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FINAL ENVIRONMENTAL PLANNING
TECHNICAL REPORT

BIOLOGICAL RESOURCES

January 1984

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PREFACE

The President has directed that the Air Force deploy the Peacekeeper missile system at a location near F.E. Warren Air Force Base (hereafter F.E. Warren AFB), close to Cheyenne, Wyoming. The Peacekeeper system (formerly known as the M-X system) is an advanced, land-based intercontinental ballistic missile. The plan calls for the replacement of 100 existing Minuteman III missiles with 100 Peacekeeper missiles. Existing missile silos will be used, and there will be very little structural modification needed. Missile replacement will occur within the two squadrons (of 50 missiles each) located nearest F.E. Warren AFB, the 319th and 400th Strategic Missile Squadrons. Peacekeeper deployment will occur between 1984 and 1989.

An environmental impact statement (EIS) was prepared for the Proposed Action as outlined above. Information contained in the EIS is based upon environmental information and analysis developed and reported in a series of 13 final environmental planning technical reports (EPTRs). This volume is one of those reports. The 13 resource areas are:

- Socioeconomics (employment demand, housing, public finance, construction resources, and social well-being);
- Public Services and Facilities;
- Utilities;
- Energy Resources;
- Transportation;
- Land Use (land use, recreation, and visual resources);
- Cultural and Paleontological Resources;
- Water Resources;
- Biological Resources;
- Geologic Resources;
- Noise;
- Air Quality;
- Jurisdictional.

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1.0 INTRODUCTION

This final environmental planning technical report (EPTR) is a companion document to the biological resources section of the final environmental impact statement (FEIS) for the Peacekeeper in Minuteman Silos project. It provides data, methodologies, and analyses which supplement and extend those presented in the FEIS.

This final EPTR consists of six major sections. Section 1.0 provides an overview of the Peacekeeper in Minuteman Silos project and a description of the biological resources and their elements.

Section 2.0 presents a detailed description of the environment potentially affected by the project. It includes a capsule description of the environmental setting (Section 2.1) and project requirements (Section 2.2). Section 2.3 defines the Region of Influence and Area of Concentrated Study for the resource. Section 2.4 (Derivation of Data Base) follows with a discussion of the literature sources, group and agency contacts, and primary data which provide the data base for the report. Section 2.5 describes analytic methods used to determine existing environmental conditions in the Region of Influence. Detailed analyses of the existing environment, broken down by constituent elements of the resource, follow in Section 2.6.

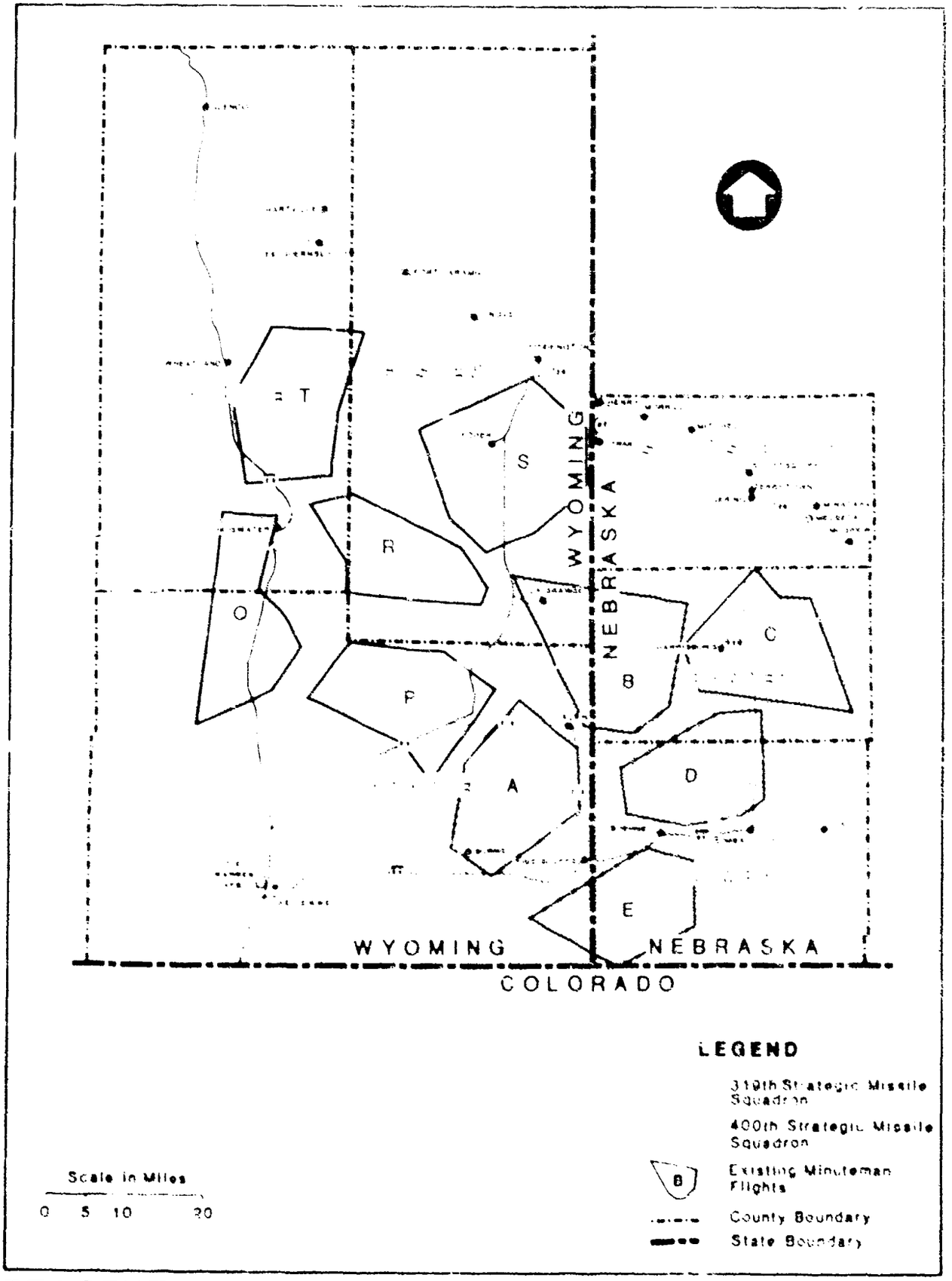
Section 3.0 describes environmental consequences of the Proposed Action and its project element alternatives, the No Action Alternative, mitigation measures, and unavoidable impacts. It contains detailed definitions of each potential level of impact (negligible, low, moderate, and high) for both short-term and long-term impacts. Beneficial effects are also discussed. Definitions of significance are also included. Methods used for analyzing future baseline and project impacts are described, as are assumptions and assumed mitigations. Additional mitigation measures to reduce project impacts are also described.

Sections 4.0 (Glossary), 5.0 (References), and 6.0 (List of Preparers) conclude the EPTR.

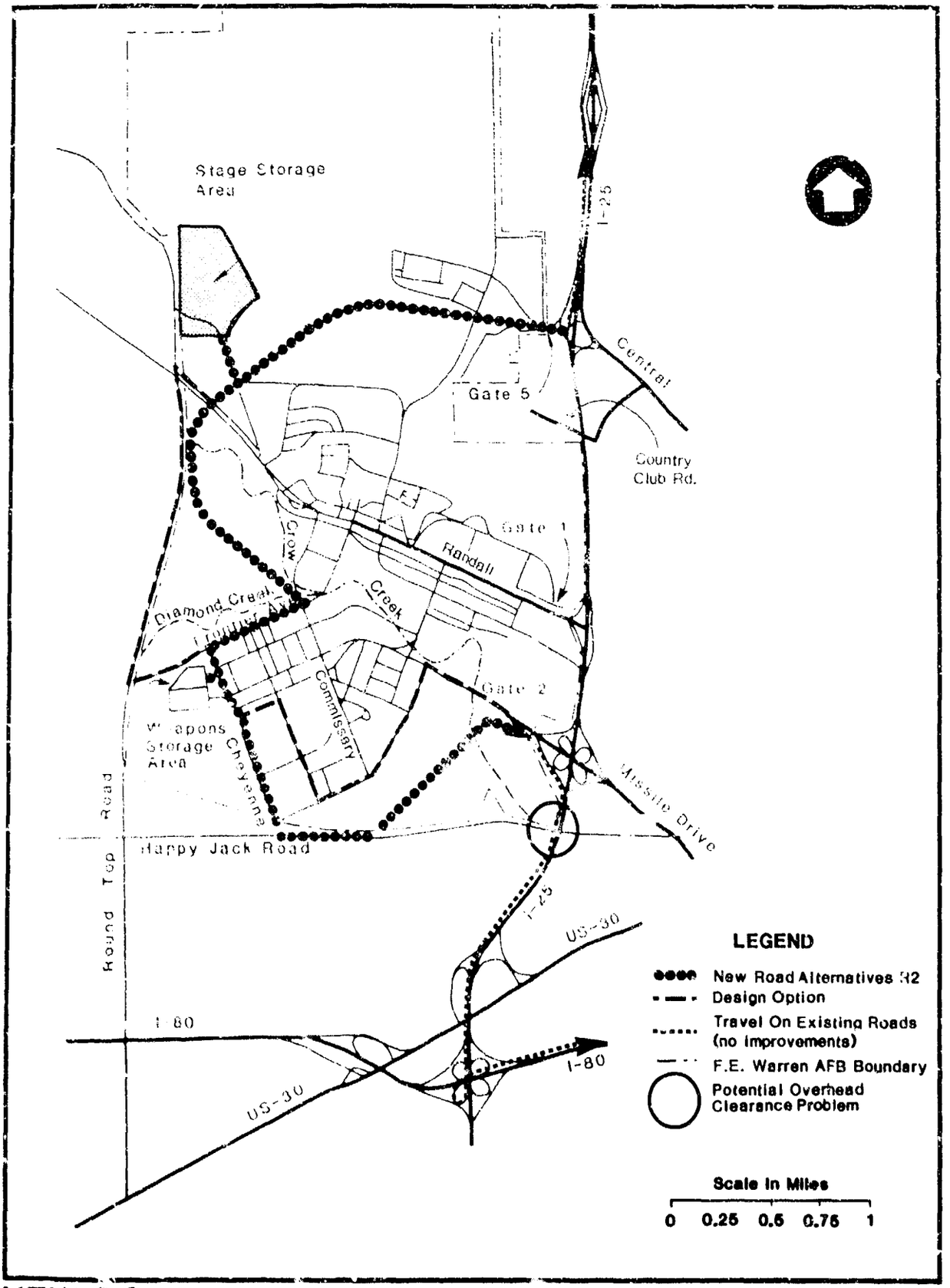
1.1 Peacekeeper in Minuteman Silos

The Peacekeeper system, which the Air Force plans to deploy within the 90th Strategic Missile Wing at F.E. Warren Air Force Base (AFB), Wyoming, is an advanced land-based intercontinental ballistic missile system designed to improve the nation's strategic deterrent force. Deployment of the Peacekeeper calls for replacement of 100 existing Minuteman III missiles with 100 Peacekeeper missiles. Missile replacement will occur in the 319th and 400th Strategic Missile Squadrons, located nearest F.E. Warren AFB (Figure 1.1-1). The Deployment Area covers parts of southeastern Wyoming and the southwestern Nebraska Panhandle.

Construction at F.E. Warren AFB will occur between 1984 and 1986. Fourteen new buildings will be constructed, and modifications or additions will be made to 11 existing buildings. Approximately 400,000 square feet of floor space will be built or modified. A new road configuration, to be selected from three alternatives, is proposed to link Peacekeeper facilities onbase and to provide improved access to or from the base (Figures 1.1-2, 1.1-3, and 1.1-4).

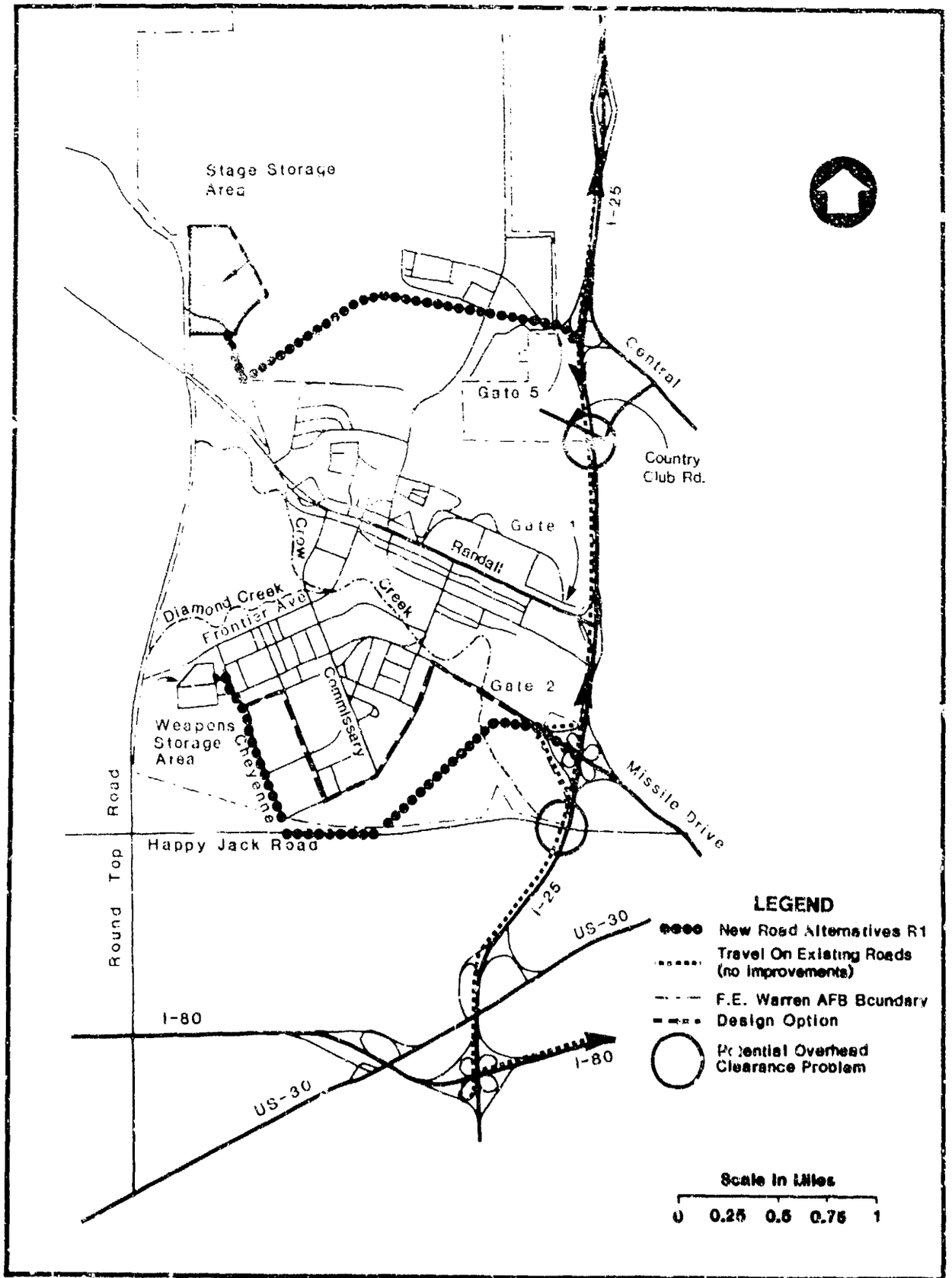


PEACEKEEPER DEPLOYMENT AREA FIGURE NO. 1.1-1



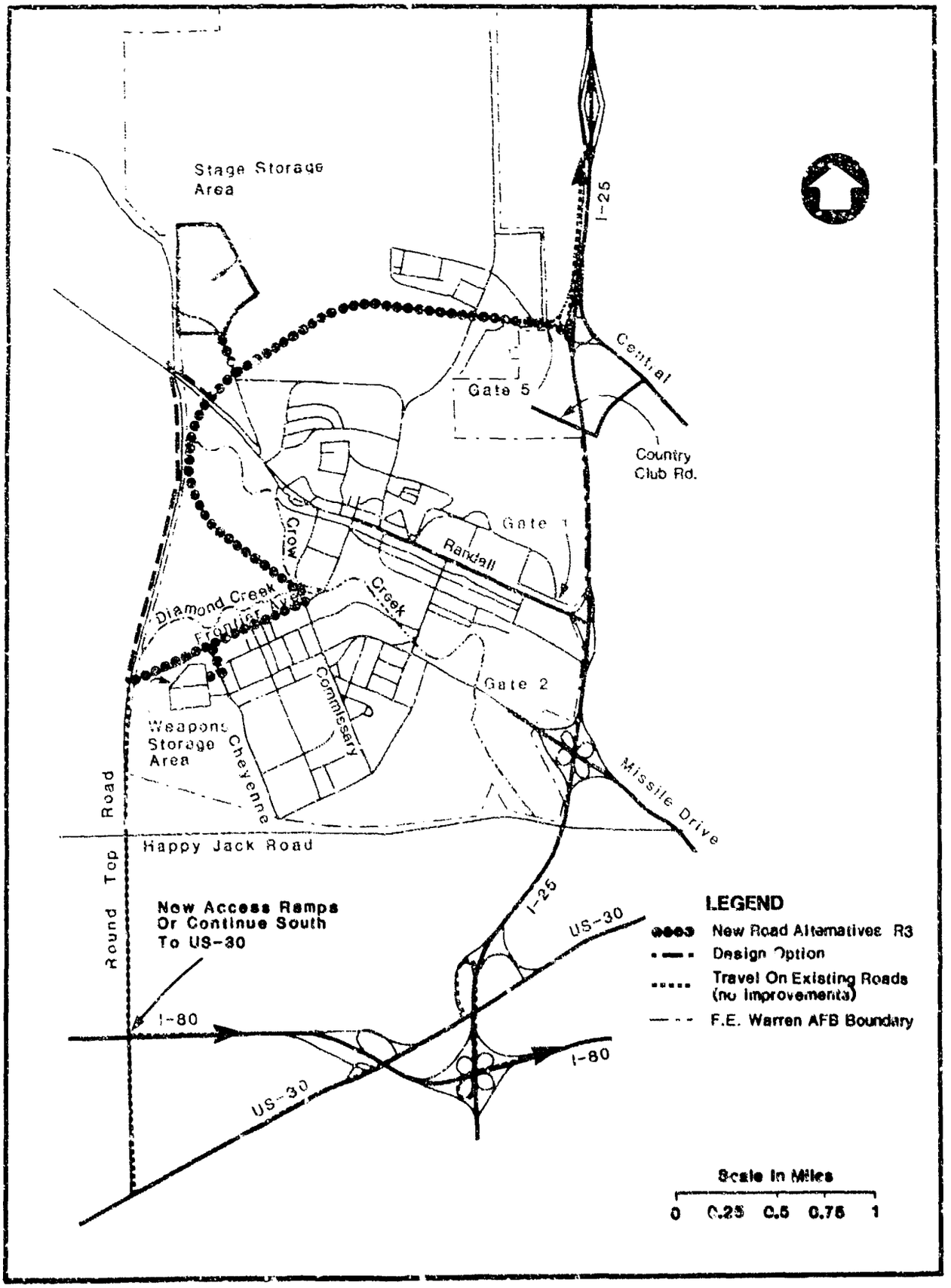
NEW ROADS AT F.E. WARREN AFB: PROPOSED ACTION R2

FIGURE NO. 1.1-2



NEW ROADS AT F.E. WARREN AFB: ALTERNATIVE R1

FIGURE NO. 1.1-3



NEW ROADS AT F.E. WARREN AFB:
ALTERNATIVE: R3

FIGURE NO.
1.1-4

Work in the Deployment Area will take place between 1985 and 1989. Many of the access roads to the Launch Facilities will be upgraded. Bridge clearance problems will be corrected, and some culverts and bridges may need to be upgraded. Below-ground modifications will be related to removal of Minuteman support hardware, insertion of a protective canister to enclose the Peacekeeper, and installation of communications systems and support equipment.

A total of 11 alternatives have been chosen as candidate routes for communication connectivity between Squadrons 319 and 400 (Figure 1.1-5). Five routes will be selected for installation. Total buried cable length will range from approximately 82 to 110 miles, depending upon final route selections.

Under the Proposed Action two dispatch stations would be established, one each in the northern and eastern portions of the Deployment Area. Although actual locations have not been selected, Chugwater, Wyoming and Kimball, Nebraska are representative locations analyzed in the Final Environmental Impact Statement and in this EPTR. Dispatch stations would be not more than 5 acres in size and would be used for the temporary open storage of equipment and material. One or more buildings would also be present at each site for contractor use as office space. All dispatch stations would be removed prior to project completion. In addition to the Proposed Action, two alternatives are considered in this environmental impact assessment:

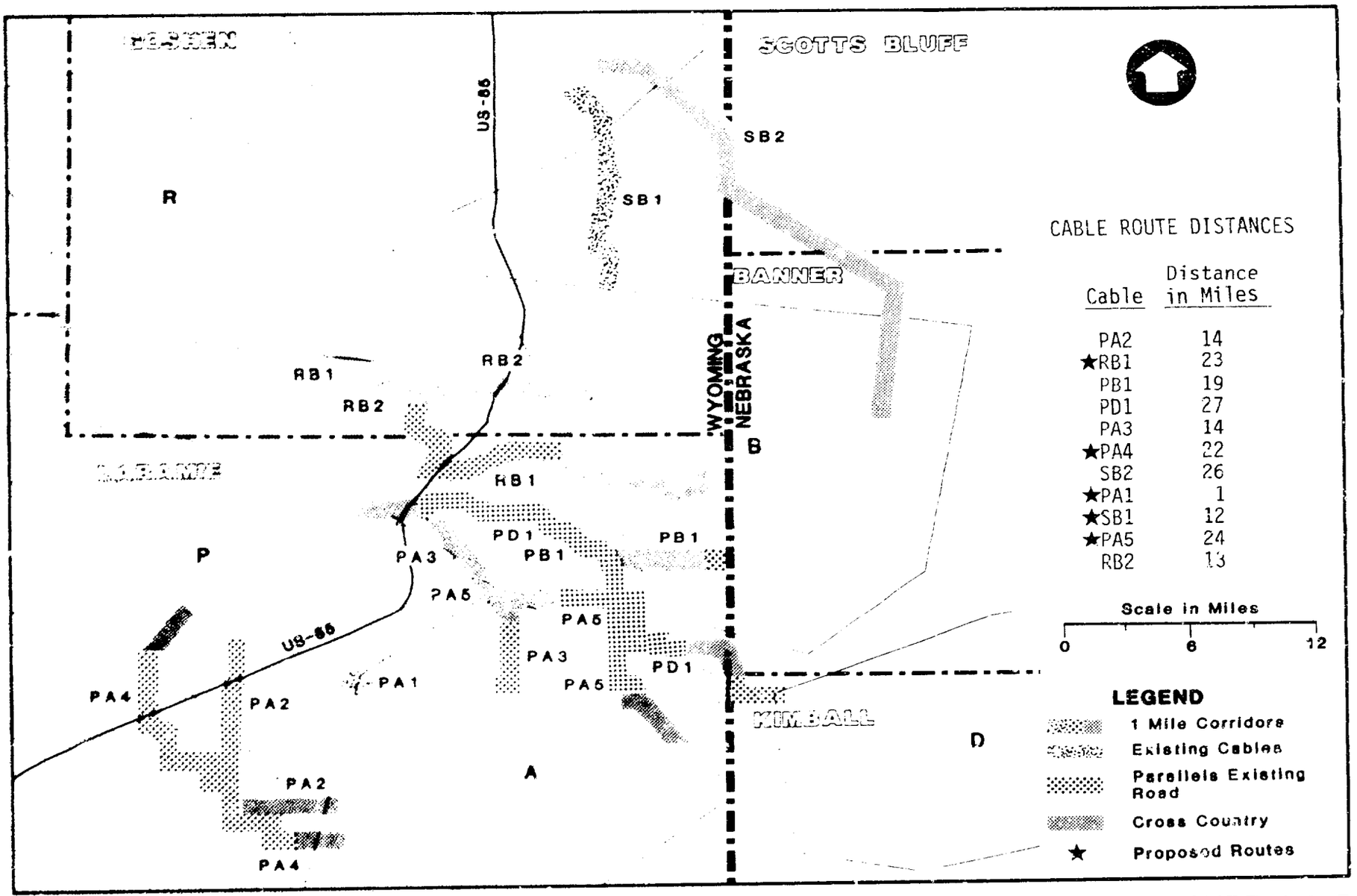
1) One dispatch station only, in the eastern part of the Deployment Area; or

2) No dispatch stations.

Two options have been identified for resurfacing Deployment Area roads. Surfacing Option A involves gravel upgrades of 252 miles of existing gravel roads and the paving or repaving of 390 additional miles of gravel and asphalt roads. Surfacing option B involves the paving or repaving of all 642 miles of gravel and asphalt roads listed in Surfacing Option A.

Direct manpower for construction, assembly and checkout, and operation of the system will peak during 1986 when an average of nearly 1,600 persons will be required. In 1991, following deployment, the remaining increased operational workforce at F.E. Warren AFB will consist of about 475 persons Table 1.1-1 presents the average annual workforce, based on quarterly estimates for each year of construction.

Table 1.1-2 shows the average number of jobs including those which are considered to be filled by available labor; as well as those filled by weekly commuters and immigrants, on an annual average basis. In general, locally available labor will fill all the road and construction jobs.



ALTERNATIVE CABLE ROUTES

FIGURE 1.1-5

Table 1.1-1

PROJECT AVERAGE MANPOWER REQUIREMENTS BY YEAR[1]

1991		1984	1985	1986	1987	1988	1989	1990
Deployment Area								
Construction	5	40	60	60	40	0	0	0
Assembly and Checkout	0	15	210	285	265	265	10	0
Operations	0	0	0	0	0	0	0	0
Defense Access Road	0	275	315	150	0	0	0	0
Subtotal	5	330	585	495	305	265	10	0
Operating Base								
Construction	100	630	70	0	0	0	0	0
Assembly and Checkout	40	130	525	555	515	510	22	0
Operations	0	130	415	490	500	500	475	475
Subtotal	140	890	1,010	1,045	1,015	1,010	497	475
TOTAL:	145	1,220	1,595	1,540	1,320	1,275	507	475

Note: [1] Estimates based on average quarterly employment.

Table 1.1-2

TOTAL JOBS, LOCAL AND REGIONAL HIRES, AND INMIGRATION FOR THE EMPLOYMENT DEMAND REGION OF INFLUENCE

	1984	1985	1986	1987	1988	1989	1990	1991 and beyond
1) Total (Direct/ Indirect) Additional Jobs	250	2,400	2,675	2,550	2,025	1,825	650	590
2) Average Annual Local Hires	157	1,750	1,525	1,350	1,100	815	225	230
3) Average Annual Weekly Commuters	25	225	175	100	25	10	0	0
4) Average Annual Inmigrant Workers	75	425	950	1,100	925	1,000	425	360
5) Unsuccessful Job-Seekers	30	185	180	150	165	110	70	0
6) Inmigrant[1] Population	275	1,475	2,875	3,200	3,025	2,875	1,200	925

Note: [1] Includes inmigrants, workers, and unsuccessful job-seekers.

As a result of the purchase of materials in the project area and the local expenditures of project employees, additional jobs will be created in the region. These jobs are estimated to number as follows:

Year:	1984	1985	1986	1987	1988	1989	1990	1991 & on
Indirect Jobs:	105	1,180	1,080	1,010	705	550	143	115

Estimated materials and costs for the project, based on total project budgetary considerations, are shown by Standard Industrial Classification in Table 1.1-3.

A number of construction and support materials will be obtained from sources within the project area. Among the materials exerting a major influence on assessment of project impacts are aggregate (4.6 million tons), water (516 acre-feet), fuel (7.6 million gallons), and electricity (3.8 million kWh). In the case of water supply for construction, the Air Force will identify and, if necessary, obtain permits for the water or purchase existing water rights.

1.2 Description of the Resources

Biological resources include the major components of the terrestrial and aquatic ecosystems potentially affected by the proposed project. Ecosystem components discussed include vegetation, wildlife, and fisheries. Important features, such as unique and sensitive habitat, threatened and endangered species (plant and animal), and big game populations are also included in the discussion of biological resources. The emphasis of the data analysis is on major vegetation types, important fish and wildlife species, and species with special status.

1.2.1 Vegetation

Vegetation resources include short-grass prairie, mixed-grass prairie, riparaian/wetlands, woodlands, shrubland, and rock outcrops.

1.2.2 Wildlife

Wildlife resources include big game, furbearers, nongame mammals, upland game, waterfowl, raptors, other birds, and reptiles and amphibians.

1.2.3 Fisheries

Fisheries resources include physical components of the environment as well as biological characteristics on a regional and local level.

1.2.4 Unique and Sensitive Habitats

Unique and sensitive habitats are habitats considered to be unique or sensitive because of such characteristics as their limited areal extent, their support of specialized uses by wildlife, or their support of rare, threatened, or endangered species.

Table 1.1-3

ESTIMATED MATERIAL REQUIREMENTS
BY STANDARD INDUSTRIAL CLASSIFICATION

Industrial Classification	Estimated 1982 Dollars (1,000s)
Fabricated Structural Metal	$22,999
Unclassified Professional Services and Products	14,358
Cement and Concrete Products	10,862
General Wholesale Trade	8,890
Structural Metal Products[1]	11,983
Millwork, Plywood, and Wood Products[1]	3,941
Copper, Copper Products	3,902
Electrical Lighting and Wiring	3,871
Stone and Clay Mining and Quarrying	39,728
Stone and Clay Products[1]	2,955
Basic Steel Products	1,233
Heating and Air Conditioning Apparatus	1,525
Plumbing and Plumbing Fixtures	938
Petroleum Refining and Products	5,148
Material Handling Equipment	1,970
Sawmills and Planing Mills	1,478
Paints and Allied Products	1,478
Plastic Products[1]	1,478
Furniture and Fixtures	986
Structural Clay Products	986
General Hardware	986
Scientific Instruments	986
Rail Transport	986
Real Estate	986
Construction, Mining, and Oilfield Machinery	749
TOTAL:	$145,402

Note: [1] Not included in other Industrial Classifications.

1.2.5 Threatened and Endangered Species

Threatened and endangered species are species listed, proposed, or in a study category for listing as threatened or endangered by the U.S. Fish and Wildlife Service, listed as rare, threatened, or endangered by state agencies, or listed as rare threatened, or endangered by other specialized programs.

2.0 AFFECTED ENVIRONMENT

2.1 General

The area within which the proposed project and project alternatives may directly affect biological resources is dominated by short-grass prairie vegetation. Riparian vegetation, ponderosa pine woodlands, and shrublands occur on a more restricted basis due to their soil and moisture requirements. A variety of additional vegetation types occurs within the region. The vegetation types in the areas potentially affected by the proposed project support a variety of wildlife species including big game, medium sized and small mammals, waterfowl, raptors, other birds, amphibians, and reptiles. Fisheries resources potentially affected directly and indirectly by the proposed project range from Class I to Class IV (USFWS 1978-a,b,c,d). Important fisheries include Seminoe and Glendo reservoirs, the North Platte River and the Laramie Plains Lakes in Wyoming, and Oliver Reservoir in Nebraska. Portions of the streams which are directly affected by the project support sport fisheries, while others support rough fish. These streams tend to be shallow with low cover habitats and support relatively low numbers of fish species.

Unique and sensitive habitats present in the area include specific vegetation, such as riparian vegetation, and broader based habitat types such as big game critical winter range. Federal threatened and endangered species potentially present include the black-footed ferret, bald eagle, whooping crane, and peregrine falcon. In addition, two species listed as Federal Category One, Laramie false sagebrush and the Colorado butterfly plant, occur within the project region.

The project Region of Influence (ROI) (Section 2.3) and the existing conditions of biological resources (Section 2.6) within it are discussed in more detail.

2.2 Project Requirements

Overall project requirements are outlined in Section 1.1. Requirements specific to the biological resources are as follows.

The project will disturb about 1,700 acres of disturbed and undisturbed land surface out of approximately 3,390,000 acres in the Area of Concentrated Study (ACS), and therefore will cause impacts on vegetation, wildlife, and fisheries resources. Over 50 percent of the land surface within the ACS is currently disturbed. The estimate of the amount of land disturbed by the project is based on an evaluation of the impacts along about 400 miles of potentially upgraded road corridor, of about 90 to 130 miles of cable paths, and of the facilities to be constructed at F.E. Warren Air Force Base (AFB). Road acreages were calculated only for road links within the ACS that require widening. The Defense Access Road (DAR) Resurfacing Options A and B (partial paving, or paving, respectively) will not produce different biological impact levels between options. Therefore, these options are not separated in discussions of road upgrade/modifications. Cable acreages were based on a 35-foot area of disturbance. The estimate for F.E. Warren AFB is based on evaluation of road and utility corridors as well as the approximate area to be fenced around the Weapons Storage Area (WSA) and the Stage Storage Area

(SSA). The effects of these impacts and others will be discussed in Section 3.0 of this Biological Environmental Planning Technical Report (EPTR).

2.3 Region of Influence

2.3.1 Definition

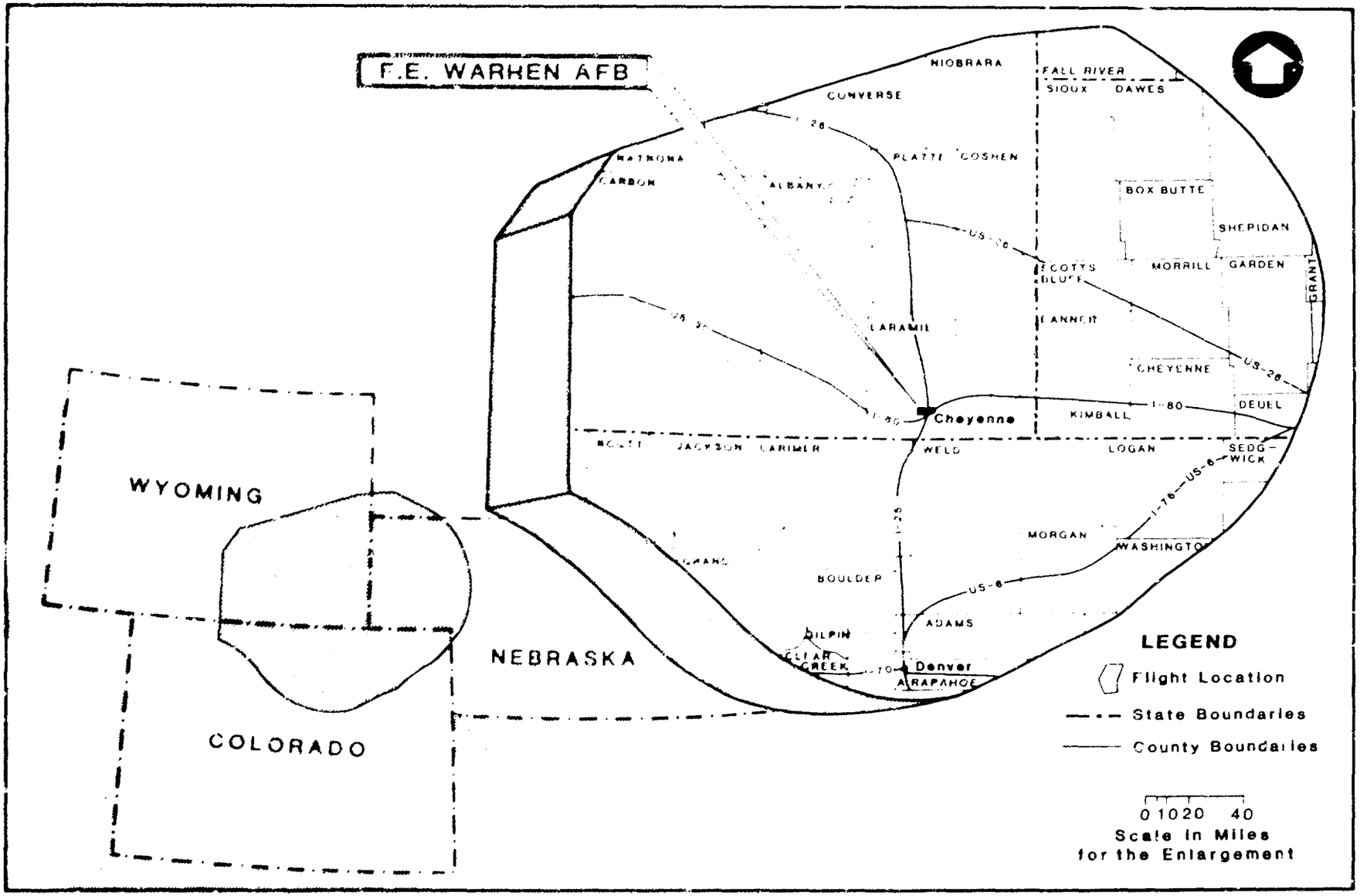
The ROI for biological resources is defined to include those areas where resources may be directly or indirectly affected by deployment of the project. The ROI is defined as an irregularly shaped polygon generated by extending 100-mile radii from Cheyenne, Wyoming, and the Scottsbluff/Gering area of Nebraska. These two locations were selected because they are projected to receive a number of project-generated inmigrants. The ROI includes portions of four states: Wyoming, Nebraska, Colorado, and South Dakota (Figure 2.3.1-1).

Within this broad ROI, an ACS consists of two disjunct areas which include locations where the majority of direct impacts to biological resources will take place. The first is an irregular polygon formed by a line linking the outermost perimeters of the ten missile Flights (the Flight portion of the ACS). The second is F.E. Warren AFB. Existing Minuteman silos, roadways designated for project use, and the disjunct F.E. Warren AFB will be considered as site-specific areas within the ACS.

2.3.2 Justification

The shape and boundaries of the ROI are based on input obtained through discussions with public agency personnel, concerns expressed by the public during the scoping process for the environmental impact statement (EIS), and a review of the data generated by the recreational resources component of the land use task group. This input provides the basis for establishing ROI borders about 100 miles from population centers. Project impacts of greatest geographic extent appear to be caused by sportsmen who travel to reach desirable hunting and fishing areas. Such travel usually does not exceed a distance of 100 miles, except where particularly attractive areas exist beyond this distance. The boundaries of the ROI are established at a distance of 100 miles from Scottsbluff/Gering and Cheyenne, extending to 150 miles west of Cheyenne to include Seminoe, Alcova, and Pathfinder reservoirs.

The ACS, incorporating the Flights and the site-specific locations within them, is based on those areas where direct effects due to road modifications, silo upgrading, and communication path construction will take place. The F.E. Warren AFB portion of the ACS includes those portions of the base and adjacent areas where direct impacts due to modification, upgrade, and construction of facilities for the project will take place. Location of the project Flights used in preparing this ROI was based on map data showing existing Minuteman silos and affected roadways. The Flight boundaries were used to delineate the Flight portion of the ACS (Figure 2.3.1-1). The F.E. Warren AFB portion of the ACS includes those areas of the base where facility modifications, upgrade, or construction will take place, as well as closely adjacent roadways and/or interchanges that may be affected by the proposed project.



REGION OF INFLUENCE FOR BIOLOGICAL RESOURCES

FIGURE NO. 2.3.1-1

2.4 Derivation of Data Base

2.4.1 Primary Data Sources

Primary data sources included helicopter overflights of the 100 Minuteman silos, potentially impacted stream crossings, and the proposed overland cable routes. In addition, field reconnaissance surveys were conducted along potentially impacted road corridors, silo locations, and cable pathways. Helicopter overflights and field surveys were also conducted at F.E. Warren AFB. The field surveys included:

- o Small mammal live trapping;
- o Road counts - e.g, raptors, big game;
- o Deer pellet group transects;
- o Passerine bird surveys;
- o Black-footed ferret surveys;
- o Fisheries studies - electroshocking, benthos collection, periphyton sampling, water quality sampling;
- o Vegetation sampling - line intercept/belt transects or 1 meter and 0.1 meter hoops to measure:
  - percent cover;
  - percent composition;
  - tree and shrub densities; and
  - tree age and height, diameter-breast-height determination.

Aerial photography was used as a primary data source with ground validation conducted in some locations. Ground validation included vehicle road surveys and representative vegetation sampling.

2.4.2 Secondary Data Sources

The secondary data necessary for preparation of this report were gathered from the available literature, environmental analysis documents (environmental impact reports, environmental impact statements, Wyoming Industrial Siting Applications), management and regulatory agency files, and university research files. Contacts (visits, telephone, and written correspondence) with state and federal agency personnel, university researchers, and other nongovernmental organizations provided additional unpublished but valuable background data pertinent to the ROI and the more site-specific areas included within the biological ACS.

Principal agency and interest group data sources included the Wyoming Game and Fish Department (WGFD), Wyoming Natural Heritage Program (WNHP), Wyoming Department of Environmental Quality (WDEQ), and the Wyoming Industrial Siting

Administration (WISA). Other sources included the Colorado Division of Wildlife (CDOW), the Colorado Natural Heritage Program (CNHP), the U.S. Fish and Wildlife Service (USFWS), U.S. Forest Service (USFS), Soil Conservation Service (SCS), Bureau of Land Management (BLM), the Nebraska Game and Parks Commission (NGPC), South Dakota Game, Fish and Parks Department (SDGFPD), and the South Dakota Department of Water and Natural Resources (SDDWNR).

In addition, a variety of other groups were contacted regarding their concerns and any appropriate and useful data held in their files. These included the Nature Conservancy, Wyoming Wildlife Federation, Audubon Society, and the Sierra Club, among others.

2.5 Analytic Methods for Existing Conditions

The methodology employed for existing conditions consisted primarily of an inventory assessment. Both primary and secondary data sources were utilized. Data from the overflights, reconnaissance surveys, literature, and personal communications were qualitatively evaluated, integrated, and used to develop the description of existing conditions. Information from overflights was used to identify vegetation types, develop vegetation maps at a scale of 1:24,000, and document maps at 1:62,500. Prairie dog towns were identified and mapped to comply with USFWS guidelines for conducting black-footed ferret surveys. Aerial surveys also provided information on big game summer use areas and validated mapped information developed from secondary data sources. Permanent and intermittent streams were identified for mapping purposes and location of sampling sites.

Ground surveys were used to validate aerial information and to characterize the vegetation and wildlife within the various habitat types within the ACS. Primary data collected during the aerial and ground surveys were used in conjunction with information provided by secondary data sources to describe existing conditions of biological resources in the ACS as well as the ROI.

Future baseline projections of the human population developed for the human resources analyses were considered to increase disruptive pressures on the biological resources of the region. Therefore, the incremental short and long-term increases in disruption of biological resources attributable to the project were evaluated as to their potential for aggravating existing and expected future conditions.

2.6 Biological Resources

The biological resources evaluated include elements of vegetation, wildlife, fisheries, and the rare, threatened, and endangered species components of these elements. The discussion of vegetation emphasizes the ACS because the direct project impacts will occur in this area. Impacts on vegetation in the ROI will generally be indirect and minor. The discussion of wildlife, especially big game, includes both the ACS and the ROI because of the need to present conditions related to the direct impacts within the ACS and the indirect impacts associated with the ROI. The fisheries element also discusses existing conditions in the ROI and the ACS because of the indirect regional recreation pressures and the direct and indirect impacts expected within the ACS. Threatened and endangered species discussions include both the ROI and ACS but emphasizes the ACS where more direct impacts may be expected to occur.

2.6.1 Vegetation

2.6.1.1 Region of Influence

Vegetation within the ROI is variable, dominated by coniferous forests in the Rocky Mountain region to the west, and by prairie grasslands on the plains of eastern Wyoming, northern Colorado, western Nebraska, and South Dakota (Laycock 1979). The elevations within the ROI range from approximately 14,000 feet Mean Sea Level (MSL) at Longs Peak, Colorado to under 4,000 feet MSL along the eastern plains of Nebraska.

The dominant native vegetation throughout the lower elevations of the ROI is short-grass prairie, which is composed of a variety of sod-forming and bunch-grasses and forbs with shrubs typically occurring as infrequent components (Weaver 1954). Blue grama (Bouteloua gracilis) and buffalograss (Buchloe dactyloides) are the dominant native grasses (Laycock 1979). Short-grass prairie within the ROI is presently used for rangeland or has been converted to cultivated agriculture, including irrigated cropland and dry land farming (University of Wyoming 1982). Pockets of mixed grasses occur where topography and soils provide greater moisture availability or where grazing pressure is low or grazing is excluded (USAF 1982).

Presently, native vegetation in the ROI is subjected to natural (i.e., fire, flooding) and human-related (i.e., livestock grazing, urbanization) disturbances that alter species composition. Costello (1964) indicated "continued heavy grazing over nearly three-quarters of a century has reduced some types to disclimaxes where subdominants, particularly the short-grasses in the Great Plains, constitute the principal species."

Unique plant communities within the ROI include portions of the Sandhills Prairie in Nebraska and Pawnee National Grassland in northern Colorado. The Sandhills Prairie is considered unique since it is restricted entirely to an area of Nebraska which is characterized by loose sandy soils and strong winds (University of Nebraska and Kaul 1975). Pawnee National Grassland is located in northeastern Colorado near the Colorado-Wyoming border and represents short-grass prairie (USFS 1983) that has undergone a minimum of disturbance from agriculture, grazing, and development.

2.6.1.2 Area of Concentrated Study

2.6.1.2.1 General Description of Vegetation Types

Native vegetation within the ACS is characteristic of the vegetation found in southeastern Wyoming and western Nebraska. The dominant native vegetation type occurring within the ACS is grassland; however, large acreages are committed to agriculture. Shrubland, woodland, rock outcrop, meadow, and riparian vegetation types are also present as minor components. Plant species characteristic of the vegetation types in the ACS are delineated in Table 2.6.1-1 and discussed in more detail below.

Table 2.6.1-1

DOMINANT AND CHARACTERISTIC PLANT SPECIES OF
MAJOR VEGETATION TYPES IN THE AREA OF CONCENTRATED STUDY

Representative Species	Common Name
GRASSLAND	
Mixed-grass Prairie	
Grass and Grass-like Species	
Agropyron smithii	Western wheatgrass
Aristida fendleriana	Fendler three-awn
Bouteloua gracilis	Blue grama
Buchloe dactyloides	Buffalograss
Carex filifolia	Linear-leaved sedge
Koeleria macrantha	June grass
Oryzopsis hymenoides	Indian rice-grass
Stipa comata	Needle-and-thread grass
Forbs	
Allium textile	Onion
Artemisia frigida	Fringed sagewort
Astragalus drummondii	Drummond milkvetch
Phlox hoodii	Hood's phlox
Short-grass Prairie	
Grass and Grass-like Species	
Agropyron smithii	Western wheatgrass
Bouteloua gracilis	Blue grama
Bromus tectorum	Cheatgrass
Buchloe dactyloides	Buffalograss
Carex filifolia	Linear-leaved sedge
Festuca octoflora	Six-weeks fescue
Schizachyrium scoparium	Little bluestem
Sporobolus cryptandrus	Sand dropseed
Calamovilfa longifolia	Prairie sand-reed grass
Forbs, Shrub-like Species, and Succulents	
Astragalus drummondii	Drummond milkvetch
Gaura coccinea	Scarlet gaura
Grindelia squarrosa	Gumweed
Lesquerella montana	Bladderpod
Sphaeralcea coccinea	Copper mallow
Yucca glauca (shrubby)	Spanish bayonet, yucca
Opuntia polyacantha	Prickly pear cactus

DOMINANT AND CHARACTERISTIC PLANT SPECIES

MEADOW

Grass and Grass-like Species

Agropyron smithii	Western wheatgrass
Bromus inermis	Smooth brome
Carex praegracilis	Sedge
Juncus arcticus ssp. ater	Baltic rush
Poa spp.	Bluegrass
Stipa viridula	Green needlegrass

Forbs

Achillea lanulosa	Yarrow
Cirsium spp.	Thistle
Euphorbia esula	Leafy spurge
Iris missouriensis	Iris
Penstemon sp.	Beardtongue
Solidago sp.	Goldenrod
Zygadenus elegans	Death camus

SHRUBLAND

Mountain Mahogany

Shrubs

Cercocarpus montanus	Mountain mahogany
Rhus trilobata	Skunkbush
Rosa woodsii	Wood rose

Forbs

Astragalus spp.	Milkvetch
Eriogonum jamesii	James wild buckwheat
Lupinus argenteus	Common lupine
Penstemon sp.	Beardtongue
Oenothera coronopifolia	Evening primrose
Sphaeralcea coccinea	Copper mallow

Grass and Grass-like Species

Agropyron smithii	Western wheatgrass
Bouteloua gracilis	Blue grama
Stipa comata	Needle-and-thread grass
Calamovilfa longifolia	Prairie sand-reed grass

Table 2.6.1-1 Continued, page 3 of 6
DOMINANT AND CHARACTERISTIC PLANT SPECIES

Silver Sagebrush

Shrubs and Shrub-like Species

Artemisia cana	Silver sagebrush
Yucca glauca	Spanish bayonet, yucca

Forbs and Succulents

Artemisia frigida	Fringed sagewort
Erigeron pumila	Fleabane
Opuntia polyacantha	Prickly pear cactus
Sphaeralcea coccinea	Copper mallow

Grass and Grass-like Species

Agropyron smithii	Western wheatgrass
Bouteloua gracilis	Blue grama
Buchloe dactyloides	Buffalograss
Carex filifolia	Linear-leaved sedge
Stipa comata	Needle-and-thread grass

Sand Sagebrush

Shrubs and Shrub-like Species

Artemisia filifolia	Sand sagebrush
Yucca glauca	Spanish bayonet, yucca
Gutierrezia sarothrae	Snakeweed

Forbs and Succulents

Eriogonum sp.	Wild buckwheat
Helianthus petiolaris	Sunflower
Opuntia polyacantha	Prickly pear
Psoralea tenceolata	Scurfpea
Tradescantia occidentalis	Prairie spiderwort

Grass and Grass-like Species

Agropyron smithii	Western wheatgrass
Bouteloua gracilis	Blue grama
Buchloe dactyloides	Buffalograss
Muhlenbergia pungens	Muhly
Oryzopsis hymenoides	Indian rice-grass
Sporobolus cryptandrus	Sand dropseed

Table 2.6.1-1 Continued, page 4 of 6
DOMINANT AND CHARACTERISTIC PLANT SPECIES

WOODLAND

Ponderosa Pine

Trees

Juniperus scopulorum	Rocky Mountain juniper
Pinus ponderosa	Ponderosa pine
Prunus virginiana var. melanocarpa	Chokecherry

Shrubs

Artemisia cana	Silver sagebrush
Ceratoides lanata	Winterfat
Cercocarpus montanus	Mountain mahogany
Chrysothamnus viscidiflorus	Rabbitbrush
Rhus trilobata	Skunkbush
Toxicodendron rydbergii	Poison ivy

Grass and Grass-like Species

Bouteloua curtipendula	Side-oats grama
Bouteloua gracilis	Blue grama
Bouteloua hirsuta	Hairy grama
Oryzopsis hymenoides	Indian rice-grass
Stipa comata	Needle-and-thread grass
Aristida fendleriana	Fendler three-awn

Forbs

Erigeron pumila	Fleabane
Grindelia squarrosa	Gumweed
Sphaeralcea coccinea	Copper mallow
Valeriana edulis	Valeriana

RIPARIAN

Trees

Acer negundo	Box-elder
Fraxinus pennsylvanica var. lanceolata	Green ash
Populus spp.	Cottonwood
Prunus virginiana var. melanocarpa	Chokecherry
Salix spp.	Willow

Table 2.6.1-1 Continued, page 5 of 6
DOMINANT AND CHARACTERISTIC PLANT SPECIES

Shrubs

Salix spp.	Willow
Ribes aureum	Golden currant
Rosa sp.	Rose

Forbs

Plantago eriopoda	Plantain
Ranunculus sp.	Buttercup
Smilax stellata	False Solomon's seal
Typha latifolia	Cattail
Zygadenus elegans	Death camus

Grass and Grass-like Species

Carex nebraskensis	Sedge
Equisetum laevigatum	Horsetail
Juncus arcticus ssp. ater	Baltic rush
Scirpus acutus	Bulrush

ROCK OUTCROP

Forbs

Phlox hoodii	Hood's phlox
Astragalus spatulatus	Milkvetch
Astragalus tridactylicus	Milkvetch
Oenothera spp.	Primrose
Eriogonum jamesii	James wild buckwheat
Artemisia frigida	Fringed sagewort

Grass and Grass-like

Aristida fendleriana	Fendler three-awn
Oryzopsis hymenoides	Indian ricegrass
Stipa comata	Needle-and-thread grass

Shrubs

Rhus trilobata	Skunkbush

DISTURBED AREAS

Forbs

Convolvulus arvensis	Field bindweed
Melilotus officinalis	Yellow sweet clover

Table 2.6.1-1 Continued, page 6 of 6
DOMINANT AND CHARACTERISTIC PLANT SPECIES

Melilotus alba	White sweet clover
Cirsium spp.	Thistle
Cardaria draba	Whitetop
Asclepias sp.	Milkweed
Salsola kali	Russian thistle
Rumex venosus	Veiny dock
Argemone sp.	Prickly poppy
Tragopogon dubius	Goatsbeard
Sisymbrium altissimum	Tumble mustard

Grasses

Agropyron cristatum	Crested wheatgrass
Bromus tectorum	Cheatgrass
Hordeum jubatum	Foxtail barley
Secale cereale	Rye

2.6.1.2.1.1 Grassland

Mixed and short-grass prairies and introduced grassland represent the grassland types occurring within the ACS. Mixed-grass prairie is the least common and occurs primarily where grazing pressure is low or grazing is excluded. Species found in this vegetation type include blue grama, buffalograss, needle-and-thread grass (Stipa comata), linear-leaved sedge (Carex filifolia), June grass (Koeleria macrantha), milkvetch (Astragalus spp.), and copper mallow (Sphaeralcea coccinea). Swales and low areas within the mixed-grass prairie are dominated by western wheatgrass (Agropyron smithii), sometimes to the exclusion of other grass species. On hilly areas with steeper slopes and rocky soils other species increase, such as fendler three-awn (Aristida fendleriana), Hood's phlox (Phlox hoodii), milkvetch (Astragalus spatulatus), and wild buckwheat (Eriogonum sp.). Shrubs including silver sagebrush (Artemisia cana) and spanish bayonet (Yucca glauca) also occur infrequently. The species composition of mixed-grass prairie within the ACS is typical of mixed-grass prairie vegetation prior to human-related disturbances. Native plains grasslands have been described by Costello (1964) as being a "mixed prairie in which blue grama and buffalograss persist beneath an overstory of taller grasses such as western wheatgrass, little bluestem (Schizachyrium scoparium), prairie sand-reed grass (Calamovilfa longifolia) sand dropseed (Sporobolus cryptandrus), needle-and-thread grass, and purple three-awn (Aristida purpurea)." The characteristic mixed-grass prairie, as described by Costello, occurs mainly within the ACS along the Chugwater Creek drainage and the eastern portion of the E-Flight near E-5. These mixed-grass prairie areas are of particular interest representing the unique community structure and composition of the type in Wyoming and Nebraska.

