more expensive Phase III work should be done.

* Phase III: Feasibility - In the third phase, the detailed and more expensive studies are conducted. It is here that the extension becomes a serious contender, and it is here that the economic feasibility and other studies are done in sufficient detail to enable a decision whether to proceed with final design and implementation or not.

* Phase IV: Final Planning and Design - This phase comprises all those things that must be done between the time that a decision to proceed with construction is made and the actual start of construction. Final design of the extension is one example of this phase's work.

* Phase V: Implementation - Finally, the implementation phase (actual construction) occurs.

Table 5-1
A SUGGESTED PHASING OF THE
RAILROAD EXTENSION IMPLEMENTATION PROCESS

PHASE I: PROJECT IDENTIFICATION

Purpose: An introductory phase, to let relevant agencies and others know that a rail line extension is beginning to be considered.

1. Identification Of What Extension Is Being Considered.
   * General corridor
   * Purpose or function
   * Rationale
2. Identification Of Participants
   * Proposer
   * Major potential rail extension users
3. Extension's Expected Key Issues Or Problems, For Example:
   * Cost
   * Funding
   * Right-of-way
   * Environmental and social
   * Other
4. Extension's History, If Any
   * Previous proposals
   * Previous studies
5. Proposal's Current Status
6. Possible Or Expected Roles For Various Participants
   * State government
   * Local government
   * Private sector
   * Alaska railroad
7. Other Items Thought Worthy Of Review And Consideration

PHASE II: PRE-FEASIBILITY PHASE

Purpose: Conduct brief analysis to determine whether the extension concept makes sense, to see if it has sufficient attributes to merit consideration, but without conducting detailed and expensive studies.

1. Prospective Rail Utilization
   * Cargo types
   * Origins and destinations
   * Cargo volumes
   * Other potential or conceivable cargo
   * Passenger use, if any

Table 5-1
A SUGGESTED PHASING OF THE
RAILROAD EXTENSION IMPLEMENTATION PROCESS
(continued)

2. Conceptual Alternatives Analysis And Rationale
   * Rail
   * Road and truck
   * Other
3. General Alignment Studies
   * General corridor
   * Alignment options
   * Map studies
   * Aerial reconnaissance (optional)
4. Right-Of-Way Acquisition Issues
   * Purchase
   * Lease or easement
   * Key difficulties
5. Supporting Facility Needs
   * Rail facility
   * Other facilities
6. Preliminary Estimates Of
   * Capital costs
   * Cost Effectiveness
   * Economic development impact
   * Environmental issues
   * Social issues
   * Implementation issues
7. Campatibility With
   * State plans and programs
   * Regional and local plans
   * Rules, regulations, laws
8. Open Dialog With Relevant Agencies
9. Expectations From State Government
10. Public Participation Plan

PHASE III: FEASIBILITY PHASE

<u>Purpose</u>: Conduct sufficient detailed studies to enable a decision to implement or not to implement.

1. Final Alignment Study
   * Field Surveys
   * Specific final alignment mapping
2. Track Profiles
   * Gradients
   * Facilities

Table 5-1
A SUGGESTED PHASING OF THE
RAILROAD EXTENSION IMPLEMENTATION PROCESS
(continued)

3. Conceptual Design
   * Track work
   * Structures
4. Quantities Extimates
   * Earthworks
   * Other
5. Cost Estimate Refinements
6. Financial Feasibility
   * Railroad capital costs
   * Railroad operating costs
   * Railroad revenues
   * Life cycle evaluation
7. Economic Feasibility
   * Induced development
   * Job creation
   * Efficiency
   * Production
     Total costs
   * Discounted costs and benefits
8. Environmental Impacts
   * Assessment (EIA)
   * Statement (EIS)
9. Social Impacts
   * Beneficiaries identification
   * Impacted person's identification
   * Key groups impact
10. Public Participation
11. Financial Plan
    * Responsibilities
    * Funding sources
    * Cash flow
12. Relationship With Alaska Railroad
    * Operations
    * Responsibilities
13. Applications To Appropriate Public Agencies
14. Institutional And Management Plan
15. Decision Whether To Implement

PHASE IV: FINAL PLANNING AND DESIGN PHASE

Purpose: Design the rail extension and conduct all other work leading up to actual construction.

