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REPORT

of

THE AMERICAN INSTITUTE OF ARCHITECTS

and

THE ENGINEERS JOINT COUNCIL

COMMITTEES

on

THE RESTORATION AND DEVELOPMENT

OF ALASKA

Prepared for

THE HON. WILLIAM A. EGAN
Governor of Alaska

Under the auspices of

THE FEDERAL RECONSTRUCTION AND DEVELOPMENT PLANNING COMMISSION FOR ALASKA
The Hon. Clinton P. Anderson, Chairman

Anchorage, Alaska **June 13, 1964**

w/revisions

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C. NOTES BY MR. BLESSING ON TOWN DESIGN

Reflection after a few days presence in a landscape of absolute beauty, of Alaska's mountain scenery, of range on range of snow-covered peaks, and of stupendous glaciers, brings the architect to focus humbly but proudly back to the reality of his purpose -- the provision of shelter for all man's activities with honesty and dignity, but, most of all, with an overwhelming respect for the great beauty of nature.

Here in Alaska, more than in any other place on this continent and perhaps in the entire world, is unspoiled nature at its greatest and its best. This is a priceless heritage for all of the people of the world, of the nation, and of the State of Alaska.

We have seen at Valdez a vast panorama of natural beauty, greater than even Switzerland can claim. The hand of man has been held here by the essential absence of human settlement. A cluster of huddled homes, stores, churches, schools, and hospitals is too often mixed with a few oil tanks. The latter show too clearly what unguided industrialization and commerce might yet do on a larger scale in a few short months or years: violate nature's handiwork of infinite ages past.

The architect is first of all a designer and his contribution is nothing if it is not profoundly sensitive to man's obligation to respect all of nature, particularly where nature is at its greatest and most beautiful. In the presence of Alaska's still pioneer settlements at Valdez, Kodiak, and Seward, the architect must acknowledge the instinctive way in which pioneer settlements can honor by a natural modesty, a natural scale, and a natural use of materials.

Here man has not scarred the earth nor insulted the natural rhythm of the earth's forms. The individual dwelling, like an outcrop of natural rock, continues the form of the land and blends with its natural cover. And yet, man's needs and uses of land provide him with the opportunity to express the uniqueness of his place and his type of settlement. The characteristic scale and form of dwellings at Valdez with the rather steep-pitched roof and the frequent lean-to extensions, give Valdez a form different from Kodiak or Seward. In its rebuilding on a new site, Valdez should be aware of these essential capabilities -- the textures of its heritage as a distinct place.

No town can be planned as an abstract two-dimensional "zip-a-tone" pattern on a map and expect to be less flat than the paper which it is drafted on. No town, however naturally flat its terrain, can suffer its essentially two-dimensional character of street pattern and land-use pattern to be dealt with separately from its third dimension, without isolating its architecture from its site. No town or city can be great, let alone even good in design, if its two-dimensional pattern is conceived as a land-use and circulation plan alone -- however efficient those arrangements may be.

In each example, the people of the place should see and deeply sense in their rebuilt town a harmony between the natural setting and the man-made town. This relation between man's town and the town's natural setting should be studied from the point of view of how it appears to a person approaching along the road, by water, and by air. It should further be studied from the point of view of how the over-all natural setting actually appears from within the town.

Designing a town in such magnificent settings is nothing short of an exercise calling forth the best qualities of architecture, planning, landscape architecture, even sculpture -- for this work is a work of creating and relating forms.

An Idea — for evolving an indigenous architecture for Valdez, Alaska.

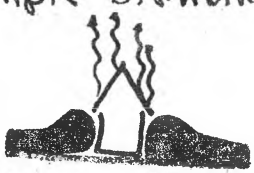
To be genuinely indigenous - (appropriate with a personality of its own) it must come naturally. It cannot be "phoney Swiss" or "phoney Shopping center".

1. In Valdez "Willie the Welder" says, ..."Most of us will build our own houses — and we'll get help from our kin & neighbors.

Simple Plan

Simple Structure.

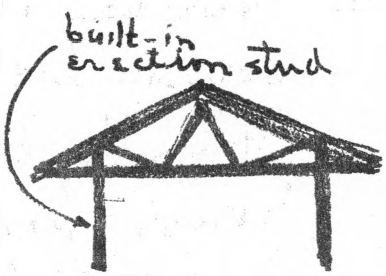
2. Snow gets 8' deep on roof & wet: Snow should be kept on the roof to provide insulation and to avoid having snow cover up windows.



bad

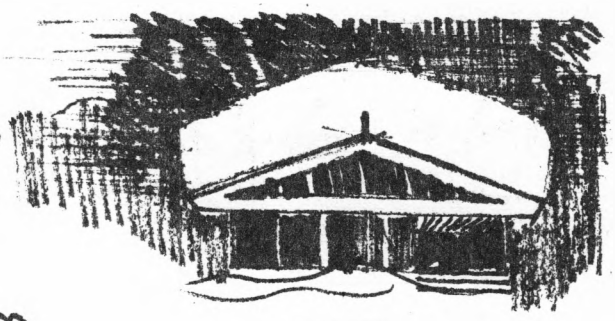
good

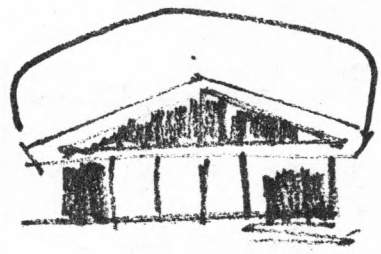
3. Building season is short. Carpenter talent is "jackleg". Lumber mill produces only smaller dimension lumber. A prefabricated "Valdez truss" of locally produced spruce could provide an economical fast building component — and provide both summer & winter work.

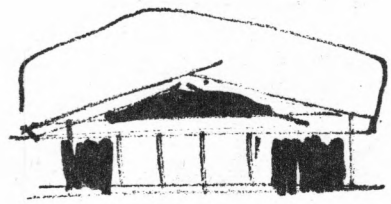


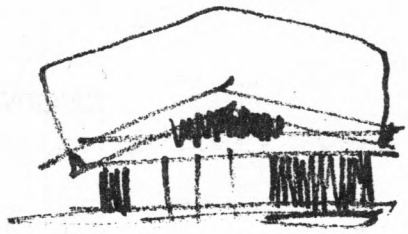
"Valdez Truss"

4. Rough sawn lumber is easier to produce and cheaper than smooth planed lumber. Stain on rough sawn lumber is cheaper, easier to apply and lasts longer than typical house paint. Even mama and the kids can apply stain. So-o-o. House could be stained in a variety of colors, with the trim always being WHITE - to give the colors "sparkle" - or "seal brown" to frame the white snow on the roof.









5. Exposed posts or fascias could be carved as a "family crest" — each house would have a personality all its own.

ANNEX II

ENGINEERING JOINT COUNCIL REPORT

A. INTRODUCTION

The Engineers Joint Council (EJC) is an institution that provides for cooperative action by 21 national engineering societies with a combined membership of 600,000 qualified engineers. While each of the societies has a responsibility for technical programs and the issuance of technical journals in its field of specialization, EJC provides for the joint efforts of engineers to contribute to the solution of better understanding of pressing national problems. For the last year EJC, with the full support of its constituent societies, has been investigating the procedures by which it can be more effective in serving the government. The organization of the EJC Alaska Committee is a logical extension of previous activities of EJC.

The EJC offer was made to the Federal Reconstruction and Development Planning Commission for Alaska, often referred to as the Alaska Reconstruction Commission (ARC), by letter of May 7, 1964 (Appendix A, Section IX). The offer was accepted by ARC letter dated May 22 (Appendix B, Section IX).

After informal discussions with ARC personnel, the EJC Alaska Committee concluded that its mission was:

a. To review what took place related to the earthquake, in fields of EJC interest.

b. To observe what is being done in restoration and development.

c. To evaluate what will result from current and planned efforts.

d. To suggest improvements in these efforts.

e. To apply the lessons of this disaster to other areas.

This section of the report, Annex 2, is a report on the above mission.

Areas under military control are excluded from our consideration, except as they may relate to other areas.

Alaska's Good Friday earthquake of March 27, 1964, the circumstances surrounding it, and the events leading out of it, have been widely reported in the press and by various agencies concerned with the technical aspects. Reports in the latter, particularly the professional journals, and their allied papers, will undoubtedly continue and expand for some time.

No effort has been made in this report to again provide source material, such as mentioned above, and the report should not be used for that purpose. However, certain points, which follow, and in some cases are expanded on later, are considered of such importance to the engineer as to justify repetition.

First, this was both an earthquake of great magnitude and of exceptionally long duration.

Second, the earthquake resulted in earth slides and subsidence or elevation in several communities. These effects contributed to extensive property damage.

Third, the recognition of the instability of the earth underlying many cities or towns has led to uncertainty as to the location of rebuilding of many buildings and facilities.

Fourth, there are areas, notably Seward, where the earthquake practically stopped the existing economy.

Fifth, many federal institutions are attempting to help in the restoration of Alaskan facilities. Some problems are being faced in the coordination of these programs.

Sixth, Alaska has a short construction season. This does not mean that construction cannot be accomplished in the winter, but substantial premiums must be paid to so do.

Seventh, those economies of those areas that were heavily damaged will revive only with completion of construction. However, the construction itself will bring substantial relief through providing employment.

Eighth, the restoration of utilities to the point that they can function, cannot await refined planning if the population is to be able to live comfortably through the winter of 1964-65.

B. ENGINEERING ABSTRACT

The EJC Ad Hoc Committee on Alaska, formed for the ARC with the concurrence of the Governor of Alaska, has made a general engineering review of the situation arising from the earthquake.

The coastal area of Alaska is rugged, deeply indented and offers many good anchorages. The glacial outwash which forms most of the habitable level areas is subject to compaction and to lateral movement. Even slight crustal movements may trigger slides.

Destructive earthquakes may be expected in the future. Relatively small earthquakes occurring near cities may be as damaging as that of March 27, 1964. Additional strong-motion accelerograph instruments should be permanently installed at various points in Alaska to produce the information needed for engineering design. A permanent agency is needed to coordinate the study of Alaskan earthquakes.

Essential utility services, some of them makeshift, are available throughout the earthquake damaged area. The permanent rebuilding of the utility systems is, as of June 15th, being delayed, awaiting decisions on soil stability and land use. In order to insure completion prior to freezing weather it is imperative that more rapid progress be made in the reconstruction of utility systems, particularly water and sewer.

Apparently no crippling damage was sustained by the airports and air traffic was hardly affected. Total destruction of docking facilities at Seward resulted in shifting the port's functions to Whittier, with immediate and serious economic loss to Seward.

Temporary dock facilities are functioning in all areas.

Railroad operations have been restored from Anchorage to Whittier. Operations to Seward are expected to be resumed by September 1.

Reconstruction of highways is proceeding in an orderly manner. Restrictions of traffic movement (Anchorage to Seward)will continue through the current construction season. This is necessary in the interest of vital construction progress. By winter unrestricted traffic movement over the entire system may be reasonably anticipated.

Care should be taken in selecting sites for new facilities and they should be designed to resist earthquake forces. Building Codes and standards should be established in populated areas. The State of Alaska might well institute a State building regulation covering schools, hospitals and buildings of public assemblage. The State might assist small communities by providing engineering assistance and advice.

Emergency response to the problems created by the Good Friday earthquake was effective and timely. The management of the reconstruction program appears to be somewhat diffuse with consequent confusion and delay. Existing legislation does not provide adequate means for meeting the needs for reconstruction in an area whose economy is disrupted as completely as in Alaska. The economic growth of Alaska has been dependent on Federal spending but the private sector must expect to play a larger role in the future of Alaska.

C. RECOMMENDATIONS

1. Since additional earthquakes can be expected in Alaska, immediate action should be taken in all Alaskan towns and cities to introduce measures based on the experience of the March 27, 1964 earthquake that are likely to reduce damage.

2. The number of strong-motion accelerograph instruments in Alaska should be considerably increased, so that the data on earthquake ground motion necessary for the design of engineering structures can be obtained for future earthquakes.

3. A permanent program of instrumental field investigations of earthquakes should be established for Alaska covering all phases of seismology and earthquake engineering. This program should involve the cooperative efforts of many organizations already conducting such studies in other parts of the world. One group should be designated as the chief coordinating agency to insure proper initiation and follow through. The possibilities of the University of Alaska for this coordinating rule should be explored.

4. It is hoped that a way can be found to utilize the talents and special knowledge of experts already living in Alaska, perhaps through the cooperation of the University of Alaska and other centers, in the preparation of the comprehensive report on the Alaskan earthquake which is being prepared under the auspices of the National Academy of Science.

5. It is recommended that engineering decisions be based on present data available on soil and foundation problems and not be delayed for further intensive, detailed studies.

6. It is recommended that immediate steps be taken to rehabilitate the underground water and sewer systems to service homes that will be occupied in the winter of 1964-65, regardless of an ultimate decision as to the suitability of the area for buildings.

7. At Seward it is recommended that new generating equipment be placed on order and that foundation construction be started immediately thereafter.

8. At Valdez, it is recommended that consideration be given to extending a power distribution circuit to the new townsite for use during the transition period.

9. Land use plans should be finalized with all possible speed to permit the orderly reconstruction of all types of utility services.

10. It is recommended that plans for urban renewal projects in all cities affected be reviewed to assure the adequacy of the highways and transportation facilities intended to serve the redeveloped areas.

11. Public Law 875 provides for the restoration of damaged facilities to the condition which existed prior to the disaster. This law,which is extremely useful, should be re-examined with a view to possible modification on two counts because the following interpretation expressed by several individuals seems entirely unrealistic:

a. The present 90 day limit for filing claims is not realistic for earthquake damage since the earth will continue to settle for an extended period with subsequent damage to underground facilities.

b. When service is interrupted, utilities habitually make every effort to correct the difficulty promptly. However, in disaster situations, costs incurred by utilities using regular employees to make repairs is non-recoverable under P.L. 875. If contract crews were used, the cost would be reimbursed. This arrangement does not encourage a utility to use its regular manpower to restore service.

12. Research programs should be initiated to develop designs and materials for underground utility systems that would have increased resistance to earthquake damage. It is not intended that this suggestion for increased research should in any way delay the immediate reconstruction of essential utilities.

13. It is recommended that there be better city enforcement of building code regulations through proper plans and specifications, supervision and inspection. Possibly a State of Alaska code and building enforcement agency should be established to regulate the design and construction of schools, hospitals and places of public assemblage.

14. It is recommended that a local director of Alaskan reconstruction be given authority to schedule reconstruction projects and to coordinate all reconstruction programs.

15. It is recommended that legislation be developed to provide for a more effective program of reconstruction planning for future emergencies.

16. It is recommended that special studies be made of the role of the private sector in the economic development of Alaska.

D. GEOLOGICAL AND SEISMOLOGICAL CONSIDERATIONS

1. Geology

The southern coast of Central Alaska lies on the belt of relatively recent mountain building activity that borders the Pacific Ocean from the tip of South America to the Aleutians and thence southward through Japan, the Philippines, New Guinea and the east coast of Australia. This belt is characterized by rugged mountains, numerous active or extinct volcanoes and frequent crustal adjustments represented by the recent severe earthquake that has devastated Alaska. The basement rocks of this belt consist of volcanic or related igneous rocks and metamorphosed sediments.

In Alaska, alpine glaciers carved out deep, steep-sided valleys of fjords. Although some of these glaciers reach the sea even today, most of them have receded and the valleys they carved are arms of the sea. As the glaciers retreated, the melt water carried vast quantities of gravel, sand, and rock flour into the sea and deposited them at the heads of the inlets first carved by the glaciers. The deltas thus formed are so recent that the sediments are unconsolidated. Foreslopes having an angle as steep as 30 degrees are common. Much of the damage caused by the March 27 earthquake resulted from: 1) lowering of land level by compaction; 2) from landslides above sea level as at Anchorage or below sea level as at Seward; and, 3) from the waves caused by these slides and tsunamis (seismic sea waves).

The long inlets and sounds carved by glacial erosion provide excellent deep-water harbors for ships. However, the steep valley walls leave little room for port facilities or building sites. The level areas found chiefly at the heads of the inlets have been occupied by cities or villages. They are underlain by poorly bedded, unconsolidated sediments that are subject to consolidation and land movement, both above and below sea level.

With the exception of Kodiak (where there is an abundance of apparently good, easily procured basaltic rock) good construction aggregate is not readily available. The deposits of sand and gravel in many of the proposed sites contain large percentages of fine material and should be beneficiated before being used for aggregates.

Altogether the geologic history of Alaska, which has provided so many opportunities for development of vast natural resources - coal, oil, timber, fishing, tourism and unknown but almost certainly rich metalliferous reserves, has placed a high price on their development. The "get in, get rich and get out" approach which appears to have been predominant in the past will have to give way to careful planning based on adequate surveys of terrain, soils, marine environments and resources if Alaska is to become a permanent prosperous unit of the National Economy. This is a long range program which few people contacted seemed to envision either in scope or in organizational structure. This is most unfortunate because even the most effective restoration of the devastated cities to the pre-earthquake "status quo" will fall short of tapping the enormous potentialities of the State.

2. Seismological Considerations:

Alaska is located on the main circum-Pacific earthquake belt along which occur a large proportion of the world's destructive shocks. Because of the largely uninhabited nature of the country and the lack of local seismological stations until recent years, the seismic history of Alaska is not accurately known in detail. The records that do exist, however, and a comparison with better known adjacent areas along the circum-Pacific belt such as California, suggest that on the average several earthquakes of a potentially dangerous size may be expected each year somewhere in the State. While most of these earthquakes may be far removed from cities or engineering works, it is clear that a continuing danger exists which calls for preventive actions such as the adoption of earthquake resistant design practices. This is a permanent problem for Alaska, just as it is for other Pacific Coast states, and for many other countries such as Japan, Chile, Mexico and India.

Although very large earthquakes such as the recent March 27, 1964, quake are fortunately rare, a large number of smaller but potentially destructive earthquakes can be expected regularly. It is worth recalling that the recent Yugoslavian earthquake which devastated the City of Skoplje with a large loss of life was only of magnitude 6, very much smaller than the Alaskan earthquake. Similarly, the very damaging California earthquakes of Santa Barbara (1927) and Long Beach (1933) were of only 6.3 magnitude. In the Anchorage area alone, more than 30 earthquakes of magnitude 6 or greater have been recorded since the beginning of this century.

It should also be noted that although most Alaskan earthquakes are located along the Aleutian arc and the coast region, earthquakes of a destructive size have occurred in practically all parts of the state. It cannot be concluded that the far inland areas are immune from such danger, and in the present condition of limited knowledge of many interior areas it would not be wise to accept lower standards of earthquake resistant design there.

Seismograph stations already existing in Alaska and other parts of the world are adequate for the approximate location of all Alaskan earthquakes of a destructive size. The instruments in these stations, however, are not able to give information on the actual ground motions in the vicinity of the earthquake, and hence do not provide the engineer with the basic data needed for the design of buildings and other engineering works.

