

Introduction

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Memorandum

January 20, 1998

To: Wayne M. Gardner

From: C. Albert White

Subject: Landslides and Earthquake Displacement of Land Survey Monuments and Land Lines

You have requested that I make a study of and prepare a report on what a cadastral surveyor should be aware of when confronted with a situation where the land survey lines and/or monuments have been displaced by landslides or earthquakes. After several months of research and extensive inquiry into the matter, the following is my report of what I found concerning these types of situations.

Land Surveys and Property Rights:

It has been said that land surveying is the second oldest profession. Although meant as a humorous remark, that statement is probably near to the truth. It is also known that prehistoric peoples marked in some way, the boundaries of the land they claimed for themselves, their tribe or clan. Most predatory animals, such as the cat species, mark their territorial boundaries in some manner. None of these set exact monuments of any sort but they claim the land for themselves.

It isn't really known when the human animal began to establish more precise boundaries of the land being claimed, by establishing natural or artificial monuments to mark boundaries. Certainly this activity occurred more than 5,000 years ago. There are references in the *Bible* that indicate the importance of established monuments. "*Cursed be he that removeth his neighbors landmark. And all the people shall say Amen*" (Deuteronomy 27:17), and "*Remove not the old landmark' and enter not into the fields of the fatherless*" (Proverbs 23:10). Thus we know that monuments have been established on the surface of the earth to mark the boundaries of the property claimed by individuals and/or "civilized" governments for a long time.

The basic law on land surveys, monuments, and land survey lines (bounds) are rooted in the English Common Law imported into North America by the early colonists. Usually, a grant of a large described land area would be made by the King of England to an individual or Chartered Colony. Smaller land areas would be surveyed on the ground, the lines marked by blazing on trees, and monuments set on the surface to mark the corners of the surveyed lands being conveyed by deed or patent to individual landowners. The deeds were usually recorded. One practice was that neighboring landowners had to "walk the bounds" once each year so that the surveyed lines would be well known and to rehabilitate the monuments. The original monuments marking the corners were often a wooden post or a tree (corner tree) marked in place.

The posts would eventually decay and trees would die. These old monuments would be replaced (in place) with marked stones. Later the stones would be replaced with an iron rod, buggy axle, or the like. In time those were replaced by such things as brass capped metal (and now even plastic) monuments.

As the land became more and more occupied with denser human population, streets and roads were constructed. If the government agencies were faithful in their duties, the survey monuments located in the street or roadway would be buried in place below the surface. Often the monument would be destroyed but that action did not destroy the property corner. A land survey monument (in whatever form) is set on the surface to mark a survey corner. The corner is a geographic position; the monument only marks that position to make it visible to an observer. If the monument has been reset in its original position below the surface, or has been buried (in place) by flood borne sediments, it still marks the corner even though not immediately visible. Personally, the deepest I have ever had to dig to recover an original survey monument is 10 feet. That monument had been covered by flood borne sediments and debris. Had the monument been destroyed, I would have had to restore the corner in the same geographic position using collateral evidence. Thus, the axiom that "an original survey monument, IF UNDISTURBED, controls the position of a survey corner and the property boundary."

What is meant by "undisturbed"? The ordinary meaning generally accepted is that the monument is undisturbed by humans picking it up and moving it to a different geographic location. Secondarily, it could be "disturbed" by floods or mechanical means such as a bulldozer. It could also be disturbed by animals causing the monument to roll down a hillside, or by a landslide. Thus, the monument is not in its original location. Therefore the monument loses its integrity, but the corner remains as before. This would include any subsequent perpetuations with a monument of a different composition so long as the original corner point was actually perpetuated in the original position.

After the War of Independence, the 13 original States of the Union quit claimed (ceded) a large part of the present land area of the country lying east of the Mississippi River to the Central or Federal Government. Those cessions included most of Ohio, all of Illinois, Indiana, Michigan, and Wisconsin, the eastern part of Minnesota, and most of Mississippi and Alabama.

Beginning in 1785, the Federal Government began the land survey of those ceded lands using the system of Townships and Sections, generally known today as the Public Land Survey System (PLSS). In 1796, the system was expanded and the office of Surveyor General was established. It was the duty of the Surveyor General to cause the public lands to be surveyed. The surveyors were required to mark the section lines by blazes on trees immediately adjacent to the line, and monument the section corners and later the 1/4 section corners. Many of the surveys made in that time period were poorly executed by contemporary standards. The Federal Government sold those surveyed lands to individuals through a deed known as a patent. When the buyer discovered that he had less acreage than his patent called for, he complained loudly. However, there is no known case where an individual objected to a survey that encompassed more land than he had paid for. To resolve those complaints the Congress enacted a statute on February 11, 1805, 2 Stat.313. Briefly, that act states that the boundaries and corners established by the Surveyor General are the true boundaries and corners (not withstanding any errors) of the lands

surveyed. When an individual purchased a described tract of land from the government and received a patent he was bound by the surveys marked on the ground.

In some of the original patents reservations were made for a portion of any gold, silver, or other valuable minerals that may later be found. In the mid 19th century reservations were made for construction of ditches and canals. By 1900 reservations were made in the patents for "all minerals." Since the PLSS was extended to the (now) states west of the Mississippi River shortly after the Louisiana Purchase (in 1803), it is possible that most patents issued by the Federal Government have some sort of reservation in them. One could say that all the government conveyed was the surface rights if the patent contained a mineral reservation.

What is the surface? How deep do surface rights extend? Surely the surface right would extend downward far enough to allow for construction of buildings, erect fences, or even drill a well for water. With the great population increases, water is becoming a valuable natural resource and probably most states require a valid permit before extracting ground water, even though the well is well within one's surveyed boundaries and the surface rights are unrestricted. Unless the individual owns all of the mineral rights he cannot drill for oil, gas, or even geothermal heat. If the government retained the mineral rights the individual cannot take coal from his own land even though the coal seam is only a few feet below the surface. Assume that an individual owns a surveyed tract of land in a public land state, with no restrictions. I believe the term used to describe that ownership is in "fee simple absolute." How deep into the earth does his ownership extend? The popular concept is that he owns everything within his boundaries downward (a plumb line) to the center of this planet. But (there is always a but) if a vein of gold ore is located under his land and a neighbor owns the apex of that vein through a valid mining claim, the neighbor can follow that vein downward according to the "apex rule" of the mining laws, even though it is under the neighbors surface.

Geologists tell us the planet Earth is made up of four layers. The surface is termed the crust (lithosphere) and is from about five miles down to about 50 miles thick. The crust (the continents and floors of the oceans) is composed of primarily igneous rocks, the so called bedrock. Atop the bedrock are layers of sedimentary rocks and soils. Below the crust is the mantle which is primarily semi-molten rock similar to the lava which spews from volcanoes. The mantle is very hot and may (someday) be a source of heat to produce the energy required by modern humans (geothermic heat). Below the mantle are the outer and inner cores of the planet which are beyond the scope of ownership by individuals residing on the surface. So, for all practical purposes, an owner of the surface could not own more than his relatively small area deeper than through the crust. And that crust moves around on top of the mantle

The general rule is that if someone owns a surveyed and described piece of land in fee simple, including the mineral rights, his ownership extends downward as marked by the extension of his surface boundaries. The Oregon Department of Transportation (ODOT) informs me that they routinely obtain an easement from the surface owner(s) prior to digging a highway tunnel through a hill or mountain, even if the tunnel is several hundred feet below the surface. The BLM often executes dependent resurveys to mark on the surface the section and section subdivisional lines of lands patented but with mineral rights reserved to the United States. The rights to mine coal or drill for oil are then leased to a third party. Any

damages done to the surface must be paid to the surface patentee but the patentee cannot prevent the taking of the minerals under his surface. I find that ironic but it seems to be the law.

The Statute laws of the States of Oregon and Washington do not appear to address subsurface rights directly. They only provide for civil litigation as to ownership of surveyed lands and that any lost or obliterated survey monuments marking section lines must be restored to their original locations using methods adopted by the BLM in the Manual(s) of Surveying Instructions.

Sudden Landslides:

There are two different types of landslides. The first is the sudden slump or slide-out of a hillside or mountainside over an area of perhaps only a few hundred square feet, ranging up to several hundred acres. Such soil slumps are endemic in the Pacific Northwest due primarily to heavy rainfall. In the Coast Range of mountains there is evidence of hundreds (perhaps thousands) of instances of ancient landslides which pre-date the public land surveys. The apparent cause is super-saturation of the sedimentary soils overlaying the top of hard rock. The subsurface rock layer may be igneous or sedimentary but is usually termed the bedrock. Heavy rains cause water to infiltrate the soil until it reaches the bedrock then flows downhill under and through the surface layers. At some point the surface soil will become so saturated that it slumps or flows downhill; a landslide. Eventually the soil stabilizes, trees, brush or other vegetation will grow, holding the soil in place once again. Perhaps years later the saturation process will repeat, causing another landslide. For the most part this type of landslide is sudden and perceptible. It may occur in a matter of minutes, days, or a few weeks. But a person can observe the slide as it is moving. Because the slide is sudden it may be termed as analogous to an avulsion of a river. An avulsion is the sudden and perceptible (you can see it happening) change in the course of a river.

There are a great many published legal decisions in which the courts have ruled that an avulsion does not change the ownership boundaries, they remain in the same geographic position as they were immediately prior to the avulsive action. That concept with a sudden landslide makes good sense. The land surveyor confronted with a sudden landslide should restore the surveyed boundaries and corners in their same geographic positions, as nearly as possible, using all valid previous records and evidence in making his determination.

So long as the landslide was induced by natural causes and not precipitated by some overt human activity, I believe that the timber (or other valuable assets) should still belong to the previous owner, as they were before the slide occurred. These assets may now be located over the top of the neighboring subsurface but the owner should have a reasonable length of time to remove them. That is actually a legal question but the land surveyor is probably the person most qualified to determine and identify their previous locations.

Resurveys of section lines, etc., performed after a sudden landslide, are illustrated in the appendix. The selected cases are intended to illustrate the problems involved in these types of surveys. The presented

cases do not address catastrophic events such as the eruption of Mt. St. Helens nor the Yellowstone Park earthquake which caused massive displacement of hundreds of millions of cubic yards of soil. Even though these landslides were immense in scope, the land survey boundaries were restored within the devastated areas based on the same theory - the land survey corners were restored to their original geographic positions as nearly as possible.

Creeping Landslides:

This type of slide is slow and imperceptible. It occurs over a period of years. If control monuments are placed within and outside the slide area and then monitored over a period of years, the movement can be measured. In the analogy with avulsion and accretion those landslides are accretive but there the analogy stops. A creeping landslide does not add any soil to the adjoining land as does accretion along a water boundary. It merely means that a large mass of land surface is moving at a slow and imperceptible rate.

The causes of these large soil movements are basically the same as the sudden landslide or slump. In the two cases discussed in the appendix the causes were excessive amounts of rainfall and snow melt at the upper end of the slide area and throughout the slide. The surface soils are relatively porous, consisting of clay, sand, gravel, rocks and other soil debris overlaying an impervious bedrock. Large amounts of water infiltrate the surface soils and flow along the bedrock. The surface soils and vegetation lose cohesion with the bedrock and start to creep downhill. Some parts of the slide may move only a few feet per year while other parts may move 50 or 100 feet per year. The faster moving soils will bunch-up against the slower moving mass. The whole area becomes pock marked with small ponds or lakes of shallow depth which appear and disappear over a few years time. Small streams on the surface tend to change course and wander considerably. The creeping surface soils may be from 50 to 250 feet in depth. In the two examples discussed in the appendix extensive monitoring of the slides was made by the U.S. Corps. of Engineers and/or the U.S. Geological Survey, with full reports made. Unfortunately no accurate or precise land surveys were made prior to the onset of the creeping slide. Therefore no positive position can be determined of original survey corners. It does appear that in the case of the Collins Point Slide that the survey lines were marked on the ground and that the whole mass moved southerly, including the surface land lines. This is a domino effect. Everyones lines were moving in relationship to the underlying bedrock. It becomes a complex problem (to me at least) as to who owns what? If the ownership is to the bedrock as marked downward from the surface monuments (as is the general rule), and all of those surface monuments and lines are now in a different location, what happens to the subsurface rights? Does the bedrock rights remain where they were originally and the surface right move? Or does the original bedrock position determine new surface locations? An exhaustive search by the Department of the Interior Solicitors Office did not find a published legal case in which a court of law has ruled on this question.

Common sense tells me that the original geographic position of the original survey monuments would ultimately control the position, on the surface, of the soils which have or are moving. Humans are not culpable in the situation. No one is to blame, its just a geologic phenomenon. But common sense also tells me that all of the surface assets, down through the moving mass, should remain with the original owner. That would include the timber, buildings, placer gold deposits, etc. The owner should have an

adequate length of time to remove any valuable assets from atop a neighboring bedrock. That issue would have to be mediated between the various ownerships or, failing an amicable agreement, decided in the appropriate courts of law.

Once again it would become a legal question and all the land surveyor could do is determine as accurately as possible the original geographic position of the original corners and lines, and their existing positions. Such a land survey would (or could) be quite complex. All original survey plats, field notes, subsequent maps and surveys would have to be considered in determining the original locations. All blazed lines, fences, occupational evidence and uses would have to be determined on the existing surface and both positions shown on the survey plat. Reliable testimony (if any available) would have to be incorporated and thoroughly documented. The result would be a "before and after" showing of all available facts. Then who knows? The land may begin to slide again, stop for a few years, and then slide some more. Eventually a court may have to decide the issue in a precedent setting case. Until then the land surveyor has no legal guidance except those already discussed.

Earthquake Shifts:

The study of earthquakes and their causes is a science itself and not within the scope of this report. The earthquake scientists theorize that the earth's crust is broken up into a myriad of plates which are shifting around (however slowly) on top of the semi-molten mantle, pushing down under or overriding an adjoining plate. Thus the bedrock itself is unstable. From time to time the internal stresses in the bedrock build to the breaking point, the rock breaks and shifts along a fault line. The movement may be vertical or horizontal, or both. In land survey matters a small vertical shift has little or no effect on the geographic position of property lines and corners, even though the vertical change may be several feet. The horizontal displacement may be only a few inches, up to 15 or 20 feet, and possibly more. The horizontal shift may be across the fault line extending deep into bedrock. Thus the surface and the bedrock beneath it, possibly all the way downward to the mantle, are shifted in position in relationship to the other side of the fault line. It has been said that in the great San Francisco earthquake of 1906, the horizontal shift was up to 19 feet. The shift, over time, along the San Andreas Fault in the Carrizo Plain east of San Luis Obispo, California, is a famous, easily visible example of displacement along a fault line. The theory exists that the land mass of California, lying westerly from the San Andreas Fault is moving northerly in relationship to the land mass easterly of the fault. It is also well known that there are a great many smaller faults throughout Southern California, which shift from time to time. These events are often only vertical shifts, with only minor horizontal movements. Though they destroy buildings and infrastructure (sewers, water lines, bridges, etc.), unless there is a measurable displacement of surveyed land lines they pose no real problems for land surveyors. But, if the shift is several feet and the previous land surveys were reasonably precise, the amount of shift can be determined with some degree of certainty.

The conundrum facing the land surveyor is what to survey as "property boundaries" after an earthquake shift?

In the book "*Boundary Control and Legal Principles*" by Curtis M. Brown, first published in 1957,

discussion is made concerning earthquake shift. On page 114, Sec. 3.9, 2nd Edition, 1969; and at page 361, Sec. 13,14, 4th Edition, 1995; earthquake shifts of 10 feet and 19 feet are illustrated. In the opinion of the author(s) the same land and bedrock should belong to the same owner as before the shift. Thus a jog in the land boundary results. That opinion is not based on any published legal decision. Since the concept is that the ownership follows the surface boundary downward through the bedrock and the earthquake has caused the surface and the bedrock to shift in geographic position, I have to agree with Brown and concur with that opinion. However, the concept is not without some resulting problems over a long period of time. If more earthquake shifts occur along the same fault line, it is conceivable that a given parcel of land could, in time, become two separate parcels no longer connected to each other. The owner of a small lot could end up with two separate lots of smaller size than the original, at least if the owner or his successors in title live long enough.

The great Alaskan Earthquake in March 1964 produced a great many landslides and earthquake shifts. Large areas of land liquefied and slumped into the sea. The resulting tidal wave (tsunami) practically destroyed the harbor areas in such places as Seward, Valdez, Homer, and Kodiak. Since the land surface was gone, there is no apparent way to determine whether a bedrock shift also occurred in those locations. The surface land lines were restored (where land still existed) by dependent resurvey procedures as in the Sudden Landslide discussed previously.

In the City of Anchorage an earthquake shift occurred, along with the Sudden Landslides and vertical displacements. A large part of the city was displaced up to about 15 feet in a horizontal shift and twisting action. Yet most of the infrastructure; lot lines, buildings, etc., were basically intact. The problem was what were the legal ramifications? The American Land Title Association (ALTA) was not concerned since they insure title but not location on the ground. To help resolve the problem the Alaska Legislature enacted the "Earthslide Relief Act" in 1966, Chapter 80 Article 10, Sec. 09.45.800-Sec. 09.45.880. That Act provides for the resurvey and replatting of areas affected by the displacement of land boundaries shifted by an earthquake or landslide (a copy may be found in the appendix). A large area in the city was resurveyed and replatted, called the "L" Street Replat. That replat is discussed in the appendix.

The Alaska Earthslide Relief Act appears to have prompted a similar statute enacted by the California Legislature in 1972, called the "Cullen Earthquake Act," Title 10, Chapter 3.6, Sec. 751.50. The Cullen Act is nearly identical to the Alaskan legislation and permits the resurvey and replatting of an affected area. The Sylmar earthquake on February 9, 1971, may have been the direct impetus of the Cullen Act. Sylmar is a heavily populated area in the northern end of the San Fernando Valley. According to Glen Nave of the Los Angeles City Surveyor's Office, the Sylmar displacement was up to about five feet and 0 16' of angle. Nave stated that there are 2000 to 3000 survey plats on file replatting lands affected by the Sylmar earthquake.

The Landers earthquake on June 26, 1992, was located in the vicinity of Yucca Valley, San Bernardino County, California. There are some rumors that horizontal movements may have exceeded 20 feet, but no study has been made of the largely unpopulated area. Dan C. Moye of the San Bernardino County Surveyor's Office supplied me with the only record of survey made in the area after the Landers

earthquake. That plat does not try to determine property boundaries. It does indicate a shift of about five feet in geographic position of utility poles, etc. The comparison between the found bearings and distances along the section lines resurveyed and monumented by the BLM in 1950-51 indicates a remarkable agreement. Since the fault line has not been located, any displacement across the fault is undetermined.

Discussion with the City of Hayward, California, revealed that no surveys are on record there showing an actual determination of property boundaries bisected by the fault line. The fault line is well mapped and jogs exist in streets, curbs, etc., but no firm stance appears to have been taken about property boundaries. That issue has not been adjudicated.

In 1991, Tracie Linn Mesloh (Hennon) prepared a thesis titled "Effects of Earthquakes on Property Boundaries" as a partial fulfillment for her Masters of Science in Engineering degree from California State University at Fresno. Mesloh graciously supplied me with a copy of her thesis which discusses the effects of the Sylmar earthquake and the replatting of one block of land within the affected area. Mesloh points out that the changes in survey lines were not consistent or proratable within even the one city block. Survey corners marked on curbs or sidewalks were displaced by inordinate amounts and could not be relied upon. Iron pipe survey monuments driven firmly into the ground did reflect the general displacement of the surface land mass. Concrete walls, fences, and buildings were used to reestablish, map, and record the new geographic locations for future reference.

Although the Bureau of Land Management's land surveyors are unlikely to ever be confronted with a resurvey of city lots and blocks following an earthquake shift, the "L" Street replat in Anchorage and the Sylmar earthquake problems are indicative of the situation to be dealt with, the theories involved and the solutions adopted.

Conclusions and Comments

This report does not provide any "earthshaking" (no pun intended) solutions or miraculous cures for problems to be dealt with when survey monuments are destroyed or displaced by landslides or earthquakes. The intent is to provide some guidelines to follow when confronted with a situation.

Landslides are basically just another type of dependent resurvey problem created by a specific act of nature. The problems presented vary only slightly from other situations created by other natural phenomena such as forest fires, floods, etc., that destroy large numbers of survey monuments. The land surveyor must execute a dependent resurvey based on the remaining evidences, reconstruct the previous surveys and remonument the "lost" corners.

Earthquake shifts are a case of their own. The Alaska Landslide Act and California's Cullen Act seem to provide a means to resolve large scale problems in heavily populated areas. Whether they can be made applicable in other States is open to question. But without some clear legislation by the individual State, those existing Acts are applicable only in California and Alaska.

If I may offer a bit of "sage advice" ---

It should be remembered that professional land surveyors, including (but not limited to) the Cadastral Surveyors employed by the Bureau of Land Management, are not clothed with judicial authority. While they do execute many original surveys of the Federal public domain, their primary function in the context of this report is in executing dependent resurveys of the original surveys performed many years ago. Once those original surveys were executed and approved, and lands patented based on them, they become fixed in position and unchangeable in accordance with Statute and Case Law. The primary function of the land surveyor, when executing dependent resurveys, is that of a professional gatherer of evidence, and presenting that evidence in a clear and understandable manner. The plat(s) and field notes should not be interpretable by only another surveyor familiar with cryptic jargon that non-surveyors do not understand. The research into the past surveys, monumentation, records, etc., must be thoroughly complete. The search for evidences of past surveys and monuments on the ground must also be well founded and complete. While so-called "gut feelings" and "instinct" may play a role in recovering evidence, they are not evidence in and of themselves. Once the surveyor has completed all of his research and retracements, gathered all of evidence, executed his dependent resurvey, drawn the plat and written the field notes, he then can testify as an expert witness as to what he has found and voice his expert opinion on where particular survey lines are located on the ground. And after all that, some court may completely overrule him in a judicial proceeding

Frustrating?? Yes it is, but that's the way the judicial system works in this country. The very best protection the surveyor has is to be absolutely thorough in his investigations, not do them with a pre-conceived goal or conclusion that he wants to prove. Keep an open mind and let the chips fall where they may. In a word, be unbiased. That is my best advice based on my 50 plus years of experience. Don't be a victim of the question: Why is it--there is never time to do it right, but always time to do it over??

Sources:

Boundary Control and Legal Principles Curtis M. Brown, et al. John Wiley Sons	Crustal Movement Monitoring Technical Report No. 26 East Bay Council on Surveying and Mapping, February 11, 1970
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<p>Clark on Surveying and Boundaries Fifth Edition Walter G. Robillard and Lane J. Bouman The Michie Company</p>	<p>Locating the New Madrid Fault Line by Michael Pallamary Professional Surveyor Magazine, Sept.-Oct. 1990</p>
<p>The Manti, Utah, Landslide U.S. Geological Survey Professional Paper 1311 U.S. Government Printing Office, 1988</p>	<p>Hayward Earthquake Study Prepared by Hayward (California) Planning Commission, April 1972</p>
<p>Rectification of Boundaries in Alaska Since the 1964 Good Friday Earthquake by Maurice P. Oswald</p>	<p>San Bernardino County Surveyor San Bernardino, California Dan C. Moyer</p>
<p>Earthquakes and Titles by James W. Robinson</p>	<p>Surveying the San Francisco Earthquake by Michael Pallamary Professional Surveyor Magazine, Jan.-Feb. 1990</p>
<p>Survey Requirements Imposed by Earthquakes by Richard J. Mitchell</p>	<p>Effects of Earthquakes on Property Boundaries by Tracie L. Mesloh UMI Dissertation Services Ann Arbor, Michigan</p>
<p>Land Deformations Resulting from the San Fernando Earthquake by Dr. James C. Savage</p>	<p>Investigative Report by Jim Lynch Dept. of the Interior, Solicitors Office Portland, Oregon, July 1997</p>
<p>Papers presented to the 1971 ASP-ACSM Fall Convention of the American Congress on Surveying and Mapping</p>	<p>City of Anchorage Anchorage, Alaska</p>
<p>Earthquakes: Picking Up the Pieces by Michael Pallamary Professional Surveyor Magazine, March-April 1989, Arlington, Virginia</p>	<p>Los Angeles County Surveyors Office</p>

SUDDEN LANDSLIDE

CASE NO. 1
DOMPIER CREEK, OREGON

A portion of the subdivisional lines of T. 30 S., R. 2 W. were surveyed by Dennis Hathorn as shown on the plat approved February 20, 1858. Hathorn noted a small lake, 10.25 chains across, on the line between section 22 and 23. He marked an oak as a corner tree at the corner of secs. 14, 15, 22, and 23, along with three Douglas fir trees and one laurel (Madrone) for bearing trees. A portion of Hathorn's plat is shown in Exhibit [A](#).

In 1909, Fred Mensch retraced and/or resurveyed a portion of the subdivisional lines previously surveyed by Hathorn and completed the surveys of the township. A portion of the Mensch plat, approved October 14, 1910, is shown in Exhibit [B](#). Mensch recovered the northwest corner of sec. 14, the cor. of secs. 14, 15, 22, and 23, the 1/4 sec. cor. of secs. 15 and 22, and the cor. of secs. 15, 16, 21, and 22 as established by Hathorn. He could not find the 1/4 sec. cor. of secs. 14 and 15, so he restored it at midpoint on line. At the corner of secs. 14, 15, 22, and 23, he found the oak corner tree and laurel bearing tree both dead, but the three fir trees alive and in place. He perpetuated that corner by setting a stone monument and marking a fourth fir bearing tree.

The terrain features were as shown on the Tiller, Oregon, quadrangle map, published by the U. S. Geological Survey, 1/62,500 scale (15 minute series) in 1944, Exhibit [C](#).