Table 5-1
A SUGGESTED PHASING OF THE
RAILROAD EXTENSION IMPLEMENTATION PROCESS
(continued)

1. Engineering Design
   * Railroad facilities
   * Support facilities
2. Final Cost Estimates
3. Engineering Specifications
4. Project Implementation Program
5. Final Financial Plan
6. Approval By Public Agencies
7. Construction Plan

PHASE V: IMPLEMENTATION PHASE

Purpose: Construct the rail extension.

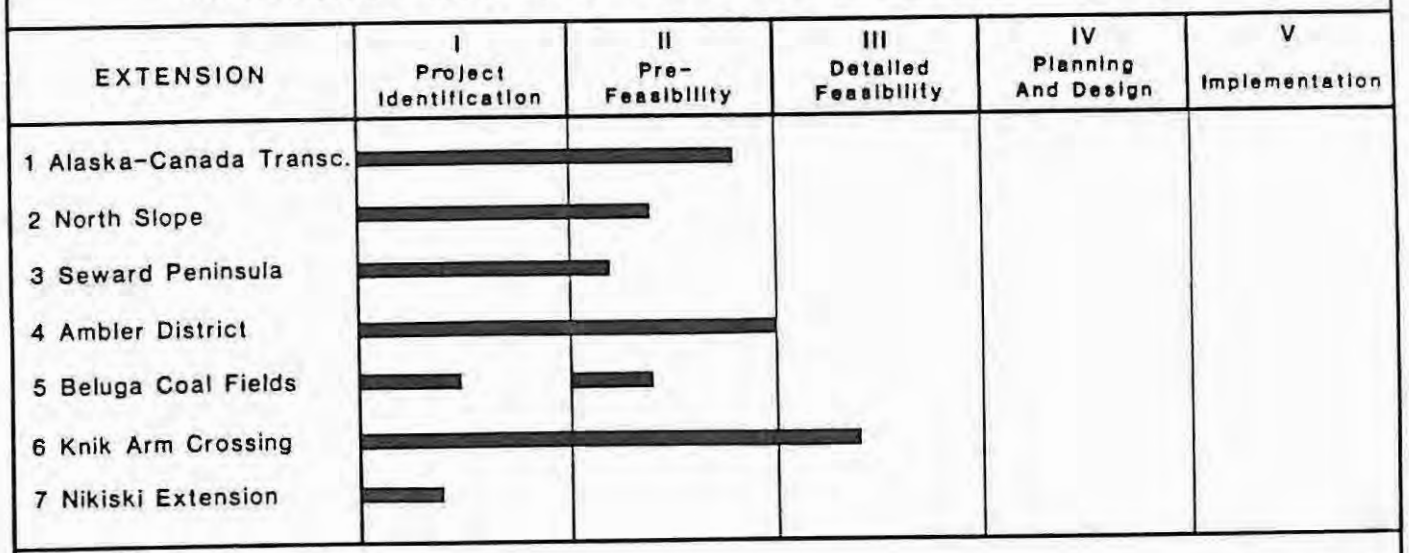
1. Right-Of-Way Acquisition
2. Bidding
3. Utility And Other Agreement
4. Construction
5. Construction Inspection

Source: Wilbur Smith and Associates

By dividing the process into these five phases, it is possible to visualize where each of the seven previous or current extension proposals are in the process. Figure 5-2 indicates that only the Knik Arm Crossing (rail component) entered Phase III: Detailed Feasibility, and this extension was found to be infeasible. The other proposals never went beyond the Pre-Feasibility Phase.