This is a good example of a technical field that has suffered by being caught in between two disciplines - the engineers have assumed that the seismologists were developing and operating suitable instrumentation, while the seismologists have been leaving the whole problem of strong ground motion measurements primarily to the engineers. The result has been that nowhere in the world is there an adequate network of strong-motion instruments, and that in none of the recent earthquakes in Chile, Mexico, Iran, Morocco, Yugoslavia, and now Alaska has there been obtained even one measurement of strong local ground motion.

The U. S. Coast and Geodetic Survey has a network of about 80 strong-motion accelerographs suitable for engineering purposes in California and the Northwest States, but none of these instruments were installed in Alaska prior to the March 27, 1964 quake. Since the earthquake, 5 of these accelerographs have been installed at Anchorage (2), Fairbanks, Kodiak, and Cordova. This is obviously a very inadequate number of instruments for this very large state. A pressing necessity for immediate action is a major expansion of the U. S. Coast and Geodetic Strong-Motion Accelerograph network, not only in Alaska, but also in other Pacific States with a similar high earthquake risk and currently inadequate instrumental coverage.

At present a number of agencies are engaged in instrumental field studies of the Alaskan earthquake. These include, besides the University of Alaska, and the U. S. Coast and Geodetic Survey, the California Institute of Technology, Columbia University and the University of Tokyo. Cooperation between these various agencies is carried out on an informal basis, mostly by means of personal contacts between field parties and interchange of short-term visiting technical and professional persons. Although this type of informal organization is effective for emergency programs of a very specific nature, it does not usually ensure the kind of permanent program which is so necessary in the field of seismology, which must collect its basic data over a long period of time. It is recommended that permanent cooperative programs be established in this field, and that a clear decision should be made as to the particular group which should expect to exert the major initiative for the work. As an idea for investigation, it would seem that the University of Alaska should be ideally suited for this initiating and coordinating role. The University has the local orientation necessary to fit the program to the scientific and economic needs and potentialities of the area,

and should find in this subject many stimulating technical and scientific problems to relate to the academic interests of the school. There has been a very fruitful cooperative effort between the U. S. Coast and Geodetic Survey and a number of universities in other parts of the country, which can serve as a model for similar cooperation in Alaska.

Although seismographic measurements have been emphasized above, this is of course only one phase of current and proposed investigations. The U. S. Coast and Geodetic Survey is already at work on a program of precise geodetic measurements which should provide important data for studies of crustal movements. These and similar studies involving tides, geomagnetism, etc., also pose problems of support and cooperation.

The National Academy of Sciences has appointed a special committee to prepare a comprehensive report on the Alaskan earthquake. A report, perhaps following the spirit of the Carnegie report on the San Francisco earthquake of 1906, would be a major contribution to all phases of earthquake studies. It is hoped that in the preparation of this report it will be possible to make use of the talents of the experts living in Alaska, perhaps through the cooperation of the University of Alaska and other centers.

3. Earthquake Engineering Considerations:

The damaging effects of earthquakes are of four basically different types:

a. Shaking of a structure, with damage or destruction caused primarily by large horizontal ground accelerations.

b. Destruction by large scale land slides or slumps, which may completely remove the foundation of buildings or engineering works.

c. Compaction of the ground caused by shaking which may lead to excessive deformation of the foundation, leading to a weakening of a structure to the point of failure.

d. The effects of seismic sea waves (tsunamis).

Of these mechanisms of damage, the first has been the most completely studied. This damage caused directly by ground acceleration is, however, the least important effect as far as the Alaskan earthquake of March 27, 1964, is concerned. This explains the very special significance of the soil mechanics problem in the reconstruction picture.

In view of the number and excellence of the experts that have been called in on these soil mechanics and foundation problems, and of the magnitude of the investigative program of drilling, etc., that is at present almost completed; it should be possible to have very quickly the essential decisions on the soils and foundation aspects of the reconstruction. While there will remain many important problems for future research, the practical decisions needed for immediate reconstruction work will have to be made essentially on the basis of data now at hand. There appears to be a tendency to defer many decisions on urgent reconstruction matters until more details can be developed on this soils and foundation problem. The essential technical knowledge needed for these practical decisions should by now be available, and it is strongly recommended that these engineering decisions should be made and announced without further delay.

E. ENGINEERING ASPECTS OF ALASKAN RECONSTRUCTION

1. Utilities

In the areas visited during the period of June 8-11, 1964, essential utility services were available in all buildings which were suitable for occupancy. The ingenuity and diligence demonstrated by all concerned in the restoration of these vital services were outstanding. Of present concern, however, is the fact that over two months have elapsed and many of the initial temporary arrangements remain in service with the schedule for permanent repairs still undetermined.

Since the construction season has already started and is of very short duration, it is urged that every effort be made to immediately start the rehabilitation of the water and sewer systems in the damaged areas. The temporary water systems consisting of aluminum pipe and rubber hose on the surface of the ground cannot survive after temperatures fall below the freezing point for extended periods. Water and sewer systems should be underground by September 15 with an absolute deadline of October 15. Some difficulty can be expected prior to the October 15 date depending on weather conditions.

Progress in making repairs to all utility systems is being delayed pending decisions on soil stability which will influence future land use. While it is desirable to integrate the rehabilitation of utility systems into the long-range urban renewal plans, it must be recognized that when public health and safety are involved the immediate restoration activity should take precedence.

It is suggested that damaged areas be surveyed to determine the homes and other structures that will be occupied this winter regardless of whether or not the area is finally approved for urban renewal. When this information is available, immediate steps should be taken to rehabilitate the underground water and sewer systems. Further delay in this action will serve no useful purpose and may result in unnecessary hardship this winter.

Certain areas were visited briefly and the following observations pertain to the utility situation in those areas only:

ANCHORAGE

Electric Power

At present all needs are being met. In a number of cases this is being accomplished by makeshift arrangements of electrical circuits and equipment that must be replaced to insure normal continuity and quality of service. It is estimated that about 80% of the underground duct system in the downtown area is severely damaged. Duct runs are broken and offset to the extent that electric power cables cannot be removed or new cables installed. Many of the wedged cables continue in service, but the failure of these cables, which can occur at any time, will pose serious power supply problems in the downtown area. The only solution appears to be a major rebuilding of the duct and cable system.

Adequate power generating capability is available in the area and it is expected that this will be the case during the winter load peaks unless some unforeseen event occurs.

Repairs continue to be made on the electrical system, but major changes such as the relocation of several substations and related transmission and distribution facilities are being delayed pending decisions on land use. While delays in making a full restoration of these facilities are not desirable, it is not considered an emergency situation.

Sanitary Sewers

The sewer system is functioning in spite of numerous breaks and changed elevations in the areas where the earth has shifted. In certain sections, sewage has seeped into open ditches and constitutes a health hazard. The rehabilitation of the sewer system will require a major effort and must be started immediately if the work is to be completed before the ground freezes.

Water System

Adequate water supplies are available from presently operating wells and pumping stations. However, large areas continue to be served by aluminum pipe and hoses laid on the ground surface. A rough estimate indicates that 10 miles of such piping is in service. This considerable temporary system must be placed underground by September 15 or shortly thereafter. The availability of manpower is such that this work must be started now if deadline dates are to be met. The supply of water is of vital importance and any further delays should be seriously examined and corrective measures applied.

Telephone System

Service has been restored to all habitable structures that had service prior to the earthquake. In some cases this has been done by makeshift arrangements that will be corrected when land use decisions are received. The underground duct system is severely damaged and requires substantial rebuilding.

KODIAK

Electric Power

Power is available as needed although additional generating capacity will be needed in the relatively near future. This condition existed prior to the earthquake, however.

Sanitary Sewers

Sewer outfalls were damaged and should be reconstructed as soon as possible.

SEWARD

The power plant is completely destroyed. No new generating equipment has been ordered and the power plant site has not been cleared of wreckage. The delay appears to arise from difficulties in arriving at an insurance settlement.

Electric service is provided by a single makeshift transmission and distribution line of about 68 miles in length. This arrangement is totally inadequate and results in excessive power losses -- estimated to be 25% of input power -- and extremely poor voltage regulation. It is essential that steps be taken to bolster this power supply system. If such action is not taken before winter, long interruptions of the electric power supply are expected.

It is recommended that new generating capacity be placed on order at once, and that foundation construction be started immediately thereafter. It is further recommended that consideration be given to the installation of so-called "package power units" which are readily available from the major electrical equipment manufacturers.

Sanitary Sewers

Rebuilding of sewer outfalls is required. Sewer mains in the Forest Acres Subdivision are damaged in many locations and considerable work must be done before winter. As in other cases reconstruction is being held pending land use decisions, although it is anticipated that certain of the affected residences will continue to be occupied in any case.

Water System

A temporary surface water system serves a substantial area and must be placed underground.

VALDEZ

Electric Power

The generating plant and electrical system generally survived the earthquake in reasonably good condition. However, since the townsite is to be moved because of soil instability it follows that the power plant must also be moved. It is recommended that consideration be given to extending a distribution circuit to the new townsite at this time. This will prove to be useful during the transition period and can later be used to serve whatever load remains in the vicinity of the old site.

Sanitary Sewers

See Seward Sanitary Sewers.

Water System

Only minimum repairs are planned at the old site. The same urgency to start work applies here as at other locations.

WHITTIER

A very brief inspection indicated the general condition of all utilities to be good.

General Comment

No contacts were made with representatives of gas utilities. However, since underground piping is used their difficulties closely parallel those of water and sewer systems. Automatic loss-of-pressure shut-off valves are reported to have been extremely effective in the Anchorage area and the expanded use of this device is encouraged.

Recommendations Pertaining To Utilities

a. Highest priority should be given to the rehabilitation of underground water systems.

b. Sewers should be repaired sufficiently to insure service continuity throughout the winter.

c. Land use plans should be finalized with all possible speed to permit the orderly reconstruction of all types of utility services.

d. Public Law 875 provides for the restoration of damaged facilities to the condition which existed prior to the disaster. This law which is extremely useful should be re-examined with a view to possible modification on two counts because the following interpretation expressed by several individuals seems entirely unrealistic:

The present 90 day limit for filing claims is not realistic for earthquake damage since the earth will continue to settle for an extended period with subsequent damage to underground facilities.

When service is interrupted, utilities habitually make every effort to correct the difficulty promptly. However, in disaster situations, costs incurred by utilities using regular employees to make repairs is non-recoverable under PL 875. If contract crews were used, the cost would be reimbursed. This arrangement is inequitable and does not encourage a utility to use its regular manpower to restore service.

e. Research programs should be initiated to develop designs and materials for underground utility systems that would have increased resistance to earthquake damage. For example, the use of large diameter flexible plastic tubing should be investigated for water and sewer systems. Materials of this kind could be installed in long lengths thereby minimizing the problem of leaking joints. Such construction methods might be especially useful for temporary installations where a small amount of settlement continues to occur over a long period of time. It is not intended that this suggestion for increased research should in any way delay the immediate reconstruction of essential utilities.

2. Transportation

The area affected by the Good Friday earthquake is served by all modern modes of transportation. Apparently no crippling damage was sustained by the airports and air traffic was hardly affected. Destruction of docking facilities, particularly at Seward, dealt a major blow to the economy of that community and required shifting of the port's functions to Whittier. The most extensive and serious damage was sustained by the railroad and the highways in the region.

Alaska Railroad

Of the system's total of 530 miles, approximately 190 miles of trackage, extending from Wasilla to Seward, became inoperative as a result of the damage caused by the earthquake. Apparently, the remainder of the system for a distance of approximately 340 miles extending North from Wasilla to Eielson was not affected by the quake. The most concentrated damage occurred at Seward where almost all of the terminal and docking facilities were destroyed, and some 300 units of rolling stock were lost. Not as concentrated, though no less significant, damage to terminal facilities has also occurred at Portage, Whittier and Anchorage. The greatest damage to trackage and bridges occurred in the section between Girdwood and Portage, with lesser damage experienced elsewhere in the 190 miles of line affected. Subsidence of the railway grade in parts of the line along Turnagain Arm required a major effort by way of reconstruction involving sizeable earthwork. Likewise, as a result of extensive lateral slides along the line and the subsequent progressive erosion of the exposed slopes, protective measures by way of rock riprap constituted a major construction item. Much of the track required realignment and reballasting. While apparently no complete loss or failure of any of the bridges on the line were experienced, many of the spans were displaced from their shoes or rollers, requiring corrective measures to restore functional adequacy. In several instances, corrective measures were required for bridges affected by the lateral movement of abutments.

By April 6, within ten days after the earthquake, operation of the Railroad was resumed on the affected line from Whittier through Portage to Anchorage and to the North. Reconstruction of the trackage South of Portage to Seward is underway and is expected to be completed by September 1, 1964. At the present time operation of trains between Anchorage and Whittier is accomplished under "slow orders". This will continue for some months until stability of the bed is ascertained and the track is completely and adequately reballasted. It appears that the resulting slower movement of cargo, as a factor in itself, does not significantly handicap normal requirements.

As of this date the terminal facilities and dockage at Whittier have been reshaped to reasonably adequate operating condition. The facilities and operations at Whittier function in a great measure as a replacement to the presently lost effectiveness and functions of the port at Seward. This circumstance is fortunate in the sense that it affords time for orderly planning and construction of the totally destroyed port facilities at Seward. Extensive studies will be required for the determination of a suitable site for the new facilities. Time will be required to develop construction plans. It is reasonable to assume that the minimum of a full construction season will be required to complete these facilities. Thus, the earliest resumption of effective port functioning at Seward can be anticipated to be the late Fall of 1965. In the interim, the port of Whittier has to be maintained in a condition adequate to handle the cargo.

It is recognized that several years of more than ordinary maintenance, care and expense will be required to stabilize the embankments, continue protective measures against erosion of slopes, and restore the affected trackage to a condition of routine maintenance and operation.

As estimated by the Alaska Railroad staff, the total cost of reconstruction will amount to $27,000,000. This includes $7,800,000 for reconstruction of the terminal facilities at Seward and $2,500,000 for replacement of rolling stock. The balance of the total estimated cost, $16,700,000, covers reconstruction of trackage, bridges and terminal facilities other than at Seward. Based on discussions with representatives of the Railroad and impressions of their capabilities, there is no reason to question their competence in arriving at these estimates. Of the item of $16,700,000, thus far $4,000,000 have been committed. Assuming that funds will be available to cover requirements the entire reconstruction program, including the new facilities at Seward, can be reasonably expected to be completed by Fall of 1965.

The railroad management and staff are to be commended on their effective measures in restoring to operating conditions the vital sections of the damaged line between Anchorage and Whittier within the limited period of ten days between March 27 and April 6. In the light of the catastrophic damage wrought by the earthquake, effective measures initiated which led to the early resumption of operations, reflect distinct competence and devotion to duty. Aside from this direct evidence of engineering and construction skill and effectiveness, it is apparent that the prompt vital restoration of operations was benefited by singleness of purpose in meeting and solving an emergency problem.

Highways

Damage was sustained by the following highways as a result of the earthquake:

a. Anchorage to Seward

b. Glenn Highway

c. Valdez - North

d. Homer Vicinity

e. Cordova Vicinity and Copper River, and

f. Kodiak Island

On the Anchorage-Seward highway the greatest damage occurred in the vicinity of Portage. The damage was significant not only by way of sizeable repair costs involved but also in the economic loss resulting from complete disruption of traffic. Even at this date, some two and one half months after the earthquake, traffic on this section of the road is intermittent. Occasionally traffic is halted altogether by high tides or difficulties with temporary bridges. Even when the highway is open traffic it is permitted to move only in one direction during certain hours to avoid interference with construction operations. Because of the character of construction involved, any liberalization of these restrictions would necessarily result in delays of construction progress.

This is an unhappy situation, and unfortunately, these restrictions will have to prevail until the end of the current construction season. In the light of the relatively short construction season, and the necessity to complete the construction before winter, these measures appear to be justifiable. The damage in this area comprises total destruction of 18 bridges and subsidence of some 15 miles of highway. There is an additional 53 miles of highway in the Turnagain Arm area which will require extensive repairs. Shortly after the earthquake, a contract was awarded by the Highway Department for the construction of temporary bridges to replace the destroyed bridges. This work together with embankment approaches to the bridges is now virtually completed.

On June 15, the Highway Department will receive bids for the earthwork and rock protection involved in raising the grade of the settled section of the highway; this work is to be completed during the current construction season. Relatively non-restrictive traffic movement will then be permitted on this highway. The initial grade reconstruction calls for a 24 foot crown width. A subsequent contract, intended to be underway in the 1965 construction season will widen this embankment and construct permanent pavement and bridges.

In this connection it is pertinent to recognize that a crossing of Turnagain Arm, on a line North of Sunrise, is under consideration. The studies of this project were completed before the earthquake occurred. Presumably these studies will have to be re-examined in the light of the effects and after-effects of the quake. None-the-less, in view of the sizeable expense involved ($17,800,000 as estimated by the Highway Department) in the final phase of reconstruction of this 15 miles of highway in the vicinity of Portage, it appears that further consideration of the new crossing should be undertaken promptly. In view of the conditions created by the earthquake the new crossing may be found to be economically feasible and to constitute a more advantageous solution of the problem. Within the urban area of Anchorage there are repairs to be effected. This work awaits city decisions as to utilities which in turn will depend on results of the geological investigations of the area now underway.

Serious damage was also sustained at the South end of this highway in the vicinity of Seward. Within the city limits of Seward, the highway is to be relocated; this project must await the final adoption of urban renewal plans, presently under consideration. Rehabilitation of some five miles of highway, North of the city limits, will include construction of three bridges over the Resurrection River to replace three bridges destroyed. Plans for these bridges are scheduled for completion by July 1. Contracts for the construction of a new bridge over the Snow River were awarded prior to the earthquake and actually construction was well underway. While some of this construction suffered damage, the contractor is proceeding with the project. It is assumed that the bridge plans for this structure have been re-examined in the light of earthquake effects.

Repairs of the Glenn Highway to the North of Anchorage comprise primarily some bridge repairs, relatively not too extensive, together with a sizeable job of pavement repairs. A total of some 118 miles of road is thus involved. Apparently all of this work is scheduled to be accomplished during the current construction season.

Damage to the Valdez-North highway appears to be relatively minor and extends only for a distance of some 10 miles East of Valdez. Damages are limited to local areas of subsidence and cracking of pavement. The repairs of this section of the road could be accomplished during the current construction season but would not be critical even if deferred until next year.

In the vicinity of Homer the highway along the Spit was virtually destroyed. This will require complete reconstruction, raising the grade of the road approximately 8 feet for a distance of 4-1/2 miles.

Reconstruction plans are scheduled for completion by July. The principal construction problem for this project is posed by the inavailability of borrow material for the embankment. Negotiations are in progress with the Corps of Engineers to obtain material dredged from the Bay. It is expected that this matter will be resolved to permit construction to get underway this season. Reconstruction of the highway West and North of Homer will involve replacement of two bridges and some 27 miles of highway reconstruction. Plans for this work are to be completed this Fall. Presumably construction work will get underway in 1965.

The highway in the immediate vicinity of Cordova requires replacement of three bridges. This is to be accomplished during the current season. While there was considerable damage sustained on the Copper River Highway, primarily in the loss of bridges, the question of reconstruction of this facility, which was previously used as a railroad, will require extensive economic studies.

