FLOOD HAZARD STUDY

KROTO, RABIDEUX, TRAPPER AND PETERS CREEKS

MATANUSKA-SUSITNA BOROUGH
ALASKA

Prepared by the
U.S. Department of Agriculture
Soil Conservation Service
Economic Research Service
Forest Service

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In cooperation with the
State of Alaska
Department of Natural Resources
Department of Fish and Game

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FOREWORD

The flood hazard information in this report will serve as a basis for local government and planning groups in formulating flood plain land use and management programs, adopting regulations, and providing the public with information concerning flood hazards along KROTO, MOOSE, NINE MILE, GATE, TWENTY MILE, SEVENTEEN MILE, PETERS, KENNY, RABIDEUX, AND TRAPPER CREEKS.

The Soil Conservation Service implemented the technical phases of the study. The State of Alaska and Matanuska-Susitna Borough, Alaska Soil Conservation District and Palmer, Wasilla, and Montana Subdistricts assisted in providing land use data, obtaining permission for field surveys, and made available materials to be used for the study. They will distribute the report and make interpretations of the study data so it may be used effectively in local flood plain management programs. The State of Alaska, Matanuska-Susitna Borough and the SCS encourage the immediate use of the flood hazard information in implementing these programs and upon request will assist in the interpretation and use of the data presented in the report.

The cooperation and assistance given by other federal, state and local agencies and property owners in the collection of data for this report are greatly appreciated.
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INTRODUCTION

Local Study Needs

The Matanuska-Susitna Borough requested the Soil Conservation Service, through the Alaska Soil Conservation District and Alaska Department of Natural Resources, to carry out flood studies of several streams which presently have development along the stream banks. The local government feels that rapid development will take place in the near future along the Petersville Road, adjacent to these streams. Development will increase the potential flood damages to those properties in the flood plains. An immediate need exists to accurately define the existing flood hazard areas along existing travel routes. This report defines the areas subject to flooding so that adequate flood plain management programs can be implemented that will regulate land use and development in flood prone areas. Such management programs will reduce potential flood damage, assure wise land use, and preserve and enhance the physical environment of the communities.

Development of flood plain reports requires that peak discharge-frequency analysis be developed in sufficient detail that reliable peak discharges by frequency can be determined for each watershed area to be studied. The peak-frequency analysis includes all of the streams that drain into the Cook Inlet north of the Anchorage bowl around to and including McArthur River.

This report will include Kroto, Moose, Ninemile, Gate, Twentymile, Seventeennmile, Peters, Kenny, Rabideux, and Trapper Creeks. The details of work items involved in this analysis and authorities for USDA and State of Alaska agency participation are set forth in the Alaska Rivers Cooperative Study Plan of Work for the Willow and Talkeetna Subbasins dated February 1979. Flood hazard reports on "1'96 Mile, Caswell, Sheep, Goose, Montana, Answer, and Birch Creeks" and "Troublesome, Byers, Honolulu Creeks-East and Middle Forks of Chulitna River" have been published by SCS in 1981.

The U.S. Corps of Engineers has published a Flood Plain Information Report on a portion of the Talkeetna River which is within the Talkeetna Subbasin.

DESCRIPTION OF THE STUDY AREA

The flood hazard report concerns the area of the Talkeetna Subbasin bounded by the Susitna River on the south and east, the most southerly boundary of the Chulitna River drainage on the north and the most easterly boundary of the Katchemak River on the west. The study area, for flood hazard concerns, encompasses about 1,052 square miles. The southern boundary of the area is about 80 miles by air north of Anchorage. The area is within the USGS hydrologic unit number 19010002. This number designates the Cook Inlet subregion of the Southcentral Alaska Region. Figure 1 shows the location of the area and delineates watershed boundaries of the area covered by the flood hazard report.

Included within the drainage are high mountainous areas in which snow pack depths are three to five feet each winter.
Elevations range from about 70 feet above sea level to about 5,200 feet above sea level. The area generally slopes to the south. Kroto, Moose, Ninemile, Gate, Twentymile, Seventeenmile, Kenny, Rabideux, and Trapper Creeks head in the Peters Hills which are relatively flat with rolling hills. Peters Creek heads in the Dutch Hills which are steep and rough. Ninemile and Gates Creeks are tributaries to Moose Creek, which along with Twentymile and Seventeenmile Creeks, flow into Kroto Creek. Kroto Creek and tributaries flow into the Susitna River. Rabideux and Trapper Creeks are tributaries to the Susitna River. Peters Creek of which Kenny Creek is a tributary flows into the Kasilof River. The lower portion of the area is nearly level to undulating; low hills with irregular slopes are prominent; poorly drained bogs and other wetlands are common.