In other words, although several of the extension proposals have been around for many years, and despite a few studies, they really have not progressed very far.

GENERALIZED STATUS OF RAILROAD EXTENSION PROPOSALS



Source: Hellur Smith and Associates

FIGURE 5-2

2. State's Rail Extension Evaluation Process

Within the context of the Table 5-1 five phase implementation process, it is suggested that the State should have specific roles and functions relative to each phase. These roles and functions are identified on Table 5-2. Several significant points are made in Table 5-2, including the following:

a. Centralized State Review

It is recommended that the State's participation in the extension process be centralized and coordinated in one entity. While the creation of a new entity could be one means of establishing such a body, it is recommended that the DOT/PF already has the role due to its enabling legislation, its designation as the "official State rail planning agency" by the governor and the Federal Railroad Administration, its active and leadership role in the railroad transfer process, and the capabilities of its headquarters staff.

Because extension considerations must cover a wide range of interests and disciplines, it is also suggested that the DOT/PF utilize some type of advisory committee comprised of representatives of the ARR, various State agencies, and others. Such a Committee could meet only infrequently (only when an extension proposal is under active consideration by the DOT/PF) and will enable an orderly and informed approach to extension consideration and evaluation.

Such a centralized role by DOT/PF plus its advisory committee would not dilute the extension roles of the ARRC; rather, the ARRC would still determine by itself and for itself which extensions, if any, are in the railroad's best interests. The DOT/PF role would be different since it would determine which railroad extensions are in the State's best interests.

b. State Roles

Table 5-2 indicates, for several phases, that the DOT/PF should "...conduct, or guide, or review..." The reason for this range of roles is that rail extensions can be proposed by any of a number of interests, and for a variety of reasons. For example, if the extension is a State proposition, or with statewide significance, then the State should expect to actively conduct and/or fund much of the work. If a local proposition, the advise and review role might be more appropriate. If the extension is proposed by the private sector, then a more passive review role may be more appropriate. The proper State role, therefore, should be dictated by the extension proposition, rather than by some rigid quidelines.

c. Methodology Guidelines

It is also suggested that the DOT/PF rail extension group have overall methods and approaches to use when extension proposals are analyzed or reviewed. Such methods should be tailored to the specific phase of the proposal and should be utilized to avoid unnecessary or methodologically improper or misleading study. Report Section VI describes such evaluation methodologies: 1) A methodology to use when considering a rail line extension proposal, and 2) Methodologies to use when evaluating a State investment on the existing railroad.

3. Rail Extension Criteria

In addition to a rail line extension process and evaluation method, it is suggested that a set of criteria, or at least subject matter, be established. Any extension proposal should be expected to address the criteria at some point as it moves through the five-phase process. The generalized criteria, by

Table 5-2
A SUGGESTED STATE RAIL
EXTENSION EVALUATION PROCESS

ADMINISTRATIVE AFFAIRS PROCESS

Purpose: Centralize the rail extension review and consideration function within a single, designated, and knowledgeable body.

1. Agree that the DOT/PF is the proper entity
2. Form a rail extension Advisory Committee
   * Controls
   * Representative membership
3. Provide this Committee with specified but limited powers.
   * Powers of review and advice
   * Reporting requirements
4. Fund the extension review process
   * The DOT/PF function
   * The Advisory Committee function

PROJECT IDENTIFICATION PHASE

Purpose: To enable the DOT/PF and its Advisory Committee to be acquainted with all extension proposals, to know of their status, and to collect and disseminate information as needed.