On Kodiak Island a section of highway within the City of Kodiak and for a distance of 4 miles to the Northeast was being constructed under contract awarded prior to the earthquake. The portion of the project within the city limits is being deferred pending approval of urban renewal plans; the work outside of the city limits is underway. Repairs of one-half mile section of the road to the Naval Station are contemplated for completion during the season. This work will involve raising the grade and some riprap protection. The road to Cape Chiniak involves construction of 12 bridges and extensive earthwork. This work is under contract and scheduled for completion this season.

In connection with the proposed urban renewal projects in Anchorage it is suggested that the plans be reviewed as regards adequacies of highways and thoroughfares intended to serve the redeveloped areas.

Conclusions

There is an overall impression that the initial paralyzing blow of the earthquake is being gradually and effectively remedied. Critical repairs and reconstruction of the damaged highways are well underway and should be completed during the current construction season. It is reasonable to anticipate that relatively unrestricted traffic movement will be afforded through the winter. Such portions of the system as are being deferred until the 1965 construction season will not constitute an acute impediment to traffic movement. Assuming that adequate funds are made available, all reconstruction operations should be completed in 1965. The reconstruction program is proceeding in an orderly manner apparently taxing to the utmost the State's engineering and construction

resources. Short of a crash program it is doubtful that anything could be done to accelerate the rate of progress. A crash program would necessarily result in additional costs. While it would be difficult to assess direct benefits which would accrue from such additional costs and efforts, an accelerated program would in some measure relieve the unemployment situation at Seward, Valdez and Homer. It is reported that because of the destruction of local industry in these communities, the extent of unemployment is critical and is assumed to be the principal cause of substantial migration from these communities.

3. Buildings and Facilities

In evaluating the damage to buildings and facilities as a result of the March 27 earthquake, it is most important to recognize the forces actually causing damage. The earthquake epicenter was some distance from the major population centers visited, and the resulting earth motion had a relatively long period. The major structural damage due to earth shaking was in the taller buildings or buildings with design and construction features that were particularly susceptible to earthquake damage. Other than a few notable examples of shaking damage in Anchorage, most of the damage observed resulted from the earth slides, earth settlements and the seismic sea wave actions that occurred during and after the initial earthquake shocks.

Major cleanup has been completed in downtown Anchorage. The damaged buildings that were particularly hazardous have been removed or evacuated. Some of the buildings that were damaged are in the process of repair and some will likely be removed. In Kodiak, Seward, Whittier and Valdez, the major damage was from the sub-surface slides under the dock facilities, the seismic sea wave and the actual raising or lowering of the area ground surface. The cleanup in these areas is nearing completion and temporary dock facilities are in operation.

Where the study of these townsites will undoubtedly show some areas where buildings and dock facilities should not be located, one must realize that most building sites adjoining these bays will be on alluvium deposits. The sites will not be ideal and must be developed with proper engineering judgment and due consideration to the economic factors involved. There is no reasonable way to design the type of structures one finds in these towns to resist the seismic sea wave. A properly designed breakwater or care in locating facilities would be of considerable help in minimizing potential hazards.

If the buildings that suffered major earthquake damage had been properly designed under the Uniform Building Code in Seismic Zone III, we believe they would have suffered only minor damage. Obviously, the design and details used should reflect the experience and competence of engineers qualified in this specialized field. Also the construction requires competent contractors with adequate supervision and inspection.

Where the cities visited have, or are adopting, established building codes, the normal city personnel are not familiar with good building practices. In Seward, for example, only one new house has been constructed in the past few years and most building permits were for minor additions or alterations. Only in Anchorage did one find major new construction and much of this did not follow good code practice and detail for a city that has rather regular seismic disturbances.

It would be our recommendation that the State of Alaska consider a building code for populated areas for buildings, housing, schools, hospitals and public assemblage. This code could be enforced by local communities where they have a proper building department. Hopefully, this State staff could assist local communities in upgrading their building standards. Fortunately, with a few good standards, normal housing construction will perform very well in a moderate to severe earthquake. Because the earthquake damage inspected was quite selective and many buildings in the areas were virtually undamaged by the earthquake, it is difficult to evaluate the quality of all construction inspected. If the major buildings are typical, we would reason that local building code enforcement could be improved considerably.

Alaska is a state of major earthquake activity and all of its cities should profit by the lessons of this March 27th earthquake. The public should be educated relative to good construction practices and the construction industry should have proper regulating codes and endorsement to reasonably protect public health and safety.

F. ORGANIZATIONAL ASPECTS OF ALASKA RECONSTRUCTION

The EJC Committee has not made a detailed study of the responsibility of each organization that is contributing to the reconstruction of Alaska or concerned with plans for the future. However, a few problems of an organizational nature have come to light.

These problems were hidden during the immediate post-quake emergency period. Many organizations have been praised for their work including the Salvation Army,the Red Cross and the Army Engineers.

However, as reconstruction began, it became evident that no single agency had funds or authority to deal with the entire problem and that some problems were marginal or outside the apparent scope of any agency. Federal, State and local groups knew that there was not time to pass new legislation responsive to the reconstruction of Alaska. Therefore a continuing effort has been to adapt existing legislation and special funds to the problems of Alaska.

Each agency has retained its independence. Joint planning and coordination of reconstruction projects has been difficult because each agency has a different procedure of review and approval. It would appear that the program would proceed with more dispatch if a local official were given responsibility and authority to manage the entire program.

Furthermore, there is an urgent need to analyze the problems of the communities and establish the actions that must be taken. A flow chart of decisions, allocation of funds and implementing agencies would be of great value to all of the people concerned with reconstruction.

These decisions must recognize the fact that Alaska will enjoy economic growth only as its private institutions are strengthened. The heavy influx of Federal funds could overwhelm the private sector.

The local Chambers of Commerce might assume the role of strengthening the private sector in Alaska's future. A request could be made to the Committee on Economic Development to make a study of this problem.

Consideration should be given to setting up a labor-business fact finding board to examine the impact of the wage differential between Alaska and the "Lower 48" on the future economic growth of Alaska.

Because of its continuing large DOD income the economy of Alaska involves a more complex relationship between the public and the private sector than in most states. The incompleteness of the development of that relationship has become clear under the stress of the problems introduced by the Good Friday earthquake.

G. POST EARTHQUAKE ACTIVITIES OF ALASKAN ENGINEERS

As in all emergencies, no complete record can be kept of the prompt and effective action of hundreds of individuals. Accordingly, this account of the activities of engineers does not purport to be comprehensive or to give adequate recognition to the many institutions that were responsive. It is indicative of the work that engineers can be expected to perform after an emergency, and it suggests the role that a University in the area can play in providing assistance and in making special studies.

Immediately following the earthquake in Anchorage, the engineers charged with the responsibility for public utilities and communications were thrown into a restoration of service, which was done with dispatch. Within two days power was restored in nearly all of Anchorage, and on the two military bases nearby. Water service was replaced early in the following week, and the damaged portion of the sewer system was placed under repair. Gas service was progressively restored, and was in almost complete operation by the end of the

first week. Communications were never fully lost, due to the availability of military and Civil Defense emergency systems. Within 72 hours after the quake, phone and telegraph service was returned about to normal, despite the heavy message load.

Highway and railway damage was severe, as was the condition of some of the city streets: these were repaired on a temporary basis at once, by heavy equipment whose use was donated by local contractors.

The Army Corps of Engineers were fully effective in clean-up and emergency services. Thus, engineers were engaged in restoration of works in their specific fields of responsibility, in addition to their personal and private care of family and neighborhood problems.

Privately employed engineers were free to undertake additional duties imposed by the emergency, and this they did without waiting for a formal call. Within hours after seeing to the safety of their families and friends, engineers began to assemble at the office of the city building inspector, where they formed small teams to inspect buildings for the degree of hazard present. Each team was assigned an area, and was given authority to enter, inspect and pose notices of condemnation of hazard, in order to determine which structures could be returned immediately to normal service, or the extent of repair necessary before public use of the buildings.

Virtually all consulting engineers in the city were engaged in this work. No payment was expected, although most of the private organizations kept the engineers so engaged on their payroll. (Later the City of Anchorage offered payment to each person so engaged.)

Consulting engineers who lived elsewhere, but who had designed structures or utilities in Anchorage began to arrive soon after the earthquake to assist in the rehabilitation program.

The University of Alaska sent three members of its engineering staff to Anchorage, to help out with the immediate problems and to preserve as much as possible of the scientific and engineering record of the post-quake period. Later, the entire junior and senior classes in civil engineering were sent to Anchorage to help with the assessment and recording of damage. At the request of some of the visiting scientists and engineers, these 21 students and three instructors made a survey and detailed assessment of all earthquake manifestations in a two-block wide strip through the town, from the sea to the mountains -- possibly the first time such information has been systematically gathered for so great a section of a damaged area. This material will be published at an early date by the University for use by engineers and other students of earthquakes.

In addition, the University sent a seismologist and geologist to help in studies of the earthquake. The Librarian established the University of Alaska Earthquake Archives on 29 March 1964. All press dispatches and accounts have been and continue to be kept on file. Hundreds of personal statements were solicited for the record.

A clearing house for scientific and technical information was established at the University to identify and keep a record of the scientists and engineers who have studied the earthquake. Nearly 200 names have been catalogued according to fields of interest and availability of data. The center also has collected and will distribute, at cost, the structural plans of all of the important structures. The address of the clearing house is:

Earthquake Information
College of Engineering
University of Alaska
College, Alaska

Visiting engineers from building suppliers, Universities, and scientific research establishments and members of advisory committees have also contributed to study of the earthquake.

H. THE ROLE OF SCIENCE AND THE ARTS IN ALASKA

The immediate need for rehabilitation of various Alaskan communities is apparent. However, preoccupation with physical restoration has tended to entangle the longer range development plan for Alaska in programs for development of facilities. Far more necessary to the growth of Alaska are ideas and concepts that will stimulate new approaches and develop new attitudes.

Looking to the future, Alaska will become increasingly dependent on research and technology as is true in other states and elsewhere in the world. Alaska will also be increasingly dependent on the development of programs that will bring scientific, engineering, and cultural leaders to Alaska and who, on returning to their homes, carry, by word of mouth, the story of Alaska's grandeur.

These programs can be fully effective only if they are considered to be the responsibility of Alaskans or institutions vitally interested in Alaska. Their work is particularly timely because of the need for economic rebuilding of the structure. However, it will be particularly difficult to find the revenues to apply to these programs in the immediate future when there exists so many urgent calls for assistance in replacing essential structures or service. Even such important and fully supported budget items as those for higher

education may be in some jeopardy for the next few years. These secondary effects of the earthquake should be examined with great care in order that their latent and implications can be given full consideration at the earliest possible time.

The process of finding opportunities to bring scientific, engineering, and cultural leaders to Alaska may require some new institutions. For example, a foundation could be organized to stimulate science and the arts in Alaska. Already there are musical programs and workshops in Anchorage. There are plans for both theatres and pageants. The foundation could seek additional sources of support for these programs. It could sponsor seminars on critical issues. It could make proposals to various foundations for financial assistance to be disbursed to various educational institutions in Alaska. It could be particularly helpful in cushioning the effects of budget adjustments on the University of Alaska during the next two or three years.

The University of Alaska and other universities in the state should be encouraged to conduct more research using state, federal, and private sources of support. To the greatest extent possible, all scientific and technical problems found in Alaska should be worked on by the University.

The foundation and the universities could try to create research parks as exist in many parts of the "lower 48" states. Programs could be developed to retain more of Alaska's talented young people in Alaska and bring more from other parts of the United States and the world.

In short, Alaska has an opportunity to expand its interests in science and the arts in order to provide a richer life in Alaska and to increase the number of talented people that live in Alaska.

Recommendations

a. It is recommended that a detailed study be made of the secondary effects of the March 27, 1964, earthquake, including the impact of emergency demands for state funds on the support of continuing programs, particularly those relating to higher education.

b. It is recommended that consideration be given to the organization of a Foundation for Science and the Arts in Alaska that would seek support for the establishment and strengthening of cultural and technical programs in Alaska.

c. It is suggested that consideration be given to specific projects to stimulate scientific and cultural life in Alaska, illustrated by the following:

(1) Arctic Biology

Alaska, with its geographical location provides access to the Arctic Sea, the Arctic mountains and the tundra. In earlier years, there was established at Woods Hole on Cape Cod, in Massachusetts, a Marine Biological Laboratory (MBL). As a result of distinguished and imaginative leadership, MBL is a summer center attracting hundreds of the world leaders in marine biology. Each brings a funded research project. MBL provides laboratory space and other facilities. MBL is increasingly crowded. It does not include an Artic environment.

There could be developed in Alaska, the equivalent of an Arctic Biological Center (ABC) with an extensive summer program modeled after that of MBL. This would bring many scientists to Alaska and strenghten the University program.

Recommendation: The Governor should invite the University of Alaska to study the operation of MBL and to develop a plan for the creation in Alaska of the equivalent of MBL.

(2) Earthquake Engineering

(Discussed at greater length in the section on seismology and earthquake research.) Alaska is an international center of earth movement. The establishment of design standards for earthquake resistance is based on scanty engineering data.

The NAS (National Academy of Science) is now studying the scientific and engineering aspects of earthquakes.

Alaska could propose to the NAS the sponsoring of a seminar on the Alaskan earthquake. It could encourage the NAS to establish an International Earthquake Decade and outline a role of Alaskan institutions in that program. It could plan for the construction and instrumentation of special structures to record the data necessary for a sounder earthquake resistance design practice in cooperation with the California Institute of Technology (Cal Tech) and other institutions. This would bring many scientists to Alaska and would strengthen the research program at the university.

Recommendation: The Governor should encourage the University of Alaska to expand its program on earthquake engineering and work toward the establishment of a cooperative program with Cal Tech and other West Coast institutions directed toward the collection of engineering information on earthquakes and the publication of design manuals on earthquake-resistant structures.

(3) Arctic Military Research

Fort Greely and Fort Wainright are active in research, development, and field trails of equipment designed for arctic operation. The Arctic Research Laboratory at Barrow is operated under contract by the University of Alaska. It is apparent that the University of Alaska is uniquely situated to participate in arctic research on an increasing scale. In particular, the University could be a central resource for the collection and study of the results of arctic research. This center would strengthen the University's research program. It is essential that the University Library resources be expanded in this field.

Recommendations: The Governor should encourage the strengthening of arctic research in the University of Alaska and should encourage the Army, Navy, and Air Force units stationed in Alaska to draw more heavily on its research capability. The DOD should establish at the University of Alaska an information center on arctic research. The University of Alaska should seek to develop a cooperative program in this field with other interested institutions.

(4) The Development of Craft Industries in Alaska

In the northern part of Europe there have been developed very effective and productive craft industries. The Norwegian production of elegantly designed sweaters, many of them hand knit and all of them based on traditional designs, has contributed in a very useful way to the Norwegian economy. The production of furniture of high standards of design has been encouraged by the Danish Government over a period of three or four decades. The unique feature of the Danish program has been establishment of a marketing activity that has permitted the individual craftsman to dedicate his attention to the production of an interest design.

Recommendation: It is suggested that the Governor establish a group to investigate the procedures for encouragement of craft industries in Alaska drawing on the experience of Scandanavia, among others.

(5) The Establishment of Centers of Fine Arts in Alaska

Provincetown, Massachusetts, and other New England centers have been aided in their development by the establishment of an art colony. One or two highly competent painters and sketchers could be commissioned to spend a summer painting in Alaska. Publication of the results of their work would stimulate interest in Alaska. A small group of artists could be retained to work toward the establishment of a summer program of instruction. In cooperation with the Fine Arts Department of the University of Alaska, a competition could be held to select Alaskan children with talent who could participate in a summer art program. A flourishing art colony could emerge from such programs and attract other artists and tourists. Similar programs could be undertaken in music, the theatre, etc.

Recommendation: It is suggested that the Governor encourage the University of Alaska, through its Fine Arts Department to organize a program aimed at creating a series of centers for artistic activity in Alaska including summer programs.

APPENDIX 1

Committee Membership Biographies

Balch, William Glenn
Fellow, AIA
Past President So. Cal. Chapter AIA-1955
Past President California Council of Architects - 1957
Senior Partner, Balch-Hutchason-Perkins, Architects, L.A.

Blessing, Charles A.
B.S. Arch. Engineering, U. of Colo. - 1934
Bachelor of Architecture, MIT - 1937
Master in City Planning, MIT - 1940
Fellow, AIA
President, American Institute of Planners - 1958-60
Director of City Planning, Detroit, Michigan - 1953

Brooks, Kenneth W.
B.S. Arch. Engineering, U. of Ill.
M.S. Architecture, U. of Ill.
Member AIA
Member Washington State Fine Arts Commission
Member AIA Urban Design Committee
Private Practicing Architect

Harmon, Craig A.
University of Denver 1934-36
University of Nebraska 1938-39
AIA
Harmon, Pray & Detrich - Architects & Engineers, Seattle

Knowles, William H.
A.B. U.of Cal. - 1930
M.A. MIT - 1931
Master in Architecture, MIT - 1932
AIA
AIA Award of Merit - 1960
President, Hertzka & Knowles, Inc. -Architects, San Francisco

Light, Herman Charles

Bach. of Arch. Ohio State U - 1932
Fellow AIA
Member Construction Specification Institute
Member American Society of Architectural Historians
Former Member L.A. Board Bldg. and Safety Commissioners
Private Practicing Architect, principally in commercial, industrial and institutional work

Richardson, Stephen

U. of Washington - 1930-34
MIT 1935-36
Member AIA
Member American Society of Planning Officials
Member Planning Commission of the City of Seattle
Senior partner, Young, Richardson & Carleton, Architects and Engineers, Seattle

Spreiregen, Paul D.

Bachelor of Architecture, MIT - 1954
Fulbright Scholar in Italy - 1954-55
Member AIA
Presently employed in AIA's special series of articles on urban design, as author and illustrator

Barney, Keith R., Major General, USA (Retired)

B.S., U.S. Military Academy, as of 1926
C.E. Cornell University, 1929
Fellow, ASCE
Deputy Chief of Engineers for Construction - 1960-62
Washington Office of Janus Engineering Designs

Brandow, George E.

B.S. in Civil Engineering - U. of Southern Cal. - 1936
Fellow, ASCE (Director District 11)
Member Structural Engineers Association of California
Member AICE
Member Consulting Engineers Association of California
Past Chairman, Structural Division, ASCE
Partner, Brandow and Johnston, Consulting Engineers, L.A., Calif.

Harris, Dr. William J.

B.S., Ch. Engineering, Purdue University - 1940
MSB, Purdue University - 1940
Doctor of Science, MIT - 1948
Vice President and Director - A.I.M.E.
Chairman, Govt Liaison Committee, E.J.C.
Asst. to the Vice President, Battelle Memorial Institute

Hudson, Dr. Donald E.

B.S. 1938, M.S. 1939, PH.D. 1942, California Institute of Technology (Mechanical Engineering)
Member, ASME
Member, American Geophysical Union
Member, Seismological Society of America
Member, Earthquake Engineering Research Institute
Professor of Mechanical Engineering and Applied Mechanics, California Institute of Technology, Pasadena, Cal.