In February, 1962, a sudden and massive landslide occurred in sections 15 and 22. All of section 15 is Oregon and California Railroad (O&C) Revested land under the administration of the B.L.M. Secs. 14 and 22 are all patented land. Sec. 23 is intermingled O&C and private ownership. Most of the timber in the west half of sections 15 and 22 had been clear-cut logged in previous years. During a period of heavy rainfall, the downslope lands below the logging became saturated and suddenly slumped downhill toward Dompier Creek. The greater mass pushed down and under the area nearer to Dompier Creek, pushed under the small lake, lifting it upward, and sliding the land north and east of the lake easterly. Dompier Creek was diverted easterly to flow around the toe of the slide. Two other small lakes were formed upstream, to the west of Dompier Creek, among the pressure ridges created by the slide. See a portion of the Tiller Quadrangle map, 1/24, 000 scale published by the U.S. Geological Survey in 1989, Exhibit [D](#).

By the spring of 1963, it was apparent that the Dompier Creek slide area had stabilized. Special Instructions for Group No. 524, Oregon, were issued on August 6, 1963, providing for the dependent resurveys necessary to restore the corners of section 15 that had been destroyed or

disturbed by the slide and to identify (if possible) the O&C timber within the slide area which might be now located on adjacent private lands. This was all necessary before salvage logging could take place. I was assigned to Group 524 on August 16, 1963, and began work on August 29th.

The lines between sections 14 and 15, 15 and 22 were retraced. The corner of sections 15, 16, 21, and 22 was intact and undisturbed as was the corner of sections 10 and 11, the corner of sections 14 and 15, and the 1/4 corner of sections 14 and 15, all as described by Mensch. The monument and bearing trees for the corner of sections 14, 15, 22, and 23 were intact, but obviously out of place when compared to the distances returned by Mensch. The stone monument was in place, but the bearing trees were leaning at an angle of about 20 from vertical, as were the other standing trees in the near vicinity. The 1/4 corner of sections 15 and 22 was destroyed although one bearing tree was found in the tangle of fallen timber, about 10 chains east of its original location.

The section corner was obviously disturbed and shifted in location due to the sudden landslide. There was no evidence of a shift in position of the underlying bedrock and no reports of any seismic activity. The available evidence and testimony of local residents proved the Dompier Creek Slide was exactly that: a sudden slump and flow of super saturated surface soils which occurred over a brief period of time.

Although there was no doubt that the monument for the corner of sections 14, 15, 22, and 23 had been shifted easterly by the landslide and was no longer valid; the question was: How should the section corner be restored to its original location?

Because section 23 contains O&C lands and to determine the accuracy of the Hathorn surveys in relationship to the Mensch retracements, I dependently retraced and resurveyed the exteriors of that section. With that data available, a decision had to be made on the best method of restoring the corner of section 14, 15, 22, and 23 to its original position. Four methods could be used, in theory. 1) Double proportioning; 2) the broken boundary method (compass rule); 3) Grant Boundary method; or 4) two point control, based on the Mensch retracements. The results of the first three methods are illustrated in Exhibit [E](#).

After comparing the four methods and the results, it was decided to use 2 point control to restoring the corner of sections 14, 15, 22, and 23. Double proportioning was rejected because mixing two different surveyors distances is usually not a good practice. Hathorn's distances around section 23 were found to be longer than the record distances, but did not reveal a definite index correction which could be logically applied. To mix two different surveyors work is analogous to mixing apples and oranges. However - that method is not prohibited by the Manual of Surveying Instructions and is sometimes applicable in special circumstances.

The Broken Boundary and Grant Boundary methods were also rejected as not appropriate

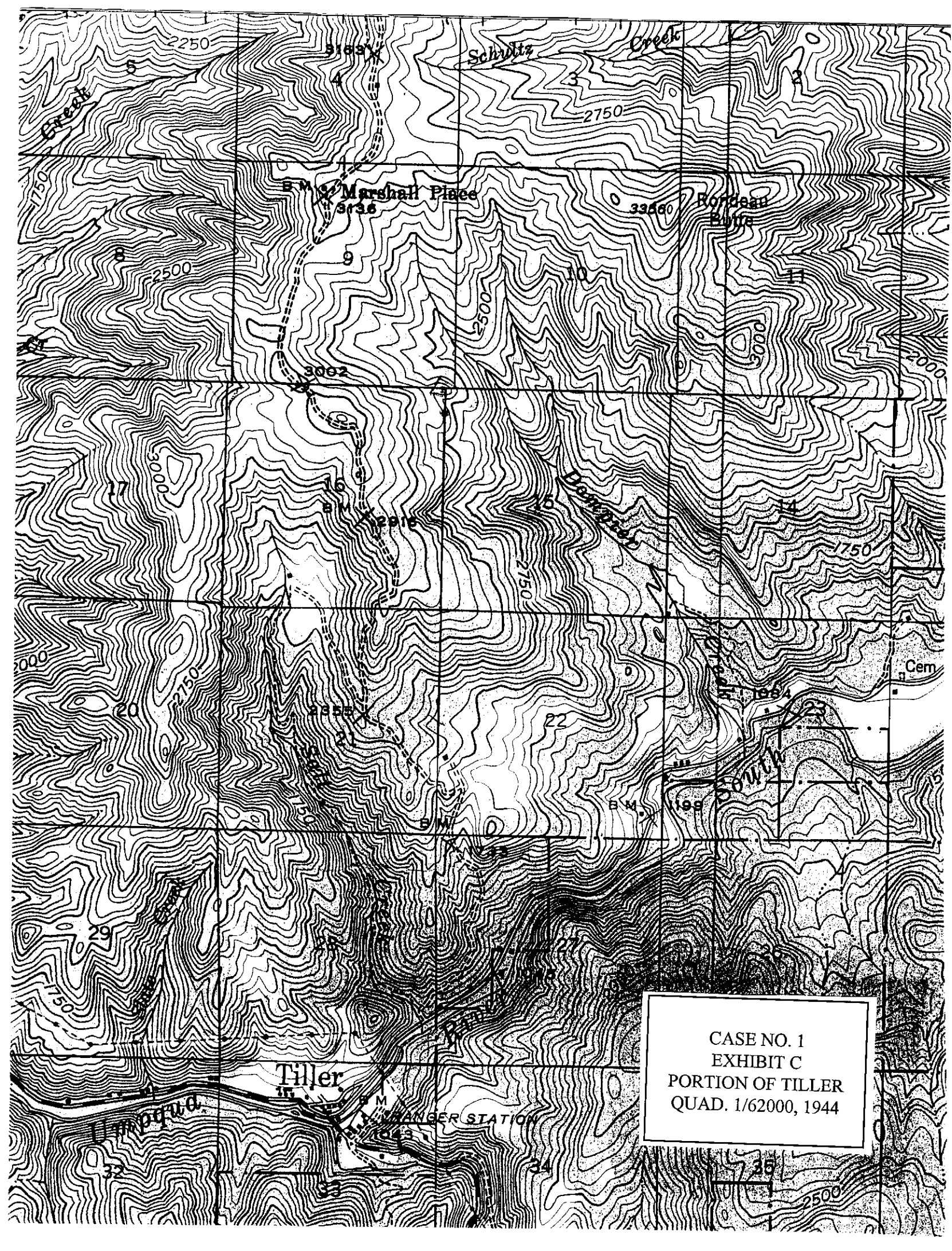
and/or compatible with what was known of Mensch's work. Therefore, the corner of sections 14, 15, 22, and 23 was restored by two point control using the distances returned by Mensch as shown on Exhibit [B](#). The plat and field notes were accepted November 10, 1964. A portion of the accepted plat is shown in Exhibit [F](#).

After restoring the corner of sections 14, 15, 22, and 23, the original (displaced) monument was tied in; S. 87 06' E., 1.58 chs. distant. The displaced monument was fully described in the field notes. One sixteenth section corners were established as indicated on Exhibit [F](#).

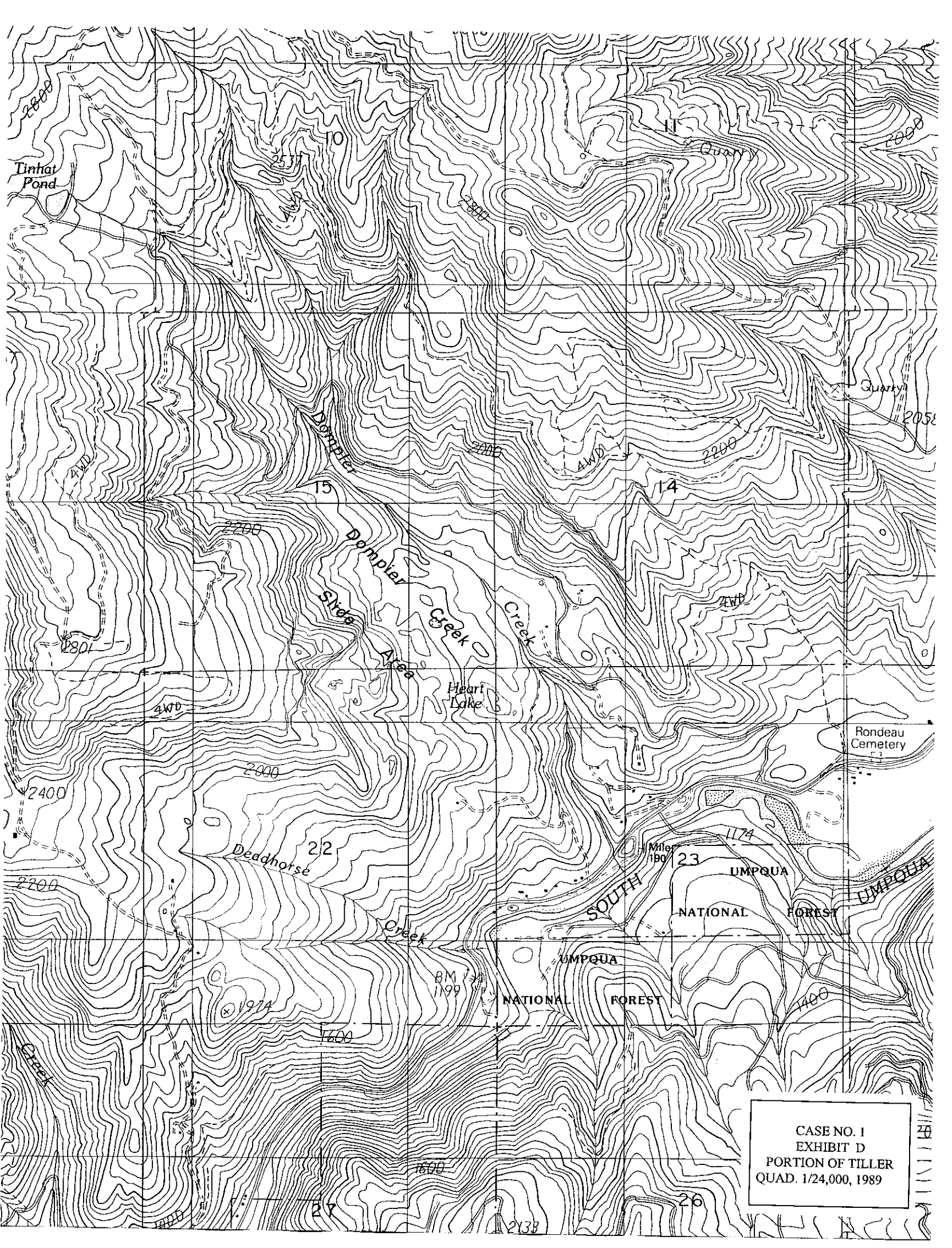
COMMENTS

Although an attempt was made to identify individual trees in the chaotic mess created by the landslide, the effort was futile. Instead, the line between sections 15, and 22 was staked and flagged across the slide area and logging was carried out in accordance with the marked line.

It was evident that at one time, in the distant past, at least one landslide had occurred in this same area. The small lake near the disturbed section corner was the product of a previous slide and the pressure ridges created thereby. Within the new slide area were pieces of a low grade coal which appeared to be the remains of logs buried under some previous slide. The two new lakes in section 15 are the direct result of the Dompier Creek Slide. Such lakes, located where no lake should logically exist, are a warning sign of old landslides.



CASE NO. 1
EXHIBIT C
PORTION OF TILLER
QUAD. 1/62000, 1944



Tinhat Pond

Dempier

Dempier Slide Area

Hearl Lake

Deadhorse

SOUTH

UMPQUA

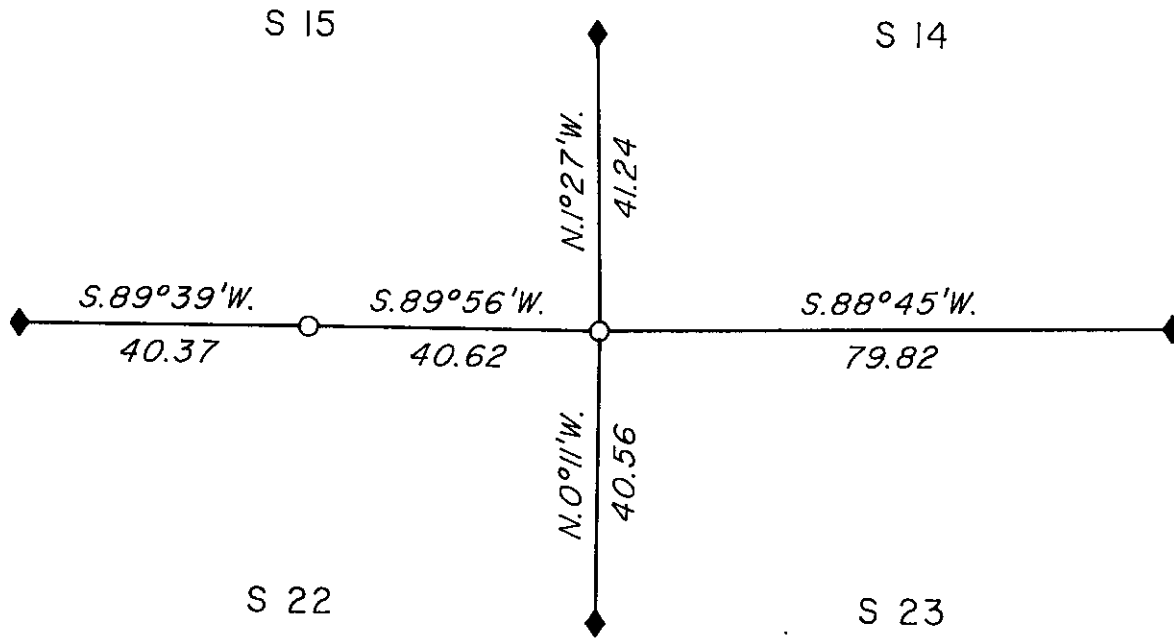
NATIONAL FOREST

UMPQUA NATIONAL FOREST

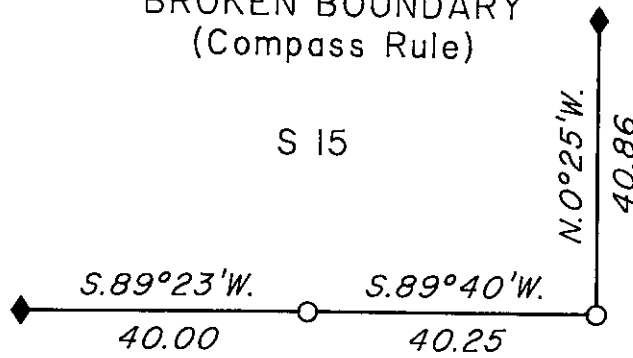
CASE NO. 1
EXHIBIT D
PORTION OF TILLER
QUAD. 1/24,000, 1989

METHODS of CORNER RESTORATION

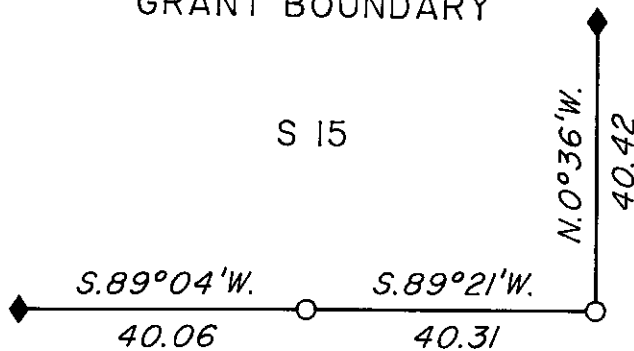
DOUBLE PROPORTION



BROKEN BOUNDARY (Compass Rule)



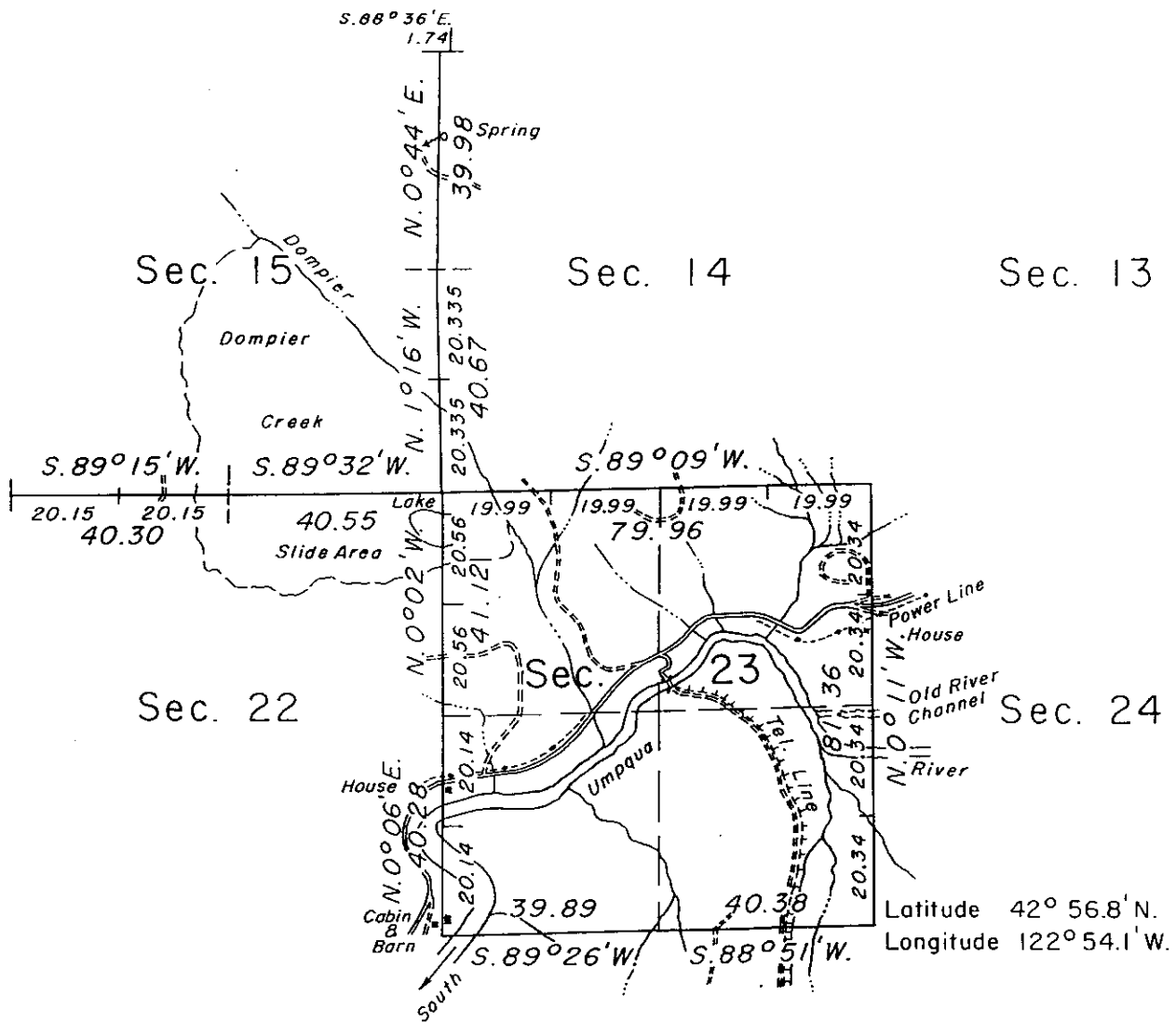
GRANT BOUNDARY



Case No. 1
Exhibit E

Sec. 10

Sec. 11



Sec. 27

Sec. 26

Sec. 25

CASE NO. 1
EXHIBIT F
PORTION OF PLAT
ACCEPTED NOV. 1964

SUDDEN LANDSLIDE

CASE NO. 2
SLIDE LAKE, WYOMING
Section 6, T. 42 N., R. 114 W.
6th Principal Meridian

The west and north boundaries of T. 42 N., R. 114 W., were surveyed by William O. Owen in October 1892. Section 4 and portions of sections 2, 3, 5, and 6 were surveyed by Adrian J. Parshall in 1907 as shown on a portion of Parshall's plat; Exhibit [A](#).

The area had been mapped by the U.S. Geological Survey with 1/125,000 scale (30 minute) quadrangle maps in 1901-02, as shown on a composite enlargement of the Grand Teton (Westerly portion) and Mt. Leidy (Eastern portion) maps, Exhibit [B](#). These maps were reprinted in 1932 and the only available copy of the Grand Teton map was defaced by "x"ing out the old road and drawing in the new road along the north side of the Gros Ventre River in sections 3 to 6.

At the request of the U.S. Forest Service, Grand Teton National Forest, pursuant to the Homestead Entry No. 079, Patent No. 139325 was issued to William O. Smith for the

W1/2 NE1/4 NE1/4, NW1/4 NE1/4, and all that portion of the SW1/4 NE1/4, N1/2 NW1/4, and SE1/4 NW1/4 north of the Gros Ventre River, sec. 6, T. 42 N., R. 114 W., 6th P.M. The patent, dated June 10, 1910, was erroneous and should not have been issued with such description because the Gros Ventre River was not meandered by Parshall. And no Homestead Entry Survey was made by the Forest Service. The area patented is shown on the sketch, Exhibit [C](#).

On August 18, 1917, R.D. Garver, Forest Examiner, executed H.E.S. No. 208, on a 43.71 acre parcel of land in lots 1 and 2, and E1/2 NW1/4, section 6. Garver meandered a portion of the Gros Ventre River. H.E.S. No. 208 was canceled on June 30, 1919. The canceled plat is shown in Exhibit [D](#).

On June 23, 1925, a massive landslide occurred on the north slope of Sheep Mountain, constituting the largest mass earth movement then on record in the United States. The saturated soils slid northerly and created a huge earthen dam, blocking the flow on the Gros Ventre River. The major height of the dam is located about on the line between sections 4 and 5. A large lake, now known as Lower Slide Lake, was created upstream of the dam. On May 18, 1927, the upper portion of the dam failed and a massive wall of water flooded down the river, through sections 5 and 6, carrying the dam debris. The flood height was recorded at 20

feet in depth 25 miles downstream. Boulders up to 20 feet in diameter were dumped below the dam. As the flood rushed through section 6, large amounts of dam debris were dumped in the northwest quarter of section 6, changing the course of the river, shifting it to the east and north.

On June 14, 1965, Special Instructions were issued for Group No. 302, Wyoming, at the request of the U.S. Forest Service, directing a dependent resurvey and surveys in T. 42 N., R. 114 W., to delineate the boundaries of patented lands in sections 2 through 6. In June and July, 1965, the B. L.M. Surveyor assigned to Group 302 executed the surveys requested. Sections 2 through 6 were dependently resurveyed utilizing existent corners located outside the slide area. All corner monuments within the slide had been destroyed, but those outside were readily identified. The sections were subdivided normally, as in any dependent resurvey and survey. In other words: the slide was treated as an avulsive action. What the surveyor DID NOT know about was the flood of May 18, 1927, and the canceled H.E. S. No. 208. As a result, he subdivided section 6, meandered the left bank of the existing Gros Ventre River and made an informative traverse of the right bank in the north half of section 6. The plat and field notes were accepted April 6, 1967. A portion of the plat, showing section 6, is shown in Exhibit [E](#).

Subsequently, the successor in title to the lands described in patent number 139325 protested the location of his lands as shown on Exhibit [E](#)., and produced evidence that the river had shifted its course during the flood of May 18, 1927. An investigation was made by a riparian specialist from the Washington Office. The investigator compared the location of the river as shown on the Parshall plat, the 1901-02 quadrangle maps, and the Shadow Mountain quadrangle, 1/24,000 (7 ½ minute) published in 1968 and photo inspected in 1975. Some shift in river position was (is) evident, see Exhibit [F](#). Further inquiry of local residents and inspection of the debris along the left bank in section 6 proved that the change was most probably avulsive. Therefore, the protest was deemed valid. Unfortunately, the riparian specialist had no knowledge of the canceled H.E. S. No. 208. That plat was misplaced in the Wyoming plat files. Upon receipt of the report of investigation, the Washington Office checked the files and found the canceled plat and so notified the Wyoming Office of its existence.

Special Instructions were issued on July 28, 1987, for Group No. 506, Wyoming, directing a correction of the 1965 survey and identifying the patented lands in section 6 as Tracts 38 and 39. Amended Special Instructions were issued on August 10, 1987, specifically stating the lands that were to be identified as Tract 39.