1. Create and maintain a file on every extension proposal.
   * Obtain information from extension proposers
   * Create and keep current a file on each extension
2. Provide Advisory Committee members with relevant information.
   * Send information, as appropriate
   * Have meetings, as appropriate
3. Have information available for use by extension proposers, and others.
   * Copies of other extension studies
   * Sources of relevant information
   * Consultant list
   * Description of State's evaluation criteria
   * Description concerning the implementation process
4. Provide information to others.
   * Advise jurisdictions in the area of the extension
   * Notify others
5. Be prepared to respond to Legislator and other inquiries.
6. Budget funds for the Pre-Feasibility Phase

Table 5-2
A SUGGESTED STATE RAIL
EXTENSION EVALUATION PROCESS
(continued)

PRE-FEASIBILITY PHASE

Purpose: Conduct, or guide, or review the analysis and studies of this phase, in order to determine whether the extension proposal makes sense and whether or not it should proceed into the more detailed and expensive feasibility phase.

1. Prepare and have available an overall pre-feasibility analysis methodology.
   * Standard approach to economic effectiveness analysis
   * Lists of other items to be addressed in investigations
2. If State sponsored extension proposal, be prepared to conduct the necessary pre-feasibility phase studies and analyses.
3. If local government extension proposal, be prepared to conduct the studies, or to fund them, or to guide them and provide advice.
4. If private sector extension proposal, be prepared to provide study methodologies, to provide review and comment, and otherwise participate as warranted.
5. Assist local governments and other entities that might be affected by the proposed rail extension.
6. Budget funds for the Feasibility Phase

FEASIBILITY PHASE

Purpose: Conduct, or guide, or review the analysis and studies of this phase, in order to help determine whether the extension should be built.

1. Prepare and have available an overall feasibility analysis methodology.
   * Standard approach to economic benefit/cost analysis
   * Lists of other items to be addressed in detail
2. If State sponsored extension proposal, be prepared to conduct the necessary feasibility phase studies and analysis.
3. If local government extension proposal, be prepared to conduct the studies, or to fund them, or to guide them and provide advice.

Table 5-2
A SUGGESTED STATE RAIL
EXTENSION EVALUATION PROCESS
(continued)

4. If private sector extension proposal, be prepared to provide study methodologies, to provide review and comment, and otherwise participate as warranted.
5. Assist local governments and other entities that might be affected by the proposed rail extension.
6. Budget funds for the remaining phases
7. Apply for and/or acquire and/or preserve rights-of-way

FINAL PLANNING AND DESIGN PHASE AND IMPLEMENTATION PHASE

Purpose: Conduct, or guide, or review the design and implementation processes.

Source: Wilbur Smith and Associates

process phase, are depicted in Figure 5-3. As shown, most criteria are suitable for use in Phases II and III.

a. Engineering Criteria

Given Alaska's terrain, weather variations and high implementation costs, any rail line extension should meet engineering criteria that are specific to the State of Alaska. The criteria or items that should be addressed are listed in Table 5-3. Rather than specify criteria standards, it is suggested that the specific standards can be obtained from six relevant sources:

* "Manual of Recommended Practice of the American Railway Engineer's Association" (AREA).
* "Alaska Transportation Study," by Tudor-Kelly-Shannon, Interim Report #4, 1971,, "Criteria for Preliminary Design."
* Special Standards of the Alaska Railroad
* "Standard Guide Specification," U. S. Army Corps of Engineers
* "The Standard Specifications for Highway Bridges of the American Association of State Highway and Transportation Officials" (AASHTO).
* "The Standard Specifications for Highway Construction," State of Alaska.

A key point is that the engineering criteria apply only in the most generalized sense in Process Phases I and II. They should come into play in a serious way only in Phase III. -- after it is established that the rail extension makes sense, may be feasible and warrants the expenditure of sizeable funds relative to detailed study.

b. Financial and Economic Criteria

Prior to the application of engineering criteria is the need to establish and apply financial and economic criteria. The financial criteria should view the extension prospect from the

veiwpoint of the railroad -- and whether or not the project will pay for itself in the railroad cost and revenue sense. The economic criteria on the other hand, should view the extension from the perspective of the State or region as a whole, with emphasis on jobs, payroll, and induced economic activity. It is likely that an extension can be financially infeasible, but economically feasible.