Meese, William G.

BSEE Purdue U. - 1941
Member IEEE
General Superintendent of Electrical Systems, the Detroit Edison Company, Detroit, Mich.

Sayre, Dr. A. Nelson

B.S., Ph.D., D. Sc. (Hon.)
AWWA, AAPG, AGU, SEG, GSA
Consulting Ground water geologist associated with Behre, Dolbear and Company

Sorkin, Josef

B.Sc. in C.E., University of Nebraska - 1929
C.E., University of Nebraska - 1936
Fellow, ASCE
Institute of Consulting Engineers
American Railway Engineering Association
American Concrete Institute
Partner, Howard, Needles, Tammen & Bergendoff, Kansas City, Mo.

APPENDIX 2

Itinerary of Committee Travels

The group assembled at Elmendorf Air Force Base, adjacent to Anchorage, Alaska, on Sunday evening, June 7, 1964. Quarters and office space were provided in Bachelor Officers Quarters, Building 10-510, convenient to the Officers' Open Mess, where meals were obtained.

The subsequent itinerary follows:

Monday, 8 June

A.M. Briefing by Colonel Sawyer, U.S.Army Dist. Engineer
P.M. Briefing by City Planning Associates (CPA), for the Alaska State Housing Authority
P.M. (later) Surveyed earthquake damage in Anchorage area.

Tuesday, 9 June

0815 Departed for Kodiak Naval Air Station, via Air Force C-54
0930 Arrived Kodiak Naval Air Station
1330 Departed Kodiak
1415 Arrived Homer
Visited Homer Spit
1530 Departed Homer
1630 Arrived Elmendorf AFB
2000 Further briefing on Anchorage Urban Renewal planning.

Wednesday, 10 June

A.M. Weathered in. Various group meetings held.
1130 Departed via USAF C-123 for Seward
1230 Arrived Seward
visited Seward and were briefed by City Manager
1530 Departed Seward
1615 Arrived Elmendorf AFB
2015 Departed Anchorage via Alaska Railroad

Thursday, 11 June

0115 Arrived Whittier
Visited facilities at Whittier
0330 Departed Whittier via Alaska Railroad
0730 Arrived Anchorage
0930 Departed Elmendorf AFB via USAF C-123 for Valdez
1030 Arrived Valdez
Visited Valdez and drove through Keystone Canyon
1630 Departed Valdez
1715 Arrived Elmendorf AFB

Friday, 12 June

Remained Elmendorf AFB and in Anchorage area, making various single visits and preparing report

Saturday, 13 June

Remained at Elmendorf AFB completing report

Sunday, 14 June

Group disbanded and headed for home

It is obvious that the group's extremely tight travel schedule could never have been accomplished without the closest cooperation of the Air Force, which cooperation is gratefully acknowledged.

The Alaska Railroad was also most helpful.

The Air Force provided quick and efficient ground transportation whenever it was requested.

APPENDIX 3

Principal Persons Contacted

Anchorage Area

Mr. Joseph FitzGerald, Governor's Coordinator on Earthquake Matters
Mr. John E. Manley, General Manager, Alaska Railroad
Mr. R. H. Bruce, Assistant General Manager, Alaska Railroad
Col. K.T. Sawyer, Corps of Engineers, U.S.Army District Engineer
Lt.Col. M.E.Rogers, Corps of Engineers, U.S.Army, Denali Area
Mr. C.A. Oliver, Mgr., Municipal Light & Power Department
Mr. J. T.Harris, Mgr., Anchorage Telephone Utility
Mr. J. Cotton, Chief Engineer, Anchorage Telephone Utility
Mr.W.A. Derynslager, Manager, Water Utility
Mr. John Shoop, Director of City Planning
Mr. Paul Finfer, City Planning Associates
Mr. Tolbert Elliot, Director, Alaska State Housing Authority
Mr. Wm. Walker, Director Urban Renewal, Alaska State Housing Auth.
Mr. Cosby Steen, District Engineer, Alaska Highway Department
Mr. Charley J. Langer, C&GS
Mr. Roger W. Sherburne, C&GS
Dr. E.F. Rice, University of Alaska, Fairbanks, Alaska
Mr. Ernest Dobrovolny, USGS
Mr. Claire O. Banks, Vice President, Anchorage Chamber of Commerce
Mr. Elmer Rasmuson, President, National Bank of Alaska and Chairman, Board of Regents, University of Alaska
Mr. Wm.K. Cloud, Chief, Seismological Field Survey, San Francisco
Mr. Warren George, Chief, Engineering Div., U.S.Army, Alaska Engineer District
Mr. John Ireton, Alaska Engineer District
Mr. Ervin Long, Alaska Engineer District
Mr. Ted Moulder, USGS
Mr. E.J. Feulner, USGS
Mr. Melvin V. Marcher, USGS

Kodiak Area

Rear Admiral R.E. Riera
Mr. Ralph Jones, City Manager

Valdez Area

Mr. H. Bruce Woodford, Mayor
Mr. James L. McNamara, Resident Engineer, Corps of Engineers
Mr. William Bedingfield, Member of City Council

Seward Area

Mr. James W. Harrison, City Manager

Whittier Area

Mr. Elton G. Jergens, Supt. of Port, Alaska Railroad

Homer Area

Mr. Ralph G. Cowles, Mayor

In addition, courtesy calls were paid on:
Lt. General R. J. Reeves, USAF, Commander in Chief, Alaska, and
Major General Ned D. Moore, Commanding General, U.S. Army, Alaska

University of Alaska

Mr. Charles Sargent, Dean
College of Math, Physical Science, and Engineering

Mr. Charles Keim, Dean
College of Arts and Letters

Mr. Keith Mather, Director
Geophysical Institute

Mr. Earl H. Beistline, Dean
College of Earth Science and Mineral Industries

Dr. William R. Wood, President
University of Alaska

Dr. Edward Berg
c/o Geophysical Institute

Dr. K. M. Rae
Vice President for Research and Advanced Study

Dr. Howard Cutler
Academic Vice President

Mr. J. L. Burdick
Associate Professor of Civil Engineering

Dr. E. F. Rice, Head
Department of Civil Engineering

APPENDIX 4

Correspondence

a. Letter from R. H. Tatlow, III, Vice President, Engineers Joint Council dated May 7, 1964

b. Letter to Mr. Tatlow from Chairman Anderson dated May 22, 1964

c. Letter to Governor Egan of Alaska from William Knowles, American Institute of Architects and Maj. Gen. Keith R. Barney, Engineers Joint Council dated June 13, 1964

ENGINEERS JOINT COUNCIL

345 EAST 47th STREET • NEW YORK, N. Y. 10017 • 212 PL 2-6800
Cable—ENGUNITY

May 7, 1964

The Honorable Clinton P. Anderson
Chairman
Alaska Reconstruction Commission
United States Senate
Washington, D.C.

Dear Senator Anderson:

The engineering professional community has been giving increased thought to the problems arising from the recent earthquake disaster in Alaska. The members of our various societies resident in Alaska are serving to the greatest extent possible in the alleviation of immediate distress and in the reconstruction program.

The Executive Committee of the Engineers Joint Council, described more fully in the enclosed bulletin and representing a combined membership of about 600,000 in its constituent societies, has authorized the establishment of a coordinating committee that will stand ready to be of assistance to you and the Alaskan Reconstruction Commission as your needs and our competence dictate. We have had preliminary discussions with Mr. Dwight Ink and Colonel William Penley, assuring them of our availability for service. We recognize of course, that the agencies of Government are drawing on their own staffs to provide immediate assistance; and our offer is made in the full recognition that you are calling on a great many competent engineers in Government and industry for specific reconstruction tasks.

We do wish to assure you of our continued interest in these programs and our availability to you for appropriate assistance. We shall be happy to discuss our participation in your program with you at our mutual convenience. The EJC activity relating to the Alaska problem is being organized by General Keith Barney (Ret.), and coordinated by the EJC Government Liaison Committee, W.J. Harris, Chairman. Their addresses appear at the bottom of this letter.

Sincerely yours,

R.H. Tatlow III,
Vice President

RHT:rms

Dr. William J. Harris, Jr.
Assistant to the Vice President
Battelle Memorial Institute
1755 Massachusetts Avenue, N.W.
Washington, D.C. 20036
Phone: 232-8553

Keith R. Barney,
Major General, U.S.A. (Ret'd.)
Janus Engineering Designs
1001 Connecticut Avenue, N.W.
Washington, D.C. 20006
Phone: 347-8527

FEDERAL RECONSTRUCTION AND DEVELOPMENT PLANNING COMMISSION FOR ALASKA

WASHINGTON

May 22, 1964

Mr. R. H. Tatlow, III, Vice President
Engineers Joint Council
345 East 47th Street
New York, N.Y. 10017

Dear Mr. Tatlow:

Thank you for your offer to lend assistance in Alaska. I am sure that there are experienced and able members of your Society who could offer valuable assistance in this disaster area. You can well understand that the effectiveness of such a team is dependent upon the response of the local people. We have discussed with the State and local authorities the merits of the assistance you have offered and they would welcome the advice of your consulting panel.

I feel that the greatest value will come if you deal directly with the state officials on this long range planning and development program. The Commission has recommended your offer to the appropriate state officials and will defray the travel expenses. We would want copies of your report to help form a pattern for this and any future disaster relief program.

I have received a similar offer from the American Institute of Architects offering their services. I feel it would be very logical to include as a single task force professional engineers and architectural representatives, since there is a need for such advice. I would prefer it be identified as one task force because it will alleviate the fears of the Alaskans who are beginning to feel that they are being studied to death. Separate reports can be submitted if you find it desirable and appropriate.

If you concur, I suggest General Barney establish direct contact with Mr. William H. Scheick, Executive Director for the American Institute of Architects.

The Commission will have a staff member travel with you and see that the necessary supporting arrangements are provided. I fully agree with you that professional service for specific projects should be done by the normal professional selection procedures.

I would like to suggest that the task force be assembled in the field in the first week in June. Please advise me if this fits in with your plans. If so, we will arrange contacts with the State and local authorities.

I wish to thank you again for your generous offer.

Sincerely yours,

Chairman

CPA:d

Elmendorf AFB, Alaska

13 June 1964

Honorable William A. Egan
Governor of Alaska
Juneau, Alaska

Dear Governor Egan:

As you know, a joint group consisting of temporary committees from the American Institute of Architects and from the Engineers Joint Council, chaired by the undersigned, have been conducting a general review of matters related to our fields of interest arising from the March 27 Alaskan earthquake.

This review has arisen from our respective offers of assistance to the Federal Reconstruction and Development Planning Commission for Alaska, and their acceptance thereof after their securing your concurrence.

The review has been general in nature, in an effort to evaluate overall segments of the problem and the resultant actions thereto. We have deliberately kept out of relatively narrow specific items.

This letter, and particularly its accompanying Annexes 1 and 2, constitute our report. Your coordinator, Mr. Fitzgerald, has been furnished copies.

The AIA and EJC members have been closely associated during our visit, and have freely exchanged and stimulated thoughts during the preparation of the report. However, each group has some fields in which the other is not ordinarily professionally engaged. We, therefore, consider that each group alone is responsible for the contents of its Annex to this letter. While perhaps not directly related to the immediate mission of the group, in the course of our discussions, various members have arrived at views on long range considerations for Alaskans. We think these views may be of interest to you and they are enclosed in Annex 6.

We received a cordial welcome and most helpful briefings wherever we went. We want to particularly call your attention to the outstanding aid given us by the following:

Mr. Joseph H. Fitzgerald, your coordinator in Anchorage
Dr. E. F. Rice, University of Alaska
Mr. John E. Manly, General Manager, Alaska Railroad
Mr. R. H. Bruce, Assistant General Manager, Alaska Railroad
Colonel K. T. Sawyer, U. S. Army Engineer District
Lt Colonel D. H. Henderson, CINCAL Staff
Lt Colonel Manley E. Rogers, U. S. Army Engineer District
Captain W. J. Randolph, Alaskan Air Command

In the case of the last four, we will address appropriate letters to their military superiors.

The group was accompanied throughout the tour by Colonel William Penly, U. S. Army, Deputy Executive Director of the Commission. We owe him a debt of gratitude. We could not have functioned anywhere nearly as effectively without his advice and counsel.

It was a great satisfaction to prepare our report and we hope that you may find it of value.

Very truly yours,

William H. Knowles

WILLIAM KNOWLES
American Institute of Architects

Keith R. Barney

KEITH R. BARNEY
Major General, USA (Ret)
Engineers Joint Council

6 Atch
1. Annex 1. Report by AIA Group
2. Annex 2. Report by EJC Group
3. Annex 3. List of Committee Members
4. Annex 4. Itinerary of Committee Travels
5. Annex 5. List of Principal Persons Contacted.
6. Annex 6. Special Report

Hughes
April 24 -

~~To take notes~~
~~(but later session)~~

REPORT

of

THE AMERICAN INSTITUTE OF ARCHITECTS

and

THE ENGINEERS JOINT COUNCIL

COMMITTEES

on

THE RESTORATION AND DEVELOPMENT

OF ALASKA

Prepared for

THE HON. WILLIAM A. EGAN
Governor of Alaska

Under the auspices of

THE FEDERAL RECONSTRUCTION AND
DEVELOPMENT PLANNING COMMISSION
FOR ALASKA
The Hon. Clinton P. Anderson, Chairman

Anchorage, Alaska

June 13, 1964

16357

Elmendorf AFB, Alaska

13 June 1964

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Governor of Alaska
Juneau, Alaska

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Very truly yours,

William H. Knowles
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American Institute of Architects

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ANNEX I

AMERICAN INSTITUTE OF ARCHITECTS REPORT

ANNEX 1

AMERICAN INSTITUTE OF ARCHITECTS REPORT

Table of Contents

MEMBERS OF AIA COMMITTEE

Glenn Balch

Charles Blessing

Kenneth W. Brooks

Craig Harmon

William F. Knowles

Herman C. Light

Stephen N. Richardson

Paul Spreiregen

(Biographies of Members are in Annex 3)

A. INTRODUCTION

The March 27 earthquake destroyed many of the life blood activities of Alaska's cities. Necessity demands their immediate restoration. However, current plans for these immediate steps reveal a great need to think of the future.

The present role of Alaska's cities are as stepping stones to tomorrow. These stepping stones can be either a help or a hindrance. We believe that they can be a great help if they are thought of in connection with Alaska's future. If, in the haste to rebuild, we do not do this, Alaska's potential may be greatly jeopardized.

The task of the American Institute of Architects survey group is as follows:

1. To survey the earthquake and tidal wave damaged areas such as Anchorage and environments, Kodiak, Homer, Seward, Whittier and Valdez.

2. To determine the progress made to date on reconstruction of damages in these cities.

3. To recommend any improvements in specific areas or in the coordination of the immediate reconstruction of damages presently under way.

4. To recommend methods of coordinating the transition and the integration of the two part problem consisting of first, the immediate construction to provide safe housing, health, sanitation, commerce, and jobs for residents of the stricken areas; and second, the long-range planning for the areas including revision of building codes and zoning codes along with the enforcement thereof.

It should be noted that most of the earthquake and tidal wave damage occurred in populated city areas constructed on shorelines or low areas. It is essential that any permanent construction be carefully sited, not only to provide for convenience, but plan for future safety of both people and property. Sewer systems, water systems, electrical distribution, telephone and gas distribution systems must be planned and located to minimize future replacement costs in case of a disaster. The economic stability of the

State, the cities and the residents is vitally affected by any disaster. The cities and State are dependent upon business and commerce. Further, storage of inflammable products and material should be located where neither earthquake nor tidal waves can compound the destruction by spreading burning materials into areas not necessarily affected by fire or earthquake. Likewise, boat harbors and dock facilities must be located where the boats themselves or the contents cannot be used as a tool or weapon by a seismic wave to destroy life or property.

It is almost a miracle that the effects of this earthquake were not many times more disastrous because of the particular day and time of day and the circumstance that it occurred during a low tide. Schools were not in session and there were no panics. The only fires that occurred were caused by burning oil, or oil tanks. This miracle may not be repeated in the inevitable next earthquake.

B. RECOMMENDATIONS

1. Immediate Needs

a. We recommend the immediate reconstruction of all facilities basic to the economy of the damaged towns as soon as they are related to sound and fully conceived long range plans.

b. We recommend that no permanent reconstruction of major buildings be done on sites which current investigations indicate are vulnerable to future natural disasters.

c. We recommend that no towns be rebuilt in whole or in part without adequate design plans which relate cities physically, functionally and aesthetically to their natural surroundings. Plans available to us, we find, neglect these aspects in part to the detriment of the future potential of this State. In the rush to get action, some of these considerations are being ignored and all plans, including urban renewal plans, should be carefully scrutinized to see that they meet all the above requirements.

d. We recommend that more alternative proposals be examined prior to official plan adoptions. We find that the plans being prepared lack scope -- that not all the apparent alternatives have been explored and presented to the townspeople.

e. We recommend that the lessons of self help and organization which took place immediately after the earthquake be recorded as part of a manual for disaster survival.

f. We recommend that all significant damaged construction be studied immediately by qualified professionals; damages and areas of failure carefully recorded, and the resulting information distributed widely as soon as possible as a basis for appropriate construction techniques.

g. We recommend that temporary structures in hazardous sites be built only in extenuating circumstances, and not be given permanent building permits. In general we observed that this policy is in force at the present time. It should not be relaxed.

h. We recommend immediate appointment of a committee of Alaskan architects to review and advise on all plans of all agencies for urban renewal, shoreline facilities, etc., with the special instructions to it to report to you the specific instances of deviation from the recommended actions embodied in this survey.

2. Long Range Needs

a. We recommend that the 1962 Federal Highway Act, which required comprehensive land use and planning in all the 216 standard metropolitan areas in the United States, with the single exception of Anchorage, be modified to include Anchorage.

b. We recommend the strengthening of locally based and continuing planning of metropolitan areas, along the lines of the City Planning Commission of Anchorage.

c. We recommend that each town in Alaska, insofar as practical, be developed as an unique place in an unique setting; that such an attitude will lead to more satisfactory towns for the townspeople themselves, resulting at the same time in more interesting stopping places for tourists.

d. We recommend that there be effective coordination of all emergency planning activities of all agencies, including the Engineers Corps, within the framework of all long range planning programs. To date this coordination does not appear to be effective, partly because of the emergency and partly because each agency employs a different approach to the problems at hand. It is vital that all agencies doing planning cooperate and work closely with each other, to the end that each is informed of what the other is doing and of his reasons therefor. When differences occur, they should be quickly and easily resolved; but if unresolved, the appropriate authorities should be immediately informed and a decision rendered as soon as possible.

e. We recommend that adequate and well-located sources of water be placed throughout cities so that in case of earthquake and fire, water for fire fighting will be available to the Fire Departments even if water mains are broken.