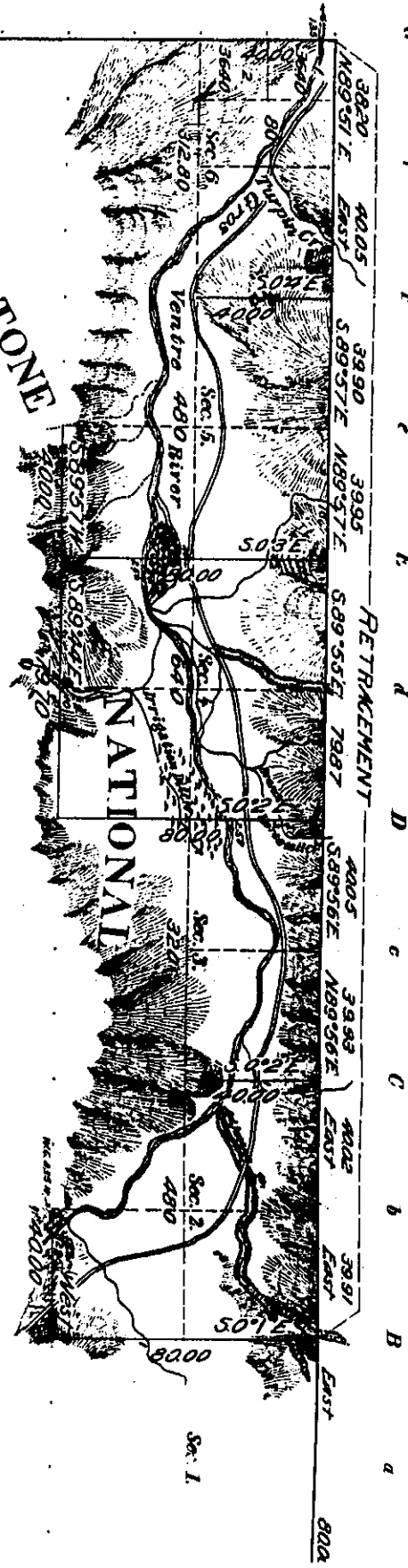
The medial line of the present and abandoned channels as determined by the use of H.E.S. No. 208, the 1965 meanders of the river, and traces of the abandoned channel, were surveyed and monumented as shown on Exhibit [G](#)., a portion of the plat accepted May 3, 1988. The patented lands are identified as Tracts 38 and 39. The unpatented lands in the north half of section 6 were given new lot numbers and areas. The remainder of section 6 is unsurveyed public lands within the Teton National Forest.

COMMENTS

It may be "second guessing," but it should be pointed out that the following errors were made regarding this case:

- 1) Patent No. 139325 should never have been issued with a description as "north of the Gros Ventre River." That river was not meandered and no definite acreage could be given. Instead, a Homestead Entry Survey should have been made, similar to H.E.S. No. 208 showing meanders of the river even though it was not meanderable under existing G.L.O. Manual requirements.
- 2) H.E.S. No. 208 was a legitimate survey of record, even though canceled 2 years later. The plat should have remained in the file and all appropriate indexes. Had the existence of H.E.S. No. 208 been known in 1965, it could have alerted the field surveyor to a potential problem.
- 3) The 1965 field surveyor could have been more alert to a possible complication given the knowledge of the landslide creating Lower Slide Lake, the large boulders along the river, and comparison of the 1907 survey plat with the quadrangle maps. Such scrutiny should have prompted inquiry to local residents, including the owner of the lands patented in section 6.
- 4) Nowhere, either on the 1988 plat or in the field notes, is Tracts 38 and 39 identified as to what area they cover and relate the fact that the tracts are lands patented under patent number 139325. That identification should have been made for future knowledge and use.

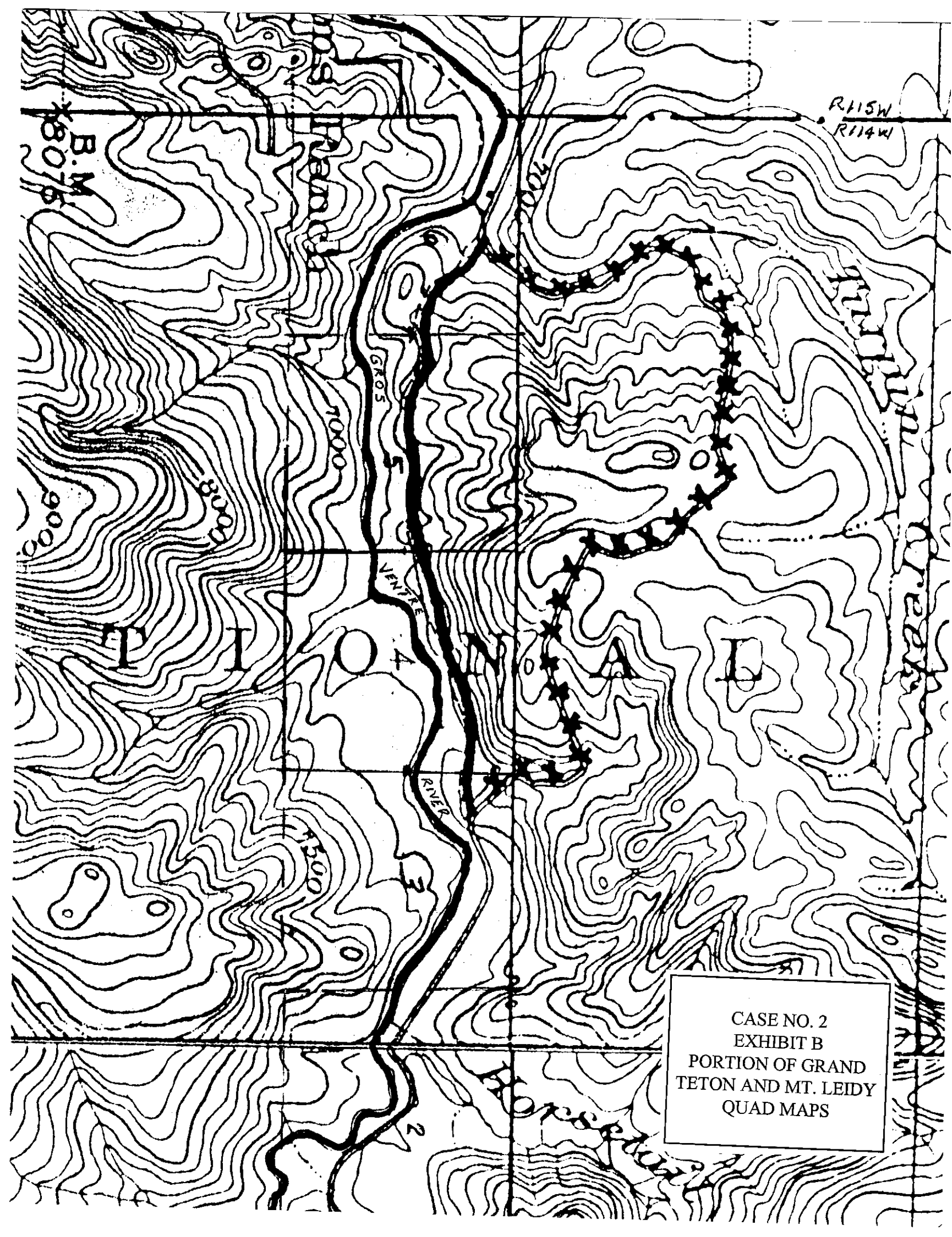
Fractional Township No 42 North Range No 14 West of the Sixth Principal Meridian, Wyo



CASE NO. 2
 EXHIBIT A
 PORTION OF
 PARSHALL PLAT 1907

UNSURVEYED

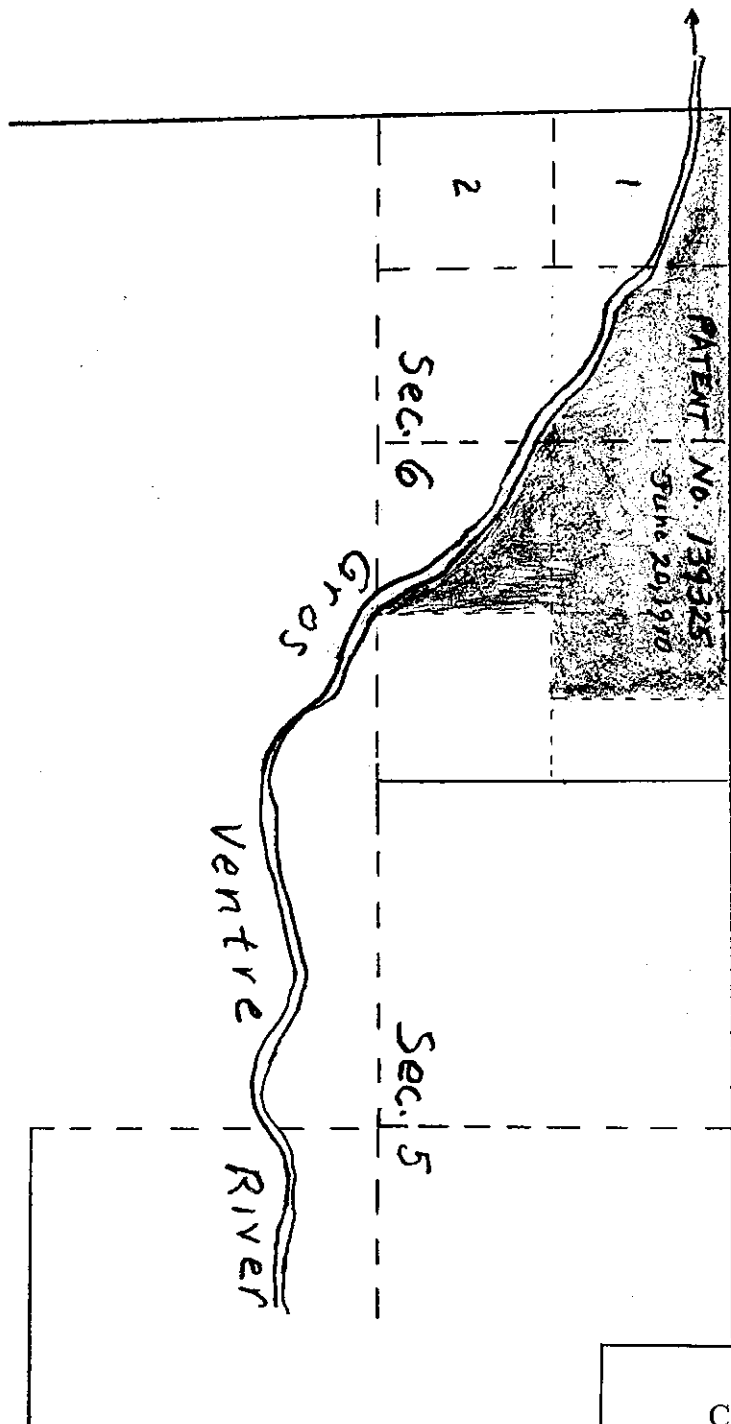
- Sec. 1
- Sec. 2
- Sec. 3
- Sec. 4
- Sec. 5
- Sec. 6
- Sec. 7
- Sec. 8
- Sec. 9
- Sec. 10
- Sec. 11
- Sec. 12
- Sec. 13
- Sec. 14
- Sec. 15
- Sec. 16
- Sec. 17
- Sec. 18
- Sec. 19
- Sec. 20
- Sec. 21
- Sec. 22
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- Sec. 24
- Sec. 25
- Sec. 26
- Sec. 27
- Sec. 28
- Sec. 29
- Sec. 30



R115W
R114W

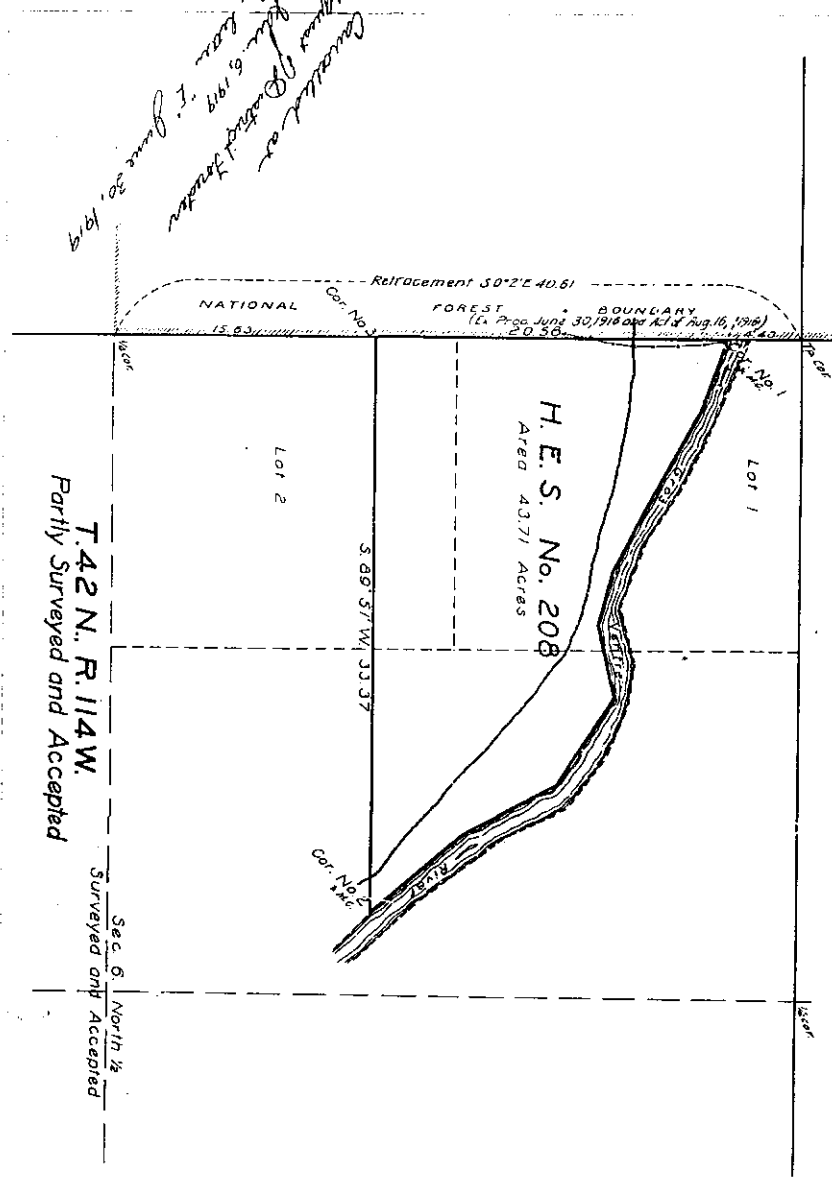
B.M.
8076

CASE NO. 2
EXHIBIT B
PORTION OF GRAND
TETON AND MT. LEIDY
QUAD MAPS



CASE NO. 2
EXHIBIT C
PATENT ISSUED
JUNE 10, 1910

Meander Course	Distance
S 69.36 E	4.70
S 60.40 E	6.22
S 64.04 E	4.17
S 75.05 E	3.11
N 77.23 E	4.44
S 56.24 E	6.02
S 29.70 E	6.02
S 40.00 E	7.10



Subdivisions	W/B	Q. Open	Relocated	Advised	Approved
N. and W. Advs.	324	April 2, 1907	July 30, 1907	Aug. 2, 1907	Feb. 14, 1908
H. E. S. No. 208	250	Sept. 2, 1892	Oct. 14, 1892	Nov. 13, 1892	June 30, 1893
	208	April 13, 1917	Aug. 13, 1917	Aug. 18, 1917	July 23, 1918

H. E. S. Survey No.	Advised in Acres	Approved
208	43.71	July 23, 1918
Total	43.71	

Act of June 11, 1906 Act of March 4, 1917
 Act No. 4-2063 Passed December 8, 1916
 Township - 43°30' 30"N
 Longitude - 110°29' W
 Mer. Ang. Dist. 104°35' E
 Observation at
 Corner No. 1

SCALE 5 chains to inch

T.42N. R.114W.
 Partly Surveyed and Accepted

Sec. 6 North 1/2
 Surveyed and Accepted

Part of
 HOME STEAD
 ENTRY SURVEY
 No. 208
 in the
 TETON
 NATIONAL FOREST
 in

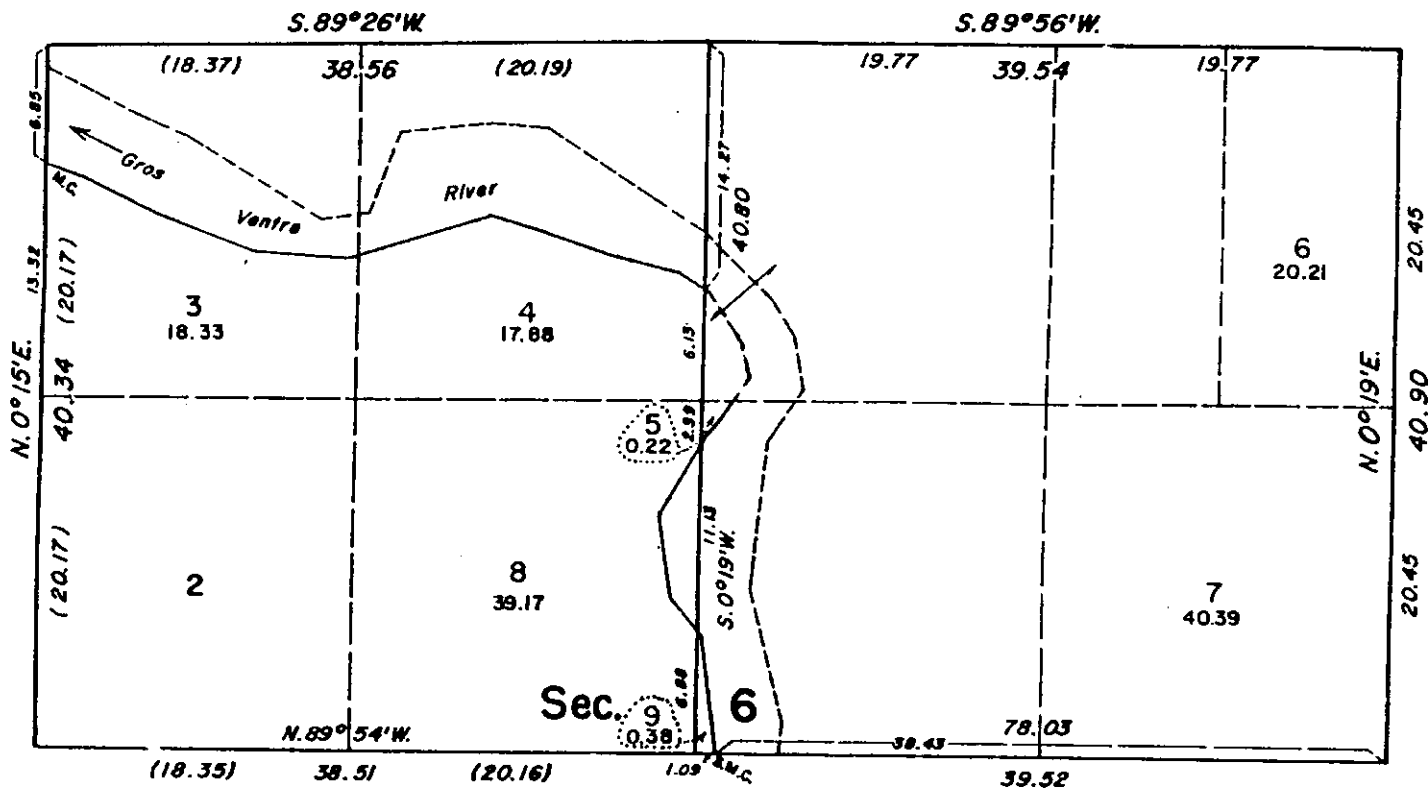
Section 6, partly surveyed T.42N. R.114W

6TH PRINCIPAL MERIDIAN
 WYOMING

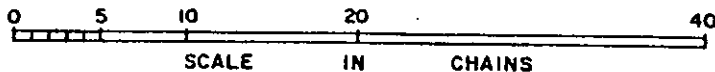
This plat of Homestead Entry Survey No. 208 State of Wyoming is hereby recomended to the field notes thereof on file in this office, which have been examined and approved.
 U.S. Surveyor for the Office
 Cheyenne, Wyoming July 25, 1918

John A. ...
 U.S. Surveyor General

CASE NO. 2
 EXHIBIT D
 CANCELLED PLAT
 OF H.E.S. 208



ENLARGED DIAGRAM

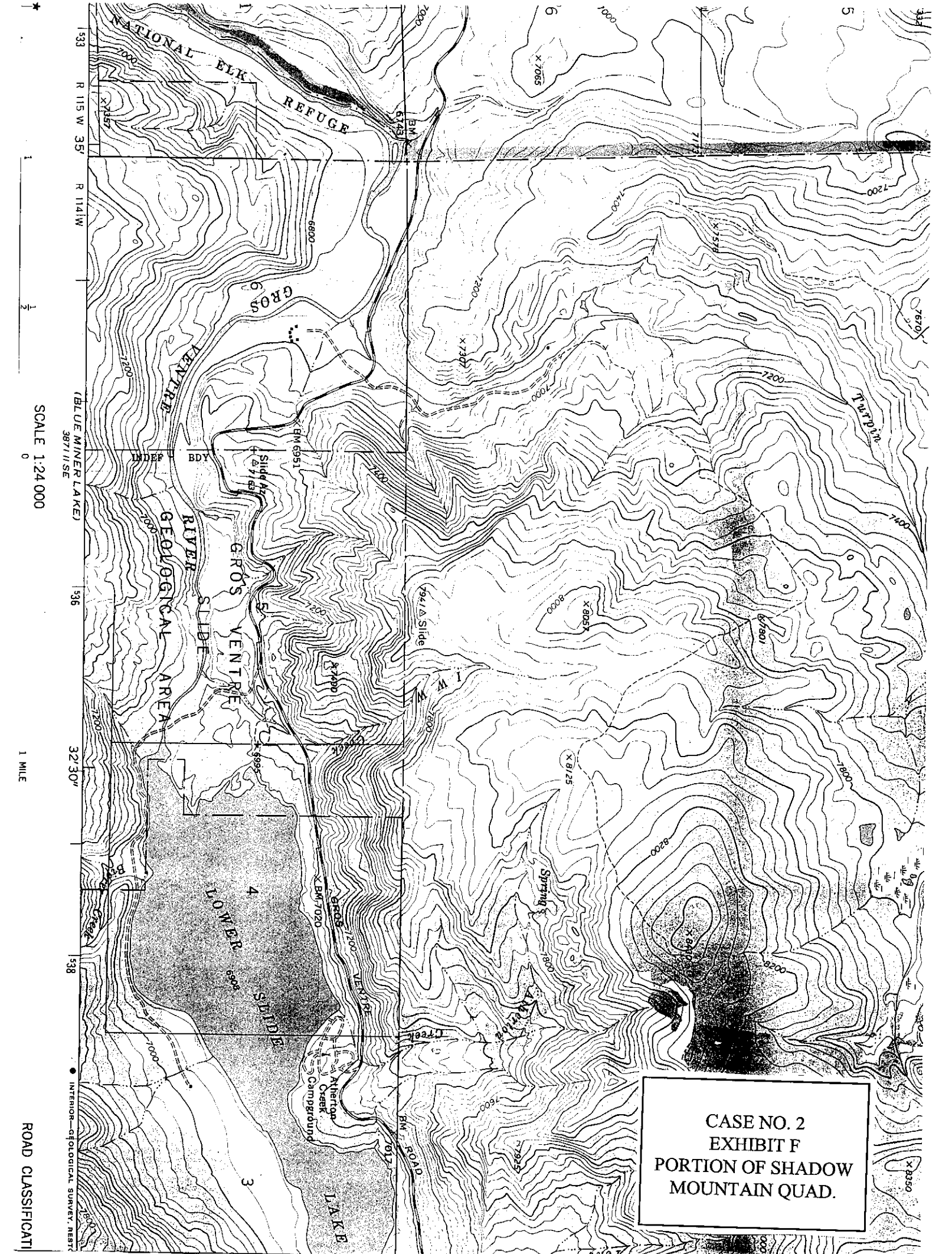


----- Informative Traverse of present right bank of Gros Ventre River.



Area Resurveyed: 953.40 Acres

CASE NO. 2
EXHIBIT E
PORTION OF SEC. 6
PLAT ACCEPTED
APRIL 6, 1967



CASE NO. 2
 EXHIBIT F
 PORTION OF SHADOW
 MOUNTAIN QUAD.

SCALE 1:24,000

1 MILE

ROAD CLASSIFICATION

(BLUE MINER LAKE)
 387111 SE

● INTERIOR- GEOLOGICAL SURVEY, REST.

SUDDEN LANDSLIDE

CASE NO. 3

WALLACE CREEK, IDAHO

Section 1, T. 22 N., R. 21 E., Boise Meridian

T. 22 N., R. 22 E., Boise Meridian was surveyed by Samuel G. Rhoades in 1891, as shown on the plat approved August 8, 1892. A portion of the Rhoades plat is shown in Exhibit [A](#). The plat shows "placer diggings" in the northwest quarter of section 6.

The west boundary of T. 22 N., R. 22 E. was retraced by B.M. Pellum in 1919, under Group No. 103, Idaho, and T. 22 N., R. 21 E was surveyed by Pellum and H.G. Bardsley at that time. A portion of the Pellum-Bardsley plat, approved November 17, 1920, is shown in Exhibit [B](#). Pellum and Bardsley found the east boundary to be out of limits for distance. They resurveyed the north five miles of the east boundary, holding the Rhoades corners for distance and alignment, setting brass capped iron post monuments at each corner, marked for T. 22 N., R. 22 E., only. They set new corners at 40.00 and 80.00 intervals marked for T. 22 N., R. 21 E. They surveyed the first meridional line in T. 22 N., R. 21 E., parallel to a mean bearing of the east boundary and surveyed the east-west section lines random and true, placing the excess distances against the east boundary, as shown on Exhibit [B](#). Thus, there are "double corners" along the east boundary of the township.