Table 5-4 presents a checklist of suggested financial and economic criteria. Effectively, the financial issue is to estimate life cycle costs and revenues to see if the railroad will earn a profit. The economic issue is intended to ultimately lead to a quantified benefit/cost analysis, to show economic feasibility from the total State's economic perspective to see if the discounted B/C ratio is equal to or greater than 1.0, the internal rate of return is in excess of the real (excluding inflation) opportunity cost (4 or 5%), and the net present value is positive. Refer to Report Section VI for a more detailed description of the economic evaluation methodology.

c. Environmental Criteria

Any rail line extension should also meet State and federal requirements for Environmental Impact Statements/Assessments. Such detailed work, however, should await Process Phase III, since it is expensive and should only be done if the prospects are good relative to a feasible extension. Earlier in Phase II, however, the environmental items listed on Table 5-5 should be reviewed and considered in a general sense -- to see if there are any major environmental issues that might ultimately cause the extension proposal to prove impossible. Examples of such key elements are ice fields, Native lands, (d)(2) lands, and the like.

RAIL LINE EXTENSION CRITERIA APPLICATION BY PROCESS PHASE

APPLICABILITY BY PROCESS PHASE

	I. PROJECT IDENTIFICATION	II. Pre-FEASIBILITY	III. FEASIBILITY	IV. PLANNING AND DESIGN	V. IMPLEMENT
ENGINEERING ASPECTS:					
General Corridor	●				
Alignments		⊙	●		
Preliminary Design			●		
Final Design				●	
Operations		○	⊙	●	
FINANCIAL ASPECTS:					
Rail Line Use	○	⊙	●		
Railroad Revenue		○	●		
Railroad O&M Costs		○	●		
Capital Costs		⊙	●		
Financial Analysis		○	●		
Funding Analysis		○	⊙	●	
ECONOMIC ASPECTS:					
Cost Effectiveness	○	●			
Economic Costs		⊙	●		
Economic Benefits		⊙	●		
Feasibility Indicators		○	⊙	●	
ENVIRONMENTAL ASPECTS:					
Key Issues	○	⊙	●		
Land Impacts		⊙	●		
Environmental Impacts		○	●		
SOCIAL ASPECTS:					
Impacted Groups	○	⊙	●		
Lifestyle Implications		⊙	●		
Community Impacts		○	●	●	
Land Use Impacts		⊙	●		
Subsistence Impacts		○	●		
Public Review	○	⊙	●	●	

NOTE: "○" denotes some idea or concept of the answer
"⊙" denotes a preliminary, quantified estimate
"●" denotes best estimate based on detailed study

SOURCE: Wilbur Smith and Associates

FIGURE 5-3

d. Social Criteria

State and federal requirements for Environmental Impact Statements/Assessments and for right-of-way grants and permits establish a minimum set of social criteria and public notice procedures that any rail line extension should meet. Beneficial and adverse social impacts associated with a rail line extension cannot be assessed in detail until Process Phase III, i.e., until the economic and environmental impacts have been identified and analyzed. Communities and other social groups likely to be affected by a rail line extension, however, should be identified in Process Phase I and any applicable, current local land management and use plans should be reviewed in Process Phase II to anticipate major social issues or controversies that may be induced by the rail line extension proposal. The intent of the social analysis is to gauge the impact of any extension proposition on people, their lifestyles and their social conduct and well being. Table 5-6 presents social criteria that should be addressed prior to any rail line extension decision.

E. Railroad Extension Concepts

The following summarizes concepts which could govern in Alaska when railroad development is considered by the State outside of the Railbelt. They are drawn from some recent experiences in Canada and elsewhere in the U. S.