3. Architectural Design and Planning

a. We recommend that Alaskan architecture and town design be developed as an unique and genuine feature of the State. Alaska needs a design philosophy that expresses the nature of this place, which adds harmoniously to the natural landscape, and which suits townspeople and tourists. Many Alaskans see Alaska as a Switzerland of the United States. Alaska is the Alaska of the world and must seek its own best character. It cannot do this by imitating superficially similar places. However, lessons can be learned from abroad, the main one being that genuine and sound character is the basis for distinction.

b. We recommend that all plans be required to consider the active effects on the natural landscape; that sketches and photographs showing these relations be prepared along with other normal planning procedures; that alternatives be studied and submitted to all those concerned.

c. We recommend that all Architects, Engineers, Planners, and others now planning elements of Alaska's towns be required to consider the effects of their separate works in this way.

d. We recommend that Alaska resist the temptation to adopt a superficial and unsuited architectural style in its interest to develop a regional style.

e. We recommend that the course to developing suitable character lies in examining each site carefully and building modestly with great deference to nature.

f. We recommend that particular attention be given to the placement of industrial elements so as not to destroy the general utility or inherent beauty of the area. An example of poor development existed at Seward before the earthquake, where the railroad effectively cut off the city from access to its entire waterfront. Another example is at Kodiak where the oil tanks are presently placed immediately adjacent to the Hospital. Fortunately they did not catch fire during the earthquake. Again, at Valdez, a preoccupation with the immediate practical requirements of locating docks and small boat harbors may lead to eliminating its beach, vital to its potential as a great international all-year resort and sports center.

g. We recommend that the attraction of these towns to tourists be based on the liveability and attractiveness of the towns to the residents themselves. This does not gainsay the necessity to cater to the wants of tourists.

h. We recommend that efforts to landscape in the towns and around individual buildings be encouraged; that clumps of native trees and ground cover within the towns be retained wherever possible.

4. Building Construction Regulation and Techniques

The Alaskan construction industry does not operate under a clearly defined, uniform program of building construction regulation. Where regulation exists, if at all, there are partially qualified personnel enforcing a sketchy existing regulatory structure. These conditions make for a dangerous situation. A typical example of this laxity is the superficial or complete lack of consideration being given to the replacement of oil storage tanks without regard for the spread of flaming liquids. These oil tanks were lethal instruments of destruction and will continue to be if replaced as presently indicated.

a. We recommend that the State retain competent professionals with experience in design and regulation of earthquake and fire resistant structures to develop a statewide building code and to establish proper statewide enforcement procedure. Professional advice must be obtained from areas which have been experiencing earthquakes and have adopted procedures to cope with them. Within this program, larger communities might maintain their own departments and smaller communities could be served by a State Agency on a district basis.

b. We recommend that, in the interim, the State adopt a proven existing building and fire code and supplement the code with special legislation to modify this code where necessary to meet special local conditions.

c. We recommend that the State institute a program for:

(1) Public officials to impress them with the need for adequate regulation and an enforcement program conducted by knowledgeable professionals working independent of political or economic pressure. Orient public officials to a full understanding of the hazardous combination of earthquake, fire, and panic in addition to the local problems inherent with the severe winter temperatures.

(2) The general public to make them more fully aware of the necessity of safe construction with its attendant higher cost of construction, higher cost of design, and its further extension of time required to

prepare documents in more complete structural detail; and to allow more time for patient review by competent regulatory agents.

(3) Design professionals to acquaint them with the design criteria employed in other communities having similar problems and to require the design professionals to demonstrate an awareness of these problems and their treatment.

(4) Educational institutions in order to permit them to re-evaluate courses in structural design and all examinations relating to professional qualification to insure that future entrants to the design professions are adequately prepared to cope with and treat the problems raised in earthquake-prone communities.

5. Tourism

1. We recommend that the tourist aspect and potential of Alaska be closely integrated into all future planning work.

2. We recommend that tourist accomodations be designed to serve tourists of all interests, not limiting those interests to hunting and fishing but extending them to include standard tourist activities and recreational attractions found the world over.

3. We recommend that one or more complete all year tourist resort centers, such as at Sun Valley or Yosemite Park, be built as soon as possible, so that tourists will have more destinations or stopping points when visiting Alaska. These centers should be large, luxurious, with all resort facilities, including one or more hotels of exceptional design so as to merit and receive world wide publicity. Easy and dependable transportation should be developed to these centers.

4. We recommend that a study should be made of the extra length of season of the available winter sports areas and these facts made known to winter sports enthusiasts and resort operators.

C. NOTES BY MR. BLESSING ON TOWN DESIGN

Reflection after a few days presence in a landscape of absolute beauty, of Alaska's mountain scenery, of range on range of snow-covered peaks, and of stupendous glaciers, brings the architect to focus humbly but proudly back to the reality of his purpose -- the provision of shelter for all man's activities with honesty and dignity, but, most of all, with an overwhelming respect for the great beauty of nature.

Here in Alaska, more than in any other place on this continent and perhaps in the entire world, is unspoiled nature at its greatest and its best. This is a priceless heritage for all of the people of the world, of the nation, and of the State of Alaska.

We have seen at Valdez a vast panorama of natural beauty, greater than even Switzerland can claim. The hand of man has been held here by the essential absence of human settlement. A cluster of huddled homes, stores, churches, schools, and hospitals is too often mixed with a few oil tanks. The latter show too clearly what unguided industrialization and commerce might yet do on a larger scale in a few short months or years: violate nature's handiwork of infinite ages past.

The architect is first of all a designer and his contribution is nothing if it is not profoundly sensitive to man's obligation to respect all of nature, particularly where nature is at its greatest and most beautiful. In the presence of Alaska's still pioneer settlements at Valdez, Kodiak, and Seward, the architect must acknowledge the instinctive way in which pioneer settlements can honor by a natural modesty, a natural scale, and a natural use of materials.

Here man has not scarred the earth nor insulted the natural rhythm of the earth's forms. The individual dwelling, like an outcrop of natural rock, continues the form of the land and blends with its natural cover. And yet, man's needs and uses of land provide him with the opportunity to express the uniqueness of his place and his type of settlement. The characteristic scale and form of dwellings at Valdez with the rather steep-pitched roof and the frequent lean-to extensions, give Valdez a form different from Kodiak or Seward. In its rebuilding on a new site, Valdez should be aware of these essential capabilities -- the textures of its heritage as a distinct place.

No town can be planned as an abstract two-dimensional "zip-a-tone" pattern on a map and expect to be less flat than the paper which it is drafted on. No town, however naturally flat its terrain, can suffer its essentially two-dimensional character of street pattern and land-use pattern to be dealt with separately from its third dimension, without isolating its architecture from its site. No town or city can be great, let alone even good in design, if its two-dimensional pattern is conceived as a land-use and circulation plan alone -- however efficient those arrangements may be.

In each example, the people of the place should see and deeply sense in their rebuilt town a harmony between the natural setting and the man-made town. This relation between man's town and the town's natural setting should be studied from the point of view of how it appears to a person approaching along the road, by water, and by air. It should further be studied from the point of view of how the over-all natural setting actually appears from within the town.

Designing a town in such magnificent settings is nothing short of an exercise calling forth the best qualities of architecture, planning, landscape architecture, even sculpture -- for this work is a work of creating and relating forms.

NOTES BY MR. BROOKS:

An Idea — for evolving an indigenous architecture for Valdez, Alaska.

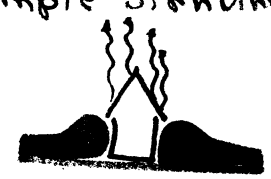
To be genuinely indigenous - (appropriate with a personality of its own) it must come naturally. It cannot be "phoney Swiss" or "phoney Shopping center".

1. In Valdez "Willie the Welder" says, ..."Most of us will build our own houses — and we'll get help from our kin & neighbors.

Simple Plan

Simple Structure.

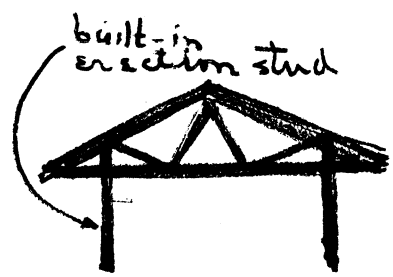
2. Snow gets 8' deep on roof & wet: Snow should be kept on the roof to provide insulation and to avoid having snow cover up windows.



bad

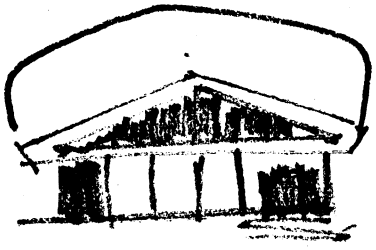
good

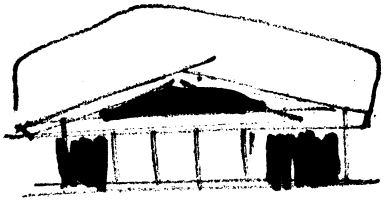
3. Building season is short. Carpenter talent is "jackleg". Lumber mill produces only smaller dimension lumber. A prefabricated "Valdez truss" of locally produced spruce could provide an economical fast building component — and provide both summer & winter work.



"Valdez Truss"

4. Rough sawn lumber is easier to produce and cheaper than smooth planed lumber. Stain on rough sawn lumber is cheaper, easier to apply and lasts longer than typical house paint. Even mama and the kids can apply stain. So-o-o. House could be stained in a variety of colors, with the trim always being WHITE - to give the colors "sparkle" -or "seal brown" to frame the white snow on the roof.





5. Exposed posts or fascias could be carved as a "family crest" — each house would have a personality all its own.

THE AMERICAN INSTITUTE OF ARCHITECTS

The Octagon • 1735 New York Avenue, N.W. • Washington 6, D.C. • EXecutive 3-7050

C
O
P
Y

COPY OF TELEGRAM

April 3, 1964

The President
The White House
Washington, D. C.

The American Institute of Architects applauds your appointment of the Federal Reconstruction and Development Commission for Alaska.

We see in this rebuilding of the damaged communities a superb opportunity to utilize the most advanced thinking and soundest concepts of American community planning. The American Institute of Architects is in a position to identify experts in urban design, earthquake proof structures and the design of schools, hospitals and housing. We propose to assist the Commission with the selection of a group of such specialists who would take part in the Commission's program as advisers or members of task forces with specific assignments.

We wish to make it clear that we propose this assistance in terms of advisory services which are completely separate from the ultimate professional services to be rendered by architects, engineers and planners on actual construction projects.

We will welcome an opportunity to meet with representatives of the Commission to implement this proposal. For direct communication with the Institute I suggest contacting the Executive Director, William H. Scheick, at our headquarters, 1735 New York Avenue, NW, Washington, DC. Telephone number Executive 3-7050.

J. Roy Carroll, Jr., FAIA
President
The American Institute of Architects

Appendix 1

United States Senate

COMMITTEE ON
AERONAUTICAL AND SPACE SCIENCES

April 7, 1964

Mr. J. Roy Carroll, Jr. President
The American Institute of Architects
1735 New York Avenue, N.W.
Washington, D.C.

Dear Mr. Carroll:

I have a copy of your wire to the President offering to assist the Federal Reconstruction and Development Commission for Alaska with the selection of a group of specialists as advisers or members of task forces.

I am glad to have this offer of assistance and will be contacting Mr. William Scheick as you suggest at a later date

Sincerely yours,

Clinton P. Anderson
Chairman
Alaska Restoration Commission

CPA:d

Appendix 2

THE AMERICAN INSTITUTE OF ARCHITECTS

The Octagon • 1735 New York Avenue, N.W. • Washington 6, D.C. • EXecutive 3-7050

April 17, 1964

C
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Y

Honorable Clinton P. Anderson, Chairman
Alaska Restoration Commission
United States Senate
Washington, D. C.

Dear Senator Anderson:

The American Institute of Architects is most gratified by your interest in the formation of a consulting panel of specialists in urban design and architecture for assistance to the Federal Reconstruction and Development Commission for Alaska. We have selected a group of our most experienced and able colleagues who would be willing to serve as advisers or members of task forces.

In making these selections, we have kept in mind the essence of our message to the President, namely, that the rehabilitation of the disaster areas in Alaska offers a great opportunity for long range planning in accordance with the most advanced thinking and soundest concepts of community and regional planning. We are aware, of course, that your most pressing problems are concerned with the urgent first steps in rehousing people, restoring facilities and jobs. Our recommended panel of consultants are qualified to render advice in certain aspects of these problems as well as in the broadest concepts of architecture and planning.

We propose the following men for service on this panel or otherwise as you may require:

Wayne S. Hertzka (San Francisco) Chairman
Expert in all types of architecture, in city planning and in administration.

Glenn Balch (Los Angeles)
Expert in earthquake problems in building design.

Charles A. Blessing (Detroit)
Expert in urban design, and city and regional planning.

John S. Bolles (San Francisco)
Expert in industrial architecture

Kenneth W. Brooks (Spokane)
Expert in urban design, city planning and transportation.

Herman C. Light (Los Angeles)
Expert in building codes and safety

Stephen H. Richardson (Seattle)
Expert in transportation and industrial architecture and city planning.

These architects are widely known in the profession. Brief biographies for each of them are attached. All of them have competence in large scale undertakings. We have taken care to attain a balance of experience in the several areas of specialization which seem to be most important for the task.

The services of this consulting panel would not, of course, embrace the professional services for specific projects of planning or building design. Normal procedures of selection of professionals would be in order when actual projects have been defined.

We will appreciate hearing from you regarding your decision to create and use the services of the proposed panel. If we can be of further assistance, please get in touch with our Washington Headquarters, 1735 New York Avenue, N. W. Phone EX 3-7050 -- Mr. William H. Scheick, Executive Director, or, if he is absent, Mr. Robert J. Piper, Director Urban Design Programs.

Sincerely yours,

J. Roy Carroll, Jr., FAIA
President

JRCjr:eah

N.B. William Knowles was subsequently substituted for Wayne Hertzka and Paul Spreiregen was added to the group.

FEDERAL RECONSTRUCTION AND DEVELOPMENT PLANNING COMMISSION FOR ALASKA

WASHINGTON

May 22, 1964

Mr. J. Roy Carroll, Jr., FAIA
President
The American Institute of Architects
6 Penn Center Plaza
Philadelphia, Pennsylvania

Dear Mr. Carroll:

Thank you for your generous offer and willingness to field a team of such outstanding talent. I regret the delay in answering your letter. However, you can well understand that the effectiveness of such a team is dependent upon the response of the local people. Subsequent to receipt of your letter, we discussed with state and local authorities the merits of assistance you have offered. Needless to say, their first concern and ours, too, was directed toward digging out of the rubble and emergency repairs to roads and utilities. Now they would welcome the advice of your consulting panel.

I feel that the greatest value will come if you deal directly with the state officials on this long range planning and development program. The Commission has recommended your offer to the appropriate state officials and will defray the travel expenses. We would want copies of your report to help form a pattern for this and any future disaster relief program.

I have received a similar offer from the Engineers Joint Council offering their services. I feel it would be very logical to include as a single task force professional engineers in the fields

of utilities and mechanics or electrical engineers since there is a need for such technical advice in these areas. I would prefer it identified as one task force because it would alleviate the fears of the Alaskans who are beginning to feel that they are being studied to death. Separate reports can be submitted if you find it desirable and appropriate.

If you concur with this proposal, I suggest you establish direct contact with General Barney, who is mentioned in the letter from the Engineers Joint Council which I have enclosed.

The Commission will have a staff member travel with you and see that the necessary supporting arrangements are provided. I fully agree with you that professional service for specific projects should be done by the normal professional selection procedures.

I would like to suggest that the task force be assembled in the field in the first week in June. Please advise me if this fits in with your plans. If so, we will arrange contacts with the state and local authorities.

I wish to thank you again for your generous offer.

Sincerely,

Clinton P. Anderson

ANNEX 2

ENGINEERS JOINT COUNCIL REPORT

ANNEX 2

ENGINEERS JOINT COUNCIL REPORT

Table of Contents

MEMBERS OF EJC COMMITTEE

Keith R. Barney, Major General, USA, Ret.

George Brandow

Dr. W. J. Harris

Dr. D. E. Hudson

William Meese

Dr. A. Nelson Sayre

Josef Sorkin

(Biographies of Members are in Annex 3)

A. INTRODUCTION

The Engineers Joint Council (EJC) is an institution that provides for cooperative action by 21 national engineering societies with a combined membership of 600,000 qualified engineers. While each of the societies has a responsibility for technical programs and the issuance of technical journals in its field of specialization, EJC provides for the joint efforts of engineers to contribute to the solution of better understanding of pressing national problems. For the last year EJC, with the full support of its constituent societies, has been investigating the procedures by which it can be more effective in serving the government. The organization of the EJC Alaska Committee is a logical extension of previous activities of EJC.

The EJC offer was made to the Federal Reconstruction and Development Planning Commission for Alaska, often referred to as the Alaska Reconstruction Commission (ARC), by letter of May 7, 1964 (Appendix A, Section IX). The offer was accepted by ARC letter dated May 22 (Appendix B, Section IX).

After informal discussions with ARC personnel, the EJC Alaska Committee concluded that its mission was:

a. To review what took place related to the earthquake, in fields of EJC interest.

b. To observe what is being done in restoration and development.

c. To evaluate what will result from current and planned efforts.

d. To suggest improvements in these efforts.

e. To apply the lessons of this disaster to other areas.

This section of the report, Annex 2, is a report on the above mission.

Areas under military control are excluded from our consideration, except as they may relate to other areas.

Alaska's Good Friday earthquake of March 27, 1964, the circumstances surrounding it, and the events leading out of it, have been widely reported in the press and by various agencies concerned with the technical aspects. Reports in the latter, particularly the professional journals, and their allied papers, will undoubtedly continue and expand for some time.

No effort has been made in this report to again provide source material, such as mentioned above, and the report should not be used for that purpose. However, certain points, which follow, and in some cases are expanded on later, are considered of such importance to the engineer as to justify repetition.

First, this was both an earthquake of great magnitude and of exceptionally long duration.

Second, the earthquake resulted in earth slides and subsidence or elevation in several communities. These effects contributed to extensive property damage.

Third, the recognition of the instability of the earth underlying many cities or towns has led to uncertainty as to the location of re-building of many buildings and facilities.

Fourth, there are areas, notably Seward, where the earthquake practically stopped the existing economy.

Fifth, many federal institutions are attempting to help in the restoration of Alaskan facilities. Some problems are being faced in the coordination of these programs.

Sixth, Alaska has a short construction season. This does not mean that construction cannot be accomplished in the winter, but substantial premiums must be paid to so do.

Seventh, those economies of those areas that were heavily damaged will revive only with completion of construction. However, the construction itself will bring substantial relief through providing employment.

Eighth, the restoration of utilities to the point that they can function, cannot await refined planning if the population is to be able to live comfortably through the winter of 1964-65.

B. ENGINEERING ABSTRACT

The EJC Ad Hoc Committee on Alaska, formed for the ARC with the concurrence of the Governor of Alaska, has made a general engineering review of the situation arising from the earthquake.

The coastal area of Alaska is rugged, deeply indented and offers many good anchorages. The glacial outwash which forms most of the habitable level areas is subject to compaction and to lateral movement. Even slight crustal movements may trigger slides.