Below timberline, about 2,000 feet above mean sea level elevation, on the better drained soils, paper birch-white spruce stands are the predominant vegetation. Black spruce is predominant on the poorly drained soils associated with numerous sphagnum bogs. Cottonwood, alder and willow are common in the flood plains adjacent to the streams. Vegetation above timberline, 2,000 feet to 6,700 feet elevation, is predominately of the tundra type.

Stream channel slopes range from about six feet per mile in the lower reaches to about 100 feet per mile in the mountains. Petersville Road runs east and west and crosses most of the streams in the study area. Alaska State Highway 3 (Parks Highway) crosses Rabideux and Trapper Creeks.

The climate of the area is influenced by marine conditions in the south and continental conditions in the east. The temperature range is from a minus 45 degrees F to 85 degrees F. The average daily maximum temperature in the summer is in the upper 60's with low 60's being common. Temperatures of 32 degrees F or lower have been recorded during every month of the year.

Average maximum winter temperatures range from about zero to the mid-teens. The freeze-free period averages about 80 to 95 days. Average annual precipitation ranges from about 28 inches in the south to about 60 inches in the mountains. In the southern portion of the area, over half of the precipitation occurs from June 1 through the end of September. In the winter snow covers the entire area and ranges from about 20 inches in the lower elevations to over 100 inches in the mountains.
FLOOD HISTORY

Development in the area is sparse and has taken place in recent years. Contact with local residents, state and borough officials, and other federal agencies, was made in an effort to obtain historical flood data in the study area.

Channel obstructions are factors which are significant in assessing flood damages. Historically the streams included in this report have had no known ice dams, jams, stream channel glaciation, etc., but others in the vicinity have. It is possible for flood damages from these types of stream channel obstructions to occur. However, reliable predictions of where and how frequent they may occur cannot be determined with present day data. Stream bank erosion is caused by the high water surface and velocities produced by storms equal to or greater than the 10-year frequency event.

FLOOD POTENTIAL (PRESENT CONDITIONS)

Flood Hazards

Present damageable property in the area consists of scattered homes and cabins, many of which are for seasonal use, and highway crossings. Damages to these properties from a 100-year event is estimated to be less than $100,000 with average annual damage totaling less than $8,000. A detailed damage analysis concerning the effect of flooding on stream fisheries is beyond the scope of this study, however, under certain conditions, flooding could severely disrupt stream sports fisheries and have a long term negative impact on commercial fisheries. See Appendix D, Exhibit 2, for water surface elevations along the streams.
Ninemile Creek

Peak discharges that exceed the peak produced by a five year frequency event will overtop the Petersville Road crossing. This would cause damage to the highway and damage to private property. Depth of flow and high velocities, in excess of 7.0 feet per second, from storms equal to or greater than the 50-year event, would endanger life, cause extensive damage to road fill, culvert, stream banks, and the flood plain.

Gate Creek

At the Petersville Road crossing over the creek, the 50-year and greater discharge will produce stream velocities through the highway bridge structure in excess of seven feet per second which is erosive to the stream banks around the bridge structure and are a risk to human life.

Twentymile Creek

The peak discharge produced by a storm equal to or greater than the 5-year event will overtop the culvert across Twentymile Creek. The stream velocity at the structure across the creek is in excess of seven feet per second and can cause extreme damage to the culvert and road bed, damage the flood plain and stream banks, and is a threat to human life.
Seventeenmile Creek

Flood events greater than the five year storm will overtop the Petersville Road and cause extensive damages to the culvert, road fill, stream banks, and flood plain. Flow velocities will be in excess of six feet per second and are a risk to human safety.

Peters Creek

The flow caused by an event equal to or greater than the ten year event will overtop the road fill at the bridge approaches on the road. The road fill, stream banks, and flood plain will receive damages, however, structure damage will be minor. Stream velocities are in excess of five feet per second and flow depths are in excess of seven or eight feet, which are a threat to loss of life.

Kenny Creek

The Petersville roadway will be overtopped from a storm equal to or greater than the 10-year event. This may cause damages to the culvert, road fill, and flood plain. Velocities, seven feet per second and greater in combination with seven or eight feet depths of flow present a risk to human life.