While native mixed-grass prairie occurs in small portions of the ACS the majority of the grasslands exhibit a short-grass prairie character where blue grama and buffalograss are dominant and bunchgrasses occur less frequently. Taller grasses occurring within the short-grass prairie include needle-and-

thread grass, western wheatgrass, Indian rice-grass (Oryzopsis hymenoides), big bluestem (Andropogon gerardii), and sand dropseed and are restricted to areas of low grazing pressure, sandy soil, and in swales, bottomlands, and drainages. Some of the more common forbs include Drummond milkvetch (Astragalus drummondii), copper mallow, and locoweed (Oxytropis lambertii). Spanish bayonet generally occurs as an infrequent shrub component. However, in areas subjected to severe grazing pressure this shrub may comprise 15 percent or more of the total cover resulting in a yucca grassland subtype. Cheatgrass (Bromus tectorum), prickly pear (Opuntia polyacantha), and greenthread (Thelesperma filifolium) also increase in heavily grazed areas.

Introduced plant species including crested wheatgrass (Agropyron cristatum), smooth brome (Bromus inermis), and yellow sweet clover (Melilotus officinalis) are used in portions of the short-grass prairie for pasture grasses, grazing, or hay operations and to reclaim disturbed roadsides. Areas planted in smooth brome are generally irrigated. while crested wheatgrass represents the common dryland cover.

2.6.1.2.1.2 Meadow

Meadow vegetation is limited in distribution compared to the grasslands and occurs within the ACS in drainages; near the major creeks including Chugwater, Horse, and Lodgepole creeks; and around the margins of ponds. Species composition in this type includes bluegrass (Poa spp.), thistle (Cirsium spp.), western wheatgrass, goldenrod (Solidago canadensis), and death camas (Zygadenus elegans) (Table 2.6.1-1). Thistle, leafy spurge (Euphorbia esula), yellow sweet clover, and crested wheatgrass are common in areas which have undergone past disturbance. Smooth brome has been introduced in several meadow areas, such as the Chugwater Creek drainage, for hay operations.

2.6.1.2.1.3 Shrubland

Shrubland is limited in distribution within the ACS in comparison to the grassland type and agricultural areas. The three common shrub types present, mountain mahogany (Cercocarpus montanus), silver sagebrush, and sand sagebrush (Artemisia filifolia), are typical of shrubland in the region. The mountain mahogany shrub type generally occurs on rocky slopes at higher elevations. It is restricted to the northwestern portion of the ACS and along the southern border of Pine Bluffs in Wyoming. The dominant shrub species include mountain mahogany and skunkbush (Rhus trilobata). Other species, such as the wood rose (Rosa woodsii), needle-and-thread grass, blue grama, copper mallow, and James wild buckwheat (Eriogonum jamesii) also occur (Table 2.6.1-1). The mountain mahogany vegetation type represents important winter deer forage and in general appears to be heavily browsed within the ACS.

The sand sagebrush type occurs in pockets throughout the ACS and is generally restricted to areas with loose sandy soils. As the type name implies, sand sagebrush is the dominant species and common associates include Indian ricegrass, sandhill muhly (Muhlenbergia pungens), prairie sand-reed grass, and scurfpea (Psoralea lanceolata). Western wheatgrass, Fendler three-awn, and blue grama frequently occur on stabilized sand areas.

The silver sagebrush type is generally associated with disturbed areas including draws, alluvial fans, and where grazing pressure is intensive. It also

occurs on some rocky hilltops and ridges. This shrub type is more common in the western portion of the ACS, particularly along the Chugwater Creek drainage near Interstate 25. In the southeastern portion of the ACS, silver sagebrush is codominant with or replaced by winterfat (Ceratoides lanata). Species composition includes silver sagebrush as a dominant, as well as fringed sagewort (Artemisia frigida), fleabane (Erigeron pumila), copper mallow, blue grama, and buffalograss. Yucca and prickly pear frequently occur on rocky hilltops with silver sagebrush. Needle-and-thread grass and western wheatgrass are commonly associated with the drier drainages throughout this type.

2.6.1.2.1.4 Woodlands

Ponderosa pine and introduced woodlands are two categories of woodlands occurring within the ACS. Ponderosa pine woodlands occur on some of the highest elevations, particularly where caprock and other exposed rock outcrop occurs. Shrubs including mountain mahogany, skunkbush, yucca, winterfat, and silver sagebrush are common in this vegetation type. Grasses and forbs such as needle-and-thread, blue grama, copper mallow, and valeriana (Valeriana edulis) also occur frequently. Rocky Mountain juniper (Juniperus scopulorum) is a relatively common species but only locally abundant, such as the population on the Goshen Hole Rim near Flight S. Some of the more mesic draws support golden currant (Ribes aureum) and chokecherry (Prunus virginiana var. melanocarpa).

Introduced woodlands, generally planted as windbreaks, occur at scattered locations within the ACS and are associated with active or abandoned farmsteads. These woodlands are important habitat for a variety of wildlife species. Trees frequently planted in the windbreaks include ponderosa pine, Russian olive (Elaeagnus angustifolia), cottonwood (Populus spp.), elm (Ulmus parvifolia), and black locust (Robinia sp.).

2.6.1.2.1.5 Riparian

Riparian vegetation in the ACS occurs along the major streams and associated oxbows, including Chugwater, Bear, Little Bear, Horse, Lodgepole, and Pumpkin creeks. This vegetation type is discussed in more detail in Section 2.6.4.1.2.

2.6.1.2.1.6 Rock Outcrops

The rock outcrop vegetation type is present as a very minor component within the ACS. This vegetation type occurs in areas with hard caprock that is more resistant to erosion than surrounding rock. Because drainage is very rapid in these areas, little moisture is available for vegetation. Therefore, plants growing in these areas have low moisture requirements and are wind tolerant. Common species associated with the rock outcrop type include Hood's phlox, Fendler three-awn, wild buckwheat (Eriogonum spp.), cryptantha (Cryptantha spp.), and skunkbush.

2.6.1.2.1.7 Agricultural/Urban/Disturbed Areas

Due to various natural and human-related activities, portions of the ACS have been disturbed. Disturbed areas include gravel pits, urban areas, and roadways among others. Species composition in these areas includes the weeds cheatgrass, thistle, sunflower (Helianthus sp.), and Russian thistle (Salsola kali) (Table 2.6.1-1). Some of the disturbed areas support an annual weedy flora while other areas have been reclaimed and revegetated with crested wheatgrass and yellow sweet clover. Noxious weeds (Alley and Lee 1979) identified during field studies include field bindweed (Convolvulus arvensis), white top (Cardaria draba), and Canada thistle (Cirsium arvense). These species are becoming naturalized within the native vegetation.

2.6.1.2.2 Vegetation Within Flights

2.6.1.2.2.1 Vegetation of Road Corridors Within Flights

Native vegetation along road corridors within the Flights is typical of vegetation within the ACS. Figure 2.6.1-1 (see pocket) illustrates the vegetation types occurring within one-half mile of road corridors in the Flights. Estimates of the acreages of each vegetation type along road corridors to be modified within the Flights are presented in Table 2.6.1-2. Generally, grasslands are more common along the corridors in the western portion of the ACS, particularly corridors within Flights P, Q, and R. Agricultural land occurs more frequently along corridors in the eastern Flights, including A, B, C, and D. Riparian vegetation is present along road corridors within all of the Flights with the exception of corridors within Flights A, D, and E.

2.6.1.2.2.2 Silos and Launch Control Facilities

Vegetation types adjacent to the silos and Launch Control Facilities (LCFs) are generally a mosaic of grassland and agricultural land (dry land and irrigated). Of the 100 silos, 58 lie within grassland while 36 lie within agricultural land (Table 2.6.1-3). Six silos lie adjacent to both agricultural land and native grassland. The woolly milkvetch (Astragalus mollissimus), a state (Wyoming) rare plant, was observed growing at the P2 silo site within a few yards of the restrictive fence, approximately 2.5 miles east of the P-2 silo, one-quarter mile west of the S-7 silo, and across the highway from the B-9 silo. This species is discussed in more detail in Section 2.6.5.1.2.2.

2.6.1.2.3 Vegetation of Road Corridors Outside of Flights

The vegetation types identified in Table 2.6.1-2 for road corridors within the Flights, also occur along roads to be modified outside of the Flights. Grassland and agricultural land occur most frequently along the interconnecting roadways. Generally, grassland is more common along the western edge of the ACS (i.e., the roads connecting Flights T, S, and Q). The proportion of grassland to agricultural land, overall, is probably higher because most of the interconnecting roadways are at higher elevations where cattle ranching predominates. The approximate acreage of each vegetation type within 1-mile corridors along roadways outside of Flights is summarized below:

Table 2.6.1-2

ROAD CORRIDOR VEGETATION TYPES[1]

Vegetation Type	Flight A	B	C	D	E	P	Q	R	S	T	Total
Agriculture	9,807	11,477	17,517	16,558	6,567	4,899	1,853	12,259	12,190	14,047	107,124
Grassland	4,538	7,229	10,079	5,138	2,707	5,813	19,662	12,097	7,871	4,855	79,987
Meadow	136	-	212	-	22	296	826	311	756	-	2,559
Riparian	-	-	101	-	-	22	184	160	131	189	872
Rock Outcrop	-	-	-	-	-	26	627	-	-	-	653
Shrubland	-	336	3	-	4	7	588	391	63	169	1,561
Woodland	6	11	26	-	-	3	2	-	13	87	148
Disturbed/ Urban	-	-	-	-	-	-	-	-	340	343	683
TOTAL	14,485	19,085	27,938	21,696	9,300	11,066	23,747	25,218	21,367	19,690	193,587

Note: 1 Approximate acreages within one mile corridors along flight roadways proposed for modification.

Table 2.6.1-3

VEGETATION TYPES ADJACENT TO SILOS AND LAUNCH CONTROL FACILITIES

	SILOS AND LAUNCH CONTROL FACILITIES	
Flight	Agriculture	Grassland
A	A1, A4, A5, A7, A8, A11	A2, A3, A6 A7, A9, A10
B	B1, B5, B6 B7	B2, B3, B4, B5 B8, B9, B10, B11
C	C1, C5 C7, C9	C2, C3, C4, C6 C8, C10, C11
D	D2, D3, D4 D5, D8, D9	D1, D6, D7 D10, D11
E	E1, E4, E7 E8, E9, E10	E2, E3, E5 E6, E10, E11
P	P4, P5	P1, P2, P5, P6, P3 P7, P8, P9, P10, P11
Q	Q1, Q5,	Q2, Q3, Q4, Q5, Q6 Q7, Q8, Q9, Q10, Q11
R	R1, R4, R7, R8 R9, R11	R2, R3, R5, R6 R10
S	S2, S3, S4 S6, S10	S1, S6, S7 S8, S9, S11
T	T2, T3, T5 T6, T7, T10	T1, T2, T4 T8, T9, T11

Note: 1 Six Silos (A7, B5, E10, P5, Q5, and T2[1]) lie within both agricultural land and native grassland.

- Grassland - 9,363 acres;
- Agricultural land - 5,522 acres (dry land and irrigated);
- Meadows - 552 acres;
- Riparian - 360 acres;
- Rock outcrop - 272 acres;
- Disturbed/Urban - 52 acres; and
- Woodlands - 19 acres.

2.6.1.2.4 Cable Paths

Vegetation along the proposed cable patns is typical of vegetation in the ACS. Grassland and agricultural land (irrigated and dry land) occur most frequently (Table 2.6.1-4). Ponderosa pine woodlands are common at some of the higher elevations along PB1 and PD1. Riparian areas occur within SB1, RB1, PB1, PD1, and PA3 paths. The woolly milkvetch, a state (Wyoming) rare plant, was observed growing in an active prairie dog town in the northern portion of the SB1 cable pathway. The prairie dog town is within short-grass prairie which is also grazed by cattle. Woolly milkvetch plants in this area showed no signs of grazing and may increase in areas subjected to heavy grazing pressure.

2.6.1.2.5 F.E. Warren AFB

Native vegetation types within F.E. Warren AFB are characteristic of those found in southeastern Wyoming and the ACS. However, because of the restricted land use associated with base activities, vegetation, particularly on the southern portion of the base, is relatively undisturbed. This represents a unique situation in contrast to human-related disturbances in the surrounding area including urban development in Cheyenne and countywide grazing and agricultural activities.

The four vegetation types that occur within F.E. Warren AFB (Figure 2.6.1-2, see pocket) are grassland, meadow, riparian, and disturbed. A majority of the planned facilities occur in disturbed areas. In addition to native grassland, certain segments of existing roads, new road alignments, and utilities cross riparian vegetation along the Diamond and Crow Creek drainages that supports the Colorado butterfly plant (Gaura neomexicana ssp. coloradensis), a Federal-listed Category One species.

Riparian vegetation on the base is typical of the region with the exception that it has not been subjected to pressure from grazing as has similar vegetation occurring outside of F.E. Warren AFB. The moist meadow areas are suitable habitat for the Colorado butterfly plant, a candidate species for federal listing. This species and its habitat are discussed in more detail in Section 2.6.5.1. Riparian vegetation occurs along the Crow and Diamond Creek drainages, the Lake Pearson pond system, and standing water in low areas on the southern part of the base, generally between Headquarters and Parade avenues to the southern boundary fence (Figure 2.6.1-2, see pocket). Species

Table 2.6.1-4

CABLE PATH VEGETATION TYPES[1]

Path	Short-Grass Prairie	Meadow	Woodland	Shrubland	Riparian	Rock Outcrop	Agricultural	Total
PA1[2]	393	-	-	-	-	-	1,159	1,552
SB1[2]	4,739	67	10	10	51	-	2,570	7,447
PB1[2]	13,217	246	10	-	50	7	2,158	15,688
PA4[2]	7,502	-	-	32	-	15	6,381	13,930
PA5[2]	8,561	184	286	39	20	45	6,451	15,586
PD1	8,954	587	350	22	100	70	6,273	16,356
SB2	5,368	35	-	-	-	-	11,080	16,483
PC1	9,490	587	841	22	100	72	1,243	12,355
PA2	4,716	-	-	-	-	-	3,757	8,473
PA3	7,102	184	6	39	20	-	2,294	9,555
RA2	8,048	25	-	-	-	-	1,205	9,278
TOTAL:	78,090	1,915	1,503	164	341	209	44,481	126,703

Notes: 1 Approximate acreages within one mile corridors along cable paths.

2 Technically preferred cable paths.

composition of riparian vegetation at F.E. Warren AFB is similar to that found in riparian vegetation within the ACS (Table 2.6.1-1).

Meadow vegetation at F.E. Warren AFB generally occurs in drainages above the major creeks, swales, and around margins of ponds (Figure 2.6.1-2, see pocket). This vegetation type is limited in distribution in comparison to other vegetation types within the base. Plant species associated with the meadow type include bluegrass, thistle, western wheatgrass, horsetail, yarrow (Achillea lanulosa), and Baltic rush. Meadow areas, particularly along lower reaches of Crow Creek (from approximately the Sixth Street crossing east to the base boundary), have undergone past disturbance. Species that occur in the disturbed meadow areas include thistle, leafy spurge, yellow sweet clover, and crested wheatgrass.

Grassland vegetation in the northern portion of F.E. Warren AFB is typical of short-grass prairie in southeastern Wyoming. Species composition in this type is similar to that found in the short-grass prairie type of the ACS (Table 2.6.1-1). The grassland in the northern portion of the base is used as pasture for horses. However, undeveloped areas of the southern portion of the base have not been grazed for over 25 years and represent an assemblage of species typical of mixed grass prairie prior to human-related disturbances. Species composition for the mixed-grass prairie in this area is typical of mixed-grass prairie described for the ACS.

Due to various base activities and development, portions of the native vegetation have been disturbed including the solid waste disposal site, roadways, perimeter firebreaks, and other facilities sited throughout the base. Some areas such as the firebreaks are seasonally maintained and support an annual weedy flora while other areas have been reclaimed and revegetated with yellow sweet clover and crested wheatgrass. Other areas supporting native grassland are subjected to periodic mowing as a maintenance procedure. Noxious weeds (Alley and Lee 1979) occurring in the disturbed areas including leafy spurge, Canada thistle, and whitetop have become naturalized within the native grassland. Presently, F.E. Warren AFB participates in a countywide noxious weed control program.

2.6.1.2.6 Other Disturbed Areas

Vegetation types generally occurring within the ACS as presented above, can be expected to occur at proposed dispatch stations, potential aggregate sites, and overpass modification areas.

2.6.2 Wildlife

2.6.2.1 Big Game

2.6.2.1.1 Region of Influence

Seven big game species commonly occur within the four-state ROI: pronghorn antelope (Antilocapra americana), mule deer (Odocoileus hemionus), white-tailed deer (Odocoileus virginianus), elk (Cervus canadensis), bighorn sheep (Ovis canadensis), black bear (Ursus americanus), and mountain lion (Felis concolor). In addition, the CDOW reintroduced a small population of moose (Alces alces) to the Illinois River drainage in north-central Colorado.

Pronghorn occur year-round in short-grass prairie and shrubland habitats throughout the ROI. Mule and white-tailed deer occur in many areas of the ROI. Mule deer are more widespread, occupying most habitat types within the ROI. White-tailed deer prefer riparian habitat along timbered drainages and adjacent agricultural lands. Deer are less common in areas of open grassland, preferring wooded or shrub-dominated habitats.

Elk distribution within the ROI is generally restricted to higher elevations of Colorado and Wyoming, where forest ecotones provide adequate food and cover. A small elk population occurs in the Pine Ridge area of Nebraska (NGPC, personal communication, 1983). Bighorn sheep occur in the high mountain habitats of Colorado and Wyoming, migrating to lower elevations in winter.

The black bear is found in Colorado and Wyoming, preferring areas of mixed coniferous and deciduous forest or riparian habitats. Some black bear hunting takes place in both states. The mountain lion is a secretive animal which may occur in a variety of habitat types in remote areas, including coniferous forest and riparian habitats (CDOW 1978-a). Limited mountain lion harvests are allowed in Colorado and Wyoming.

Big game hunting is an important recreational pastime, as well as an important source of revenue generated from sales of licenses, equipment, and guide services. In 1981, big game hunting comprised approximately 50 percent of the total recreation days spent in hunting all game species in Colorado (CDOW 1982-a), and 76 percent in Wyoming (WGFD 1982-a).

The number of licenses and permits issued varies for each big game species in each state. In Nebraska, a specific number of permits are authorized in each management unit for pronghorn and deer (NGPC 1982). Licenses in Colorado for pronghorn and bighorn sheep are issued on a quota system per game management unit (CDOW 1982-a). Deer and elk (buck and bull) licenses are for the most part unlimited, with the antlerless licenses issued on a limited basis (CDOW 1982-a). Black bear licenses are unlimited in Colorado, and mountain lion licenses are issued under a controlled harvest quota system (CDOW 1982-a). Pronghorn and bighorn sheep licenses are issued on a limited quota basis in Wyoming (WGFD 1982-b). Limited quota and general licensing for deer and elk vary by hunting area (WGFD 1982-b). Black bear and mountain lion licenses are unlimited, with an allowable mortality quota set for each mountain lion hunting area (WGFD 1982-b). In South Dakota, all big game licenses are issued on a limited basis except for buck deer (SDGFPD, personal communication, 1983).

2.6.2.1.1.1 Nebraska

Pronghorn densities of approximately one to two animals per square mile (sq mi) are common within many areas of the Nebraska portion of the ROI. Highest pronghorn densities are reported in the Pine Ridge area of Sioux and Dawes counties (NGPC 1972).

Recent population estimates are available for four of the five pronghorn management units which comprise the Nebraska portion of the ROI (Table 2.6.2-1). NGPC data indicate a variety of population trends have occurred over the last 7 years. The severe winter of 1978 to 1979 adversely affected populations in some of the management units. The number of hunting

Table 2.6.2-1

PRONGHORN POPULATION TRENDS IN THE
NEBRASKA PORTION OF THE REGION OF INFLUENCE

Management Unit	Pronghorn			Population Objective
	1976	1981	1982	
Banner	1,064	1,336	1,224	Increase Herd
Box Butte	2,240	1,412	1,608	Increase Herd
Cheyenne	147	-	-	Increase Herd
Garden	918	450	546	Increase Herd
North Sioux	2,904	2,036	4,364	Increase herd; however, at present if rapid increase continues, increase harvest to stabilize herd.
TOTAL:	7,273	5,234	7,742	

Source: NGPC 1983-a.
NGPC, personal communication, 1983.

permits issued in most units has shown a general decline over a 7-year period, reflecting an attempt by the NGPC to increase populations by reducing harvests. Most units exhibited an increase in population between 1981 and 1982, with the most apparent increase taking place in the North Sioux unit, where pronghorn populations more than doubled. Available 1982 data indicate populations have increased approximately 9 percent within the four Nebraska management units from 1976 populations levels (NGPC 1983-a).

Nebraska ROI deer densities (both species combined) are high (more than 8 per sq mi) in the Pine Ridge area of the northern panhandle, the Wildcat Hills, and Cheyenne Escarpment in Banner, Morrill, and Scotts Bluff counties, and along the Niobrara River. Moderate densities (4-8 per sq mi) exist along the Platte River (NGPC 1972). In 1972, the ratio of mule deer to white-tailed deer was ten to one in the Nebraska Panhandle (NGPC 1972). However, during the last 10 years this ratio is changing because of lower hunter vulnerability (due to habitat preference) and higher productivity of while-tailed deer. The species composition of the region is indicating an increase in the numbers of white-tailed deer relative to mule deer in the region. The NGPC indicated that this trend has slowed considerably during the last few years (NGPC, personal communication, 1983). Data for 1982 show approximately 31 percent of the deer harvested in the 3 management units of the Panhandle were white-tailed deer (NGPC 1983-b).

The Pine Ridge, Plains, and Upper Platte deer management units are within the Nebraska portion of the ROI (NGPC 1982). Population trends and objectives for these units are presented in Table 2.6.2-2. Populations of both deer species have increased over the last 6 years in all 3 management units. Combined mule deer populations increased 57 percent from 1977, while white-tailed deer populations showed a 100-percent increase over the 6-year period. This increasing population trend is also evident between 1981 and 1982. All management units indicate recent mule deer increases, and two of the three units show white-tailed deer increases between 1981 and 1982 (NGPC, personal communication, 1983).

Population objectives for the management units are somewhat less than the actual deer populations recorded during the mid-1970s. A major winter die-off in 1976 lowered populations dramatically in 1977. Currently the NGPC is managing these units at a level to prevent a reoccurrence of a similar die-off.

A small elk herd numbering approximately 25 to 75 animals occurs in the Pine Ridge area of Nebraska. Presently, there is no harvesting of this herd. A limited harvest may be permitted if the population increases above 100 animals and crop damage complaints increase (NGPC, personal communication, 1983).

Black bear and mountain lion are not presently known to occur in the Nebraska ROI. No verified reports of bear in Nebraska have occurred since the 1890s (NGPC, personal communication, 1983). The last published report of a mountain lion observation in Nebraska occurred in 1903 in the Pine Ridge area. Two mountain lions were killed in Wyoming in 1959 and 1960 just across the border from Sioux County. Currently no data is available to substantiate that a resident mountain lion population occurs in Nebraska (NGPC 1972).

Table 2.6.2-2

DEER POPULATION TRENDS IN THE
NEBRASKA PORTION OF THE REGION OF INFLUENCE

Management Unit	Mule Deer[1]			White-Tailed Deer[1]			Population Objective[2]
	1977	1981	1982	1977	1981	1982	
Pine Ridge	4,000	7,000	8,200	2,000	4,000	5,000	Stabilize near present population
Plains	4,000	3,600	4,300	1,300	1,600	2,000	Stabilize near present population
Upper Platte	2,500	3,400	4,000	1,200	2,000	2,000	Increase herd by 30-50%
TOTAL:	10,500	14,000	16,500	4,500	7,600	9,000	

Notes: 1 Population estimates accurate to within ± 20 percent.
2 For both species combined.

Source: NGPC, personal communication, 1983.

2.6.2.1.1.2 Colorado

The CDOW's Northeast Region encompasses most of the Colorado portion of the ROI. Currently within the Northeast Region, pronghorn, mule deer, white-tailed deer, and elk populations are all increasing (CDOW, personal communication, 1983).

In 1981, the Northeast Region contained 38 percent of the state's post-hunting season pronghorn population (CDOW 1982-c). Population trends and objectives for the six Data Analysis Units (DAU) comprising the Colorado portion of the ROI are varied, with an apparent emphasis on population stabilization (Table 2.6.2-3). Data are not available for the Clarksville DAU because no hunting season was allowed in 1981. The 1982 post-season management objective calls for a slight increase (2%) in the Northeast Region population. The long-range 1988 objective calls for a general stabilizing of the regional population near the 1982 level (CDOW 1982-c).

Mule deer and white-tailed deer occurring within the Colorado portion of the ROI equaled 8 percent of the state's 1981 post-season population. The management goal for the Colorado portion of the ROI is to increase deer populations (Table 2.6.2-4). Objectives for seven of the eight DAUs in the Colorado portion of the ROI require population increases for 1982 and further long-term increases through 1988. The 1988 post-season objective for all deer DAUs combined in the Colorado portion of the ROI is a 23-percent increase over post-season 1981 population estimates (CDOW 1982-d).

The Colorado elk herd is relatively stable on a statewide basis (CDOW, personal communication, 1983). Recommended objectives for 1988 in the state's new strategic plan include an increase in the elk population of less than 2 percent above the 1981 post-season population estimate(CDOW 1982-e). The combined population of those elk DAUs which occur in the Colorado portion of the ROI represented 11 percent of the state's total 1981 post-season herd. The elk population in the Colorado portion of the ROI is presently increasing (CDOW, personal communication, 1983).

Stabilization of elk populations through 1988 for most DAUs within the ROI is the current management objective in Colorado (Table 2.6.2-5). However, the St. Vrain (E-9) unit's 1988 objective requires a 35-percent reduction in post-season numbers from 1981 levels (CDOW 1982-e).

Accurate bighorn sheep population data are difficult to obtain due to the species' remote habitat and its sensitivity to human intrusion. The Colorado portion of the ROI contains an estimated bighorn sheep population of 595 to 635 animals, which is approximately 14 to 15 percent of the state's total herd (CDOW 1982-f; CDOW, personal communication, 1983). Although the Geneva Creek (S-3A) DAU is located just south of the 100-mile ROI border in the Mt. Evans area, it is included in this analysis due to its accessibility and proximity to the ROI. Bighorn sheep management population objectives for the six individual DAUs vary with the characteristics of each unit (Table 2.6.2-6). Due primarily to the loss of winter range caused by domestic livestock grazing on private and BLM lands, the Mt. Zirkel (S-8) DAU population has been greatly reduced. There is presently no population objective for this unit because winter range cannot expand (CDOW, personal communication, 1983). The Rawah (S-18) DAU historically contained a large bighorn population. Loss of winter

Table 2.6.2-3

PRONGHORN POPULATION TRENDS IN THE
COLORADO PORTION OF THE REGION OF INFLUENCE

Data Analysis Unit	1981 Post-Hunt Estimate	1982 Post-Hunt Objective	1988 Post-Hunt Objective
PH-1 Escarpment	5,200	5,200	5,400
PH-2 Hardpan	6,400	6,200	6,200
PH-3 North Park	1,250	1,520	1,500
PH-4 Sandhills	680	710	1,000
PH-29 Clarksville	-	-	-
PH-33 Cherokee	1,860	2,120	1,600
TOTAL:	15,390	15,750	15,700

Source: CDOW 1982-c.

Table 2.6.2-4

DEER POPULATION TRENDS IN THE
COLORADO PORTION OF THE REGION OF INFLUENCE

Data Analysis Unit	1981 Post-Hunt Estimate	1982 Post-Hunt Objective	1988 Post-Hunt Objective
D-3 North Park	2,100	2,450	3,000
D-4 Red Feather	9,400	9,740	9,800
D-5 High Plains	4,000	5,000	6,000
D-9 Middle Park	10,840	11,670	15,000
D-10 Boulder	6,210	6,470	6,500
D-17 Bailey	4,725	4,300	5,000
D-27 Rawah	1,200	1,305	1,700
D-44 S. Platte River	1,455	1,600	2,000
TOTAL[1]:	39,930	42,535	49,000

Note: 1 Total = NE Region plus D-9 Unit.

Source: CDOW 1982-d.

Table 2.6.2-5

ELK POPULATION TRENDS IN THE COLORADO PORTION OF THE REGION OF INFLUENCE

Data Analysis Unit	1981 Post-Hunt Estimate	1982 Post-Hunt Objective	1988 Post-Hunt Objective
E- 3 North Park	2,650	2,650	2,650
E- 4 Poudre River	1,800	1,800	1,900
E- 8 Troublesome	1,910	1,860	1,900
E- 9 St. Vrain	2,300	2,190	1,500
E-13 Williams Fork	2,320	2,325	2,400
E-37 Rawah	1,710	1,690	1,700
E-39 Clear Creek	545	535	545
TOTAL:	13,235	13,050	12,595

Source: CDOW 1982-e.

Table 2.6.2-6

BIGHORN SHEEP POPULATION TRENDS IN THE
COLORADO PORTION OF THE REGION OF INFLUENCE

Data Analysis Unit	1981 Population Estimate	Long-Term Population Objective
S- 1 Poudre River	150-175	Increase to 600-700
S- 3 Mt. Evans	100	Hold population; may need to reduce due to disease
S-3A Geneva Creek	55-70	Reduce due to disease; Rebuild herd after 6 years
S- 8 Mt. Zirkel	20	Not Available
S-19 Rawah	25	Increase
S-19 Never Summers	245	Maintain stable population; trap and remove excess population
TOTAL:	595-635	

Source: CDOW 1982-f, CDOW, personal communication, 1983.

range has also reduced this herd, but the population objective is for an increase in bighorn numbers (CDOW 1982-e). The Never Summers (S-19) DAU is primarily managed by the National Park Service through the Rocky Mountain National Park branch. It is composed of two herds, the Fall River herd, numbering approximately 75 individuals, and the Never Summers herd, numbering approximately 170 individuals (CDOW, personal communication, 1983). Bighorn sheep were harvested from all ROI units except Mt. Zirkel (S-8) and Rawah (S-18) in 1981 (CDOW 1982-e).

Colorado black bear populations presently appear to be stable on a statewide basis (CDOW, personal communication, 1983). The estimated statewide population has increased from 2,500 animals in preseason 1975 to 3,000 animals in 1978 (CDOW 1982-a). Out of a statewide harvest of 659 black bear in 1981, 57 (9%) were taken from game management units within the ROI.

Generally mountain lions in Colorado occur from the eastern foothills to the western slope. However, mountain lions usually occur in relatively remote locations where adequate populations of deer exist, including the eastern plains (CDOW, personal communication, 1983). In 1981, 107 mountain lions were harvested in Colorado. Only three were taken from game management units within the ROI (CDOW 1982-a). Colorado's mountain lion population has experienced an estimated increase in preseason population from 970 in 1975 to 1,200 in 1978 (CDOW 1982a). The statewide population is considered stable at the present time (CDOW, personal communication, 1983).

During 1978 and 1979, the CDOW transplanted 24 moose (12 each year) into the Illinois River drainage of North Park in north-central Colorado (CDOW, personal communication, 1983). Presently 80 moose use the area. Approximately a dozen of these individuals have moved south into Middle Park on a year-round basis. The CDOW indicated that some method of population control may be necessary when the herd size reaches 100 animals. The moose are completely protected, with no hunting permitted. The primary cause of mortality in this herd is shooting by hunters mistaking them for elk or deer (CDOW, personal communication, 1983).

2.6.2.1.1.3 Wyoming

Wyoming's Game Management District 5 and the southern portion of District 7 (south of the northern boundary of Converse and Niobrara counties) comprise the Wyoming portion of the ROI relative to big game management. In 1981, Wyoming pronghorn populations within Districts 5 and 7 (all herd units within each district) reached an estimated post-season population of approximately 149,000 animals. This represents a 29-percent increase in the herd since 1976 (WGFD n.d.-a, Bohne and Rothwell 1982, Nemick et al. 1982). Generally, most pronghorn populations in the 18 herd units within the Wyoming portion of the ROI are presently stable or increasing (Table 2.6.2-7). Only 5 of these 18 units presently indicate a definite declining population trend. An increase or restructuring of harvest may be necessary in some units in order to meet management population objectives. The management objectives are to decrease the post-season population by 23 percent for combined herd units within the Wyoming portion of the ROI (Bohne and Rothwell 1982, Nemick et al. 1982).

Table 2.6.2-7

PRONGHORN POPULATION TRENDS IN THE
WYOMING PORTION OF THE REGION OF INFLUENCE

Data Analysis Unit	1981 Post-Season Estimate	Population Trend	Population Objective
Bates Hole - Hat Six	4,750	Decreasing	4,000
Bear Creek	11,700	Increasing	8,000
Big Creek	700	Increasing	200
Boxelder	1,600	Stable	1,700
Centennial	6,651	Increasing	5,000
Chalk Bluffs	425	Stable	450
Cooper Lake	2,360	Decreasing Slightly	2,000
Dwyer	2,500	Increasing	1,600
Elk Mountain	8,680	Increasing	5,000
Hawk Springs	5,552	Stable	5,000
Iron Mountain	5,500	Decreasing	6,000
Iron Springs	7,118	Increasing/ Decreasing Slightly[1]	8,000
LaBonte	2,000	Decreasing	1,000
Lance Creek	22,700	Increasing	17,000
Meadowdale	5,311	Increasing	3,800
Medicine Bow	34,360	Increasing	24,000
Ormsby	3,400	Decreasing	2,600
Sage Creek	3,050	Increasing	1,800
TOTAL:	128,357	-	99,150

Source: Bohne and Rothwell 1982, Nemick et al. 1982.

Note: 1 Data is ambiguous; population may be either increasing or decreasing slightly (Bohne and Rothwell 1982).

Between 1976 and 1981, mule deer herds increased by approximately 33,000 individuals in Wyoming's Game Management Districts 5 and 7 (WGFD n.d.-a, Bohne and Rothwell 1982, Nemick et al. 1982). Eight of the 13 herd units within the Wyoming portion of the ROI presently are experiencing increasing populations (Table 2.6.2-8). The population objective for all 13 herd units combined is to decrease the post-season herd by 8 percent from the 1981 population level (Bohne and Rothwell 1982, Nemick et al. 1982).

The white-tailed deer herd in Wyoming's Districts 5 and 7 numbered 39,791 individuals in post-season 1981. This is an 8-percent increase over 1976 population estimates (WGFD n.d.-a, Bohne and Rothwell 1982, Nemick et al. 1982). All four herd units within the Wyoming portion of the ROI indicate stable or increasing population trends (Table 2.6.2-9). Current management plans and population objectives are to reduce the post-season population level of 1981 by 8 percent (Bohne and Rothwell 1982, Nemick et al. 1982).

Districts 5 and 7 supported an estimated 7,050 elk in post-season 1976 (WGFD n.d.-a). Post-season 1981 data indicate a 36-percent increase over the previous 6-year estimates (WGFD n.d.-a, Bohne and Rothwell 1982, Nemick et al. 1982). Although the 6 herd units comprising the Wyoming portion of the ROI show a variety of population trends, only 1 unit is currently experiencing an increase in elk numbers (Table 2.6.2-10). The combined population objective for all 6 herd units is to decrease the number of elk to approximately 7,600 individuals. This represents a 17-percent decrease from 1981 population estimates (Bohne and Rothwell 1982, Nemick et al. 1982).

Wyoming's District 5 post-season bighorn sheep herd, as of 1981, has increased by 45 percent since 1976 (WGFD n.d.-a, Bohne and Rothwell 1982). Bighorn populations occur in or near Medicine Bow National Forest in Carbon, Albany, and Converse counties in the Wyoming portion of the ROI. Each of the District's three bighorn herd units are increasing (Table 2.6.2-11). The District's overall post-season population objective requires a 60-percent herd increase (Bohne and Rothwell 1982). There are no bighorn sheep herds in Game Management District 7.

Wyoming black bear populations appear to be relatively stable on a statewide basis (WGFD n.d.-a). In 1977, approximately 268 black bear were harvested statewide out of an estimated wintering population of 2,100 individuals (WGFD n.d.-a). In 1981, 36 black bear were harvested statewide, with 27 animals taken within the ROI in Albany and Carbon counties (Strickland 1982-a). Current data indicate black bear may occur only in extreme western Albany and Carbon counties in the Wyoming ROI (Findholt et al. 1981). However, the WGFD's Wildlife Observation System reports a sighting in Platte County west of Chugwater in 1981 (WGFD 1983-a). The 1978 to 1983 strategic plan for black bear is a population of 2,300 individuals for 1983 to 1993 (WGFD n.d.-a).

Data regarding mountain lion populations in Wyoming are extremely limited. Eight mountain lions were harvested in the state during 1977. However, only one was harvested within the Wyoming ROI in Albany County during the 1977 harvest period (WGFD n.d.-a). In 1981, 21 mountain lions were harvested in Wyoming, only 1 of which could have been within the ROI in Hunting Area 3 (Strickland 1982-a). Hunting Area 3 includes all of Niobrara County and portions of Platte, Goshen, and Converse counties in the northern portion of the ROI. A total of 15 mountain lion observations were reported in Hunting

Table 2.6.2-8

MULE DEER POPULATION TRENDS IN THE
WYOMING PORTION OF THE REGION OF INFLUENCE

Data Analysis Unit	1981 Post-Season Estimate	Population Trend	Population Objective
Bates Hole - Hat Six	4,200	Stable	5,200
Cheyenne	2,300	Increasing Slightly	2,300
Goshen Hole	3,483	Increasing Slightly	3,500
Iron Mountain	12,000	Decreasing Slightly	11,590
Lance Creek	9,600	Increasing Slightly	8,500
Laramie Peak	16,151	Decreasing Slightly	14,000
Muskrat	3,921	Increasing Slightly	4,000
Ormsby	2,200	Increasing Slightly	4,000
Platte Valley	23,300	Increasing	15,000
Sheep Mountain	7,030	Increasing	13,000
Shirley Mountain	8,982	Increasing	8,000
South Converse	7,900	Stable to Decreasing Slightly	5,500
West Bill	2,000	Stable	2,000
TOTAL:	101,667	-	93,590

Source: Bohne and Rothwell 1982, Nemick et al. 1982.

Table 2.6.2-9

WHITE-TAILED DEER POPULATION TRENDS IN THE
WYOMING PORTION OF THE REGION OF INFLUENCE

Data Analysis Unit	1981 Post-Season Estimate	Population Trend	Population Objective
Central	3,500	Stable	3,500
Laramie River	1,500	Increasing	1,000
Southeast Wyoming	1,091	Increasing Slightly	1,000
Thunder Basin	1,700	Increasing	1,700
TOTAL:	7,791	-	7,200

Source: Bohne and Rothwell 1982, Nemick et al. 1982.

Table 2.6.2-10

ELK POPULATION TRENDS IN THE
WYOMING PORTION OF THE REGION OF INFLUENCE

Data Analysis Unit	1981 Post-Season Estimate	Population Trend	Population Objective
Iron Mountain	175	Stable	75
Laramie Peak	2,700	Increasing	2,500
Muddy Mountain	179	Stable	200
Rawhide	12	Decreasing	40
Shirley Mountain	877	Decreasing	800
Snowy Range	5,200	Decreasing	4,000
TOTAL:	9,143	-	7,615

Source: Bonne and Rothwell 1982, Nemick et al. 1982.

Table 2.6.2-11

BIGHORN SHEEP POPULATION TRENDS IN THE
WYOMING PORTION OF THE REGION OF INFLUENCE

Data Analysis Unit	1981 Post-Season Estimate	Population Trend	Population Objective
Douglas Creek	220	Increasing	350
Encampment River	135	Increasing Slightly	200
Laramie Peak	300	Increasing	500
TOTAL DISTRICT 5:	655		1,050

Source: Bohne and Rothwell 1982.

Areas 3, 4, 5, 6, and 7 during 1981 (Strickland 1982). At least 50 percent of each of these hunting areas is within the ROI. The WNHP also reports sightings in Niobrara, Converse, and Carbon counties during the 1979 to 1980 period (WNHP 1983). The WGFD's Wildlife Observation System has recorded sightings in southwest Goshen County and east-central Platte County in 1981 and 1982, respectively (WGFD 1983-a).

2.6.2.1.1.4 South Dakota

Big game species occurring within the South Dakota portion of the ROI include pronghorn, mule deer, and white-tailed deer (SDGFPD, personal communication, 1983). All three species are increasing in population size (SDGFPD personal communication, 1983). The present estimated populations of these species within the South Dakota portion of the ROI are pronghorn - 5,000, mule deer - 1,500, and white-tailed deer - 600.

The stabilization of pronghorn, mule deer, and white-tailed deer populations is the objective of the SDGFPD within the ROI (SDGFPD, personal communication, 1983).

2.6.2.1.2 Area of Concentrated Study

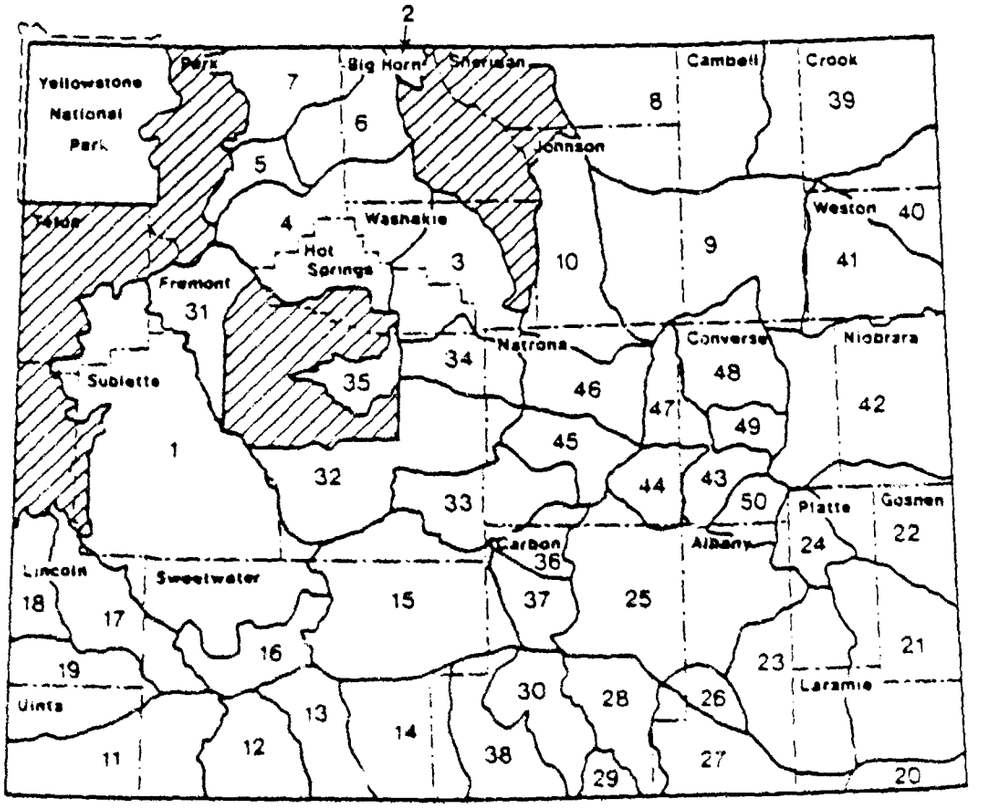
2.6.2.1.2.1 Flights

Pronghorn, mule deer, and white-tailed deer are known to occur within the ACS in Wyoming and Nebraska. Elk habitat is located approximately 2 miles northwest of Flight Q in Wyoming. Habitat diversity in the eastern Flights is relatively low, reflecting less variation in topography. The foothills of the Laramie Mountains to the west of the Flights provide a variety of habitat types which contribute to seasonal migration across the mountains from the Laramie Basin in Albany County. Major drainages in the western portion of the Flights are more well defined than in the east, providing a greater amount of habitat diversity.

The Iron Mountain, Hawk Springs, and Chalk Bluffs pronghorn herd units are within the Wyoming portion of the Flights (Figure 2.6.2-1). The Iron Mountain herd unit is located west of Interstate 25, and includes the majority of Flight Q and the southwest corner of Flight T. This unit currently has a declining pronghorn population, and population management objectives are to increase the herd size by 500 above the 1981 post-season population level of 5,500 (Bohne and Rothwell 1982).

Damage and nuisance complaints are a problem in this herd unit, and substantially affect the formulation of population management objectives. Habitat loss is occurring because of suburban home development and range modification practices (WGFD 1981-a). In addition, the practice of landowners charging trespass fees to hunters may cause future management problems by reducing the numbers of hunters (WGFD 1981-a).