Destructive earthquakes may be expected in the future. Relatively small earthquakes occurring near cities may be as damaging as that of March 27, 1964. Additional strong-motion accelerograph instruments should be permanently installed at various points in Alaska to produce the information needed for engineering design. A permanent agency is needed to coordinate the study of Alaskan earthquakes.

Essential utility services, some of them makeshift, are available throughout the earthquake damaged area. The permanent rebuilding of the utility systems is, as of June 15th, being delayed, awaiting decisions on soil stability and land use. In order to insure completion prior to freezing weather it is imperative that more rapid progress be made in the reconstruction of utility systems, particularly water and sewer.

Apparently no crippling damage was sustained by the airports and air traffic was hardly affected. Total destruction of docking facilities at Seward resulted in shifting the port's functions to Whittier, with immediate and serious economic loss to Seward.

Temporary dock facilities are functioning in all areas.

Railroad operations have been restored from Anchorage to Whittier. Operations to Seward are expected to be resumed by September 1.

Reconstruction of highways is proceeding in an orderly manner. Restrictions of traffic movement (Anchorage to Seward) will continue through the current construction season. This is necessary in the interest of vital construction progress. By winter unrestricted traffic movement over the entire system may be reasonably anticipated.

Care should be taken in selecting sites for new facilities and they should be designed to resist earthquake forces. Building Codes and standards should be established in populated areas. The State of Alaska might well institute a State building regulation covering schools, hospitals and buildings of public assemblage. The State might assist small communities by providing engineering assistance and advice.

Emergency response to the problems created by the Good Friday earthquake was effective and timely. The management of the reconstruction program appears to be somewhat diffuse with consequent confusion and delay. Existing legislation does not provide adequate means for meeting the needs for reconstruction in an area whose economy is disrupted as completely as in Alaska. The economic growth of Alaska has been dependent on Federal spending but the private sector must expect to play a larger role in the future of Alaska.

C. RECOMMENDATIONS

1. Since additional earthquakes can be expected in Alaska, immediate action should be taken in all Alaskan towns and cities to introduce measures based on the experience of the March 27, 1964 earthquake that are likely to reduce damage.

2. The number of strong-motion accelerograph instruments in Alaska should be considerably increased, so that the data on earthquake ground motion necessary for the design of engineering structures can be obtained for future earthquakes.

3. A permanent program of instrumental field investigations of earthquakes should be established for Alaska covering all phases of seismology and earthquake engineering. This program should involve the cooperative efforts of many organizations already conducting such studies in other parts of the world. One group should be designated as the chief coordinating agency to insure proper initiation and follow through. The possibilities of the University of Alaska for this coordinating rule should be explored.

4. It is hoped that a way can be found to utilize the talents and special knowledge of experts already living in Alaska, perhaps through the cooperation of the University of Alaska and other centers, in the preparation of the comprehensive report on the Alaskan earthquake which is being prepared under the auspices of the National Academy of Science.

5. It is recommended that engineering decisions be based on present data available on soil and foundation problems and not be delayed for further intensive, detailed studies.

6. It is recommended that immediate steps be taken to rehabilitate the underground water and sewer systems to service homes that will be occupied in the winter of 1964-65, regardless of an ultimate decision as to the suitability of the area for buildings.

7. At Seward it is recommended that new generating equipment be placed on order and that foundation construction be started immediately thereafter.

8. At Valdez, it is recommended that consideration be given to extending a power distribution circuit to the new townsite for use during the transition period.

9. Land use plans should be finalized with all possible speed to permit the orderly reconstruction of all types of utility services.

10. It is recommended that plans for urban renewal projects in all cities affected be reviewed to assure the adequacy of the highways and transportation facilities intended to serve the redeveloped areas.

11. Public Law 875 provides for the restoration of damaged facilities to the condition which existed prior to the disaster. This law,which is extremely useful, should be re-examined with a view to possible modification on two counts because the following interpretation expressed by several individuals seems entirely unrealistic:

a. The present 90 day limit for filing claims is not realistic for earthquake damage since the earth will continue to settle for an extended period with subsequent damage to underground facilities.

b. When service is interrupted, utilities habitually make every effort to correct the difficulty promptly. However, in disaster situations, costs incurred by utilities using regular employees to make repairs is non-recoverable under P.L. 875. If contract crews were used, the cost would be reimbursed. This arrangement does not encourage a utility to use its regular manpower to restore service.

12. Research programs should be initiated to develop designs and materials for underground utility systems that would have increased resistance to earthquake damage. It is not intended that this suggestion for increased research should in any way delay the immediate reconstruction of essential utilities.

13. It is recommended that there be better city enforcement of building code regulations through proper plans and specifications, supervision and inspection. Possibly a State of Alaska code and building enforcement agency should be established to regulate the design and construction of schools, hospitals and places of public assemblage.

14. It is recommended that a local director of Alaskan reconstruction be given authority to schedule reconstruction projects and to coordinate all reconstruction programs.

15. It is recommended that legislation be developed to provide for a more effective program of reconstruction planning for future emergencies.

16. It is recommended that special studies be made of the role of the private sector in the economic development of Alaska.

D. GEOLOGICAL AND SEISMOLOGICAL CONSIDERATIONS

1. Geology

The southern coast of Central Alaska lies on the belt of relatively recent mountain building activity that borders the Pacific Ocean from the tip of South America to the Aleutians and thence southward through Japan, the Philippines, New Guinea and the east coast of Australia. This belt is characterized by rugged mountains, numerous active or extinct volcanoes and frequent crustal adjustments represented by the recent severe earthquake that has devastated Alaska. The basement rocks of this belt consist of volcanic or related igneous rocks and metamorphosed sediments.

In Alaska, alpine glaciers carved out deep, steep-sided valleys of fjords. Although some of these glaciers reach the sea even today, most of them have receded and the valleys they carved are arms of the sea. As the glaciers retreated, the melt water carried vast quantities of gravel, sand, and rock flour into the sea and deposited them at the heads of the inlets first carved by the glaciers. The deltas thus formed are so recent that the sediments are unconsolidated. Foreslopes having an angle as steep as 30 degrees are common. Much of the damage caused by the March 27 earthquake resulted from: 1) lowering of land level by compaction; 2) from landslides above sea level as at Anchorage or below sea level as at Seward; and, 3) from the waves caused by these slides and tsunamis (seismic sea waves).

The long inlets and sounds carved by glacial erosion provide excellent deep-water harbors for ships. However, the steep valley walls leave little room for port facilities or building sites. The level areas found chiefly at the heads of the inlets have been occupied by cities or villages. They are underlain by poorly bedded, unconsolidated sediments that are subject to consolidation and land movement, both above and below sea level.

With the exception of Kodiak (where there is an abundance of apparently good, easily procured basaltic rock) good construction aggregate is not readily available. The deposits of sand and gravel in many of the proposed sites contain large percentages of fine material and should be beneficiated before being used for aggregates.

Altogether the geologic history of Alaska, which has provided so many opportunities for development of vast natural resources - coal, oil, timber, fishing, tourism and unknown but almost certainly rich metalliferous reserves, has placed a high price on their development. The "get in, get rich and get out" approach which appears to have been predominant in the past will have to give way to careful planning based on adequate surveys of terrain, soils, marine environments and resources if Alaska is to become a permanent prosperous unit of the National Economy. This is a long range program which few people contacted seemed to envision either in scope or in organizational structure. This is most unfortunate because even the most effective restoration of the devastated cities to the pre-earthquake "status quo" will fall short of tapping the enormous potentialities of the State.

2. Seismological Considerations:

Alaska is located on the main circum-Pacific earthquake belt along which occur a large proportion of the world's destructive shocks. Because of the largely uninhabited nature of the country and the lack of local seismological stations until recent years, the seismic history of Alaska is not accurately known in detail. The records that do exist, however, and a comparison with better known adjacent areas along the circum-Pacific belt such as California, suggest that on the average several earthquakes of a potentially dangerous size may be expected each year somewhere in the State. While most of these earthquakes may be far removed from cities or engineering works, it is clear that a continuing danger exists which calls for preventive actions such as the adoption of earthquake resistant design practices. This is a permanent problem for Alaska, just as it is for other Pacific Coast states, and for many other countries such as Japan, Chile, Mexico and India.

Although very large earthquakes such as the recent March 27, 1964, quake are fortunately rare, a large number of smaller but potentially destructive earthquakes can be expected regularly. It is worth recalling that the recent Yugoslavian earthquake which devastated the City of Skoplje with a large loss of life was only of magnitude 6, very much smaller than the Alaskan earthquake. Similarly, the very damaging California earthquakes of Santa Barbara (1927) and Long Beach (1933) were of only 6.3 magnitude. In the Anchorage area alone, more than 30 earthquakes of magnitude 6 or greater have been recorded since the beginning of this century.

It should also be noted that although most Alaskan earthquakes are located along the Aleutian arc and the coast region, earthquakes of a destructive size have occurred in practically all parts of the state. It cannot be concluded that the far inland areas are immune from such danger, and in the present condition of limited knowledge of many interior areas it would not be wise to accept lower standards of earthquake resistant design there.

Seismograph stations already existing in Alaska and other parts of the world are adequate for the approximate location of all Alaskan earthquakes of a destructive size. The instruments in these stations, however, are not able to give information on the actual ground motions in the vicinity of the earthquake, and hence do not provide the engineer with the basic data needed for the design of buildings and other engineering works.

This is a good example of a technical field that has suffered by being caught in between two disciplines - the engineers have assumed that the seismologists were developing and operating suitable instrumentation, while the seismologists have been leaving the whole problem of strong ground motion measurements primarily to the engineers. The result has been that nowhere in the world is there an adequate network of strong-motion instruments, and that in none of the recent earthquakes in Chile, Mexico, Iran, Morocco, Yugoslavia, and now Alaska has there been obtained even one measurement of strong local ground motion.

The U. S. Coast and Geodetic Survey has a network of about 80 strong-motion accelerographs suitable for engineering purposes in California and the Northwest States, but none of these instruments were installed in Alaska prior to the March 27, 1964 quake. Since the earthquake, 5 of these accelerographs have been installed at Anchorage (2), Fairbanks, Kodiak, and Cordova. This is obviously a very inadequate number of instruments for this very large state. A pressing necessity for immediate action is a major expansion of the U. S. Coast and Geodetic Strong-Motion Accelerograph network, not only in Alaska, but also in other Pacific States with a similar high earthquake risk and currently inadequate instrumental coverage.

At present a number of agencies are engaged in instrumental field studies of the Alaskan earthquake. These include, besides the University of Alaska, and the U. S. Coast and Geodetic Survey, the California Institute of Technology, Columbia University and the University of Tokyo. Cooperation between these various agencies is carried out on an informal basis, mostly by means of personal contacts between field parties and interchange of short-term visiting technical and professional persons. Although this type of informal organization is effective for emergency programs of a very specific nature, it does not usually ensure the kind of permanent program which is so necessary in the field of seismology, which must collect its basic data over a long period of time. It is recommended that permanent cooperative programs be established in this field, and that a clear decision should be made as to the particular group which should expect to exert the major initiative for the work. As an idea for investigation, it would seem that the University of Alaska should be ideally suited for this initiating and coordinating role. The University has the local orientation necessary to fit the program to the scientific and economic needs and potentialities of the area,

and should find in this subject many stimulating technical and scientific problems to relate to the academic interests of the school. There has been a very fruitful cooperative effort between the U. S. Coast and Geodetic Survey and a number of universities in other parts of the country, which can serve as a model for similar cooperation in Alaska.

Although seismographic measurements have been emphasized above, this is of course only one phase of current and proposed investigations. The U. S. Coast and Geodetic Survey is already at work on a program of precise geodetic measurements which should provide important data for studies of crustal movements. These and similar studies involving tides, geomagnetism, etc., also pose problems of support and cooperation.

The National Academy of Sciences has appointed a special committee to prepare a comprehensive report on the Alaskan earthquake. A report, perhaps following the spirit of the Carnegie report on the San Francisco earthquake of 1906, would be a major contribution to all phases of earthquake studies. It is hoped that in the preparation of this report it will be possible to make use of the talents of the experts living in Alaska, perhaps through the cooperation of the University of Alaska and other centers.

3. Earthquake Engineering Considerations:

The damaging effects of earthquakes are of four basically different types:

a. Shaking of a structure, with damage or destruction caused primarily by large horizontal ground accelerations.

b. Destruction by large scale land slides or slumps, which may completely remove the foundation of buildings or engineering works.

c. Compaction of the ground caused by shaking which may lead to excessive deformation of the foundation, leading to a weakening of a structure to the point of failure.

d. The effects of seismic sea waves (tsunamis).

Of these mechanisms of damage, the first has been the most completely studied. This damage caused directly by ground acceleration is, however, the least important effect as far as the Alaskan earthquake of March 27, 1964, is concerned. This explains the very special significance of the soil mechanics problem in the reconstruction picture.

In view of the number and excellence of the experts that have been called in on these soil mechanics and foundation problems, and of the magnitude of the investigative program of drilling, etc., that is at present almost completed; it should be possible to have very quickly the essential decisions on the soils and foundation aspects of the reconstruction. While there will remain many important problems for future research, the practical decisions needed for immediate reconstruction work will have to be made essentially on the basis of data now at hand. There appears to be a tendency to defer many decisions on urgent reconstruction matters until more details can be developed on this soils and foundation problem. The essential technical knowledge needed for these practical decisions should by now be available, and it is strongly recommended that these engineering decisions should be made and announced without further delay.

E. ENGINEERING ASPECTS OF ALASKAN RECONSTRUCTION

1. Utilities

In the areas visited during the period of June 8-11, 1964, essential utility services were available in all buildings which were suitable for occupancy. The ingenuity and diligence demonstrated by all concerned in the restoration of these vital services were outstanding. Of present concern, however, is the fact that over two months have elapsed and many of the initial temporary arrangements remain in service with the schedule for permanent repairs still undetermined.

Since the construction season has already started and is of very short duration, it is urged that every effort be made to immediately start the rehabilitation of the water and sewer systems in the damaged areas. The temporary water systems consisting of aluminum pipe and rubber hose on the surface of the ground cannot survive after temperatures fall below the freezing point for extended periods. Water and sewer systems should be underground by September 15 with an absolute deadline of October 15. Some difficulty can be expected prior to the October 15 date depending on weather conditions.

Progress in making repairs to all utility systems is being delayed pending decisions on soil stability which will influence future land use. While it is desirable to integrate the rehabilitation of utility systems into the long-range urban renewal plans, it must be recognized that when public health and safety are involved the immediate restoration activity should take precedence.

It is suggested that damaged areas be surveyed to determine the homes and other structures that will be occupied this winter regardless of whether or not the area is finally approved for urban renewal. When this information is available, immediate steps should be taken to rehabilitate the underground water and sewer systems. Further delay in this action will serve no useful purpose and may result in unnecessary hardship this winter.

Certain areas were visited briefly and the following observations pertain to the utility situation in those areas only:

ANCHORAGE

Electric Power

At present all needs are being met. In a number of cases this is being accomplished by makeshift arrangements of electrical circuits and equipment that must be replaced to insure normal continuity and quality of service. It is estimated that about 80% of the underground duct system in the downtown area is severely damaged. Duct runs are broken and offset to the extent that electric power cables cannot be removed or new cables installed. Many of the wedged cables continue in service, but the failure of these cables, which can occur at any time, will pose serious power supply problems in the downtown area. The only solution appears to be a major rebuilding of the duct and cable system.

Adequate power generating capability is available in the area and it is expected that this will be the case during the winter load peaks unless some unforeseen event occurs.

Repairs continue to be made on the electrical system, but major changes such as the relocation of several substations and related transmission and distribution facilities are being delayed pending decisions on land use. While delays in making a full restoration of these facilities are not desirable, it is not considered an emergency situation.

Sanitary Sewers

The sewer system is functioning in spite of numerous breaks and changed elevations in the areas where the earth has shifted. In certain sections, sewage has seeped into open ditches and constitutes a health hazard. The rehabilitation of the sewer system will require a major effort and must be started immediately if the work is to be completed before the ground freezes.

Water System

Adequate water supplies are available from presently operating wells and pumping stations. However, large areas continue to be served by aluminum pipe and hoses laid on the ground surface. A rough estimate indicates that 10 miles of such piping is in service. This considerable temporary system must be placed underground by September 15 or shortly thereafter. The availability of manpower is such that this work must be started now if deadline dates are to be met. The supply of water is of vital importance and any further delays should be seriously examined and corrective measures applied.

Telephone System

Service has been restored to all habitable structures that had service prior to the earthquake. In some cases this has been done by makeshift arrangements that will be corrected when land use decisions are received. The underground duct system is severely damaged and requires substantial rebuilding.

KODIAK

Electric Power

Power is available as needed although additional generating capacity will be needed in the relatively near future. This condition existed prior to the earthquake, however.

Sanitary Sewers

Sewer outfalls were damaged and should be reconstructed as soon as possible.

SEWARD

The power plant is completely destroyed. No new generating equipment has been ordered and the power plant site has not been cleared of wreckage. The delay appears to arise from difficulties in arriving at an insurance settlement.

Electric service is provided by a single makeshift transmission and distribution line of about 68 miles in length. This arrangement is totally inadequate and results in excessive power losses -- estimated to be 25% of input power -- and extremely poor voltage regulation. It is essential that steps be taken to bolster this power supply system. If such action is not taken before winter, long interruptions of the electric power supply are expected.

It is recommended that new generating capacity be placed on order at once, and that foundation construction be started immediately thereafter. It is further recommended that consideration be given to the installation of so-called "package power units" which are readily available from the major electrical equipment manufacturers.

Sanitary Sewers

Rebuilding of sewer outfalls is required. Sewer mains in the Forest Acres Subdivision are damaged in many locations and considerable work must be done before winter. As in other cases reconstruction is being held pending land use decisions, although it is anticipated that certain of the affected residences will continue to be occupied in any case.

Water System

A temporary surface water system serves a substantial area and must be placed underground.

VALDEZ

Electric Power

The generating plant and electrical system generally survived the earthquake in reasonably good condition. However, since the townsite is to be moved because of soil instability it follows that the power plant must also be moved. It is recommended that consideration be given to extending a distribution circuit to the new townsite at this time. This will prove to be useful during the transition period and can later be used to serve whatever load remains in the vicinity of the old site.

Sanitary Sewers

See Seward Sanitary Sewers.

Water System

Only minimum repairs are planned at the old site. The same urgency to start work applies here as at other locations.

WHITTIER

A very brief inspection indicated the general condition of all utilities to be good.

General Comment

No contacts were made with representatives of gas utilities. However, since underground piping is used their difficulties closely parallel those of water and sewer systems. Automatic loss-of-pressure shut-off valves are reported to have been extremely effective in the Anchorage area and the expanded use of this device is encouraged.

Recommendations Pertaining To Utilities

a. Highest priority should be given to the rehabilitation of underground water systems.

b. Sewers should be repaired sufficiently to insure service continuity throughout the winter.

c. Land use plans should be finalized with all possible speed to permit the orderly reconstruction of all types of utility services.

d. Public Law 875 provides for the restoration of damaged facilities to the condition which existed prior to the disaster. This law which is extremely useful should be re-examined with a view to possible modification on two counts because the following interpretation expressed by several individuals seems entirely unrealistic:

The present 90 day limit for filing claims is not realistic for earthquake damage since the earth will continue to settle for an extended period with subsequent damage to underground facilities.