Rabideaux Creek

The culverts in Rabideaux Creek at the Parks Highway crossing are large enough to convey the peak discharge produced by the 100-year storm event. Structural and road fill damages are minor, however, the velocity, in excess of six feet per second, and depth of flow, eight to ten feet, is a risk to human life.
Trapper Creek

There are two road crossings, developed farmland, and several cabins which will be endangered by flood discharges on Trapper Creek. Flood flows in excess of that produced by the 10-year storm will cause damage to about 120 acres of farmland and several cabins.

At the Petersville Road crossing flood discharges equal to or greater than the 5-year event exceeds the capacity of the culverts and overtops the road fill. Road fill, stream banks, and flood plains are damaged by erosion. Depth of flow, greater than seven feet, and high velocity, greater than six feet per second, combine to present a risk to human life.

The Parks Highway culverts will convey the discharge produced by the 100-year storm and do not present any problems.

Technical Data and Related Material

The technical data and related material needed for the intended uses of this study are provided as figures, exhibits and tables in this report.

Figures 2 through 17 are drawings of selected valley cross sections showing the flood elevations for the 10-, 50-, 100-, and 500-year under present land use conditions.

Table 1 (Appendix A) is a tabulation of frequency-discharge-elevation data at cross sections for the 10-, 50-, 100-, and 500-year floods under present conditions. This table may provide greater convenience and efficiency when information is needed at specific locations. At a particular location the water surface may be more accurately located by using depth of flow from the stream channel bottom. Table 2 (Appendix B) is a listing of
descriptions and elevations for selected elevation reference marks established in the study area. All elevations, except for those in the immediate vicinity of the Parks Highway crossing over Rabideaux, are estimated from USGS topographic quadrangles. Their locations are shown on the appropriate photomap indicated in the table. They may be used in establishing the relative locations of existing or planned buildings, roadways, etc., with the floodwater elevations. Cross sections in the immediate vicinity of the Parks Highway and Rabideaux Creek crossing are based on bench levels run from a USGS bench mark.

Table 3 (Appendix C) presents flood flow width and velocities by valley cross section for the 100-year event.

Exhibit 1 of Appendix D provides the index for Exhibit 2, flood profile sheets. Exhibit 2 provides plotings of the routed water surface elevations for the 10-, 50-, 100-, and 500-year peak discharges under present conditions, along the streams. Except for Peters Creek the zero station for each stream is at its confluence with the Susitna River. Peters Creek stationing starts at a point about 17 miles downstream from the bridge. The stations increase in an upstream direction from these points. The profiles for each stream with the exception of Peters Creek were started at the average water surface in the Susitna River. Water surface profiles for Peters Creek were started by assuming normal flow. A straight line interpolation was used between each cross section. These profiles may be used for those purposes which require the location of flood boundaries on the ground.

To locate a flood profile elevation on the ground, determine on the appropriate photomap the distance along the stream from the point in question to the nearest cross section. On the appropriate profile sheet, use the distance from the reference cross section to determine the stream distance on the profile of the point in question and read the elevation of the desired flood frequency line. Transfer this elevation to the ground from the nearest reference mark. Check the depth of flow from the profiles to be sure that your ground elevation allows for an adequate depth of flow. Adjust upward if needed to provide a safe elevation.

Exhibit 3 of Appendix E is a Photomap Index to determine the sheet number of the photomap desired.

The Flood Hazard Photomaps, Exhibit 4 of Appendix E, show the area inundated by the 100-year flood. The actual limits of the 100-year flood line on the ground may vary somewhat from that shown because of the stereoscopic interpolation and the interpolation from USGS quadrangles with 50 feet or 100 feet contour intervals. These photomaps can be used to determine the location of points in question and their relationship to specific flood frequency as outlined above for Exhibit 2. They may also be used for flood plain management decisions or for purposes which require the approximate location of the 100-year flood plain.

FUTURE FLOOD POTENTIAL

The Matanuska-Susitna Borough is a participant in the HUD Flood Insurance Program administered by the Federal Insurance Administration. This participation guarantees that federally subsidized flood insurance coverage is available to owners and occupants of all buildings and mobile homes (including contents) within the subbasin.

As required by the HUD Program the Borough has adopted land use management regulations which:

1. Insure that all new construction is designed to minimize flood loss, and

2. Require that all new construction or substantial improvements to existing structures have the first floor (including basement) level at or above the 100-year flood elevation and that all utilities be flood proofed.