The area was mapped by the U.S. Geological Survey as shown on the Bird Creek and Salmon quadrangle maps published in 1966, 1/24,000 scale (7 1/2 minute series). A portion of those two quadrangles is shown in Exhibit [C](#).

The north, south, and west boundaries of section 7, T. 22 N., R. 22 E., were resurveyed and a tract 37 was surveyed in section 7, in 1970, under Group No. 446, Idaho, as shown on the plat accepted March 8, 1973; Exhibit [D](#).

All of section 1, T. 22 N., R. 21 E., is public lands within and administered by the Salmon National Forest. All of section 6, T. 22 N., R. 22 E., is patented land in private ownership.

In 1982, the Salmon National Forest was in the process of checking and posting the Forest Boundary(s). It was discovered that a relatively new fence had been build on a straight line from the corner of sections 1 and 12, T. 22 N., R. 21 E., to the corner of Tps. 22 and 23 N., Rs. 21 and 22 E. A new log home had been build a short distance south of the location for the 1/4 corner of section 6, only; rather close to the fence. The brass capped monuments for the 1/4 corner of section 6 and 1/4 corner of section 1 were found about 165 ft. east of the fence, both intact and nearly the correct distance apart.

Inquiry was made of the owner of the log home about the situation. The owners father was a long time resident. He stated that a canal (ditch) has been build in section 1, bringing water out of Wallace Creek and around the hillside to the placer mining operations in section 6. About the year 1930, the ditch became obstructed. The overflow out of the ditch breached the ditch, saturated the hillside, and caused a sudden slump of the clay soil. The slide out was not extensive, only a hundred acres or so, but as the soil flowed eastward, it carried the two 1/4 section posts with it, intact. Therefore, the landowner knew the monuments were displaced. The old slide was still evident 50 years later, as evidenced by the large displaced boulders, unevenness of the landscape, and the scarp at the upper edge of the slide.

The landowner wanted to build a home, so he hired a private surveyor to replace the 1/4 corners and/or mark the west boundary of section 6. Evidently, the private surveyor did not do the proper research. He marked a straight line between section corners and the fence was built, but the 1/4 corners were not replaced or monumented.

The Forest Service surveyor developed the above recited information. He dependently resurveyed the line between sections 1 and 6, as shown on a portion of his record of survey plat, recorded in Lemhi County on April 28, 1983. A portion of that plat is shown in Exhibit [E](#). As the plat indicates: The two 1/4 corners were restored by the irregular boundary method based on the Pellum and Bardsley plat, Exhibit [B](#). The bearings and distances remained remarkably close to the 1919 record. The 1919 brass capped posts were removed from their displaced positions and utilized to remonument the corners in the correct location.

After the range line was properly restored, it was found that the new log home was only 15 feet east of the range line, and considerable amounts of landscaping were on Forest Service land.

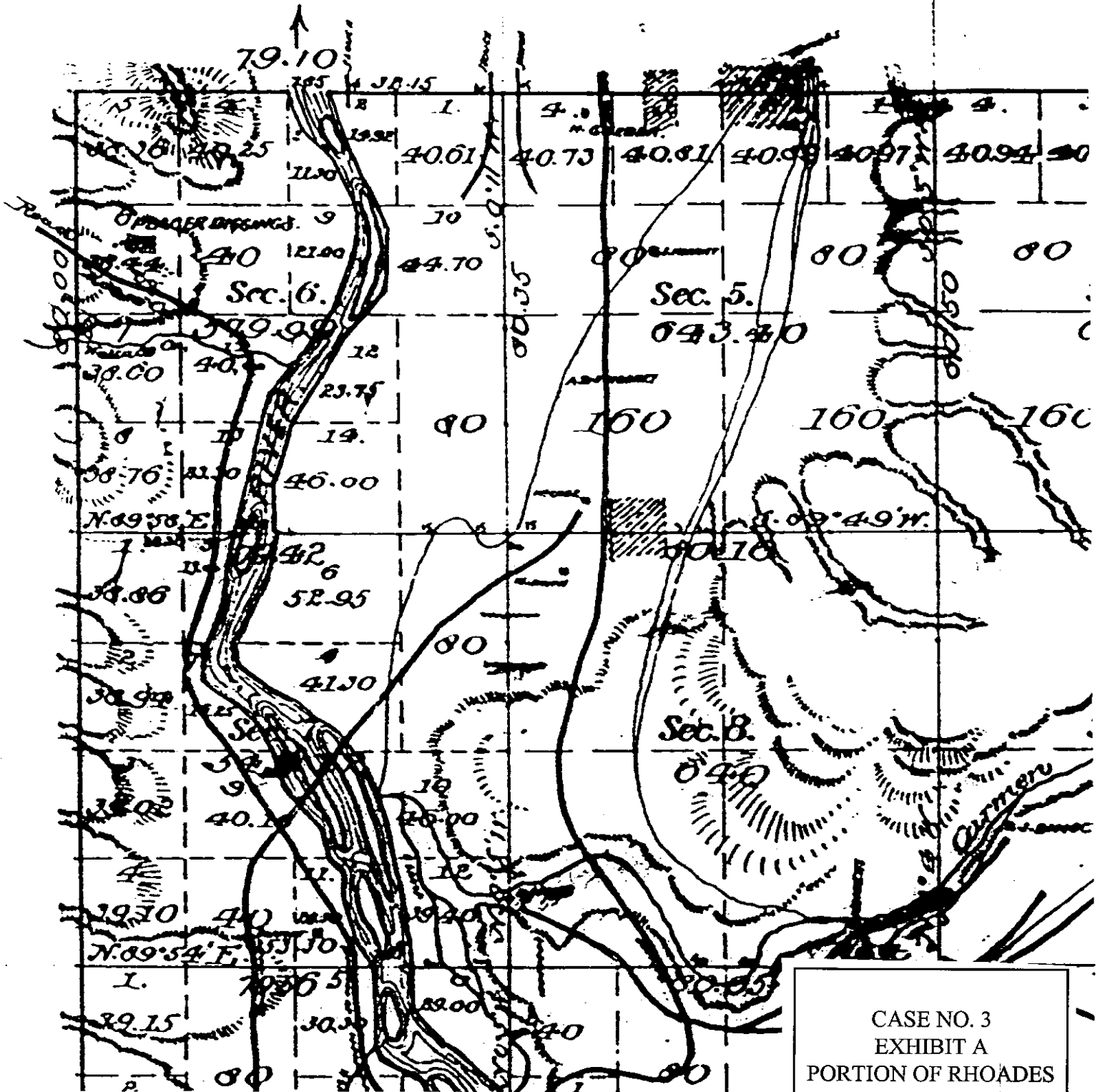
COMMENTS

This case is very simple, but does illustrate the need to pay attention when something is abnormal. The private surveyor was almost certainly derelict in not restoring the boundary based on the 1919 resurvey. That record was readily available from Lemhi County or the Salmon National Forest, both located only seven miles south, in Salmon, Idaho.

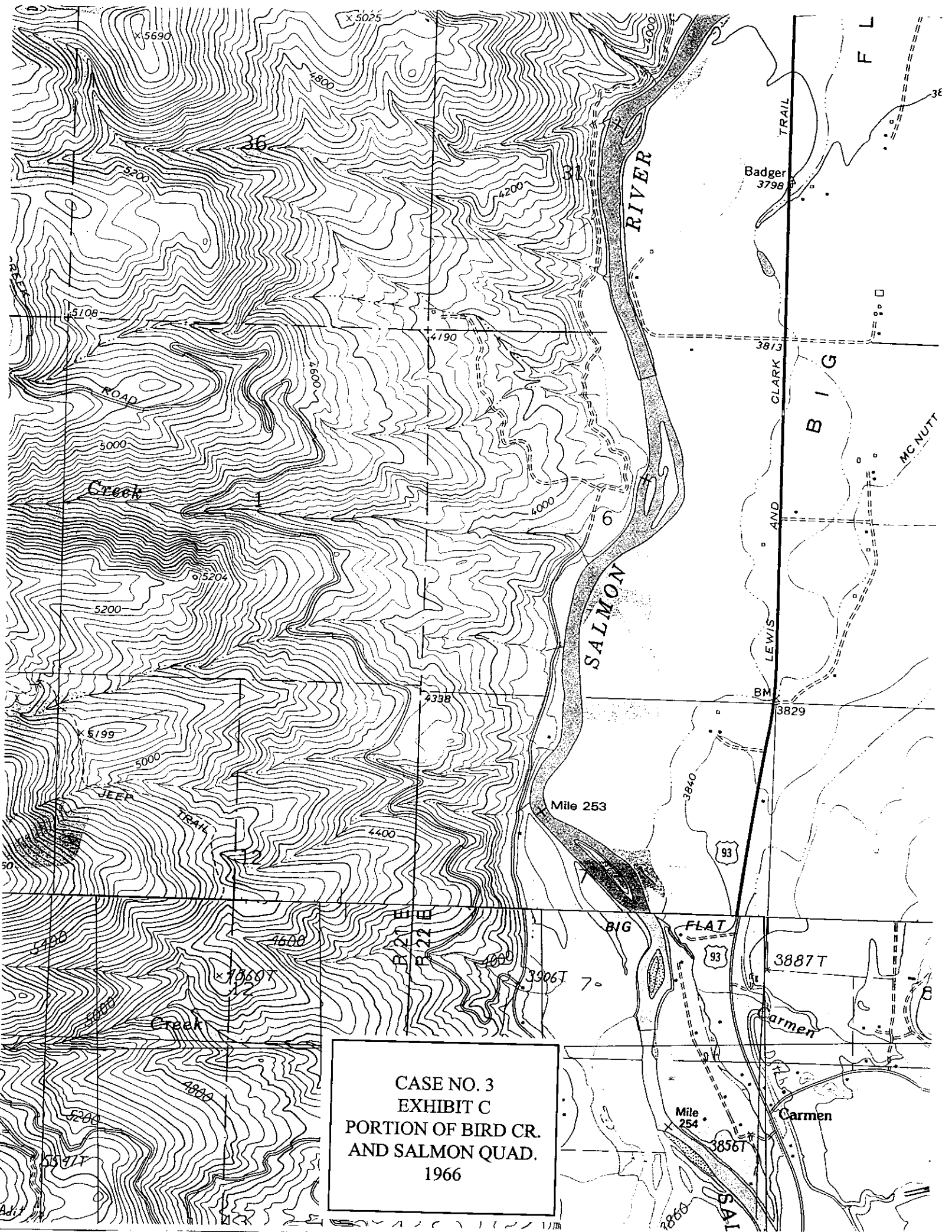
The 1973 B.L.M. plat of the survey in section 7 is technically in error. The plat correctly shows that the boundaries of section 6 were surveyed by Rhoades. But - the west boundary of section 6 should have shown the 1919 record by Pellum and Bardsley; not the 1891 record. But, the private surveyor should not have been misled by that error because the date on the brass caps was 1919, therefore, that resurvey should have been obvious.

Township No 22 North Range 1

G F E



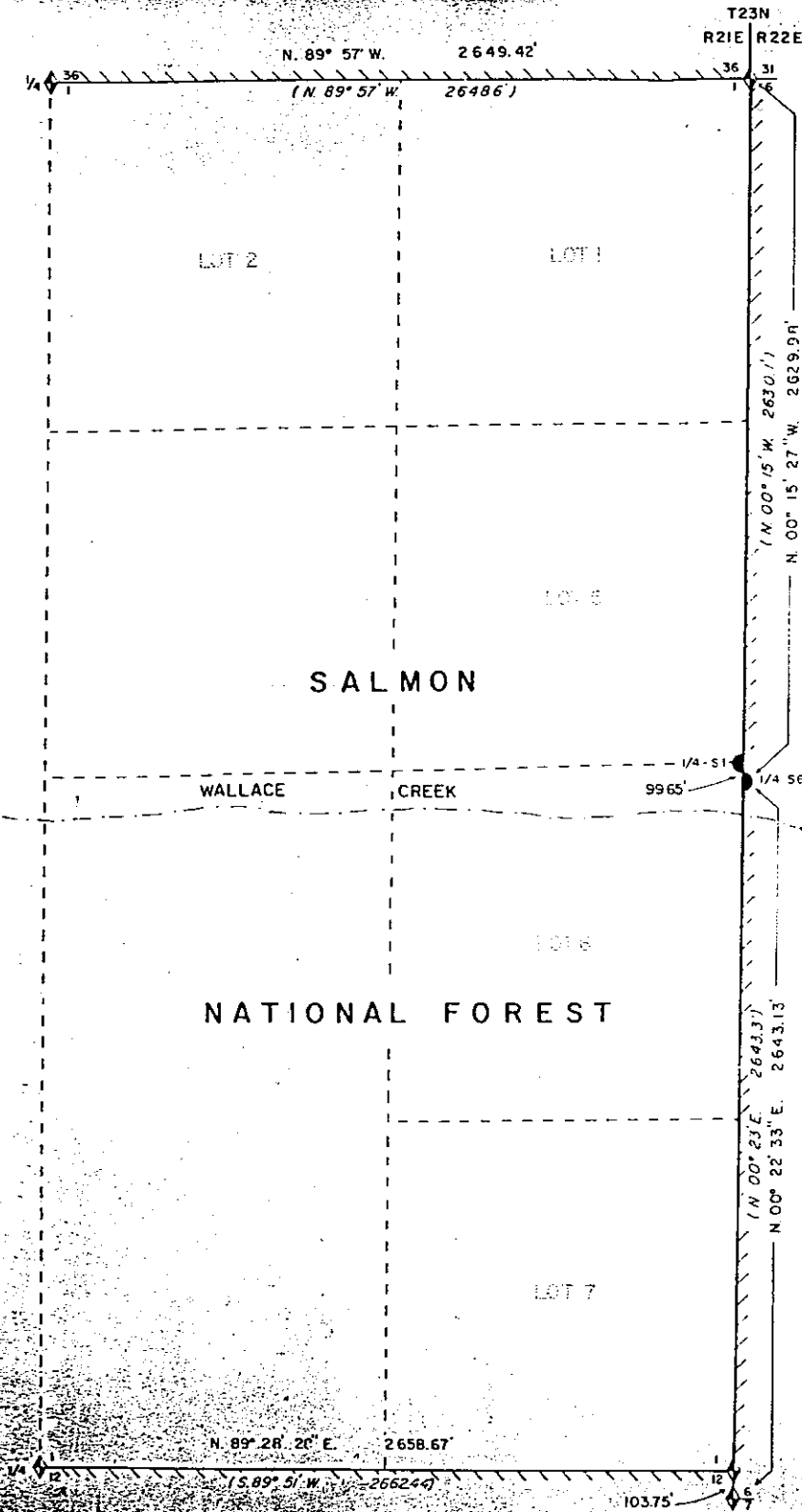
CASE NO. 3
 EXHIBIT A
 PORTION OF RHOADES
 PLAT, T. 22 N., T. 22 E.
 1892



CASE NO. 3
EXHIBIT C
PORTION OF BIRD CR.
AND SALMON QUAD.
1966

TOWNSHIP 22 NORTH, RANGE 21

DEPENDENT RESURVEY OF THE EAST



LEGEND

- ◆ G.L.O. IRON PIPE and BRASS
- U.S.F.S. ALUMINUM PIPE and C
- FOREST BOUNDARY
- (SLANTED LETTERING) - RECORD



CASE NO. 3
EXHIBIT E
PORTION OF FOREST
SERVICE PLAT
RECORDED
APRIL 28, 1983

CREEPING LANDSLIDE

CASE NO. 4
COLLINS POINT SLIDE
TPS. 3 N., RS. 8 AND 9 E.,
WILLAMETTE MERIDIAN, WASHINGTON

Portions of Tps. 3 N., Rs. 8 and 9 E., and meanders of the right bank of the Columbia River were surveyed by E.L. Smith and Samuel J. Spray in 1875, as shown on the plats approved February 19, 1876. A composite of the Smith and Spray plats are shown in Exhibit [A](#).

A portion of the east boundary of T. 3 N., R. 8 E., a portion of the subdivisional lines and the James M. Findley Donation Land Claim No. 37, located in sections 36 (and 31) were surveyed by Eugene P. McCornack in 1878, as shown on the plat approved September 18, 1878. A portion of the McCornack plat is shown in Exhibit [B](#). The DLC plat in section 31, T. 3 N., R. 9 E., was added to the Smith and Spray plat as an inset, approved August 13, 1878.

A portion of the west boundary and subdivisional lines of T. 3 N., R. 9 E., were surveyed by Lewis D.W. Shelton in 1880, as shown on the plat approved July 19, 1880. A portion of the Shelton plat is shown in Exhibit [C](#).

The west boundary of section 18 was retraced by Frank X. Gesner in 1901. The Gesner surveys are not exhibited herein.

In his 1875 field notes, Samuel Spray noted the Collins house in Lot 4, section 31, and the "Collins Wood Flume" near the west side of Collins Creek. He also stated that most of the timber in the area had been logged off.

In 1878 McCornack surveyed the line between sections 19 and 24, concluding that mile with the following statement, "*The land along this line is very much broken, apparently by some recent volcanic force. Trees inclined at every angle to the plane of the horizon; but little valuable timber; soil almost utterly valueless; abundance of very fine quality, on last half mile, timber mainly fir.*"

In 1880 Lewis D.W. Shelton could not find McCornack's corner of sections 13, 18, 19, and 24, nor the 1/4 corner of sections 19 and 24. He reported finding the Spray-McCornack corner of sections 19, 24, 25, and 30. He then resurveyed the line between sections 19 and 24 without any mention of leaning trees or other unusual phenomenon.

In the early 1900's construction was undertaken for the Oregon-Washington Railroad and

Navigation Company Railroad (now Union Pacific) along the north side of the Columbia River. By 1907-08 the railroad became aware of land slippage occurring in the Collins Creek area causing displacement of the railroad tracks. Extraordinary roadbed was constructed but the railroad would continue to shift necessitating periodic re-alignment of the tracks. The State of Washington subsequently built the North Bank Highway (State Route No. 14) north of and somewhat parallel to the railroad. The highway grade also experienced shifting and movement southerly of the roadbed over a period of years.

In 1912 G.E. Linn, Skamania County Engineer, surveyed the "Mountain Glade Fruit Tracts," in the NW¼ of section 31 (lying north of the Findley DLC), for a Mr. Leist. The field notes of that survey are located in Field Book No. 403-No. 36, Skamania County Records, Stevenson, Washington. The notes are sketchy and not very clear but indicated that Linn set iron pipes and returned distances as indicated on Exhibit [D](#). Nowhere does Linn state what he found at the various original corner points.

In 1926 the U.S. Geological Survey published the Hood River, Oregon-Washington quadrangle map, 1/125,000 scale. An enlarged portion of that map is shown in Exhibit [E](#). The reader will note that several small lakes are shown in the vicinity of Collins Creek between Wind and Dog Mountains.

About 1935 the U.S. Army Corps of Engineers began surveys pertaining to the construction of Bonneville Dam across the Columbia River. The dam (completed in 1938) would raise the water level in the Columbia and lands to be inundated would have to be acquired. The Corps found and remonumented the corner of sections 25, 30, 31, and 36, the 1/4 corner of sections 30 and 31, the 1/4 corner of sections 31 and 36, and intersection of the DLC and range line, all as monumented by Linn in 1912. They also found Linn's monuments at the NE. and NW. corners of the DLC. The Corps found the original bearing tree for the meander corner of sections 31 and 36 on the north bank of the Columbia River. They set a Corps brass cap, in concrete, at a point 48.78 feet north for a witness meander corner. The Corps of Engineers surveys are on large sheets. A composite of their work is shown in Exhibit [F](#).

In 1939 the Bonneville Power Administration (BPA) built a main transmission line, the Bonneville-Coulee Line, across section 19. Ties were made to corners of section 19 from the centerline of the right-of-way as shown on Exhibit [G](#).

In 1948 the Girl Scouts of America purchased land in sections 25 and 30, and constructed Arrowhead Lodge in 1953. Other cabins, outbuildings and shelters were also constructed. Subsequently the Collins Point Slide became more active and the lodge began to break apart. Sometime in 1965-66 the electrical wiring broke, set the lodge afire and it burned to the ground. A new lodge was built outside the active slide area in 1968. The other facilities were moved or constructed in section 25, outside the slide area.

The BPA had also discovered that the Collins Point Slide was moving their main transmission line southerly, causing the towers to lean and in danger of failing. In 1952 they acquired an easement and rerouted the Coulee Line northerly into sections 13 and 18, regaining the original alignment in section 20. The plans for that easement show no ties to survey corners and are therefore of no help in connecting the various surveys.

In 1957 the U.S. Geological Survey published the Hood River quadrangle map, 1/62,500 scale (15 minute). An enlarged portion of that map is shown in Exhibit [H](#).

Due to the required (and expensive) movement of the BPA line and the extensive damage to the Girl Scout property, the Corps of Engineers undertook an extensive study of the slide area to determine the causes and any possible means of stopping the slide action. The Corps drilled several wells and test holes in the slide to monitor water levels, soils tests, etc. Control monuments were set at numerous selected points within the slide and other control points outside the slide to monitor movements. The primary control was established on the Oregon side of the Columbia River to measure movement of the points within the slide. These studies revealed that any annual rainfall in excess of 100 inches at the upper end of the slide in sections 24 and 19 would percolate through the comparatively loose pyroclastic debris, rocks, clay, gravel, etc., which overlay the basalt bedrock. Within two years following the excess rainfall the surface soils which are from 25 to 250 feet thick would begin to creep downhill. The general slope of the slide area is about 8 degrees but is steeper at the upper end. The slide would move at very uneven rates of as much as 60 feet per year at the upper part, less than 25 feet per year in the central areas, and less than one foot per year near the Columbia River. These movements are not uniform throughout the area. Localized areas may exceed, or be less than, the generalized shifting. Soils will bunch-up, creating small lakes or ponds which will appear and disappear. The Corps of Engineers report is lengthy, as is the U.S. Forest Service report dated January 1990, so this discussion need not go into detail. However, the Corps of Engineers estimated (in 1971) that the cost of constructing tunnels, wells, ditches, etc., to divert or intercept the excess water, thus stabilizing the slide, would exceed 10 million dollars. Those costs would clearly far exceed the value of the land itself. To maintain such facilities would be an on-going expense which just wasn't practical.

In 1979 the U.S. Geological Survey published the "Mt. Defiance, Oreg.-Wash." quadrangle map, 1/24,000 scale (7½ minute). An enlarged portion of that map with an outline of the active slide area (heavy dashed line) imposed thereon, is shown in Exhibit [I](#).

In 1975 the adjoining landowner south of the Girl Scout property began to log trees that were on Girl Scout land. He justified that action by asserting that as the trees slid over his land (as determined by presumed geographic positions of the original property lines) the trees became his property and he could (and did) log them off. I have not been able to determine just where this logging took place and/or how the logger determined where the property line was. Since the whole land mass was moving including the property lines, and there are no surveys of

record in Skamania County to indicate any known fixed positions, I'm at a loss in voicing an opinion on that exact issue.

The Girl Scout's contacted attorneys and land surveyors for advice and/or opinions on the matter. As could be expected: the opinions varied. One land surveyor was fairly firm in his opinion that the principles of accretion applied, the property ownership went with the surface as it moved southerly. One law firm did state that there were no legal precedents for the movement by a slow and creeping landslide, but voiced the following possibilities.

1. Accept the situation as it exists, and if the logging continues don't do anything. The cost of surveys and legal fees are far greater than the value of the trees being logged.
2. The Girl Scouts should log the trees themselves before they slid over the line. (That may have been a solution but the Girl Scouts wanted to SAVE the trees, not log them.)
3. Seek legislation by the Washington Legislature. Both Alaska and California had enacted laws allowing for continued ownership of the surface when displaced by earthquakes. (See the Alaska Earthquake Act and the Cullen Act). The cost of lobbying the Washington Legislature, uncertain results, and length of time were not viable for the Girl Scouts.
4. File a lawsuit. Claim ownership of the trees by virtue of longstanding ownership under an adverse possession type action. Along the same theory was the possibility of "recognition and acquiescence," similar to adverse possession. Lastly was the possibility of an action based on "equitable apportionment," because of the injustices involved. The cost of a lawsuit was estimated at 15,000, a sum the Girl Scouts could not afford. They just didn't have the funds to fight the issue through the court system.

By 1980 the Collins Point Slide began to stabilize and the relatively rapid movement of the whole mass began to subside. The Girl Scouts sold their holdings to the Gifford-Pinchot National Forest. The Forest Service made the purchased lands part of the Columbia Gorge National Scenic Area and leased the land back to the Girl Scouts with a recreational lease.

In 1980 Olson Engineering of Vancouver, Washington (at the request of Edward Scriven), resurveyed the north half mile between sections 31 and 36, between the monuments set by the Corps of Engineers in 1935. Olson found the line to be 2546.03 feet in length, as opposed to 2670.83 feet in 1912 and 2649.05 by the Corps of Engineers. The Olson survey is not exhibited herein. Olson accepted the C.E. monuments in place but noted that they had probably moved from the original location.

In 1981 the Forest Service responded to the need for recreational facilities in the vicinity of Grant Lake located adjacent to State Route No. 14 in section 31. Due to the intermingled ownership a resurvey and subdivision of section 31 was required. On April 23, 1982, Special Instructions were issued under Group No. 327, for the dependent resurvey of the necessary

boundaries of section 31, DLC No. 37, the subdivision of the section and survey of parcels adjacent to the highway.