The Flight area within the Iron Mountain herd unit is composed almost entirely of winter-yearlong pronghorn habitat (Figure 2.6.2-2). Winter-yearlong habitat is important to the pronghorn during winter, even though it is used during all seasons of the year (Rippe and Rayburn 1981). The nearest critical-winter-yearlong habitat is located approximately 7 miles southwest of



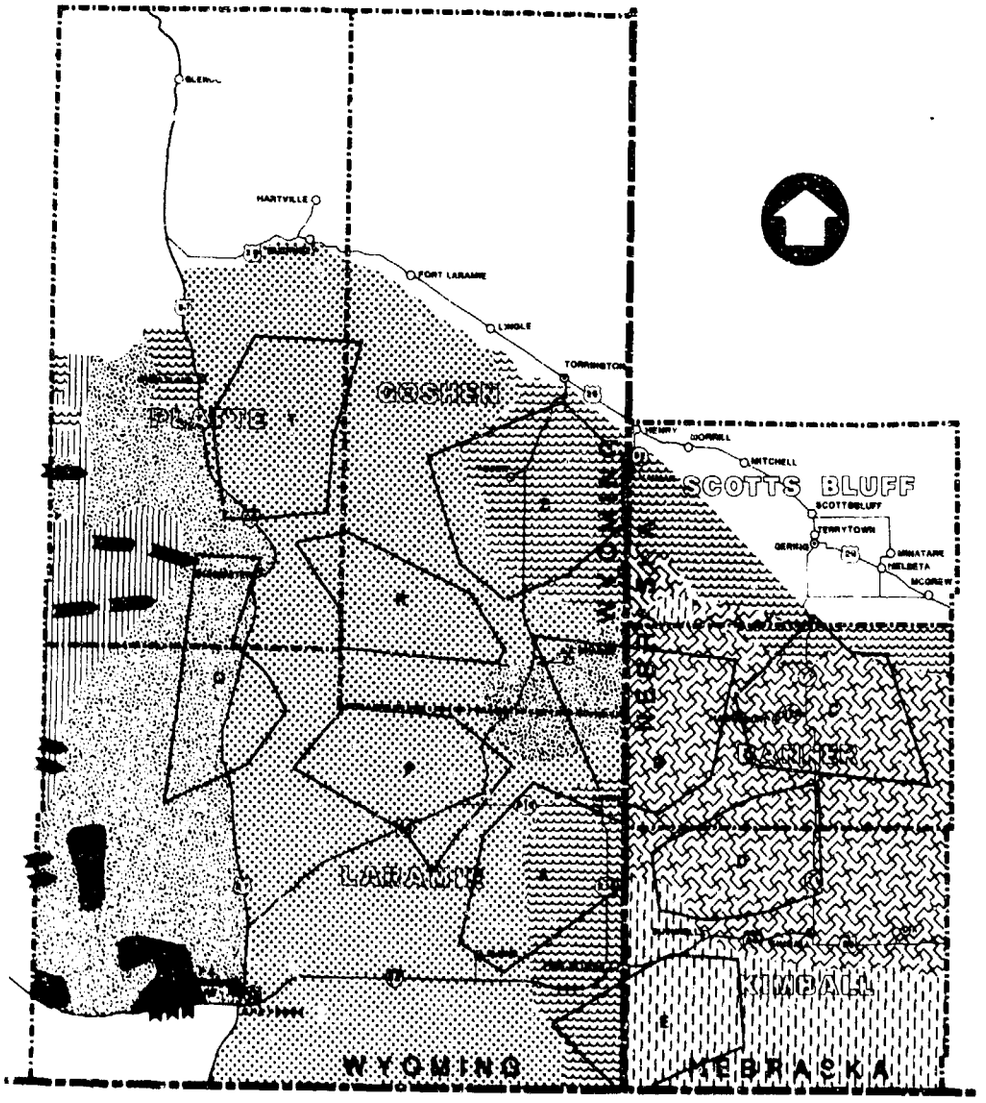
LEGEND

Number	Herd unit	Number	Herd unit	Number	Herd unit
1	Sublette	18	Cokeville	35	Project
2	Crystal	19	Carter Lease	36	North Ferris
3	Copper Mountain	20	Chalk Bluffs	37	South Ferris
4	Meeteetse	21	Hawk Springs	38	Baggs
5	Southfork Shoshone	22	Meadowdale	39	North Black Hills
6	McCullough Peaks	23	Iron Mountain	40	South Black Hills
7	Badger Basin	24	Owyer	41	Thunder Basin
8	Powder River	25	Medicine Bow	42	Lance Creek
9	Pumpkin Buttes	26	Cooper Lake	43	Boxelder
10	Upper Powder River	27	Centennial	44	Bates hole-Hat Six
11	Cedar Mountain	28	Elk Mountain	45	Rattlesnake
12	South Rock Springs	29	Big Creek	46	North Natrona
13	Black Butte	30	Iron Springs	47	Ormsby
14	South Wamsutter	31	Wind River	48	Bear Creek
15	Red Desert	32	Fremont	49	Sage Creek
16	Dry Lake	33	Sweetwater	50	LaBonte
17	West Green River	34	Badwater		Not a designated herd unit

SOURCE: Rippe and Rayburn, 1981

LOCATIONS OF PRONGHORN HERD UNITS IN WYOMING

FIGURE NO. 2.6.2-1



LEGEND

- CRITICAL-WINTER-YEARLONG HABITAT (WYO)
- WINTER-YEARLONG HABITAT (WYO)
- SUMMER HABITAT (WYO)
- YEARLONG HABITAT (WYO)

Two independent data bases used (Wyoming & Nebraska)

- MODERATE DENSITY (NEB) (1.0 TO 2.0/SQ. MILES)
- SCARCE (NEB) (LESS THAN 0.3/SQ. MILES)
- NOT IN RANGE
- MIGRATION ROUTE
- MISSILE FLIGHTS

SCALE IN MILES

0 5 10 20

Sources: WGFD 1982 -c WGFD n.d.-b WGFD 1978
NGPC 1972 NGPC, Personal communication, 1983

PRONGHORN DISTRIBUTION IN THE IRON MOUNTAIN, HAWK SPRINGS, CHALK BLUFFS, AND BANNER HERD UNITS WITHIN THE ACS

FIGURE NO. 2.6.2-2

Flight Q. Critical habitats are those areas where pronghorn can find food, water, and cover during periods of severe weather conditions (Rippe and Rayburn 1981). The northern portion of Flight Q is the eastern terminus of a pronghorn migration route (Figure 2.6.2-2). Pronghorn migrate into the area from summer range located along the Laramie Mountains and from the Laramie Basin. Pronghorn summer range occurs approximately 2 miles northwest of Silo Q-9.

The Hawk Springs herd unit is located east of Interstate 25 and north of Interstate 80 and includes the following Flights in Wyoming: A, P, R, S, most of T, southeastern Q, and the western portion of B. The herd unit is approximately 90 percent privately owned, and is used extensively for agriculture and grazing (WGFD 1981-b). The present pronghorn population trend in this herd unit is stable, with a population objective of 5,000 animals. Maintaining this objective is largely a function of landowner tolerance (Bohne and Rothwell 1982).

Pronghorn density in the Hawk Springs herd unit is approximately two individuals per sq mi. However, the average District 5 density is four pronghorn per sq mi. (Bohne and Rothwell 1982). During winter and early spring, pronghorn concentrate on croplands because of greening winter wheat. In addition, irrigated meadows and alfalfa fields provide forage during the summer months. Crop damage problems occur in these areas, and in order to stabilize the herd unit population near 1981 levels, pronghorn harvest must be increased above 1981 figures (Bohne and Rothwell 1982). Other problems affecting pronghorn populations in the Hawk Springs herd unit include water availability, habitat loss, and disease (WGFD 1981-b).

The majority of the Hawk Springs herd unit within the Flights is classified as yearlong pronghorn habitat (Figure 2.6.2-2). Yearlong habitat includes areas where all or part of a herd occurs throughout the year (Rippe and Rayburn 1981). An area of winter-yearlong habitat is located in the vicinity of Flight B.

The Chalk Bluffs pronghorn herd unit is located east of Interstate 25 and south of Interstate 80 and includes the Wyoming portion of Flight E. This unit exhibits a stable population trend, with a population objective of 450 animals, which is an increase of 25 individuals above the 1981 post-season estimate (Bohne and Rothwell 1982). Interstate highways tend to limit significant movement to the north and west of this unit. However, pronghorn movement does occur across the Colorado and Nebraska state lines, causing management problems for all three state management agencies (Bohne and Rothwell 1982). Because of the interstate movements, hunting seasons need to be coordinated between Wyoming, Nebraska, and Colorado.

The western three-fourths of the Chalk Bluffs unit is classified as yearlong pronghorn habitat (Figure 2.6.2-2). The eastern portion of the unit, which includes the Wyoming portion of Flight E, however, is not classified as pronghorn habitat.

The Nebraska portion of the Flights is included within the Banner pronghorn management unit, and includes Flights C, D, and the eastern portions of B and E (NGPC 1982). Data indicate a 15-percent increase in pronghorn from 1976, to an estimated 1982 population of 1,224 individuals. The management objective is

to increase the pronghorn herd in this unit. However, landowner tolerance is the major controlling factor (NGPC 1983-a; NGPC, personal communication, 1983).

The NGPC has not designated seasonal habitat for big game species in Nebraska; however, big game density data are available. Pronghorn densities in the Banner unit range from less than 0.3 per sq mi to 2.0 per sq mi (Figure 2.6.2-2). Moderate pronghorn densities (1.0 to 2.0 per sq mi) occur in the Nebraska portion of Flight E, while pronghorn are considered scarce in the other three Nebraska Flights.

A big game aerial reconnaissance of the 100 Minuteman silos and 10 LCFs was conducted by helicopter during the June 15 to 17, 1983 period. In addition, a ground reconnaissance was conducted at all 100 silos, 10 LCFs, and access roads from June 28 to July 7, 1983. Big game sightings during both of these surveys are presented in Table 2.6.2-12. The number of pronghorn sightings was highest in Flight P. Sightings were generally lower in the eastern Flights, with B and C showing only a few sightings. A total of 392 pronghorn were observed during aerial and ground reconnaissance surveys. The majority of pronghorn sightings occurred in grassland habitat.

The Iron Mountain, Cheyenne, and Goshen Hole mule deer herd units are within the Wyoming portion of the Flight area (Figure 2.6.2-3). The Iron Mountain herd unit is located west of Interstate 25, and includes the western two-thirds of Flight Q and the southwest corner of Flight T. The mule deer population within this unit is decreasing slightly (Bohne and Rothwell 1982). The post-season 1981 population was estimated to be 12,000 animals, and a population management objective of 11,590 mule deer has been established (Bohne and Rothwell 1982). Most of the mule deer habitat is on private land that is dominated by shrub vegetation. Stands of mountain mahogany are of particular importance (WGFD 1981-c). The majority of agricultural damage problems occur in the Farthing-Iron Mountain area west of the Flights (Bohne and Rothwell 1982).

The proximity of the Iron Mountain herd unit to a major population center has resulted in a variety of problems. Critical winter range is being reduced due to urban development (WGFD 1981-c). Landowners are experiencing increasing pressure to allow hunter access to their lands and, as a result, obtaining access to these lands is becoming increasingly difficult (WGFD 1981-c). The popularity of this herd unit for various recreational activities is increasing, especially in the Pole Mountain Division of Medicine Bow National Forest (WGFD 1981-c, Bohne and Rothwell 1982). The increase in recreational pressure may have adverse impacts on the Iron Mountain mule deer herd.

The Flights within the Iron Mountain mule deer herd unit contain critical-winter-yearlong habitat, winter-yearlong habitat, and yearlong habitat (Figure 2.6.2-4). Critical-winter-yearlong habitat is located along Horse and Chugwater creeks, and includes Silo Q-6, a small portion of the access road near the silo, and Silo Q-10, along with its entire access road between the silo and Chugwater. Mountain mahogany/skunkbush and riparian vegetation types occur in the Horse Creek critical-winter-yearlong mule deer habitat; silver sagebrush and mountain mahogany are the dominant shrub vegetation types in the Chugwater Creek critical-winter-yearlong habitat.

Table 2.6.2-12

BIG GAME OBSERVATIONS WITHIN THE FLIGHT PORTION OF THE AREA OF CONCENTRATED STUDY[1]

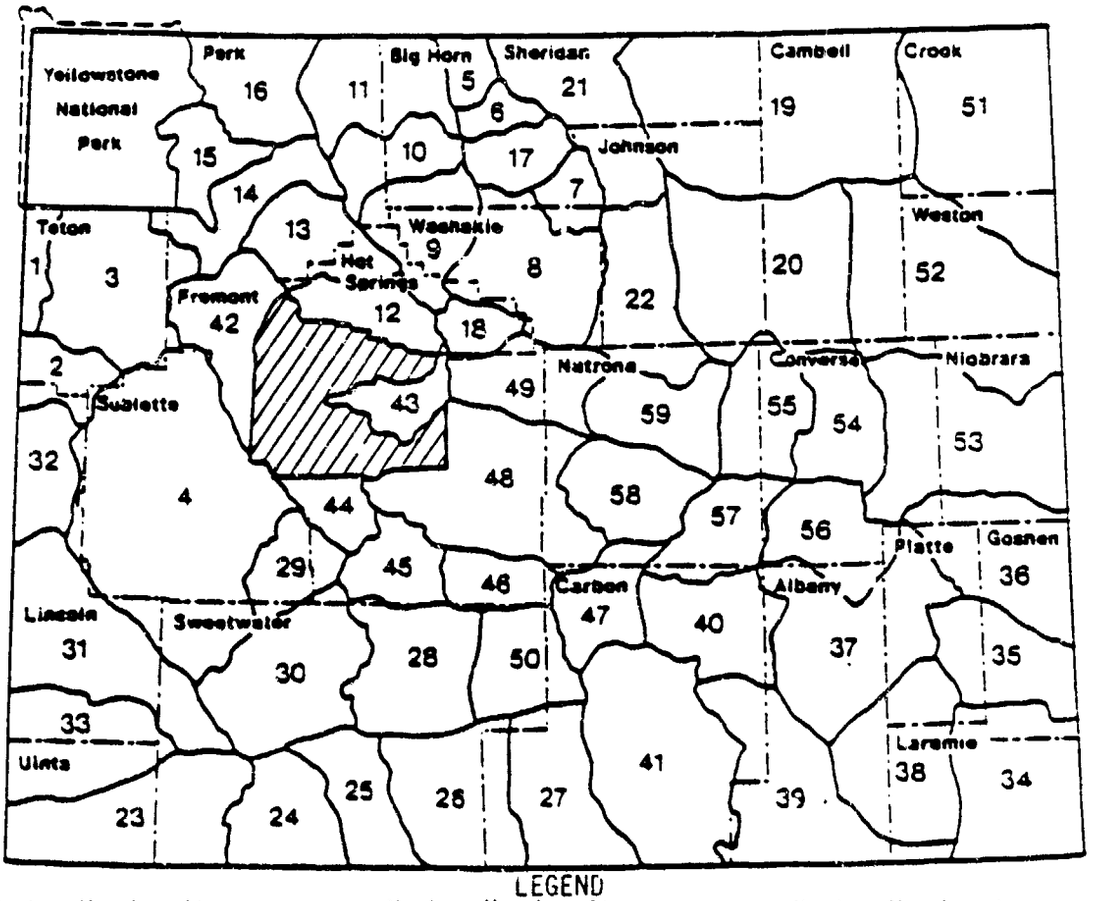
Flight	Aerial Observations			Ground Observations			Total		
	PR[2]	MD[3]	WTD[4]	PR	MD	WTD	PR	MD	WTD
Q	73	5	0	22	11	3	95	16	3
I	22	1	0	19	3	0	41	4	0
P	69	4	0	32	3	0	101	7	0
R	10	0	0	2	0	0	12	0	0
S	24	0	0	0	0	0	24	0	0
A	16	1	0	28	3	0	44	4	0
B	1	0	0	0	1	0	1	1	0
E	17	1	0	13	0	0	30	1	0
D	37	0	1	4	0	0	41	0	1
C	3	1	0	0	0	0	3	1	0
TOTAL:	272	13	1	120	21	3	392	34	4

Notes: 1 Time frame for observations: June-July, 1983.

2 Number of pronghorn sighted.

3 Number of mule deer sighted.

4 Number of white-tailed deer sighted.



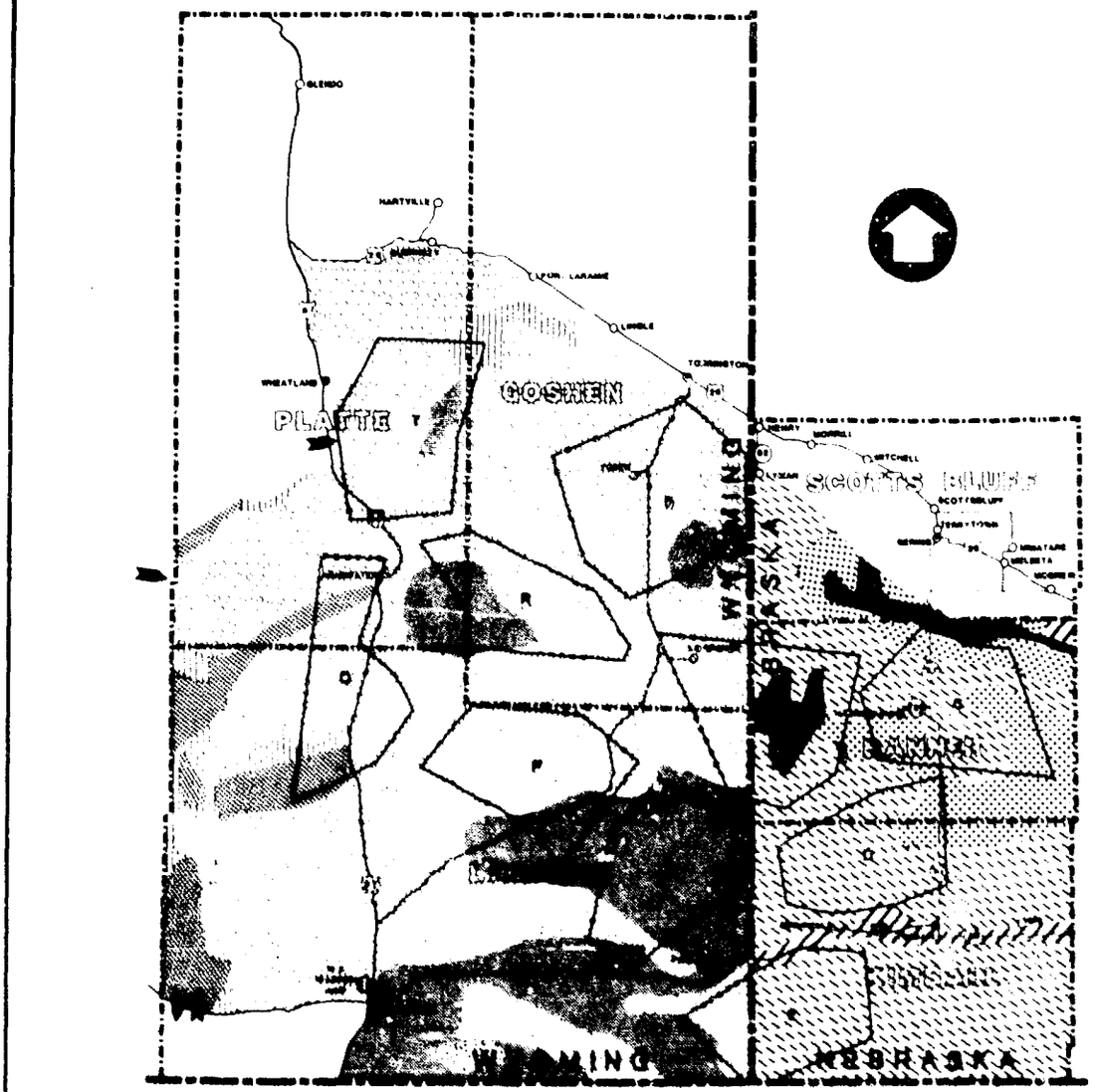
LEGEND

Number	Herd unit	Number	Herd unit	Number	Herd unit
1	Targhee	21	East Bighorn	41	Platte Valley
2	Fall Creek	22	Upper Powder River	42	Dubois
3	Jackson	23	Uinta-Cedar Mountain n	43	Project
4	Sublette	24	Little Mountain	44	Lander
5	Devil's Canyon	25	Black Butte	45	Hall Creek
6	Horse Creek	26	South Wamsutter	46	Green Mountain
7	Broken Back	27	Baggs	47	Ferris
8	Big Trails	28	Table Rock	48	Beaver Rim
9	Basin	29	Prospect Mountain	49	Badwater
10	Greybull River	30	Steamboat	50	Chain Lakes
11	Shoshone River	31	West Green River	51	Black Hills
12	Upper Cottonwood	32	Lincoln	52	Thunder Basin
13	Meeteetse	33	Carter Lease	53	Lance Creek
14	Southfork Shoshone	34	Cheyenne	54	West Bill
15	Northfork Shoshone	35	Goshen Hole	55	Ormsby
16	Clark's Fork	36	Muskrat	56	South Converse
17	Trapper	37	Laramie Peak	57	Bates Hole-Hat Six
18	Copper Mountain	38	Iron Mountain	58	Rattlesnake
19	Powder River	39	Sheep Mountain	59	North Natrona
20	Pumpkin Buttes	40	Shirley Mountain		Not a designated herd unit

SOURCE: Rippe and Rayburn, 1981

LOCATIONS OF MULE DEER HERD UNITS IN WYOMING

FIGURE NO. 2.6.2-3



LEGEND

- CRITICAL-WINTER-YEARLONG HABITAT (WYO)
- WINTER-YEARLONG HABITAT (WYO)
- WINTER HABITAT (WYO)
- YEARLONG HABITAT (WYO)
- HIGH DENSITY (NEB) (MORE THAN 8.0/SQ MI)
- MODERATE DENSITY (NEB) (4.0 TO 8.0/SQ MI)
- LOW DENSITY (NEB) (1.0 TO 3.0/SQ MI)
- SCARCE (NEB) (LESS THAN 1.0/SQ MI)
- NOT IN RANGE
- MIGRATION ROUTE
- MISSILE FLIGHTS

SCALE IN MILES

0 5 10 20

Sources: WGFD 1980-a, 1979-a, 1979-b
NGPC 1972

MULE DEER DISTRIBUTION IN THE IRON MOUNTAIN,CHEYENNE,GOSHEN HOLE,AND UPPER PLATTE HERD UNITS WITHIN THE ACS

FIGURE NO. 2.6.2-4

The Cheyenne mule deer herd unit is located east of Interstate 25 and south of State Roads 313 and 151 in southern Goshen County. This unit includes Flights A, P, southern R, southwestern B, and western E in Wyoming. Data for this herd unit currently indicate a slightly increasing population. The population management objective is to maintain the herd size at 2,300 individuals, or equal to the post-season 1981 population estimate (Bohne and Rothwell 1982).

The Cheyenne unit is dominated by short-grass prairie, and the mule deer population is considered low in relation to the size of the herd unit (Bohne and Rothwell 1982). Good mule deer habitat occurs in only a small percentage of the herd unit. Most of the mule deer habitat is located on private lands (WGFD 1981-d). Damage problems have occurred locally in years of high mule deer population. Recreational hunting demands are increasing in this area due to its close proximity to human population centers. The ability to increase the mule deer herd is severely limited by lack of habitat, and permits may have to be limited to preserve hunting quality within this unit (WGFD 1981-d).

Yearlong mule deer habitat occurs in the majority of Flights within the Cheyenne mule deer herd unit. Extensive areas in the southeast portion of the Flight area are not classified as mule deer habitat, including the majority of Flight A (Figure 2.6.2-4).

The Goshen Hole mule deer herd unit is located in south-central Platte and Goshen counties west of Interstate 25. It includes Flights S, most of T, northwestern B, and northern R. This herd unit shows a slightly increasing population trend, with a population objective of 3,500 animals (Bohne and Rothwell 1982).

The Goshen Hole herd unit vegetation types are prairie shrub, grasslands, and croplands. Mule deer utilize riparian areas, mountain mahogany breaks, ponderosa savannah, and agricultural lands within this unit (Bohne and Rothwell 1982). The Flights within the Goshen Hole herd unit are primarily yearlong mule deer habitat, although an area of winter-yearlong range occurs in the northeast corner of Flight T (Figure 2.6.2-4).

The Nebraska portion of the Flight area lies totally within the Upper Platte deer management unit, and includes Flights C, D, and the eastern portions of B and E (NGPC 1982). The estimated mule deer population in this unit has increased by 60 percent over the last 6 years to a 1982 estimated population of 4,000 mule deer (NGPC, personal communication, 1983). The population objective for this unit (both deer species) is to increase the herd by 30 to 50 percent (NGPC, personal communication, 1983).

Deer densities in Nebraska vary from high (more than 8 per sq mi) to scarce (less than 1 per sq mi) (NGPC 1972). Combined density data are presented for mule deer and white-tailed deer in Figure 2.6.2-4. High deer densities occur in west-central Banner County in Flight B, and in the Wildcat Hills in Flight C. Moderate densities (4 to 8 per sq mi) occur in central and eastern Banner County in portions of Flights B, C, and D. Low densities occur along Lodgepole Creek between Flights D and E. Deer densities within Flight E are considered scarce (NGPC 1972).

During aerial and ground reconnaissance surveys, a total of 34 mule deer were observed within the ACS (excluding F.E. Warren AFB). The majority of these

observations occurred in riparian habitat, shrubland, or windbreaks (Table 2.6.2-12). Flight Q contained the highest number of sightings.

The Southeast Wyoming white-tailed deer herd unit includes the entire Wyoming portion of the Flight area, including Flights Q, T, S, R, P, A, and the western portions of B and E (Figure 2.6.2-5). This herd unit has a slightly increasing population, with a management objective of 1,000 individuals (Bohne and Rothwell 1982). White-tailed deer generally use agricultural lands and riparian zones in this herd unit, and appear to be increasing their range and numbers (Bohne and Rothwell 1982). Yearlong habitat for white-tailed deer within the Wyoming portion of the Flight area is located along Horse, Chugwater, and lower Bear creeks, and along the Laramie and North Platte rivers (Figure 2.6.2-6). All Wyoming Flights contain yearlong white-tailed deer habitat except A and E.

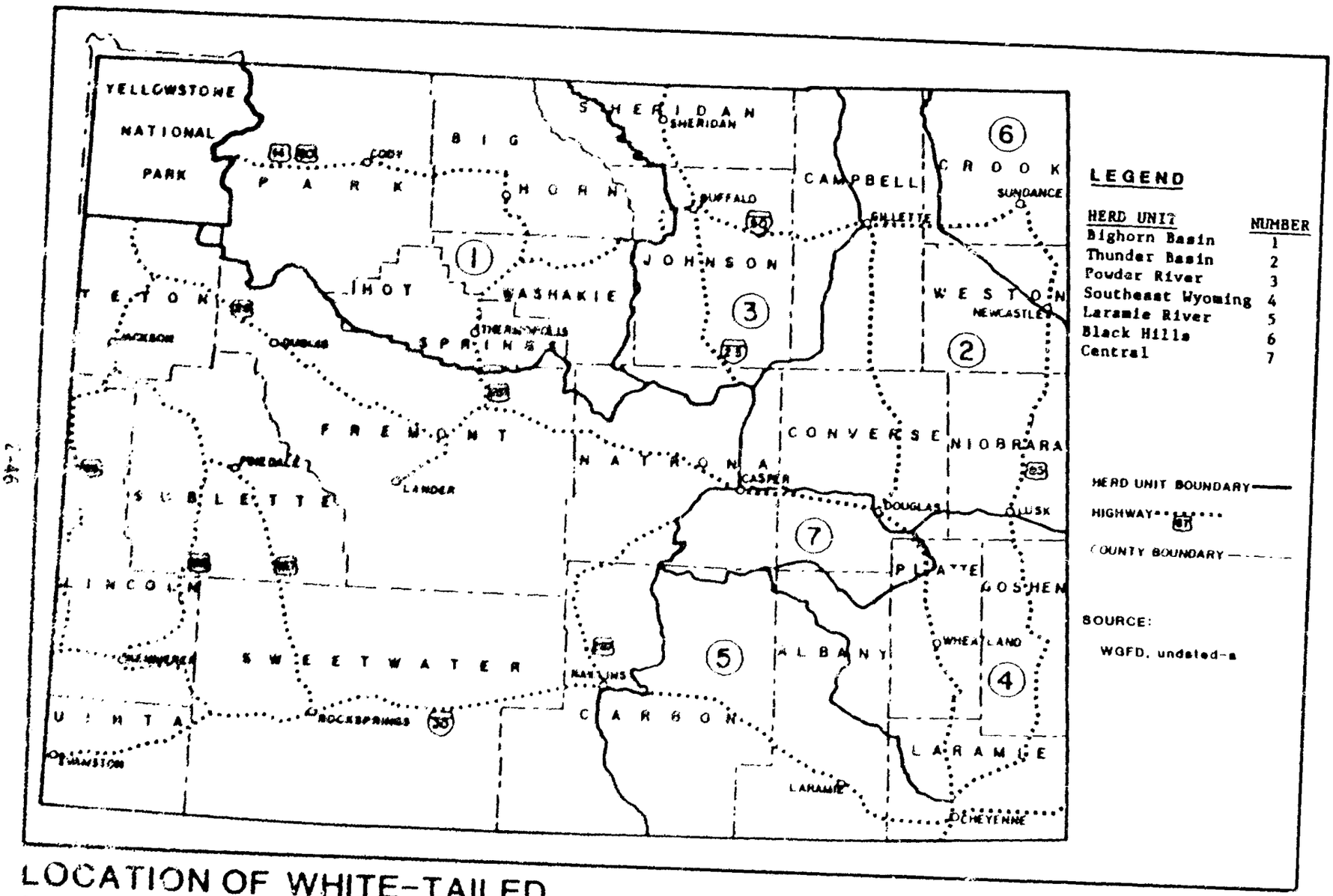
The Nebraska portion of the Flights lies totally within the Upper Platte deer management unit and includes Flights C, D, and the eastern portions of B and E (NGPC 1982). The estimated white-tailed deer population in this unit was 2,000 animals in 1982. This is a 67-percent increase from 1977 (NGPC, personal communication, 1983). Density estimates for white-tailed deer in the Upper Platte unit are presented in the mule deer discussion, because both species are combined in the data base.

During aerial and ground reconnaissance surveys, white-tailed deer were observed within the riparian habitat along Chugwater Creek in Flight Q and adjacent to an intermittent drainage in Flight D (Table 2.6.2-12).

The only elk herd unit adjacent to the Flight area is the Iron Mountain unit, which is located west of Interstate 25 in Wyoming, and includes the western two-thirds of Flight Q, and the southwest corner of Flight T (Figure 2.6.2-7). The Iron Mountain elk herd unit's population is considered stable. The 1981 post-season management objective is 75 elk for this unit (Bohne and Rothwell 1982). The WGFD has an agreement with the USFS to maintain a minimum of 50 elk on the Pole Mountain Division of Medicine Bow National Forest (Bohne and Rothwell 1982). Population data concerning this elk herd are very limited. It is possible that 100 to 150 elk may be a more reasonable management objective for this herd (Bohne and Rothwell 1982).

The Flights are not classified as elk habitat. However, winter-yearlong elk habitat is located approximately 2 miles northwest of Silo Q-9, and approximately 5 miles southwest of Silo T-8 (Figure 2.6.2-8). No elk were sighted during the aerial or ground reconnaissance surveys in Wyoming; however, the WGFD's Wildlife Observation System has recorded three sightings along the northern border of Flight Q, and one sighting in the northwest corner of Flight T (WGFD 1983-a). In Nebraska, elk were observed in the Wildcat Hills State Recreation Area along the northern border of Flight C during surveys in October and November 1983. This population is a captive herd which is managed by the NGPC for aesthetic purposes (NGPC, personal communication, 1983).

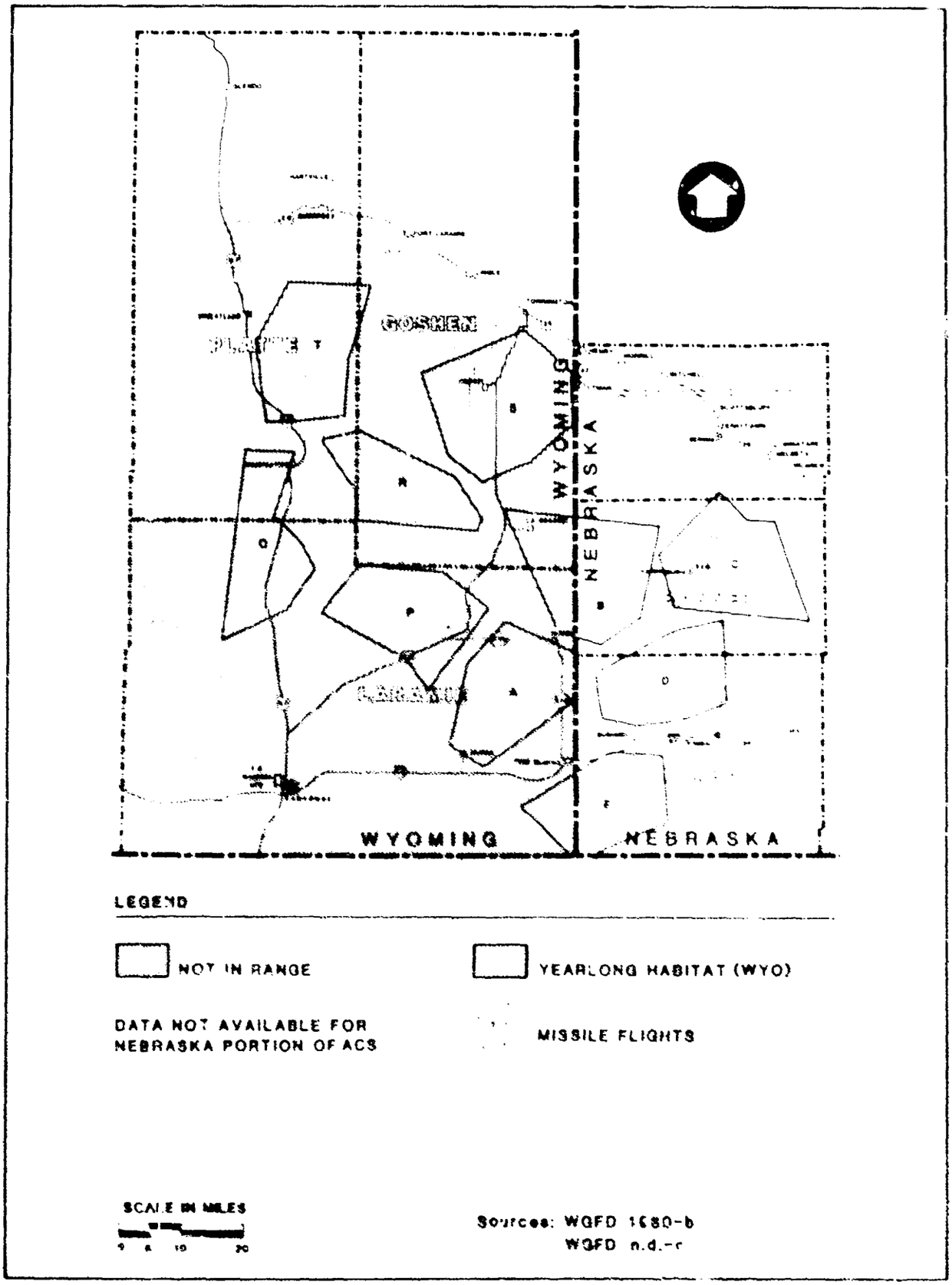
There are no data available to indicate the presence of bighorn sheep within the Flights or the immediate vicinity. The black bear is not normally known to occur in the vicinity of the Flights. However, the WGFD's Wildlife Observation System reports a sighting in Platte County, west of Chugwater (WGFD 1983-a). This sighting is within the Flight area, approximately 1 to 2 miles east of Silo Q-2.



94-7

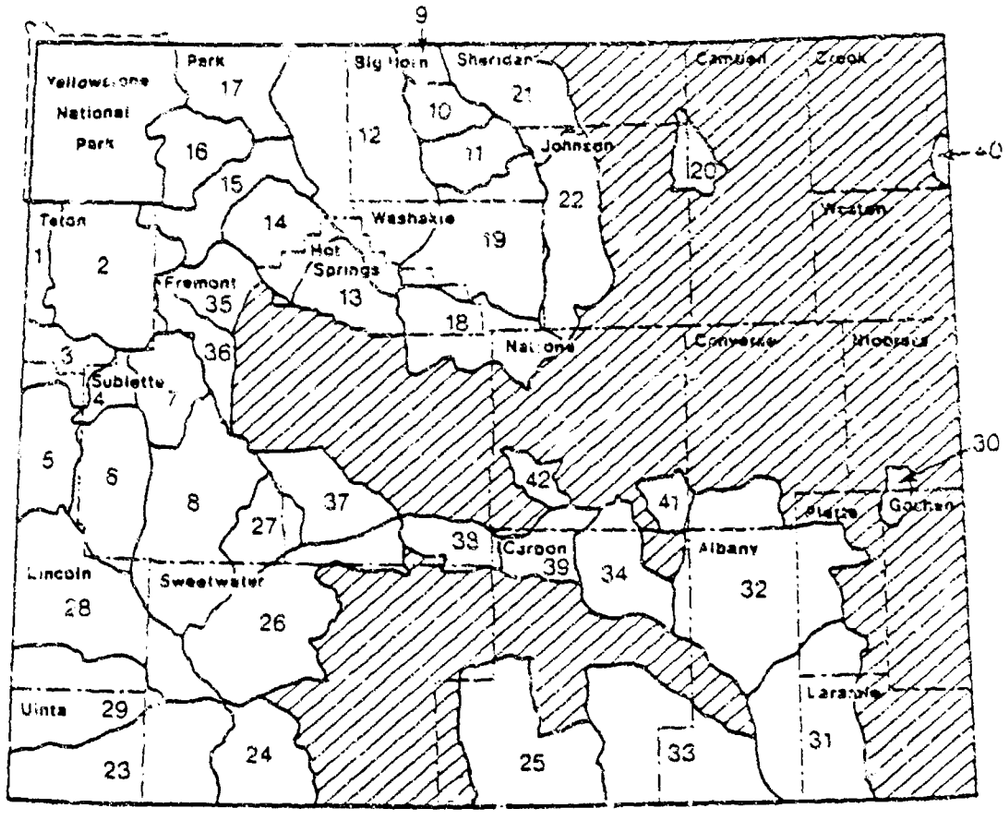
LOCATION OF WHITE-TAILED DEER HERD UNITS IN WYOMING

FIGURE NO. 2.6.2-5



WHITE-TAILED DEER DISTRIBUTION IN THE SOUTHEAST WYOMING AND LARAMIE RIVER HERD UNITS WITHIN THE ACS

FIGURE NO. 2.6.2-6



LEGEND

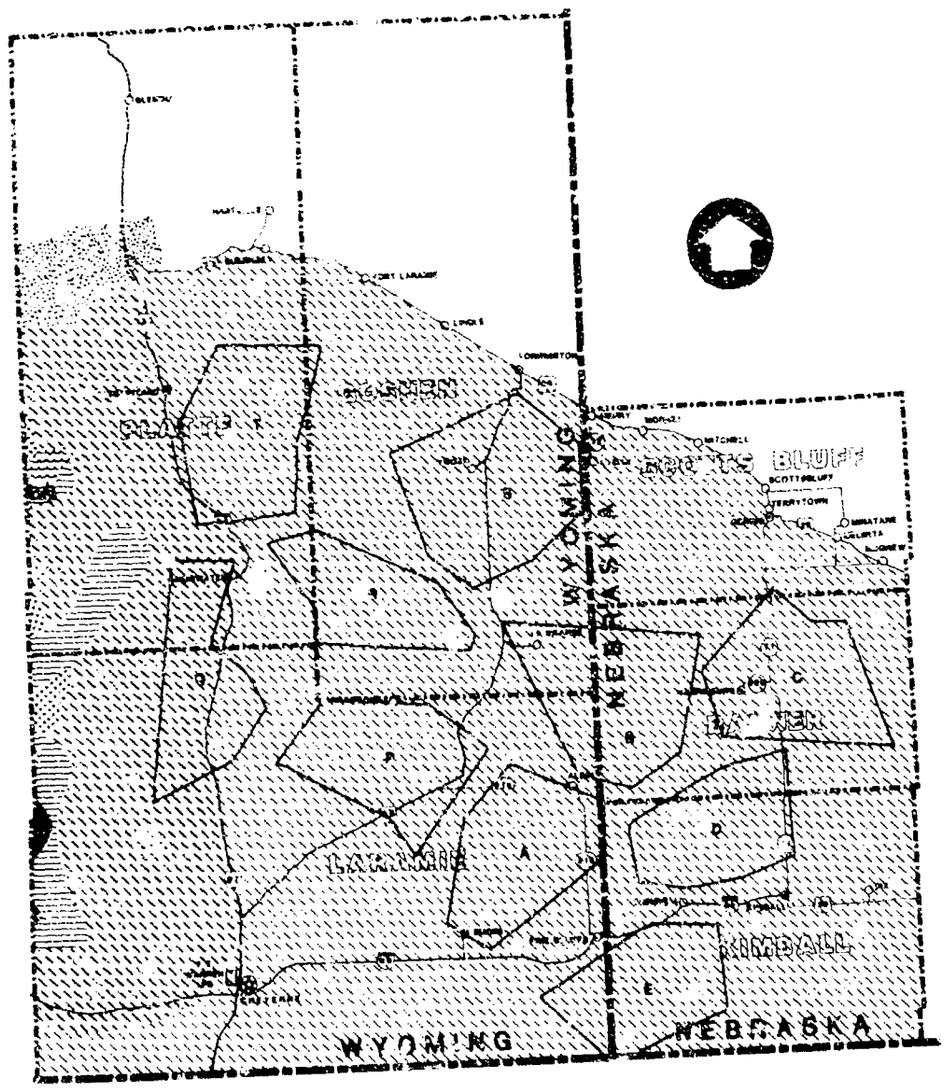
Number	Herd unit	Number	Herd unit	Number	Herd unit
1	Targhee	15	Southfork Shoshone	29	Carter Lease
2	Jackson	16	Northfork Shoshone	30	Rawhide
3	Fall Creek	17	Clark's Fork	31	Iron Mountain
4	Hoback	18	Upper Nowood	32	Laramie Peak
5	Afton	19	Paintrock	33	Snowy Range
6	Piney	20	Fortification	34	Shirley Mountain
7	Upper Green River	21	Northeast Bighorn	35	Wiggins Fork
8	Pinedale	22	Southeast Bighorn	36	Warm Springs
9	Deer Creek	23	Uinta-Cedar Mountain	37	Lander
10	Horse Creek	24	Little Mountain	38	Green Mountain
11	Trapper	25	Baggs	39	Ferris
12	Basin	26	Steamboat	40	Black Hills
13	Owl Creek	27	Prospect	41	Muddy Mountain
14	Upper Greybull River	28	West Green River	42	Rattlesnake

Not a designated herd unit

SOURCE: Rippe and Rayburn, 1981

LOCATIONS OF ELK HERD UNITS IN WYOMING

FIGURE NO. 2.6.2-7



LEGEND

- CRITICAL-WINTER- YEARLONG HABITAT (WYO)
- CRITICAL-WINTER HABITA. (WYO)
- WINTER-YEARLONG HABITAT (WYO)
- SUMMER HABITAT (WYO)
- OUT OF RANGE
- YEARLONG HABITAT (WYO)
- MISSILE FLIGHTS

SCALE IN MILES

0 5 10 20

Source: WGFD 1982-d

ELK DISTRIBUTION IN THE IRON MOUNTAIN HERD UNIT IN WYOMING

FIGURE N
2.6.2-

The mountain lion is considered rare in Wyoming (Findholt et al. 1981). However, the Wildlife Observation System has recorded two sightings within the Flights, in southwestern Goshen County near the southern border of Flight R, and in east-central Platte County along the northern border of Flight T (WGFD 1983-a).

2.6.2.1.2.2 F.E. Warren AFB

Pronghorn, mule deer, and white-tailed deer occur on F.E. Warren AFB. The base is classified as winter-yearlong pronghorn habitat by the WGFD (WGFD 1982-c). The majority of pronghorn onbase use the grassland habitat in the northern portion of the base. Approximately 60 pronghorn occupy the northern portion of the base during winter, with approximately 30 individuals occurring year-round. Pronghorn also occur in the southwestern portion of the base, south of the WSA. Pronghorn habitat on F.E. Warren AFB may be locally important due to the lack of intense grazing pressure.

The Crow Creek area of F.E. Warren AFB is classified as winter-yearlong habitat for mule deer. The remaining portions of the base are delineated as yearlong habitat (WGFD 1980-a). Approximately 20 mule deer use the base year-round. During the June 1983 biological field surveys, the majority of mule deer observations were made in riparian habitat along central and lower Diamond Creek and the entire length of Crow Creek.

Yearlong habitat for white-tailed deer is delineated along Crow Creek within F.E. Warren AFB (WGFD n.d.-c). Approximately seven white-tailed deer occur along Crow Creek within the base. The majority of white-tailed deer observations made during the biological field surveys were in riparian habitat along Crow Creek. Several sightings also occurred along lower Diamond Creek.

Deer pellet transects were established in the Crow and Diamond Creek drainages within F.E. Warren AFB in June 1983 to determine relative deer-days use. Data collected from the transects in late October 1983 indicated mule and white-tailed deer summer use was concentrated along Crow Creek. Areas of highest use included the downstream portion of the Creek between Gate No. 2 and Third Street. Transects will also be examined in April 1984 to determine winter deer use patterns within the base.

2.6.2.1.2.3 Other Disturbed Areas

Data concerning big game habitat characteristics and species composition of aggregate quarries and dispatch stations are not available because their locations are not presently known. Quarries may be located along drainages or in upland areas, and riparian, woodland, shrubland, or grassland habitat types may occur along these drainages. Yearlong, winter-yearlong, or critical-winter-yearlong habitats for pronghorn or deer may be affected in the Wyoming portion of the ACS, or areas of scarce to high pronghorn and/or deer densities in the Nebraska portion of the ACS. Dispatch stations would most likely be located in grassland habitats adjacent to urban areas, with relatively low quality big game habitat affected.

2.6.2.2 Furbearers

2.6.2.2.1 Region of Influence

Twenty-one species classified as furbearers may occur in the ROI. The location and numbers of these species primarily depend on habitat availability. Forested mountain regions and associated drainages located in the western portion of the ROI provide a variety of habitat types and may support diverse furbearer populations. The grassland and agricultural areas to the east generally support fewer species.

The ROI includes portions of western Nebraska and South Dakota. The drainages of the North Platte River and its tributaries, the Niobrara, Cheyenne, and White rivers in the northeast area of the Nebraska portion of the ROI, provide habitat for muskrat (Ondatra zibethicus) and a small number of beaver (Castor canadensis) (NGPC 1972, Schildman 1981). Riparian habitat associated with these drainages may support populations of raccoon (Procyon lotor) and striped skunk (Mephitis mephitis), and smaller populations of mink (Mustela vison) and opossum (Didelphia virginiana) (NGPC 1972, Schildman 1981).

Habitat that includes agricultural fields/grasslands and shrub or woodlands is preferred by red fox (Vulpes vulpes) and long-tailed weasel (Mustela frenata), and smaller numbers of gray fox (Urocyon cinereoargenteus) and least weasel (Mustela nivalus) (Chapman and Feldhamer 1982, NGPC 1972, Schildman 1981). Bobcat (Felis rufus) and spotted skunk (Spilogale putorius) are also uncommon residents of the Nebraska and South Dakota portions of the ROI in these habitat associations and prefer scarp/woodland areas as den sites (Chapman and Feldhamer 1982, NGPC 1972, Schildman 1981). Coyote (Canis latrans), badger (Taxidea taxus), jackrabbits (Lepus spp.), and swift fox (Vulpes velox) use the open grasslands (Chapman and Feldhamer 1982, NGPC 1972, Schildman 1981). All of these species are common residents of the Nebraska portion of the ROI with the exception of the swift fox which is a Nebraska state-listed endangered species (NGPC 1977).

The foothills and Rocky Mountains of Colorado within the ROI provide a variety of habitat types that support several furbearer species.

Beaver, muskrat, raccoon, mink, and striped skunk are common residents in Colorado and are generally associated with aquatic and riparian habitats found in the drainages of the South Platte River (CDOW 1979-a, CDOW 1982-b). Bobcat, red fox, spotted skunk, and gray fox are common within the shrub and woodlands of the western foothills and where riparian habitat occurs in the eastern grasslands of Colorado. These species are dependent, to varying degrees, on the food and cover provided by these habitat types (Chapman and Feldhamer 1982, CDOW 1979, CDOW 1982-b). In addition, opossum occur in riparian habitats along the easternmost reaches of the South Platte River. The coyote, white and black-tailed jackrabbits, long-tailed weasel, and badger are common throughout the various habitats of the Colorado portion of the ROI (CDOW 1979-a, CDOW 1982-b).The swift fox is common throughout the grasslands of eastern Colorado. Small populations of marten (Martes americana) and ermine occur in the alpine and coniferous/scrub oak habitat of the mountains. Small populations of wolverine (Gulo gulo), and the Canada lynx (Lynx canadensis) also occur in the coniferous forests of the mountains (CDOW 1982-b, 1979-a).

The Wyoming portion of the ROI consists of short-grass prairie and agricultural lands to the east, and the foothills and Rocky Mountains to the west. Because of the similar habitat types occurring in the Colorado and Wyoming portion of the ROI, the furbearer species composition is also basically the same (Findholt et al. 1981, WGFD 1977). There are fewer swift fox in Wyoming. Larger populations of badger and long and short-tailed weasel occur in Wyoming (Findholt et al. 1981, WGFD 1977).

2.6.2.2.2 Area of Concentrated Study

Drainages within the ACS flow eastward from the Laramie Mountains into the North Platte River, providing aquatic and riparian furbearer habitat. Perennial streams are more prevalent in the P, Q, R, S, and T Flights and therefore may support larger populations of muskrat, beaver, mink, raccoon, and striped skunk than the A, B, C, D, and E Flights.

The coyote, long-tailed weasel, badger, red fox, and jackrabbit are common throughout the ACS, and may also occur in riparian areas (Findholt et al. 1981, Jones 1964). Larger numbers of these species may be found where ponderosa pine, shrubland, or farm windbreaks occur in combination with grasslands. Low densities of swift and gray fox, spotted skunk, bobcat, and opossum may also occur throughout the ACS (Findholt et al. 1981, Jones 1964).

During the June and October 1983 reconnaissance, the following species were observed: red fox in Flights P, S, and D, raccoon in Flights A and B, coyotes in Flights Q, R, and S, and badger in Flights P, R, and S.

2.6.2.2.3 F.E. Warren AFB

F.E. Warren AFB has a habitat composition similar to that of the ACS, and therefore would support similar species of furbearers. Riparian and aquatic habitats located along Crow and Diamond creeks may support a variety of furbearer species. Species such as gray fox, spotted skunk, opossum, and bobcat are not expected to occur onbase due to small or insufficient amounts of habitat.

Red fox, beaver, muskrat, jackrabbit, and striped skunk were observed during the October 1983 reconnaissance of F.E. Warren AFB. In addition, raccoon and badger sign were also recorded in the riparian and grassland areas respectively, during the June and October 1983 reconnaissance on the base.

2.6.2.2.4 Other Disturbed Areas

Other disturbed areas include aggregate quarries and dispatch stations. Quarries may be located along drainages or upland areas. Habitats that may be impacted include aquatic, riparian, woodland, shrubland, and grassland. Dispatch stations would most likely be located adjacent to urban areas and may vary in size. Habitats that may be impacted by the dispatch station areas or associated activities include grassland and agricultural land.

2.6.2.3 Nongame Mammals

2.6.2.3.1 Region of Influence

Sixty-seven species of nongame mammals may occur in a variety of vegetation associations within the ROI. Many of these species are found in the diverse habitat types occurring in the western parts of ROI (Findholt et al. 1981, CDOW 1978-a). These species may be common or abundant in their preferred habitats.

2.6.2.3.2 Area of Concentrated Study

Thirty-nine species of nongame mammals occur within the vegetation associations of the ACS (Table 2.6.2-13). Several species are known to occur within and adjacent to the Flights in Goshen and eastern Laramie counties including the plains pocket gopher (Geomys bursarius), silky pocket mouse (Perognathus flavus), hispid pocket mouse (Perognathus hispidus), plains harvest mouse (Reithrodontomys montanus), eastern mole (Scalopus aquaticus), spotted ground squirrel (Spermophilus spilosoma), meadow jumping mouse (Zapus hudsonius), and plains pocket mouse (Perognathus flavescens) (WGFD 1983-a, WNHP 1983). The WNHP lists all but the plains pocket gopher as a species of special concern. With respect to their Wyoming distributions, these species generally have small population densities or are limited to the southeast quarter of the state (Findholt et al. 1981, Burt and Grossenheider 1976, WGFD 1974).

Porcupine and their sign were observed in Flight P during the October 1983 reconnaissance. Porcupines have also recently been observed in or adjacent to the Q, R, and T Flights (WGFD 1983-a).

During the June and October 1983 helicopter surveys of the silos and cable paths, 12 black-tailed prairie dog (Cynomys Ludovicianus) towns were observed within 1 mile of proposed cable paths, existing silos and/or associated access roads. Seven towns were located in Flight S, two in Flight T, and one each in Q, B, and P Flights.

Limited (224 trap nights) small mammal live trapping was conducted in various habitats within the ACS during the October 1983 reconnaissance. Species captured include the Ord's kangaroo rat (Dipodomys ordii), northern grasshopper mouse (Onychomys leucogaster), prairie vole (Microtus ochrogaster), and deer mouse (Peromyscus maniculatus), (Table 2.6.2-14).

2.6.2.3.3 F.E. Warren AFB

The nongame mammals within F.E. Warren AFB include several species expected to occur throughout the ACS (Table 2.6.2-13).