With flood plain management regulations in effect it is expected that future residential, commercial, and industrial flood plain development will be such that flood damages to these properties will not increase above present levels. This presupposes that flood plains will be identified and used as a tool and a means for enforcing local ordinances and that the ordinances themselves are enforced. Should this fail to occur, damage potential will increase drastically with population growth.
Although the damage threat to existing development is expected to be arrested, it is doubtful that the same will be true of highways and railroads. Transportation networks are often found in and adjacent to floodplain lands as a result of construction costs. Even when flood damage costs are added to construction, operation, and maintenance costs, it often remains less expensive to build on flat lowland areas than on more rugged upland terrain.

FLOOD PLAIN MANAGEMENT

Management Programs

Regulatory measures presently adopted do not prevent flooding but, instead, reduce the threat of damage or loss of life from floods by discouraging development of homes and other buildings on floodplains. Without additional measures damage to existing property will continue and road and bridge related damages are likely to increase. As a means to minimize this situation the following alternatives are suggested.

1. For Existing Properties:
   a. Permanent measures built as an integral part of the structure, such as raising the elevation of the structure, water-proofing of basement and foundation walls, anchor and reinforce floors and walls, and use water-resistant materials.
   b. Contingency measures which require action to be taken to make them effective, such as manually closed flood gates and removable bulkheads.
   c. Emergency measures carried out during floods according to prior emergency plans, such as sandbagging, pumping, and removal of contents to flood-free areas.
   d. Reclamation of flood plains which includes the permanent evacuation of developed areas subject to inundation and the acquisition of these lands by purchase or land trades, the removal of structure, and the relocation of the population from such areas.

2. Future Road and Bridge Construction
   a. When analyzing proposed alternative transportation routes, the costs of potential flood damage will continue to be investigated and included for use in the decision making process.
   b. Construction designs will continue to reflect sound engineering judgement with regards to flood hazard potential. This includes the analysis of soils, geology, hydrology and hydraulics, as well as adequacy of construction materials.

Recommendations

It is not the intent of this report to provide solutions to flood problems in the study area; however, it does furnish an information base for the adoption of an overall flood plain management program. Other management programs dealing with environmental values of flood plains may also benefit from this information. Following are recommendations which should be emphasized during development and implementation of this program.

1. Adopt and/or enforce flood plain regulations in compliance with the National Flood Insurance Program as a minimum. The regulations should address such things as minimum floor elevations, floodways, greenbelt areas, adequate drainage facilities, building and housing codes, and sanitary codes with specific flood hazard provisions for all new construction.

2. Consider nonstructural measures for flood prevention such as flood plain acquisition, flood proofing, and flood forecasting and warning systems. Federal cost sharing for these measures may be available under Section 73(b) of Public Law 93-251. The realization of the need for a
flood warning system is due to the projected rapid development of the
flood plains that have occurred in the past decade and the high velocities
in the streams. The National Weather Service of the National Oceanic
and Atmospheric Administration issues frequent warnings of potential
flood producing storms. Frequently the flood warnings are preceded by
a "severe weather or flood watch."

3. Include in land development ordinance the provision for on-site runoff
and sediment storage. A continuous maintenance program needs to be
provided for these types of measures.

4. Owners of property subject to flood damage (including areas adjacent
to the delineated flood hazard areas) should be encouraged to purchase
flood insurance on their buildings, mobile homes, and their contents.

5. Develop a regular maintenance program to keep all hydraulic structure
openings, approach channels, and outfall channels clear of sediment and
debris.

A few key cross sections were surveyed and others were made by use of
the key cross sections, interpolations made by use of USGS quadrangles
and use of high altitude photography.

Hydraulics

Elevation-discharge relationships were developed for all bridges, culverts,
and valley sections utilizing the water surface profile computer program
WSP2 outlined in SCS Technical Release No. 61. The hydraulic parameters
of the channel and flood plain for the conditions existing prior to 1979
were input data for the WSP2 program. High water marks, stream gage
records, and other historical flood data were used in checking the accuracy
of the computed water surface profiles.

One stream gage, on Kroto Creek, is located in the study area and has two
years of record which was used to check hydraulic parameters.