When service is interrupted, utilities habitually make every effort to correct the difficulty promptly. However, in disaster situations, costs incurred by utilities using regular employees to make repairs is non-recoverable under PL 875. If contract crews were used, the cost would be reimbursed. This arrangement is inequitable and does not encourage a utility to use its regular manpower to restore service.

e. Research programs should be initiated to develop designs and materials for underground utility systems that would have increased resistance to earthquake damage. For example, the use of large diameter flexible plastic tubing should be investigated for water and sewer systems. Materials of this kind could be installed in long lengths thereby minimizing the problem of leaking joints. Such construction methods might be especially useful for temporary installations where a small amount of settlement continues to occur over a long period of time. It is not intended that this suggestion for increased research should in any way delay the immediate reconstruction of essential utilities.

2. Transportation

The area affected by the Good Friday earthquake is served by all modern modes of transportation. Apparently no crippling damage was sustained by the airports and air traffic was hardly affected. Destruction of docking facilities, particularly at Seward, dealt a major blow to the economy of that community and required shifting of the port's functions to Whittier. The most extensive and serious damage was sustained by the railroad and the highways in the region.

Alaska Railroad

Of the system's total of 530 miles, approximately 190 miles of trackage, extending from Wasilla to Seward, became inoperative as a result of the damage caused by the earthquake. Apparently, the remainder of the system for a distance of approximately 340 miles extending North from Wasilla to Eielson was not affected by the quake. The most concentrated damage occurred at Seward where almost all of the terminal and docking facilities were destroyed, and some 300 units of rolling stock were lost. Not as concentrated, though no less significant, damage to terminal facilities has also occurred at Portage, Whittier and Anchorage. The greatest damage to trackage and bridges occurred in the section between Girdwood and Portage, with lesser damage experienced elsewhere in the 190 miles of line affected. Subsidence of the railway grade in parts of the line along Turnagain Arm required a major effort by way of reconstruction involving sizeable earthwork. Likewise, as a result of extensive lateral slides along the line and the subsequent progressive erosion of the exposed slopes, protective measures by way of rock riprap constituted a major construction item. Much of the track required realignment and reballasting. While apparently no complete loss or failure of any of the bridges on the line were experienced, many of the spans were displaced from their shoes or rollers, requiring corrective measures to restore functional adequacy. In several instances, corrective measures were required for bridges affected by the lateral movement of abutments.

By April 6, within ten days after the earthquake, operation of the Railroad was resumed on the affected line from Whittier through Portage to Anchorage and to the North. Reconstruction of the trackage South of Portage to Seward is underway and is expected to be completed by September 1, 1964. At the present time operation of trains between Anchorage and Whittier is accomplished under "slow orders". This will continue for some months until stability of the bed is ascertained and the track is completely and adequately reballasted. It appears that the resulting slower movement of cargo, as a factor in itself, does not significantly handicap normal requirements.

As of this date the terminal facilities and dockage at Whittier have been reshaped to reasonably adequate operating condition. The facilities and operations at Whittier function in a great measure as a replacement to the presently lost effectiveness and functions of the port at Seward. This circumstance is fortunate in the sense that it affords time for orderly planning and construction of the totally destroyed port facilities at Seward. Extensive studies will be required for the determination of a suitable site for the new facilities. Time will be required to develop construction plans. It is reasonable to assume that the minimum of a full construction season will be required to complete these facilities. Thus, the earliest resumption of effective port functioning at Seward can be anticipated to be the late Fall of 1965. In the interim, the port of Whittier has to be maintained in a condition adequate to handle the cargo.

It is recognized that several years of more than ordinary maintenance, care and expense will be required to stabilize the embankments, continue protective measures against erosion of slopes, and restore the affected trackage to a condition of routine maintenance and operation.

As estimated by the Alaska Railroad staff, the total cost of reconstruction will amount to $27,000,000. This includes $7,800,000 for reconstruction of the terminal facilities at Seward and $2,500,000 for replacement of rolling stock. The balance of the total estimated cost, $16,700,000, covers reconstruction of trackage, bridges and terminal facilities other than at Seward. Based on discussions with representatives of the Railroad and impressions of their capabilities, there is no reason to question their competence in arriving at these estimates. Of the item of $16,700,000, thus far $4,000,000 have been committed. Assuming that funds will be available to cover requirements the entire reconstruction program, including the new facilities at Seward, can be reasonably expected to be completed by Fall of 1965.

The railroad management and staff are to be commended on their effective measures in restoring to operating conditions the vital sections of the damaged line between Anchorage and Whittier within the limited period of ten days between March 27 and April 6. In the light of the catastrophic damage wrought by the earthquake, effective measures initiated which led to the early resumption of operations, reflect distinct competence and devotion to duty. Aside from this direct evidence of engineering and construction skill and effectiveness, it is apparent that the prompt vital restoration of operations was benefited by singleness of purpose in meeting and solving an emergency problem.

Highways

Damage was sustained by the following highways as a result of the earthquake:

a. Anchorage to Seward

b. Glenn Highway

c. Valdez - North

d. Homer Vicinity

e. Cordova Vicinity and Copper River, and

f. Kodiak Island

On the Anchorage-Seward highway the greatest damage occurred in the vicinity of Portage. The damage was significant not only by way of sizeable repair costs involved but also in the economic loss resulting from complete disruption of traffic. Even at this date, some two and one half months after the earthquake, traffic on this section of the road is intermittent. Occasionally traffic is halted altogether by high tides or difficulties with temporary bridges. Even when the highway is open traffic it is permitted to move only in one direction during certain hours to avoid interference with construction operations. Because of the character of construction involved, any liberalization of these restrictions would necessarily result in delays of construction progress.

This is an unhappy situation, and unfortunately, these restrictions will have to prevail until the end of the current construction season. In the light of the relatively short construction season, and the necessity to complete the construction before winter, these measures appear to be justifiable. The damage in this area comprises total destruction of 18 bridges and subsidence of some 15 miles of highway. There is an additional 53 miles of highway in the Turnagain Arm area which will require extensive repairs. Shortly after the earthquake, a contract was awarded by the Highway Department for the construction of temporary bridges to replace the destroyed bridges. This work together with embankment approaches to the bridges is now virtually completed.

On June 15, the Highway Department will receive bids for the earthwork and rock protection involved in raising the grade of the settled section of the highway; this work is to be completed during the current construction season. Relatively non-restrictive traffic movement will then be permitted on this highway. The initial grade reconstruction calls for a 24 foot crown width. A subsequent contract, intended to be underway in the 1965 construction season will widen this embankment and construct permanent pavement and bridges.

In this connection it is pertinent to recognize that a crossing of Turnagain Arm, on a line North of Sunrise, is under consideration. The studies of this project were completed before the earthquake occurred. Presumably these studies will have to be re-examined in the light of the effects and after-effects of the quake. None-the-less, in view of the sizeable expense involved ($17,800,000 as estimated by the Highway Department) in the final phase of reconstruction of this 15 miles of highway in the vicinity of Portage, it appears that further consideration of the new crossing should be undertaken promptly. In view of the conditions created by the earthquake the new crossing may be found to be economically feasible and to constitute a more advantageous solution of the problem. Within the urban area of Anchorage there are repairs to be effected. This work awaits city decisions as to utilities which in turn will depend on results of the geological investigations of the area now underway.

Serious damage was also sustained at the South end of this highway in the vicinity of Seward. Within the city limits of Seward, the highway is to be relocated; this project must await the final adoption of urban renewal plans, presently under consideration. Rehabilitation of some five miles of highway, North of the city limits, will include construction of three bridges over the Resurrection River to replace three bridges destroyed. Plans for these bridges are scheduled for completion by July 1. Contracts for the construction of a new bridge over the Snow River were awarded prior to the earthquake and actually construction was well underway. While some of this construction suffered damage, the contractor is proceeding with the project. It is assumed that the bridge plans for this structure have been re-examined in the light of earthquake effects.

Repairs of the Glenn Highway to the North of Anchorage comprise primarily some bridge repairs, relatively not too extensive, together with a sizeable job of pavement repairs. A total of some 118 miles of road is thus involved. Apparently all of this work is scheduled to be accomplished during the current construction season.

Damage to the Valdez-North highway appears to be relatively minor and extends only for a distance of some 10 miles East of Valdez. Damages are limited to local areas of subsidence and cracking of pavement. The repairs of this section of the road could be accomplished during the current construction season but would not be critical even if deferred until next year.

In the vicinity of Homer the highway along the Spit was virtually destroyed. This will require complete reconstruction, raising the grade of the road approximately 8 feet for a distance of 4-1/2 miles.

Reconstruction plans are scheduled for completion by July. The principal construction problem for this project is posed by the inavailability of borrow material for the embankment. Negotiations are in progress with the Corps of Engineers to obtain material dredged from the Bay. It is expected that this matter will be resolved to permit construction to get underway this season. Reconstruction of the highway West and North of Homer will involve replacement of two bridges and some 27 miles of highway reconstruction. Plans for this work are to be completed this Fall. Presumably construction work will get underway in 1965.

The highway in the immediate vicinity of Cordova requires replacement of three bridges. This is to be accomplished during the current season. While there was considerable damage sustained on the Copper River Highway, primarily in the loss of bridges, the question of reconstruction of this facility, which was previously used as a railroad, will require extensive economic studies.

On Kodiak Island a section of highway within the City of Kodiak and for a distance of 4 miles to the Northeast was being constructed under contract awarded prior to the earthquake. The portion of the project within the city limits is being deferred pending approval of urban renewal plans; the work outside of the city limits is underway. Repairs of one-half mile section of the road to the Naval Station are contemplated for completion during the season. This work will involve raising the grade and some riprap protection. The road to Cape Chiniak involves construction of 12 bridges and extensive earthwork. This work is under contract and scheduled for completion this season.

In connection with the proposed urban renewal projects in Anchorage it is suggested that the plans be reviewed as regards adequacies of highways and thoroughfares intended to serve the redeveloped areas.

Conclusions

There is an overall impression that the initial paralyzing blow of the earthquake is being gradually and effectively remedied. Critical repairs and reconstruction of the damaged highways are well underway and should be completed during the current construction season. It is reasonable to anticipate that relatively unrestricted traffic movement will be afforded through the winter. Such portions of the system as are being deferred until the 1965 construction season will not constitute an acute impediment to traffic movement. Assuming that adequate funds are made available, all reconstruction operations should be completed in 1965. The reconstruction program is proceeding in an orderly manner apparently taxing to the utmost the State's engineering and construction

resources. Short of a crash program it is doubtful that anything could be done to accelerate the rate of progress. A crash program would necessarily result in additional costs. While it would be difficult to assess direct benefits which would accrue from such additional costs and efforts, an accelerated program would in some measure relieve the unemployment situation at Seward, Valdez and Homer. It is reported that because of the destruction of local industry in these communities, the extent of unemployment is critical and is assumed to be the principal cause of substantial migration from these communities.

3. Buildings and Facilities

In evaluating the damage to buildings and facilities as a result of the March 27 earthquake, it is most important to recognize the forces actually causing damage. The earthquake epicenter was some distance from the major population centers visited, and the resulting earth motion had a relatively long period. The major structural damage due to earth shaking was in the taller buildings or buildings with design and construction features that were particularly susceptible to earthquake damage. Other than a few notable examples of shaking damage in Anchorage, most of the damage observed resulted from the earth slides, earth settlements and the seismic sea wave actions that occurred during and after the initial earthquake shocks.

Major cleanup has been completed in downtown Anchorage. The damaged buildings that were particularly hazardous have been removed or evacuated. Some of the buildings that were damaged are in the process of repair and some will likely be removed. In Kodiak, Seward, Whittier and Valdez, the major damage was from the sub-surface slides under the dock facilities, the seismic sea wave and the actual raising or lowering of the area ground surface. The cleanup in these areas is nearing completion and temporary dock facilities are in operation.

Where the study of these townsites will undoubtedly show some areas where buildings and dock facilities should not be located, one must realize that most building sites adjoining these bays will be on alluvium deposits. The sites will not be ideal and must be developed with proper engineering judgment and due consideration to the economic factors involved. There is no reasonable way to design the type of structures one finds in these towns to resist the seismic sea wave. A properly designed breakwater or care in locating facilities would be of considerable help in minimizing potential hazards.

If the buildings that suffered major earthquake damage had been properly designed under the Uniform Building Code in Seismic Zone III, we believe they would have suffered only minor damage. Obviously, the design and details used should reflect the experience and competence of engineers qualified in this specialized field. Also the construction requires competent contractors with adequate supervision and inspection.

Where the cities visited have, or are adopting, established building codes, the normal city personnel are not familiar with good building practices. In Seward, for example, only one new house has been constructed in the past few years and most building permits were for minor additions or alterations. Only in Anchorage did one find major new construction and much of this did not follow good code practice and detail for a city that has rather regular seismic disturbances.

It would be our recommendation that the State of Alaska consider a building code for populated areas for buildings, housing, schools, hospitals and public assemblage. This code could be enforced by local communities where they have a proper building department. Hopefully, this State staff could assist local communities in upgrading their building standards. Fortunately, with a few good standards, normal housing construction will perform very well in a moderate to severe earthquake. Because the earthquake damage inspected was quite selective and many buildings in the areas were virtually undamaged by the earthquake, it is difficult to evaluate the quality of all construction inspected. If the major buildings are typical, we would reason that local building code enforcement could be improved considerably.

Alaska is a state of major earthquake activity and all of its cities should profit by the lessons of this March 27th earthquake. The public should be educated relative to good construction practices and the construction industry should have proper regulating codes and endorsement to reasonably protect public health and safety.

F. ORGANIZATIONAL ASPECTS OF ALASKA RECONSTRUCTION

The EJC Committee has not made a detailed study of the responsibility of each organization that is contributing to the reconstruction of Alaska or concerned with plans for the future. However, a few problems of an organizational nature have come to light.

These problems were hidden during the immediate post-quake emergency period. Many organizations have been praised for their work including the Salvation Army, the Red Cross and the Army Engineers.

However, as reconstruction began, it became evident that no single agency had funds or authority to deal with the entire problem and that some problems were marginal or outside the apparent scope of any agency. Federal, State and local groups knew that there was not time to pass new legislation responsive to the reconstruction of Alaska. Therefore a continuing effort has been to adapt existing legislation and special funds to the problems of Alaska.

Each agency has retained its independence. Joint planning and coordination of reconstruction projects has been difficult because each agency has a different procedure of review and approval. It would appear that the program would proceed with more dispatch if a local official were given responsibility and authority to manage the entire program.

Furthermore, there is an urgent need to analyze the problems of the communities and establish the actions that must be taken. A flow chart of decisions, allocation of funds and implementing agencies would be of great value to all of the people concerned with reconstruction.

These decisions must recognize the fact that Alaska will enjoy economic growth only as its private institutions are strengthened. The heavy influx of Federal funds could overwhelm the private sector.

The local Chambers of Commerce might assume the role of strengthening the private sector in Alaska's future. A request could be made to the Committee on Economic Development to make a study of this problem.

Consideration should be given to setting up a labor-business fact finding board to examine the impact of the wage differential between Alaska and the "Lower 48" on the future economic growth of Alaska.

Because of its continuing large DOD income the economy of Alaska involves a more complex relationship between the public and the private sector than in most states. The incompleteness of the development of that relationship has become clear under the stress of the problems introduced by the Good Friday earthquake.

G. POST EARTHQUAKE ACTIVITIES OF ALASKAN ENGINEERS

As in all emergencies, no complete record can be kept of the prompt and effective action of hundreds of individuals. Accordingly, this account of the activities of engineers does not purport to be comprehensive or to give adequate recognition to the many institutions that were responsive. It is indicative of the work that engineers can be expected to perform after an emergency, and it suggests the role that a University in the area can play in providing assistance and in making special studies.

Immediately following the earthquake in Anchorage, the engineers charged with the responsibility for public utilities and communications were thrown into a restoration of service, which was done with dispatch. Within two days power was restored in nearly all of Anchorage, and on the two military bases nearby. Water service was replaced early in the following week, and the damaged portion of the sewer system was placed under repair. Gas service was progressively restored, and was in almost complete operation by the end of the

first week. Communications were never fully lost, due to the availability of military and Civil Defense emergency systems. Within 72 hours after the quake, phone and telegraph service was returned about to normal, despite the heavy message load.

Highway and railway damage was severe, as was the condition of some of the city streets: these were repaired on a temporary basis at once, by heavy equipment whose use was donated by local contractors.

The Army Corps of Engineers were fully effective in clean-up and emergency services. Thus, engineers were engaged in restoration of works in their specific fields of responsibility, in addition to their personal and private care of family and neighborhood problems.

Privately employed engineers were free to undertake additional duties imposed by the emergency, and this they did without waiting for a formal call. Within hours after seeing to the safety of their families and friends, engineers began to assemble at the office of the city building inspector, where they formed small teams to inspect buildings for the degree of hazard present. Each team was assigned an area, and was given authority to enter, inspect and pose notices of condemnation of hazard, in order to determine which structures could be returned immediately to normal service, or the extent of repair necessary before public use of the buildings.

Virtually all consulting engineers in the city were engaged in this work. No payment was expected, although most of the private organizations kept the engineers so engaged on their payroll. (Later the City of Anchorage offered payment to each person so engaged.)

Consulting engineers who lived elsewhere, but who had designed structures or utilities in Anchorage began to arrive soon after the earthquake to assist in the rehabilitation program.

The University of Alaska sent three members of its engineering staff to Anchorage, to help out with the immediate problems and to preserve as much as possible of the scientific and engineering record of the post-quake period. Later, the entire junior and senior classes in civil engineering were sent to Anchorage to help with the assessment and recording of damage. At the request of some of the visiting scientists and engineers, these 21 students and three instructors made a survey and detailed assessment of all earthquake manifestations in a two-block wide strip through the town, from the sea to the mountains -- possibly the first time such information has been systematically gathered for so great a section of a damaged area. This material will be published at an early date by the University for use by engineers and other students of earthquakes.

In addition, the University sent a seismologist and geologist to help in studies of the earthquake. The Librarian established the University of Alaska Earthquake Archives on 29 March 1964. All press dispatches and accounts have been and continue to be kept on file. Hundreds of personal statements were solicited for the record.

A clearing house for scientific and technical information was established at the University to identify and keep a record of the scientists and engineers who have studied the earthquake. Nearly 200 names have been catalogued according to fields of interest and availability of data. The center also has collected and will distribute, at cost, the structural plans of all of the important structures. The address of the clearing house is:

Earthquake Information
College of Engineering
University of Alaska
College, Alaska

Visiting engineers from building suppliers, Universities, and scientific research establishments and members of advisory committees have also contributed to study of the earthquake.

ENGINEERS JOINT COUNCIL

345 EAST 47th STREET • NEW YORK, N. Y. 10017 • 212 PL 2-6800
Cable—ENGUNITY

May 7, 1964

The Honorable Clinton P. Anderson
Chairman
Alaska Reconstruction Commission
United States Senate
Washington, D.C.