Small mammal live trapping was conducted in various habitats within F.E. Warren AFB. Sherman live traps were used for 1,300 trap nights during the June 1983 reconnaissance. Due to their better capture rates, Smith live traps were used for a total of 810 trap nights during the October 1983 effort. Deer mice and prairie voles were the most common species captured within the base (Table 2.6.2-15). The house mouse (Mus musculus) was trapped primarily in the disturbed riparian habitat of lower Crow Creek. This species appears to be associated with the past human occupation that has occurred in

Table 2.6.2-13

NONGAME MAMMALS OCCURRING WITHIN THE AREA OF CONCENTRATED STUDY

Scientific Name	Common Name	Habitat Types	Relative Abundance
Sorex cinereus	Masked shrew	1,2,3,4	II
Sorex monticolus	Dusky shrew	3,5,6	II
Sorex merriami	Merriam's shrew	2,7	I
Cryptotis parva	Least shrew	12,4	I
Scalopus aquaticus	Eastern mole	2,8	I
Myotis lucifugus	Little brown bat	1,9,10	I
Myotis leibii	Small-footed myotis	2,11,7	I
Lasionycteris noctivagus	Silver haired bat	9,10	I
Lasiurus borealis	Red bat	2,8	I
Eptesicus fuscus	Big brown bat	12,7,9,10	I
Myotis evotis	Long-eared myotis	9,7,5	II
Myotis keenii	Keen's myotis	9,10	I
Myotis volans	Long-legged myotis	9,10,7,5	II
Lasiurus cinereus	Hoary bat	9,10,7,5,1	I
Eutamias minimus	Least chipmunk	Most habitats	III
Spermophilus elegans	Wyoming ground squirrel	7,2,11,8	II
Spermophilus spilosoma	Spotted ground squirrel	13,2	I
Spermophilus tridecemlineatus	Thirteen-lined ground squirrel	7,2,11,8	II
Cynomys ludovicianus	Black-tailed prairie dog	13,2,11	II

Table 2.6.2-13 Continued, Page 2 of 3
NONGAME MAMMALS OCCURRING WITHIN THE
AREA OF CONCENTRATED STUDY

Scientific Name	Common Name	Habitat Types	Relative Abundance
Thomomys talpoides	Northern pocket gopher	12,8,9,10	II
Geomys bursarius	Plains pocket gopher	13,2,8	I
Perognathus fasciatus	Olive-backed pocket mouse	7,2,11	II
Perognathus flavescens	Plains pocket mouse	13,2,14	I
Perognathus flavus	Silky pocket mouse	13,2	I
Perognathus hispidus	Hispid pocket mouse	13,2	I
Dipodomys ordii	Ord's kangaroo rat	2,7	II
Reithrodontomys montanus	Plains harvest mouse	2	I
Reithrodontomys megalotus	Western harvest mouse	2,7	II
Peromyscus maniculatus	Deer mouse	Most habitats	III
Onychomys leucogaster	Northern grasshopper mouse	2,11,7	II
Neotoma cinerea	Bushy tailed wood rat	2,11,7	II
Microtus pennsylvanicus	Meadow vole	9,10,5,16, 15,3,4	III
Microtus ochrogaster	Prairie vole	2,13	II
Lagurus curtatus	Sagebrush vole	2,11,8,7	II
Rattus norvegicus	Norway rat	8	I
Mus musculus	House mouse	8	II

Table 2.6.2-13 Continued, Page 3 of 3
NONGAME MAMMALS OCCURRING WITHIN THE
AREA OF CONCENTRATED STUDY

Scientific Name	Common Name	Habitat Types	Relative Abundance
Zapus hudsonius	Meadow jumping mouse	3,15	I
Zapus princeps	Western jumping mouse	3	II
Erethizon dorsatum	Porcupine	13,9,10	II

Notes:

I UNCOMMON — A species that is common in small areas within its range or a species that is found throughout its range in relatively low densities; usually requires intensive searching or trapping to locate species or its sign.

II COMMON — A species that inhabits much of the preferred habitat within its range; species or its sign usually encountered while using techniques which could be expected to reveal the presence of the species.

III ABUNDANT — A species that inhabits much of the preferred habitat within its range; species or its sign always encountered while using techniques which could be expected to reveal the presence of the species.

1. Riparian shrub - shrub steppe
2. Eastern Great Plains area grasslands
3. Grasslike types (sedge)
4. Marsh - swamp wetlands
5. Sagebrush grassland (foothill)
6. Cottonwood riparian
7. Prairie shrub - shrub steppe
8. Cropland/agricultural land
9. Conifer trees
10. Deciduous trees
11. Great Basin - Foothills grasslands
12. Grasslands
13. Sagebrush - grassland (prairie)
14. Sand dune - sand blowouts
15. Wet - moist meadow grasslands
16. Riparian - willow, hawthorn, birch, alder, shrubby cinquefoil

Source: WGFD 1974, 1977,1983-a; Findholt et al. 1981; Burt and Grossenheider 1976; NGPC 1972.

Table 2.6.2-14

NUMBERS OF SMALL MAMMALS LIVE TRAPPED IN THE ACS
DURING OCTOBER 1983 BY VEGETATION TYPES

	Meadow	Mountain Mahogany	Silver Sagebrush	Riparian	Grassland	Ponderosa Pine
Trap Nights	50	16	41	40	47	50
	Number	Number	Number	Number	Number	Number
Deer Mouse	4	2	2	1	9	-
Prairie Vole	3	-	-	-	1	-
Northern Grasshopper Mouse	-	-	2	-	1	-
Ord's Kangaroo Rat	-	-	1	-	-	-
TOTALS	7	2	5	1	11	1

Table 2.6.2-15

NUMBERS AND RELATIVE ABUNDANCE, BY VEGETATION TYPE,
OF SMALL MAMMALS LIVE TRAPPED ON F.E. WARREN AFB DURING JUNE 1983

	Riparian Trap Nights - 660		Grasslands Trap Nights - 496		Disturbed[1] Trap Nights - 144	
	# of Captures	Relative Abundance %	# of Captures	Relative Abundance %	# of Captures	Relative Abundance
Deer Mouse	31	60	2	22	13	72
Prairie Vole	20	38	5	56	5	28
House Mouse	1	2	-	-	-	-
Thirteen-lined Ground Squirrel	-	-	2	22	-	-
TOTALS:	52	100	9	100	18	100

NUMBERS AND RELATIVE ABUNDANCE, BY VEGETATION TYPE,
OF SMALL MAMMALS LIVE TRAPPED ON F.E. WARREN AFB DURING OCTOBER 1983

	Riparian Trap Nights - 345		Grasslands Trap Nights - 496		Disturbed[1] Trap Nights - 144	
	# of Captures	Relative Abundance %	# of Captures	Relative Abundance %	# of Captures	Relative Abundance %
Deer Mouse	21	46	48	51	-	-
Prairie Vole	22	48	45	48	16	94
House Mouse	3	6	1	1	-	-
Masked Shrew	-	-	-	-	1	6
TOTALS:	46	100	94	100	17	100

Note: 1 Disturbed habitat was dominated with weedy plant species (e.g., yellow sweet clover).

this area of the base. In addition to the thirteen-lined ground squirrel (Spermophilus tridecemlineatus) trapped in grassland habitat, a masked shrew (Sorex cinereus) was captured in meadow habitat along middle Diamond Creek. The capture rate for all species was higher during the October trapping effort, particularly in the grassland habitat type (Table 2.6.2-15). Several potential reasons for the increase in trapping success include: increase in population of small mammals due to the reproduction effort of adults and their offspring, high natality rates, survivability of small mammal populations during the late summer, and the higher capture success rate attributed to Smith live traps. In addition, the silver-haired bat (Lasionycteris noctivagans), sagebrush vole (Lagurus curtatus), plains harvest mouse, and Merriam's shrew (Sorex merriami) have also been sighted (WNHP 1983). No recent sightings of the meadow jumping mouse have been recorded but historical data indicate this species has occurred on the base (WNHP 1983, WGFD 1983-a).

2.6.2.3.4 Other Disturbed Areas

Other disturbed areas include aggregate quarries and dispatch stations. Quarries may be located along drainages or upland areas. Habitats that may be affected include aquatic, riparian, meadow, shrubland, and grassland. Dispatch stations may be located adjacent to urban areas and will vary in size. Habitats that may be impacted include grassland and agricultural land.

2.6.2.4 Upland Game

2.6.2.4.1 Region of Influence

Twenty-one species of upland game birds and mammals may be expected to occur within the ROI. Several of the upland game species, including the white-tailed ptarmigan (Lagopus leucurus), gray partridge (Perdix perdix), chukar (Alectoris chukar), and sandhill crane (Grus canadensis) have restricted distributions because of habitat requirements. Other species such as the mourning dove (Zenaida macroura) and cottontail rabbit (Sylvilagus spp.) are widely distributed.

Upland game populations are limited in the Nebraska and South Dakota portions of the ROI due to habitat availability. The grassland vegetation does not provide the necessary cover or forage required by many upland game species.

The riparian habitat associated with the drainages of the North Platte River and other woodland areas support populations of cottontail rabbit, fox squirrel (Sciurus niger) mourning dove, and a small number of bobwhite (Colinus virginianus) (NGPC 1972, Dey 1981). Sage grouse (Centrocercus urophasianus), occur in sagebrush habitats north of the Niobrara River (NGPC 1972, Dey 1981).

During recent state big game field surveys in the Nebraska and South Dakota portions of the ROI, 6,000 turkeys (Meleagris gallopavo) were estimated for the Pine Ridge area. An additional 400 to 800 turkeys were estimated to occur in the Cheyenne Escarpment/Wild Cat Hills area in Banner and Morrill counties (NGPC, personal communication, 1983; SDGFPD 1983). Ring-necked pheasants (Phasianus colchicus) occur throughout the Nebraska/South Dakota ROI and prefer a combination of cropland and brushy/wooded habitat. Pheasants are abundant in Box Butte County where this habitat combination is extensive (NGPC 1972, Dey 1981). To the east of this area in the Nebraska Sandhills portion

of the ROI, there are scarce to low numbers of greater prairie chicken (Tympanuchus cupido), sharp-tailed grouse (Pedioecetes phasianellus), and an introduced population of scaled quail (Callipepla squamata) (NGPC 1972, Dey 1981). In addition, the midcontinent population of sandhill cranes use portions of the Platte River east of the ROI for their spring staging area. Small numbers of sanchill cranes may use areas within the Nebraska portion of the ROI (USFWS 1981-a, NGPC n.d.).

Throughout the Colorado portion of the ROI, large populations of pheasant and mourning dove are expected to occur in association with riparian and cropland or grass/shrub habitats (CDOW 1982-b, 1979-b, Chase et al. 1982-b). Two small game mammals common throughout the Colorado ROI are the fox squirrel, which occurs in riparian habitat, and the desert cottontail (Sylvilagus audubonii), which prefers scrubby grassland habitat (CDOW 1982-b). Small populations of chukar and turkey occur in the foothill and mountain areas of the Colorado ROI. Chukars occur in mountain meadow/parkland and barren areas; turkeys prefer ponderosa pine and pinyon/juniper habitats (Chase et al. 1982-b, CDOW 1979-b). Five common species of upland game expected to occur in the Colorado portion of the ROI are restricted to montane habitats. Abert's squirrel (Sciurus niger), blue grouse (Dendragapus obscurus), red squirrel (Tamiasciurus hudsonicus), and Nuttall's cottontail (Sylvilagus nuttallii) occur in various coniferous habitats. Sage grouse are expected to occur in sagebrush habitat. The white-tailed ptarmigan occurs only in alpine habitat (CDOW 1979-a, 1979-b; Chase et al. 1982-b). Bobwhite, eastern cottontail (Sylvilagus floridanus), greater prairie chicken, and sharp-tailed grouse may be expected to occur in the eastern portion of the Colorado ROI. The latter two species exist in very small populations (Chase et al. 1982-b, CDOW 1979-b). Small numbers of sandhill crane migrate through and use resting stops in various water associated habitats in Colorado. They rarely breed in the state and none have been harvested in recent years in the Colorado ROI (Chase et al. 1982-b; CDOW 1979-c, 1980, 1981-a, 1982-g).

The Wyoming portion of the ROI has a similar habitat composition and distribution to the ROI in Colorado resulting in similar upland game population distributions. However, there are some differences in range, abundance, and species occurrence. Pheasant and eastern cottontail occur primarily in the riparian and agricultural areas in the eastern counties of Wyoming (Findholt et al. 1981, WGFD 1982-e, Oakleaf et al. 1982). Sage grouse and sharp-tailed grouse are more abundant and widespread in the Wyoming ROI (WGFD 1977, Bohne et al. 1981, Oakleaf et al. 1982) than in the Colorado ROI. Due to abundant populations in recent years, the length of the hunting season for sage grouse has been doubled (Bohne et al. 1981). Two additional species of upland game occurring within the Wyoming portion of the ROI include the gray partridge and ruffed grouse (Bonasa umbellus). These species are uncommon to common and occur only in the western mountain habitats (Findholt et al. 1981, Oakleaf et al. 1982). A very small number of bobwhite occur in the riparian and cropland habitats in the southeastern corner of Wyoming, representing the only self-sustaining population within the state (Oakleaf et al. 1982). Cottontail and turkey harvests have increased noticeably in recent years in the southeastern portion of Wyoming (WGFD 1981, Bohne et al. 1981). Approximately 1,000 turkeys are using the foothill ranges east of the Laramie Range in Platte and Goshen counties (Bohne et al. 1981).

2.6.2.4.2 Area of Concentrated Study

Habitat types in the ACS are characterized by a mosaic of grassland and agricultural vegetation interspersed by many small areas of shrub, meadow, woodland, and riparian vegetation. The drainages of the Laramie Range occurring in the westernmost Flights provide a variety of these habitat types for wildlife use. Turkey distribution in the Wyoming portions of the ACS generally follow the riparian habitats associated with the Laramie River tributaries in Flight T and Bear Creek within Flights R and S (Bohne et al. 1981). The Wild Cat Hills turkey population in Nebraska (Section 2.6.2.4.1) occurs adjacent to the northern silos within Flight C. Very small numbers of sage grouse and chukar may extend eastward to the sagebrush habitat of the northwestern Flights (WGFD 1981-e, Oakleaf et al. 1982, Bohne et al. 1981).

Three other species of upland game, sharp-tailed grouse, gray partridge, and bobwhite are also found in small numbers within the ACS (Bohne et al. 1981, WGFD 1983-a, Oakleaf et al. 1982).

Sharp-tailed grouse utilize prairie shrub steppe and bobwhite may use the riparian/agricultural habitat associations that occur throughout the ACS. Sharp-tailed grouse were observed in Flight P during the October 1983 reconnaissance. Gray partridge may occur on the shrub and agricultural lands that occur in the northern Flight areas. Ring-necked pheasants and mourning doves are common residents throughout the ACS and prefer the windbreaks and agricultural land associated with the farms and ranches (WGFD 1983-a, Bohne et al. 1981). Several sightings of pheasants were made in Flights S and B during the June and October 1983 field reconnaissance of the ACS. Small game mammals including the fox squirrel, Nuttall's cottontail, and the desert and eastern cottontail rabbit are common within the ACS (Findholt et al. 1977, WGFD 1981-e, Bohne et al. 1981). Sandhill cranes may occasionally migrate through the ACS (USFWS 1981-a, NGPC n.d.).

2.6.2.4.3 F.E. Warren AFB

The riparian habitat along Crow and lower Diamond creeks supports populations of mourning dove and cottontail rabbit. Fox squirrels are expected to occur in wooded areas along Diamond and Crow creeks and the adjacent urban areas north of Crow Creek. Small numbers of ring-necked pheasant may occur within the base where suitable cover and forage exist. In addition, very low numbers of bobwhite and sharp-tailed grouse may occur within the short-grass prairie habitat on the northern half of the base (Oakleaf et al. 1982).

2.6.2.4.4 Other Disturbed Areas

Other disturbed areas include aggregate quarries and dispatch stations. Quarries may be located along drainages or upland areas. Habitats that may be impacted include riparian, woodland, shrubland, and grassland. Dispatch stations may be located adjacent to urban areas and may vary in size. Habitats that may be impacted because of the dispatch stations include grassland and agricultural land.

2.6 2.5 Waterfowl

2.6.2.5.1 Region of Influence

Approximately 27 species of waterfowl are known to occur in the ROI which is within the Central Flyway (Table 2.6.2-16). Waterfowl concentrate at water sources such as rivers, marshes, streams, lakes, and potholes because they require open water for foraging and nesting (Chase et al. 1982, Oakleaf et al. 1982). General areas of waterfowl concentration within the ROI include the North and South Platte rivers, Niobrara River, wildlife refuges, major reservoirs, and the Sandhills area in Nebraska (NGPC 1972, CDOW n.d.). Waterfowl may occur within the ROI year-round where open water occurs. Western Nebraska is one of the traditional wintering areas of approximately 170,000 Canada geese (Branta canadensis) that use the short-grass prairie region (USFWS 1982-a).

The main migration routes of the white-fronted goose (Anser albifrons), snow goose (Chen caerulescens) and Ross' goose (Chen rossii) are outside the ROI; however occasionally these species are observed within the area (USFWS 1982-b, [illegible]). Although the whistling swan (Cygnus columbianus columbianus) and trumpeter swan (Cygnus buccinator) are classified as waterfowl, they are not considered game species (WGFD 1977). Swan migration routes occur outside the ROI, but individuals are sometimes observed within the region during migration periods (USFWS 1980-a, 1982-d).

Although waterfowl hunting is an important recreational activity in the ROI, only a few species are commonly harvested by hunters. The mallard (Anas platyrhynchos) is the most sought after and frequently harvested species, and accounts for approximately 50 percent of the annual waterfowl harvest within the ROI (NGPC 1972, 1980; CDOW n.d.; WGFD n.d.-a). Other ducks commonly harvested include the gadwall (Anas strepera), pintail (Anas acuta), American wigeon (Anas americana), green-winged teal (Anas crecca), and blue-winged teal (Anas discors) (NGPC 1980, CDOW n.d., WFGD n.d.-a).

Waterfowl populations fluctuate from year to year depending upon the production each spring (WGFD 1972, n.d.-a). Reproduction in a seasonal environment is dependent upon a combination of resources and climate (Ricklefs 1979). The number of ducks and geese harvested per hunter in the ROI varies from 4.7 to 7.4 and 1.4 to 3.0, respectively (Strickland 1979, 1980, 1981, 1982-b; CDOW 1979-c, 1980, 1981-a, 1982-f; NGPC 1972, 1980). Due to the recovery of waterfowl populations from the drought of the 1960s and an increase in the number of hunters, recent annual waterfowl harvests are above the 1966 to 1975 average (Carney et al. 1978). Current hunting pressure on waterfowl is less than what the resource can support, particularly in the Wyoming portion of the ROI (NGPC 1980, CDOW 1982-f, WGFD 1972, n.d.-a).

2.6.2.5.2 Area of Concentrated Study

2.6.2.5.2.1 Flights

Generally, the Flights provide limited habitat that is of substantial benefit to waterfowl. Two major waterfowl habitat areas under state control within the Flights are Springer Wildlife Management Unit and Table Mountain (Belirose 1980). Both areas are located within Flight S in Wyoming and have a combined

Table 6.2-16

WATERFOWL SPECIES OCCURRING WITHIN THE REGION OF INFLUENCE

Scientific Name	Common Name	Habitat[1]	Seasonal Status[2]	Relative Abundance[3]
Anser albifrons	Greater white-fronted goose	Aq	M	U
Chen caerulescens	Snow goose	Aq, Ag	M	U
Chen rossii	Ross goose	Aq, Ag	M	U
Branta canadensis	Canada goose	Aq, Ag	R	Ab
Aix sponsa	Wood duck	R, Aq	R	U
Anas crecca	Green-winged teal	Aq	R	Ab
Anas platyrhynchos	Mallard	Aq, Ag	R	Ab
Anas acuta	Northern pintail	Aq	R	Ab
Anas discors	Blue-winged teal	Aq	S	C
Anas cyanoptera	Cinnamon teal	Aq	S	C
Anas clypeata	Northern shoveler	Aq, Ag	R	C
Anas strepera	Gadwall	Aq	R	Ab
Anas americana	American wigeon	Aq	R	Ab
Aythya valisineria	Canvasback	Aq	R	U
Aythya americana	Redhead	Aq	R	C
Aythya collaris	Ring-necked duck	Aq	S	C
Aythya marila	Greater scaup	Aq	M	U
Aythya affinis	Lesser scaup	Aq	R	U
Clangula hyemalis	Oldsquaw	L, St	M	U
Bucephala clangula	Common goldeneye	L, St	W	C
Bucephala islandica	Barrow's goldeneye	L, St	W	U

Table 2.6.2-16 Continued, Page 2 of 2
WATERFOWL SPECIES OCCURRING WITHIN THE
REGION OF INFLUENCE

Scientific Name	Common Name	Habitat[1]	Seasonal Status[2]	Relative Abundance[3]
Bucephala albeola	Bufflehead	Aq	W	U
Lophodytes cucullatus	Hooded merganser	Aq	W	U
Mergus merganser	Common merganser	Aq, R	R	C
Mergus serrator	Red-breasted merganser	Aq	M	U
Oxyura jamaicensis	Ruddy duck	Aq	R	C
Fulica americana	American coot	Aq	R	Ab

Notes: 1 Ag - Agricultural areas
Aq - Aquatic
L - Lakes or reservoirs
R - Riparian
St - Streams and rivers

2 M - Migrant
R - Resident
S - Summer inhabitant (June - August)
W - Winter inhabitant (especially January)

3 Ab - Abundant
C - Common
U - Uncommon

Source: NGPC 1972, WGFD 1977, USFWS 1981-b, Oakleaf et al. 1982, Chase et al. 1982, AOU 1983, Robbins et al. 1983.

total of approximately 3,300 acres (Bellrose 1980). Waterfowl may also use other creeks, rivers, and lakes within the Flight area to some extent.

The major waterfowl production area in the Wyoming portion of the Flights is located within Flight S and between Flights S and B. The state maintains goose nesting structures on several lakes within Flight S (WGFD 1982-f). The major waterfowl harvest area within the Wyoming portion of the Flight area also includes this concentration of lakes and reservoirs in Flight S (WGFD 1982-g).

Waterfowl harvest areas within the Nebraska portion of the Flights include Lodgepole Creek between Flights D and E and Pumpkin Creek in Flight C (NGPC 1972). However, the harvests within Banner and Kimball counties are relatively low when all Nebraska counties are considered (NGPC 1980).

2.6.2.5.2.2 F.E. Warren AFB

Waterfowl habitat within F.E. Warren AFB consists of Crow and Diamond creeks, Lake Pearson, and scattered sinks and potholes. These areas provide limited breeding habitat for small numbers of waterfowl.

Six species of waterfowl were observed on Crow and Diamond creeks, Lake Pearson, and one of the potholes during the June and October 1983 reconnaissance of F.E. Warren AFB including mallard, blue-winged teal, gadwall, American wigeon, redhead (Aythya americana), and American coot (Fulica americana). Additional species may be expected to use the habitat on the base. Use of F.E. Warren AFB by waterfowl may peak during the spring and fall migration periods.

2.6.2.5.2.3 Other Disturbed Areas

Other disturbed areas include aggregate quarries and dispatch stations. Since specific locations of these areas are unknown, discussion regarding waterfowl utilization of these areas is not possible. The discussion regarding waterfowl occurrence and utilization of these areas is limited to assessing the presence of potential suitable habitat. Quarries may be located along drainages or upland areas. Habitats that may be involved include aquatic, riparian, meadows, and grasslands. These habitats could provide feeding, resting, and nesting areas for waterfowl. Dispatch stations may be located adjacent to urban areas and may vary in size. Habitats that are likely to be involved include grassland and agricultural areas.

2.6.2.6 Raptors

2.6.2.6.1 Region of Influence

Twenty-eight species of raptors are known to occur within the ROI (Table 2.6.2-17). However, the diversity of raptors within the area varies with habitat and season.

Species such as the osprey (Pandion haliaetus), bald eagle (Haliaeetus leucocephalus), sharp-shinned hawk (Accipiter striatus), Cooper's hawk (Accipiter cooperii), northern goshawk (Accipiter gentilis), Northern pygmy-owl (Glaucidium gnoma), and northern saw-whet owl (Aegolius acadicus) are

Table 2.6.2-17

RAPTOR SPECIES OCCURRING WITHIN THE REGION OF INFLUENCE

Scientific Name	Common Name	Habitat[1]	Seasonal Status	Relative Abundance[3]
Pandion haliaetus	Osprey	Aq, Cf,D	S	U
Haliaeetus leucocephalus	Bald eagle	Aq,R, Cf	R	U
Circus cyaneus	Northern harrier (marsh hawk)	GL, Ms, S	S	C
Accipiter striatus	Sharp-shinned hawk	D, Cf	R	U
Accipiter cooperii	Cooper's hawk	Cf, As, Cr, Sc	R	U
Accipiter gentilis	Northern goshawk	As, Cf	R	U
Buteo platypterus	Broad-winged hawk	GL, Ag	M	U
Buteo swainsoni	Swainson's hawk	Most habitats	S	C
Buteo jamaicensis	Red-tailed hawk	All habitats	R	C
Buteo regalis	Ferruginous hawk	DS, R, GL, BA	R	C
Buteo lagopus	Rough-legged hawk	CL, Ag, DS	W	C
Aquila chrysaetos	Golden eagle	All habitats	R	C
Falco sparverius	American kestrel	All habitats	R	Ab
Falco columbarius	Merlin	Most habitats	R	U
Falco peregrinus	Peregrine falcon	All habitats with cliffs nearby	R	U
Falco rusticolus	Gyrfalcon	GL, Ag, DS	W	U
Falco mexicanus	Prairie falcon	All habitats with cliffs nearby	R	C
Tyto alba	Barn Owl	GL, Ag, DS, U	R	U
Otus asio	Eastern Screech-owl	D, R, Ag, U	R	U
Otus kennicottii	Western Screech-owl	R, A, U	R	C

Table 2.6.2-17 Continued, Page 2 of 2
RAPTOR SPECIES OCCURRING WITHIN THE
REGION OF INFLUENCE

Scientific Name	Common Name	Habitat[1]	Seasonal Status	Relative Abundance
Bubo virginianus	Great horned owl	Most esp. R	R	C
Nyctea scandiaca	Snowy owl	GL, Ag, Ms	W	U
Glaucidium gnoma	Northern pygmy-owl	Cf, As, R	R	U
Athene cunicularia	Burrowing owl	GL	S	U
Asio otus	Long-eared owl	Cf, D, R	R	U
Asio flammeus	Short-eared owl	GL, Ag, S	R	U
Aegolius funereus	Boreal owl	CF, As	R	U
Aegolius acadicus	Northern saw-whet	C, Cf, R	R	U

Notes: 1 Ag - Agricultural areas
Aq - Aquatic
As - Aspen
Cf - Coniferous forest
Cr - Croplands
Ba - Barren areas
D - Deciduous habitat
DS - Desert shrub
GL - Grassland
Ms - Marshes
R - Riparian
S - Shrub/brush
Sa - Sagebrush, rabbitbrush
Sc - Scrub oak, mountain mahogany
U - Urban

2 M - Migrant
R - Resident
S - Summer inhabitant (June - August)
W - Winter inhabitant (especially January)

3 Ab - Abundant
C - Common
U - Uncommon

Source: NGPC 1972, Chase et al. 1982, Oakleaf et al. 1982, AOU 1983, Robbins et al. 1983.

associated with coniferous forest habitats within the ROI. The peregrine falcon (Falco peregrinus) and prairie falcon (Falco mexicanus) may use several habitats provided some cliffs are nearby (Oakleaf et al. 1982). The remaining 19 species are more commonly associated with grassland and agricultural habitats (Table 2.6.2-17, Williams and Matteson 1973, Chase et al. 1982, Oakleaf et al. 1982). Eleven of the 28 species are known to migrate south during the winter. Other species such as the rough-legged hawk (Buteo lagopus), gyrfalcon (Falco rusticolus), and snowy owl (Nyctea scandiaca) are arctic breeders whose winter ranges include the ROI (AOU 1983, Robbins et al. 1983, Williams and Matteson 1973). In addition, the broad-winged hawk (Buteo platypterus) may occur as an uncommon spring and fall visitor (Chase et al. 1982, Oakleaf et al. 1982). Twenty of the 28 species are considered residents within the ROI (Table 2.6.2-17).

Most of the raptor populations are stable or increasing (WGFD, personal communication, 1983). However, the Swainson's hawk (Buteo swainsoni) and ferruginous hawk (Buteo regalis) are currently declining in numbers (WGFD 1977). The peregrine falcon, an endangered species, is increasing slightly (WGFD, personal communication, 1983). The American kestrel (Falco sparverius) is the most common raptor in the ROI (Robbins et al. 1983, Williams and Matteson 1973, Chase et al. 1983).

A limited number of raptors within the ROI are captured for the purpose of falconry and the number of requests for permits has been increasing (WGFD n.d.-a). The prairie falcon, red-tailed hawk (Buteo jamaicensis), and goshawk are the most popular raptors used for falconry (WGFD n.d.-a).

2.6.2.6.2 Area of Concentrated Study

2.6.2.6.2.1 Flights

Raptor species expected to occur within the Flights in the ACS are typically associated with grassland, agricultural, and riparian habitats. The golden eagle (Aquila chrysaetos), prairie falcon, Swainson's hawk, ferruginous hawk, red-tailed hawk, northern harrier (Circus cyaneus), and American kestrel are the primary raptors using the Flights during the breeding season. The general distribution of raptors and nests observed within the Flights during a reconnaissance (June 27 through July 7, 1983) of access roads and silos is shown in Table 2.6.2-18. The golden eagle and prairie falcon were associated with Flights containing bluffs and cliff faces while hawks were observed in all habitats.

Species composition of raptors within the Flight area during winter and migration periods differs from that during the breeding season. Wintering bald eagles have been documented within the Flights, particularly within Flight S (WGFD, personal communication, 1983, WGFD 1983-a). The rough-legged hawk also occurs as a winter resident.

Uncommon species of raptors that have been recently observed within the Flights include the sharp-shinned hawk, Cooper's hawk, gyrfalcon, merlin (Falco columbarias), and osprey (WGFD 1983-a). Most of these observations are within Flight S.

Table 2.6.2-18

RAPTOR OBSERVATIONS AND NESTS WITHIN FLIGHTS

Flight	Eagle Sightings	Eagle Nests	Other Raptor Sightings	Other Raptor Nests
A	0	0	2	1
B	4	3	9	13
C	0	5	2	6
D	0	0	3	1
E	0	3	3	3
P	2	1	19	1
Q	0	1	14	1
R	2	4	2	2
S	0	0	2	1
T	1	1	6	0
TOTAL:	9	18	62	29

Sources: WGFD, personal communication, 1983.
NGPC, personal communication, 1983.
Field reconnaissance (June 27 through July 7, 1983).

2.6.2.6.2.2 F.E. Warren AFB

F.E. Warren AFB is expected to support only a small population of raptors due to limited habitat availability and human activity present on the base. The areas of F.E. Warren AFB that may support raptors include the grasslands in the northern one-half and the southern edge of the base, and the riparian habitat along Crow and Diamond creeks. Raptor species expected to occur on F.E. Warren AFB are those generally associated with grassland and riparian habitats (Table 2.6.2-18). However, species commonly associated with other habitats may be occasionally observed on F.E. Warren AFB during migration.

During a reconnaissance of F.E. Warren AFB in June 1983 three species of raptors were observed including the Swainson's hawk, great horned owl, and burrowing owl (Athene cunicularia). A pair of Swainson's hawks had established a nest in a cottonwood tree along Crow Creek near Gate No. 2. The adults were observed foraging over Crow Creek and the grasslands to the south. A great horned owl was observed roosting in a cottonwood along Crow Creek west of the picnic grounds. Although a nest was not detected, it is assumed this species was nesting in the general vicinity of the base. A burrowing owl was observed in the northern grassland area at the mouth of a burrow. This observation indicates a potential nesting site. In addition, a red-tailed hawk was observed foraging over Crow Creek and the grasslands to the south in October.

2.6.2.6.2.3 Other Disturbed Areas

Other disturbed areas include aggregate quarries and dispatch stations. Since locations of these areas are not known, discussion regarding raptor use of these areas is not possible. Because raptors utilize large areas of varied habitats for foraging, the occurrence of some species is probable in these disturbed areas. Quarries may be located along drainages or upland areas. Habitats that may be potentially involved include riparian, meadow, shrubland, and grasslands. Dispatch station areas may vary in size. Habitats that are likely to be involved include grassland and agricultural land.

2.6.2.7 Other Birds

2.6.2.7.1 Region of Influence

Approximately 200 nongame bird species are expected to occur within the ROI (NGPC 1972, Chase et al. 1982, Oakleaf et al. 1982). Nongame birds, as a group, are associated with all habitat types within the ROI. Some species, such as the turkey vulture (Cathartes aura), are associated with several habitats, while others, such as the American bittern (Botaurus lentiginosus), are restricted to a narrow range of habitats (WGFD 1977, Chase et al. 1982).

The avian composition of the ROI varies with the season. Approximately half of the nongame birds are considered breeding migrants and occur only during the summer (Robbins et al. 1983, WGFD 1977, Chase et al. 1982, Oakleaf et al. 1982). The majority of the remaining species are considered yearlong residents of the ROI or only pass through during the spring and fall migrations (WGFD 1977, Chase et al. 1982, Oakleaf et al. 1982). Approximately half of the nongame avian species occurring within the ROI are considered common or abundant, and the rest are described as uncommon (Chase et al. 1982, Oakleaf et al. 1982).

2.6.2.7.2 Area of Concentrated Study

2.6.2.7.2.1 Flights

The composition of other bird species within the Flight area is expected to be similar to that of the ROI with the exception that birds associated specifically with aspen and coniferous forests would be absent. Species such as the western meadowlark (Sturnella neglecta), lark bunting (Calamospiza melanocorys), and horned lark (Eremophila alpestris) are the common species in grassland and agricultural habitats. Riparian habitats have a greater species diversity than grasslands (Cody 1974). Species expected to be common in riparian areas include redwinged blackbird (Agelaius phoeniceus), American goldfinch (Carduelis tristis), common grackle (Quisculus quiscula), and song sparrow (Melospiza melodia).

2.6.2.7.2.2 F.E. Warren AFB

A variety of other bird species occur on F.E. Warren AFB. Avian habitat present on F.E. Warren AFB includes grassland, riparian, and urban areas. The grassland and riparian habitats were surveyed for other bird species during June and October 1983 reconnaissance of F.E. Warren AFB.

Avian diversity within grasslands was generally low. Birds occurring within this habitat type include the horned lark, western meadowlark, lark bunting, and grasshopper sparrow (Ammodramus savannarum).

Species diversity was highest within the riparian habitat. Thirty species of nongame birds were observed in riparian habitat during the June 1983 reconnaissance. The five most common species included redwinged blackbird, American gold-finch, common grackle, yellow-headed blackbird, and yellow warbler (Dendroica petechia). The American tree sparrow (Spizella arborea) was the only additional species observed in riparian habitat during October 1983 surveys of F.E. Warren AFB.

Avian species associated with urban habitat were observed on an opportunistic basis and include the house sparrow (Passer domesticus), house finch (Carpodacus mexicanus), starling (Sturnus vulgaris), and rock dove (Columba livia).

2.6.2.7.2.3 Other Disturbed Areas

Other disturbed areas include aggregate quarries and dispatch station areas. Quarries may be located along drainages or upland areas. Habitats that may be potentially involved include aquatic, riparian, meadow, shrubland, and grassland. Dispatch stations may be located adjacent to urban areas and may vary in size. Habitats that are likely to be involved include grassland and agricultural land. Specific locations of these areas are not known; therefore, determination of other bird presence and use of these areas is not possible.

2.6.2.8 Reptiles and Amphibians

2.6.2.8.1 Region of Influence

Reptiles and amphibians are generally restricted to lower elevations within the ROI. The region's semiarid climate and general uniformity of habitats have contributed to a lower diversity of these species than in many other regions of the country. Approximately 12 species of amphibians and 28 species of reptiles may occur within the ROI. Most are common or fairly common (Baxter and Stone 1980, Hammerson 1982, CDOW 1981-b, Hudson 1972) (Table 2.6.2-19). The amphibians include one species of salamander, five species of toads, and six species of frogs. Reptiles potentially occurring in the ROI include 5 species of turtles, 8 species of lizards, and 15 species of snakes.

The Wyoming (Baxter's) toad (Bufo hemiophrys baxteri) has recently been submitted for possible listing as an endangered species by the USFWS (1983). This toad is related to the Canadian or Manitoba toad (Bufo hemiophrys) of Canada and the northern United States (Baxter and Stone 1980). The Wyoming toad is considered a relict population remaining after the retreat of the glaciers, and has only been found in the Laramie Basin of Albany County, Wyoming, approximately 45 miles west of the ACS (USFWS 1983). Habitats historically occupied include floodplains, ponds, and small seepage lakes (Baxter and Stromberg 1980).

Populations of the Wyoming toad have drastically declined since 1976 (USFWS 1983). Surveys conducted during 1980 in the Laramie Basin located only 1 population of toads, consisting of approximately 25 individuals (USFWS 1983). During 1982 surveys of the ACS, no Wyoming toads were observed (USFWS 1983). Surveys conducted during the summer of 1983 indicate this species is still reproducing within its range (Sayre 1983).

The wood frog (Rana sylvatica) is classified as threatened by the CDOW, and rare by the WGFD (CDOW 1983, WGFD 1977). This species' distribution is restricted in Colorado to the mountains surrounding North Park and the upper portions of the Colorado River drainage near Grand Lake (CDOW 1981-b). Within the Wyoming portion of the ROI the wood frog is found in the Medicine Bow Mountains of southwest Albany and southeast Carbon counties (Baxter and Stone 1980). This frog is found in the montane zone at relatively high elevations, and is seldom found far from water (Baxter and Stone 1980). Habitats utilized include beaver ponds, marshes, streams, and lakes (Baxter and Stone 1980, CDOW 1981-b).

The western smooth green snake (Opheodrys vernalis blanchardi) and the pale milk snake (Lampropeltis triangulum multistrata) are both classified as rare by the WGFD (1977). The western smooth green snake occurs in the Laramie Peak area of Albany, Niobrara, and Converse counties, and in Carbon County (Baxter and Stone 1980). The pale milk snake is distributed through northeast Wyoming south to northern Laramie County in the ROI, preferring scarp woodlands in the plain and foothill zones (Baxter and Stone 1980).

Table 2.6.2-19

REPTILES AND AMPHIBIANS POTENTIALLY OCCURRING WITHIN THE REGION OF INFLUENCE AND AREA OF CONCENTRATED FLOW[1]

Scientific Name	Common Name	Abundance	Habitat
	Amphibians		
	Salamanders		
Ambystoma tigrinum	Tiger salamander[1]	Common	Marshes, ponds, moist environments
	Toads		
Scaphiopus bombifrons	Plains spadefoot[1]	Common	Grasslands Sagebrush
Bufo boreas boreas	Boreal toad[1]	Common	Foothills and Montane zones
Bufo cognatus	Great plains toad	Fairly common	Grasslands
Bufo hemiophrys baxteri	Wyoming (Baxter's toad	Extremely rare	Floodplains and ponds
Bufo woodhousei woodhousei	Woodhouse's toad[1]	Common	Near water in Plains and foothills
	Frogs		
Rana catesbeiana	Bullfrog[1]	Common	Marshes, ponds, riparian
Rana pipiens	Northern leopard frog	Common	Marshes, ponds, riparian
Rana blairi	Plains leopard frog	Common	Marshes, ponds, riparian
Rana sylvatica	Wood frog	Rare	Near water in M[illegible] zones
Acris crepitans blanchardi	Blanchard's cricket frog	Fairly common	Marshes, ponds, riparian
Pseudacris triseriata maculata	Boreal chorus frog[1]	Common	Marshes, ponds riparian
	Reptiles		
	Turtles		
Chrysemys picta bellii	Western painted turtle[1]	Common	Marshes, ponds, riparian
Terrapene ornata ornata	Ornate box turtle	Fairly common	Grasslands
Trionyx spiniferus hartwegi	Western spiny soft-shell[1]	Common	Lakes and streams
Terrapene ornata ornata	Ornate box turtle	Fairly common	Grasslands
Trionyx spiniferus hartwegi	Western painted turtle[1]	Common	Marshes, ponds, riparian
Chelydra serpentina serpentina	Common snapping turtle[1]	Common	Lakes and streams
Kinosternon flavescens flavescens	Yellow mud turtle	Uncommon	Marshes, ponds, riparian
	Lizards		
Cnemidophorus sexlineatus viridis	Prairie-lined racerunner[1]	Common	Grasslands, riparian
Eumeces multivirgatus	Many-lined skink[1]	Fairly common	Grass and
Eumeces obsoletus	Northern sagebrush lizard[1]	Common	Rocky outcrops in sagebrush
Phrynosoma cornutum cornutum	Texas horned lizard[1]	Common	Sand flats, roadsides
Phrynosoma douglasi hernandesi	Northern pygmy lizard[1]	Common	Grass and sagebrush
Phrynosoma hernandesi brevirostre	Eastern short-horned lizard[1]	Common	Grass and shrublands
Holbrookia maculata maculata	Northern earless lizard[1]	Common	Grasslands
Eumeces obsoletus	Great plains skink	Fairly [illegible] undetermined	Grasslands

Table 2.6.2-19 Continued, Page 2 of 2
REPTILES AND AMPHIBIANS POTENTIALLY OCCURRING WITHIN THE REGION OF INFLUENCE AND AREA OF CONCENTRATED STUDY[1]

Scientific Name	Common Name	Status[2]	Habitat
[illegible]	[illegible] snake	[illegible]	[illegible]
[illegible]	[illegible] snake	[illegible]	[illegible]
[illegible]	[illegible] snake	[illegible]	[illegible]
[illegible]	[illegible] snake	[illegible]	[illegible]
[illegible]	[illegible] snake	[illegible]	[illegible]
[illegible]	[illegible] snake	[illegible]	[illegible]
[illegible]	[illegible] snake	[illegible]	[illegible]
[illegible]	[illegible] snake	[illegible]	[illegible]
[illegible]	[illegible] snake	[illegible]	[illegible]
[illegible]	[illegible] snake	[illegible]	[illegible]
[illegible]	[illegible] snake	[illegible]	[illegible]
[illegible]	[illegible] snake	[illegible]	[illegible]

2.6.2.8.2 Area of Concentrated Study

2.6.2.8.2.1 Flights

Approximately 7 species of amphibians and 20 species of reptiles may occur within the Flight area (Table 2.6.2-19). The amphibians include one species of salamander, three species of toads, and three species of frogs. Reptiles which may occur include four species of turtles, seven species of lizards, and nine species of snakes.

Data presently do not exist concerning the species composition or abundance of reptiles and amphibians inhabiting the Flight area. However, any existing streams, wetlands, potholes, or reservoirs, either permanent or temporary, must be considered important habitat components for reptiles and amphibians. Permanent water available for potential habitat becomes limited in eastern Flight areas. Flights Q, T, and S include Horse, Chugwater, and Bear creeks, the Laramie and North Platte rivers, and their tributaries. These water bodies provide more diversified habitats than those located to the east and southeast. The lack of permanent bodies of water for habitat and breeding is a limiting factor for amphibians and some reptile species in the westernmost portion of the Flight area, including Flights C, D, E, and eastern B. In addition, a greater portion of the eastern Flight area has been disturbed by agricultural practices, further reducing the potential for suitable habitat.

The pale milk snake may occur in the northern portion of the Flight area, including Flights T, S, R, and northern J, P, and B (Baxter and Stone 1980). Although its preferred habitat is scarp woodlands, it may occur in a variety of habitats, including grasslands (Hammerson 1982).

During field reconnaissance of the existing silos and associated access roads, the following reptile and amphibian observations were reported within the Deployment Area:

Scientific Name	Common Name
Ambystoma tigrinum	Tiger salamander
Rana pipiens	Northern leopard frog
Bufo woodhousei woodhousei	Woodhouse's toad
Terrapene ornata ornata	Ornate box turtle
Malaclemys macrinata macrinata	Northern map turtle
Pituophis melanoleucas sayi	Bull snake
Crotalus viridis viridis	Prairie rattlesnake

2.6.2.8.2.2 [illegible]

Five species of amphibians and eight species of reptiles may occur [illegible] F.E. Warren AFB (Baxter and Stone 1980). The amphibians include one species of salamander, two species of toads, and two species of frogs. The reptiles

potentially occurring on the base include one species of turtle, three species of lizards, and four species of snakes (Baxter and Stone 1980).

Riparian and moist meadow vegetation along Crow and Diamond creeks and Lake Pearson provide habitat for amphibians and semiaquatic species of reptiles. Grasslands and disturbed areas in the northern and southwestern portions of the base provide habitat for the more terrestrial reptile species. During the June 1983 field reconnaissance, garter snakes (Thamnophis spp.) were observed along both Crow and Diamond creeks. The boreal chorus frog (Pseudacris triseriata maculata) was heard calling along upper Crow Creek.

2.6.2.8.2.3 Other Disturbed Areas

Other disturbed areas include aggregate quarries and dispatch stations. Specific locations of these areas are not known. Therefore, species composition and use of these areas is not discussed. Also, because of the wide range of habitats that could be utilized by this group, the habitats discussed below could potentially be utilized by a variety of amphibian and reptile species. Quarries may be located along drainages or upland areas. Reptile and amphibian habitats that may be potentially affected include aquatic and riparian habitats, meadows, shrublands, and grasslands. Dispatch stations may be located adjacent to urban areas and may vary in size. Habitats that are likely to be involved include grassland and agricultural land.

2.6.3 Fisheries Resources

2.6.3.1 Physical Conditions

2.6.3.1.1 Region of Influence

The ROI includes a major portion of the Platte River drainage basin in Wyoming, Colorado, Nebraska, and South Dakota, in addition to a portion of the Colorado River drainage basin. It encompasses a variety of geographical features from the Rocky Mountains in the west to the grasslands in the east. Water features in the ROI are numerous and diverse, including high alpine lakes and streams in the Rocky Mountain region, major river systems such as the Platte and Colorado, and lowland streams, lakes, and reservoirs.

The physicochemical conditions of the aquatic resources in the ROI vary according to geographical diversity and differential water uses. In general, the physicochemical variability increases downstream, varying with substrates and localized conditions.

High alpine waters originate from snowmelt in the mountains and are generally cold, slightly acidic, and highly oxygenated. Levels of total dissolved solids are low. Downstream, the aquatic resources in the ROI cover a wide variety of substrates and pick up a range of dissolved organic and inorganic substances. The result is higher temperatures, total dissolved solids levels, and concentrations of alkalinity, nutrients, metals, and trace elements. These characteristics tend to increase downstream due to the effects of evaporation, irrigation, and agricultural runoff.

2.6.3.1.2 Area of Concentrated Study

2.6.3.1.2.1 Flights

Aquatic resources within the Flights are contained within the Platte River drainage basin. These drainages originate in the Laramie Mountains and flow in an easterly direction to the plains (Figure 2.6.3-1). Consequently perennial and intermittent streams are found within the Flights. Spring floods caused by melting snows and heavy spring rains are relatively common to streams within the ACS (Larson 1961).

In the western portion of the ACS, aquatic resources associated with Flights P, Q, R, S, and T are more prevalent. Relatively few streams are found in Flights A, B, C, D, and E. A helicopter overflight during August 1983 and a field survey in November 1983 indicated that as these drainages flow eastward, the streambeds become narrower and shallower, and vegetation cover is less. Evidence of grazing effects and agricultural uses on aquatic resources within the ACS were apparent. Water quality data at each of the nine stations were taken with a Horiba U-210 water quality analyzer, and a Marsh McBirney 201 flow meter (Table 2.6.3-1).

2.6.3.1.2.2 F.E. Warren AFB

Aquatic resources within F.E. Warren AFB include Crow and Diamond creeks in addition to the Lake Pearson system (Figure 2.6.3-2). Crow Creek traverses the southern portion of F.E. Warren AFB and flows in a southeasterly direction. Diamond Creek flows into Crow Creek north of the Frontier Road and the Commissary Road intersection. Water quality measurements taken during the June, August, and November 1983 field surveys are listed in Tables 2.6.3-2 and 2.6.3-3.

2.6.3.1.2.3 Other Disturbed Areas

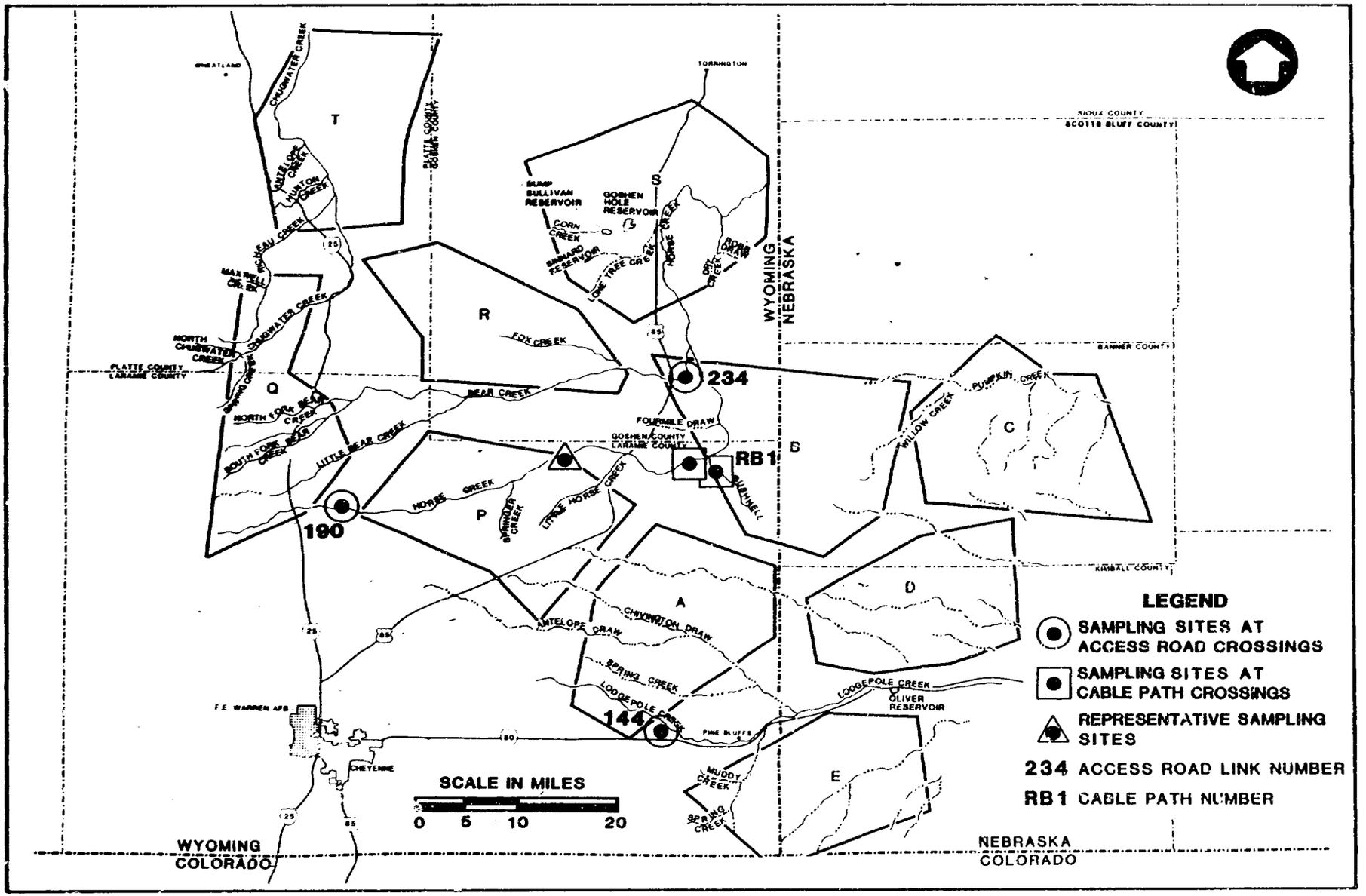
Aquatic resources may occur in areas of the proposed aggregate quarry sites. The physical characteristics of these streams will be determined when the aggregate quarry sites are selected. No aquatic resources are anticipated to be in the proposed dispatch stations.