Hydrology

Peak-frequency (annual series) studies were made by the USGS for all of
Alaska. The USGS published a regional analysis, "Flood Characteristics of
Alaskan Streams," Water Resources Investigations 78-129, dated 1979,
which presents regional equations for two areas in Alaska: Area I and Area
II.

The study area is located in Area II. Peak-frequency curves were developed
using the equation proposed by USGS and by use of the Log-Pearson Type
III method. Peaks calculated by these two frequency methods for given
storm frequencies were compared to one another to determine the ade-
quacy of the regional equation for this study. From these comparisons it
was determined that the regional equation lacked sufficient accuracy for
this type of study.

Twenty-six stream gages within the Southcentral Region were then used to
develop peak-frequency curves in an effort to obtain more reliable peaks
for the study area.
Thirteen of these gage records were discarded because watershed characteristics and/or drainage areas were not representative of the study area and/or the time of stream gaging records was too short for adequate frequency analysis. Eleven of the gage records, on streams within the Cook Inlet drainage, were used to make a final determination of peak-frequency curves to be used in this study area.

An envelope for high, medium, and low peak discharge curves, for the 2-year, 10-year, 50-year, 100-year and 500-year events were developed. (See Appendix E, Exhibit 5, 6, 7, 8, and 9 of "Flood Hazard Study for 196 Mile, Caswell, Sheep, Montana, Answer and Birch Creeks" by SCS 1981.) These curves and watershed characteristics such as watershed slope, channel length and slope, mean elevation, land cover and average annual precipitation, were used to develop a peak-frequency curve for each watershed at each cross section.

The peak discharge for each area above each cross section for the 10-, 50-, 100-, and 500-year storm events were taken from these curves and used for channel flood routing on each stream to determine water surface elevations and area inundated.
GLOSSARY

ANNUAL SERIES - A frequency series in which only the largest value in each year is used, such as the annual floods.

BACKWATER - The resulting high water due to a downstream obstruction or restriction or from high water elevations in an intersecting stream.

BM - Benchmark. See elevation reference mark.

CFS - Abbreviation for cubic feet per second. The rate of discharge or flow of water representing a volume of 1 cubic foot passing a given point during 1 second.

CHANNEL - A natural or artificially created open conduit that periodically or continuously conveys water. River, creek, stream, branch, and tributary are some of the terms used to describe channels.

CROSS SECTION (stream or valley) - The shape of a channel, stream, or valley viewed across the axis. In watershed investigations it is determined by a line approximately perpendicular to the main path of water flow, along which measurements of distance and elevation are taken to define the cross sectional area.

CSM - Abbreviation for cubic feet per second per square mile. (Rate of discharge per square mile of drainage area.)

DRAINAGE AREA - The area, measured in a horizontal plane, which drains into a stream at a specified location. See watershed.

ELEVATION REFERENCE MARK - A fixed reference, usually placed on or near the ground, giving the measurement in elevation of that point in relation to mean sea level. Bench mark (BM) or (TBM) temporary bench mark is the common term used by surveyors.

FLOOD - An overflow or inundation of normal dry lands from a stream or other body of water; the high streamflow overtopping the banks of a stream; or a high flow as measured by either stage or discharge.

FLOOD HAZARD AREA PHOTOMAP - A photographic background map that indicates areas likely to be flooded by the 100-year frequency or the one percent chance flood (it has one chance in 100 of being equaled or exceeded in any given year) from an adjoining stream or water body.

FLOOD CREST - The maximum stage or elevation reached by the waters of a flood at a given location.

FLOOD FREQUENCY - The average interval of time between floods equal to or greater than a specified discharge or stage. It is generally expressed in years. Following are examples:

10-year flood ... two percent chance ... in any given year.

50-year flood ... one percent chance ... in any given year.

FLOOD HAZARD - A general term meaning the risk to life or damage to property from overflows of rivers or stream channels, extraordinary waves or tides occurring on lake or estuary shores; floodwells in intermittent or normally dry streams; floods on tributary streams; floods caused by accumulated debris or ice in rivers; or other similar events.

FLOOD PEAK OR PEAK DISCHARGE - The highest value of the stage or discharge attained by a flood, thus, peak stage or peak discharge.

FLOOD PLAIN OR FLOOD-PRONE AREA - The land area situated on either side of a channel or body of water which is subject to flooding.

FLOOD PLAIN MANAGEMENT - The operation of an overall program of corrective and preventive measures for reducing flood damage, including but not limited to emergency preparedness plans, flood control works, and land use and control measures.