Dear Senator Anderson:

The engineering professional community has been giving increased thought to the problems arising from the recent earthquake disaster in Alaska. The members of our various societies resident in Alaska are serving to the greatest extent possible in the alleviation of immediate distress and in the reconstruction program.

The Executive Committee of the Engineers Joint Council, described more fully in the enclosed bulletin and representing a combined membership of about 600,000 in its constituent societies, has authorized the establishment of a coordinating committee that will stand ready to be of assistance to you and the Alaskan Reconstruction Commission as your needs and our competence dictate. We have had preliminary discussions with Mr. Dwight Ink and Colonel William Penley, assuring them of our availability for service. We recognize of course, that the agencies of Government are drawing on their own staffs to provide immediate assistance; and our offer is made in the full recognition that you are calling on a great many competent engineers in Government and industry for specific reconstruction tasks.

Appendix 1

We do wish to assure you of our continued interest in these programs and our availability to you for appropriate assistance. We shall be happy to discuss our participation in your program with you at our mutual convenience. The EJC activity relating to the Alaska problem is being organized by General Keith Barney (Ret.), and coordinated by the EJC Government Liaison Committee, W.J. Harris, Chairman. Their addresses appear at the bottom of this letter.

Sincerely yours,

R.H. Tatlow III,
Vice President

RHT:rms

Dr. William J. Harris, Jr.
Assistant to the Vice President
Battelle Memorial Institute
1755 Massachusetts Avenue, N.W.
Washington, D.C. 20036
Phone: 232-8553

Keith R. Barney,
Major General, U.S.A. (Ret'd.)
Janus Engineering Designs
1001 Connecticut Avenue, N.W.
Washington, D.C. 20006
Phone: 347-8527

FEDERAL RECONSTRUCTION AND DEVELOPMENT PLANNING COMMISSION FOR ALASKA

WASHINGTON

May 22, 1964

Mr. R. H. Tatlow, III, Vice President
Engineers Joint Council
345 East 47th Street
New York, N.Y. 10017

Dear Mr. Tatlow:

Thank you for your offer to lend assistance in Alaska. I am sure that there are experienced and able members of your Society who could offer valuable assistance in this disaster area. You can well understand that the effectiveness of such a team is dependent upon the response of the local people. We have discussed with the State and local authorities the merits of the assistance you have offered and they would welcome the advice of your consulting panel.

I feel that the greatest value will come if you deal directly with the state officials on this long range planning and development program. The Commission has recommended your offer to the appropriate state officials and will defray the travel expenses. We would want copies of your report to help form a pattern for this and any future disaster relief program.

I have received a similar offer from the American Institute of Architects offering their services. I feel it would be very logical to include as a single task force professional engineers and architectural representatives, since there is a need for such advice. I would prefer it be identified as one task force because it will alleviate the fears of the Alaskans who are beginning to feel that they are being studied to death. Separate reports can be submitted if you find it desirable and appropriate.

If you concur, I suggest General Barney establish direct contact with Mr. William H. Scheick, Executive Director for the American Institute of Architects.

The Commission will have a staff member travel with you and see that the necessary supporting arrangements are provided. I fully agree with you that professional service for specific projects should be done by the normal professional selection procedures.

I would like to suggest that the task force be assembled in the field in the first week in June. Please advise me if this fits in with your plans. If so, we will arrange contacts with the State and local authorities.

I wish to thank you again for your generous offer.

Sincerely yours,

Chairman

CPA:d

ANNEX 3

COMMITTEE MEMBERSHIP BIOGRAPHIES

ANNEX 3

COMMITTEE MEMBERSHIP BIOGRAPHIES

Balch, William Glenn
Fellow, AIA
Past President So. Cal. Chapter AIA-1955
Past President California Council of Architects - 1957
Senior Partner, Balch-Hutchason-Perkins, Architects, L.A.

Blessing, Charles A.
B.S. Arch. Engineering, U. of Colo. - 1934
Bachelor of Architecture, MIT - 1937
Master in City Planning, MIT - 1940
Fellow, AIA
President, American Institute of Planners - 1958-60
Director of City Planning, Detroit, Michigan - 1953

Brooks, Kenneth W.
B.S. Arch. Engineering, U. of Ill
M.S. Architecture, U. of Ill.
Member AIA
Member Washington State Fine Arts Commission
Member AIA Urban Design Committee
Private Practicing Architect

Harmon, Craig A.
University of Denver 1934-36
University of Nebraska 1938-39
AIA
Harmon, Pray & Detrich - Architects & Engineers, Seattle

Knowles, William H.
A.B. U.of Cal. - 1930
M.A. MIT - 1931
Master in Architecture, MIT - 1932
AIA
AIA Award of Merit - 1960
President, Hertzka & Knowles, Inc. -Architects, San Francisco

Light, Herman Charles

Bach. of Arch. Ohio State U - 1932
Fellow AIA
Member Construction Specification Institute
Member American Society of Architectural Historians
Former Member L.A. Board Bldg. and Safety Commissioners
Private Practicing Architect, principally in commercial, industrial and institutional work

Richardson, Stephen

U. of Washington - 1930-34
MIT 1935-36
Member AIA
Member American Society of Planning Officials
Member Planning Commission of the City of Seattle
Senior partner, Young, Richardson & Carleton, Architects and Engineers, Seattle

Spreiregen, Paul D.

Bachelor of Architecture, MIT - 1954
Fulbright Scholar in Italy - 1954-55
Member AIA
Presently employed in AIA's special series of articles on urban design, as author and illustrator

Barney, Keith R., Major General, USA (Retired)

B.S., U.S. Military Academy, as of 1926
C.E. Cornell University, 1929
Fellow, ASCE
Deputy Chief of Engineers for Construction - 1960-62
Washington Office of Janus Engineering Designs

Brandow, George E.

B.S. in Civil Engineering - U. of Southern Cal. - 1936
Fellow, ASCE (Director District 11)
Member Structural Engineers Association of California
Member AICE
Member Consulting Engineers Association of California
Past Chairman, Structural Division, ASCE
Partner, Brandow and Johnston, Consulting Engineers, L.A., Calif.

Harris, Dr. William J.

B.S., Ch. Engineering, Purdue University - 1940
MSB, Purdue University - 1940
Doctor of Science, MIT - 1948
Vice President and Director - A.I.M.E.
Chairman, Govt Liaison Committee, E.J.C.
Asst. to the Vice President, Battelle Memorial Institute

Hudson, Dr. Donald E.

B.S. 1938, M.S. 1939, PH.D. 1942, California Institute of Technology (Mechanical Engineering)
Member, ASME
Member, American Geophysical Union
Member, Seismological Society of America
Member, Earthquake Engineering Research Institute
Professor of Mechanical Engineering and Applied Mechanics, California Institute of Technology, Pasadena, Cal.

Meese, William G.

BSEE Purdue U. - 1941
Member IEEE
General Superintendent of Electrical Systems, the Detroit Edison Company, Detroit, Mich.

Sayre, Dr. A. Nelson

B.S., Ph.D., D. Sc. (Hon.)
AWWA, AAPG, AGU, SEG, GSA
Consulting Ground water geologist associated with Behre, Dolbear and Company

Sorkin, Josef

B.Sc. in C.E., University of Nebraska - 1929
C.E., University of Nebraska - 1936
Fellow, ASCE
Institute of Consulting Engineers
American Railway Engineering Association
American Concrete Institute
Partner, Howard, Needles, Tammen & Bergendoff, Kansas City, Mo.

ANNEX 4

ITINERARY OF COMMITTEE TRAVELS

ANNEX 4

ITINERARY OF COMMITTEE TRAVELS

The group assembled at Elmendorf Air Force Base, adjacent to Anchorage, Alaska, on Sunday evening, June 7, 1964. Quarters and office space were provided in Bachelor Officers Quarters, Building 10-510, convenient to the Officers' Open Mess, where meals were obtained.

The subsequent itinerary follows:

Monday, 8 June

A.M. Briefing by Colonel Sawyer, U.S.Army Dist. Engineer
P.M. Briefing by City Planning Associates (CPA), for the Alaska State Housing Authority
P.M. (later) Surveyed earthquake damage in Anchorage area.

Tuesday, 9 June

0815 Departed for Kodiak Naval Air Station, via Air Force C-54
0930 Arrived Kodiak Naval Air Station
1330 Departed Kodiak
1415 Arrived Homer
Visited Homer Spit
1530 Departed Homer
1630 Arrived Elmendorf AFB
2000 Further briefing on Anchorage Urban Renewal planning.

Wednesday, 10 June

A.M. Weathered in. Various group meetings held.
1130 Departed via USAF C-123 for Seward
1230 Arrived Seward
visited Seward and were briefed by City Manager
1530 Departed Seward
1615 Arrived Elmendorf AFB
2015 Departed Anchorage via Alaska Railroad

Thursday, 11 June

0115 Arrived Whittier
Visited facilities at Whittier
0330 Departed Whittier via Alaska Railroad
0730 Arrived Anchorage
0930 Departed Elmendorf AFB via USAF C-123 for Valdez
1030 Arrived Valdez
Visited Valdez and drove through Keystone Canyon
1630 Departed Valdez
1715 Arrived Elmendorf AFB

Friday, 12 June

Remained Elmendorf AFB and in Anchorage area, making various single visits and preparing report

Saturday, 13 June

Remained at Elmendorf AFB completing report

Sunday, 14 June

Group disbanded and headed for home

It is obvious that the group's extremely tight travel schedule could never have been accomplished without the closest cooperation of the Air Force, which cooperation is gratefully acknowledged.

The Alaska Railroad was also most helpful.

The Air Force provided quick and efficient ground transportation whenever it was requested.

ANNEX 5

PRINCIPAL PERSONS CONTACTED

ANNEX 5

PRINCIPAL PERSONS CONTACTED

Anchorage Area

Mr. Joseph FitzGerald, Governor's Coordinator on Earthquake Matters
Mr. John E. Manley, General Manager, Alaska Railroad
Mr. R. H. Bruce, Assistant General Manager, Alaska Railroad
Col. K.T. Sawyer, Corps of Engineers, U.S.Army District Engineer
Lt.Col. M.E.Rogers, Corps of Engineers, U.S.Army, Denali Area
Mr. C.A. Oliver, Mgr., Municipal Light & Power Department
Mr. J. T. Harris, Mgr., Anchorage Telephone Utility
Mr. J. Cotton, Chief Engineer, Anchorage Telephone Utility
Mr. W. A. Derynslager, Manager, Water Utility
Mr. John Shoop, Director of City Planning
Mr. Paul Finfer, City Planning Associates
Mr. Tolbert Elliott, Director, Alaska State Housing Authority
Mr. Wm. Walker, Director Urban Renewal, Alaska State Housing Auth.
Mr. Cosby Steen, District Engineer, Alaska Highway Department
Mr. Charley J. Langer, C&GS
Mr. Roger W. Sherburne, C&GS
Dr. E.F. Rice, University of Alaska, Fairbanks, Alaska
Mr. Ernest Dobrovolny, USGS
Mr. Claire O. Banks, Vice President, Anchorage Chamber of Commerce
Mr. Elmer Rasmuson, President, National Bank of Alaska and
Chairman, Board of Regents, University of Alaska
Mr. Wm. K. Cloud, Chief, Seismological Field Survey, San Francisco
Mr. Warren George,Chief, Engineering Division, U.S.Army,
Alaska Engineer District
Mr. John Ireton, Alaska Engineer District
Mr. Ervin Long, Alaska Engineer District
Mr. Ted Moulder, USGS
Mr. E.J. Feulner, USGS
Mr. Melvin V. Marcher, USGS
Mr. Edward Crittenden, AIA
Mr. F. Wayne White, Jr., President, Alaska Chapter AIA

Kodiak Area

Rear Admiral R. E. Riera
Mr. Ralph Jones, City Manager

Valdez Area

Mr. H. Bruce Woodford, Mayor
Mr. James L. McNamara, Resident Engineer, Corps of Engineers
Mr. William Bedingfield, Member of City Council

Seward Area

Mr. James W. Harrison, City Manager

Whittier Area

Mr. Elton G. Jergens, Supt. of Port, Alaska Railroad

Homer Area

Mr. Ralph G. Cowles, Mayor

In addition, courtesy calls were paid on:
Lt. General R. J. Reeves, USAF, Commander in Chief, Alaska, and
Major General Ned D. Moore, Commanding General, U.S. Army, Alaska

University of Alaska

Mr. Charles Sargent, Dean
College of Math, Physical Science, and Engineering

Mr. Charles Keim, Dean
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ANNEX 6

SPECIAL REPORT

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THE ROLE OF SCIENCE AND THE ARTS IN ALASKA

The immediate need for rehabilitation of various Alaskan communities is apparent. However, preoccupation with physical restoration has tended to entangle the longer range development plan for Alaska in programs for development of facilities. Far more necessary to the growth of Alaska are ideas and concepts that will stimulate new approaches and develop new attitudes.

Looking to the future, Alaska will become increasingly dependent on research and technology as is true in other states and elsewhere in the world. Alaska will also be increasingly dependent on the development of programs that will bring scientific, engineering, and cultural leaders to Alaska and who, on returning to their homes, carry, by word of mouth, the story of Alaska's grandeur.

These programs can be fully effective only if they are considered to be the responsibility of Alaskans or institutions vitally interested in Alaska. Their work is particularly timely because of the need for economic rebuilding of the structure. However, it will be particularly difficult to find the revenues to apply to these programs in the immediate future when there exists so many urgent calls for assistance in replacing essential structures or service. Even such important and fully supported budget items as those for higher education may be in some jeopardy for the next few years. These secondary effects of the earthquake should be examined with great care in order that their latent and implications can be given full consideration at the earliest possible time.

The process of finding opportunities to bring scientific, engineering, and cultural leaders to Alaska may require some new institutions. For example, a foundation could be organized to stimulate science and the arts in Alaska. Already there are musical programs and workshops in Anchorage. There are plans for both theatres and pageants. The foundation could seek additional sources of support for these programs. It could sponsor seminars on critical issues. It could make proposals to various foundations for financial assistance to be disbursed to various educational institutions in Alaska. It could be particularly helpful in cushioning the effects of budget adjustments on the University of Alaska during the next two or three years.

The University of Alaska and other universities in the state should be encouraged to conduct more research using state, federal, and private sources of support. To the greatest extent possible, all scientific and technical problems found in Alaska should be worked on by the University.

The foundation and the universities could try to create research parks as exist in many parts of the "lower 48" states. Programs could be developed to retain more of Alaska's talented young people in Alaska and bring more from other parts of the United States and the world.

In short, Alaska has an opportunity to expand its interests in science and the arts in order to provide a richer life in Alaska and to increase the number of talented people that live in Alaska.

Recommendations

a. It is recommended that a detailed study be made of the secondary effects of the March 27, 1964, earthquake, including the impact of emergency demands for state funds on the support of continuing programs, particularly those relating to higher education.

b. It is recommended that consideration be given to the organization of a Foundation for Science and the Arts in Alaska that would seek support for the establishment and strengthening of cultural and technical programs in Alaska.

c. It is suggested that consideration be given to specific projects to stimulate scientific and cultural life in Alaska, illustrated by the following:

(1) Arctic Biology

Alaska, with its geographical location provides access to the Arctic Sea, the Arctic mountains and the tundra. In earlier years, there was established at Woods Hole on Cape Cod, in Massachusetts, a Marine Biological Laboratory (MBL). As a result of distinguished and imaginative leadership, MBL is a summer center attracting hundreds of the world leaders in marine biology. Each brings a funded research project. MBL provides laboratory space and other facilities. MBL is increasingly crowded. It does not include an Artic environment.

There could be developed in Alaska, the equivalent of an Arctic Biological Center (ABC) with an extensive summer program modeled after that of MBL. This would bring many scientists to Alaska and strenghten the University program.

Recommendation: The Governor should invite the University of Alaska to study the operation of MBL and to develop a plan for the creation in Alaska of the equivalent of MBL.

(2) Earthquake Engineering

(Discussed at greater length in the section on seismology and earthquake research.) Alaska is an international center of earth movement. The establishment of design standards for earthquake resistance is based on scanty engineering data.

The NAS (National Academy of Science) is now studying the scientific and engineering aspects of earthquakes.

Alaska could propose to the NAS the sponsoring of a seminar on the Alaskan earthquake. It could encourage the NAS to establish an International Earthquake Decade and outline a role of Alaskan institutions in that program. It could plan for the construction and instrumentation of special structures to record the data necessary for a sounder earthquake resistance design practice in cooperation with the California Institute of Technology (Cal Tech) and other institutions. This would bring many scientists to Alaska and would strengthen the research program at the university.

Recommendation: The Governor should encourage the University of Alaska to expand its program on earthquake engineering and work toward the establishment of a cooperative program with Cal Tech and other West Coast institutions directed toward the collection of engineering information on earthquakes and the publication of design manuals on earthquake-resistant structures.

(3) Arctic Military Research

Fort Greely and Fort Wainright are active in research, development, and field trails of equipment designed for arctic operation. The Arctic Research Laboratory at Barrow is operated under contract by the University of Alaska. It is apparent that the University of Alaska is uniquely situated to participate in arctic research on an increasing scale. In particular, the University could be a central resource for the collection and study of the results of arctic research. This center would strengthen the University's research program. It is essential that the University Library resources be expanded in this field.

Recommendations: The Governor should encourage the strengthening of arctic research in the University of Alaska and should encourage the Army, Navy, and Air Force units stationed in Alaska to draw more heavily on its research capability. The DOD should establish at the University of Alaska an information center on arctic research. The University of Alaska should seek to develop a cooperative program in this field with other interested institutions.

(4) The Development of Craft Industries in Alaska

In the northern part of Europe there have been developed very effective and productive craft industries. The Norwegian production of elegantly designed sweaters, many of them hand knit and all of them based on traditional designs, has contributed in a very useful way to the Norwegian economy. The production of furniture of high standards of design has been encouraged by the Danish Government over a period of three or four decades. The unique feature of the Danish program has been establishment of a marketing activity that has permitted the individual craftsman to dedicate his attention to the production of an interest design.

Recommendation: It is suggested that the Governor establish a group to investigate the procedures for encouragement of craft industries in Alaska drawing on the experience of Scandanavia, among others.

(5) The Establishment of Centers of Fine Arts in Alaska

Provincetown, Massachusetts, and other New England centers have been aided in their development by the establishment of an art colony. One or two highly competent painters and sketchers could be commissioned to spend a summer painting in Alaska. Publication of the results of their work would stimulate interest in Alaska. A small group of artists could be retained to work toward the establishment of a summer program of instruction. In cooperation with the Fine Arts Department of the University of Alaska, a competition could be held to select Alaskan children with talent who could participate in a summer art program. A flourishing art colony could emerge from such programs and attract other artists and tourists. Similar programs could be undertaken in music, the theatre, etc.

Recommendation: It is suggested that the Governor encourage the University of Alaska, through its Fine Arts Department to organize a program aimed at creating a series of centers for artistic activity in Alaska including summer programs.