2.6.3.2 Biological Conditions

2.6.3.2.1 Region of Influence

2.6.3.2.1.1 General

Because of the variety of physicochemical conditions present in the ROI, the streams, lakes, and reservoirs are able to support diverse coldwater and warmwater communities of plankton, invertebrates, and fishes. Generally, the types of aquatic organisms found in a particular area are indicative of the altitude, water quality, flow, substrate type, and interspecific competition present. Approximately 67 species of fish occur in the ROI (Table 2.6.3-4).



STREAMS WITHIN THE ACS

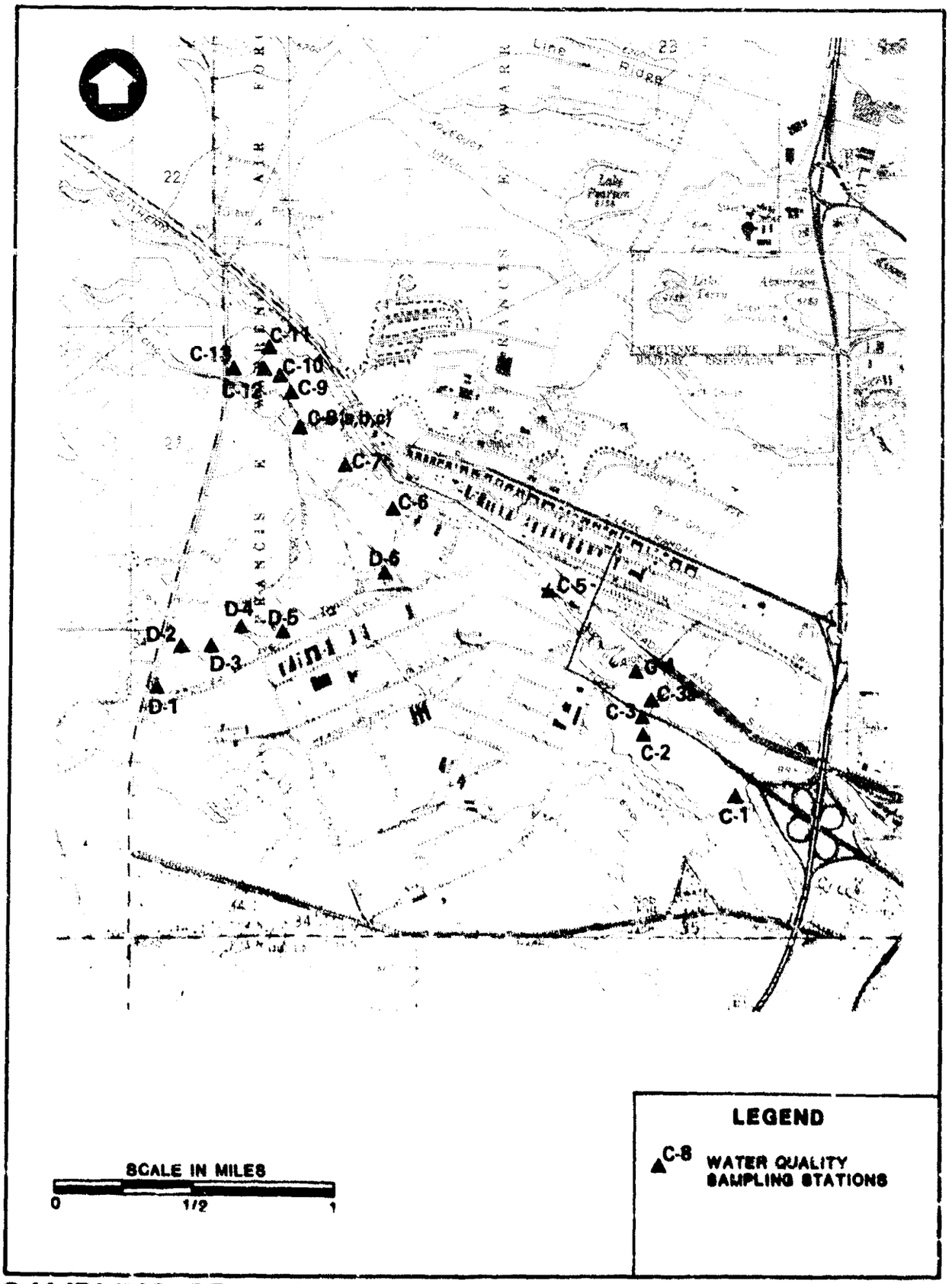
FIGURE NO. 2.6.3-1

Table 2.6.3-1

WATER QUALITY DATA FROM STREAMS ASSOCIATED WITH DEFENSE ACCESS ROAD AND CABLE PATH CROSSINGS WITHIN THE ACS*

Stream	Sampling Site	Station	Date (1983)	T(°c)	Conductivity (mS/cm)	pH	DO (ppm)	Turbidity (ppm)	Velocity (ft/s)
Bear Creek	Road Link 234	Be-1	11/5	6.0	0.02	8.5	12.5	11.0	1.1 @ 1.3 ft
Bushell Creek	Cable Path RB1	Bu-1	11/6	12.8	0.03	7.8	9.3	4.0	0.0 @ 2.5 ft
Horse Creek	Road Link 190	H-1	11/4	10.2	0.11	8.5	12.0	4.0	1.9 @ 1.4 ft
Horse Creek	Representative Sample	H-2	11/7	9.4	0.03	8.6	13.4	5.0	2.7 @ 1.7 ft
Horse Creek	Representative Sample	H-3	11/7	9.1	0.03	8.6	13.0	5.0	2.3 @ 1.0 ft
Horse Creek	Representative Sample	H-4	11/7	9.0	0.02	8.7	12.2	3.0	2.0 @ 1.5 ft
Horse Creek	Cable Path RB1	H-5	11/6	6.9	3.00	8.3	13.2	5.0	2.3 @ 2.3 ft
Horse Creek	Cable Path RB1	H-6	11/6	8.8	4.00	8.5	12.8	4.0	2.9 @ 1.3 ft
Lodgepole Creek	Road Link 144	L-1	11/3	10.2	0.01	8.5	6.6	9.0	0.6 @ 0.3 ft

*See Figure 2.6.3-1 for sampling site locations.



SAMPLING STATIONS ON CROW AND DIAMOND CREEKS AT F.E. WARREN AFB

FIGURE NO. 2.6.3-2

Table 2.6.3-2

JUNE AND AUGUST, 1983 WATER QUALITY DATA
FROM CROW AND DIAMOND CREEKS[1]

Station[2]	Date	T(°C)	Conductivity (µmhos/cm x 10)	pH	Salinity (ppt)	Velocity (ft/s)
Diamond Creek						
D-1	6/18	17.9	50	-	0.1	0.1
D-2	6/13	-	-	-	-	-
D-3	6/20	26.5	82	7.6	0.1	0.0
D-4	6/20	24.0	97	8.18	0.3	0.0
D-5	6/20	-	-	8.07	-	-
D-6	6/24	25.0	50	8.47	0.0	1.5
Crow Creek						
C-1	6/23	16.0	28	7.40	0.2	0.3
C-2	6/21	31.0	29	7.64	0.0	0.0
C-3	6/21	-	-	-	-	-
C-3a	8/6	17.0	40	-	0.1	0.9
C-4	6/23	18.9	89	7.88	0.5	-
C-5	6/23	21.2	31	7.70	0.0	0.6
C-6	6/20	-	-	-	-	-
C-7	6/24	19.0	27	7.17	0.0	1.2
C-8	6/19	23.0	39	7.82	0.1	2.2
C-9	6/19	22.0	38	8.24	0.0	2.2
C-10	6/19	24.0	38	8.35	0.0	2.3
C-11	6/21	27.0	40	8.68	0.0	2.6
C-12	6/22	23.1	[illegible]	8.47	0.1	1.9
C-13	6/22	24.0	28	8.36	0.0	0.7

Note: 1 All sample stations are within F.E. Warren AFB boundaries.

2 See Figure 2.6.3-2 for sampling station locations.

Table 2.6.3-3

NOVEMBER, 1983, WATER QUALITY DATA FROM CROW AND DIAMOND CREEKS ON F. E. WARREN AIR FORCE BASE

Stream	Station[1]	Date	T(°C)	Conductivity (mS/cm)	pH	DO ppm	Turbidity ppm	Velocity (ft/s)
Diamond Creek	D-1	11/8	5.7	0.02	8.4	11.4	3.0	0.6 @ 0.5 ft
	D-2	11/8	4.9	0.02	8.4	11.6	6.0	0.5 @ 0.6 ft
Crow Creek	C-8a	11/8	2.2	0.05	8.4	12.5	5.0	2.0 @ 0.7 ft
	C-8b	11/8	4.6	0.03	8.0	6.8	47.0	NO FLOW
	C-8c	11/8	2.4	0.04	8.5	13.4	5.0	0.6 @ 1.4 ft

Note: 1 See Figure 2.6.3-2 for sampling station locations.

Table 2.6.3-4

FISH SPECIES POTENTIALLY OCCURRING IN THE REGION OF INFLUENCE

Scientific Name	Common Name	Distribution			
		WY	CO	NE	SD
	ORDER SALMONIFORMES FAMILY SALMONIDAE (Trout, Salmon)				
Oncorhynchus nerka	Kokanee	x	x		
Prosopium williamsoni	Mountain white fish	x			
Salmo clarki	Cutthroat trout	x	x		
Salmo clarki pleuriticus	Colorado River cutthroat trout	x			
Salmo clarki stomias	Greenback cutthroat trout		x		
Salmo gairdneri	Rainbow trout	x	x	x	x
Salmo trutta	Brown trout	x	x	x	x
Salvelinus fontinalis	Brook trout	x	x	x	
Salvelinus malma	Dolly varden	x			
Salvelinus namaycush	Lake trout	x	x		
Thymallus orcticus	Grayling	x			
	FAMILY ESOCIDAE (Pike)				
Esox lucius	Northern pike			x	
	ORDER CYPRINIFORMES FAMILY CYPRINIDAE (Minnows)				
Campostoma anomalum	Stoneroller	x	x	x	
Carassius auratus	Goldfish	x	x		
Catostomus catostomus	Longnose sucker				x

Table 2.6.3-4 Continued, Page 2 of 4
FISH SPECIES POTENTIALLY OCCURRING IN THE IN THE REGION OF INFLUENCE

Scientific Name	Common Name	Distribution			
		WY	CO	NE	SD
Couesius plumbeus	Lake chub		x		x
Ctenopharyngodon idella	Grass carp		x		
Cyprinus carpio	Carp	x		x	
Gila robusta	Roundtail chub	x			
Hybognathus hankinsoni	Brassy minnow	x	x	x	
Hybognathus placitus	Plains minnow	x		x	
Hybopsis gelida	Sturgeon chub				x
Hybopsis gracilis	Flathead chub	x	x	x	x
Nocomis biguttatus	Hornyhead chub	x	x	x	
Notemigonus crysoleucas	Golden shiner	x		x	x
Notropis cornutus	Common shiner	x	x	x	
Notropis dorsalis	Bigmouth shiner	x	x	x	
Notropis lutrensis	Red shiner	x	x	x	
Notropis stramineus missouriensis	Sand shiner	x	x	x	x
Phenacobius mirabilis	Suckermouth minnow	x	x	x	
Phoxinus eos	Northern redbelly dace	x			x
Phoxinus neogaeus	Finescale dace	x			x
Pimephales promelas	Fathead minnow	x	x	x	x
Rhinichthys cataractae	Longnose dace	x	x	x	x
Rhinichthys osculus	Speckled dace	x	x		
Richardsonius balteatus hydrophlox	Bonneville redside shiner	x			

Table 2.6.3-4 Continued, Page 3 of 4
FISH SPECIES POTENTIALLY OCCURRING IN THE REGION OF INFLUENCE

Scientific Name	Common Name	Distribution			
		WY	CO	NE	SD
Semotilus atromaculatus	Creek chub	x	x	x	x
Semotilus margarita	Pearl dace				x
Semotilus margarita nachtriebi	Northern pearl dace	x		x	
	FAMILY CATOSTOMIDAE (Suckers)				
Carpoides carpio	River carpsucker	x		x	
Carpoides cyprinus	Quillback	x		x	
Catostomus catostomus	Longnose sucker	x	x	x	
Catostomus commersoni	White sucker	x	x	x	x
Catostomus discobolus	Bluehead sucker	x	x		
Catostomus latipinnis	Flannelmouth sucker	x	x	x	
Catostomus platyrhynchus	Mountain sucker	x	x	x	x
Moxostoma macrolepidotum	Northern redhorse	x		x	
	FAMILY ICTALURIDAE (Catfish)				
Ictalurus melas	Black bullhead	x	x	x	x
Ictalurus punctatus	Channel catfish	x	x	x	x
Noturus flavus	Stonecat	x		x	x
	ORDER CYPRINODONTIFORMES FAMILY CYRINODONTIDAE (Killifish)				
Fundulus kansae	Plains killifish	x	x	x	x
Fundulus sciadicus	Plains topminnow	x			x
	ORDER PERCIFORMES FAMILY CENTRARCHIDAE (Sunfish)				
Ambloplites rupestris	Rock bass			x	

Table 2.6.3-4 Continued, Page 4 of 4
FISH SPECIES POTENTIALLY OCCURRING IN THE REGION OF INFLUENCE

Scientific Name	Common Name	Distribution			
		WY	CO	NE	SD
Lepomis cyanellus	Green sunfish	x	x	x	
Lepomis gibbosus	Pumpkinseed	x	x		x
Lepomis macrochirus	Bluegill				
Micropterus dolomieui	Smallmouth bass		x	x	
Micropterus salmoides	Largemouth bass	x	x	x	x
Pomoxis annularis	White crappie	x		x	
Pomoxis nigromaculatus	Black crappie	x		x	
	FAMILY PERCIDAE (Perch)				
Archoplites interruptus	Sacramento perch		x		
Etheostoma exile	Iowa darter	x	x	x	
Etheostoma nigrum	Johnny darter	x	x	x	
Etheostoma spectabile pulchellum	Orangethroat darter	x			
Perca flavescens	Yellow perch	x		x	x
Stizostedion vitreum vitreum	Walleye	x	x		x
	FAMILY COTTIDAE (Sculpin)				
Cottus bairdi	Mottled sculpin	x	x		

Source: Baxter and Simon 1970; Everhart and Seaman 1971; Lee et al. 1980; Bailey and Allum 1962; SDGFPD, personal communication, 1983.

2.6.3.2.1.2 Alpine Regions

Alpine lakes and streams are generally small, cold, and often contain a low level of nutrients. Consequently, a low species diversity of coldwater organisms is often apparent in these alpine communities. Rooted aquatic plants are usually absent, and plankton and benthic macroinvertebrates are represented by sparse populations (Pennak 1977).

Trout are the main species of game fish occurring in high alpine streams and lakes. However, these fish populations are not always capable of sustaining themselves due to limited food sources and low temperatures, and are often stocked to maintain the fishery.

2.6.3.2.1.3 Major River Drainages

The variety of available habitat within the major river ecosystems of the ROI supports a diverse group of coldwater and warmwater organisms. Submergent vegetation is common, and planktonic and benthic communities are well established within these waters. Fishes including the trout, minnow, sucker, and perch families occur within these major river systems.

2.6.3.2.1.4 Plains Region

The lakes, reservoirs, and streams occurring at lower elevations are subject to high evaporation rates and temperatures. Although cold and warmwater fishes occur within these waters, warmwater species can tolerate higher water temperatures and flow fluctuations. Fish species commonly occurring in this portion of the ROI include members of the trout, minnow, sucker, sunfish, and perch families.

2.6.3.2.2 Area of Concentrated Study

2.6.3.2.2.1 Flights

Available data for aquatic resources within the ACS indicate the majority of the streams are small and shallow with a minimum amount of cover. These conditions contribute to relatively low fish productivity within the project area.

The 1983 WGFD computerized Lake and Stream Survey Reporting and Numbering System (WGFD 1983-b) provides biological data for some of the streams in the ACS (Table 2.6.3-5). An overflight of the streams in the study area was conducted in August 1983 to determine flow status and habitat quality. Several perennial streams which may be affected by access roads and cable path construction activities occur within the ACS (Table 2.6.3-6). Several of these streams were sampled to determine the existing aquatic resources during a November 1983 field survey. Additional surveys will be conducted in February and April 1984.

Electro-shocking with a Coffelt BP-4 shocker was used to collect fish. Benthic macroinvertebrates were sampled by means of timed kick samples. Fourteen species of fish were identified during the field survey (Table 2.6.3-7). Preliminary data indicate Horse Creek supports the most valuable sport fishery of the streams sampled, particularly in the western

Table 2.6.3-5

AVAILABLE STREAM AND LAKE INFORMATION FOR AQUATIC RESOURCES WITHIN FLIGHT AREAS IN THE WYOMING PORTION OF THE AREA OF CONCENTRATED STUDY

Flight/Stream	Annual Flow* P	Annual Flow* I	Class**	Number of Days/ Mile or Acre	Availability***	Productivity****	Mgt. for Species+	Mgt. Concepts++	Stocking+++	Species Composition+**
Flight A										
Antelope Draw		X	-	-	-		-	-	-	-
Chivington Draw		X	-	-	-		-	-	-	-
Spring Creek		X	4	25	2	2	-	B	7	03,60,62
Lodgepole Creek	X		5	10	2	1	1	B	7	-
Flight C										
Horse Creek	X		-	-	-		-	-	-	-
Bear Creek	X		-	-	-		-	-	-	-
Fourmile Draw		X	-	-	-		-	-	-	-
Bushnell Creek	X		4	15	2	2	1	B	3-7;1-7	01,03
Flight E										
Spring Creek		X								
Muddy Creek		X								
Flight P										
Chivington Draw		X	-	-	-		-	-	-	-
Springer Creek	X		-	-	-		-	-	-	-
Horse Creek			-	-	-		-	-	-	-
Flight Q										
Maxwell Creek	X		4	8	3	2	-	E	3-7	03
Richeau Creek	X		4	80	3	2	-	A	1-7;3-7	01,03,52,67,87
Chugwater Creek	X		4	2	2	2	-	B	3-7	03
Spring Creek		X	4	8	3	2	-	B	3-7	03
North Bear Creek	X		4	33	2	2	-	E	7	03,60,67
South Fork Bear Creek	X		4	-	2	2	-	B	8	-
Little Bear Creek (upper)	X		4	10.5	2	2	-	E	7	03
Little Bear Creek (lower)	X		4	36	2	2	-	E	7	03,62,60
Flight R										
Fox Creek	X		-	-	-	-	-	-	-	-
Bear Creek	X		-	-	-	-	-	-	-	-

Table 2.6.3-5 Continued, Page 2 of 4
AVAILABLE STREAM AND LAKE INFORMATION FOR AQUATIC RESOURCES WITHIN
FLIGHT AREAS IN THE WYOMING PORTION OF THE AREA OF CONCENTRATED STUDY

Flight/Stream	Annual Flow* P	I	Class**	Number of Days/ Mile or Acre	Availability***	Productivity****	Mgt. for Species†	Mgt. Concepts††	Stocking†††	Species Composition†*
Flight T										
Chugwater Creek	X		4	2	2	2	-	B	3-7	01,03,61,52,54, 90,82,86,87,67
Richeau Creek	X		4	80	3	2	1,3	A	1-7;3-7	01,02,52,67,82, 87
Antelope Creek	X		-	-	-	-	-	-	-	-
Hunton Creek	X		-	-	-	-	-	-	-	-
Flight S										
Corn Creek		X	-	-	-	-	-	-	-	-
Goshen Hole			-	-	-	-	-	-	-	-
Bump Sullivan Reservoir			-	150	-	-	-	F	20-7;30-7 1-7	61,32,41,31
Sinnard Reservoir			-	-	-	-	-	B	7	-
Horse Creek	X		4	441	2	2	1	B	1-7	01,02,03,61,67, 60
Horse Creek	X		4	301	2	2	1	B	6	01,32,41,67
Dry Creek		X	-	-	-	-	-	-	-	-
Robb Draw		X	-	-	-	-	-	-	-	-
Lone Tree Creek		X	-	-	-	-	-	-	-	-

Notes: * Annual Flow

P Perennial
I Intermittent

** Class

1 Premium trout waters with fish of national importance.
2 Very good trout waters with fish of statewide importance.
3 Important trout waters of regional importance.
4 Low production waters with fish frequently of local importance, but generally incapable of sustaining fishing pressure.
5 Very low production waters, often incapable of sustaining a fishery.

*** Availability

5 Accessibility to fishing waters by road satisfactory for modern cars. Stream access in terms of posting and availability to fisherman use very good. Camping, lodging, stream floatable.
4 Vehicular access relatively good, posting not extensive and stream bank cover not restrictive to fisherman utilization. Stream not floatable.
3 Accessible road or trail fit or appropriate for jeep, horseback, or afoot. Posting not considered an important restrictive problem.
2 Accessibility often difficult or posting so extensive fisherman access is seriously restricted.
1 Accessibility inadequate as natural or man-made restrictions cause fisherman utilization to be almost impossible.

Table 2.6.3-5 Continued, Page 3 of 4
AVAILABLE STREAM AND LAKE INFORMATION FOR AQUATIC RESOURCES WITHIN
FLIGHT AREAS IN THE WYOMING PORTION OF THE AREA OF CONCENTRATED STUDY

**** Productivity

5 Supports high fish populations in good condition of one or more species of the better cold-water game fish, and/or the fishing water is large enough to accommodate considerable use and can withstand heavy to moderate fishing pressure. Natural propagation maintains the fish population, but some hatchery stocking may be required or has been required.
4 Supports a moderate fish population of one or more better game fish species. Fishing waters are moderate in size; however, productivity is high and water can withstand much fishing pressure.
3 The fishing waters are small; however, productivity is good and can withstand heavy to moderate fishing pressure; or fishing waters are large but productivity is low, and hatchery stocking is required to maintain fishing success.
2 The fishing waters are small and/or cannot withstand much fishing pressure due to lack of cover, short growing season, shallow waters, etc.
1 Supports low populations of game species. Waters can be either large or small, but are of such a nature that a successful long-term fishery cannot be maintained by either natural or artificial means.

+ Management for Species

Number is equal to species number, and that species is being managed.

++ Management Concepts

A Catchables - Waters where management is primarily directed towards providing the fisherman with the opportunity to harvest fish. The majority of the harvest from waters under this concept is comprised of fish which were raised to a catchable size in the hatchery.
B Basic Yield - Waters where management is primarily directed toward providing the fisherman with the opportunity to harvest fish. Basic yield fisheries may be supported by stocking fingerlings or fry, but the yield to the fisherman is a fish which grew to catchable size in the wild.
C Trophy - Waters where management is primarily directed towards providing the fisherman with the opportunity to catch "larger than average" fish. In order to be managed under the trophy concept, a water must have relatively high productivity and management procedures such as low stocking rates, restrictive size and creel limits, and limitations on fishing pressure are usually employed. A trophy water typically will not support as much use as a basic yield or catchable water.
D Unique Species - Waters where management is primarily directed toward providing the fisherman with the opportunity to catch a unique species. Unique refers to those species which are relatively rare throughout the country and because of their scarcity, are highly prized by the fisherman.
E Wild - Waters where management is primarily directed toward providing the fisherman with the opportunity to catch fish from a fishery totally supported by natural production. The wild concept will include only those waters specifically designed for wild fisheries management and not those basic yield waters presently supported by natural production.
F Not classified - none of the above.

+++ Stocking

The first number stands for the species (see +* Species Composition); the second number correlates to the stocking programs below:

0 - Eggs
1 - 0"-2" Fry
2 - 2"-4" Fingerling
3 - 4"-6" Advanced Fingerling
4 - 6"-8" Subcatchable
5 - 8 Catchable
6 - No stocking - unsuitable
7 - No stocking at present
8 - No stocking - insufficient information
9 - Virgin

Table 2.6.3-5 Continued. Page 4 of 4
AVAILABLE STREAM AND LAKE INFORMATION FOR AQUATIC RESOURCES WITHIN
FLIGHT AREAS IN THE WYOMING PORTION OF THE AREA OF CONCENTRATED STUDY

** Species Composition

01 Rainbow trout
02 Brown trout
03 Brook trout
20 Largemouth bass
30 Walleye
31 Yellow perch
41 Black bullhead
52 White sucker
54 Longnose sucker
60 Suckers
61 Carp
62 Chubs
67 Creek chub
80 Longnose dace
82 Common shiner
86 Sand shiner
87 Brassy minnow

Source: WFGD 1983-b.

Table 2.6.3-6

STREAM CROSSING LOCATIONS AT
PROPOSED ROAD CORRIDORS AND CABLE PATHS

Road Corridors	County	Township Range Section
Bear Creek	Goshen	T19N,R61W,S5
Bear Creek	Goshen	T19N,R62W,S2
Chugwater Creek	Platte	T22N,R66W,S18,19
Horse Creek	Laramie	T18N,R64W,S28
Horse Creek	Laramie	T17N,R66W,S3
Horse Creek	Goshen	T19N,R61W,S2,11
* Little Bear Creek	Laramie	T18N,R66W,S4,9
Lodgepole Creek	Laramie	T14N,R60W,S9,10
Lodgepole Creek	Laramie	T15N,R62W,S31,32
* Lonetree Creek	Laramie	T21/22N,R62W,S3,34
Spring Creek	Laramie	T14N,R60W,S9,10
Spring Creek	Laramie	T15N,R62W,S19,20
Unnamed Stream	Laramie	T15N,R60W,S3,4
Cable Paths		
Bushnell Creek PB1	Laramie	T18N,R60W,S31
Bushnell RB1	Larmie	T18N,R61W,S11,14
* Fourmile Draw RB1	Goshen	T19N,R62W,S29
Horse Creek RB1	Laramie	T18N,R61W,S11
Little Horse Creek PB1	Laramie	T18N,R62W,S19
* Robb Draw SB2	Goshen	T21N,R58W,S28
Horse Creek PD1	Laramie	T18,R62,61
Little Horse Creek PD1	Laramie	T18,R62

* Stations were dry during November, 1983 field survey.

Table 2.6.3.7

FISH SPECIES AND NUMBERS COLLECTED IN STREAMS IN THE ACS

Stream	Station[1]	Species	Common Name	Number Collected
Bear Creek	Be-1	Catostomus commersoni	white sucker	5
		Notropis stramineus	sand shiner	5
		Rhinichthys cataractae	longnose dace	7
Bushnell Creek	Bu-1	Catostomus commersoni	white sucker	2
		Fundulus sciadicus	plains topminnow	12
		Hybognathus hankinsoni	brassy minnow	6
		Notropis cornutus	common shiner	11
		Pimephales promelas	fathead minnow	11
		Rhinichthys osculus	speckled dace	16
		Semotilus atromaculatus	creek chub	17
Horse Creek	H-1	Catostomus commersoni	white sucker	13
		Rhinichthys cataractae	longnose dace	1
		Salmo trutta	brown trout	2
		Salvelinus fontinalis	brook trout	3
		Semotilus atromaculatus	creek chub	15
	H-2	Catostomus commersoni	white sucker	13
		Salmo trutta	brown trout	3
	H-3	Catostomus commersoni	white sucker	6
		Rhinichthys cataractae	longnose dace	2
		Salmo trutta	brown trout	2
	H-4	Catostomus commersoni	white sucker	2
		Salmo trutta	brown trout	5

Table 2.6.3-7 Continued, Page 2 of 2
FISH SPECIES AND NUMBERS COLLECTED IN
STREAMS IN THE ACS

Stream	Station[1]	Species	Common Name	Number Collected
Horse Creek	H-5	Catostomus commersoni	white sucker	1
		Etheostoma nigrum	johnny darter	1
		Hybognathus hankinsoni	brassy minnow	8
		Rhinichthys osculus	speckled dace	9
		Semotilus atromaculatus	creek chub	1
	H-6	Catostomus commersoni	white sucker	2
		Rhinichthys cataractae	longnose dace	2
		Rhinichthys osculus	speckled dace	1
		Hybognathus hankinsoni	brassy minnow	4
Lodgepole Creek	L-1	Catostomus commersoni	white sucker	8
		Etheostoma exile	Iowa darter	2
		Etheostoma nigrum	johnny darter	1
		Fundulus zebrinus	plains killifish	6
		Semotilus atromaculatus	creek chub	21

Note: 1 See Figure 2.6.3-1 and Table 2.6.3-1 for sample site location information.

reaches where brown and brook trout were collected. Horse Creek was sampled in three locations:

- o Road link 190 (Station H-1);
- o Representative sample near Silo P-2 (Stations H-2, H-3, and H-4); and
- o Cable path RB1 (Stations H-5 and H-6).

Adult brook and brown trout (Salvelinus fontinalis and Salmo trutta, respectively) were captured at Stations H-1 through H-4. The water at these stations was cold, fast flowing, and varied in depth (Table 2.6.3-1). The substrate is primarily gravel. Grazing along the banks is evident. Vegetation cover at the Horse Creek stations is dominated by willows. Data indicate that these stations have suitable trout habitat. Stations H-5 and H-6 have been influenced by heavy grazing pressure. Vegetation cover is reduced and the banks have been altered at several locations by livestock grazing. Although the water at these stations was also cold, fast, and contained a variety of pools, no salmonid species were collected. Survey data suggest that there is no trout habitat at this site.

Segments of Bear, Bushnell, and Lodgepole creeks that were sampled supported only nongame warmwater fisheries (Table 2.6.3-7). Bushnell Creek (Station Bu-1) was sampled at cable path Alternative RB1. Bushnell Creek was sampled approximately 500 feet from the confluence with Horse Creek. The sample location is a springfed pool. Several nongame fish species were collected by dip-netting (Table 2.6.3-7). Bear Creek (Station Be-1) was sampled at road link 234 and Lodgepole Creek (Station L-1) was sampled at road link 144. These streams were shallow and contained a number of warmwater nongame species (Table 2.6.3-7). Grazing was not apparent at the Bear Creek station, and the riparian cover consisted of willows and cottonwoods. The substrate is mainly silt and sand. Grazing was evident at Lodgepole Creek. The vegetative cover was dominated by short grasses and the bank had been somewhat altered by livestock grazing. The substrate at this station is a silt and gravel mixture.

2.6.3.2.2.2 F.E. Warren AFB

Field surveys were conducted from June 15 through June 24, and on August 6, and November 8, 1983 to determine the existing aquatic resources of Crow and Diamond creeks within F.E. Warren AFB. A total of 11 fish species (Table 2.6.3-8) were identified during the field program. These species indicate a predominantly warmwater rough fishery. The only game species observed was the green sunfish (Lepomis cyanellus). However, local anglers reported catching brook and rainbow trout adjacent to the Plant Road bridge. Trout occurring within the F E. Warren AFB sections of Crow Creek may have been washed down from suitable habitat farther upstream, especially during high flow periods. Physical and biological conditions in Crow and Diamond creeks may not provide satisfactory habitat for these species on a year-round basis.

Table 2.6.3-8

FISH SPECIES COLLECTED IN CROW AND DIAMOND CREEKS ON F. E. WARREN AIR FORCE BASE

Stream	Station[1]	Species	Common Name	Number Collected
Crow Creek	C-1	Catostomus commersoni	white sucker	3
		Notropis cornutus	common shiner	5
		Semotilus atromaculatus	creek chub	5
	C-2	Catostomus commersoni	white sucker	4
		Etheostoma exile	Iowa darter	2
		Etheostoma nigrum	johnny darter	7
		Notropis cornutus	common shiner	11
		Pimephales promelas	fathead minnow	1
		Semotilus atromaculatus	creek chub	23
	C-3	NO FISH COLLECTED		
	C-3a	Catostomus commersoni	white sucker	5
		Etheostoma nigrum	johnny darter	1
		Notropis cornutus	common shiner	7
		Semotilus atromaculatus	creek chub	8
	C-4	Catostomus commersoni	white sucker	1
		Etheostoma exile	Iowa darter	1
		Etheostoma nigrum	johnny darter	2
		Notropis cornutus	common shiner	11
		Pimephales promelas	fathead minnow	1
		Semotilus atromaculatus	creek chub	2
	C-5	Catostomus commersoni	white sucker	1
		Notropis cornutus	common shiner	3

Table 2.6.3-8 Continued, Page 2 of 4
FISH SPECIES COLLECTED IN CROW AND DIAMOND CREEKS ON F.E. WARREN AIR FORCE BASE

Stream	Station[1]	Species	Common Name	Number Collected
Crow Creek	C-6	Etheostoma nigrum	johnny darter	1
		Semotilus atromaculatus	creek chub	2
	C-7	Catostomus commersoni	white sucker	1
	C-8	Catostomus commersoni	white sucker	1
	C-8a	Campostoma anomalum	stoneroller	1
		Etheostoma nigrum	johnny darter	1
		Notropis cornutus	common shiner	1
		Rhinichthys osculus	speckled dace	5
		Semotilus atromaculatus	creek chub	13
	C-8b	NO FISH COLLECTED		
	C-8c	Campostoma anomalum	stoneroller	1
		Catostomus commersoni	white sucker	1
		Etheostoma nigrum	johnny darter	2
		Notropis cornutus	common shiner	2
		Rhinichthys osculus	speckled dace	9
		Semotilus atromaculatus	creek chub	17
	C-9	Catostomus commersoni	white sucker	1
		Notropis cornutus	common shiner	1
	C-10	Catostomus commersoni	white sucker	2
		Noturus flavus	stonecat	1
		Semotilus atromaculatus	creek chub	1

Table 2.6.3-8 Continued, Page 3 of 4
FISH SPECIES COLLECTED IN CROW AND DIAMOND CREEKS ON F.E. WARREN AIR FORCE BASE

Stream	Station[1]	Species	Common Name	Number Collected
Crow Creek	C-11	Catostomus commersoni	white sucker	1
		Notropis cornutus	common shiner	1
		Semotilus atromaculatus	creek chub	1
	C-12	NO FISH COLLECTED		
	C-13	Notropis cornutus	common shiner	5
Diamond Creek	D-1	Etheostoma nigrum	johnny darter	1
		Lepomis cyanellus	green sunfish	1
		Notropis cornutus	common shiner	12
		Semotilus atromaculatus	creek chub	10
	D-1a	Etheostoma exile	Iowa darter	1
		Etheostoma nigrum	johnny darter	7
		Fundulus zebrinus	plains killifish	4
		Semotilus atromaculatus	creek chub	9
	D-2	NO FISH COLLECTED		
	D-2a	Semotilus atromaculatus	creek chub	2
	D-3	Catostomus commersoni	white sucker	2
		Lepomis cyanellus	green sunfish.	2
		Notropis cornutus	common shiner	6
		Pimephales promelas	fathead minnow	1
		Semotilus atromaculatus	creek chub	17
	D-4	Catostomus commersoni	white sucker	4
		Lepomis cyanellus	green sunfish	5

Table 2.6.3-8 Continued, Page 4 of 4
FISH SPECIES COLLECTED IN CROW AND DIAMOND
CREEKS ON F.E. WARREN AIR FORCE BASE

Stream	Station[1]	Species	Common Name	Number Collected
Diamond Creek	D-4	Notropis cornutus	common shiner	1
		Noturus flavus	stonecat	1
		Pimephales promelas	fathead minnow	1
		Semotilus atromaculatus	creek chub	7
	D-5	Catostomus commersoni	white sucker	1
		Etheostoma nigrum	johnny darter	2
		Lepomis cyanellus	green sunfish	1
		Pimephales promelas	fathead minnow	2
		Semotilus atromaculatus	creek chub	15
	D-6	Catostomus commersoni	white sucker	1
		Etheostoma nigrum	johnny darter	4
		Notropis cornutus	common shiner	4
		Pimephales promelas	fathead minnow	1
		Semotilus atromaculatus	creek chub	2

Note: 1 See Figure 2.6.3-2 for sampling station locations.

2.6.3.2.2.3 Other Disturbed Areas

Aquatic resources may occur in areas of the proposed aggregate quarry sites. The biological characteristics of these streams may only be determined when the aggregate quarry sites are selected. No aquatic resources are anticipated to occur in the areas of proposed dispatch stations.

2.6.3.3 Fisheries Resources

2.6.3.3.1 Region of Influence

A variety of habitats within the ROI provides a number of cold and warmwater angling opportunities. Several rivers, streams, lakes, and reservoirs in the ROI are considered valuable fisheries (Table 2.6.3-9). Game fish occurring in the ROI include rainbow trout (Salmo gairdneri) walleye (Stizostedian vitreum vitreum), small and largemouth bass (Micropterus dolomieui and Micropterus salmoides), and yellow perch (Perca flavescens).

2.6.3.3.1.1 South Dakota

Information on the fisheries in the South Dakota portion of the ROI is not currently available.

2.6.3.3.1.2 Colorado

The Colorado portion of the ROI is located in the Platte and Colorado river drainage basins, and encompasses most or all of the following counties: Adams, Boulder, Denver, Gilpin, Grand, Jackson, Larimer, Logan, Morgan, and Weld; as well as small portions of Clear Creek, Phillips, Routt, Sedgewick, and Washington counties. The 1980 estimated fishing pressure for these counties was 3,085,630 fisherman-days, and represents 31 percent of the state total. Fishing pressure is highest in the Fort Collins/Greeley and Denver/Boulder areas (Kroeckel 1980). Agency data indicate warmwater fisheries on the eastern slope are currently being overfished (CDOW, personal communication, 1983).

2.6.3.3.1.3 Nebraska

Fishery resources in the Nebraska portion of the ROI are limited because of the semiarid conditions associated with the Panhandle region. Oliver Reservoir, fed by Lodgepole Creek, is one of the main fisheries in the area, and has recently been renovated (NGPC, personal communication, 1983). The reservoir supports a self-propagating population of warmwater species. However, populations of coldwater species occurring in the reservoir currently require a stocking program to maintain a viable fishery.

The North Platte River in Nebraska is subjected to large water drawdowns during the summer months because of irrigation requirements. Low water conditions limit the fishery; however, the North Platte still supports a viable catfish population. Rainbow trout occasionally migrate up the North Platte from Lake McConaughy into small tributaries, providing limited angling opportunities within those drainages. Lake Minatare in the North Platte River drainage has a well-established warmwater fishery that receives a substantial amount of fishing pressure from the Scottsbluff area. Fishery resources in

Table 2.6.3-9

MAJOR FISHERIES WITHIN
THE REGION OF INFLUENCE

State	Water	Resident Game Species[1]	Fishery Type[2]
Wyoming	Alcova Reservoir	T	C
	Crystal Reservoir	T,P	C,W
	Diamond Lake	T	C
	East Allen Lake	T	C
	Encampment River	T	C
	Glendo Reservoir	T,W,P	C,W
	Granite Reservoir	T,P	C,W
	Gray Rocks Reservoir	T,W,CA,C,B,P	C,W
	Lake Hattie	T,P	C,W
	Laramie River	T	C
	Little Snake River	T	C
	Medicine Bow River	T	C
	North Platte River	T	C
	Pathfinder Reservoir	T,W	C
	Seminoe Reservoir	T,W	C
	Twin Buttes Lake	T	C
Colorado	Big Thompson River	T	C
	Cache La Poudre	T	C
	Horsetooth Reservoir	T,B,P,W,SA,SU,C	C,W
	Red Feather Lakes	T	C
	South Platte River	T	C
Nebraska	Box Butte Reservoir	P,W,B,SU,CA	W
	Lake Minatare	W,P,C,CA	W
	Niobrara River	T	C
	North Platte River	T,CA,W,B	C,W
	Oliver Reservoir	T,B,C,CA	C,W
South Dakota	White River	CA,SU	W

Notes:

1 trout - T
salmon - SA
bass - B
walleye - W
perch - P
crappie - C
sunfish - SU
catfish - CA

2 coldwater - C
warmwater - W

Sources: Baxter and Simon 1970; WGFD 1983b; USFWS 1978-a,b,c,d; Bailey and Allum 1962.

Table 2.6.3-10

ESTIMATED FISHING PRESSURE/SUPPLY IN WYOMING FOR 1976 AND 1979

	Total Estimated Supply 1976 (fmn. days)[1]	Estimated Supply with Guaranteed Access 1976 (fmn. days)	Estimated Pressure 1976 (fmn. days)	Estimated Pressure 1979 (fmn. days)
Platte River Drainage				
Streams	585,552	227,830	386,482	559,407
Standing Water	1,541,012	1,328,682	561,696	797,389
TOTAL:	2,126,564	1,556,512	948,178	1,356,796
Statewide				
Streams	2,230,949	1,324,022	1,260,603	1,891,579
Standing Water	5,301,910	4,899,558	1,311,694	1,764,463
TOTAL:	7,532,859	6,223,580	2,572,297	3,665,042

Note: 1 Fisherman-days.

Source: Stone 1977, Phillips et al. 1981.

2.6.3.3.2.2 F.E. Warren AFB

During the field survey of Crow and Diamond creeks, no trout species were observed. However, several reports from local anglers indicate rainbow and brook trout are occasionally caught near the bridge by Gate No. 2. The Pearson lakes are stocked annually with brown and rainbow trout. Catfish and weed carp were stocked in the lakes in 1982 (McConnell and Cormier 1982). Fishing is available on approximately 18.4 acres in the Pearson Lake system, and along 2.5 miles of Crow Creek on F.E. Warren AFB.

2.6.3.3.2.3 Other Disturbed Areas

Aquatic resources may occur in areas of the proposed aggregate quarry sites. The characteristics of the fisheries resources of these streams will be determined when the aggregate quarry sites are selected. No aquatic resources are anticipated to be in the proposed dispatch areas.

2.6.4 Unique and Sensitive Habitats

2.6.4.1 Vegetation

2.6.4.1.1 Region of Influence

Unique or sensitive habitats present within the ROI include riparian areas and habitat supporting proposed or listed endangered or threatened plants. Several limestone quarries east of Laramie, Wyoming provide unique habitat for Laramie false sagebrush (Sphaeromeria simplex) (WNHP, personal communication, 1983; WNHP 1983), a Federal Category One species. The riparian areas along the Crow and Diamond creek drainages are considered sensitive habitat because of the occurrence of the Colorado butterfly plant, a Federal Category One species. Wind-formed blowouts in the Nebraska Sandhills provide unique habitat for Hayden's penstemon (Penstemon haydenii), a Federal Category Two species (Weedon and Norton 1982). Raw sandstone exposures and nearby areas of the Coalmont formation adjacent to the Michigan and North Platte rivers in Colorado provide unique habitat for the Federal endangered Northpark phacelia (Phacelia formosula).

2.6.4.1.2 Area of Concentrated Study

Riparian vegetation and associated wetland habitat are present along the major drainages in the ACS including Chugwater, Lodgepole, Horse, Bear, and Little Bear creeks. Plant species with more mesic habitat requirements dominate the riparian areas. Box elder (Acer negundo), cottonwood (Populus spp.) peachleaf willow (Salix amygdaloides), and green ash (Fraxinus pennsylvanica var. lanceolata) are common in areas along the major streams with large oxbows. Willow (Salix spp.) thickets occur frequently where the stream velocity is high. In areas where the stream velocity is low, emergent aquatic vegetation is present including cattail (Typha latifolia), rush (Scirpus spp.), horsetail (Equisetum laevigatum), baltic rush (Juncus arcticus ssp. ater), and sedge (Carex spp.). Plant species characteristic of riparian areas are delineated on Table 2.6.1-1. Riparian vegetation along the Lodgepole Creek drainage in the vicinity of Pine Bluffs is considered sensitive habitat because of the potential occurrence of the Colorado butterfly plant. It is not known whether or not this population is extant since it is represented by an 1889 historical

collection. Although several plants considered rare in either Wyoming or Nebraska are known to occur within the ACS, the habitat for these species is not considered unique or sensitive.

2.6.4.1.2.1 Roads Within Flights

Riparian areas (as discussed for the ACS above) and associated wetland habitats were identified along road corridors within Flights B, C, P, Q, R, S, and T during field studies. An estimate of the acreage of riparian vegetation along road corridors within the Flights is presented in Table 2.6.1-2.

2.6.4.1.2.2 Silos

No unique or sensitive habitats were identified adjacent to silos or LCFs during field reconnaissance.

2.6.4.1.2.3 Roads Outside of Flights

Riparian areas and associated wetland habitat (as discussed for the ACS above) were noted along portions of the interconnecting roadways. Approximately 360 acres of riparian vegetation is present along roadways outside of the Flights.

2.6.4.1.2.4 Cable Paths

Riparian areas and associated wetland habitats are present along RB1, PB1, PD1, PA3, SB1, and PA5.

2.6.4.1.2.5 F.E. Warren AFB

Moist meadow habitat in riparian areas along the Crow and Diamond creek drainages is considered unique or sensitive habitat because of the occurrence of the Colorado butterfly plant, a Federal Category One species. The distribution and habitat of this species is discussed in more detail in Section 2.6.5.1.

2.6.4.1.2.6 Other Disturbed Areas

Riparian and meadow vegetation may be present at proposed dispatch stations. Aggregate sources for silo modification have not yet been determined; however, 30 tons of fill will be needed at each silo site. Habitat for the Laramie false sagebrush, a Federal Category One species, occurs near limestone quarries east of Laramie. Since these quarries are distant from the ACS, it is not expected that they will represent an aggregate source.

2.6.4.2 Wildlife

2.6.4.2.1 Region of Influence

No direct impacts are anticipated to occur to unique and sensitive wildlife habitat in the ROI as a result of the project; therefore, this section is not applicable.

2.6.4.2.2 Area of Concentrated Study

2.6.4.2.2.1 Flights

The eastern terminus of a pronghorn migration route is in the northern portion of Flight Q. Pronghorn migrate into winter-yearlong habitat in Flight Q from summer range to the west along the Laramie Range and in the Laramie Basin (WGFD 1982-c). Critical-winter-yearlong habitat for mule deer occurs along Horse and Chugwater creeks west of Interstate 25 in Flight Q (WGFD 1980-a). The Q-6 silo and a small portion of its access road, along with the Q-10 silo and its entire access road, lie within these critical areas. Mountain mahogany/skunkbush, silver sagebrush, and riparian vegetation types dominate the critical habitat. No lambing, fawning, or calving grounds for any big game species are presently known to occur within the Flights (WGFD n.d.-b, 1978, 1979-a, 1979-b, 1980-a, 1980-b, 1981-a, 1981-b, 1981-c, 1981-d, 1982-c, 1982-d).

2.6.4.2.2.2 F.E. Warren AFB

There are no known unique or sensitive habitats for wildlife on F.E. Warren AFB.

2.6.4.2.2.3 Other Disturbed Areas

Other disturbed areas include aggregate quarries and dispatch stations. Unique and sensitive wildlife habitats that may be potentially involved in these areas include riparian, meadow, shrubland, and grassland habitat types. The unique or sensitive wildlife areas most likely to be disturbed include critical-winter-yearlong habitat or migration routes for pronghorn or mule deer at quarry sites. However, the locations of these quarry sites is unknown at the present time. No unique or sensitive wildlife habitat is expected to be disturbed by the dispatch stations since they will be located adjacent to urban areas.

2.6.4.3 Fisheries Resources

2.6.4.3.1 Region of Influence

There are no unique or sensitive aquatic habitats known to occur in the ROI.

2.6.4.3.2 Area of Concentrated Study

2.6.4.3.2.1 Flights

There are no unique or sensitive aquatic habitats known to occur in the Flight areas.

2.6.4.3.2.2 F.E. Warren AFB

There are no unique or sensitive aquatic habitats known to occur on F.E. Warren AFB.

2.6.4.3.2.3 Other Disturbed Areas

There are no unique or sensitive aquatic habitats known to occur in other areas potentially disturbed by the project.

2.6.5 Threatened and Endangered Species

A variety of rare and endangered plant, wildlife, and fish species occur within the ROI, which is further delineated in the following sections. Twenty-two federal candidate or listed plant and animal species occur within the ROI (Table 2.6.5-1, Figure 2.6.5-1). State species of special concern are also included in Table 2.6.5-1; the legal status of these species vary.

2.6.5.1 Vegetation

2.6.5.1.1 Region of Influence

Within the ROI, one plant taxa is a federal-listed endangered species, two are listed under Category One and seven are listed under Category Two (Table 2.6.5-1) (USFWS, personal communication, 1983; USFWS 1980-b). One of the ten listed taxa is known to occur in the ACS on F.E. Warren AFB, and three are peripheral to the ACS. The Northpark phacelia (Phacelia formosula) found in Jackson County, Colorado, is an endangered species that is currently somewhat affected by off-road vehicle activity (CNHP, personal communication, 1983). The present distribution of the Laramie false sagebrush (Sphaeromeria simplex), a Category One species, is restricted to limestone quarries near Laramie, Wyoming (WNHP, personal communication, 1983; WNHP 1983). Hayden's penstemon (Penstemon haydenii), a Category Two species of concern, is a successional endemic species that is confined to wind-formed blowouts in the Nebraska Sandhills (WNHP, personal communication, 1983; Weedon and Norton 1982). Known populations of Hayden's penstemon are small and subject to vegetative encroachment and/or herbivore pressure (Weedon 1982). Sandy soils are present in the eastern portion of the ACS and could represent marginal habitat for Hayden's penstemon, although it has not been documented in this area.

The Colorado butterfly plant (Gaura neomexicana ssp. coloradensis), a Federal Category One species, occurs within the boundaries of F.E. Warren AFB. This biennial or short-lived perennial grows in moist meadows, usually at the transition between wet stream bottoms and dry upland (WNHP, personal communication, 1983; WNHP 1983). Extant populations of the species have been observed in Laramie County (WNHP, personal communication, 1983) adjacent to F.E. Warren AFB. This species has also been observed in Weld County, Colorado as late as 1982, however, the population could not be located during a field survey in 1983 (CNHP, personal communication, 1983). The Colorado butterfly plant population occurs within F.E. Warren AFB in the moist meadow/riparian habitat along Crow and Diamond creeks and an unnamed drainage south of Diamond Creek (Figure 2.6.1-2). Several other state-listed rare plant species also occur within the ROI in Nebraska (Table 2.6.5-2), Wyoming (Table 2.6.5-3), and South Dakota (Table 2.6.5-4). Colorado rare plant species, however, were included in Table 2.6.5-1, since they may be considered threatened or endangered as more information is developed.