FLOOD PROFILES - A plot or graph defining the water surface elevation in relation to the distance along the stream during a particular flood.
FLOOD ROUTING - Determining the changes in a flood wave as it moves downstream through a valley or through a reservoir (then sometimes called reservoir routing). Graphic or numerical methods are used.

FREQUENCY-DISCHARGE-ELEVATION - The relationship of the flood frequency of discharges and the water elevations resulting from these discharges at a surveyed cross section or other point along a stream. This data may be shown as a plotted curve or in table form.

GREENBELT AREA - A strip of land kept in its natural or relatively undeveloped state or in agricultural use which is planned around the periphery of urban development or in the flood plain of a stream or body of water.

HEADWATER - (1) The source of a stream. (2) The water upstream from a structure or point on a stream.

LEFT FLOOD PLAIN - The flood plain on the left side of a river, stream, or watercourse, looking downstream.

MANNING'S "n" VALUE - A coefficient of roughness in Manning's flow equation for determining stream velocities.

RIGHT FLOOD PLAIN - The flood plain on the right side of a river, stream, or watercourse, looking downstream.

RUNOFF - That portion of the precipitation on a drainage area that is discharged from the area in stream channels. Types include surface runoff, groundwater runoff, or seepage.

SEDIMENT - Solid material, both mineral and organic, that is in suspension, and is being transported, or has been moved from its site of origin by air, water, gravity, or ice, and has come to rest on the earth's surface.

STREAM - Any natural channel or depression through which water flows either continuously, intermittently, or periodically, including modification of natural channel or depression.

STRUCTURE - Anything constructed or erected, the use of which requires a more or less permanent location on or in the ground. Includes but is not limited to bridges, buildings, canals, dams, ditches, diversions, irrigation systems, pumps, pipelines, railroads, roads, sewage disposal systems, underground conduits, water supply systems, and wells.

SUPERCRITICAL FLOW - Those conditions of flow for which the depth is less than critical and the velocity is greater than critical. Critical flow is the term used to describe open channel flow when the discharge is maximum for a given specific energy head, or stated conversely, those which exist when the specific energy head is minimum for a given discharge.

TBM - Temporary bench mark. See elevation reference mark.

WATERSHED - The area contributing direct runoff to a stream. Usually it is assumed that base flow in the stream also comes from the same area. However, the groundwater watershed may be larger or smaller.

**CONVERSION TABLE**

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Typical Valley Sections
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TYPICAL VALLEY SECTION
PRESENT CONDITIONS

DISTANCE IN FEET
SECTION RS-L
MUNOZ CREEK

SOL CONSERVATION SERVICE
U.S. DEPARTMENT OF AGRICULTURE
TALKEETNA, ALASKA
MAMMISKA-SUSTAK BOROUGH, ALASKA

FIGURE 2
TYPICAL VALLEY SECTION
PRESENT CONDITIONS

DISTANCE IN FEET
SECTION MG-GAM
MOOSE CREEK

ELEVATION IN FEET

SOIL CONSERVATION SERVICE
U.S. DEPARTMENT OF AGRICULTURE
TALKEETNA SUBBASIN
MATANUSKA-SUSITNA BOROUGH, ALASKA

FIGURE 1
TYPICAL VALLEY SECTION
PRESENT CONDITIONS

DISTANCE IN FEET
SECTION P-6
PETERS CREEK

ELEVATION IN FEET

SOIL CONSERVATION SERVICE
U.S. DEPARTMENT OF AGRICULTURE
TALKEETNA SUBAREA
MATSANUSA-SUSITNA BOROUGH, ALASKA

FIGURE II
TYPICAL VALLEY SECTION
PRESENT CONDITIONS

DISTANCE IN FEET
SECTION RX-S
HABILLY DRIER

SOIL CONSERVATION SERVICE
U.S. DEPARTMENT OF AGRICULTURE
TALKEETNA SUBBASIN
MATANUSKA- SUSITNA BOROUGH, ALASKA

FIGURE 14
APPENDIX A

Table 1 - Present Conditions Frequency, Discharge, Elevation

Data at Valley Cross Sections

Elevations are approximate
### Table 1. Present Conditions: Frequency-Discharge Elevation Data at Valley Sections
Krotos and Peters Creeks and Tributaries - Rabideau and Trapper Creeks
Matanuska-Susitna Borough, Alaska

