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Dave Carey
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SEWARD AREA RIVERS
Flood Damage Prevention Interim Reconnaissance Report

Prepared for the Kenai Peninsula Borough by
Army Alaska District Corps of Engineers

February 1994

This report is a reconnaissance level study of the flooding problem on watersheds draining into Resurrection Bay. The study concludes that an economically feasible project with Federal interest is possible to control flooding there. The preferred plan is a levee to prevent overtopping of the Seward Highway. All watersheds were examined and all have a history of flooding. Box Canyon and Salmon Creeks were previously studied and no economically feasible measures were found.

Reserve flood prone areas for recreational use, fee simple title purchase or acquisition of easements, regulate flood plain development to eliminate new structures using zoning and ordinances, control land use outside flood plains to reduce effects downstream.

Ordinances would be appropriate to all the alluvial fans to prohibit structures with 1st floor finished at ground level, prohibit raising structures above 100-year flood level using fill due to erosion, prohibit individuals from building flood control diversion structures without analyzing downstream impacts, require arterial streets be laid out parallel to flow patch and be depressed belowground elevation for conveyance of flood waters, identify areas too hazardous for any structural development, require structural flood proofing to structures and utilities, and remove structures or relocate occupants .

Preventative measures do not provide immediate relief but they do avoid or reduce damage to future development and should be considered as any part of a comprehensive management plan. Control measures may reduce future damage but are designed primarily to move the existing flood problem to another area.

Lowell Creek tunnel is deteriorating faster than it can be repaired. The emergency spillway through the original creek bed through town is no longer a safe outlet as the entire creek bed has been developed. The 1992 Corps of Engineers report estimated that the tunnel would completely fail by the year 2015 if only minor repairs are made.



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HAZARD MITIGATION IN THE SEWARD AREA

**Prepared for the Kenai Peninsula Borough by
GEOMAX, P.C.
GEOLEGAL, GEOCHEMICAL, GEODESIGN ENGINEERS & SURVEYORS**

June 1988

Geomax was retained by the borough to identify natural and man-made geologic hazards and prepare a conceptual plan to minimize economic loss due to hazards. The area is subject to substantial geologic forces not commonly encountered in most areas. The information in the report would allow the area to adapt to local hazards and allow safer future development, including general construction guidelines.

The simplest way to avoid hazards is to stay out of harms way. Existing developments must be adjusted or eliminated. Planning must recognize hazards. Sacrifices made to good planning will be secondary to frustration, agony and despair as a result of disasters if status quo is maintained.

Development sites must provide firm foundations against quakes, have an elevation above floodplains and wave run-up, have gentle slopes with minimal landslide potential and allow for construction.

Such a location does exist and the Kenai Peninsula Borough, through Resolution 87-77 (8/18/87), requested conveyance of the land and adjacent land from Alaska for this purpose. (Sections 13, 24 & 25, T1N, R1W) The KPB or other government agency must be responsible for developing the bedrock area, land trading must be used to promote abandonment of occupied area, and existing structures must be moved.

Quakes and man-caused manipulation of the streams in the area make fans and deltas undesirable for development. Alluvial fans and deltas are unstable. And groundwater saturation leads to instability. Streams have been pushed aside and diverted around established fans.

Manipulation and diversion has a large effect on deltas, which normally extend into water subjecting the edge to attack from waves, currents and tides. Sediment supply must at least equal the rate of destruction to remain stable. Once deposits are cut off destruction of the delta is inevitable. Sediment is not spread by lateral movement, but confined requiring continual maintenance; high flow can cause erosion and failure; dikes or other diversion provides a false sense of security.



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FLOOD OF OCTOBER 1986 AT SEWARD, ALASKA

***Prepared for the Kenai Peninsula Borough by the USGS
WATER RESOURCES INVESTIGATIONS REPORT 87-4278***

June 1988

This report was prepared to provide a hydraulic analysis, a flood inundation map, a map delineating flood related hazards and tabulations of hydrologic and hydraulic data of this and earlier floods as a technical basis on which to make flood plain management decisions.

Over the previous ten years, residential development encroached into the Salmon Creek flood plain. The area has an extensive history of floods and flood damage. Broad areas along this area inundated and exacerbated by severe erosion and heavy debris deposition that clogged channels, overtopping and erosion of railroad and highway banks, landslides, avalanches, surge release flooding and debris flows. Peak discharges due to surge releases were greater than any previous flood flows.

The largest debris avalanche recorded was near Spruce Creek and measured at 3 million cubic feet, through similar flooding occurred on Godwin, Lost, Box Canyon and Jap Creeks. The debris-laden flood shifted channels near Old Mill eroding banks, washing out a bridge and flooding residences. The flow carried logs and debris to the railroad bridge, causing it to fail, washing out about 500-feet of track.

The erosion of Salmon Creek left a cut bank within 115-feet of Bear Creek, which is 7-feet above the Salmon Creek streambed. At one time Bear Creek entered Salmon at this point, but is now channelized so that it flows into Lost Creek. Slides in Box Canyon dammed water, then surge released, causing a debris-laden flood that breached levees and washed out part of Exit Glacier Road, flooding homes and businesses in the Clear Creek area as well as Salmon Creek.