Table 2.6.5-1

SPECIES OF SPECIAL CONCERN

Common Name	Scientific Name	Wyoming[1]	Nebraska[2]	Colorado[3]	South Dakota[4]	Federal	Occurrence
Wildlife							
Bald eagle	Haliaeetus leucocephalus	--	Endangered	Endangered	Endangered	Endangered	ROI and ACS[5]
Osprey	Pandion haliaetus	--	--	--	Threatened	--	ROI and ACS
Peregrine falcon	Falco peregrinus	Rare	Endangered	Endangered	Endangered	Endangered	ROI and ACS
Whooping crane	Grus americana	Rare	Endangered	Endangered	Endangered	Endangered	ROI and ACS
American White Pelican	Pelecanus erythrorhynches	--	--	Threatened	--	--	ROI
Greater prairie chicken	Tympanuchus cupido pinnatus	--	--	Endangered	--	--	ROI
Lesser prairie chicken	Tympanuchus pallidicinctus	--	--	Threatened	--	--	ROI
Prairie sharptailed grouse	Tympanuchus phasianellus jamesi	--	--	Endangered subspecies	--	--	ROI
Greater sandhill crane	Grus canadensis tabida	--	--	Endangered subspecies	--	--	ROI
Interior least tern	Sterna albifrons athalassos	--	Threatened	--	Endangered	--	ROI
Mountain plover	Charadrius montanus	--	Threatened	--	--	Category 2	ROI and ACS
Long-billed curlew	Numenius americanus	--	--	--	--	Category 2	ROI and ACS

Table 2.8.5-1 Continued, Page 2 of 5
SPECIES OF SPECIAL CONCERN

Common Name	Scientific Name	Wyoming[1]	Nebraska[2]	Colorado[3]	South Dakota[4]	Federal	Occurrence
Swainson's hawk	Buteo swainsoni	--	--	--	--	Category 2	ROI and ACS
Ferruginous hawk	Buteo regalis	--	--	--	--	Category 2	ROI and ACS
White-faced ibis	Plegadis chihi	--	--	--	--	Category 2	ROI and ACS
Burrowing owl	Athene cunicularia	Rare	--	--	--	--	ROI and ACS
Black-footed ferret	Mustela nigripes	Rare	Endangered	Endangered	Endangered	Endangered	ROI and ACS
Meadow jumping mouse	Zapus hudsonius	Rare	--	--	--	--	ROI and ACS
Swift fox	Vulpes velox	--	Endangered	--	Threatened	Category 2	ROI and ACS
Pale milk snake	Lampropeltis triangulum multistrata	Rare	--	--	--	--	ROI and ACS
Wyoming toad	Bufo hemiophrys baxteri	Rare	--	--	--	Category 1	ROI
Wood frog	Rana sylvatica	--	--	Threatened	--	--	ROI
Fishes							
Plains orangethroat darter	Etheostoma spectabile pulchellum	Rare	--	--	--	--	ROI and ACS
Suckermouth minnow	Phenacobius mirabilis	Rare	--	--	--	--	ROI and ACS

Table 2.6.5-1 Continued, Page 1 of 5
SPECIES OF SPECIAL CONCERN

Common Name	Scientific Name	Wyoming[1]	Nebraska[2]	Colorado[3]	South Dakota[4]	Federal	Occurrence
Greenback cutthroat trout	Salmo clarki stomias	-	--	Threatened	--	Endangered	ROI
Johnny darter	Etheostoma nigrum	--	--	Threatened	--	--	ROI
Colorado River cutthroat trout	Salmo clarki pleuriticus	Rare	--	--	--	--	-
Northern redbelly dace	Phoxinus eos	--	--	--	Threatened	--	ROI
Finescale dace	Phoxinus neogaeus	Rare	--	--	Threatened	--	ROI
Sturgeon chub	Hybopsis gelida	--	--	--	Threatened	--	ROI
Northern pearl dace	Semotilus margarita margarita	Rare	--	--	Threatened	--	ROI
Common shiner	Notropis cornutus	Rare	--	--	--	--	ACS
Longnose sucker	Catostomus catostomus	--	--	--	Threatened	--	ROI
Plains topminnow	Fundulus sciadicus	--	--	--	Threatened	--	ROI
Pearl dace	Semotilus margarita	--	--	--	Endangered	--	ROI
Plants							
Colorado butterfly plant	Gaura neomexicana coloradensis	Endangered	--	A/	--	Category 1	ROI and ACS
Persistent sepal yellowcress	Rorippa calycina	Threatened	--	--	--	Category 2	ROI
Laramie false sagebrush	Sphaeromeria simplex	Endangered	--	--	--	Category 1	ROI

Table 2.6.5-1 Continued, Page 4 of 5
SPECIES OF SPECIAL CONCERN

Common Name	Scientific Name	Wyoming[1]	Nebraska[2]	Colorado[3]	South Dakota[4]	Federal	Occurrence
Zig-zag cloak fern	Notholaena fendleri	Unique	--	--	--	--	ROI
Northpark phacelia	Phacelia formosula	--	--	A1	--	Endangered	ROI
Spleenwort	Asplenium andreusii	--	--	A2	--	Category 2	ROI
Twinpod	Physaria bellii	--	--	A2	--	Category 2	ROI
Osterhout milkvetch	Astragalus osterhoutii	--	--	A1	--	Category 2	ROI
Monkeyflower	Mimulus gemmiparus	--	--	A1	--	Category 2	ROI
Coaltown sagebrush	Artemisia argillosa	--	--	A1	--	Category 2	ROI
--	Bolophyta alpina	--	--	A2	--	--	ROI
Hayden's penstemon	Penstemon haydeni	--	Rare	--	--	Category 2	ROI
Forktip threeawn	Aristida basiramea	--	--	BU	--	--	ROI
American potato bean	Apios americana	--	--	BU	--	--	ROI
Patterson bluegrass	Poa pattersonii	--	--	BU	--	--	ROI
Hall fescue	Festuca hallii	--	--	BU	--	--	ROI
--	Cryptantha cana	--	--	BU	--	--	ROI

Notes: 1 Animal and plant species listed for Wyoming are species of special concern to the Wyoming Fish and Game Department and Wyoming Natural Heritage Program, respectively. These species currently have no legal status within the state.

2 Animal and plant species listed for Nebraska are species of special concern to the Nebraska Game and Parks Commission, and the Nebraska interagency ad hoc group for rare plants, respectively. The plant species listed currently have no legal status.

3 Animal and plant species listed for Colorado are species of special concern to the Colorado Division of Wildlife and Colorado Natural Heritage Inventory, respectively. The plant species listed currently have no legal status.

4 Animal and plant species listed for South Dakota are species of special concern to the South Dakota Game, Fish and Parks Department. The plant species listed currently have no legal status.

5 ROI - Region of Influence; ACS - Area of Concentrated Study.

Definition of Terms:

Endangered - A species that is threatened with extinction throughout all, or a significant portion of, its range (USFWS 1981c).

Threatened - A species that is likely to become endangered in the foreseeable future (USFWS 1981c).

Rare Animals - A species that occupies only a small percentage of the preferred habitat within its range or a species that is found throughout its range in extremely low densities; cannot always be found by a skilled observer even during intensive survey work (WGFD 1977).

Rare Plants - Plant species which are uncommon within the particular state, but may be common elsewhere (Clark and Dorn, 1981).

Unique - Plant species that may be abundant outside Wyoming but usually are uncommon within Wyoming and are unusual in some respect.

Category 1 - Taxa for which the USFWS presently has sufficient information on hand to support the biological appropriateness of their being listed as Endangered or Threatened species.

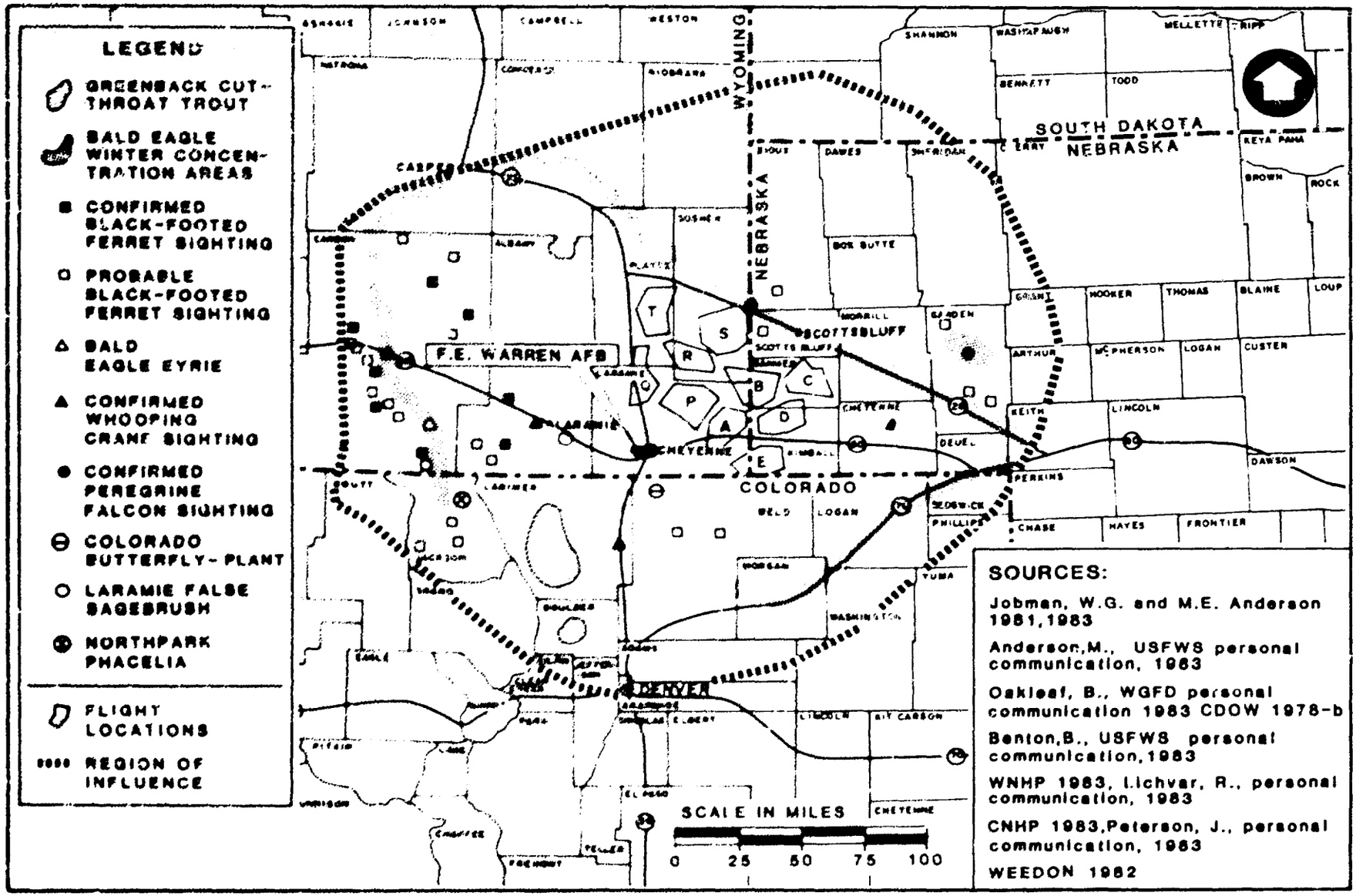
Category 2 - Taxa for which information now in the possession of the USFWS indicates the probable appropriateness of citing as Endangered or Threatened, but for which sufficient information is not presently available to biologically support a proposed rule (USFWS 1980b).

A1 - Plant species critically endangered throughout their range.

A2 - Plant species endangered throughout their range.

BU - Plant species that may be state threatened or endangered; more information is needed.

Source: CDOW 1978, WGFD 1977, NGPC 1977, Nebraska Ad hoc Committee 1978, Peterson, CNHP, personal communication 1983; USFWS 1980b; Peterson 1982, SDGFPD, personal communication 1983; Bailey and Allum 1962.



KNOWN LOCATIONS OF ENDANGERED SPECIES IN THE PROJECT REGION

FIGURE NO. 2.6.5-1

Table 2.6.5-2

NEBRASKA RARE PLANTS OCCURRING WITHIN THE REGION OF INFLUENCE

Scientific Name	Common Name	County
Corallorhiza striata	Hooded coral root	Sioux
Cupripedium calceolus	-	Dawes
Lesquerella ovalifolia ssp. *ovalifolia*	Bladderpod	Kimball
Liparis loeselii	Fen orchid	Cherry
Loeflingia squarrosa	Loeflingia	Dawes
Lomatium nuttalli	Nuttall lomatium	Scotts Bluff
Ophioglossum vulgatum	Adders tongue	Cherry
Petalostemon compactum	Prairie clover	Scotts Bluff
Platanthera leucophaea	Prairie white-fringed orchid	Cherry, Grant
Populus acuminata	Lanceleaf poplar	Scotts Bluff
Psoralea hypogaea	Little breadroot scurfpea	Morrill
Psoralea linearifolia	Narrowleaf scurfpea	Deuel
Trifolium stoloniferum	Running buffalo cover	Cherry, Grant

Source: Nebraska Ad hoc Committee 1976.

Table 2.6.5-3

WYOMING RARE PLANTS OCCURRING WITHIN THE REGION OF INFLUENCE

Scientific Name	Common Name	County
Agalina tenuiflora	Agalinus	Platte
Androstephium breviflorum	Purple funnel lily	Carbon
Antheropeas wallancei	Antheropeas	Carbon
Aquilegia laramiensis	Laramie columbine	Converse, Albany, Platte
Arabis crandallii	Crandall rockcress	Carbon
Arabis demissa var. languida	Rockcress	Albany
Arabis demissa var. russeola	Rockcress	Albany
Arabis perennans	Longlived rockcress	Albany
Arenaria eastwoodii	Eastwood sandwort	Carbon
Asclepias subverticillata	Western whorled milkweed	Carbon
Astragalus leptaleus	Park milkvetch	Carbon
Astragalus mollissimus	Woolly milkvetch	Goshen, Laramie
Astragalus simplicifolius	Bun milkvetch	Carbon, Natrona
Bahia dissecta	Ragleaf bahia	Laramie, Albany
Besseya plantaginea	Plantain kittentails	Albany
Bouteloua simplex	Mat grama	Laramie
Bromus pubescens	Hairy brome	Converse
Carex arapahoensis	Arapaho sedge	Albany
Carex crawei	Craw sedge	Goshen
Carex egglestonii	Eggleston sedge	Albany
Celtis occidentalis	Common hackberry	Goshen
Chaenactis stevioides	Desert dusty maiden	Carbon
Chenopodium subglabrum	Smooth goosefoot	Natrona
Chionophila jamesii	James snowlover	Albany
Coreopsis tinctoria	Thickseed coreopsis	Goshen
Crataegus erthropoda	Red hawthorne	Carbon
Cuscuta plattensis	Platte dodder	Platte, Converse
Cuscuta umbrosa	Umbrella dodder	Platte
Dalea aurea	Distinct dalea	Platte

Table 2.6.5-3 Continued, Page 2 of 3
WYOMING RARE PLANTS OCCURRING WITHIN THE REGION OF INFLUENCE

Scientific Name	Common Name	County
Erigeron bellidiastrum	Annual fleabane	Platte, Goshen
Eriogonum acaule	Stemless wild buckwheat	Carbon, Albany
Eriogonum exilifolium	Narrow wild buckwheat	Carbon, Albany
Eriogonum jamesii var. flavescens	James wild buckwheat	Laramie, Albany
Euphorbia exstipulata	No-stipule spurge	Platte
Euphorbia hexagona	Angled spurge	Platte
Grayia brandegei	Spineless hopsage	Carbon
Haplopappus croceus	Yellow-headed goldenweed	Carbon
Haplopappus pygmaeus	Pygmy goldenweed	Carbon, Albany
Haplopappus wardii	Ward goldenweed	Carbon, Albany
Hemicarpha micrantha	Tiny flowered hemicarpha	Albany
Leersia oryzoides	Rice cutgrass	Goshen
Liatris lancifolia	Lanceleaf gayfeather	Goshen
Lithospermum multiflorum	Manyflowered gromwell	Goshen
Lysimachia thyrsiflora	Water loosestrife	Albany
Machaeranthera coloradoensis	Colorado aster	Carbon, Albany
Mentzelia oligosperma	Manyseeded mentzelia	Platte
Mimulus rebellus	Reddish monkeyflower	Carbon
Monarda pectinata	Pony beebalm	Goshen
Oenothera laciniata	Cutleaf evening primrose	Albany
Orecxis alpina	Alpine parsley	Albany
Oxytropis nana	Wyoming locoweed	Converse, Carbon, Natrona
Palafoxia rosea	Palafoxia	Converse
Paronychia jamesii	James nailwort	Albany
Parthenium alpinum	Wyoming feverfew	Goshen, Platte
Pectis angustifolia	Pectis	Converse
Physaria eburniflora	White-flowered twinpod	Carbon, Natrona
Polypodium vulgare	Western polypody	Albany
Prenanthes racemosa	Rattles	Albany
Psoralea linearifolia	Narrowleaf scurfpea	Laramie
Selaginella mutica	Ledge selaginella	Laramie, Carbon
Shinnersoseris rostrata	Beaked skeleton-weed	Goshen
Stipa neomexicana	New Mexico needlegrass	Platte

Table 2.6.5-3 Continued, Page 3 of 3
WYOMING RARE PLANTS OCCURRING WITHIN THE REGION OF INFLUENCE

Scientific Name	Common Name	County
Sullivantia hapemanii	Hapeman sullivantia	Natrona
Trillium ovatum	Pacific trillium	Carbon
Triodanis holzingeri	Holzinger Venus looking-glass	Platte

Source: WNHP 1983.

Table 2.6.5-4

SOUTH DAKOTA RARE PLANTS
OCCURRING WITHIN THE REGION OF INFLUENCE

Scientific Name	Common Name	County
Adiantum capillus-veneris	Southern maidenhair fern	Fall River
Astragalus barrii	Barr's milkvetch	Fall River
Clematis hirsutissima	Hairy virgin's bower	Fall River Shannon
Cryptantha thyrsiflora	Cryptantha	Fall River
Eleocharis rostellata	Beaked spiked rush	Fall River
Epipactis gigantea	Stream orchid	Fall River
Erigeron acris	Bitter fleabane	Fall River
Eustoma grandiflorum	Gentian	Fall River
Haplopappus multicaulis	Branched goldenweed	Fall River
Polanisia jamesii	James crist	Fall River
Xylorhiza glabriuscula	Woody aster	Fall River

Source: SDNHP 1983.

2.6.5.1.2 Area of Concentrated Study

The Colorado butterfly plant, a Federal-listed Category One species and Wyoming endangered species, is the only plant listed in "species of special concern" (Table 2.6.5-1) that is known to occur in the ACS on F.E. Warren AFB and from an 1889 historical collection in the vicinity of Pine Bluffs, Wyoming. Fourteen other plant species considered rare in either Wyoming or Nebraska also occur in the ACS (Table 2.6.5-5). Pony beebalm (Monarda pectinata), a species considered rare in Wyoming, was found growing a few miles east of the border in Nebraska where it is not classified as rare.

2.6.5.1.2.1 Roads Within the Flights

The plant species listed as important for the ACS can be expected to occur along the road corridors within the Flights; however, known populations of these 13 state-listed rare species lie outside of a mile-wide corridor along the roads within the Flights. The woolly milkvetch (Astragalus mollissimus), a state-listed (Wyoming) rare species was observed approximately 10 meters from the existing road edge, 1.5 miles south of Silo R-11. No federally proposed or listed plant species are known to occur along road corridors within the Flights.

2.6.5.1.2.2 Silos

The woolly milkvetch, a state-listed (Wyoming) species, was observed at the P2 silo site within a few meters of the restrictive fence (Table 2.6.5-5). This plant was also observed growing in active prairie dog towns one-quarter of a mile west of the S-7 silo, approximately 2.5 miles east of the P-2 silo, and across the highway from the B-9 silo. No federal-proposed or listed plant species are known to occur at silo sites within the Flights. Prairie dog towns in these areas are within short-grass prairie which is also grazed by cattle. The woolly milkvetch plants showed no signs of grazing and may increase in areas subjected to heavy grazing pressure.

2.6.5.1.2.3 Roads Outside of Flights

The plant species listed as important in the ACS (Table 2.6.5-5) can be expected to occur along the roads interconnecting the silos where appropriate habitat exists.

2.6.5.1.2.4 Cable Paths

The plant species listed as important in the ACS (Table 2.6.5-5) can be expected to occur within the cable paths where appropriate habitat exists. The woolly milkvetch was observed growing in the northern portion of the SB-1 cable pathway.

2.6.5.1.2.5 F.E. Warren AFB

The Colorado butterfly plant, a Federal Category One species, and Wyoming endangered species (Table 2.6.5-1) is located within F.E. Warren AFB. A Memorandum of Understanding to conserve the Colorado butterfly plant has been entered into between the Air Force and the USFWS in lieu of listing the plant as an endangered species (USFWS, personal communication, 1983). None of the other candidate species are known to occur within F.E. Warren AFB.

Table 2.6.5-5

WYOMING AND NEBRASKA RARE PLANT SPECIES RECORDED
WITHIN THE AREA OF CONCENTRATED STUDY

Species	USGS Quadrangle	Approximate Distance from Nearest Silo or LCF Site
Astragalus mollissimus	Duroc[1]	S-6: 2.5 miles
	Rocky Hollow[2]	P-2: 2.5 miles
	Rocky Hollow[2]	P-2: Within a few meters
	Hawk Springs[1]	S-2: 2.25 miles
	Kessler Gap[2]	S-7: .25 miles
	La Grange[2]	B-9: .25 miles (across the road)
	Pine Bluffs[1]	E-11: 3.5 miles
	YBO Canyon[2]	R-11: 1.75 miles
Bouteloua simplex	Midway SE[1]	A-9: 1 mile
Carex crawei	Lyman[1]	S-4: 4.25 miles
Celtis occidentalis	Diamond Flat[1]	R-1: 1.5 miles
	Diamond Flat[1]	R-2: .75 miles
Cuscuta plattensis	Dwyer[1]	(T25N R67W Sec. 20)
Dalea aurea	Antelope Gap[1]	T-11: 4.75 miles
Erigeron bellidiastrum	Lyman[1]	S-4: 4.75 miles
	Wheatland[1]	T-11: 3.5 miles
Eriogonum jamesii flavescens	Pine Bluffs[1]	E-11: 1.5 miles
Gaura neomexicana coloradensis	Cheyenne North[1]	On F.E. Warren AFB
	Pine Bluffs[1]	E-11: 1.5 miles
	Round Top Road[1]	On F.E. Warren AFB
Leersia oryzoides	Duroc[1]	S-6: 2 miles
Lesquerella ovalifolia	Not known[3] (Kimball County)	Could be near D or E Flight Silos
Liatris lancifolia	Lyman[1]	S-4: 4.75 miles
Lithospermum multiflorum	Lyman[1]	S-5: 3.75 miles
Monarda pectinata	Lyman[1]	S-4: 4.75 miles
Psoralea linearifolia	Pine Bluffs[1]	E-11: 3.25 miles

Notes: 1 Source = WNHP 1983.
2 Source = Field Observations 1983.
3 Source = Nebraska Ad hoc Committee 1976.

The Colorado butterfly plant is generally associated with the moist meadow transition area between the wet stream bottoms and drier uplands (USFWS 1978, Dorn 1980). Common associates of the species include Cirsium flodmanii, Poa pratensis, Iris missouriensis, Helianthus nuttallii, and Rudbeckia hirta (Dorn 1980). The Colorado butterfly plants at F.E. Warren AFB occupy the moist meadow habitat along the Crow and Diamond Creek drainages, an unnamed drainage in the vicinity of Cheyenne Road and Parade Avenue, and a localized area south of Crow Creek near the eastern fenceline (Figure 2.6.5-1).

Extant populations of Colorado butterfly plant are currently subject to various impacts related to habitat modification, land use practices, and foraging animals. Human-related impacts include:

- o Mowing moist meadow habitat for grass hay;
- o Mowing moist meadow habitat along road shoulders and borrow pits for maintenance purposes;
- o Herbicide spraying for noxious weed control;
- o Farming/ranching activities within moist meadow habitat, including intensive grazing; and
- o Human-caused change in water flows, either inundating or drying moist meadow habitat.

Near the end of August or early September, herbicide spraying to control the noxious weeds Cirsium arvense, Euphorbia esula, and Cardaria draba resulted in the eradication of approximately 60 percent of the Colorado butterfly plants at the junction of Parade Avenue and Cheyenne Road on F.E. Warren AFB. Several years will be required before 1) the soil will again support broad-leaved plant species and 2) Colorado butterfly plants reinvade the area from seed produced by individuals or their progeny that were not sprayed. To avoid further herbicide and mowing impacts, on September 7 and 8, 1983, flagged "T" fence posts were installed on F.E. Warren AFB, outlining the critical moist meadow habitat currently supporting the Colorado butterfly plant population. This action would be in accordance with continued compliance with the existing Memorandum of Understanding.

A Colorado butterfly plant study plan is being developed to provide input to the facility siting and design process. The final study plan will include experimental design for pre and post-construction characterization of the habitat and biology of the Colorado butterfly plant.

2.6.5.1.2.6 Other Disturbed Areas

No federal threatened or endangered plant species are presently known to occur at the potential aggregate quarry sites, dispatch stations, or overpass modification areas. However, the 14 state rare plant species listed for the ACS may occur in these areas where appropriate habitat exists.

2.6.5.2 Wildlife

2.6.5.2.1 Region of Influence

Four listed and one proposed species of federal-endangered wildlife occur within the ROI (Table 2.6.5-1). The bald eagle, peregrine falcon, whooping crane (Grus americana), and black-footed ferret (Mustela nigripes) are federally endangered. The Wyoming toad has been proposed for federal-endangered status (USFWS 1983-e), and is expected to be listed.

The bald eagle may occur as a winter resident within the ROI (NGPC 1972, Chase et al. 1982 , Oakleaf et al. 1982). During the winter it may be expected to occur throughout the ROI, but is primarily associated with lakes and rivers including the North and South Platte rivers. Within the Wyoming portion of the ROI, 61 bald eagles were observed along the North Platte River during the 1983 Bald Eagle Midwinter Survey (WGFD, personal communication, 1983). In the Nebraska portion of the ROI, 49 bald eagles were observed along the North Platte River during the 1983 survey (NGPC, personal communication, 1983). The South Platte River and Jackson Reservoir are the major areas for wintering bald eagles in the Colorado portion of the ROI (USFWS, personal communication, 1983). Habitat for wintering bald eagles also occurs around Angostura Reservoir in Fall River County, South Dakota (Harrell 1978).

Bald eagles are not known to nest in the Nebraska, Colorado, or South Dakota portions of the ROI (CDOW 1978; USFWS, personal communication, 1983; Harrell 1978); however, two active nests are located along the North Platte River in the extreme western Wyoming portion of the ROI (WGFD, personal communication, 1983). Eagles generally defend their breeding territories from April to September (Snow 1973); consequently, eagles not associated with the known active nests in the ROI should be migrating out to other breeding areas by late March or early April.

Peregrine falcons occur primarily as migrants within the ROI. Although nesting is not known to occur in the South Dakota and Nebraska portion of the ROI, some nesting occurs in small areas of the Wyoming and Colorado ROI (CDOW 1978; Oakleaf et al. 1982; WGFD, personal communication, 1983; Harrell 1978; USFWS, personal communication, 1983). Peregrine falcons have been observed near the Wyoming-Nebraska border and at Crescent Lake National Wildlife Refuge in Nebraska (USFWS, personal communication, 1983).

Breeding peregrine falcons require adequate food supply and isolation from disturbance (Sherrod et al. 1982). Peregrines prefer high cliffs overlooking water as eyries because the peregrine's staple food items include passerine birds, waterfowl, and shorebirds that concentrate near water (Snow 1972, Williams and Matteson 1973).

Whooping crane migration routes lie primarily east and west of the ROI (NGPC 1972, CDOW 1978, Oakleaf et al. 1982), but some birds may occasionally pass through the ROI. Recent confirmed sightings within the ROI include: nine birds in 1979 in Albany County, Wyoming; three birds in Larimer County, Colorado in 1983, and three birds in Cheyenne County, Nebraska in 1979 (USFWS, personal communication, 1983).

The whooping crane population migrates along the eastern border of the ROI flying from wintering grounds on the Aransas National Wildlife Refuge in Texas to breeding grounds in Wood Buffalo National Park in Alberta, Canada (NGPC 1977). The cranes use wet meadows, marshy areas, and grain fields near water as staging areas during migration (Clark and Dorn 1981). The closest staging area lies between Hershey and North Platte Nebraska, approximately 80 kilometers (50 mi) east of the ROI. Cranes passing to the west of the ROI are transplants fostered by sandhill cranes in Gray's Lake National Wildlife Refuge in Idaho (Welty 1982). These cranes migrate from Idaho to Bosque Del Apache National Wildlife Refuge in New Mexico (BLM and Woodward-Clyde Consultants 1982).

The black-footed ferret depends upon prairie dog towns for shelter and food; consequently, the potential distribution of the black-footed ferret coincides with that of the prairie dog. Ferrets were probably never abundant (Chapman and Feldhamer 1982), which may be partly an adaptation against over-exploitation of their food supply (WGFD 1977). Prairie dog towns are scattered throughout the ROI and the black-footed ferret may occur within these towns. The reduction in black-footed ferret populations is attributed to habitat destruction from the poisoning and shooting of prairie dogs and land use changes (Hillman and Clark 1980). In Laramie County, Wyoming, about 1,500 acres are occupied by black-tailed prairie dogs, which is 1.1 percent of the total area occupied by black-tailed prairie dogs in Wyoming (Clark 1973). The most recent confirmed or probable sightings of black-footed ferrets within the Wyoming, Nebraska, and Colorado portions of the ROI occurred in June 1982 in Wyoming, summer of 1974 in Nebraska, and August 1979 in Colorado (Jobman and Anderson 1981, 1983). Locations of sightings made since 1970 are shown in Figure 2.6.5-1.

The Wyoming toad is a subspecies of the Canadian or Manitoba toad, which occurs in Canada and south to Minnesota and the Dakotas (Baxter and Stone 1980). The Wyoming toad is considered to be a relict population from recent glacial periods (USFWS 1983-a) and not known to occur outside Laramie Basin in Albany County, Wyoming (Baxter and Stone 1980). Historically, the species has occupied floodplains, ponds, and small seepage lakes (Baxter and Stromberg 1980) and requires deep, soft soils for burrowing (Baxter and Stone 1980).

The Wyoming toad was a common resident of the Laramie Basin from the 1950s through the early 1970s, but experienced a precipitous decline between 1976 and 1978 (USFWS 1983-a). Intensive surveys located a population (on private land) of 25 individuals in 1980; however, no toads were located in 1982 (USFWS 1983-a). Surveys conducted during the summer of 1983 indicate the species is still reproducing within its range (Sayre 1983). The causes of the decline are unknown but possibly include (USFWS 1983-a):

- Changes in irrigation practices by area landowners;
- Draining of habitat for nonirrigated uses;
- Use of herbicides and insecticides in controlling noxious weeds and mosquitos; and
- Increase in predation.

Species of special concern to the states that are listed as endangered, threatened, or rare and which may occur within the ROI and ACS were reviewed for potential impacts. The mountain plover (Charadrius montanus), burrowing owl, swift fox, meadow jumping mouse, and pale milk snake (Table 2.6.5-1) may experience project-related impacts.

The mountain plover, considered threatened by the state of Nebraska, is restricted to the short-grass prairie in the southwest portion of the Panhandle (NGPC 1977; NGPC, personal communication, 1983). The plover prefers arid, heavily grazed expanses of buffalograss and blue grama grass (NGPC 1977). Their limited numbers in Nebraska are probably related to the loss of nesting habitat due to the conversion of prairie to agricultural land and because western Nebraska is the eastern limit of the species' distribution (AOU 1983).

Burrowing owls are considered rare in Wyoming, and usually nest in prairie dog towns (WGFD 1977). Openness, short vegetation, and burrow availability appear to be essential for burrowing owl habitat (WGFD 1977). Their decline is probably related to the decline of prairie dog towns. Data are limited on the numbers of burrowing owls in Wyoming.

Populations of the swift fox, classified as endangered by Nebraska, are apparently distributed throughout much of the Panhandle (NGPC 1977; NGPC personal communication, 1983). Swift fox habitat consists of open, short to mid-grass prairie with little agriculture (NGPC 1977). Population data on the swift fox are limited due to its rare occurrence. The swift fox is classified as threatened in South Dakota and is considered to be a species of high research/management priority in Wyoming (WGFD 1977).

The distribution of the meadow jumping mouse includes the eastern quarter of Wyoming (Burt and Grossenheider 1976, WGFD 1974, Findholt et al. 1981). This species is classified as rare in the state, since Wyoming is on the western edge of its overall range (WGFD 1977), The meadow jumping mouse is associated with moist meadow grasslands and grass-like habitats (Findholt et al. 1981).

The pale milk snake is considered rare in Wyoming (WGFD 1977). The southern limit of the Wyoming distribution for the snake extends from Platte and Goshen counties into the northern fringe of Laramie County (Baxter and Stone 1980). Habitat associations for the pale milk snake are unclear because of discrepancies in the literature. Baxter and Stone (1980) indicate that the short-grass prairie is rarely utilized, while scarp woodlands are preferred in Wyoming. However, Colorado data suggest that grasslands are utilized by the species (Hammerson 1982). The pale milk snake may occur in both of these habitats within the Wyoming portion of the ROI.

2.6.5.2.2 Area of Concentrated Study

2.6.5.2.2.1 Flights

The bald eagle is the only one of the five wildlife species in the ROI with federal endangered or proposed for endangered status that is known to occur within the Flights. Generally, bald eagles may pass through any part of the Flight areas during migration periods. Bald eagles predominantly utilize fish and waterfowl as food and would be expected to concentrate around bodies of water (Steenhoff 1978, Griffin et al. 1982). Six bald eagles were observed on

reservoirs within Flight S during the 1983 Bald Eagle Midwinter Survey (WGFD, personal communication, 1983). Seven bald eagles were observed along the North Platte River north of Flight S (WGFD, personal communication, 1983). No other concentration areas for bald eagles within the Flights are known.

Peregrine falcons are not known to breed within the Flight areas. Use of the Flight areas by peregrines is expected to be limited to migratory birds during late fall, winter, and early spring. The occurrence of whooping cranes within the Flights is expected to be marginal because whooping crane migration corridors do not traverse any of the Flights. The nearest corridor is approximately 265 km (165 mi) east of the ACS.

The June 1983 aerial reconnaissance indicated that prairie dog towns are present within the Flights. The black-footed ferret may occur within these towns. Five towns were located within 1 mile of a silo, and varied in size from less than 5 acres to approximately 30 acres. Flight S had two silos with towns (Silos 1 and 7), Flight T had two towns (Silos 7 and 9), and Flights B and Q each had towns adjacent to one silo (Silos 9 and 2, respectively). Five of the six towns are known to be active.

Although access roads were not specifically surveyed during the aerial reconnaissance, three active prairie dog towns were observed within approximately one-half mile of access roads in Flight S. The colonies were located along the roads to Silos 4, 6, and 9. Of the 11 cable path alternatives, three are known to pass through prairie dog towns (SB-1, SB-2, and PB-1). The largest town (approximately 300 acres) is located at the northern end of Alternative SB-1.

Five prairie dog towns were within 0.8 km (0.5 mi) of cable paths or 0.2 km (0.1 mi) of silos or access roads and were surveyed for black-footed ferrets during late October and early November 1983 according to USFWS procedures (USFWS 1983b). Spotlighting with 200,000 candlepower spotlights was conducted for a minimum of three consecutive nights at each town. Surveys began at dusk and continued until dawn. The towns were also searched for signs of ferrets immediately following sunrise each morning. No evidence of black-footed ferrets was observed at any of the five prairie dog towns surveyed. Additional winter diurnal surveys are scheduled for February 1984.

Species of special state concern expected to occur within the Flight areas include mountain plover, burrowing owl, swift fox, meadow jumping mouse, and pale milk snake.

In Nebraska the mountain plover is known to occur only in the southwest corner of Kimball County (NGPC, personal communication, 1983). Silo areas that may contain nesting habitat for mountain plover include Silos 2 and 7 of Flight E, and Silos 7 and 8 of Flight D. Although Silo 1 in Flight E lies within the potential range of the mountain plover, it is not expected to occur there due to the absence of grassland within 1 mile of the site.

Confirmed observations of the swift fox indicate that it occurs within the Nebraska Flights (NGPC, personal communication, 1983). Based on the locations of the confirmed sightings, Silos 5, 6, 7, and 8 in Flight D and Silos 1, 2, 3, 4, 5, 6, and 7 in Flight E are within the potential range of the swift fox in Nebraska. A confirmed sighting is within 1 mile of Silo E-7 while another

is within 2 miles of Silo E-2. Silos D-6 and D-8 have confirmed observations within a 3-mile radius.

Occurrence of burrowing owls has been documented in Wyoming within Flights S and T, with the majority of the sightings occurring within Flight S (WGFD 1983-a). These are the only documented observations of the burrowing owl in Wyoming. The burrowing owl may occur within 1 mile of a silo in Flights S and T if adequate habitat is available. Although it has not been documented, the burrowing owl may also occur within the other Flights located in Wyoming.

The meadow jumping mouse may occur within the Wyoming Flights. No observations of this species have been made since 1954 within the Flight areas (Finholt et al. 1981, WNHP 1983). However, population fluctuations in combination with their localized distribution and nocturnal habits may partially account for the lack of observations (WGFD 1977).

The pale milk snake may occur within the Flight areas in Wyoming. Its occurrence would be expected to be limited to Flights B, P, Q, R, S, and T (Baxter and Stone 1980). Confirmed observations have been recorded in Flights B and S. The nocturnal habits of the pale milk snake make population estimates and ranges difficult to delineate.

2.6.5.2.2.2 F.E. Warren AFB

Federal-listed or proposed threatened and endangered wildlife species are not expected to use F.E. Warren AFB extensively. The black-footed ferret and whooping crane are not expected to occur on the base because of the lack of suitable habitat. The bald eagle and peregrine falcon are not expected to occur, except as infrequent migrants due to the lack of suitable habitat and the amount of human activity. The Wyoming toad is not expected to occur on F.E. Warren AFB, which lies well outside of its known range (Baxter and Stromberg 1980).

Species of special concern to the state of Wyoming that may occur on F.E. Warren AFB include the burrowing owl and meadow jumping mouse. A burrowing owl was observed near a burrow entrance during a reconnaissance of the base in June 1983. The burrow was located in the grasslands of the northern part of the base. The proximity of the bird to the burrow combined with the time of year (breeding season) suggests that the burrow may have contained a nest. Potential habitat suitable for the meadow jumping mouse occurs on F.E. Warren AFB. Small mammal trapping efforts in June and October 1983 did not result in any captures of the meadow jumping mouse; however, this species may occur on F.E. Warren AFB. In addition, the swift fox may occur on F.E. Warren AFB since its distribution includes the eastern plains of Wyoming.

2.6.5.2.2.3 Other Disturbed Areas

Other disturbed areas include aggregate quarries and dispatch stations. Since specific locations of these areas are not known, discussion regarding use of these areas by species of special concern is not possible. The discussion of these areas is limited to assessing the presence of potential suitable habitat. Quarries may be located along drainages or upland areas. Habitats that may be affected include aquatic, riparian, meadow, shrubland, and grassland. Dispatch stations will be located near Cheyanne, Chugwater, and Kimball and

may vary in size. Habitats that are likely to be involved include grassland and agricultural land.

2.6.5.3 Fisheries Resources

2.6.5.3.1 Region of Influence

The sturgeon chub (Hybopsis gelida), northern redbelly dace (Phoxinus eos), finescale dace (Phoxinus neogaeus), longnose sucker (Catostomus catostomus, and plains topminnow (Fundulus sciadus) are fishes listed as threatened by the SDGFPD. The pearl dace (Semotilus margarita) is listed as a state endangered species by the SDGFPD. These species may occur within the drainages of the ROI (Table 2.6.5-1).

The greenback cutthroat trout (Salmo clarki stomias) is federal-listed as endangered, and state-listed by Colorado as threatened. It is found in the Colorado portion of the ROI in the drainages of the Cache La Poudre and Big Thompson rivers. The johnny darter is listed as threatened by the State of Colorado. It occurs in tributaries of the South Platte River (CDOW 1978-b).

There are no federal or state-listed threatened or endangered species of fish in the Nebraska ROI.

The Colorado River cutthroat trout (Salmo clarki pleuriticus) is listed as rare by the State of Wyoming. It is found in the Snake River drainages in the Wyoming portion of the ROI (WGFD 1977). The finescale dace and northern pearl dace (Semotilus margarita nachtriebi) are also considered rare by the State of Wyoming. These two species occur in the Niobrara River near the Wyoming-Nebraska border (WGFD 1977).

2.6.5.3.2 Area of Concentrated Study

2.6.5.3.2.1 Flights

There are no federal-listed threatened or endangered species of fish in the Flight areas. The orangethroat darter (Etheostoma spectabile pulchellum) has an undetermined status in Wyoming, but because there is evidence of declining populations (WGFD 1977), maintenance or increase of the current populations is a priority. The species was recorded in 1969 in Lodgepole Creek near the Wyoming-Nebraska border. That population was eliminated during a stream poisoning for rough fish. Attempts to reintroduce the species into Lodgepole Creek seem to have been unsuccessful, although some specimens were recorded recently in Nebraska (WGFD, personal communication, 1983).

The suckermouth minnow (Phenacobius mirabilis) is listed as rare by the WGFD. It has been recorded in Lodgepole Creek in Laramie County; however, recent collections have been made only near the mouth of the Laramie River (Baxter and Simon 1970).

The common shiner (Notropis cornutus) is also listed as rare by the WGFD. It was collected in Bushnell Creek during the November 1983 field survey.

2.6.5.3.2.2 F.E. Warren AFB

There are no federal-listed threatened or endangered fish species in Crow and Diamond creeks. The suckermouth minnow, classified as rare in Wyoming was reportedly collected in Crow Creek in 1977, but due to poor preservation the specimen was not positively identified. Several specimens of the common shiner (rare status in Wyoming) were collected in Crow and Diamond creeks during the June 1983 field survey. The common shiner was also collected in Crow Creek in 1978 (WDEQ 1979). Agency management concern has been low on this species because populations appear to be stable and may occur in various streams throughout southeastern Wyoming (WGFD, personal communication, 1983).

2.6.5.3.2.3 Other Disturbed Areas

Aquatic resources may occur in areas of the proposed aggregate quarry sites. Information on threatened and endangered fish species that may occur in these streams will be determined when the aggregate quarry sites are chosen. No aquatic resources are anticipated to be in the proposed dispatch stations.

3.0 ENVIRONMENTAL CONSEQUENCES, MITIGATION MEASURES, AND UNAVOIDABLE IMPACTS

3.1 Analytic Methods

The data collected during the literature search; agency, group, researcher contacts; and the primary data collection program were used to evaluate and assess the levels of the various potential impacts on biological resources. The potential impacts were evaluated using an impact assessment model (modified from Odening and Smith 1980). This model is used as an evaluation structure to aid in developing judgments of impact levels for all biological resources. The impact level evaluations are made independently of the determination of significance and are not affected by that determination.

The model combines several characteristics that collectively define the value of natural biotic communities and subjects these characteristics to various impact features to predict impact magnitude. Specifically, susceptibility and habitat quality are examined in conjunction with quantity and duration.

General definition of these four characteristics are:

- Susceptibility - Degree of response to change based, as appropriate, on an evaluation of the quantified areal extent, on quantifiable elements of composition, and/or on the relative condition of the habitats/species present.

- Habitat Quality - Value of the habitat for support of plant and animal populations based on existing disturbance levels which may, when appropriate, be quantified on the basis of the percent composition of weedy species, grazing pressure indicator species, or indicators of early successional stages.

- Quantity - Amount of a natural system potentially disrupted due to project activities.

- Duration - The time over which a disturbance occurs plus the time necessary for recovery of a resource following a disturbance. Long duration is a disturbance time plus recovery time which will exceed 5 years. Short duration is a disturbance time plus recovery time which will take less than 5 years.

The elements of these four characteristics used in the impact analysis model are defined below (Table 3.1-1).

Table 3.1-1

DEFINITION OF IMPACT ANALYSIS ELEMENTS

Susceptibility

High - Occurs in habitats that are usually of very limited areal extent in the region under study.

Occurs in habitats that are critical or necessary habitats for federal-listed threatened or endangered species.

Moderate - Occurs in diverse habitats or habitats containing state-protected biota.

Occurs in areas of special wildlife use such as nesting areas or migration routes, and valuable fishery areas such as spawning sites.

Occurs in plant communities of limited areal extent within the region. The implication here is that such communities or habitats are of greater extent than those listed under "High" above, but not nearly as common as those listed in "Low" below. For example, compare the extent of mixed shrub associations in the region with that of riparian/wetland or short-grass prairie associations (moderate, high, and low sensitivity, respectively).

Low - Occurs in widespread natural communities with low diversity.

Occurs in highly modified or degraded areas and/or areas where natural communities have been replaced by human developments.

Habitat Quality

Good - A relatively undisturbed example of a particular habitat type. Habitat susceptibility to change is not a factor in defining quality.

Moderate - A somewhat degraded or altered example of a particular habitat type. Some disturbance is obvious, even to a casual observer.

Low - A highly degraded or altered example of a particular habitat type. Disturbance is present to the point that natural integrity is destroyed, or very nearly so.

Quantity

High (H) - Construction and operation resulting in the greatest quantity of natural terrestrial or aquatic community disruption (e.g., acres, percent of population).

Intermediate(I) - Construction and operation resulting in a moderate or intermediate level of disruption of natural terrestrial or aquatic communities (e.g., acres, percent of population).

Low (L) - Construction and operation resulting in a low-level of disruption of natural terrestrial or aquatic communities (e.g., acres, percent of population).

Duration

Long - Disturbance time (which can include construction, operation, and/or termination and abandonment) plus recovery time (with or without implementation of reclamation procedures) will exceed 5 years.

Short - Disturbance time (which can include construction, operation, and/or termination and abandonment) plus recovery time (with or without implementation of reclamation procedures) will take less than 5 years.

These definitions are then used to evaluate the qualitative and quantitative (when possible) level of a characteristic for a resource component. A value for each component will be assigned in each of the four characteristics input into the following model:

Susceptibility	Quality	Duration	Quantity	Impact Level
			H	H
		LONG	I	H
	GOOD		L	M-H
			H	H
		SHORT	I	H
			L	M-H
			H	M-H
		LONG	I	M-H
HIGH	MODERATE		L	M-H
			H	M-H
		SHORT	I	M-H
			L	M-H
			H	M-H
		LONG	I	M-H
	LOW		L	M-H
			H	M-H
		SHORT	I	M-H
			L	M-L
			H	M-H
		LONG	I	M-H
	GOOD		L	M-H
			H	M-H
		SHORT	I	M
			L	M
			H	M-H
		LONG	I	M-H
MODERATE	MODERATE		L	M
			H	M-H
		SHORT	I	M
			L	M-L
			H	M
		LONG	I	M
	LOW		L	L-M
			H	M
		SHORT	I	L-M
			L	L-M

Susceptibility	Quality	Duration	Quantity	Impact Level
LOW	GOOD	LONG	H	M
			I	M
			L	L-M
		SHORT	H	M
			I	L-M
			L	L
	MODERATE	LONG	H	M
			I	L-M
			L	L-M
		SHORT	H	L-M
			I	L
			L	L
	LOW	LONG	H	L
			I	L
			L	L
		SHORT	H	L-N[1]
			I	L-N
			L	N

[1] N=Negligible

The impact evaluation model is used in conjunction with an impact assessment/mitigation planning chart (see figure 3.1-1 as an example) to estimate the residual impact level and the unavoidable impacts remaining following implementation of mitigation programs. In the impact mitigation planning chart the impact is identified as to location, initial level, and type; and is briefly described. Appropriate mitigation measures are presented and the effect of the mitigations briefly described. The residual impact level based on the implementation of the assumed mitigations and the suggested mitigations is presented. The impact assessment/mitigation planning chart is presented in more detail by resource element in Section 3.5.

3.2 Assumptions and Assumed Mitigations

3.2.1 Assumptions

The evaluation of impacts on biological resources included the use of several assumptions. Some representative assumptions are:

- While a mitigative modeling and monitoring program for the Cheyenne wellfield is under development by the water resources group, it is assumed that increased pumping of the Cheyenne wellfield could affect the riparian vegetation along Crow Creek by lowering the water table.

EXAMPLE

BIOLOGICAL IMPACT ASSESSMENT/MITIGATION PLANNING CHART - VEGETATION

LOCATION	IMPACT			MITIGATION		RESIDUAL IMPACT LEVEL	
ROAD CORRIDORS WITHIN FLIGHTS	LEVEL[1]	TYPE[2]	DESCRIPTION	MEASURE[3,4]	EFFECT	ASSUMED MIT.	SUGGEST. MIT.
FLIGHT A							
-Link 255	L	1a,1b,3, 4,5	Short-grass prairie (6.4ac)[5]	3,9,10,11,13, 14,15,21	Minimize Disturbance	N	N
	M	1a,1b	Shrubland (Mtn. Mahogany) (1.1ac)	3,9,10,11,14, 15,19,21,d	Minimize Disturbance	L	L
-Link 438	L	1a,1b,3, 4,5	Short-grass prairie (.4ac)	3,9,10,11,13, 14,15,21	Minimize Disturbance	N	N
-Link 444	L	1a,1b,3, 4,5	Short-grass prairie (3.4ac)	3,9,10,11,13, 14,15,21	Minimize Disturbance	N	N
	M	1a,1b,4	Meadow(.9ac)	3,9,10,11,14 15,19,21,d	Minimize Disturbance	L	L
	M	1a,1b,4	Riparian(.3ac)	1,3,9,10,14,15, 16,17,19,21,d	Minimize Disturbance	M	L
-Link 446	L	1a,1b,3, 4,5	Short-grass prairie (1.5ac)	3,9,10,11,13, 14,15,21	Minimize Disturbance	N	N

FOOTNOTES:
1 Unmitigated.
2 Impact Type (1,2,3), see Section 3.3.
3 Assumed Mitigations (1,2,3), see Section 3.2.2.
4 Suggested Mitigations (a,b,c), see Section 3.7.
5 Estimated disturbed area in acres.

EXAMPLE OF THE BIOLOGICAL IMPACT ASSESSMENT/MITIGATION PLANNING CHART

FIGURE NO. 3.1-1

- o Workforce inmigrants will increase fishing and hunting pressures proportionately within the Region of Influence (ROI).

- o Use of aggregate sources within the Area of Concentrated Study (ACS) or the ROI may affect fish and wildlife resources.

- o Dispatch stations will be in urban or urbanizing areas, will have been subjected to some previous disturbance, and will not be in riparian/floodplain habitats.

3.2.2 Assumed Mitigations

In addition to the assumptions discussed above, it is assumed that in conformance with normal construction practices, certain mitigation measures will be carried out. These assumed mitigations, potential disturbances, suggested mitigations, and the existing conditions were analyzed in an impact evaluation model and an impact assessment and mitigation planning chart to determine impact levels and residual adverse impacts/beneficial effects.

There are three categories of biological resource mitigations including: 1) planning, 2) design and construction commitments, and 3) other. Implementation of several of the assumed mitigations has been initiated in the area of planning and design instructions. The implementation of these mitigations is reflected in the determination of levels of expected impacts on biological resources and endangered species within the ACS.

The Air Force will be responsible for these assumed mitigation measures which include the following provisions:

Planning

1) Conduct work in streams in a manner that minimizes siltation and erosion;

2) Conduct surveys of potential black-footed ferret habitat and include results in early planning processes by utilizing maps of prairie dog towns within the ACS to avoid disturbance to identified black-footed ferret habitat;

3) Within mission design and budget constraints, minimize disturbance to rare plant populations and wildlife species; and minimize erosion, surface disturbances, and removal of trees (raptor roosts/nests);

4) Conduct a site-specific biological inventory and survey of cable paths providing the necessary data base to plan appropriate avoidance or minimization of installation impacts on the sensitive vegetation types (riparian, meadow, shrubland, and woodland) along these paths. The results will be used to position the centerline of the cable right-of-way in the most environmentally compatible location within mission and design criteria; and

5) Conduct a site-specific biological inventory and survey of culvert upgrade and other road modification locations wherever these

potential actions intersect or parallel the sensitive vegetation zones on F.E. Warren AFB.