The BLM surveyor assigned to Group No. 327, made no particular attempt to determine the original geographic location of the corners of section 31. It was determined that the corner of sections 29, 30, 31, and 32; the 1/4 corner of sections 30 and 31; the witness meander corner of sections 31 and 36; the corner of sections 13, 18, 19, and 24 and the northwest corner of the Findley DLC, were outside the slide area and reasonably certain to be undisturbed. The conditions found by the BLM surveyor are illustrated by the sketch, Exhibit [J](#).

The BLM field surveyor found the following original corner monuments recovered in 1935 by the Corps of Engineers: Corner of sections 29, 30, 31, and 32 (outside the slide); corner of sections 25, 30, 31, and 36; 1/4 corner of sections 31 and 36 (both within the slide); the Corps witness to the meander corner of sections 31 and 36; the northeast corner of DLC No. 37 (within the slide); and the northwest corner of the DLC (outside the slide). The original 1/4 corner of sections 30 and 31 was recovered during the field work, was within the slide area, but did not appear to have been moved significantly in a relatively inactive part of the slide.

No attempt was made to determine the extent of displacement by the slide of the corner monuments. The monuments were accepted in place. The section was subdivided accordingly as shown on the plat, accepted September 2, 1983. A portion of the plat is shown in Exhibit [K](#). A tie was made to the recovered original corner of sections 13, 18, 19, and 24, and to U.S.C.&G. S. station "Puppy," both located outside the active slide area. These ties, along with the northwest corner of the DLC No. 37, could be useful in determining any future movements, if the Collins Point Slide ever becomes active again.

Comments

As has been previously stated: There is no legal precedent, through a published case, to use as a guide for the proper procedure to follow in dealing with the displacement of surveying monuments and boundaries in a creeping landslide. Therefore, the following comments are my considered opinion, based on the preceding information about the Collins Point Slide.

The basic principle that disturbed monuments lose their integrity seems to me to be paramount. There is little basic difference between a monument that has been deliberately picked up by a dishonest person and moved to a different geographic location and a monument that has been moved by a naturally occurring landslide. The principle problem in this case is the determination of where the original monument(s) were established in geographic position by the original surveyors, and the acceptable evidence presently available to determine those positions.

The original record distance along the range line, from the meander corner of sections 31 and

36 to the corner of sections 13, 18, 19, and 24, is 239.00 chains. These two monuments can be reasonably assumed to be in their original positions given that the original meander corner position is marked by the Corps of Engineers witness corner 0.735 chains to the north. The Corps map shows they found an original bearing tree for the meander corner. The Corps was to determine by surveys where the "take line" would have to be established. I am certain that they obtained copies of the original rectangular survey field notes, the DLC notes, and the record of Linn's 1912 survey of the Mountain Glade Fruit Tracts. It is patently obvious that the Corps did not try to execute a dependent resurvey in 1935. They accepted monuments as they found them on the ground, without any questions asked.

Then comes the question, on what evidence did Linn base his Fruit Tracts surveys?

The Findley DLC was occupied at the time of the original rectangular surveys and the DLC survey. It is reasonable and logical to assume that the occupant(s) would have a special interest in preserving the northeast and northwest corners of that DLC. I am accepting that presumption as fact, without any specific proof, just common sense. Linn was going to subdivide the NW $\frac{1}{4}$ of section 31 lying north and east of the DLC (government Lots 1, 2, 9, and the NE $\frac{1}{4}$ NW $\frac{1}{4}$). Linn may have actually found the corner of sections 25, 30, 31, and 36, and did find the 1/4 corner of sections 30 and 31. Although his notes give no indication of what he found, he must have identified those two corners in some way. Linn does not identify how he determined the direction of the range line.

My conclusion is that Linn retraced, or at least determined alignment of the north boundary of the DLC. He then ran south (compass bearing) from the section corner. Where his "south" line intersected the DLC boundary he set an iron pipe. From that intersection he measured south, 7.50 chains (record distance) and set a pipe for the 1/4 corner of sections 31 and 36. Linn ran his East-West centerline of section 31 easterly, parallel to the DLC boundary. How he determined his bearing of the North-South centerline is a mystery because it incompatible with his distances.

Although we know there was some movement of the Collins Point Slide during the 1912 time frame, there is no way of knowing how much and where. I am assuming that some movement had occurred in the area of the west half of section 31.

When the Corps of Engineers entered the scene in 1935, some small amount of movement may have occurred between then and 1912. But the slide was NOT ACTIVE. If any active movement had been occurring the BPA would never have built an expensive power transmission line across the area in 1939

It is reasonable to state that the Corps of Engineers are not professional land surveyors. The Corps work (in 1935) shows no bearing on the range line, and no basis for the other bearings given on their map. While their map(s) show what they found (mostly Linn's pipes) and they

show distances in hundredths of a foot, those measurements are not absolute and are open to question in a minor degree, when compared to more accurate measurements made with an EDM by the BLM in 1982. There appears to be no defensible case for using the Corps of Engineers distances, by themselves, for restoring the line between sections 31 and 36.

That leaves single proportionate measurement, as described in Sec. 5-34 of the Manual of Surveying Instructions, 1973.

Exhibit [L](#) is a sketch of what would result from a single proportion of the range line between the meander corner of sections 31 and 36, and the corner of sections 13, 18, 19, and 24, accepting the corners of the DLC and 1/4 corner of sections 30 and 31. The 1/4 corner of sections 31 and 36 would be 1.35 chs. N. and 0.245 chs. W. of the Corps of Engineers monument. The corner of sections 25, 30, 31, and 36 would be 2.309 chs. N. and 0.522 chs. W. of the Corps monument. The later position is 4.4 feet farther north of the meander corner than the measurement made by the Corps in 1935, and 55 feet farther west of the 1/4 corner of sections 30 and 31. Thus, the distances given by the Corps of Engineers, measured with a steel tape, are closely compatible with a single proportion position, using distances measured with an EDM.

Why did the BLM decide to accept the monuments set by Linn and remonumented by the Corps of Engineers, knowing that they had been moved by the Collins Point Slide?

I can't answer that question, only conjecture. Most of the land area affected by this survey was (in 1982) in private ownership. When Olson Engineering resurveyed the north half mile between sections 31 and 36 in 1980, they accepted the Corps monuments with the notation that the monuments were displaced. That condition seems to have been acceptable to the private landowners because no objections were made then or after the 1982 field work by BLM. Since no one protested it was probably deemed to be an "acceptable local condition." And there is no legal case on record to refute that assumption.

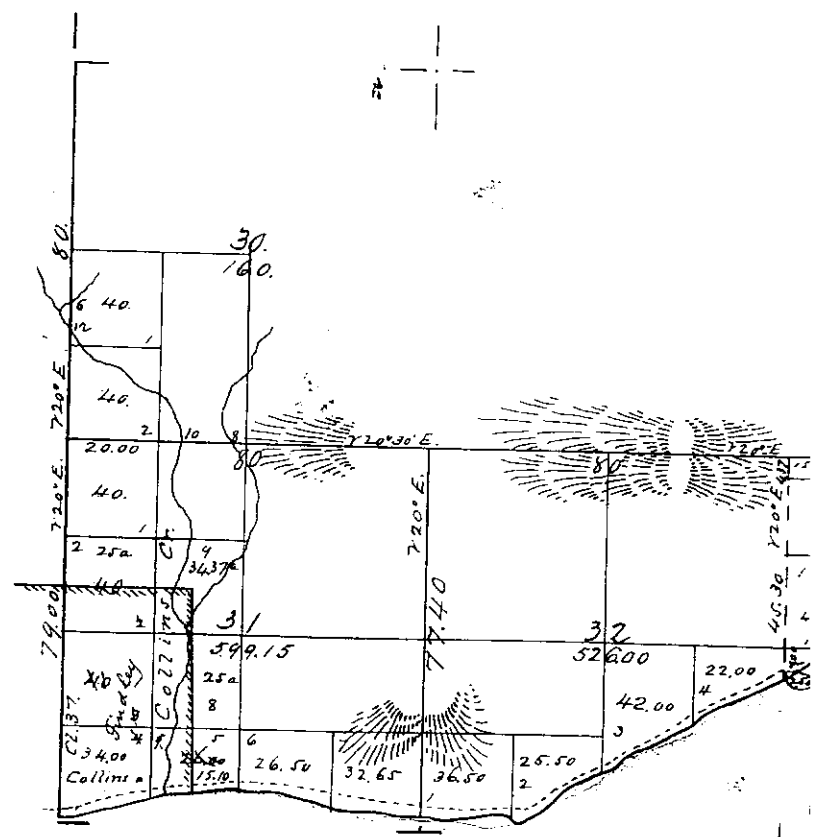
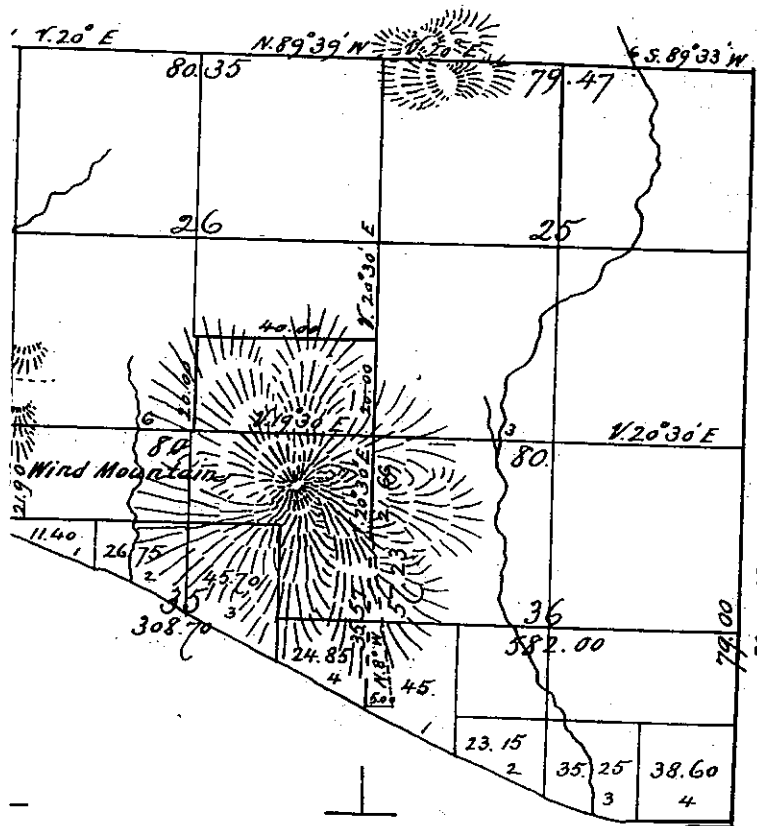
Another possibility is the Cullen Act in California, which of course pertains to earthquake movements. I personally can't see any similarity between an earthquake shift and displacement caused by a landslide. Maybe someone did and accepted the Corps monuments in place.

Whatever the rationalization was, I don't agree with the decision and from a good surveying practice point of view believe the range line should have been restored as indicated in Exhibit [L](#).

R. 8 E.

R. 9 E

unfit for S



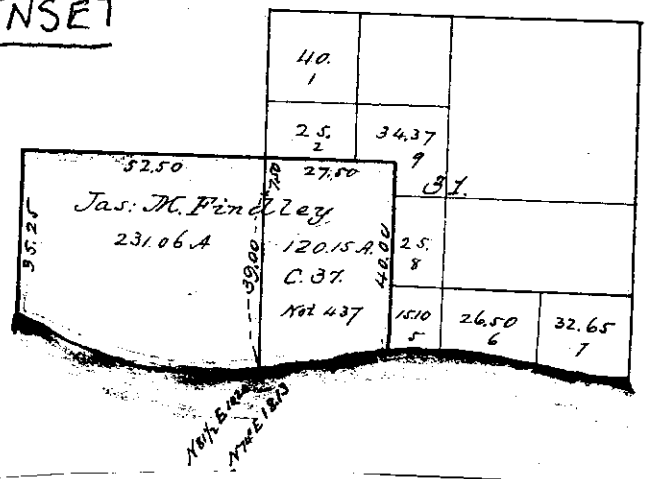
Completed
 1875
 " "
 " "

The above Map of Township No. 4, Meridian, in the Territory of Wash. the survey thereof on file in this office

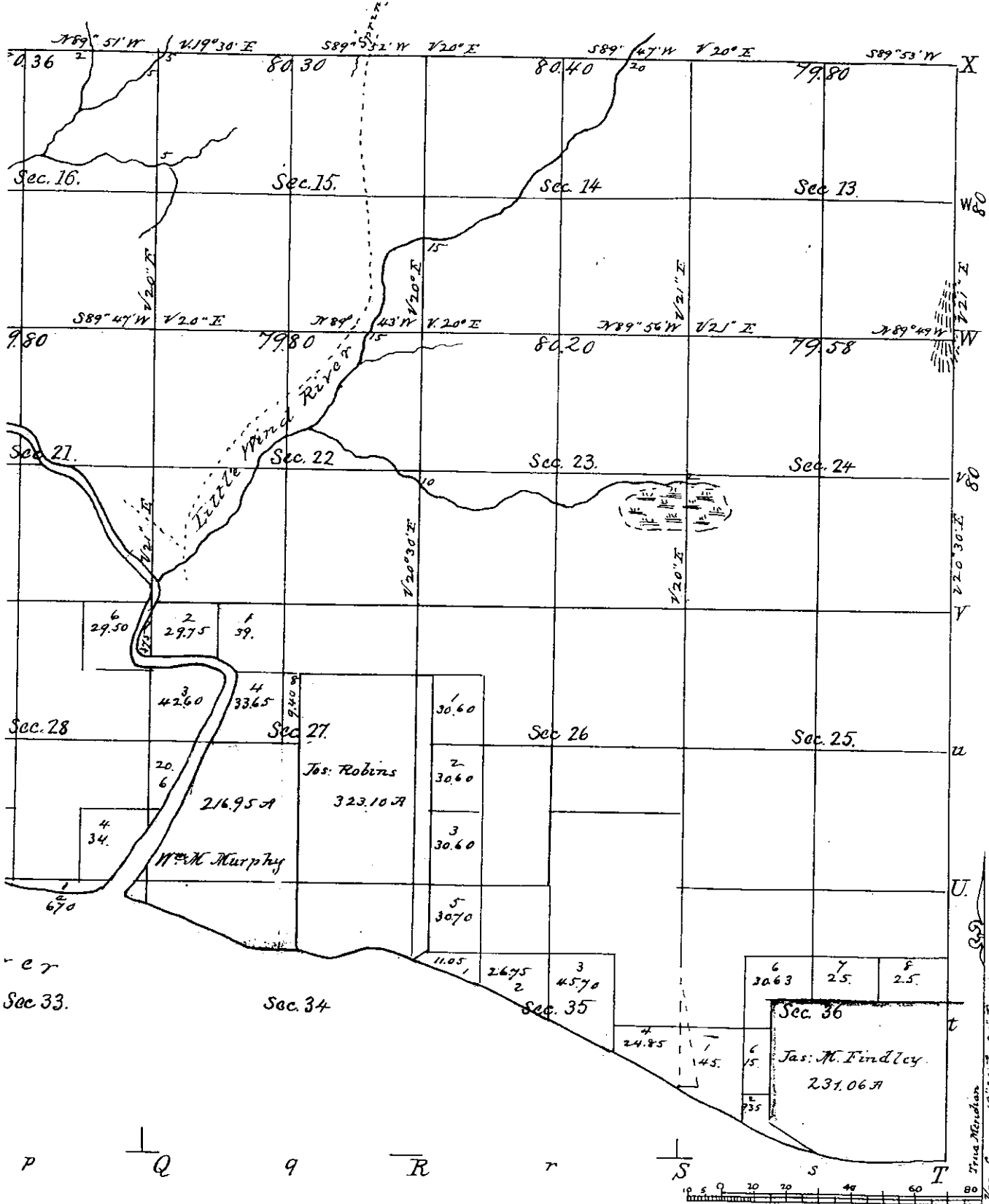
SURVEYS DESIGNATED.	BY WHOM SURVEYED.	CONTRACT.	
		No.	Date.
West boundary Subdivisions	Smith & Spray	216	26 th Aug 87
Headers	" " "	"	" "
Total No of Acres		4128.80	

CASE NO. 4
 EXHIBIT A
 PORTION OF PLATS
 APPROVED
 FEBRUARY 19, 1876
 AND AUGUST 13, 1878

INSET



Date of Certificate
1878
July 5th



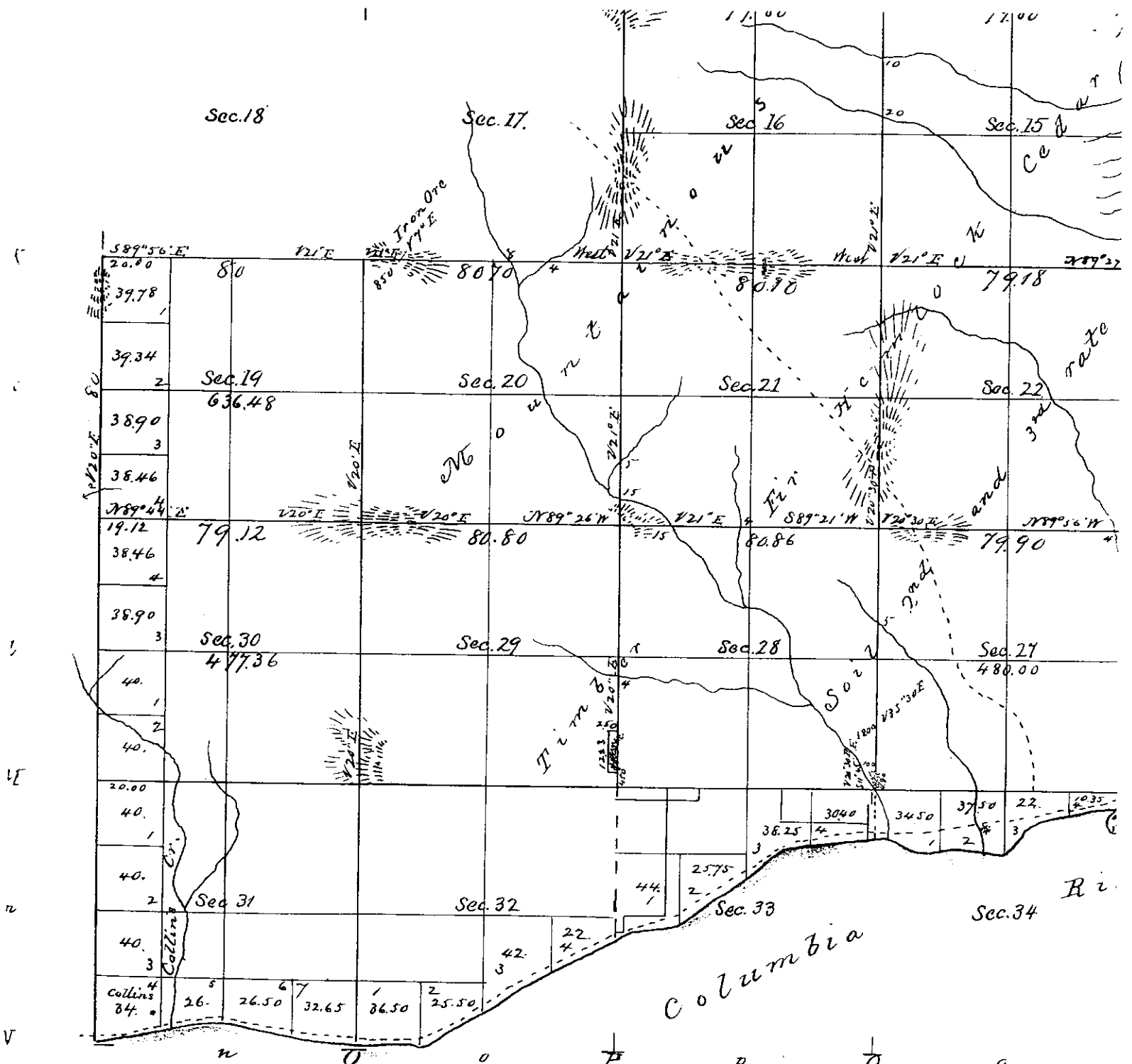
Add
Sept

Total number of Acres. 12,779.20

of Surveys		When Surveyed
26	1	9 th August 1878.
		20 th October 1875.

CASE NO. 4
EXHIBIT B
PORTION OF PLAT
APPROVED
SEPTEMBER 18, 1878

The above Map of Township N 03 North of Range N 08 Willamette Meridian Washington Territory is strictly conforming to the notes of the survey thereof on file in this Office which have been examined by
 Surveyor General's Office } W. McWickens
 Olympia W.T. Sept 18 1878 }
 Ju

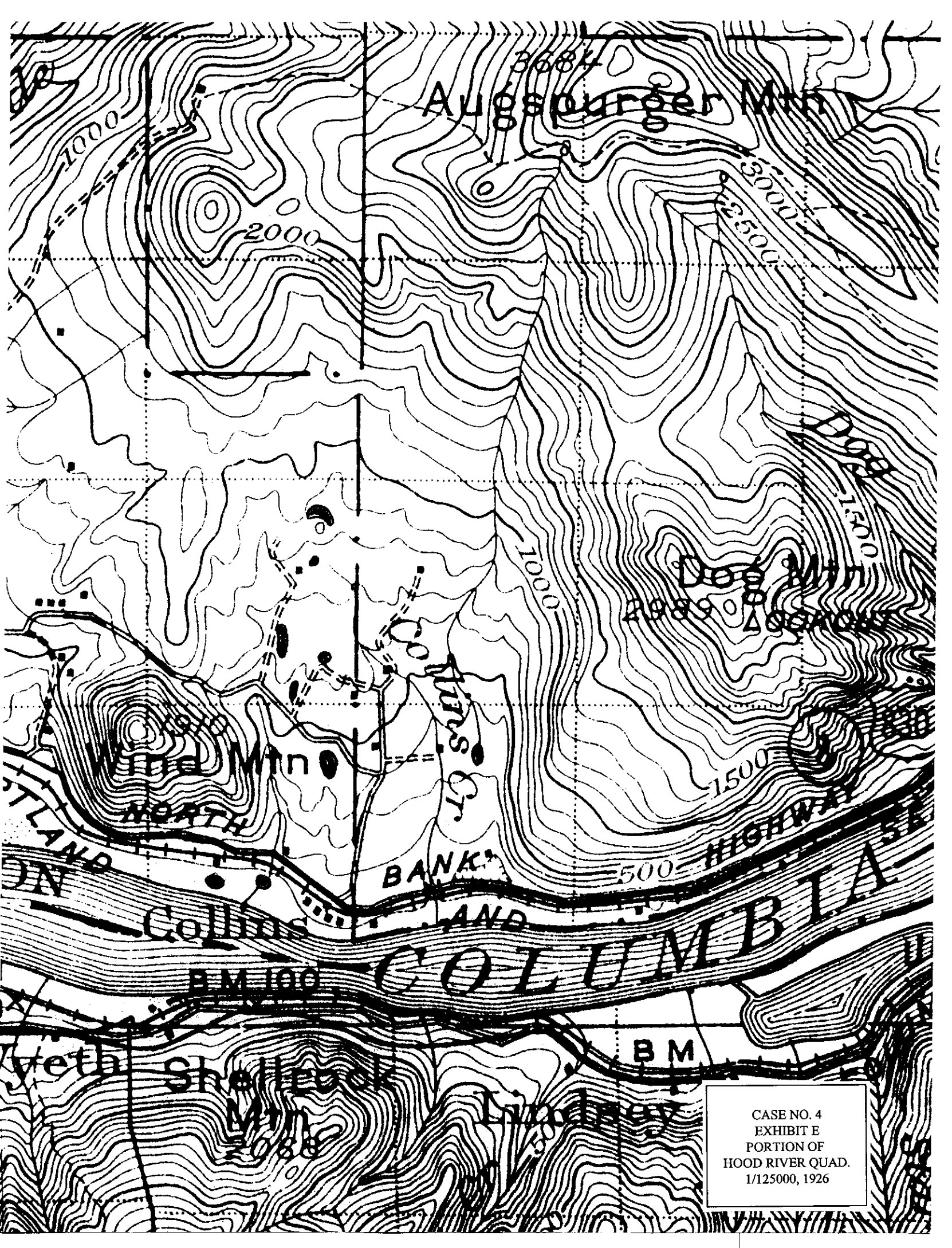


← Supplemental plat filed Sep. 26. 1870 (T^o 50940)

Total number of Acres 15966.68

Surveys Designated	By Whom Surveyed	Date of Contract Special Instructions	Amount of Surveys	When Surveyed
(Equal to main plat to township lines Subdivisions	Levin D. Shelton	17 th May 1880	M 23 Ch ^s 1 I ^s 06	19 th June 1880
Previous Surveys				
N. bdy. Sub ^d Meanders	Smith & Spray	26 th August 1875		12 th October 1875
N. bdy & Sub ^d	Edwin Richardson	7 th Dec 1878.		14 th July 1879