1. Characteristics of Recent Rail Extensions

During the last 30 years, only a handful of significant new railroads or extensions have been built in North America, and each was designed to haul coal or iron ore. These rail lines include: 1) the Quebec North Shore and Labrador (iron ore), 2) the Black Mesa and Lake Powell in Arizon (coal), 3) the Tumbler

Ridge in British Columbia (coal), 4) the Powder River Cutoff in Wyoming (coal), 5) the Lee Ranch Mine Spur in New Mexico (coal), 6) the Deserado Bonanza Western in Colorado (coal), 7) the Cartier Railway in Quebec, 8) and possibly a few others depending on one's definition of "significant" new rail lines. These railroads had the following elements in common:

* The line was based on hauling a dominant bulk commodity.
* The line was designed to carry a resource upon which the user was completely dependent (e.g., power plant designed to burn a specific coal) or a resource which was relatively insensitive to world market prices.
* The line often provided direct rail service between producing and consuming points by rail. (The iron ore line did involve a linehaul mode change between rail and water, and the Powder River line and others connected to the overall U.S. rail network.)
* In several instances the three principal components: (1) the resource (pit or mine), (2) the rail line itself, and (3) the receiver, were owned or controlled by the same corporate entity.
* Competing highway facilities are or were not available or the tonnage was such that highway was an ill-suited mode.
* A relatively long haul was involved.
* Substantial tonnage, well above the minimums required to sustain rail operations on a continuing basis, were reasonably certain.
* There was little or no need to interchange traffic with other railroads.

Against this, it is worthwhile to contrast the White Pass and Yukon Railway, a bulk minerals carrier over which service may never be restored. The WP&Y had the following elements:

* A very small shipper base.
* No corporate interlocking; each extractive industry could make its own transportation arrangements.
* No long term commitment either by shippers to use the service or the railroad to provide the service.
* A long linehaul distance involving two intermediate terminals: truck to rail and rail to water. Rail distance constituted a small portion of total linehaul distance.
* A railroad cost structure conducive to competition brought about in the first instance by labor (high salaries, contracts requiring excessive crew size) and the lack of economies of scale achievable with narrow guage equipment.

Table 5-3
ENGINEERING CRITERIA CHECKLIST
Rail Line Extension Proposals

ALIGNMENT ASPECTS:

General Corridor
* Termini of Line
* Topography
* Mapping

Alignments
* Rights-of-Way Lands
* Grades and Curvature
* Foundation and Materials
* Safety
* Service to Communities
* Environmental Issues
* Generalized Cost

DESIGN ASPECTS:

Geometrics
* Clearances
* Design Speed (Ruling and Other Grades)
* Vertical Alignment (Control Gradients, Compensation, Vertical Curves)
* Horizontal Alignment (Control, Circular Curves, Superelevation, Spiral Transition, Curves, Rights-of-Way Widths)

Structures
* Loading (Live, Impact, Wind, Temperature, Ice Forces, Earthquakes)
*Materials (AREA Manual)

Bridge & Trestle Foundations
* Pier Foundation
* Piles (Types, Ice Jacking, Bearing Capacity)

Earthworks
* Roadbed Standards
* Embankments
* Excavation
* Slope Protection
* Construction Season

Hydrology and Drainage
* Flood Frequency Design (Culverts, Bridge Spans)
* Peak Discharge
* Flood Clearances

Trackwork
* Ballast (Material, Dimensions)
* Ties (Materials, Dimensions, Spacing)
* Rail (Jointed or CWR, Weight)
* Fastenings, Anchors and Appurtenances
* Turnouts

RAILROAD OPERATIONS:

Service Levels
* Train Speeds
* Frequency
* Service Types

Utilization
* Tons
* Type
* Form
* Origin/Destination

Source: Wilbur Smith and Associates

Table 5-4
FINANCIAL/ECONOMIC CRITERIA CHECKLIST
Rail Line Extension Proposals

FINANCIAL FEASIBILITY ASPECTS:

Rail Line Use
* Cargo types
* Volumes
* Origin/destination
* Number of rail users
* Use alternatives
* Certainty of use
* Duration of use
* Line capacity needs
* Equipment capacity needs
* Use variations
* Induced demand

Railroad Revenue
* Rate expectations
* Annual revenues now
* Future annual revenues

Railroad O&M Costs
* Transportation
* Maintenance of way and structures
* Maintenance of equipment
* Traffic
* General overhead

Capital Costs
* Line construction
* R/W acquisition
* Equipment

Financial Evaluation
* Financial performance estimates
* Life cycle analysis
* Sensitivity analysis
* Funding analysis

ECONOMIC FEASIBILITY ASPECTS:

Cost Effectiveness
* Generalized capital cost
* Annualized cost per ton
* Annualized cost per car
* Induced jobs
* Ton value versus rail rate

Economic Costs
* Economic portion of capital costs
* Future capital costs

Direct Economic Benefits
* Railroad profit (loss)
* Railroad employment/payroll
* Railroad local purchases
* Induced jobs/payroll
* Induced purchases
* Induced local profits
* Induced tax base

Indirect Economic Benefits
* Basic impacts
* Non-basic impacts
* Economic multipliers

Feasibility Indicators
* Discounted benefit/cost
* Net present value
* Internal rate of return
* Distribution of benefits and costs

Impacts During Construction
* Displacements
* Economic Disturbances
* Jobs and payroll

Source: Wilbur Smith and Associates

Table 5-5
ENVIRONMENTAL CRITERIA CHECKLIST
Rail Line Extension Proposals

LAND IMPACTS:

Land Use
* Types (Towns, Farming, Mining, Timber, Other)
* Displacements
* Development Patterns
* Plans and Regulations

Terrain Types

Protected Properties
* Types (Parks, Recreation Areas, Wildlife & Waterfront areas, Historic Sites, Others)
* (d)(2) Lands

Land Ownership
* State (Potential, Tentatively Approved, Pending)
* Federal (BLM, U.S. Fish & Wildlife Service, Military, Other)
* Alaskan Native (Regional and Native Selected, Reservation)
* Private

Geologic and Hydrological
* Flooding (River, Glacier)
* Ice Fields
* Slides
* Faults

ENVIRONMENTAL IMPACTS:

Wildlife
* In Corridor, by Type
* Habitat (Prime, Important)
* Threatened or Endangered
* Subsistence Activities

Vegetation
* Plant Communities
* Threatened or Endangered

Water
* Water Quality (Turbidity, Sedimentation, Chemical Pollutants, Biodata)
* Groundwater and Wetlands
* Flooding

Air Quality
* Air Quality Classification
* Air Pollutant Emissions
* Conformity with State Plan

Noise and Vibration
* Impact Zone
* Attainment of Federal Noise Emission Standards for Railroads

Archeological, Historic, and Cultural Resources
* Sites
* Survey Needs

Scenic Aesthetic Resources

Source: Wilbur Smith and Associates

Table 5-6

SOCIAL CRITERIA CHECKLIST
Rail Line Extension Proposals

IMPACTED GROUPS:
* Identification
* Location
* Native Groups
* Individuals
* Nature of Impact

LIFESTYLE IMPLICATIONS:
* Family Roles
* Traditions Impacts
* Social Interaction
* Social Cohesiveness
* Goods, Services Availability
* Employment, Income

COMMUNITY IMPACTS:
* Accessibility, Isolation
* Right-of-Way Acquisition
* Disruption
* Community Identity

LAND USE IMPACTS:
* Existing Land Uses
* Land Use Plans
* Native Lands
* Higher Uses
* Access Impacts

SUBSISTENCE IMPACTS:
* Cash Economy
* Employment
* Habitat
* Wildlife
* Social Roles
* Family Roles

PUBLIC REVIEW:
* Proper Public Notice
* Groups Participating
* Locations of Review
* Extent of Participation
* Capacity to Participate

SOURCE: Wilbur Smith and Associates

2. Conditions Needed for Alaska Railroad Extension

Consequently, it would seem that the following conditions tend to favor rail extensions in Alaska, either within the Railbelt or outside.