Design and Construction Commitments

6) Have a qualified biologist/botanist work with the design contractor during the design of the onbase roads, bridges/culverts, and other facilities;

7) Maintain a separation distance of at least one-half mile between cable right-of-way and identified raptor nest sites within mission and design requirements;

8) Install stream crossing facilities such that there is minimal disturbance of critical Colorado butterfly plant habitat or downstream hydrology on F.E. Warren AFB;

9) Provide criteria at start of design to be included in contract provisions to set forth requirements to minimize disturbance within and adjacent to the ACS;

10) Utilize erosion controls during construction activities;

11) Restrict off-road vehicle use by the construction workforce in the project vicinity during working hours;

12) Restrict use of firearms in construction areas;

13) Revegetate with quick growing native species as appropriate for short-term soil stabilization;

14) Revegetate with native plants for long-term recovery;

15) Control dust during construction;

16) Construction lay down areas at stream crossings will not be placed in riparian or other sensitive habitats;

17) Restrict vehicle maintenance activities to areas away from stream banks; and

18) Install the cable so as to restore the top soil and associated seed sources when back filling.

Other

19) Have a qualified biologist/botanist act as an advisor to the Construction Monitor to provide direct onsite input to ensure the contractor's compliance with mitigation stipulations in biologically sensitive areas;

20) Individual Colorado butterfly plants that would be covered or damaged by stream-crossing facilities will be transplanted on an experimental basis to adjacent areas that support or may potentially support the species; and

21) Minimize the spread of noxious weeds as appropriate, exercising caution in and adjacent to Colorado butterfly plant habitat.

3.3 Level of Impact Definitions

The impact model used in this analysis provides a structure for development of the impact levels. The impact levels developed through the model include negligible, low, moderate, and high impacts. Examples of typical impact levels, developed using quantified input when appropriate, as summarized from the impact model are:

- Negligible Impact - Would result if impacts occurred and the susceptibility, quantity, duration, and habitat quality characteristics are all low.

- Low Impact - Would generally affect widespread habitats with low diversity or areas that are highly modified or degraded (usually by human activities). Low impacts can be short or long in duration and usually affect relatively low amounts of the available habitat or population.

- Moderate Impact - Would generally affect diverse habitats, habitats supporting species of state concern, special wildlife use areas, or vegetation/habitat types of regionally limited areal extent. Moderate impacts are usually long in duration, but can be of short duration.

- High Impact - Would generally result in disruption or loss of highly unique vegetation/habitat types, habitats that are relatively unmodified, or habitats of federally listed threatened or endangered species. High impacts are usually long but can be short in duration.

These impact levels are based, when appropriate, on an evaluation of the following impact types.

Vegetation

1) Vegetation removal/disturbance
   a. Temporary
   b. Permanent
2) Habitat loss for rare, threatened, or endangered plant species
   a. Colorado butterfly plant
   b. Laramie false sagebrush
   c. Woolly milkvetch
3) Increased weed habitat

4) Increased off-road vehicle activity
5) Reduced vegetative productivity/palatability

Wildlife

6) Construction noise
7) Movement of construction vehicles
8) Mortality
   a. Due to construction machinery
   b. Vehicle/train collisions (road kills)
9) Domestic/feral dog kills
10) Wildlife habitat loss (temporary or permanent)
   a. Population displacement
   b. Increased competition
11) Increased hunting pressures
12) Increased hunting violations
   a. Poaching
   b. Indiscriminate shooting/trapping
13) Increased recreation pressure
   a. Off-road vehicle harassment
   b. Nonhunting-related human activities
14) Disruption of nesting raptors during construction

Fisheries

15) Increased fishing pressures
16) Water quality changes
   a. Increased siltation/turbidity
   b. Petroleum products/chemical spills
17) Aquatic habitat loss/degradation

3.4 Significance Determination

The determination of significance for biological resources involves the evaluation of the context in which the impact may occur, and the intensity and extent of the impact effect. Potential impacts are assessed as significant or not significant in a site-specific, local, and regional context. Evaluations determining an impact to be significant or not significant also include an assessment of intensity (severity criteria) and extent (in time and space).

Intensity is based on relative changes:

- To the unique characteristics of the area (wetland, ecologically critical areas);
- That are likely to be controversial (examples of impacts considered to be controversial include those for which there is a likelihood of a substantial dispute, those about which segments of the public indicate substantial concern, or those which have been found to be controversial on other projects.);
- In cumulative impact;

- That may cause potential adverse effects on threatened, endangered, or otherwise unique species; and

- In resources considered to be important or valuable from the perspective of scientific opinion and management agency concerns.

Extent is related to:

- Area/quantity of a resource affected relative to the area/quantity of a resource available;

- Potential for change in reproductive success and maintenance of a population at preproject levels; and

- Duration of time over which an impact (including recovery) will occur.

A finding of significance for a particular impact can be based on one or more of the intensity (severity) and extent criteria as well as the context in which it occurs. The determination of significance is made independently of the evaluation of impact level and is not affected by that evaluation.

3.5 Environmental Consequences of the Proposed Action and the No Action Alternative

3.5.1 Vegetation

3.5.1.1 Baseline Future - No Action Alternative

Past and current trends in human population-related impacts on the native vegetation resources will be expected to continue into the future. Native vegetation communities will continue to be impacted by human demands such as grazing, agriculture, and other land use developments. Quantity and quality of native vegetation will continue to decline. The rates of change will be dependent on management agency and public perceptions of value, usefulness, and/or extent of the resource. Under normal conditions, populations vary in size over time due to natural successional changes, unpredictable weather, wildfire, and floods. Future baseline is expected to continue with the same type of vegetation changes brought about by urban and agricultural land use, and wildlife habitat and recreation management policies that influence native vegetation at present. Therefore, the existing conditions are assumed to reflect the general conditions for the future with the expectation that there will be increasing land use and recreational pressures.

3.5.1.2 Proposed Action

Analysis of impacts on vegetation is based on the future baseline conditions. Direct project-related disturbances will be restricted to the ACS and closely adjacent areas, therefore, no significant impacts on vegetation are anticipated outside the ACS within the broader ROI.

Transportation corridors (Figure 3.5.1-1, see pocket) included within the Flights will be modified as part of the Defense Access Road (DAR) program

(including widening, paving, gravelling, culvert installation, and potential bridge replacement) as necessary to meet the weight and width requirements of a stage transporter (S/T). Some potential areas to be modified lie within existing road right-of-ways and are currently recovering from past maintenance-related disturbance. However, in other areas, native vegetation extends to the road edge and will be directly impacted by road modifications. Impacts in these areas will largely consist of disturbance to short-grass prairie, while much smaller amounts of shrubland, meadow, rock outcrop, woodland, and riparian vegetation may also be affected. Impacts on riparian vegetation are discussed in Section 3.5.4.1 except for specific mention relative to cable path alternatives in this section. The acreages of vegetation types potentially disturbed along specific road corridors within the Flights are listed on Table 3.5.1-1. Impact types, assumed mitigations (Section 3.2.2), and suggested mitigations (Section 3.7) were considered in evaluating impact levels delineated on the impact/mitigation charts (Table 3.5.1-2).

Short-term impacts would be associated with increased dust from vehicles, unauthorized offsite/off-road vehicle activity, and localized erosion. Dust would increase above normal levels along access roads during the period in which silos are undergoing modification (a maximum of 20 vehicles for approximately 55 days). Increased dust levels may affect pollination, seed production, and photosynthesis in roadside vegetation. These impacts would occur during the growing season, but would tend to be minimized during wet periods.

Potential unauthorized vehicle activities by construction workers maneuvering vehicles outside of the existing road right-of-way in addition to off-road vehicle use for sightseeing and hunting will affect vegetation by crushing plants and compacting the soil. Short and long-term impacts along transportation corridors will result from permanent removal or burial of any vegetation types. Short and long-term impacts may also occur from off-road vehicle use in shrubland, woodland, and riparian vegetation.

Under the Proposed Action, short and long-term impacts to short-grass prairie along road corridors will be negligible since short-grass prairie is abundant throughout the ROI and ACS and has been subjected to grazing pressure in many areas. The impact to short-grass prairie will not be significant considering the potential amount of habitat disturbed (approximately 366 acres) and the duration of time over which the impacts will occur (Table 3.5.1-2).

Short and long-term impacts to rock outcrop vegetation along the road corridors are expected to be low but significant because the vegetation type is considered to be a unique characteristic of the area, very limited in distribution regionally, and the recovery period of this vegetation may be relatively long term. However, the potential quantity affected (approximately 2 acres) would be low compared to the quantity of rock outcrop vegetation available (approximately 653 acres) within a half mile of the road corridors within the Flights (Table 2.6.1-2).

With implementation of the appropriate assumed mitigations, short and long-term direct impacts to shrubland, woodland, and meadow areas along the road corridors are anticipated to be significant and low. The impacts on these vegetation types will be significant because of their limited areal

Table 3.5.1-1

ROAD CORRIDOR VEGETATION DISTURBED WITHIN FLIGHTS[1]

Flight	Short-Grass Prairie	Meadow	Shrubland		Woodland	Riparian	Rock Outcrop	Agricultural	Total
			Mountain Mahogany	Silver Sagebrush					
A	23	<1	3	-	-	<1	-	45	72
B	40	-	1	-	?	<1	-	54	97
C	27	1	-	-	-	<1	-	46	74
D	15	-	-	-	-	-	-	48	63
E	14	<1	-	-	-	-	-	30	44
P	42	-	-	-	-	<1	<1	-	43
Q	76	1	1	1	-	-	2	11	92
R	43	-	1	1	-	-	-	36	81
S	39	2	3	-	-	1	-	22	67
T	47	1	<1	<1	-	1	-	63	113
TOTAL	366	6	9	2	2	4	2	355	745

Notes: 1 Estimated acreage which may be disturbed.

Table 3.5.1-2

BIOLOGICAL IMPACT ASSESSMENT/MITIGATION PLANNING CHART - VEGETATION

LOCATION	IMPACT			MITIGATION		RESIDUAL IMPACT LEVEL	
ROAD CORRIDORS WITHIN FLIGHTS	LEVEL[1]	TYPE[2]	DESCRIPTION	MEASURE[3,4]	EFFECT	ASSUMED MIT.	SUGGEST. MIT.
FLIGHT A							
-Link 255	L	1a,1b,3, 4,5	Short-grass prairie (6.4ac)[5]	3,9,10,11,13, 14,15,21	Minimize Disturbance	N	N
	M	1a,1b	Shrubland (Mtn. Mahogany) (1.1ac)	3,9,10,11,14, 15,19,21,d	Minimize Disturbance	L	L
-Link 432	L	1a,1b,3, 4,5	Short-grass prairie(.6ac)	3,9,10,11,13, 14,15,21	Minimize Disturbance	N	N
-Link 437	L	1a,1b,3, 4,5	Short-grass prairie (3.4ac)	3,9,10,11,13, 14,15,21	Minimize Disturbance	N	N
-Link 438	L	1a,1b,3, 4,5	Short-grass prairie (.4ac)	3,9,10,11,13, 14,15,21	Minimize Disturbance	N	N
-Link 444	L	1a,1a,3, 4,5	Short-grass prairie (3.4ac)	3,9,10,11,13, 14,15,21	Minimize Disturbance	N	N
	M	1a,1b,4	Meadow(.9ac)	3,9,10,11,14 15,19,21,d	Minimize Disturbance	L	L
	M	1a,1b,4	Riparian(.3ac)	1,3,9,10,14,15, 16,17,19,21,d	Minimize Disturbance	M	L
-Link 446	L	1a,1b,3, 4,5	Short-grass prairie (1.5ac)	3,9,10,11,13, 14,15,21	Minimize Disturbance	N	N

FOOTNOTES: 1 Unmitigated.
2 Impact Type (1,2,3), see Section 3.3.
3 Assumed Mitigations (1,2,3), see Section 3.2.2.
4 Suggested Mitigations (a,b,c), see Section 3.7.
5 Estimated disturbed area in acres.

Table 3.5.1 2 (continued).
BIOLOGICAL IMPACT ASSESSMENT/MITIGATION PLANNING CHART - VEGETATION

LOCATION	IMPACT			MITIGATION		RESIDUAL IMPACT LEVEL	
ROAD CORRIDOR WITHIN FLIGHT	LEVEL[1]	TYPE[2]	DESCRIPTION	MEASURE[3,4]	EFFECT	ASSUMED MIT.	SUGGEST. MIT.
Link 447	L	1a,16,3 4,5	Short-grass prairie (7.4ac)	3,9,10,11,13, 14,15,21	Minimize Disturbance	N	N
	M	1a,1b,4	Shrubland (Mtn. Mahogany) (1.7ac)	3,9,10,11,14, 15,19,21,d	Minimize Disturbance	L	L
FLIGHT 8							
Link 234	L	1a,1b,3, 4,5	Short-grass prairie(5.9ac)	3,9,10,11,13, 14,15,21	Minimize Disturbance	N	N
	M	1a,1b,4	Shrubland (Mtn. Mahogany) (.8ac)	3,9,10,11,14, 15,19,21	Minimize Disturbance	L	L
	M	1a,1c,4	Riparian(.4ac)	1,3,9,10,14,15 16,17,19,21	Minimize Disturbance	M	L
Link 235	L	1a,1b,3, 4,5	Short-grass prairie(3ac)	3,9,10,11,13, 14,15,21,d	Minimize Disturbance	N	N
Link 256	L	1a,1b,3, 4,5	Short-grass prairie(.9ac)	3,9,10,11,13, 14,15,21	Minimize Disturbance	N	N
Link 301	L	1a,1b,3, 4,5	Short-grass prairie (9.2ac)	3,9,10,11,13, 14,15,21	Minimize Disturbance	N	N
Link 307	L	1a,1b,3, 4,5	Short-grass prairie (12.8)	3,9,10,11,13, 14,15,21	Minimize Disturbance	N	N
Link 659	M	1a,1b,4, 5	Woodland(1.5ac)	3,9,10,11,14, 15,19,21,d	Minimize Disturbance	L	L
	L	1a,1b,3, 4,5	Short-grass prairie (7.1ac)	3,9,10,11,13, 14,15,21	Minimize Disturbance	N	N
Link 561	L	1a,1b,3 4,5	Short-grass prairie (1.3ac)	3,9,10,11,13, 14,15,21	Minimize Disturbance	N	N
FLIGHT 9							
Link 314	L	1a,1b,3, 4,5	Short-grass prairie (5.7ac)	3,9,10,11,13, 14,15,21	Minimize Disturbance	N	N
Link 329	L	1a,1b,3, 4,5	Short-grass prairie(.2ac)	3,9,10,11,13, 14,15,21	Minimize Disturbance	N	N

Table 3.5.1-2 (Continued)
BIOLOGICAL IMPACTS AND MITIGATION MEASURES - VEGETATION

LOCATION	IMPACT			MITIGATION		RESIDUAL IMPACT LEVEL	
ROAD CORRIDORS WITHIN FLIGHTS	LEVEL[1]	TYPE[2]	DESCRIPTION	MEASURE[3,4]	EFFECT	ASSUMED MIT.	SUGGEST. MIT.
Alma 37	L	1a,1b,3, 4,5	Short-grass prairie(.7ac)	3,9,10,11,13, 14,15,21	Minimize Disturbance	N	N
Alma 561	L	1a,1b,3, 4,5	Short-grass prairie (4.5ac)	3,9,10,11,13, 14,15,21	Minimize Disturbance	N	N
	M	1a,1b,4	Riparian(.5ac)	1,3,9,10,14, 15,16,17,19, 21,d	Minimize Disturbance	M	L
	M	1a,1b,4	Meadow(.8ac)	3,9,10,11,14 15,16,21,d	Minimize Disturbance	L	L
Alma 642	L	a,1b,3,	Short-grass prairie(.7ac)	3,9,10,11,13, 14,15,21	Minimize Disturbance	N	N
Alma 643	L	1a,1b,3, 4,5	Short-grass prairie(5ac)	3,9,10,11,13 14,15,21	Minimize Disturbance	N	N
Alma 653	L	1a,1b,3, 4,5	Short-grass prairie (8.7ac)	3,9,10,11,13, 14,15,21	Minimize Disturbance	N	N
Flight D							
Alma 364	L	1a,1b,3, 4,5	Short-grass prairie(.1ac)	3,9,10,11,13, 14,15,21	Minimize Disturbance	N	N
Alma 365	L	1a,1b,3, 4,5	Short-grass prairie(.7ac)	3,9,10,11,13, 14,15,21	Minimize Disturbance	N	N
Alma 366	L	1a,1b,3, 4,5	Short-grass prairie ($.1ac)	3,9,10,11,13, 14,15,21	Minimize Disturbance	N	N
Alma 370	L	1a,1b,3, 4,5	Short-grass prairie(.7ac)	3,9,10,11,13, 14,15,21	Minimize Disturbance	N	N
Alma 371	L	1a,1b,3, 4,5	Short-grass prairie (4.7ac)	3,9,10,11,13, 14,15,21	Minimize Disturbance	N	N
Alma 373	L	1a,1b,3, 4,5	Short-grass prairie (1.7ac)	3,9,10,11,13, 14,15,21	Minimize Disturbance	N	N

Table 3.5.1-2 Continued
BIOLOGICAL IMPACT ASSESSMENT/MITIGATION PLANNING CHART - VEGETATION

LOCATION	IMPACT			MITIGATION		RESIDUAL IMPACT LEVEL	
ROAD CORRIDORS WITHIN FLIGHTS	LEVEL[1]	TYPE[2]	DESCRIPTION	MEASURE[3,4]	EFFECT	ASSUMED MIT.	SUGGEST. MIT.
FLIGHT E							
-Link 401	L	1a,1b,3, 4,5	Short-grass prairie (1.6ac)	3,9,10,11,13, 14,15,21	Minimize Disturbance	N	N
-Link 403	L	1a,1b,3, 4,5	Short-grass prairie(.9ac)	3,9,10,11,13, 14,15,21	Minimize Disturbance	N	N
-Link 404	L	1a,1b,3, 4,5	Short-grass prairie (2.6ac)	3,9,10,11,13, 14,15,21	Minimize Disturbance	N	N
-Link 411	L	1a,1b,3, 4,5	Short-grass prairie (3.7ac)	3,9,10,11,13, 14,15,21	Minimize Disturbance	N	N
-Link 421	L	1a,1b,3, 4,5	Short-grass prairie (2.6ac)	3,9,10,11,13, 14,15,21	Minimize Disturbance	N	N
	M	1a,1b,4	Meadow(.2ac)	3,9,10,11,14, 15,19,21,d	Minimize Disturbance	L	L
-Link 691	L	1a,1b,3 4,5	Short-grass prairie (2.9ac)	3,9,10,11,13, 14,15,21	Minimize Disturbance	N	N
FLIGHT P							
-Link 187	L	1a,1b,3 4,5	Short-grass prairie (7.6ac)	3,9,10,11,13, 14,15,21	Minimize Disturbance	N	N
-Link 188	L	1a,1b,3 4,5	Short-grass prairie(8ac)	3,9,10,11,13, 14,15,21	Minimize Disturbance	N	N
-Link 281	L	1a,1b,3 4,5	Short-grass prairie (4.7ac)	3,9,10,11,13, 14,15,21	Minimize Disturbance	N	N
	L	1a,1b,4	Rock outcrop(.2ac)	3,9,10,11,14, 15,19,21	Minimize Disturbance	L	L
-Link 282	L	1a,1b,3 4,5	Short-grass prairie (21.7ac)	3,9,10,11,13, 14,15,21	Minimize Disturbance	N	N
	M	1a,1b,4	Riparian(.2ac)	1,3,9,10,14, 16,17,19,21,d	Minimize Disturbance	M	L

Table 3.5.1-2 Continued
BIOLOGICAL IMPACT ASSESSMENT/MITIGATION PLANNING CHART - VEGETATION

LOCATION	IMPACT			MITIGATION		RESIDUAL IMPACT LEVEL	
ROAD CORRIDORS WITHIN FLIGHTS	LEVEL[1]	TYPE[2]	DESCRIPTION	MEASURE[3,4]	EFFECT	ASSUMED MIT.	SUGGEST. MIT.
FLIGHT Q							
-Link 135	L	1a,1b,3 4,5	Short-grass prairie (13.9ac)	3,9,10,11,13, 14,15,21	Minimize Disturbance	N	N
	M	1a,1b,4	Shrubland (Silver Sagebrush)(.8ac)	3,9,10,11,14, 15,19,21	Minimize Disturbance	L	L
-Link 136	L	1a,1b,3 4,5	Short-grass prairie (4.7ac)	3,9,10,11,13, 14,15,21	Minimize Disturbance	N	N
	M	1a,1b,4	Shrubland (Silver Sagebrush)(.2ac)	3,9,10,11,14, 15,19,21	Minimize Disturbance	L	L
-Link 171	M	1a,1b,4	Shrubland (Mtn. Mahogany) (.2ac)	3,9,10,11,14, 15,19,21	Minimize Disturbance	L	L
	L	1a,1b,3 4,5	Short-grass prairie (7.5ac)	3,9,10,11,13, 14,15,21	Minimize Disturbance	N	N
-Link 172	L	1a,1b,3 4,5	Short-grass prairie (17.6ac)	3,9,10,11,13, 14,15,21	Minimize Disturbance	N	N
-Link 173	L	1a,1b,3 4,5	Short-grass prairie (5.2ac)	3,9,10,11,13, 14,15,21	Minimize Disturbance	N	N
	M	1a,1b,4	Meadow(1.2ac)	3,9,10,11,14, 15,19,21,d	Minimize Disturbance	L	L
	M	1a,1b,4	Shrubland (Mtn. Mahogany) (.3ac)	3,9,10,11,14, 15,19,21	Minimize Disturbance	L	L
-Link 180	L	1a,1b,4	Rock outcrop(.9ac)	3,9,10,11,14, 15,19,21	Minimize Disturbance	L	L
-Link 181	L	1a,1b,4	Rock outcrop(.9ac)	3,9,10,11,14, 15,19,21	Minimize Disturbance	L	L
-Link 182	L	1a,1b,3 4,5	Short-grass prairie (1.5ac)	3,9,10,11,13, 14,15,21	Minimize Disturbance	N	N
-Link 184	M	1a,1b,4	Shrubland (Mtn. Mahogany) (.3ac)	3,9,10,11,14, 15,19,21,d	Minimize Disturbance	L	L
	L	1a,1b,3 4,5	Short-grass prairie (11.5ac)	3,9,10,11,13, 14,15,21	Minimize Disturbance	N	N

Table 3.5.1-2 Continued
BIOLOGICAL IMPACT ASSESSMENT/MITIGATION PLANNING CHART - VEGETATION

LOCATION	IMPACT			MITIGATION		RESIDUAL IMPACT LEVEL	
ROAD CORRIDORS WITHIN FLIGHTS	LEVEL[1]	TYPE[2]	DESCRIPTION	MEASURE[3,4]	EFFECT	ASSUMED MIT.	SUGGEST. MIT.
·Link 185	M	1a,1b,4	Shrubland (Mtn. Mahogany) (.2ac)	3,9,10,11,14, 15,19,21,d	Minimize Disturbance	L	L
	L	1a,1b,3 4,5	Short-grass prairie (8.4ac)	3,9,10,11,13, 14,15,21	Minimize Disturbance	N	N
·Link 190	L	1a,1b,3 4,5	Short-grass prairie (5.8ac)	3,9,10,11,13, 14,15,21	Minimize Disturbance	N	N
	M	1a,1b,4	Shrubland (Mtn. Mahogany) (.1ac)	3,9,10,11,14, 15,19,21,d	Minimize Disturbance	L	L
FLIGHT R							
·Link 139	L	1a,1b,3 4,5	Short-grass prairie (1.4ac)	3,9,10,11,13, 14,15,21	Minimize Disturbance	N	N
·Link 140	L	1a,1b,3 4,5	Short-grass prairie (2.6ac)	3,9,10,11,13, 14,15,21	Minimize Disturbance	N	N
·Link 155	L	1a,1b,3 4,5	Short-grass prairie (12.3ac)	3,9,10,11,13, 14,15,21	Minimize Disturbance	N	N
·Link 158	L	1a,1b,3 4,5	Short-grass prairie (1.8ac)	3,9,10,11,13, 14,15,21	Minimize Disturbance	N	N
·Link 231	L	1a,1b,3 4,5	Short-grass prairie (2.7ac)	3,9,10,11,13, 14,15,21	Minimize Disturbance	N	N
·Link 232	L	1a,1b,3 4,5	Short-grass prairie(5ac)	3,9,10,11,13, 14,15,21	Minimize Disturbance	N	N
	M	1a,1b,4	Shrubland (Mtn. Mahogany) (1.1ac)	3,9,10,11,14, 15,19,21	Minimize Disturbance	L	L
·Link 233	L	1a,1b,3 4,5	Short-grass prairie (17.6ac)	3,9,10,11,13, 14,15,21	Minimize Disturbance	N	N
	M	1a,1b,4	Shrubland (Silver sage brush) (1.1ac)	3,9,10,11,14, 15,19,21	Minimize Disturbance	L	L
FLIGHT S							
·Link 204	L	1a,1b,3 4,5	Short-grass prairie (12.8ac)	3,9,10,11,13, 14,15,21	Minimize Disturbance	N	N

Table 3.5.1-2 Continued
BIOLOGICAL IMPACT ASSESSMENT/MITIGATION PLANNING CHART - VEGETATION

LOCATION	IMPACT			MITIGATION		RESIDUAL IMPACT LEVEL	
ROAD CORRIDORS WITHIN FLIGHTS	LEVEL[1]	TYPE[2]	DESCRIPTION	MEASURE[3,4]	EFFECT	ASSUMED MIT.	SUGGEST. MIT.
-Link 212	L	1a,1b,3 4,5	Short-grass prairie (1.4ac)	3,9,10,11,13, 14,15,21	Minimize Disturbance	L	L
	M	1a,1b,4	Meadow(.2ac)	3,9,10,11,13, 14,15,21	Minimize Disturbance	L	L
-Link 213	L	1a,1b,3 4,5	Short-grass prairie(1ac)	3,9,10,11,13, 14,15,21	Minimize Disturbance	N	N
-Link 214	L	1a,1b,3 4,5	Short-grass prairie(4ac)	3,9,10,11,13, 14,15,21	Minimize Disturbance	N	N
	M	1a,1b,4	Meadow(.1ac)	3,9,10,11,14, 15,19,21	Minimize Disturbance	L	L
-Link 220	L	1a,1b,3 4,5	Short-grass prairie (7.2ac)	3,9,10,11,13, 14,15,21	Minimize Disturbance	N	N
	M	1a,1b,4	Meadow(.4ac)	3,9,10,11,14, 15,19,21,d	Minimize Disturbance	L	L
	M	1a,1b,4	Riparian(.2ac)	1,3,9,10,14,15, 16,17,19,21,d	Minimize Disturbance	M	L
-Link 221	L	1a,1b,3 4,5	Short-grass prairie (5.1ac)	3,9,10,11,13, 14,15,21	Minimize Disturbance	N	N
-Link 222	L	1a,1b,3 4,5	Short-grass prairie(2ac)	3,9,10,11,13, 14,15,21	Minimize Disturbance	N	N
	M	1a,1b,4	Shrubland (Mtn. Mahogany) (3.4ac)	3,9,10,11,14, 15,19,21,d	Minimize Disturbance	L	L
-Link 223	L	1a,1b,3 4,5	Short-grass prairie (5.8ac)	3,9,10,11,13, 14,15,21	Minimize Disturbance	N	N
	M	1a,1b,4	Riparian(.4ac)	1,3,9,10,14,15 16,17,19,21,d	Minimize Disturbance	M	L
	M	1a,1b,4	Meadow(1.1ac)	3,9,10,11,14, 15,19,21,d	Minimize Disturbance	L	L
-Link 101	L	1a,1b,3 4,5	Short-grass prairie (3.1ac)	3,9,10,11,13, 14,15,21	Minimize Disturbance	N	N

Table 3.5.1-2 Continued
BIOLOGICAL IMPACT ASSESSMENT/MITIGATION PLANNING CHART - VEGETATION

LOCATION	IMPACT			MITIGATION		RESIDUAL IMPACT LEVEL	
ROAD CORRIDORS WITHIN FLIGHTS	LEVEL[1]	TYPE[2]	DESCRIPTION	MEASURE[3,4]	EFFECT	ASSUMED MIT.	SUGGEST. MIT.
·Link 105	L	1a,1b,3 4,5	Short-grass prairie (10.5ac)	3,9,10,13, 14,15,21	Minimize Disturbance	N	N
	M	1a,1b,4	Riparian(.4ac)	1,2,9,10,14,15 16,17,19,21,d	Minimize Disturbance	M	L
·Link 107	L	1a,1b,3 4,5	Short-grass prairie (9.9ac)	3,9,10,11,13, 14,15,21	Minimize Disturbance	N	N
·Link 108	L	1a,1b,3 4,5	Short-grass prairie (4.7ac)	3,9,10,11,13, 14,15,21	Minimize Disturbance	N	N
·Link 109	L	1a,1b,3 4,5	Short-grass prairie (3.7ac)	3,9,10,11,13, 14,15,21	Minimize Disturbance	N	N
·Link 110	L	1a,1b,3 4,5	Short-grass prairie(6ac)	3,9,10,11,13, 14,15,21	Minimize Disturbance	N	N
	M	1a,1b,4	Riparian(.2ac)	1,3,9,10,14,15 16,17,19,21,d	Minimize Disturbance	M	L
·Link 115	L	1a,1b,3 4,5	Short-grass prairie(.4ac)	3,9,10,11,13, 14,15,21	Minimize Disturbance	N	N
	M	1a,1b,4	Shrubland (Silver sage) (.1ac)	3,9,10,11,14, 15,19,21,d	Minimize Disturbance	L	L
·Link 120	L	1a,1b,3 4,5	Short-grass prairie(.3ac)	3,9,10,11,13, 14,15,21	Minimize Disturbance	N	N
·Link 125	L	1a,1b,3 4,5	Short-grass prairie (1.2ac)	3,9,10,11,13, 14,15,21	Minimize Disturbance	N	N
·Link 126	L	1a,1b,3 4,5	Short-grass prairie (2.3ac)	3,9,10,11,13, 14,15,21	Minimize Disturbance	N	N
·Link 127	L	1a,1b,3 4,5	Short-grass prairie (4.5ac)	3,9,10,11,13, 14,15,21	Minimize Disturbance	N	N
	M	1a,1b,4	Meadow(.7ac)	3,9,10,11,14, 15,19,21,d	Minimize Disturbance	L	L
	M	1a,1b,4	Riparian(.5ac)	1,3,9,10,14,15 16,17,19,21,d	Minimize Disturbance	M	L

Table 3.5.1-2 Continued
BIOLOGICAL IMPACT ASSESSMENT/MITIGATION PLANNING CHART - VEGETATION

LOCATION	IMPACT			MITIGATION		RESIDUAL IMPACT LEVEL	
ROAD CORRIDORS WITHIN FLIGHTS	LEVEL[1]	TYPE[2]	DESCRIPTION	MEASURE[3,4]	EFFECT	ASSUMED MIT.	SUGGEST. MIT.
(Link 127)	M	1a,1b,4	Shrubland (Mtn. Mahogany) (.5ac)	3,9,10,11,14, 15,19,21	Minimize Disturbance	L	L
-Link 128	L	1a,1b,3 4,5	Short-grass prairie (.03ac)	3,9,10,11,13, 14,15,21	Minimize Disturbance	N	N
-Link 129	L	1a,1b,3 4,5	Short-grass prairie(.4ac)	3,9,10,11,13, 14,15,21	Minimize Disturbance	N	N
INTERCONNECTING ROADS							
-Link 138	L	1a,1b,3 4,5	Short-grass prairie(.7ac)	3,9,10,11,13, 14,15,21	Minimize Disturbance	N	N
-Link 186	L	1a,1b,3, 4,5	Short-grass prairie (12.4ac)	3,9,10,13,14, 15,21	Minimize Disturbance	N	N
	M	1a,1b,4	Riparian(.2ac)	1,3,9,10,14,15 16,17,19,21,d	Minimize Disturbance	M	L
	M	1a,1b,4	Meadow(.5ac)	3,9,10,11,14, 15,19,21,d	Minimize Disturbance	L	L
	L	1a,1b,4	Rock outcrop(2.2ac)	3,9,10,11,14, 15,19,21	Minimize Disturbance	L	L
-Link 190	L	1a,1b,3 4,5	Short-grass prairie (11.3ac)	3,9,10,11,13, 14,15,21	Minimize Disturbance	N	N
	M	1a,1b,4	Shrubland (Mtn. Mahogany) (.2ac)	3,9,10,11,14, 15,19,21	Minimize Disturbance	L	L
-Link 193	L	1a,1b,3 4,5	Short-grass prairie(.3ac)	3,9,10,11,13, 14,15,21	Minimize Disturbance	N	N
-Link 195	L	1a,1b,3 4,5	Short-grass prairie (13.7ac)	3,9,10,11,13, 14,15,21	Minimize Disturbance	N	N
	M	1a,1b,4	Riparian(.1ac)	1,3,9,10,14,15 16,17,19,21,d	Minimize Disturbance	M	L
	M	1a,1b,4	Meadow(.1ac	3,9,10,11,14, 15,19,21,d	Minimize Disturbance	L	L
-Link 196	L	1a,1b,3 4,5	Short-grass prairie (29.3ac)	3,9,10,11,13, 14,15,21	Minimize Disturbance	N	N

Table 3.5.1-2 Continued
BIOLOGICAL IMPACT ASSESSMENT/MITIGATION PLANNING CHART - VEGETATION

LOCATION	IMPACT			MITIGATION		RESIDUAL IMPACT LEVEL	
INTER-CONNECTING ROADS	LEVEL[1]	TYPE[2]	DESCRIPTION	MEASURE[3,4]	EFFECT	ASSUMED MIT.	SUGGEST. MIT.
-Link 281	L	1a,1b,3 4,5	Short-grass prairie (4.7ac)	3,9,10,11,13, 14,15,21	Minimize Disturbance	N	N
-Link 354	L	1a,1b,3 4,5	Short-grass prairie (6.2ac)	3,9,10,11,13, 14,15,21	Minimize Disturbance	N	N
-Link 374	L	1a,1b,3 4,5	Short-grass prairie (1.8ac)	3,9,10,11,13, 14,15,21	Minimize Disturbance	N	N
-Link 388	L	1a,1b,3 4,5	Short-grass prairie (5.1ac)	3,9,10,11,13, 14,15,21	Minimize Disturbance	N	N
	M	1a,1b,4	Riparian(.3ac)	1,3,9,10,14,15 16,17,19,21,d	Minimize Disturbance	M	L
	M	1a,1b,4	Meadow(.8ac)	3,9,10,11,14, 15,19,21,d	Minimize Disturbance	L	L
-Link 397	L	1a,1b,3 4,5	Short-grass prairie (2.2ac)	3,9,10,11,13, 14,15,21	Minimize Disturbance	N	N
	M	1a,1b,4	Riparian(.3ac)	1,3,9,10,14, 15,16,17,19,21	Minimize Disturbance	M	L
-Link 1000	L	1a,1b,3 4,5	Short-grass prairie (1.9ac)	3,9,10,11,13, 14,15,21	Minimize Disturbance	N	N
	M	1a,1b,4	Riparian(.3ac)	1,3,9,10,14,15 16,17,19,21,d	Minimize Disturbance	M	L
SILOS P-2	M	1a,1b,1c	Short-grass prairie - the state rare plant (Wyoming) woolly milk-vetch occurs in short-grass prairie near the P-2 silo pad.	3,9,10,11,13, 14,15,21	Minimize disturbance to woolly milkvetch population.	M	M
COMMUNICATION CABLE PATHS PA-1	L	1a,1b,3 4,5	Short-grass prairie(2ac)	3,4,9,10,11,13, 14,15,18,19,21	Minimize Disturbance	N	N

Table 3.5.1-2 Continued
BIOLOGICAL IMPACT ASSESSMENT/MITIGATION PLANNING CHART - VEGETATION

LOCATION	IMPACT			MITIGATION		RESIDUAL IMPACT LEVEL	
COMMUNICATION CABLE PATHS	LEVEL[1]	TYPE[2]	DESCRIPTION	MEASURE[3,4]	EFFECT	ASSUMED MIT.	SUGGEST. MIT.
SB-1	M	1a,1b,3, 4,5	Short-grass prairie - the state rare plant (Wyoming) woolly milkvetch occurs in short-grass prairie in the northern portion of the SB-1 cable path.(32ac)	3,4,9,10,11, 13,14,15,18, 19,21	Minimize Disturbance	M	M
RB-1	L	1a,1b,3 4,5	Short-grass prairie (81ac)	3,4,9,10,11, 13,14,15,18, 19,21,d	Minimize Disturbance	M	M
	M	1a,1b	Meadow(11ac)	3,4,9,10,14,15, 16,17,18,19,21	Minimize Disturbance	L	L
	M	1a,1b	Riparian(<1ac)	1,3,4,9,10,14, 15,16,17,18,19, 21,c	Minimize Disturbance	M	L
PD-1	L	1a,1b,3, 4,5	Short-grass prairie (44ac)	3,4,9,10,11,13 14,15,18,19,21	Minimize Disturbance	M	M
	M	1a,1b	Meadow(8ac)	3,4,9,10,11,14, 15,18,19,21,d	Minimize Disturbance	L	L
	M	1a,1b,4	Shrubland(<1ac)	3,4,9,10,11,14, 15,18,19,21,d	Minimize Disturbance	L	L
	M	1a,1b	Woodland(8ac)	3,4,9,10,11,14, 15,18,19,21	Minimize Disturbance	L	L
	M	1a,1b	Riparian(1ac)	1,3,4,9,10,14, 15,16,17,18,19, 21,d	Minimize Disturbance	M	L
	L	1a,1b,4	Rock outcrop(2ac)	3,4,9,10,11,14, 15,18,19,21	Minimize Disturbance	L	L
SB-2	L	1a,1b,3 4,5	Short-grass prairie (32ac)	3,4,9,10,11,13, 14,15,18,19,21	Minimize Disturbance	M	M
	M	1a,1b,	Meadow(<1ac)	3,4,9,10,11,14, 15,18,19,21,d	Minimize Disturbance	L	L
PB-1	L	1a,1b,3 4,5	Short-grass prairie (46ac)	3,4,9,10,11,13, 14,15,18,19,21	Minimize Disturbance	M	M

Table 3.5.1-2 Continued
BIOLOGICAL IMPACT ASSESSMENT/MITIGATION PLANNING CHART - VEGETATION

LOCATION	IMPACT			MITIGATION		RESIDUAL IMPACT LEVEL	
COMMUNICATION CABLE PATHS	LEVEL[1]	TYPE[2]	DESCRIPTION	MEASURE[3,4]	EFFECT	ASSUMED MIT.	SUGGEST. MIT.
(PB-1)	M	1a,1b	Meadow(9ac)	3,4,9,10,11, 14,15,18,19,21	Minimize Disturbance	L	L
	M	1a,1b,4	Shrubland(<1ac)	3,4,9,10,11,14, 15,18,19,21,d	Minimize Disturbance	L	L
	M	1a,1b	Woodland(18ac)	3,4,9,10,11,14, 15,18,19,21,d	Minimize Disturbance	L	L
	L	1a,1b,4	Rock outcrop(2ac)	3,4,9,10,11, 14,15,18,19,21	Minimize Disturbance	L	L
	M	1a,1b	Riparian(1ac)	1,3,4,9,10,14, 15,16,17,18, 19,21,c,d	Minimize Disturbance	M	L
PA-2	L	1a,1b,3 4,5	Short-grass prairie (40ac)	3,4,9,10,11,13, 14,15,18,19,21	Minimize Disturbance	N	N
PA-3	L	1a,1b,3 4,5	Short-grass prairie (50ac)	3,4,9,10,11,13, 14,15,18,19,21	Minimize Disturbance	N	N
	M	1a,1b	Meadow(3ac)	3,4,9,10,11,14, 15,18,19,21,d	Minimize Disturbance	L	L
	M	1a,1b	Riparian(<1ac)	1,3,4,9,10,14, 15,16,17,18, 19,21	Minimize Disturbance	M	L
	M	1a,1b,4	Shrubland(1ac)	3,4,9,10,11,14, 15,18,19,21,d	Minimize Disturbance	L	L
PA-4	L	1a,1b,3 4,5	Short-grass prairie (73ac)	3,4,9,10,11,13, 14,15,18,19,21	Minimize Disturbance	N	N
	M	1a,1b 4	Shrubland(1ac)	3,4,9,10,11,14 15,18,19,21,d	Minimize Disturbance	L	L
	L	1a,1b,4	Rock outcrop(3ac)	3,4,9,10,11, 14,15,18,19,21	Minimize Disturbance	L	L
PA-5	L	1a,1b,3 4,5	Short-grass prairie (54ac)	3,4,9,10,11,13, 14,15,18,19,21	Minimize Disturbance	N	N

Table 3.5.1-2 Continued
BIOLOGICAL IMPACT ASSESSMENT/MITIGATION PLANNING CHART - VEGETATION

LOCATION	IMPACT			MITIGATION		RESIDUAL IMPACT LEVEL	
COMMUNICATION CABLE PATHS	LEVEL[1]	TYPE[2]	DESCRIPTION	MEASURE[3,4]	EFFECT	ASSUMED MIT.	SUGGEST. MIT.
(PA-5)	M	1a,1b	Meadow(3ac)	3,4,9,10,11,14, 15,18,19,21,d	Minimize Disturbance	L	L
	M	1a,1b,4	Shrubland(<1ac)	3,4,9,10,11,14, 15,18,19,21,d	Minimize Disturbance	L	L
	M	1a,1b	Woodland(3ac)	3,4,9,10,11,14, 15,18,19,21,d	Minimize Disturbance	L	L
	M	1a,1b	Riparian(<1ac)	1,3,4,9,10,14 15,16,17,18, 19,21	Minimize Disturbance	M	L
	L	1a,1b,4	Rock outcrop(<1ac)	3,4,9,10,11,14 15,18,19,21	Minimize Disturbance	L	L
MB-2	L	1a,1b,3 4,5	Short-grass prairie (46ac)	3,4,9,10,11,13, 14,15,18,19,21	Minimize Disturbance	M	M
	M	1a,1b	Meadow(<1ac)	3,4,9,10,11,14, 15,18,19,21,d	Minimize Disturbance	L	L
F.E. WARREN AFB Facilities	M	1a,1b,3, 4,5	Mixed-grass prairie (Relatively undisturbed, 31ac)	3,6,10,13,14 15,21	Minimize Disturbance	M	M
Proposed utility corridors	M	1a,1b,3 4,5	Mixed-grass prairie (Relatively undisturbed, 3.5ac)	3,6,10,13,14, 21	Minimize Disturbance	M	M
Proposed communication corridor (crossing Crow Creek at Sixth Street)	M	1a,1b	Riparian(.1ac)	1,3,5,6,10, 14,15,16,17, 19,21,f	Minimize Disturbance	M	M
	M	1a,1b	Colorado butterfly Plant - present habitat (.1ac)	1,3,5,6,8,10, 15,16,17,20,21	Minimize Disturbance	M	M
	M	1a,1b	Meadow(.2ac)	3,5,6,10,14, 15,19,21,f	Minimize Disturbance	M	M

Table 3.5.1-2 Continued
BIOLOGICAL IMPACT ASSESSMENT/MITIGATION PLANNING CHART - VEGETATION

LOCATION	IMPACT			MITIGATION		RESIDUAL IMPACT LEVEL	
F.E. WARREN AFB	LEVEL[1]	TYPE[2]	DESCRIPTION	MEASURE[3,4]	EFFECT	ASSUMED MIT.	SUGGEST. MIT.
Proposed hot water line crossing Crow Creek at Sixth Street	M	1a,1b	Riparian(.1ac)	1,3,4,9,10,14, 15,16,17,18, 19,21,f	Minimize Disturbance	M	M
	M	1a,1b	Colorado butterfly plant - present habitat (.1ac)	1,3,5,6 8,10, 15,16,19,20,21	Minimize Disturbance	M	M
	M	1a,1b	Meadow(.2ac)	3,4,9,10,11,14, 15,18,19,21,f	Minimize Disturbance	M	M
Proposed return water line crossing Crow Creek at Third Street	M	1a,1b	Meadow(.1ac)	3,4,9,10,11, 14,15,18,19, 21,f	Minimize Disturbance	M	M
TRANSPORTATION CORRIDORS Northern Access (SSA to Gate 5 - Alternatives R1,R2,R3	M	1a,1b	Mixed-grass prairie - approximately 12 acres (Relatively undisturbed)	3,6,10,13,14, 15,21	Minimize Disturbance	M	M
North/South Access (SSA to WSA) -Proposed Action Alignment	M	1a,1b	Mixed-grass prairie - (Approximately 6 acres)	3,6,10,13,14 15,21	Minimize Disturbance	M	M
	M	1a,1b	Meadow(.6ac)	3,5,6,10,14, 15,19,21,f	Minimize Disturbance	M	M
	M	1a,1b	Riparian(.6ac)	1,3,5,6,10, 14,15,16,17, 19,21,f	Minimize Disturbance	M	M
	M	1a,1b	Colorado butterfly plant - present habitat (.6 ac)	1,3,5,6,8,10, 15,16,19,20,21	Minimize Disturbance	M	M

Table 3.5.1-2 Continued
BIOLOGICAL IMPACT ASSESSMENT/MITIGATION PLANNING CHART - VEGETATION

LOCATION	IMPACT			MITIGATION		RESIDUAL IMPACT LEVEL	
TRANSPORTATION CORRIDORS	LEVEL[1]	TYPE[2]	DESCRIPTION	MEASURE[3,4]	EFFECT	ASSUMED MIT.	SUGGEST MIT.
-Offbase Design Option	H	1a,1b	Mixed-grass prairie (4 ac)	3,6,10,13,14, 15,21	Minimize Disturbance	M	M
	M	1a,1b	Meadow(.3ac)	3,5,6,10,14, 15,19,21,f	Minimize Disturbance	M	M
	M	1a,1b	Riparian vegetation (.5 ac)	1,3,5,6,10,14 15,16,17,19,21,f	Minimize Disturbance	M	M
	M	1a,1b	Colorado butterfly plant - present habitat (.5 ac)	1,3,5,6,8,10, 16,17,19,20,21	Minimize Disturbance	M	M
Southern Access							
-(Proposed Action Alignment	M	1a,1b	Meadow(.4ac)	3,5,6,10,14,15, 19,21	Minimize Disturbance	M	M
	M	1a,1b	Riparian(.9ac)	1,3,5,6,10,14, 15,19,21,f	Minimize Disturbance	M	M
	M	1a,1b	Colorado butterfly plant - present habitat (.9 ac)	1,3,5,6,8,10, 15,16,17,19,20, 21	Minimize Disturbance	M	M
	M	1a,1b	Mixed-grass prairie(9ac)	3,6,10,13,14, 15,21	Minimize Disturbance	M	M
Potential Vegetation Types Affected at Aggregate Quarry Sites	L	1a,1b,3, 5	Short grass prairie	3,9,10,11,13, 14,15,21	Minimize Disturbance	M	M
	M	1a,1b	Shrubland	3,9,10,11,14, 15,19,21	Minimize Disturbance	L	L
	M	1a,1b	Woodland	3,9,10,11,14, 15,19,21	Minimize Disturbance	L	L
	M	1a,1b	Meadow	3,9,10,11,14, 15,19,21	Minimize Disturbance	L	L
	M	1a,1b	Riparian	1,3,9,10,14,15, 16,17,19,21	Minimize Disturbance	M	L
	L	1a, 5	Rock out crop	3,9,10,11,14, 15,19,21	Minimize Disturbance	L	L

Table 3.5 1-7 Continued
BIOLOGICAL IMPACT ASSESSMENT/MITIGATION PLANNING CHART - VEGETATION

LOCATION	IMPACT			MITIGATION		RESIDUAL IMPACT LEVEL	
DISPATCH STATIONS	LEVEL[2]	TYPE[2]	DESCRIPTION	MEASURE[3,4]	EFFECT	ASSUMED MIT	SUGGEST MIT.
Potential Vegetation Types Affected at Dispatch Stations	L	1,2,3, 5	· Short-grass prairie · Shrubland · Woodland · Meadow · Riparian · Rock Outcrop	1,3,9,10,11, 13,14,15,16, 17,19,21	Minimize Disturbance	N	N

FOOTNOTES: 1 Unmitigated.
2 Impact Type (1,2,3), see Section 3.2.
3 Assumed Mitigations (1,2,3), see Section 3.2.2.
4 Suggested Mitigations (a,b,c), see Section 3.7.
5 Estimated disturbed area in acres.

extent and scattered (mosaic-like) distributions. Due to the infrequency of suitable soil factors within both the ROI and ACS, they are less abundant than short-grass prairie vegetation. In addition, the recovery rate of shrubland and woodland vegetation after revegetation is slow (generally greater than 5 years).

Modification of the majority of silos will not require additional land beyond the current 25-foot buffer zone. The buffer zones around the silo sites are generally cleared of all vegetation and disturbance to adjacent vegetation in these areas is expected to be negligible. Some direct project-related disturbance to short-grass prairie may occur at silo sites where additional vehicle maneuvering and parking areas are required. These impacts would be negligible and not significant because the quantity affected (approximately 1-3 acres per silo site) would be low in relation to the regional abundance of short-grass prairie.

Impacts associated with road corridors outside the Flight portion of the ACS but closely adjacent to them would be the same as those occurring along road corridors within Flights (Table 3.5.1-2). The acreage of vegetation types which may be disturbed along road corridors connecting the Flights is summarized below:

- Short-grass prairie - 90 acres;
- Meadow - 1 acre;
- Shrubland - 1 acre;
- Riparian - 1 acre;
- Rock outcrop - 2 acres;
- Agricultural land - 31 acres; and
- Disturbed/Urban - 4 acres.

Direct project-related disturbance to vegetation adjacent to the cable paths (Table 3.5.1-3) will occur within the 35-foot easement required for placement of the cables, particularly in areas where easements across private land (where access roads may not exist) are necessary. The types of impacts are expected to be similar to those described for road corridors with the addition of trenching activities (3-6 foot deep trenches will be dug to lay cables), and increased potential for erosion.

The vegetation types potentially disturbed and impact levels for these types are the same as those identified earlier for the road corridors. Disturbance to short-grass prairie within the cable paths will be negligible, since areas disturbed by construction are likely to return to preconstruction condition in 5 years or less. Short-grass prairie may be affected over the long term if erosion occurs where cables cross steep slopes. Impacts to shrubland, meadow, woodland, and riparian areas are considered long term since species in these vegetation types tend to be longer-lived and have slow recovery rates.