CASE NO. 4
EXHIBIT C
PORTION OF PLAT
APPROVED
JULY 19, 1890



3684
Augsburger Mt

2089
Doe Mt

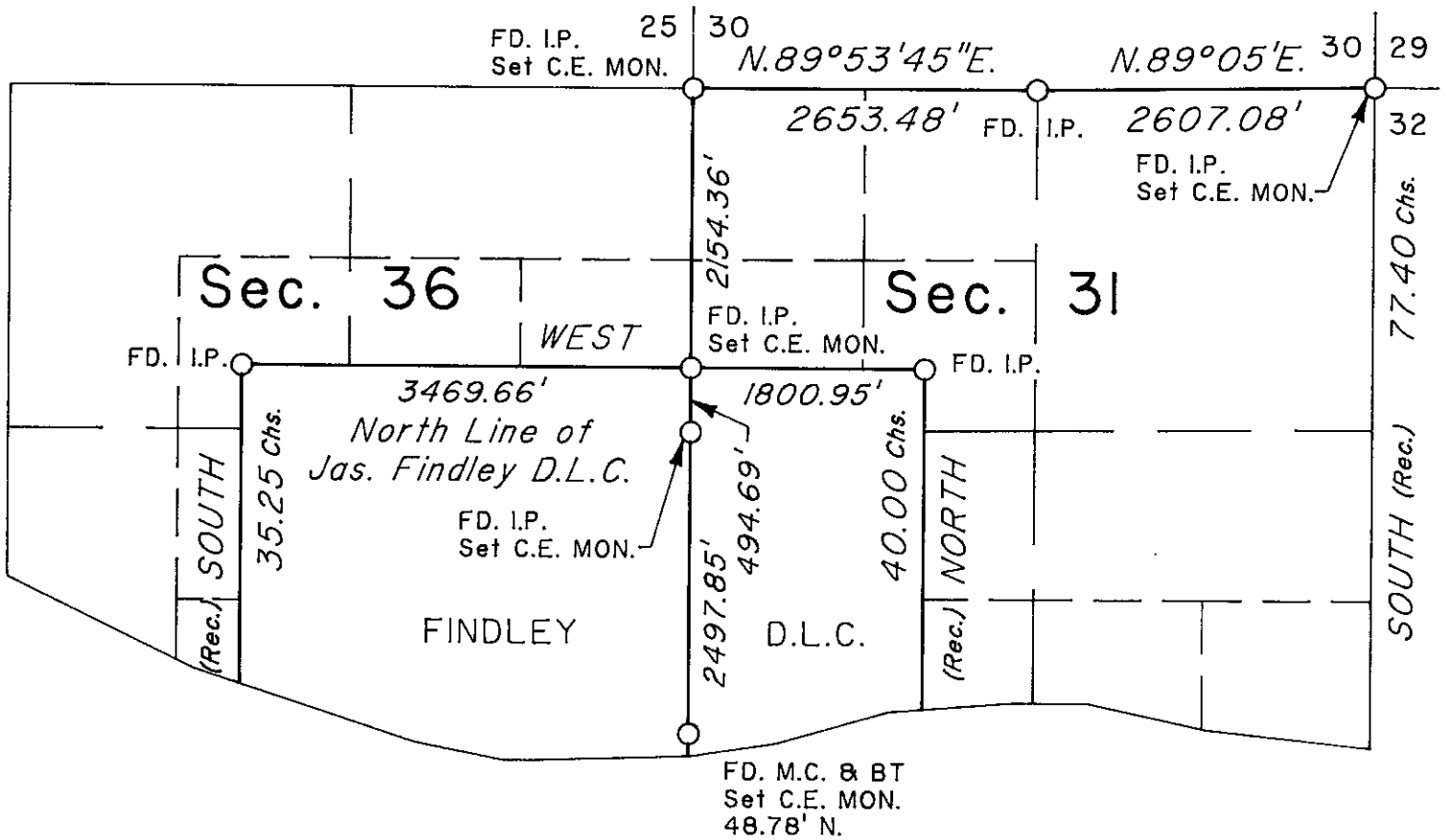
WATERS CT

WYETH SHALLOW MOUNTAIN
COLUMBIA RIVER
COLUMBIA AND HIGHWAY 51

WYETH SHALLOW MOUNTAIN
BM 100
BM

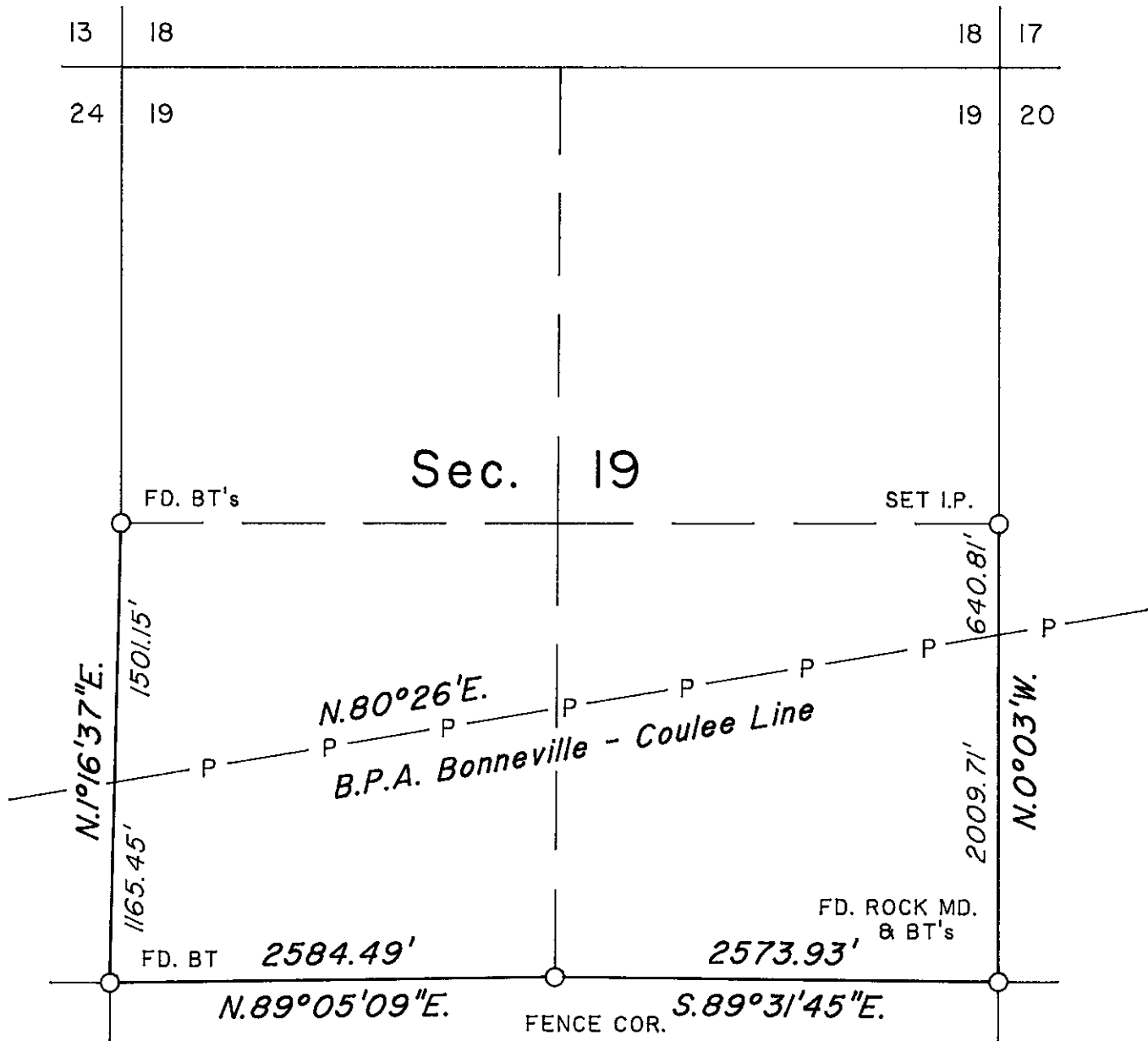
CASE NO. 4
EXHIBIT E
PORTION OF
HOOD RIVER QUAD.
1/125000, 1926

U.S. ARMY CORP OF ENGINEERS 1935

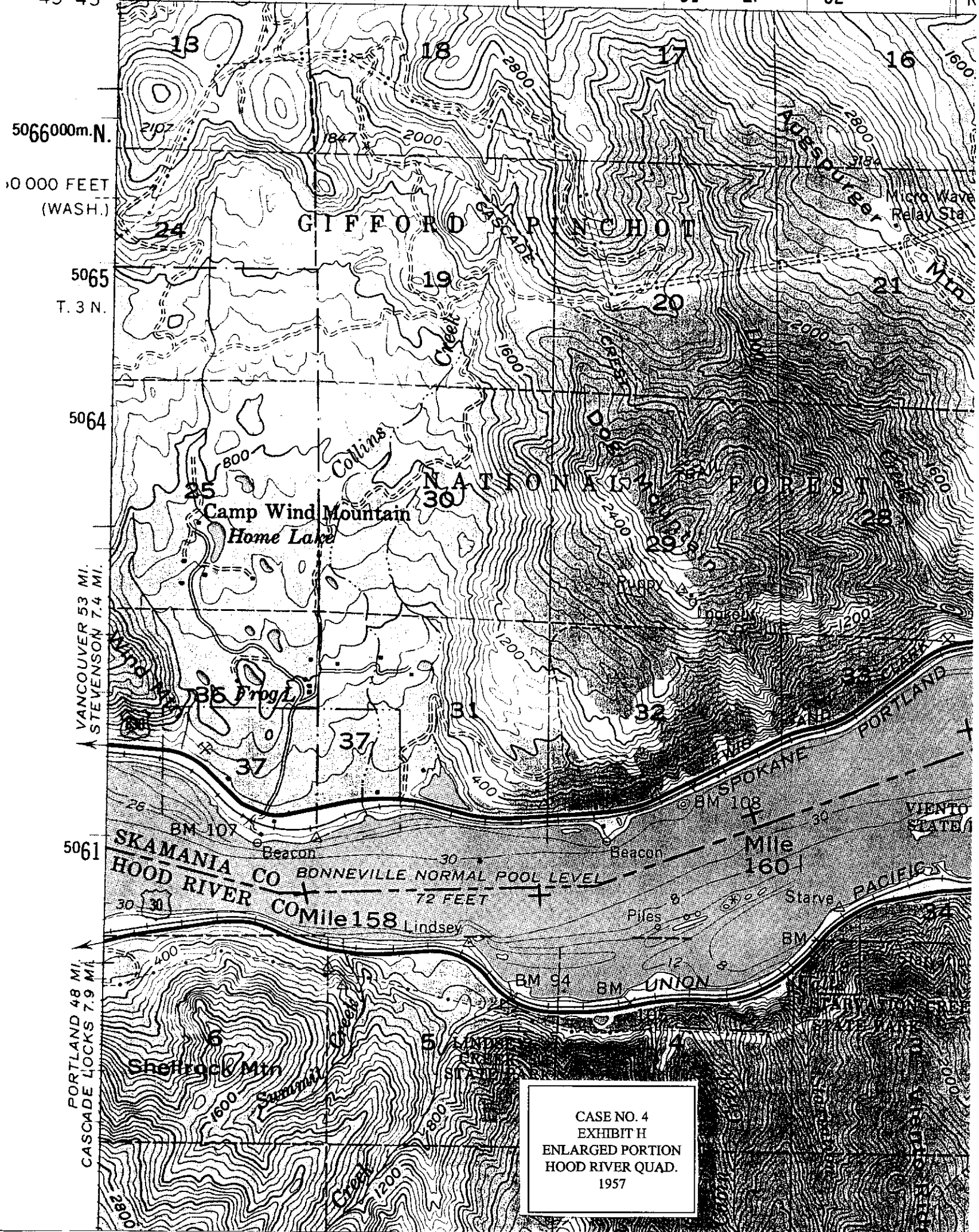


**CASE NO. 4
EXHIBIT F**

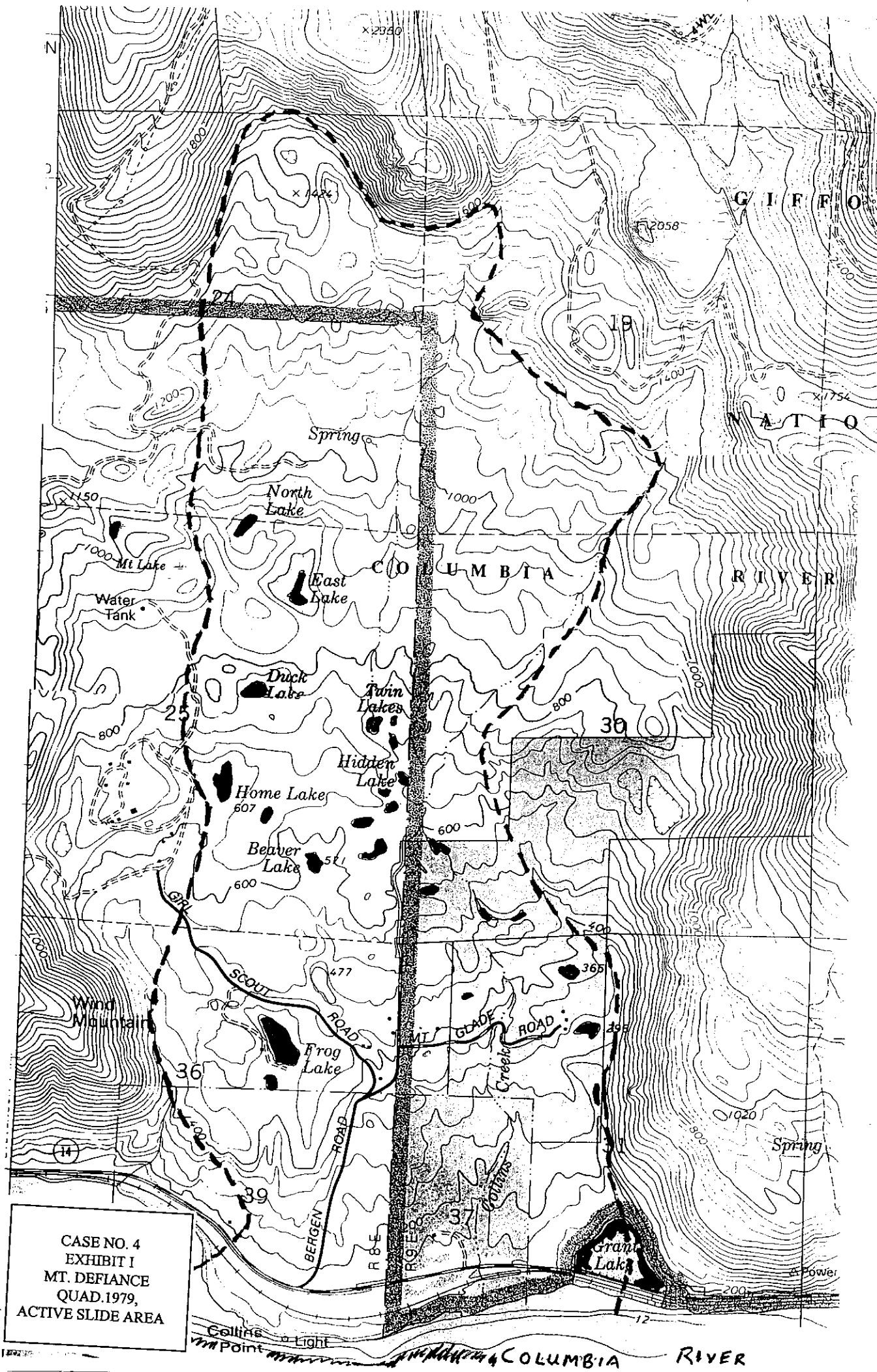
B.P.A. POWER LINE 1939



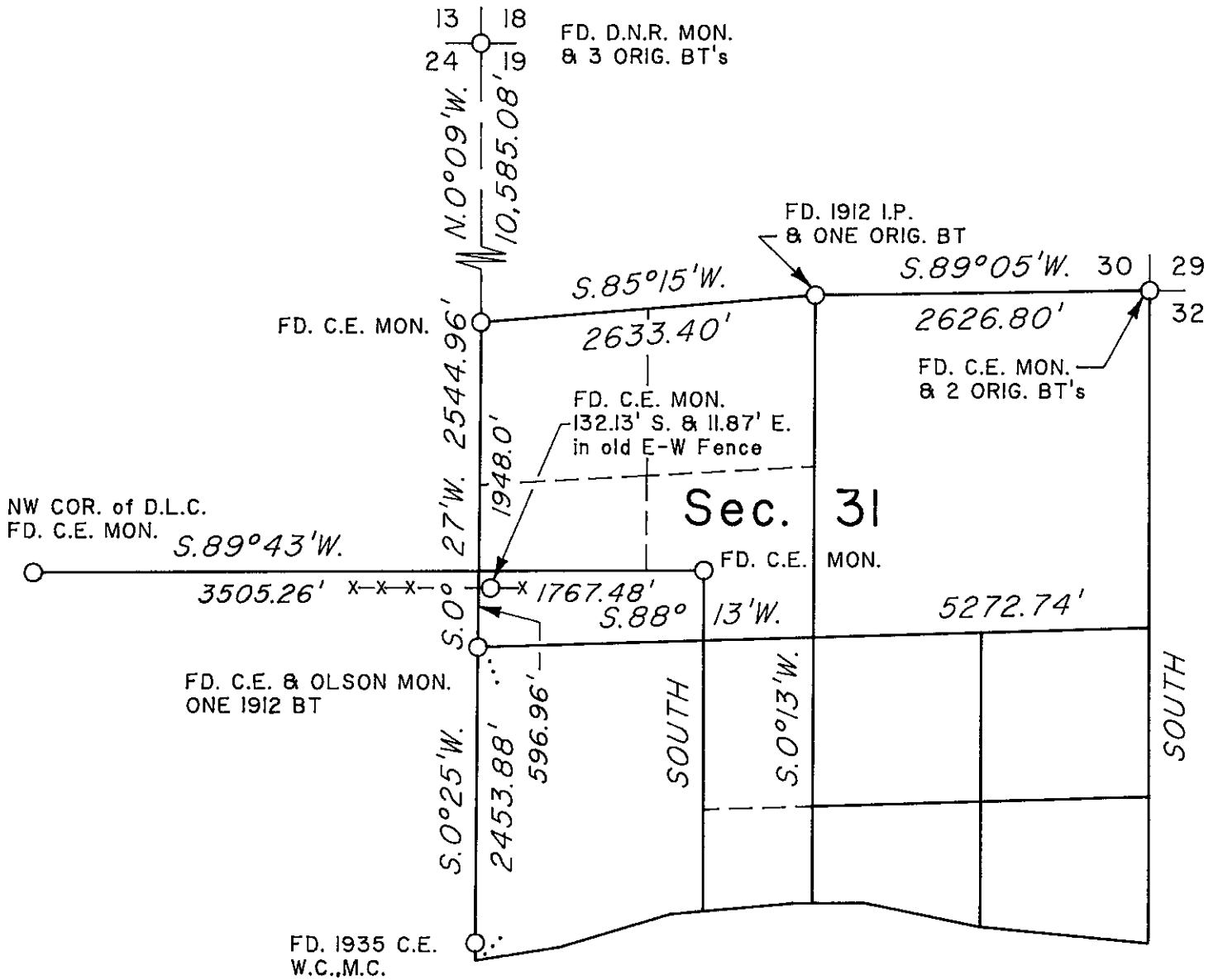
CASE NO. 4
EXHIBIT G.



CASE NO. 4
EXHIBIT H
ENLARGED PORTION
HOOD RIVER QUAD.
1957

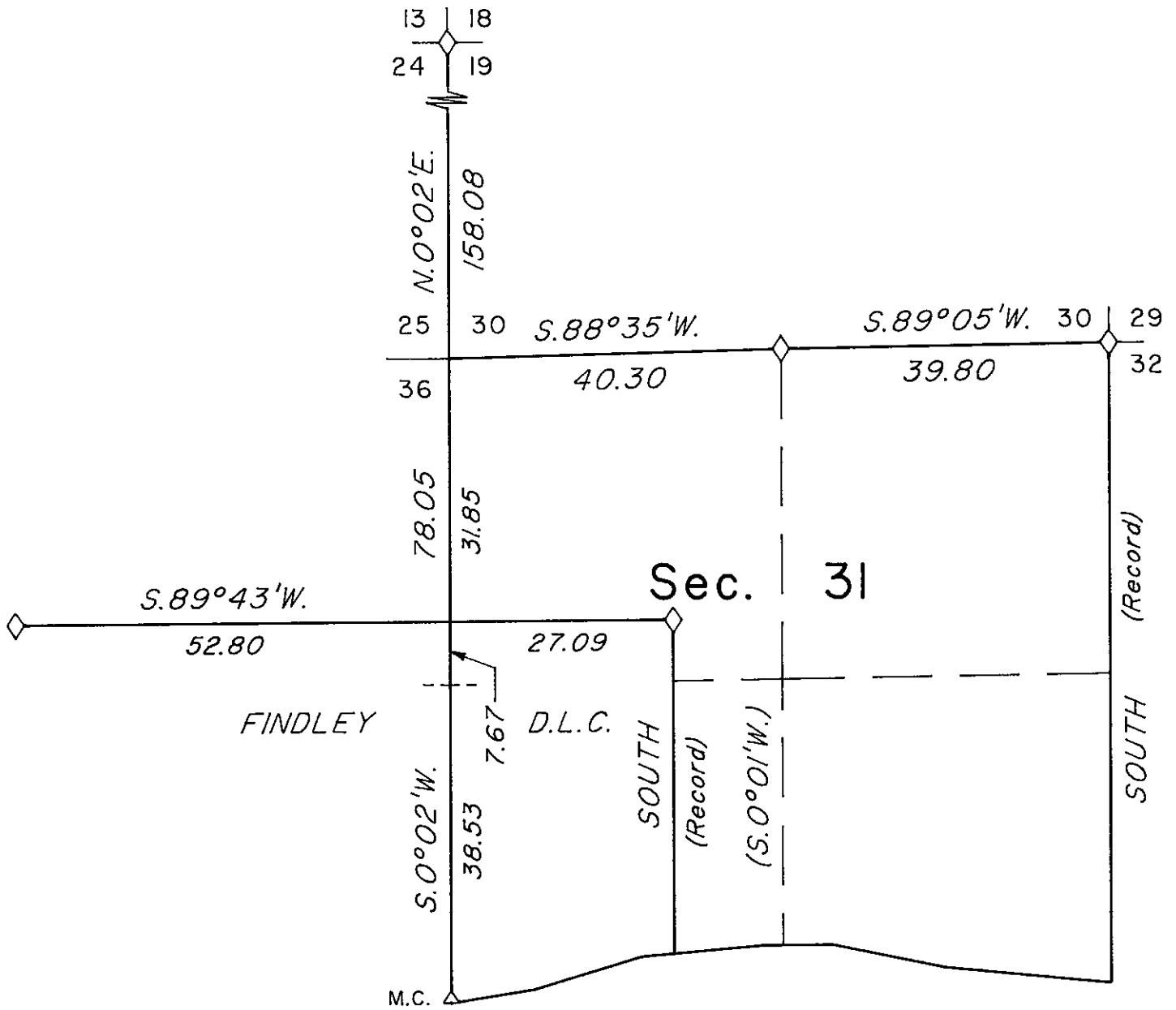


B.L.M. SURVEY 1982



CASE NO. 4
EXHIBIT J

SINGLE PROPORTIONING



CASE NO. 4
 EXHIBIT L
 SINGLE PROPORTION
 OF RANGE LINE

CREEPING LANDSLIDE

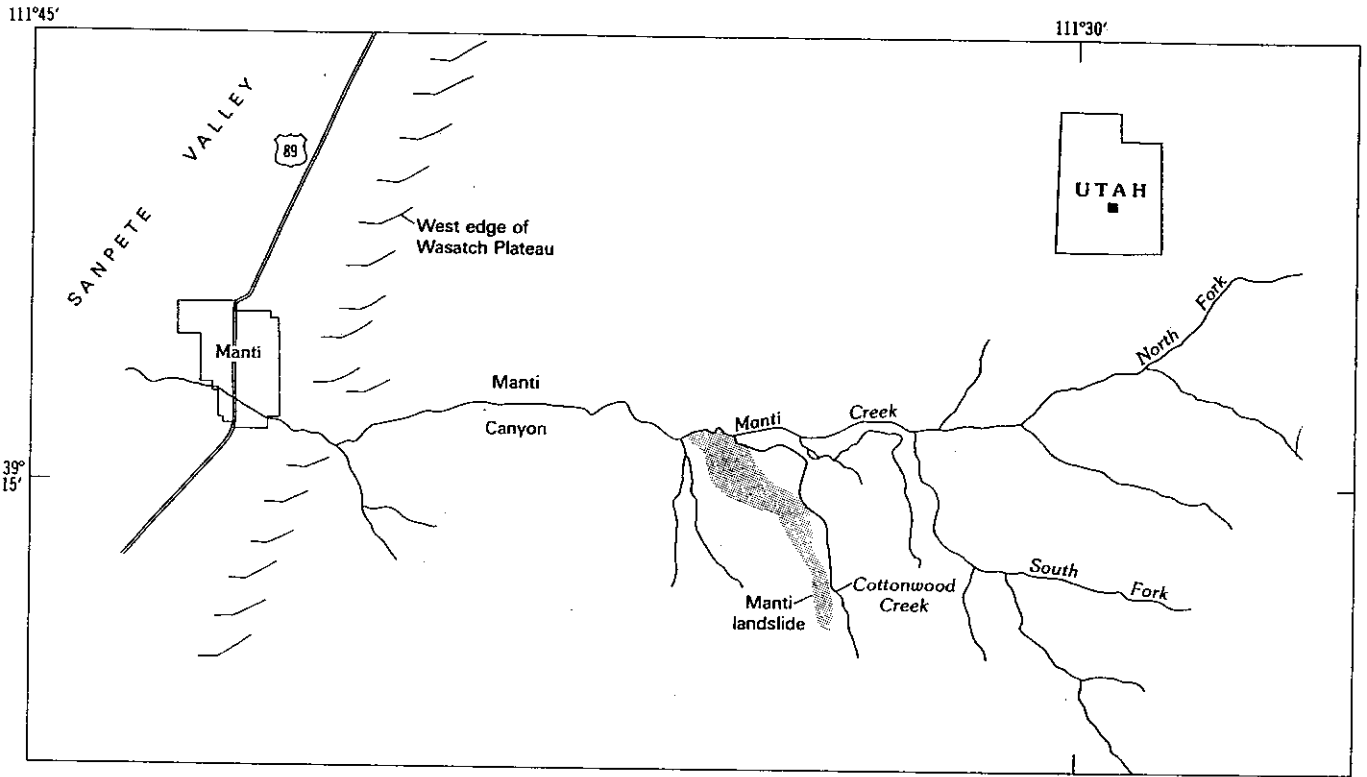
CASE NO. 5
MANTI SLIDE
T. 18 S., R. 3 E.,
SALT LAKE MERIDIAN

The Manti Slide is located entirely within the Manti-LaSal National Forest, in T. 18 S., R. 3 E., Salt Lake Meridian, sections 10, 11, 14, 15, 23, and 24, about 7 miles east of Manti, Utah.