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1/ All elevations based on interpolations from USGS quadrangles, Scale 1:63,360; Contour intervals = 50 feet and 100 feet.
## Table 1. Present Conditions: Frequency-Discharge Elevation Data at Valley Sections
### Kroto and Peters Creeks and Tributaries - Rabideux and Trapper Creeks
### Matanuska-Susitna Borough, Alaska

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| G-MB           | 10                       | 111                     | 30.9                      | 1040                     | 455.2                     | 1540                      | 456.0                     | 1770                     | 456.3                     | 2350                     | 457.1                     | 450.0                     |
| G-MC           | 11                       | 113                     | 30.9                      | 1040                     | 506.7                     | 1540                      | 507.5                     | 1770                     | 507.8                     | 2350                     | 508.5                     | 500.0                     |
| G-MD           | 11                       | 114                     | 30.9                      | 1040                     | 558.2                     | 1540                      | 559.2                     | 1770                     | 539.7                     | 2350                     | 560.0                     | 550.0                     |
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| G-MERD         | 11                       | 118                     | 22.1                      | 810                      | 711.8                     | 1090                      | 712.2                     | 1370                     | 712.4                     | 1820                     | 712.9                     | 704.3                     |
| G-MII          | 11                       | 118                     | 22.1                      | 810                      | 712.1                     | 1090                      | 712.6                     | 1370                     | 712.8                     | 1820                     | 713.3                     | 706.3                     |
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| G-MJ           | 11                       | 119                     | 22.1                      | 810                      | 758.8                     | 1090                      | 759.3                     | 1370                     | 759.5                     | 1820                     | 760.0                     | 754.3                     |
| G-MKPRD        | 11                       | 120                     | 22.1                      | 810                      | 760.9                     | 1090                      | 761.6                     | 1370                     | 761.6                     | 1820                     | 761.8                     | 754.9                     |
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| G-MM           | 11                       | 121                     | 22.1                      | 810                      | 824.8                     | 1090                      | 825.0                     | 1370                     | 825.1                     | 1820                     | 825.4                     | 823.0                     |</p>
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Table 1. Present Conditions: Frequency-Discharge Elevation Data at Valley Sections
Kroto and Peters Creeks and Tributaries - Rabideux and Trapper Creeks
Matanuska-Susitna Borough, Alaska

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APPENDIX B

Table 2 - Elevation Reference Mark Description.

(All elevations except at Rabideux and Parks highway crossing are estimated from USGS Topographic Sheets.)
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<th>Elev. msl (feet)</th>
<th>Description and Location of Elevation Markers</th>
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<td>Top of upstream end of 2.9 feet diameter corrugated metal pipe culvert at the Petersville Road and Twentymile Creek crossing.</td>
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<td>Top of downstream end of 4.9 feet diameter corrugated metal pipe culvert at the Petersville Road and Seventeenmile Creek crossing.</td>
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<td>715.4</td>
<td>West along the Petersville Road about 9.9 miles from the Parks Highway intersection, on the top of a bolt on the Southeast corner and top of bridge rail, of the Petersville Road Bridge across the Gate Creek.</td>
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<td>Along development road above Petersville Road on the upstream girder of the bridge across Gate Creek, at the center of the 42 feet bridge.</td>
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<td>7.1 miles west of Parks Highway along the Petersville Road on the top of a bolt for guardrail, most southerly guardrail post southeast end of bridge across Moose Creek.</td>
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<td>Top of upstream end of 5.0 feet diameter corrugated metal pipe culvert at Petersville Road and Ninemile Creek crossing.</td>
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1 Elevations are estimated from USGS topographic quadrangles; Scale = 1:63,360; Contour interval = 50 feet and 100 feet, except R-1 which is based on true S.L. Elevation.
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¹ Elevations are estimated from USGS topographic quadrangles; Scale = 1:63,360. Contour interval = 50 feet and 100 feet, except R-1 which is based on true S.L. Elevation.
APPENDIX C

Table 3 - 100-year Flood Data
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MATANUSKA-SUSITNA BOROUGH, ALASKA

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APPENDIX D

Exhibit 1 - Flood Profile Index
Exhibit 2 - Flood Profile Sheets

NOTE: ELEVATIONS ARE APPROXIMATE
SOIL CONSERVATION SERVICE
U.S. DEPARTMENT OF AGRICULTURE
Matanuska-Susitna Borough, Alaska

FLOOD PROFILES

MOOSE CREEK