“Since the beginning of man’s presence in the Seward area, floods and the occurrence and effects of associated mass-movement phenomena have repeatedly caused major damage to bridges, roads, private property, and public facilities.”



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HAZARD MITIGATION PLAN for the SEWARD AREA
Flood Damage Prevention Interim Reconnaissance Report

Prepared by the Kenai Peninsula Borough Planning Department

September 1987

This report is a planning tool to consider the potential limits of development sites prone to natural hazards, to develop design standards for development in the area, to examine relocation and acquisition options, and long range planning to minimize development in flood, avalanche, and debris flow prone areas.

The 1986 flood highlighted the need for strategies to reduce hazards of floodplain development. An interagency group determined:

- The need for identifying and maintaining debris corridors;
- Develop and implement a public awareness program aimed at lenders, engineers, planners; builders and real estate agents; protection of infrastructure already in place;
- Review subdivision development requirements;
- Document the effects of floods and develop a scope of work for the plan;
- Define usable techniques to minimize development hazards;
- Develop planning revisions of regulations related to subdivision development;
- Design standard for future public and private development;
- Relocation and acquisition of properties;
- Environment constraints;
- Identify areas where conditions are appropriate for development;
- Design standards for elevation of bridges and lengthening spans;
- Setbacks from fans and slopes;
- Location and design standards for residential, commercial and industrial development;
- Specific location and design criteria for subdivisions;
- Relocation and acquisition of properties and structures;
- Plan for development in lieu of existing sites, specifically to relocate Seward;
- Recommend an overall mining plan to remove gravel

The borough made steps to select future commercial, industrial and residential development sites using Resolution 87-77 to select appropriate lands for this purpose.



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FLOOD PLAIN INFORMATION – RESSURRECTION RIVER & SALMON CREEK

***Prepared for the Kenai Peninsula Borough by the Army Alaska District Corps of Engineers
As provided in Section 206 of the 1960 Flood Control Act as amended***

June 1975

This report was prepared because knowledge of flood potential and flood hazards is important in land use planning and for management decisions in flood plain use. It identifies areas at risk for future floods.

It does not provide solutions to flood problems but does provide a suitable basis for adoption of land use controls to guide flood plain development and thereby prevent intensification of loss and damage.

It aids in identifying flood damage reduction techniques that could be used in overall flood plain management. Environmental and future land use roles would also benefit.

At the time of report, development in the Salmon Creek drainage was minor, but anticipated to increase. It recommends use of the ample high ground on each side of the streams as safe building sites.

Between 1946 and 1974 there were eight major flood events that caused significant damage, threatened the railroad, polluted wells, inundated Clear Creek area with 5-feet of water, eroded, roads and highways, eroded and flooded the airport, and damaged homes and businesses.

With expanded development and without planning controls for development combined with the natural, constant shifting of streams debris and water have a high probability of causing injury or drowning due to current overtopping roads and private property, contamination of drinking water, and isolation of areas creating hazards in terms of medical, fire and law enforcement emergencies. The relatively high probability of significant earthquakes brings the likelihood of tsunamis.

An unresolved flood and erosion problem requires control of development in these areas.



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THE ALASKA EARTHQUAKE, MARCH 27, 1964: EFFECTS ON COMMUNITIES

BY RICHARD W. LEMKE (1967)
Geological Survey Professional Paper 542 – E

A description and analysis of the damage resulting from submarine land sliding, seismic sea waves and oil-tank fires in one of the most devastated cities in Alaska

This paper describes conditions that caused structures to fail during the quake, and identifies other conditions in the area for use in planning future facilities to locate them to reduce damage in the event of another severe quake. To plan for best land use and to attempt to minimize damage from future quakes, the plan is based largely on geologic information from USGS, the Scientific and Engineering Task Force and Corps of Engineers so as to base the reconstruction plan on a thorough understanding of what had happened during the earthquake. In addition, consulting advice was given to the Field Team, Scientific and Engineering Task Force of the Reconstruction Commission, in regard to designating high-risk areas along the waterfront area of Seward and in part of Forest Acres

The entire economic base of the town wiped out; cost to replace destroyed public and private facilities was around \$22 million (1967 dollars).

The business district and most of the residential district of the city are on the alluvial fan of Lowell Creek near the northwest corner of Resurrection Bay. Small faults, shear zones, and joints are common in the area. Fractured ground along the Seward waterfront is prone to landslides that would be unstable under strong shaking.

In choosing the location for the new railroad dock and facilities, sites at both the northwest and northeast corners of the bay were considered. Conditions at the northeast corner appeared to be superior to those at the northwest corner. In final selection of the dock site at the northwest corner of the bay, however, economic and logistical considerations overrode the indicated differences in geologic suitability.

In the event of another large earthquake, additional onshore and submarine land sliding can be expected along that part of the Seward waterfront that slid during the earthquake of 1964.

For this reason the Task Force placed the area in a high-risk classification and recommended no repair, rehabilitation, or new construction in this area involving use of Federal funds and recommended that the area be reserved for park or other uses that do not involve large congregations of people.