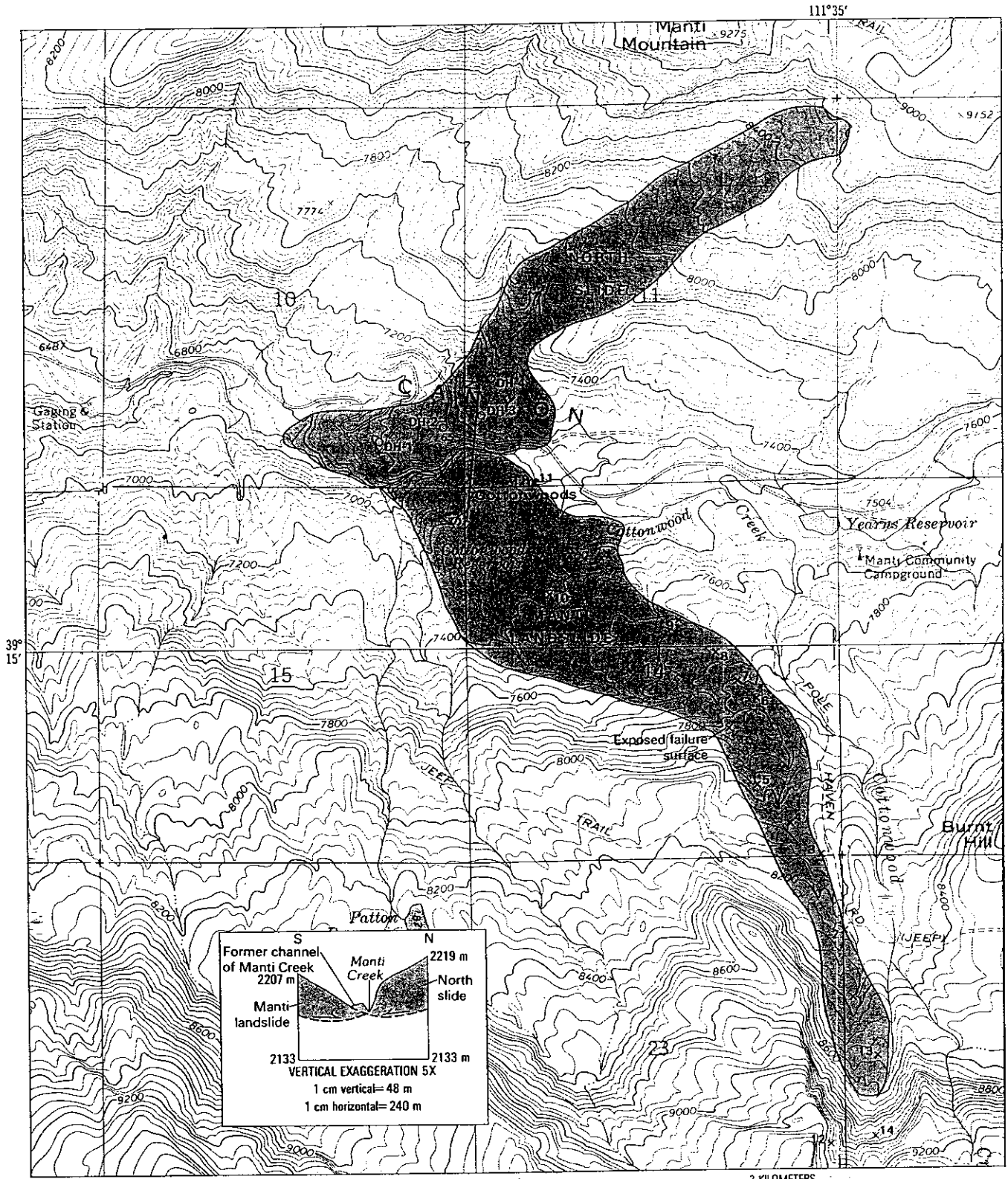
The portion of the township in which the slide is located was surveyed in 1913 by Howard Miller, under Group No. 25, Utah. The monumentation is brass capped iron posts. All of the land area in and around the slide area is federal public lands administered by the Manti-LaSal National Forest and no resurveys have been made since the original surveys in 1913. Therefore, there is no "case" to cite in this report.

The Manti Slide became active in 1974. Apparently the slide was a long-standing geologic feature, was dormant for a great many years, became active in the spring of 1974 and by 1982, was again inactive. During the period of greatest activity, extensive studies were made by the Forest Service and U.S. Geological Survey because the slide threatened to block Manti Creek, a main source of water supply for the city of Manti. The result was an elaborate report titled "The Manti, Utah, Landslide," by R.W. Fleming, R.B. Johnson, R.L. Shuster, and G.P. Williams, U.S. Geological Survey Professional Paper No. 1311, published by the U.S. Government Printing Office in 1988. The report is more than 69 pages in length, in a hardcover book.

The Manti Slide geology and causes are very similar to the conditions found in the Collins Point Slide. The report contains many photographs, diagrams, and statistics. Anyone interested in creeping landslides should read the Manti Slide report. The location and size of the slide are shown in Exhibits [A](#) and [B](#), attached. Both exhibits are copied from the Manti Slide report.



MANTI SLIDE
EXHIBIT A
LOCATION MAP



MANTI SLIDE
EXHIBIT B
DETAIL MAP

EARTHQUAKE SHIFTS

CASE NO. 6

ANCHORAGE TOWNSITE

L ST. REPLAT; ANCHORAGE, ALASKA

T. 13 N., R. 3 W., SEWARD MERIDIAN

The Anchorage Townsite was surveyed by J. Frank Warner and V. H. Wilhelm in May and June 1915, as shown on the plat approved October 5, 1915, by the Commissioner of the General Land Office. Anchorage is a railroad townsite surveyed for purposes of terminal facilities for the Alaska Railroad.

An Amended Plat of the Anchorage Townsite, showing the South, East, and Third Additions, surveyed by Warner, Wilhelm, John P. Walker, and C.K. Streit was approved by the Commissioner on December 17, 1917. Exhibit [A](#) is a portion of the amended plat of the area involved in the "L" St. Replat.

In the afternoon of March 27, 1964, a major earthquake (8.4 on the Richter Scale) occurred in the area of Prince William Sound and Cook Inlet, from Cordova to Kodiak Island, Anchorage and Seward Peninsula and surrounding regions. The earthquake was followed by a tsunami, or tidal wave, 50 feet in height, which devastated coastal regions as far south as Crescent City, California. Much of the coastal land areas in Alaska were composed of a compacted glacial silt, a fine soil easily liquefied by the earthquake. The town of Hope, Alaska, on Turnagin Arm subsided into the Arm. The tsunami wiped out the harbor areas in Seward, Valdez, Homer, and Kodiak. There just wasn't anything left to survey in most of those areas. In Anchorage much of the area north of 4th Avenue, including 3rd Avenue, slumped into Ship Creek and Knik Arm. The subsidence was in excess of 10 feet and the horizontal shift was up to 19 feet northerly and 2 to 3 feet westerly. The buildings and infrastructure north of 4th Avenue were nearly totally destroyed.

In the area between the Chugach Mountains to Spenard and the International Airport, the subsidence was only about 1.5 to 2 feet, with horizontal shifts of not more than about 2 feet. Within a few days studies were conducted by local government personnel and private land surveyors. It was decided that where the horizontal shifts were less than 1/5000, no action need to be taken on relocations and resurveying. Where the devastation was great and changes so major the only viable solution was to resurvey based on the original geographic location, as nearly as possible.

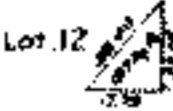
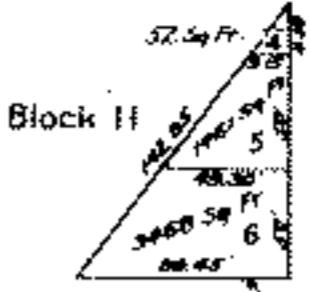
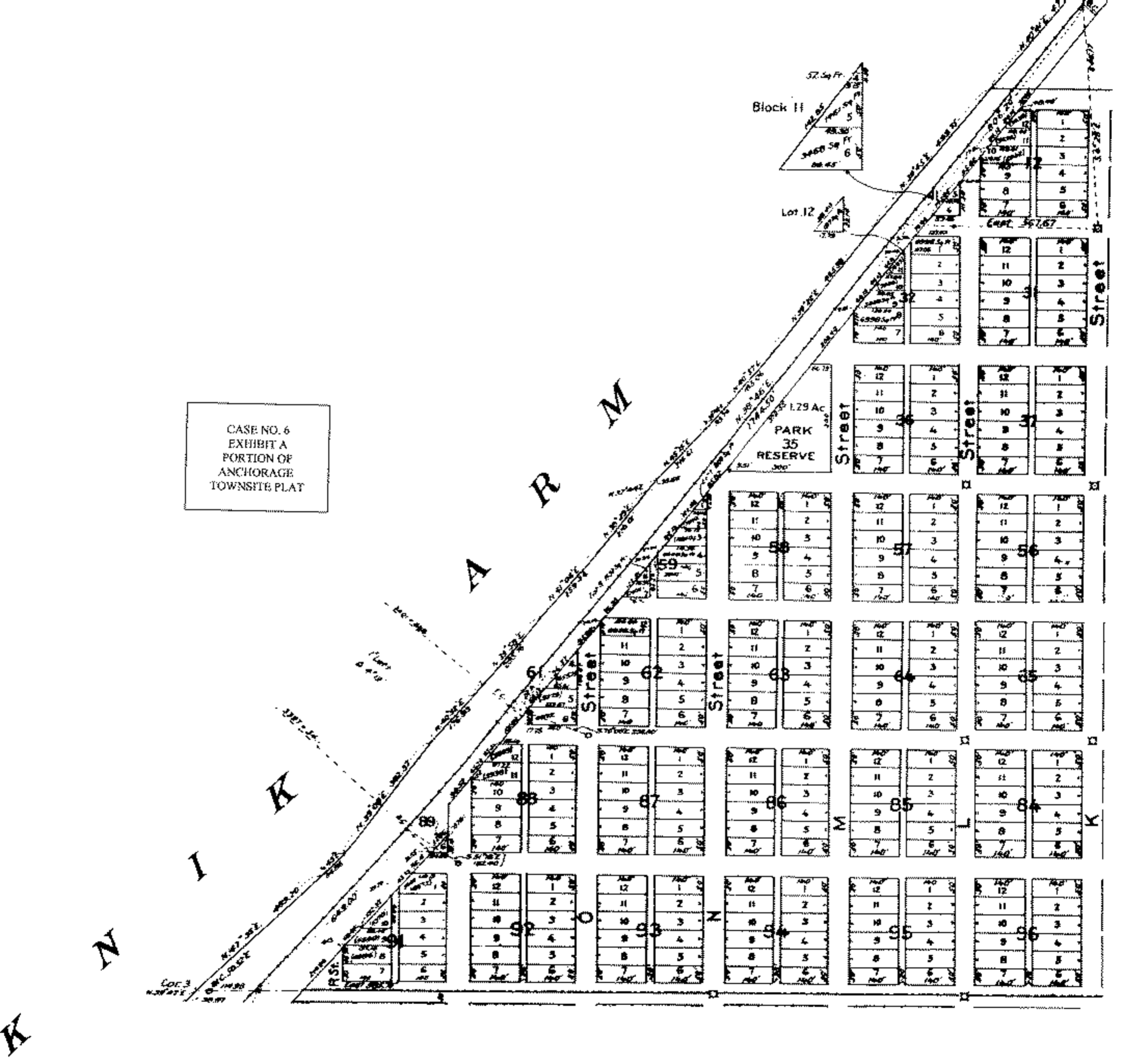
In Anchorage in the area west of K Street and north of Ninth Avenue, the horizontal shift was from zero to about 8 feet northerly and from zero to about 11 feet westerly. The shift was not

proratable, exceeded 1/5000 and not consistent in any given area. However, all of the buildings and infrastructure were intact with only minor damage overall. The City of Anchorage enacted an ordinance on April 14, 1964, permitting the reoccupation of buildings found safe for occupation, the use and occupation of temporary business structures, etc. But the question of land titles in the above described area still existed. The American Land Title Association was consulted without relief. ALTA only insures title, not location.

To resolve the problem the Alaska Legislature enacted the "Earthslide Relief Act," approved by the Governor on April 9, 1966. See Exhibit [B](#).

The part of Anchorage lying west of K Street and north of Ninth Avenue was resurveyed and replatted by private and city surveyors. The lot and street lines were resurveyed in place as found on the ground. No attempt was made to correct the existing conditions to conform with the original surveys in geographic position. The area is called the "L St. Slide Replat" and is shown in Exhibits [C](#) and [D](#).

CASE NO. 6
 EXHIBIT A
 PORTION OF
 ANCHORAGE
 TOWNSHIP PLAT



1.29 AC
 PARK
 35
 RESERVE

LOT 3
 14.80
 14.80
 14.80



LAWS OF ALASKA

1966

Source:

CSHB 427

Chapter No.:

80

AN ACT

Relating to establishment of land boundaries affected by earthslides; and providing for an effective date.

BE IT ENACTED BY THE LEGISLATURE OF THE STATE OF ALASKA:

* Section 1. PURPOSES. (a) This Act is enacted as an exercise of the police power of the state, for the purpose of serving the public welfare of the people of Alaska by

(1) making fully available for new constructions the entire area owned by each entity, either public or private, which purpose can only be served by a re-establishment of certainty as to the present location of land boundaries;

(2) facilitating the sale, mortgage or lease of land parcels in the state;

(3) confirming and establishing the exact areas available for public uses in streets and other public ways;

(4) minimizing the losses suffered by land owning entities, which have been caused by an earthslide, by allocating to adjacent owners areas of land released by the narrowing or vacating of streets owned by a municipality, with the consent of the municipality, given for the promotion of the general welfare

CASE NO. 6
EXHIBIT B
ALASKA EARTHSLIDE
RELIEF ACT

77-2777-27

of the people of Alaska, thus reducing in an equitable manner the number of landowners having losses, caused by an act of God, in the square footage of land owned before the earthslide;

(5) correcting existing public records, consisting of land plats, which no longer are accurate, so that a substitute plat, judicially found to be in accordance with existing boundaries as fixed by the earthslide, which was an act of God, and filed subsequent to judicial approval will accurately represent the existing land boundaries;

(6) permitting these ends to be accomplished in a single action in rem, brought with respect to a large area affected by an earthslide, rather than in numerous separate actions;

(7) safeguarding the due process of the remedial procedure in rem, established by the provisions of this Act by allowing deviations from the rules of civil procedure wisely established by the Supreme Court of Alaska for all other actions and proceedings of a civil nature, legal, equitable or otherwise. It is expressly declared to be the purpose of the legislature to change these established rules to the extent, but only to the extent, authorized in this Act, and only in the conduct of the actions authorized in this Act.

(b) The legislature finds that the attainment of each of the objectives enumerated in this section will significantly promote the welfare of all the people in the state.

* Sec. 2. AS 09.45 is amended by adding new sections to read:

ARTICLE 10. EARTHSLIDE RELIEF ACT.

Sec. 09.45.800. PREREQUISITE EARTHSLIDE CHANGING LAND BOUNDARIES. If the boundaries of land, owned either by public or by private persons have been moved by an act of

God, consisting of an earthslide, so that they are in a location different from that at which, by solar survey, they were located before the earthslide, an action in rem to recognize the boundaries as they presently exist and to quiet title within the boundaries in the persons judicially found entitled to title under secs. 800 - 880 of this chapter, is authorized, maintainable by the persons and with the procedures in secs. 800 - 880 of this chapter for the handling of the emergencies dealt with in this chapter.

Sec. 09.45.805. PARTIES. (a) An action authorized by secs. 800 - 880 of this chapter may be commenced by

(1) a borough with the joinder of a city or cities included in the borough;

(2) a city not included within the boundaries of a borough, if the earthslide has affected land in the city, or land outside the city as to which outside land the city has statutory power to approve a land map;

(3) a school district which has statutory power to approve a land map; or

(4) any other entity or person, granted permission by the court to bring the action.

(b) In an action authorized by secs. 800 - 880 of this chapter every person in actual and peaceable possession of, or having an estate or interest in any of the land affected by the action, whose possession or evidence of estate or interest is either recorded or known to the plaintiffs, must be designated in the complaint of the action, and given notice in the manner required by secs. 800 - 880 of this chapter and the court rules of civil procedure.

(c) All unknown parties, including owners, claimants, heirs, devisees, legatees or assigns, may be described in the caption and complaint as "all persons claiming any interest in or lien upon, the real property herein described or any part of it".

Sec. 09.45.810. SEPARATE ACTIONS AS TO SEPARATE SLIDE AREAS. An entity which is a permissible plaintiff under sec. 805 of this chapter, may, in its discretion, bring a separate action under secs. 800 - 880 of this chapter with respect to each separate slide area located within its boundaries and its decision regarding the desirability of the separate action, and regarding the area to be dealt with in each action is final.

Sec. 09.45.815. COMPLAINT. The complaint shall substantially include

- (1) a statement of the facts making the provisions in secs. 800 - 880 of this chapter applicable;
- (2) a description of the entire real property sought to be affected by the action;
- (3) a specification of the estate, title and interest owned, and in the actual possession of the plaintiff or plaintiffs in described parts of the entire real property sought to be affected by the action;
- (4) a specification of the estate, title and interest, so far as they are known to the plaintiffs or either of them, and so far as they are capable of being discovered by reasonably diligent search by the plaintiff or plaintiffs, in each separate part of the entire real property sought to be affected by the action;

(5) a specification of the street areas offered by the plaintiff, or plaintiffs, to be vacated in whole or in part for judicial equitable allocation to landowners for the mitigation of the losses inflicted upon the landowners by the act of God consisting of the earthslide;

(6) a proposed replatting of the entire real property sought to be affected by the action, embodying the land boundaries as fixed by the act of God, except as these have been liberalized by judicially directed use of the vacated lands.

Sec. 09.45.820. PUBLICATION AND POSTING OF NOTICE. The notice required by Rule 4(e)(5) of the court rules of civil procedure shall be published as provided in the rules and a copy of the notice shall be posted in a conspicuous place on each separate parcel of the entire real property described in the complaint within 20 days after the first publication of the notice.

Sec. 09.45.825. PROCEDURE APPLICABLE. Except as otherwise provided in secs. 800 - 880 of this chapter, the court rules of civil procedure shall apply to actions authorized by secs. 800 - 880 of this chapter.

Sec. 09.45.830. JURISDICTION. Upon the completion of the service, publication and posting of the summons, as may be required by secs. 800 - 880 of this chapter and the court rules of civil procedure, the court has complete jurisdiction over the parties plaintiff or plaintiffs and the entire real property described in the complaint as intended to be affected by the action and over the person of everyone having or claiming an estate, right, title or interest in or to, or

lien upon, all or any part of the property and shall be considered to have obtained the possession and control of the property for the purposes of the action with complete jurisdiction to render the judgment provided for in secs. 800 - 880 of this chapter.

Sec. 09.45.835. ANSWER. (a) An answer to the complaint must be served within 90 days after the first publication of the notice, or such further time not exceeding 30 days, as the court for good cause may grant.

(b) An answer must

(1) specifically set out the particulars in which the claimant's estate, right, title, or interest in or to, or lien upon all or any part of the property is different from, or greater than, the interest of the claimant as it is described in the complaint;

(2) be confined to rights based on events occurring at the time of, or since the time of the act of God, consisting of the earthquake.

(c) To whatever extent, if at all, the answering party has rights against anyone whatsoever, based upon facts or events which occurred before the earthquake, the claims shall remain unaffected by the action brought under secs. 800 - 880 of this chapter and shall be assertable subsequent to the conclusion of the action at any time and in any manner permitted by law, notwithstanding the judgment granted in this action, recognizing however the finality of this judgment as to the consequences, with respect to land boundaries, of the earthquake.

Sec. 09.45.840. LIS PENDENS. A party to an action

authorized by secs. 800 - 880 of this chapter may file a notice of the pendency of the action in the form and at the place and with the effects specified in sec. 790 of this chapter.

Sec. 09.45.845. VACATING OF STREETS IN WHOLE OR IN PART. The vacating of streets in whole or in part by the voluntary action of a municipality, for the purpose of making it possible for the court to mitigate the hardships suffered by individuals because of the change in land boundaries caused by the act of God, consisting of an earth-slide, can be accomplished by the offer of the municipality expressed in the complaint followed by the court's approval of it in the action authorized in secs. 800 - 880 of this chapter, without other formalities. This provision is a special emergency substitute for the provisions contained in AS 40.15.140 - 40.15.180.

Sec. 09.45.350. PROOF OF FACTS. In an action of the type authorized in secs. 800 - 880 of this chapter, judgment shall not be given by default, but the court must require proof of the facts alleged in the complaint and other pleadings.

Sec. 09.45.855. SCOPE OF JUDGMENT. The judgment shall

(1) determine the land boundaries of each parcel of land located within the entire area of real property sought to be affected by the action, whether owned publicly or privately after judicial equitable allocation of lands voluntarily vacated by a municipality under sec. 845 of this chapter;

(2) determine the person or persons having estates,

rights, titles, interests and claims in and to each parcel, whether legal or equitable, present or future, vested or contingent, or whether they consist of mortgages or liens of any description;

(3) approve and direct the proper filing of a new plat map covering the entire area of real property sought to be affected by the action, as a substitute for the plat maps previously filed, but rendered inaccurate by the act of God consisting of an earthslide.

Sec. 09.45.860. STANDARDS FOR JUDGMENT. In reaching the conclusions called for by sec. 855 of this chapter the court shall give effect to the changes in land boundaries caused by the earthslide, mitigated, however, so far as can equitably be done, by allocating to contiguous lots parts of the land released by a municipality by its voluntary vacation of areas formerly constituting public ways, which vacatings of streets shall be approved in this judgment.

Sec. 09.45.865. EFFECT OF JUDGMENT. The judgment shall be conclusive with respect to land boundaries upon every person who at the commencement of the action had or claimed an estate, right, title or interest in or to a part of the entire area of real property described in the complaint as intended to be affected by this action, and upon every person claiming under any such person by title subsequent to the commencement of the action.

Sec. 09.45.870. RECORDING OF JUDGMENT. A certified copy of the judgment shall be recorded, at the expense of the plaintiff or plaintiffs in the action, in the office of the recorder of the recording district in which the affected

land is situated.

Sec. 09.45.875. CUMULATIVE REMEDIES. The remedies provided for by secs. 800 - 880 of this chapter are cumulative and in addition to any other remedy provided by law for quieting or establishing title to real property or the boundaries of it.

Sec. 09.45.880. SHORT TITLE. Secs. 800 - 880 of this chapter may be cited as the Earthslide Relief Act.

* Sec. 3. DEVIATION FROM COURT PROCEDURE. This Act provides for deviations from the court Rules of Civil Procedure and therefore the Act must receive an affirmative vote of at least two-thirds of the full membership of each house in order to be effective.

* Sec. 4. EFFECTIVE DATE. This Act takes effect on the day after its passage and approval or on the day it becomes law without such approval.

-9-

Approved by Governor April 9, 1966
Actual effective date: April 10, 1966

77-27

L ST. SLIDE REPLAT PLAT OF

A PORTION OF THE ANCHORAGE TOWNSITE WEST OF K ST. & NORTH OF NINTH AVE.

As approved by the Alaska Superior Court, Third Judicial District in CIVIL ACTION NO. 66-1240 B, pursuant to the EARTHSLIDE RELIEF ACT AS 09.45.800 et seq.