* A bulk commodity where the loading and unloading operations can be automated so as to achieve sufficient tonnage volumes.
* A relatively long total rail haul, e.g.,200 miles, to enable it to be more cost effective than a road.
* A sizeable annual tonnage to be carried.
* Difficult terrain, costly construction conditions, and environmentally sensitive areas to be avoided to the extent possible.
* A railroad built to reasonably high standards so as to minimize operating and maintenance costs.
* Absence of competing, parallel highways. Fully allocated new construction railroad costs make rail quite expensive, with the result that new rail service cannot afford to give the shipper a choice among modes, unless the tonnage is extremely heavy and the length of haul is extremely long.
* Whenever possible, shippers should have a stake in the success of the railroad through investment. It would be risky for government to assume the full responsibility of putting up the capital for a railroad project, unless it controls the usage of the line.
* Railroad could be either privately operated by a for-profit organization or by a non-profit organization comprised of the shippers (e.g., the Alyeska Pipeline model).
* The Alaska Railroad should operate the line only if it interconnects, or if it can do so at less cost than a separate organization through shared administration and other centralized facilities.
* It is not necessary that a new railroad interconnect with the Alaska Railroad; a resource-to-port line will make more sense if the resulting length of the line is substantially reduced by not interconnecting. In other words, the lesser present cost (capital and operating) of (1) a separate line plus port facilities, versus (2) an interconnected line.
* Ideally there should be a guaranteed minimum level of traffic, or some revenue source that will permit operations to continue should traffic levels drop below a breakeven point. The mechanism for accomplishing this is unknown. In other words, shipper discontinuance of

extractive operations or choosing another mode must not destroy the viability of the line for other shippers nor impose operating or debt service costs upon government. (In actuality, this may be a very difficult condition to implement.)

* The State should not develop railroads on a speculative basis. There is no guarantee that development will follow railroad construction. The recent extension of the British Columbia Railway is an excellent example of not following this principle.
* Mineral deposts should be world class in size and ore content and quality; mining operations should use modern and efficient extraction and concentration processes; and the mines must be profitable and be price competitive on world markets at prevailing exchange rates and price levels.

3. Other Elements Relative to Railroad Extensions

Some additional thoughts relating to rail and highway development, including extensions:

* Railroads are very capital-intensive, long-term investments which, in this day and age, can be justified for new construction in only unique situations.
* A railroad requires threshhold traffic levels in order to sustain operations; they are extremely uneconomic at low output. Railroads are not very useful if low traffic forces a cessation of operations, whereas a highway will continue to function regardless of freight traffic levels.
* To be useful, the whole railroad facility must be provided. Highways lend themselves far more to incremental development.
* Highways are a more flexible, less risky investment. They do not have threshhold traffic levels.
* If an extension is contemplated into hardrock mineral areas, rail lines need not necessarily be connected to individual mines or pits, but rather could be connected by "collector" haul roads connecting these facilities with transfer facilities provided at centralized locations.
* The traditional method for paying for public highways may be inapplicable in development areas. In short, capital and maintenance costs are spread over the entire vehicle base in the state. A facility strictly used as a haul road should be paid for by the industry benefited by the facility. If it is also used by local traffic, the resource industry should pay the incremental cost of build-

ing and maintaining the highway to higher standards than would otherwise be required.

* The Alaska Railroad should not entertain extensions unless it can be proven that the revenues generated exceed on and off branch costs of the movement, and hence result in increased profitability for the system as a whole. If required to provide the service for economic or social reasons, the railroad should be reimbursed for its out-of-pocket costs.
* On the other hand, the framework for State decision making for an extension should take into account socio-economic benefits as well as those relating to transport costs and revenues. This framework is described in Report Section VI.

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