BLK. 11	BLK. 12	BLK. 31	BLK. 32	BLK. 35	BLK. 36	BLK. 37	BLK. 56	BLK. 57
LOTS	LOTS	LOTS	LOTS	ELDERBERRY PARK	LOTS	LOTS	LOTS	LOTS
4A 1201	7A 1214 2A 1203 3A 1206 4A 1208 5A 1209 6A 1210	7A 1214 8A 1211 9A 1209 4B 1202 10B 1200 11B 1208	7A 1202 8A 1205 9A 1207 10A 1207 11A 1204 12A 1206	50.00	7A 1206 8A 1208 9A 1209 10A 1200 11A 1204 12A 1205	7B 1200 9A 1204 10A 1202 11A 1203 12A 1201	7A 1204 8A 1204 9A 1203 10A 1204 11A 1205 12A 1204 5A 1200 6A 1204	7A 1204 8A 1202 9A 1201 10A 1201 11A 1201 12A 1201

BLK. 58	BLK. 59	BLK. 61	BLK. 62	BLK. 63	BLK. 64	BLK. 65	BLK. 84	BLK. 85
LOTS	LOTS	LOTS	LOTS	LOTS	LOTS	LOTS	LOTS	LOTS
1A 1200 2A 1204 3A 1201 4A 1203 5A 1207 6A 1202	7A 1201 8A 1204 9A 1202 10A 1201 11A 1201 12A 1201	1B 1204 7A 1201 8A 1204 3A 1200 4A 1203 5A 1201 6A 1200	1A 1201 2A 1200 3A 1200 4A 1200 5A 1200 6A 1200	7A 1201 8A 1201 9A 1201 10A 1201 11A 1201 12A 1201	1A 1200 2A 1200 3A 1200 4A 1200 5A 1200 6A 1200	7A 1200 8A 1200 9A 1200 10A 1200 11A 1200 12A 1200	1B 1204 7A 1201 8A 1201 9A 1201 10A 1201 11A 1201 12A 1201	1A 1201 2A 1201 3A 1201 4A 1201 5A 1201 6A 1201 7A 1201 8A 1201 9A 1201 10A 1201 11A 1201 12A 1201

BLK. 86	BLK. 87	BLK. 88	BLK. 89	BLK. 91	BLK. 92	BLK. 93	BLK. 94	BLK. 95
LOTS	LOTS	LOTS	LOTS	LOTS	LOTS	LOTS	LOTS	LOTS
1A 1201 2A 1201 3A 1201 4A 1201 5A 1201 6A 1201	7A 1201 8A 1201 9A 1201 10A 1201 11A 1201 12A 1201	1A 1201 2A 1201 3A 1201 4A 1201 5A 1201 6A 1201	7A 1201 8A 1201 9A 1201 10A 1201 11A 1201 12A 1201	1A 1201 2A 1201 3A 1201 4A 1201 5A 1201 6A 1201	7A 1201 8A 1201 9A 1201 10A 1201 11A 1201 12A 1201	1A 1201 2A 1201 3A 1201 4A 1201 5A 1201 6A 1201	7A 1201 8A 1201 9A 1201 10A 1201 11A 1201 12A 1201	1A 1201 2A 1201 3A 1201 4A 1201 5A 1201 6A 1201

NOTES:
1. Only surveys are of 1/2 acre or more will be recorded in the City of Anchorage.

LEGEND:
1. All lots are 1/2 acre or more.
2. All lots are 1/4 acre or more.
3. All lots are 1/8 acre or more.
4. All lots are 1/16 acre or more.

NOTE:
THE SUPERIOR COURT RENDERED FINAL JUDGMENT IN APRIL 1967 AND THIS PLAT INCORPORATES ALL CHANGES APPROVED IN THAT JUDGMENT - ENTERED IN COURT JOURNAL AT ANCHORAGE NO. 817, PAGE 50.

SURVEYOR'S CERTIFICATE:
I, the undersigned registered surveyor, hereby certify that I have surveyed the above described lots and that the same are in accordance with the original survey and that the same are in accordance with the original survey and that the same are in accordance with the original survey.

CASE NO. 6
EXHIBIT C
L. ST. SLIDE REPLAT

67-30
Anchorage
4/24/67
City of Anchorage



APPROVED
[Signature]
CITY ENGINEER

Office of the City Engr
Scale 1" = 100'
Drawn by [Signature]
June 1, 1967
Sheet 1 of 2



127-4R

CASE NO. 6
EXHIBIT D
1. St. SLIDE REPLAT

KNIK ARM

67-30

Anchorage
1/2 Sec 87
City of Anchorage

Office of the Civil Eng.
Scale 1" = 100'
Drawn by [Signature]
Grid 1229, 1528, 1329

Anchorage Assessor
JUNE 1, 1966
Checked by [Signature]
Sheet 2 of 2

57-301 FO 0112 of 2

EARTHQUAKE SHIFTS

CASE NO. 7
SYLMAR EARTHQUAKE RESURVEY
by TRACIE L. MESLOH (HENNON)

This "case" is a part of the thesis written by Tracie Linn Mesloh (now Hennon) and is presented here to indicate the type of information placed on the resurvey plat(s) in the Sylmar Earthquake area in accordance with the Cullen Act. The Cullen Act is simple, as shown in Exhibit [A](#), and gives no guidance to the land surveyor.

Exhibits [B](#), [C](#), [D](#), and [E](#) are copies of the Record of Survey as filed by Mesloh and presented in her thesis. Though different in many technical details, the similarity to the Anchorage "L" St. Replat is obvious.

**CALIFORNIA CODES
CODE OF CIVIL PROCEDURE
PART 2. OF CIVIL ACTIONS
TITLE 10. ACTIONS IN PARTICULAR CASES
CHAPTER 3.6. CULLEN EARTHQUAKE ACT**

§ 751.50. Boundaries of land disturbed by earth movements;
action to reestablish boundaries and to quiet title

If the boundaries of land owned either by public or by private entities have been disturbed by earth movements such as, but not limited to, slides, subsidence, lateral or vertical displacements or similar disasters caused by man, or by earthquake or other acts of God, so that such lands are in a location different from that at which they were located prior to the disaster, an action in rem may be brought to equitably reestablish boundaries and to quiet title to land within the boundaries so reestablished.

CASE NO. 7
EXHIBIT A
CULLEN ACT

SCALE: 1"=60'
1"=20'

SHT. 1 OF 4 SHTS.

RECORD OF SURVEY

IN THE CITY OF LOS ANGELES
COUNTY OF LOS ANGELES, STATE OF CALIFORNIA

BEING A SURVEY OF LOTS 23 TO 27 INCLUSIVE OF TRACT NO. 7922, AS PER MAP RECORDED IN BOOK 116 PAGES 25 AND 26 OF MAPS, AND OF PORTIONS OF BLOCK 73 OF MACLAY RANCHO EX-MISSION OF SAN FERNANDO, AS PER MAP RECORDED IN BOOK 37 PAGES 5 TO 16 INCLUSIVE OF MISCELLANEOUS RECORDS, ALL RECORDS OF LOS ANGELES COUNTY.

FILED
AT REQUEST OF
TRACIE LINN MESLOH
APR 09 1991 21 MIN PAST 3 PM
IN BOOK 124
AT PAGE 57-62
OF RECORD OF SURVEY
LOS ANGELES COUNTY, CA
Registrar-Recorder
BY S. K. Smith
FEE \$ 12.00
91 502869
91-502869

SURVEYOR'S STATEMENT:

THIS MAP REPRESENTS A FIELD SURVEY MADE BY ME OR UNDER MY DIRECTION IN CONFORMANCE WITH THE REQUIREMENTS OF THE LAND SURVEYORS' ACT AT THE REQUEST OF TRACIE LINN MESLOH DURING JANUARY 1991.

Tracie Linn Mesloh 8 April 1991
BY TRACIE LINN MESLOH, PLS NO. 6188 (EXPIRES 3-31-94) DATE



PURPOSE OF SURVEY:

THIS SURVEY REPRESENTS A PRELIMINARY STUDY OF THE EFFECTS OF THE SAN FERNANDO VALLEY 1971 EARTHQUAKE ON PROPERTY BOUNDARIES ALONG HARDING STREET. THIS SURVEY IS BEING MADE FOR ACADEMIC PURPOSES ONLY, AND BECAUSE OUR ACCESS TO THE REAR AREAS OF THE PROPERTY IN QUESTION WAS NOT POSSIBLE, A DETAILED SURVEY INCLUDING THE EVIDENCE OBTAINED ALONG THE REAR PROPERTY LINES MAY CHANGE THE ESTABLISHMENT OF PROPERTY LINES SHOWN HEREON.

COUNTY SURVEYOR'S STATEMENT:

THIS MAP HAS BEEN EXAMINED IN ACCORDANCE WITH SECTION 8766 OF

THE LAND SURVEYORS' ACT THIS 8th DAY OF April 1991.
BY Harold J. Smith
DEPUTY COUNTY SURVEYOR



BASIS OF BEARINGS:

THE BEARING OF N 41°30'15" W ALONG THE CENTERLINE OF FOOTHILL BOULEVARD SHOWN AS MULHOLLAND STREET ON MAP OF TRACT NO. 7922 AS RECORDED IN BOOK 116, PAGES 25 AND 26 OF MAPS, RECORDS OF LOS ANGELES COUNTY, WAS TAKEN AS THE BASIS OF BEARINGS SHOWN ON THIS MAP.

LEGAL DESCRIPTIONS:

PARCEL A
LOT 27 OF TRACT NO. 7922, IN THE CITY OF LOS ANGELES, COUNTY OF LOS ANGELES, STATE OF CALIFORNIA, AS PER MAP RECORDED IN BOOK 116 PAGES 25 AND 26 OF MAPS, RECORDS OF SAID COUNTY.

PARCEL B
LOT 26 OF TRACT NO. 7922, IN THE CITY OF LOS ANGELES, COUNTY OF LOS ANGELES, STATE OF CALIFORNIA, AS PER MAP RECORDED IN BOOK 116 PAGES 25 AND 26 OF MAPS, RECORDS OF SAID COUNTY.

PARCEL C (PER INST. NO. 87-859305, O.R.)
THE SOUTHWESTERLY 45.00 FEET OF LOT 25 OF TRACT NO. 7922, IN THE CITY OF LOS ANGELES, AS PER MAP RECORDED IN BOOK 116, PAGES 25 AND 26 OF MAPS, IN THE OFFICE OF THE COUNTY RECORDER OF SAID COUNTY.

PARCEL D (PER INST. NO. 80-329858, O.R.)
IN THE CITY OF LOS ANGELES, COUNTY OF LOS ANGELES, STATE OF CALIFORNIA

PARCEL 1
LOT 24 OF TRACT NO. 7922 AS PER MAP RECORDED IN BOOK 116, PAGES 25 AND 26 OF MAPS, IN THE OFFICE OF THE COUNTY RECORDER OF SAID COUNTY.

PARCEL 2
LOT 25 OF TRACT NO. 7922 AS PER MAP RECORDED IN BOOK 116, PAGES 25 AND 26 OF MAPS, IN THE OFFICE OF THE COUNTY RECORDER OF SAID COUNTY.
EXCEPT THE SOUTHWESTERLY 45.00 FEET THEREOF.

PARCEL E
LOT 23 OF TRACT NO. 7922, IN THE CITY OF LOS ANGELES, COUNTY OF LOS ANGELES, STATE OF CALIFORNIA, AS PER MAP RECORDED IN BOOK 116, PAGES 25 AND 26 OF MAPS, RECORDS OF SAID COUNTY.

PARCEL F (INST. NO. 81-658762, O.R.)
IN THE CITY OF LOS ANGELES, COUNTY OF LOS ANGELES, STATE OF CALIFORNIA
THAT PORTION OF BLOCK 73 OF THE MACLAY RANCHO EX-MISSION OF SAN FERNANDO, AS PER MAP RECORDED IN BOOK 37, PAGE 5 ET SEQ. OF MISCELLANEOUS RECORDS, IN THE OFFICE OF THE COUNTY RECORDER OF SAID COUNTY, DESCRIBED AS FOLLOWS:
BEGINNING AT THE MOST EASTERLY CORNER OF SAID BLOCK 73; THENCE NORTHWESTERLY ALONG FOOTHILL BOULEVARD 100 FT; THENCE SOUTHWESTERLY PARALLEL WITH THE SOUTHEASTERLY LINE OF SAID BLOCK, 360 FT TO THE NORTHEASTERLY LINE OF TRACT NO. 7922, AS PER MAP RECORDED IN BOOK 116 PAGES 25 AND 26 OF MAPS, IN THE OFFICE OF THE COUNTY RECORDER OF SAID COUNTY; THENCE SOUTHEASTERLY 100 FT. ALONG SAID NORTHEASTERLY LINE TO THE SOUTHEASTERLY LINE OF SAID BLOCK 73; THENCE NORTHEASTERLY ALONG SAID SOUTHEASTERLY LINE 360 FT TO THE POINT OF BEGINNING. EXCEPTING THEREFROM THE NORTHEASTERLY 300 FT OF SAID BLOCK.

LEGAL DESCRIPTIONS:

PARCEL G (NO DEED OBTAINED)

PARCEL H (PER INST. NO. 77-807398, O.R.)
IN THE CITY OF LOS ANGELES, COUNTY OF LOS ANGELES, STATE OF CALIFORNIA
THE SOUTHWESTERLY 50 FEET OF THE NORTHEASTERLY 250 FEET OF THAT PORTION OF BLOCK 73 OF MACLAY RANCHO EX-MISSION OF SAN FERNANDO, AS PER MAP RECORDED IN BOOK 37, PAGE 5 ET SEQ. OF MISCELLANEOUS RECORDS, IN THE OFFICE OF THE COUNTY RECORDER OF SAID COUNTY, DESCRIBED AS FOLLOWS:
BEGINNING AT THE MOST EASTERLY CORNER OF SAID BLOCK 73; THENCE NORTHWESTERLY ALONG MULHOLLAND STREET (NOW FOOTHILL BOULEVARD), 100 FEET; THENCE SOUTHWESTERLY, PARALLEL WITH THE SOUTHEASTERLY LINE OF SAID BLOCK 360 FEET TO THE NORTHEASTERLY LINE OF TRACT 7922, AS PER MAP RECORDED IN BOOK 116 PAGES 25 AND 26 OF MAPS, IN THE OFFICE OF THE COUNTY RECORDER OF SAID COUNTY; THENCE SOUTHEASTERLY 100 FEET ALONG THE SAID NORTHEASTERLY LINE TO THE SOUTHEASTERLY LINE OF SAID BLOCK 73; THENCE NORTHEASTERLY ALONG SAID SOUTHEASTERLY LINE 360 FEET TO THE POINT OF BEGINNING.

PARCEL I (PER INST. NO. 90-2062955, O.R.)

PARCEL J (PER INST. NO. 492, REC. IN BK D2256 PG 601, O.R.)
THE SOUTHWESTERLY 50 FEET OF THE NORTHEASTERLY 150 FEET OF THAT PORTION OF BLOCK 73 OF THE MACLAY RANCHO EX-MISSION OF SAN FERNANDO, IN THE CITY OF LOS ANGELES, COUNTY OF LOS ANGELES, STATE OF CALIFORNIA, AS PER MAP RECORDED IN BOOK 37, PAGE 5, ET SEQ. OF MISCELLANEOUS RECORDS IN THE OFFICE OF THE COUNTY RECORDER OF SAID COUNTY, DESCRIBED AS FOLLOWS:
BEGINNING AT THE MOST EASTERLY CORNER OF SAID BLOCK 73; THENCE NORTHWESTERLY ALONG MULHOLLAND STREET (NOW FOOTHILL BOULEVARD), 100 FEET; THENCE SOUTHWESTERLY, PARALLEL WITH THE SOUTHEASTERLY LINE OF SAID BLOCK 360 FEET TO THE NORTHEASTERLY LINE OF TRACT 7922, AS PER MAP RECORDED IN BOOK 116 PAGES 25 AND 26 OF MAPS, IN THE OFFICE OF THE COUNTY RECORDER OF SAID COUNTY; THENCE SOUTHEASTERLY 100 FEET ALONG THE SAID NORTHEASTERLY LINE TO THE SOUTHEASTERLY LINE OF SAID BLOCK 73; THENCE NORTHEASTERLY ALONG SAID SOUTHEASTERLY LINE 360 FEET TO THE POINT OF BEGINNING.

PARCEL K (NO DEED OBTAINED)

TECHNICAL NOTES:

1. NOTHING FOUND OR SET AT ANY CORNER OR POINT UNLESS NOTED.
2. PARCEL LETTER DESIGNATIONS ARE SHOWN HEREON AS A REFERENCE AID ONLY, AND ARE NOT TO BE USED IN THE DESCRIPTION OF PROPERTY FOR LEGAL PURPOSES.
3. THIS SURVEY IS CONCERNED WITH THE FEB. 9, 1971 SAN FERNANDO VALLEY EARTHQUAKE, AND COMPARES THE PRE QUAKE AND POST QUAKE CITY OF LOS ANGELES ENGINEER'S SURVEYS WITH A FIELD SURVEY MADE BY HENNON AND ASSOCIATES UNDER THE DIRECTION OF FIRM PRINCIPAL MS. TRACIE LINN MESLOH, PLS. THE RESULTS SHOW THAT THE C/L DISTANCE ALONG HARDING STREET BETWEEN BROMONT AVENUE AND FOOTHILL BOULEVARD HAS BEEN COMPRESSED BY 5.5 FEET (SEE PAGE TWO HEREOF.) PAGES THREE AND FOUR HEREOF SHOW HOW THIS LAND DEFORMATION HAS AFFECTED PROPERTY HOLDINGS, AND HOW THE OCCUPATION OF SAID PROPERTIES MAY BE RECONCILED WITH THE UNDERLYING RECORD LINES.
4. LEGAL DESCRIPTIONS TO PARCELS "G", "I", AND "K" ARE NOT SHOWN HEREON AS SAID PARCELS ARE ESTABLISHED BY ADJOINING DEEDS.

53-B-2

THOM. GUIDE 3-44
CITY D.M. 218-157/222-157
FILE: 974RS1
PROJECT NO. 974

HENNON and Associates 313 SOUTH BEACHWOOD DRIVE
BURBANK, CALIFORNIA 91508
(818)566-9844 (213)664-2513
SURVEYING - ENGINEERING - PLANNING

CASE NO. 7
EXHIBIT B
SYLMAR
EARTHQUAKE

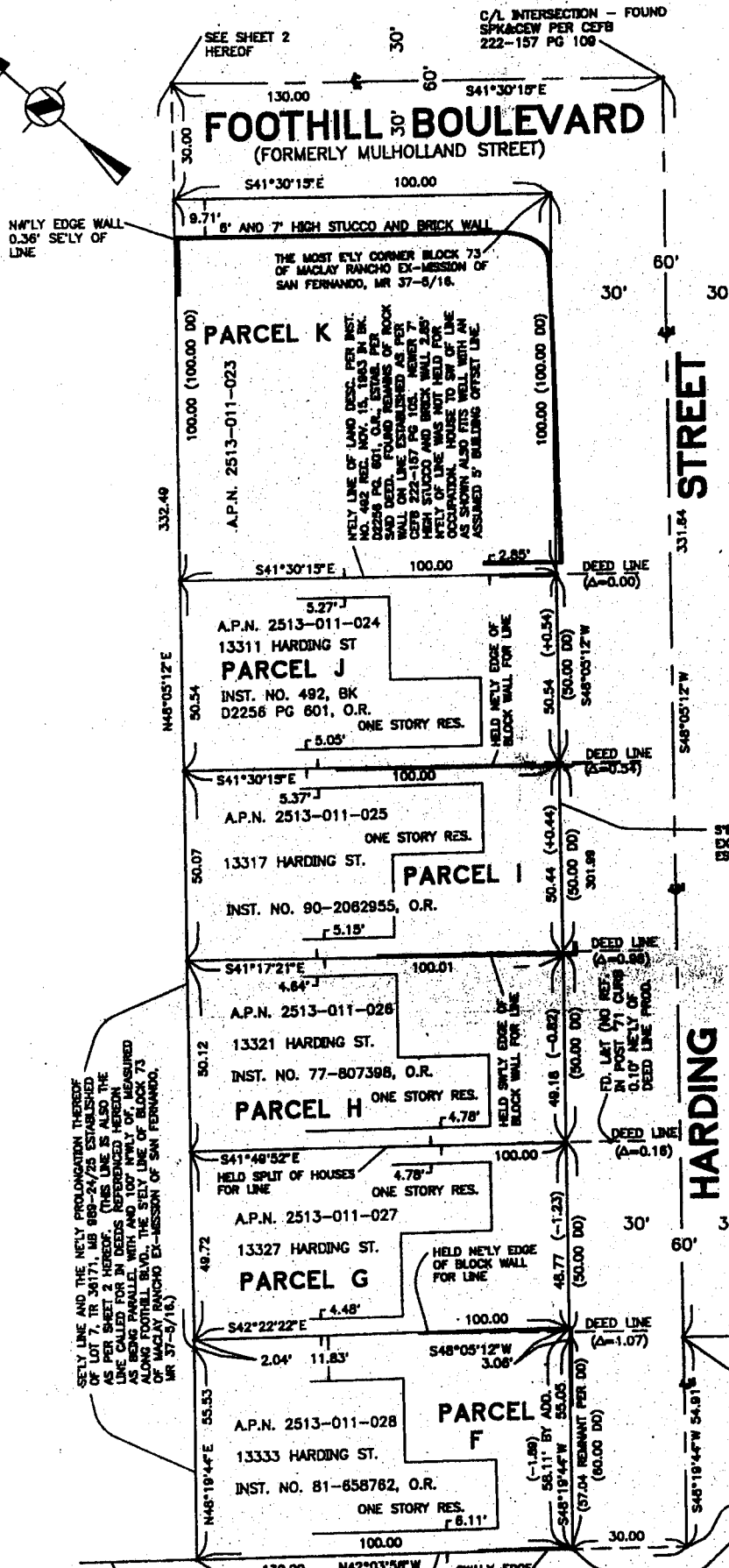
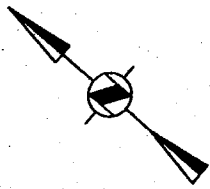
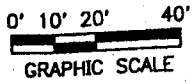
white 29

SCALE: 1"=20'

SHT. 4 OF 4 SHTS.

RECORD OF SURVEY

IN THE CITY OF LOS ANGELES
COUNTY OF LOS ANGELES, STATE OF CALIFORNIA



LEGEND:

- CEFB - CITY OF LOS ANGELES ENGINEER FIELD BOOK AS NOTED
- SPK&CW - SPIKE AND CITY ENGINEER WASHER
- C.L. FENCE - CHAIN LINK FENCE
- P/L - PROPERTY LINE
- LM - LEAD AND TACK SURVEY MONUMENT
- (XXX DD) - INDICATES A DISTANCE PER DEED OR IMPLIED BY DEED
- (+/- XXX) - INDICATES THE DIFFERENCE BETWEEN MEASURED AND RECORD DISTANCE.
- (Δ=XXX) - INDICATES THE DIFFERENCE BETWEEN THE PROPERTY LINE AS ESTABLISHED HEREON AND WHERE THE PROPERTY LINE WOULD FALL PER DEED.
- A.P.N. - ASSessor PARCEL NUMBER
- O.R. - OFFICIAL RECORDS, RECORDS OF LOS ANGELES COUNTY

NOTE: ALL BEARINGS AND DISTANCES SHOWN HEREON ARE FIELD MEASURED OR DERIVED FROM FIELD MEASUREMENTS UNLESS NOTED.

TECHNICAL NOTES:

1. THIS SURVEY REPRESENTS A PRELIMINARY STUDY OF THE EFFECTS OF THE SAN FERNANDO VALLEY 1971 EARTHQUAKE ON PROPERTY BOUNDARIES ALONG HARDING ST. BECAUSE OUR ACCESS TO THE REAR AREAS OF THE PROPERTY IN QUESTION WAS NOT POSSIBLE, A DETAILED SURVEY INCLUDING THE EVIDENCE OBTAINED ALONG THE REAR PROPERTY LINES MAY CHANGE THE ESTABLISHMENT OF PROPERTY LINES SHOWN HEREON.
2. SEE SHEETS ONE, TWO, AND THREE OF THIS SURVEY FOR ADDITIONAL NOTES AND INFORMATION.
3. PARCEL LETTER DESIGNATIONS ARE SHOWN HEREON AS A REFERENCE AND ONLY, AND ARE NOT TO BE USED IN THE DESCRIPTION OF PROPERTY FOR LEGAL PURPOSES.
4. BECAUSE OF THE NONLINEAR DISTORTION OF THE LAND IN THIS AREA, HOLDING RECORD DEED CALLS WILL RESULT IN INEQUITIES TO CERTAIN LAND OWNERS. THEREFORE, WE ESTABLISHED THE PROPERTY LINES SHOWN HEREON BY HOLDING OCCUPATION AS EVIDENCED BY IMPROVEMENTS AS SHOWN.

SE'LY LINE AND THE NELY PROLONGATION THEREOF OF LOT 7, TR 36171, MB 989-24/18 AS ESTABLISHED AS PER SHEET 2 HEREOF. THIS LINE IS ALSO THE NELY LINE CALLED FOR IN PARAGRAPHS 1 AND 2 OF THE INSTRUMENT DATED 10/17/18, MEASURING ALONG FOOTHILL BLVD., THE SE'LY LINE OF BLOCK 73 OF MACLAY RANCHO EX-MISSION OF SAN FERNANDO, MR 37-8/18.

C/L INTERSECTION AND POST EARTHQUAKE ANGLE POINT IN C/L OF HARDING STREET. FOUND SPK&CW PER CEFB 219-157 PG 114

SEE SHEET 2 HEREOF
ELY CORNER LOT 23-TR 7922, MB 116-25/28 (AND TRACT BOUNDARY). FOUND AND ACCEPTED AS ORIGINAL 2" IRON PIPE W/WOOD PLUG DOWN 0.25' UNDER CONC. PVMT. PER SAID TR 7922. REPLACED CONCRETE OVER PIPE.

SEE SHEET 3
NELY LINE LOT 23 TR 7922, MB 116-25/28 ESTAB. AS PER SHEET 2 HEREOF. THIS LINE IS ALSO NELY BOUNDARY OF SAID TR 7922.

THOM GUYER - S.A.
CITY D.M. 219-157/222-157
FILE: 874854
PROJECT NO. 874

HENNON and Associates
313 SOUTH BEACHWOOD DRIVE
BURBANK, CALIFORNIA 91506
(818)566-8844 (213)664-2513
SURVEY - ENGINEER - PLANS

CASE NO. 7
EXHIBIT E
SYLMAR
EARTHQUAKE

wh 4 a