Table 3.5.1-3

CABLE PATH VEGETATION DISTURBED[1]

Cable Path	Short-Grass Prairie	Meadow	Shrubland	Woodland	Riparian	Rock Outcrop	Agricultural	Total[2]
PA1[3]	2	-	-	-	-	-	4	6
SB1[3]	32	-	-	-	-	-	18	50
RE1[3]	81	11	-	-	<1	-	4	96
PA4[3]	73	-	1	-	-	3	11	88
PA5[3]	54	3	<1	3	<1	<1	37	99
SB2	32	<1	-	-	-	-	79	111
PB1	46	9	<1	18	1	2	4	30
PA2	40	-	-	-	-	-	20	60
PA3	60	3	1	-	<1	-	8	62
PD1	44	8	<1	3	1	2	17	80
RB2	46	<1	-	-	-	-	5	51

Notes: 1 Estimated acreage disturbed.
2 Approximately 263 acres of existing vegetation is expected to be disturbed by the preferred cable paths.
3 Preferred cable paths.

Estimated impact levels for the preferred cable paths are negligible for PA1; significant, low, and short and long term for PA4; and significant, moderate, and short term for PA5, SB1, and RB1. Impacts on PA5 and RB1 are also estimated to be significant, low, and long term, while impacts for SB1 will be significant, moderate, and long term. Estimated impact levels for the six alternative cable paths are negligible for PA2; significant, low, and short and long term for SB2 and RB2; and significant, moderate, and short and long term for PB1, PA3, and PD1. Long-term impacts on PB1, PA3, and PD1 are estimated to be significant and low. Significant, moderate, and short-term impacts are generally related to the presence of riparian vegetation along the cable paths. However, significant, short and long-term, moderate impacts along cable path SB1 are a result of the presence of a state (Wyoming) rare plant, the woolly milkvetch.

The majority of planned project activities within F.E. Warren AFB will occur in developed urban and currently disturbed areas. New construction and modifications related to proposed facility locations, utility, and transportation corridors will result in significant, short and long-term impacts to mixed-grass prairie, meadow, and riparian vegetation.

Direct project-related impacts to mixed-grass prairie will occur at the proposed Weapons Storage Area (WSA) and Stage Storage Area (SSA) facility locations, along the three alternative access routes on the base (northern, north-south, and southern), and along utility corridor routes connecting the SSA with the existing utility system (Table 3.5.1-2). Short-term impacts to mixed-grass prairie in these areas would be associated with increased dust levels from vehicles, localized erosion, and vehicle maneuvering during construction. Increased dust levels may affect pollination, seed production, and photosynthesis during the growing season. Erosion may result from large volumes of runoff during intense storms, or over a period of time if reclamation efforts near construction sites are unsuccessful. Vehicle maneuvering during construction would affect vegetation by crushing plants and compacting the soil.

Long-term impacts would be associated with the permanent removal and burial of mixed-grass prairie vegetation at the SSA and WSA sites, where new roads are constructed, and where existing roads are widened. Impacts to mixed-grass prairie at F.E. Warren AFB would be significant and moderate because native mixed-grass prairie is limited in distribution within the ROI and ACS (Table 3.5.1-2). In addition, the mixed-grass prairie vegetation on F.E. Warren AFB represents a unique situation in that it has not been grazed for over 25 years.

Project-related disturbance to meadow vegetation would include construction of a new communication corridor and a high temperature and return water line across Crow Creek, north-south access road development (Alternatives R2 and R3) crossing Crow and Diamond creeks, and upgraded road and culvert replacement associated with Diamond Creek. Access to Interstate 25 from the WSA will be required and consists of the proposed southern route. This action will require upgrading Cheyenne Road south of the WSA where it crosses an unnamed drainage supporting Colorado butterfly plant habitat just north of the Parade Avenue intersection. Road widening at this location will impact meadow vegetation. Meadow vegetation will also be disturbed east along the proposed southern access route where a new bridge will be installed southwest of base

Gate No. 2. Construction-related impacts occurring in these areas will be the same as those described earlier for mixed-grass prairie including increased dust levels, localized erosion, vehicle maneuvering activity (short term), and permanent removal or burial of vegetation (long term).

Impacts to meadow vegetation within the F.E. Warren AFB portion of the ACS will be moderate and significant because the type is limited in distribution within the ROI and ACS. These impacts may be short term if disturbed areas are revegetated. However, long-term impacts can be expected in those areas where habitat is eliminated by road expansions.

Impact levels associated with aggregate quarry sites could range from low and significant to moderate and significant depending on the vegetation types present and the amount of disturbance. However, due to the small acreages involved, the dispatch station alternatives and overpass modifications are expected to result in negligible impacts over the short and long term.

Overall impact levels on vegetation will be short and long term, significant, and low within the Flight areas and short and long term and moderate on F.E. Warren AFB, due to loss or disruption of vegetation.

3.5.2 Wildlife

3.5.2.1 Big Game

3.5.2.1.1 Baseline Future - No Action Alternative

Big game resources, under normal conditions, tend to vary in population size over time (and location) due to range or habitat condition, unpredictable weather conditions, disease, and annual hunting pressures. Currently, Wyoming pronghorn populations within the ACS are stable except in the Iron Mountain herd unit, where populations are decreasing. In the Nebraska portion of the ACS pronghorn numbers are increasing. Mule deer and white-tailed deer populations are generally increasing in management herd units within the ACS except in the Wyoming Iron Mountain unit, where populations are decreasing slightly. Human population-related pressures have caused almost every big game population (species) to come under some degree of direct or indirect human management. Management agency goals are to maintain these populations in an approximate equilibrium with the available habitat that can support them. These goals may allow varying levels of annual harvest in this equilibrium or may just permit preservation of the species. Management goals may also include habitat (vegetation) restoration or preservation of specific habitat types that are important or critical to the species survival. Trends in population size for the most actively managed species will vary depending on the agency perception of the need to increase, decrease, or maintain a specific population. These perceptions and goals can and do vary over time because of public and private agency concerns, pressures, and/or perceptions of value, usefulness, and/or extent of the resource. Therefore, the existing conditions are assumed to reflect the general conditions for the future with expectation that there will be increasing land use and recreational pressures.

3.5.2.1.2 Proposed Action

Analysis of impacts on big game is based on the future baseline conditions. The determination of significance for impacts to big game is based on an evaluation of the potential for increased hunter take in unlimited permit areas and the potential for increased game violations because these influence the maintenance of preproject population levels.

Project impacts on big game in the ROI will be indirect or secondary, resulting from project-related increases in human population. An increase in hunting pressure is expected within the ROI, including the Flight portion of the ACS, due to this population increase. While big game hunting comprises a major portion of the hunting recreation days in Wyoming and Colorado, the impact level of increased hunting pressure within the ROI would range from not significant and negligible in Nebraska and Colorado to low and significant in Wyoming over the short term (Table 3.5.2-1).

Negligible impacts would result to big game in Nebraska during both the short and long term due to increased hunting pressure because the Nebraska Game and Parks Commission (NGPC) limits pronghorn and deer permits within the Nebraska portion of the ROI and elk hunting is not permitted. Although population increases are forecast in the Fort Collins and Greeley areas of Colorado during peak project years (1985 to 1989), the majority of these inmigrants would come from the Denver area and are not anticipated to alter hunting pressures in any Colorado area. Therefore, negligible impacts to big game are anticipated in the Colorado portion of the ROI due to increased hunting pressure.

Significant but low-level impacts from increased hunting pressure would occur over the short term in hunting areas in the Wyoming portion of the ROI where general (unlimited quota) licensing occurs for deer and elk. Black bear populations would receive significant, low-level impacts throughout the Wyoming portion of the ROI over the short term since hunting licenses are issued on an unlimited quota basis statewide. Hunting permits are issued on a limited basis for other big game species, or mortality quotas (for mountain lion) are set for each hunting area (WGFD 1982-b). Approximately 12,020 additional hunting recreation days are forecast in Wyoming as a result of the project for the peak population year 1987 (Section 3.5.2.1, Land Use Environmental Planning Technical Report [EPTR]). This increase is 1.0 percent of the 1978 to 1982 5-year average total hunting days in Wyoming (WGFD 1982-a). Although big game hunting comprises a major portion of the hunting days spent in Wyoming, a low-level of impact is anticipated because of the relatively low increase in hunting days projected, and because of the ability of the Wyoming Game and Fish Department (WGFD) to manage big game populations. For the year 1990, only 3,660 additional hunting days are predicted, or 0.3 percent of the previous 5-year average total hunting days in Wyoming. Therefore, long-term impacts due to increased hunting pressure would not be significant to Wyoming big game.

No significant impacts are anticipated in the South Dakota portion of the ROI from increased hunting pressure. Only buck deer licenses are unlimited, and relatively few hunters would be willing to pay the higher nonresident license fee required for hunting in South Dakota. In addition, the South Dakota Game, Fish, and Parks Department (SDGFPD) manages deer populations relative to

Table 3.5.2-1

BIOLOGICAL IMPACT ASSESSMENT/MITIGATION PLANNING CHART - WILDLIFE

LOCATION	IMPACT			MITIGATION		RESIDUAL IMPACT LEVEL	
	LEVEL[1]	TYPE[2]	DESCRIPTION	MEASURE[3,4]	EFFECT	ASSUMED MIT.	SUGGEST. MIT.
Region of Influence	L	11	Deer and elk in Wyoming hunting areas where general licensing occurs, and black bear in Wyoming ROI: Increase in hunting pressure	-	-		L
	L	12a,b	Big game: Increase in poaching and indiscriminate shooting	j	Minimize illegal activity	L	L
	L	9	Big game: Increase in feral/domestic dog kills	-	-		L
	M	13a,b	Big game: Increase in recreational pressure	j	Minimize illegal activity	M	M
	L	8b	Big game: Increase in automobile/train collisions	-	-		L
	L	11	Swift fox: Increase in trapping pressure in the ROI	j	Minimize trapping violations	L	L
	M	12b	Raptors: Impact of indiscriminate shooting varies with the species	j	Minimize illegal activity	M	M
Flights	L	6,7	Pronghorn migration route in northern portion of Flight Q: Construction activity disturbance	9,11,b	Minimize disturbance; avoid construction during pronghorn migration period	L	N
	L	6,7	Pronghorn, mule deer, white-tailed deer, all habitat types and densities: Construction activity	9,11	Minimize illegal activity	L	L

FOOTNOTES: 1 Unmitigated.
2 Impact Type (1,2,3), see Section 3.3.
3 Assumed Mitigations (1,2,3), see Section 3.2.
4 Suggested Mitigations (a,b,c), see Section 3.7.

Table 3.5.2-1 Continued
BIOLOGICAL IMPACT ASSESSMENT/MITIGATION PLANNING CHART - WILDLIFE

LOCATION	IMPACT			MITIGATION		RESIDUAL IMPACT LEVEL	
	LEVEL[1]	TYPE[2]	DESCRIPTION	MEASURE[3,4]	EFFECT	ASSUMED MIT.	SUGGEST. MIT.
Flights	L	12a,b	Big game: Poaching and indiscriminate shooting	11,12,j	Minimize illegal activity	L	L
	L	8b	Big game vehicle/train collisions	-	-		L
	M	14	Raptors: Disturbance of nesting raptors	7,9,11,a	Minimize disturbance	L	M
	M	10a,b	Raptors: Loss of trees to construction impact; level dependent upon size, age, and number of trees removed	3,4,19	Minimize removal of trees	L	L
	M	10a,b	Loss of potential nest burrows for burrowing owls	3,7	Minimize loss of burrows	L	L
	H	10a,b	Disturbance of prairie dog colonies inhabited by the black-footed ferret	2,3	Avoid disturbance to identified black-footed ferret habitat	M	M
	L	10a,b	Disturbance to habitat of rare species including swift fox, pale milk snake, and meadow jumping mouse	3,9	Avoid disturbance to rare animal habitat where identified	L	L
F.E. Warren AFB	L	10a,b	Pronghorn, mule deer, white-tailed deer: Habitat loss	9,i,j	Minimize disturbance	L	L
	L	6,7	Pronghorn, mule deer, white-tailed deer: Construction activity disturbance	9,11	Minimize disturbance	L	L
	M	14	Raptors: Disturbance of nesting raptors	9,11,a	Minimize disturbance	M	M
	M	14	Raptors: Loss of trees	3,19,i	Minimize loss of trees	L	L

Table 3.5.2-1 Continued
BIOLOGICAL IMPACT ASSESSMENT/MITIGATION PLANNING CHART - WILDLIFE

LOCATION	IMPACT			MITIGATION		RESIDUAL IMPACT LEVEL	
	LEVEL[1]	TYPE[2]	DESCRIPTION	MEASURE[3,4]	EFFECT	ASSUMED MIT.	SUGGEST. MIT.
F.E. Warren AFB	L	10a,b	Disturbance to habitat of rare species including swift fox, meadow jumping mouse, and burrowing owl	3,9,i	Avoid disturbance to rare animal habitat where identified	L	L
Aggregate Quarries	L	10a,b	Pronghorn or mule deer critical habitat: Habitat loss	9,j	Minimize disturbance to critical habitat	L	L
	L	6,7	Pronghorn or mule deer critical habitat: Construction activity disturbances	9,11	Minimize disturbance	L	L
	M	14	Raptors: Disturbance of nesting raptors	9,11,a	Minimize disturbance	L	N
	M	10a,b	Raptors: Loss of trees	3,19	Minimize removal of trees	L	L
	M	10a,b	Loss of potential nest burrows for burrowing owl	3,7	Minimize loss of burrows	L	L
	M	10a,b	Disturbance to habitat of rare species including swift fox, pale milk snake, and meadow jumping mouse	3,9	Avoid disturbance to rare animal habitat where identified	L	L

FOOTNOTES: 1 Unmitigated.
2 Impact Type (1,2,3), see Section 3.3.
3 Assumed Mitigations (1,2,3), see Section 3.2.
4 Suggested Mitigations (a,b,c), see Section 3.7.

variations in hunting pressure and other factors by controlling hunting seasons and harvest levels.

The project-related increase in population may cause an increase in poaching and random shooting of big game within the ROI. Violation and population records examined in Wyoming and Nebraska indicated, based on available data, a trend between statewide population growth and increased violations. In addition, a WGFD report indicates a general trend between violations and population increase (WGFD 1981-f).

The WGFD has recommended a 50-mile radius ROI surrounding Cheyenne for considering poaching impacts, since most violators are not likely to travel great distances to illegally kill big game (WGFD, personal communication, 1983). Therefore, most of the poaching impact would be expected to occur in the Laramie County area of Wyoming.

Although it is difficult to predict the amount of poaching and random shooting which possibly could occur as a result of project-related inmigration, short-term, significant, but low-level impacts on big game are anticipated during peak population years. Violations involving big game species constitute a major portion of total hunting violations in Wyoming due to big game's accessibility, visibility, and broad distribution (WGFD 1981-f). However, the WGFD's ability to manage big game populations and control harvests results in a low-level impact on big game populations should illegal kills increase as a result of the project.

Animal-vehicle collisions in the ROI may also increase with the expanding population from inmigration. Higher traffic volumes on major highways, back roads, and railways may result in increased road and railroad kills. Significant, short-term impacts are expected, but on a low level. Because of relatively low snow cover, big game animals in the area have relatively low daily and seasonal movements between winter and summer habitats (WGFD, personal communication, 1983).

Both an increase in nonhunting recreational pressure and an increase in domestic/feral dog harassment of big game may accompany the project-related population growth in the ROI. Increased mortality, stress, and alteration of daily and seasonal activity patterns can result from these intrusions. Significant, short-term, and moderate impacts on big game are anticipated during the peak population years from increased recreational pressures on those public lands expected to sustain a high proportion of the projected recreational use such as Medicine Bow National Forest and Curt Gowdy State Park. Impacts on big game in the remaining areas of the ROI would be low since recreation pressures would not be highly concentrated in any particular area. Significant but low-level impacts on big game would result over the short term from an increase in domestic/feral dog harassment. These impacts would be somewhat localized in the Cheyenne area of the ROI where the majority of the project's support population would reside, but may occur throughout the ROI and ACS.

These indirect impacts within the ROI are expected to be greatest during the peak construction years of 1985 through 1989. No significant, long-term impacts would occur by 1990 because project-related immigration would be greatly reduced over the previous 5 years.

Direct impacts on big game within the Flight portion of the ACS as a result of the project include loss of habitat and construction activity disturbances. Both long and short-term habitat loss will occur from the upgrading of access roads, and short-term habitat loss will result from cable installations. However, due to the minimal amount of big game habitat to be disturbed and its fragmented occurrence along roads and cable paths, negligible impacts are anticipated from big game habitat loss within the Flight portion of the ACS for any species.

Construction activity disturbances such as noise and vehicle movement at the silos and access roads in the Flights may cause significant but low-level, short-term impacts to big game species (Table 3.5.2-1). These stress-related impacts would be greatest in the pronghorn migration route in the northern portion of Flight Q; in Flight Q where critical-winter-yearlong habitat for mule deer occurs along Horse and Chugwater creeks; and in areas of high deer density in Nebraska in Flights B and C. Despite the presence of relatively good quality big game habitat in these three areas, impact levels would be low since construction disturbances would be localized at the silos and access roads, and would occur over a relatively short duration at any one site. Construction activity would not take place simultaneously at all sites, but would be spread out over a 5-year period, thereby dispersing impacts to specific areas during different time periods. In many cases, big game species will tolerate or ignore vehicle noise if the noise is localized, persistent, and not associated with alarming events such as vehicle pursuit (Schmidt and Gilbert 1980).

Construction activity disturbances at silos and access roads within pronghorn, mule deer, and white-tailed deer winter-yearlong and yearlong habitat, and in areas of scarce, low, and moderate densities, would also have significant but low-level impacts on these big game species over the short term. However, within the Flights, these impacts would occur on an even lower level due to the lower sensitivity and relatively widespread distributions of these habitats. The modification of overpasses to State Highway 71 at Kimball and to Interstate 25 near Cheyenne will result in negligible impacts to big game species. These sites are highly disturbed at present, and additional habitat loss will be minimal.

Elk would receive negligible impacts from construction activity disturbances within the Flights. Although winter-yearlong elk habitat is located approximately 1 to 2 miles northwest of Silo Q-9, negligible impacts are expected to occur since the disturbance would be very localized, of relatively short duration, and would take place along areas presently disturbed.

The installation of underground cables would result in short-term construction activity disturbances to big game along cable paths. Regardless of which alternative route is selected, impacts are not expected to be significant. No known critical big game habitat or areas of high animal density would be involved with any cable path alternative and the construction disturbances would be dispersed along a relatively narrow linear area.

An increase in the illegal killing of big game and road kills may result from the presence of construction-related personnel in the Flights at silos, access roads, and along cable paths. The potential for the occurrence of these indirect impacts would be greater in areas of higher wildlife activity such as

the pronghorn migration route in Flight Q, the mule deer critical-winter-yearlong habitat in Flight Q, and areas of high deer density in Nebraska in Flights B and C. However, both impacts are anticipated to be significant short term but low level due to the relatively low amount of daily and seasonal movement of big game in the area, and the state agencies' management activities for big game populations. In addition, mitigation, such as restricting firearms at the worksite, can reduce the potential for the illegal killing of big game within the Flights.

No significant impacts are anticipated to affect black bear or mountain lion within the ACS since their occurrence in the area is considered unlikely. Black bear normally do not occur within the Flight portion of the ACS, and mountain lion prefer relatively remote areas (Findholt et al. 1981).

Potential project-related impacts occurring to big game on F.E. Warren AFB include both short and long-term loss of habitat, construction disturbances, and increases in road kills and recreation pressure. Hunting is not permitted on the base. These impacts are negligible when examining F.E. Warren AFB as part of the regional area. However, when examining the base on a local level, some impacts take on greater significance.

The loss of winter-yearlong pronghorn habitat on the base, principally at the SSA and its connecting road east, results in significant but low-level, short and long-term impacts, regardless of the road alternative examined (Table 3.5.2-1). Habitat quantities to be removed are relatively low when compared to that available on the base. However, it is relatively good quality grassland due to low grazing pressure, and is therefore considered significant.

Mule deer and white-tailed deer habitat loss would potentially occur only in areas where riparian or shrubland habitats are removed along Diamond or Crow creeks. This could occur in road Alternatives R1 and R2 on lower Crow Creek in the southeast corner of the base if the proposed new road is constructed, or on upper Crow and Diamond creeks in Alternatives R2 and R3. Since the amount of riparian habitat available for deer on the base is relatively limited, the impact is considered significant, short and long term for any of the three road alternatives. However, due to the relatively low quantity of habitat potentially affected, the impact level is low. The greatest impact among the three road alternatives would occur with Alternative R2, where both upper and lower portions of Crow Creek, and upper Diamond Creek, would be affected.

Noise and vehicular movement from construction activities and operations may result in stress-related impacts to pronghorn, mule deer, and white-tailed deer. Daily or seasonal movements may be affected, as well as feeding habits. Significant, low level, short-term impacts could result locally. Big game using the base are presently exposed to a substantial amount of human disturbance, and due in part to their mobility, are able to acclimate to the relatively constant activity levels.

Therefore, project-related construction disturbances should not result in substantial impacts to big game on the base. Construction disturbances to pronghorn could potentially occur at the SSA and its connecting road to the east. Deer populations (both species) could experience construction-activity

impacts from the WSA road or connecting alternatives at the Diamond or Crow Creek crossings, as discussed above.

A short-term increase in road kills and recreation pressure may occur on the base, due to increased traffic and population associated with the project. However, impacts would be negligible because of the small projected increase in the F.E. Warren AFB population.

The expansion of existing aggregate quarries for project-related construction could potentially result in significant impacts to big game if the quarries are located in relatively sensitive or limited big game habitat. This would include pronghorn and mule deer critical-winter-yearlong habitat or migration routes in Wyoming and areas of high deer density in Nebraska. Long and short-term habitat loss or short-term construction disturbances at quarry sites in these habitat types would result in significant impacts to these big game species. These impacts would potentially occur on a low level since the project would only expand the extent of a presently disturbed site. Habitat loss and construction activity impacts at quarry sites located in other habitat types would be negligible due to the lower sensitivity and widespread distribution of these habitats. Indirect impacts potentially occurring at quarry sites include increases in road kills and in poaching of big game. However, it is anticipated that these impacts would occur on a low and not significant level to big game populations in the area since impacts would be very localized, and the relative daily and seasonal movement of big game in the area is low.

The use of dispatch stations for construction personnel at Cheyenne, F.E. Warren AFB, or Kimball would not result in any significant impacts to big game species. Urban habitat types or land adjacent to urban areas would most likely be used for dispatch stations. Big game habitat in such locations would probably be low in quality or even nonexistent, with a considerable amount of human activity occurring in the area. Impacts on big game are expected to be negligible.

Overall impact levels for big game will be short and long term, low, and significant due to construction activity disturbances and loss of habitat in the Flight portion of the ACS or at F.E. Warren AFB. Short-term impacts in the ROI will be significant and moderate due to increased recreation pressures at areas currently receiving heavy recreational pressures.

3.5.2.2 Furbearers

3.5.2.2.1 Baseline Future - No Action Alternative

Furbearer resources, under normal conditions, tend to vary in population size over time and location due to range or habitat condition, unpredictable weather conditions, disease, and annual hunting and trapping pressures. Human population-related pressures have caused almost all of these species to come under some degree of direct or indirect human management. Management agency goals are to maintain these populations in an approximate equilibrium with the available habitat that can support them. These goals may allow varying levels of annual harvest in this equilibrium or may just permit preservation of the species. Management goals may also include habitat (vegetation) restoration or preservation of specific habitat types that are important or critical to

the species survival. Trends in population size for the most actively managed species will vary depending on the agency perception of the need to increase, decrease, or maintain a specific population. These perceptions and goals can and do vary over time because of public and private agency concerns, pressures, and/or perceptions of value, usefulness, and/or extent of the resource. Therefore, the existing conditions are assumed to reflect the general conditions for the future with the expectation that there will be increasing land use and recreational pressures.

3.5.2.2.2 Proposed Action

Analysis of impacts on furbearers is based on the future baseline conditions. Increased hunting and trapping pressures are expected to have negligible to low impacts that are not significant on furbearers in the ROI and ACS because projected population increases are anticipated to be short term, and trapping in the area is done primarily by long-term local residents. Bobcat and spotted skunk are NGPC species of concern (NGPC, personal communication, 1983), and the swift fox is listed by the WGFD as a species of high research/management priority (WGFD 1977) Increased hunting and trapping pressures are expected to have low impacts on these species.

Poaching and random shooting of furbearers in the ROI and ACS may increase as project-related human populations increase. These impacts are expected to be short term and low, but not significant due to the nocturnal habits or secretive nature of furbearer species.

Habitat loss due to construction activities from access road modifications and installation of communication cables will have short and long-term, low-level impacts that are not significant on furbearers in riparian areas within the Flights due to the limited regional extent of these habitats and the necessary recovery time for revegetation. Furbearers that utilize these habitats are characteristically mobile with high reproductive and dispersion rates. Habitat loss in grassland areas is expected to have negligible impacts on furbearer populations. Access road overpass modifications will also result in negligible impacts due to minimal loss of habitat in already disturbed areas. Road kills and construction noise impacts may occur, but will result in negligible impacts to furbearers.

Loss of riparian habitat due to construction activities associated with the Proposed Action road Alternative (R2) on Diamond and Crow creeks within F.E. Warren AFB may result in short and long-term, low-level impacts that will not be significant on furbearer populations. The quantity of riparian habitat is limited within F.E. Warren AFB, and construction-related impacts may cause the temporary displacement of red fox, long-tailed weasel, striped skunk, beaver, muskrat, and raccoon. Road Alternative R3, designed to use Round Top Road to access Interstate 80, would result in the lowest impacts to furbearer species of the three road alternatives because new bridge construction on lower Crow Creek near base Gate No. 2 would not be required. Disruption or loss of grassland furbearer habitats will be minimal and is expected to have negligible impacts on furbearer populations within F.E. Warren AFB.

No increase in furbearer trapping pressure is expected on F.E. Warren AFB due to the restriction of base trapping permits. A limit of two to three base

personnel are permitted to trap annually; consequently impacts will be negligible.

Negligible impacts to furbearer populations would occur from poaching or random shooting on F.E. Warren AFB. Hunting is not permitted and trapping is closely regulated; consequently little illegal killing of furbearers is anticipated on the base.

If proposed aggregate quarry sites are selected that affect the limited aquatic or riparian habitats of the region, long-term, low-level but not significant impacts would occur on furbearers from habitat loss and construction disturbances. Dispatch stations for the project are expected to be located on land adjacent to urban areas, and impacts to furbearers are expected to be negligible.

Overall impacts on furbearers will be short and long term, low and not significant throughout the ACS due to loss and disturbance of aquatic and riparian habitat, increases in hunting and trapping pressures, and poaching. The impacts will be low and not significant in the ROI for the short term because of increases in hunting and trapping pressures and poaching.

3.5.2.3 Nongame Mammals

3.5.2.3.1 Baseline Future - No Action Alternative

Nongame mammal resources, under normal conditions, tend to vary in population size over time (and location) due to range or habitat condition, unpredictable weather conditions, disease, and illegal hunting pressures. Human population-related pressures have caused some species of several of these groups to come under some degree of direct or indirect human management. Management agency goals are to maintain these populations in an approximate equilibrium with the available habitat that can support them. These goals may help to preserve the species in this equilibrium. Management goals may include habitat (vegetation) restoration or preservation of specific habitat types that are important or critical to the species survival. Trends in population size for the most actively managed species will vary depending on the agency perception of the need to increase, decrease, or maintain a specific population. These perceptions and goals can and do vary over time because of public and private agency concerns, pressures, and/or perceptions of value, usefulness, and/or extent of the resource. Therefore, the existing conditions are assumed to reflect the general conditions for the future with the expectation that there will be increasing land use and recreational pressures.

3.5.2.3.2 Proposed Action

Analysis of impacts on nongame mammals is based on the future baseline conditions. Direct construction-related impacts are expected to be negligible on nongame mammals in the ROI. Indirect impacts, including random shooting, are expected to be negligible due to the large population sizes and high reproductive rates of nongame mammals.

Installation of cables and proposed access road and overpass modifications would result in short and long-term loss of nongame mammal habitat within the ACS, as well as the probable short-term elimination of some individuals.

These impacts would be negligible on nongame mammal populations. Most nongame mammals occur in populations with relatively broad distributions. High reproductive and dispersion rates enable these species to reinvade disturbed areas as revegetation occurs. However, these impact levels may be moderate and significant if unique/rare species (such as the meadow jumping mouse) occur within the disturbed locales of the ACS.

Impacts from other project-related construction activities, including road and facility modifications or additions on F.E. Warren AFB, further use of existing quarry sites, and the use of dispatch stations for the project, are expected to be negligible because of the population characteristics of nongame mammals and the relatively small amounts of habitat involved.

Overall impact levels on nongame mammals in the ACS and the ROI are negligible during the short and long term because of the relatively broad distributions and high reproductive rates of these species.

3.5.2.4 Upland Game

3.5.2.4.1 Baseline Future - No Action Alternative

Upland game resources, under normal conditions, tend to vary in population size over time and location due to range or habitat condition, unpredictable weather conditions, disease, and annual hunting and trapping pressures. Human population-related pressures have caused almost all of these species to come under some degree of direct or indirect human management. Management agency goals are to maintain these populations in an approximate equilibrium with the available habitat that can support them. These goals may allow varying levels of annual harvest in this equilibrium or may just permit preservation of the species. Management goals may also include habitat (vegetation) restoration or preservation of specific habitat types that are important or critical to the species survival. Trends in population size for the most actively managed species will vary depending on the agency perception of the need to increase, decrease, or maintain a specific population. These perceptions and goals can and do vary over time because of public and private agency concerns, pressures, and/or perceptions of value, usefulness, and/or extent of the resource. Therefore, the existing conditions are assumed to reflect the general conditions for the future with the expectation that there will be increasing land use and recreational pressures.

3.5.2.4.2 Proposed Action

Analysis of impacts on upland game is based on the future baseline conditions. Indirect impacts of the proposed project potentially occurring to upland game in the ROI and ACS include an increase of hunting pressure, poaching, and random shooting. Additional Wyoming hunting recreation days due to project-related increases in human population would result in a peak-year (1987) increase in hunting days of 1.0 percent above the previous 5-year average (1978-1982) (WGFD 1982-a). The percentage increase in harvests resulting from these additional recreation days will be considerably below the increases needed to reach harvest objectives set by the WGFD for all but one species of upland game (ring-necked pheasant) (WGFD 1982-a). Therefore,

short-term, low-level, not significant impacts to upland game are anticipated in the Wyoming portion of the ROI and Flight area from increased hunting pressure.

The project-related increase in hunting pressure on upland game would have negligible, short-term impacts in the Colorado and Nebraska portions of the ROI. The expected project-related inmigration in Nebraska is less than 1 percent of the total present population in the Nebraska portion of the ROI. Most of the project-related population increases anticipated in Larimer and Weld counties of Colorado will originate from the Denver area, and no significant change in state hunting pressures are anticipated.

Poaching and random shooting impacts to upland game populations will be short term, low level, but not significant throughout the ROI and ACS as a result of the expected low increases in human population. Impact levels would also be low due to the large populations and/or secretive nature of some upland game species.

The construction of silo or access road modifications and placement of cable paths will result in habitat loss and construction activity impacts which are short and long term, low level, but not significant to upland game populations in the Flight area. Relatively small amounts of grassland, shrubland, or woodland vegetation may be disrupted in dispersed locations throughout the Flight area. Negligible impacts to abundant upland game species are anticipated due to the high fecundity or mobility of these species. Sage grouse and turkey are restricted to shrub and woodland habitats, respectively. Long-term, low-level, not significant impacts to these species are anticipated from habitat loss and construction disturbances since relatively low amounts of shrub or woodland habitat are located near silos or access roads. Access road overpass modifications will also result in negligible impacts due to minimal loss of habitat in already disturbed areas.

Habitat removed as a result of the proposed construction including road Alternative R2 and modification of facilities on F.E. Warren AFB will have short and long-term, low-level, but not significant impacts on upland game. Relatively small portions of widespread grassland habitat would be impacted by project construction. Although the quality of grassland habitat on the base is generally good, impacts to species such as the pheasant, sharp-tailed grouse, and bobwhite will be low because of their mobility and regional distributions. Species such as fox squirrel, mourning dove, and cottontail that utilize other habitat types would also receive low-level impacts because habitat loss in woodland, shrubland, or riparian habitats would be minimal. These three species are common on the base wherever suitable habitat exists. Road Alternative R3, designed to use Round Top Road to access Interstate 80, would result in the lowest impacts to upland game species of the three road alternatives because the removal of shrub and tree cover adjacent to lower Crow Creek would not be required.

Because hunting is not permitted on F.E. Warren AFB, very little poaching or random shooting of upland game will occur, and negligible impacts are expected.

Construction activity within aggregate quarries and dispatch stations will have long-term, low-level, not significant impacts on upland game species

because relatively small amounts of shrubland or woodland habitat would be affected.

Overall impacts on upland game will be short and long term, low and not significant throughout the ACS due to loss and disturbance of aquatic and riparian habitat, increases in hunting and trapping pressures, and poaching. The impacts will be low and not significant in the ROI for the short term because of increases in hunting and trapping pressures and poaching.

3.5.2.5 Waterfowl

3.5.2.5.1 Baseline Future - No Action Alternative

Waterfowl resources, under normal conditions, tend to vary in population size over time and location due to range or habitat condition, unpredictable weather conditions, disease, and annual hunting and trapping pressures. Human population-related pressures have caused almost all of these species to come under some degree of direct or indirect human management. Management agency goals are to maintain these populations in an approximate equilibrium with the available habitat that can support them. These goals may allow varying levels of annual harvest in this equilibrium or may just permit preservation of the species. Management goals may also include habitat (vegetation) restoration or preservation of specific habitat types that are important or critical to the species survival. Trends in population size for the most actively managed species will vary depending on the agency perception of the need to increase, decrease, or maintain a specific population. These perceptions and goals can and do vary over time because of public and private agency concerns, pressures, and/or perceptions of value, usefulness, and/or extent of the resource. Therefore, the existing conditions are assumed to reflect the general conditions for the future with the expectation that there will be increasing land use and recreational pressures.

3.5.2.5.2 Proposed Action

The proposed project is not expected to cause significant direct or indirect impacts to waterfowl. Direct impacts occurring in the ACS including F.E. Warren AFB would be associated with disruptions of riparian habitat. Indirect impacts refer to increased hunting pressures which would occur in the ROI and ACS. Hunting is not allowed on F.E. Warren AFB.

Project-related increased hunting pressure includes legal and illegal hunting. Project-related inmigration is projected to cause an increase in overall hunter recreation days. However, hunter recreation days are projected to increase by only about 1 percent during the peak population years, based on estimates of hunter recreation days for recent years in the ROI (Section 3.5.2.1.2). This increase is expected to drop off rapidly in the years following the peak population year. Because waterfowl are considered to be underutilized within the ROI, management goals are directed at increasing the waterfowl harvest (WGFD n.d.-a). The impacts resulting from the increase in hunting pressure related to the proposed project is expected to be short term, low, and not significant.

Illegal hunting (poaching and random shooting) may increase within the ROI and ACS as a result of the proposed project. However, the increase would result

in short-term, low impacts that are not significant. These impacts would be low due to the relatively low numbers of project-related inmigrants expected in the ROI and ACS. The restriction of firearms in project areas during construction will also help minimize the impacts of illegal hunting in the ACS.

Direct impacts to waterfowl would be associated with habitat loss or disturbance. Within the Flight area, the Springer Wildlife Management Unit and Table Mountain Unit, both in Flight S, are of primary concern because they provide relatively high quality waterfowl habitat. However, the proposed project is not expected to impact the waterfowl habitat of either of these units. Upgrading of roads at stream crossings and construction of the cable system outside of these wildlife management units are not expected to disturb more than a minimal amount of high quality waterfowl habitat. Modifications of access road overpasses are not expected to impact waterfowl because of the lack of waterfowl habitat associated with these construction activities. These direct impacts would be short and long term, low level, and not significant because of the amount disturbed relative to the amount available.

Direct impacts to waterfowl would also occur on F.E. Warren AFB and would be associated with proposed construction of road and utility crossings of Diamond and Crow creeks. Alternative road access routes R1 and R2 would disturb waterfowl habitat along the eastern part of Crow Creek if the proposed new road and bridge to Gate No. 2 are constructed. Proposed new roads along the western boundary of F.E. Warren AFB (R2 and R3) would impact waterfowl habitat at crossing points on Crow and Diamond creeks. However, waterfowl habitat at these potential crossings and at the proposed utility line crossing of Crow Creek is not high quality. Based upon the quantity and quality of waterfowl habitat that may be disturbed, the proposed project is expected to result in short and long-term, low, and not significant impacts to waterfowl on F.E. Warren AFB.

Construction or expansion of aggregate quarries and dispatch stations are not expected to significantly affect waterfowl habitat. Expansion of aggregate quarries would not impact high quality waterfowl habitat because it is not known to occur within the ACS, other than in the Springer and Table Mountain Wildlife Management areas. Some quarries that may be used are located in upland situations away from any waterfowl habitat. Impacts on waterfowl from expansion of quarries would be low, short and long term, and not significant. Dispatch stations are expected to be placed adjacent to urban areas, which would not affect waterfowl. Impacts on waterfowl from construction of the alternate dispatch stations would be considered short term and negligible.

Overall impacts on waterfowl will be short and long term, low and not significant throughout the ACS due to loss and disturbance of aquatic and riparian habitat, increases in hunting and trapping pressures, and poaching. The impacts will be low and not significant in the ROI for the short term because of increases in hunting and trapping pressures and poaching.

3.5.2.6 Raptors

3.5.2.6.1 Baseline Future - No Action Alternative

Raptor resources, under normal conditions, tend to vary in population size over time (and location) due to habitat condition, unpredictable weather conditions, disease, and random shooting. Most of the raptor populations in the ACS are stable or increasing. However, the Swainson's hawk and ferruginous hawk are currently declining in numbers. Management agency goals are to maintain these populations in an approximate equilibrium with the available habitat that can support them. Goals may be limited to preservation of the species and/or may also include habitat (vegetation) restoration or preservation of specific habitat types that are important or critical to the species survival. Trends in population size for the most actively managed species will vary depending on the agency perception of the need to increase, decrease, or maintain a specific population. These perceptions and goals can and do vary over time because of public and private agency concerns, pressures, and/or perceptions of value, usefulness, and/or extent of the resource. Therefore, the existing conditions are assumed to reflect the general conditions for the future with the expectation that there will be increasing land use and recreational pressures.

3.5.2.6.2 Proposed Action

Analysis of impacts on raptors is based on the future baseline conditions. Raptors may experience direct and indirect impacts from the proposed project. Project-related construction and modification activities would cause direct impacts while recreational activities of project personnel would cause the indirect impacts (Table 3.5.2-1).

Indiscriminate or random shooting of raptors is considered to be one of the major mortality factors for raptors (Newton 1979; WGFD, personal communication, 1983), and may increase within the ROI as a result of the proposed project. However, because of the reproductive potential of some species such as the American kestrel, they may overcome losses due to shooting (Newton 1979). Indiscriminate shooting will have a short-term impact on raptor populations with a moderate to low-level rating, depending upon the extent of increased shooting and the species involved. Moderate impacts may occur in the short term during peak population years. These impacts are considered to be significant because of the potential effects of shooting on raptor population levels. Evaluation of biological data and operational workforce levels indicate that the regional long-term impact of random shooting of raptors is expected to be low and significant in the ACS and ROI.

Direct impacts include the disturbance of nesting raptors due to construction noise, vehicle, and human movements. Disruption of important habitat components, such as trees and small mammal burrows (burrowing owl nesting habitat) may impact raptors. These impacts would occur within the ACS and F.E. Warren AFB. Raptors may be easily disrupted during the early stages of the nesting cycle (courtship, egg laying, and incubation) by disturbances near the nest. Construction activity near a nest during this time may cause abandonment. Some raptors may not attempt renesting following abandonment of a nest. Therefore, the year's reproductive effort may be lost. The failure of one or a few nesting pairs could result in short-term impacts of a moderate

to low level depending upon the species involved and the status of their regional and national populations. With implementation of appropriate assumed mitigations the impact would be low. These impacts could be significant because of agency concerns about raptor production levels.

Of the more than 40 known raptor nests located within the ACS, 26 are within 1 mile of silos or access roads. At least 1 of these 26 nests occurs in each of the 10 Flights. Raptors nesting within each Flight may be disturbed by construction activity. However, with appropriate mitigations, impacts to nesting raptors may be avoided.

Trees provide raptors with perches, roosting sites, and nesting sites. With the implementation of assumed mitigations, the potential loss of raptor habitat through tree removal will be reduced to a low, significant, short and long-term impact.

Small mammal burrows provide the burrowing owl with nesting habitat. However, small mammal control and human development have reduced the potential nesting habitat of the burrowing owl (WGFD 1977). Implementation of appropriate assumed mitigations could minimize habitat loss impacts to the burrowing owl resulting in a low, significant, short-term impact level within the Flights.

Impacts to raptors resulting from the installation of the five proposed cables pathways would depend on the amounts and types of habitats disturbed by each cable. Cables RB1, PD1, PA5, PB1, and PA3 traverse areas with woodland and riparian habitats. With implementation of appropriate assumed mitigations, impacts due to loss of raptor habitat would be low, short and long term, and significant. A prairie dog town inhabited by burrowing owls is known to occur within cable Alternative SB1. Within Wyoming, the occurrence of burrowing owls within the other ten alternatives is not known. Following implementation of appropriate assumed mitigations, impacts to the burrowing owl would be low, short term, and significant if Alternative SB1 is selected or if any other alternative inhabited by burrowing owls is selected because of the owl's rare (Wyoming) status.

Installation of the cables may potentially impact raptors nesting along a proposed route by increased noise levels, vehicle, and human movement. Although none of the known raptor nests are located within 1 mile of a proposed cable route, other nests may potentially occur along the routes. The occurrence of raptor nests would be most likely along routes RB1, PD1, PA5, PB1, and PA3. If nesting occurs along a selected route and is disturbed while active, the impact may be short term, significant, and range from moderate to low depending upon the species involved and the status of their regional and national populations. With implementation of appropriate assumed mitigations the impact would be low. Modifications of access road overpasses are not expected to impact raptors. Due to the low quality of nesting habitat at proposed overpass locations, raptors are not expected to nest within the vicinity of these construction areas. Impacts to raptors from these modifications will be negligible.

Raptors on F.E. Warren AFB may be impacted by the proposed project. Construction of the proposed road between the WSA and Gate No. 2 (Alternatives R1 and R2) during the raptor breeding season may impact the Swainson's hawk nest near Gate No. 2. This impact would be moderate and significant because

of the Swainson's Federal Category Two status and short term due to the duration of road construction activity.

All three circulation road alternatives will cause a loss of raptor habitat. However, with implementation of appropriate assumed mitigations, impacts from this loss would be short and long term, low, and significant because of the limited number of trees in the area suitable for raptors.

Construction of the SSA and an access road from the SSA to Interstate 25 may impact the burrowing owl. If the burrowing owl occurs in the area, impacts would be short term, low, and significant because of the owl's rare status in Wyoming.

Impacts to raptors from construction-related activity at aggregate quarries and dispatch stations will depend upon the location of the sites and the amount and type of habitat disturbed. If raptor nests occur near these sites, impacts caused by disturbance and nest failure would be short term and moderate to low level depending upon the species involved and the status of their regional and national populations. These impacts would be significant because of agency concerns about raptor population levels.

Overall impacts on raptors will be moderate and significant for the short term in all areas because of an increase in the potential for random raptor shooting and disturbance to nesting. Long-term impacts will be low and significant in all areas because of the loss of raptor habitat and the increased potential for random raptor shooting.

3.5.2.7 Other Birds

3.5.2.7.1 Baseline Future - No Action Alternative

The other birds resource, under normal conditions, tends to vary in population size over time (and location) due to range or habitat condition, unpredictable weather conditions, disease, and illegal hunting pressures. Human population-related pressures have caused some species or several of these groups to come under some degree of direct or indirect human management. Management agency goals are to maintain these populations in an approximate equilibrium with the available habitat that can support them. These goals may help to preserve the species in this equilibrium. Management goals may include habitat (vegetation) restoration or preservation of specific habitat types that are important or critical to the species survival. Trends in population size for the most actively managed species will vary depending on the agency perception of the need to increase, decrease, or maintain a specific population. These perceptions and goals can and do vary over time because of public and private agency concerns, pressures, and/or perceptions of value, usefulness, and/or extent of the resource. Therefore, the existing conditions are assumed to reflect the general conditions for the future with the expectation that there will be increasing land use and recreational pressures.

3.5.2.7.2 Proposed Action

Analysis of impacts on other birds is based on the future baseline conditions. The proposed project is expected to have negligible impacts that are not significant on other birds. No direct impacts are anticipated within the ROI. Indirect impacts such as random shooting are considered to be negligible because of the relatively high reproductive rates, widespread distributions, and relatively large populations of these species. Construction activities within the Flights and on F.E. Warren AFB are also expected to be negligible.

Impacts to other birds from permanent and temporary loss of habitat in the Flights and on F.E. Warren AFB would be negligible and not significant because these species are widely distributed, mobile, and an extensive amount of alternate habitat is available. Direct mortality would be limited to species with immobile young. Impacts from this loss would be negligible and not significant because of the relatively high reproductive rates of these species.

Temporary and permanent habitat losses and direct loss of life may also result from the expansion of aggregate quarries and construction of dispatch stations. These losses are expected to have negligible impacts on other bird species.

Overall, impact levels on other birds in the ACS and the ROI are negligible during the short term because of relatively broad distributions and high reproductive rates of these species.

3.5.2.8 Amphibians and Reptiles

3.5.2.8.1 Baseline Future - No Action Alternative

Reptile and amphibian resources, under normal conditions, tend to vary in population size over time (and location) due to range or habitat condition, unpredictable weather conditions, disease, and illegal hunting pressures. Human population-related pressures have caused some amphibian and reptile species to come under some degree of direct or indirect human management. Management agency goals are to maintain these populations in an approximate equilibrium with the available habitat that can support them. These goals may help to preserve the species in this equilibrium. Management goals may include habitat (vegetation) restoration or preservation of specific habitat types that are important or critical to the species survival. Trends in population size for the most actively managed species will vary depending on the agency perception of the need to increase, decrease, or maintain a specific population. These perceptions and goals can and do vary over time because of public and private agency concerns, pressures, and/or perceptions of value, usefulness, and/or extent of the resource. Therefore, the existing conditions are assumed to reflect the general conditions for the future with the expectation that there will be increasing land use and recreational pressures.

3.5.2.8.2 Proposed Action

Analysis of impacts on reptiles and amphibians is based on the future baseline conditions. The proposed project would not cause any significant impacts to amphibian and reptile populations in the ROI. No direct impacts such as habitat loss or mortality will occur within the ROI outside the ACS. Indirect impacts resulting from an increase in the regional human population, including random shooting of rattlesnakes and other species, will be negligible to the populations of these animals due to their secretive nature and relatively wide distributions. Negligible impacts are expected for the unique/rare amphibian and reptile species within the ROI outside the ACS, including the Wyoming toad, pale milk snake, western smooth green snake, and wood frog.

Both long and short-term habitat loss for amphibians and reptiles may occur at silos, access roads (including overpasses), and cable paths within the ACS. Short-term construction activities at these sites may result in the direct mortality of individual amphibians and reptiles because their mobility is relatively low. These impacts are considered negligible due to the relatively broad distributions of most species (Table 2.6.2-17), and their relatively high recovery rates. Disturbed areas may be repopulated as revegetation occurs. In addition, these impacts will be dispersed over a large number of sites within the ACS, reducing the potential for the loss of concentrated areas of habitat. However, impact levels may be low and significant if the pale milk snake occurs at potentially impacted areas in the ACS.

No sensitive amphibian or reptile habitats occur within the cable path alternatives (Table 2.6.2-17). Although the range of the pale milk snake may include portions of several cable paths, the actual occurrence of this species has not been verified at these sites.

Habitat loss and the direct loss of individual amphibians and reptiles may occur as a result of construction activities on F.E. Warren AFB and other disturbed areas. These impacts may occur at the WSA, SSA, connecting roads, and utility corridors on F.E. Warren AFB, and at aggregate quarries and dispatch stations. Impact levels resulting from habitat loss or direct mortality will be negligible, due to the relatively low quantity of habitat affected, and the relatively broad distributions and high recovery rates of these species.

Overall impacts on reptiles and amphibians in the ACS and the ROI are negligible during the short and long term because of the relatively broad distributions and high reproductive rates of these species.

3.5.3 Fisheries Resources

3.5.3.1 Baseline Future - No Action Alternative

Fisheries resources, under normal conditions, tend to vary in population size over time (and location) due to habitat conditions, unpredictable changes in streamflows disease, and annual fishing pressures. Human population-related pressures have caused many fish species to come under some degree of direct or indirect human management. Management agency goals are to maintain these populations in an approximate equilibrium with the available habitat that can support them. These goals may allow varying levels of annual take within this

equilibrium or may just permit preservation of the species. Management goals may also include habitat restoration, improvement measures, and preservation of specific habitat types that are important or critical to the species survival. Trends in population size for the most actively managed species will vary depending on the agency perception of the need to increase, decrease, or maintain a specific population. These perceptions and goals can and do vary over time because of public and private agency concerns, pressures, and/or perceptions of value, usefulness, and/or extent of the resource. Therefore, the existing conditions are assumed to reflect the general conditions for the future with the expectation that there will be increasing land use and recreational pressures.

3.5.3.2 Proposed Action

Analysis of impacts on fisheries is based on the future baseline conditions. The determination of significance for fisheries is generally based on the need to protect and maintain the fisheries. These concerns include the potential effects of increased fisherman take on the available resource and the need for increased management of the resource through increased stocking or restrictions on take as well as construction-related impacts to streams.

Aquatic resources in the ROI will not be impacted directly by construction activities. Fishing opportunities may decline due to the estimated increase in the fishing population projected for the period of project construction. A significant, short-term, low impact may occur on waters that are currently overfished or at fishing capacity. Long-term impacts due to increased fishing pressure in the ROI are expected to be negligible (Table 3.5.3-1).

Impacts from increased fishing pressure on South Dakota fisheries in the ROI are expected to be negligible and not significant.

Although population increases are anticipated in the Fort Collins and Greeley areas of Colorado during peak project years, most of these inmigrants would come from Denver. Consequently, increases in fishing pressure are expected to be negligible in the Colorado ROI.

Available data on the fisheries resources in the Nebraska portion of the ROI suggest that impacts from project-related increased fishing pressures during the peak-construction period will be short term, significant, and low. Long-term impacts will be negligible. Lake Minatare may receive some increase in fishing pressure from the Scottsbluff area. The North Platte and Niobrara rivers are anticipated to experience negligible fishing pressure impacts because these fisheries are limited by irrigation drawdown problems (NGPC, personal communication, 1983).

Impacts from increased fishing pressures in the Wyoming portion of the ROI as a result of project-related population increases are expected to be short term, significant, and low. The projected increase of 14,400 fisherman days during the peak year 1987 is less than 1 percent of the estimated annual number of user days in the Platte River drainage basin of Wyoming. It is anticipated that most of the fishing pressure increases will occur in areas that are relatively close to Cheyenne, such as the Laramie Plains Lakes, and Glendo Reservoir.

Table 3.5.3-1

BIOLOGICAL IMPACT ASSESSMENT/MITIGATION PLANNING CHART - FISHERIES

LOCATION	IMPACT			MITIGATION		RESIDUAL IMPACT LEVEL	
F.E. WARREN AFB	LEVEL[1]	TYPE[2]	DESCRIPTION	MEASURE[3,4]	EFFECT	ASSUMED MIT.	SUGGEST. MIT.
Diamond Creek	L	17	Loss of Habitat	5,6,c	Minimize extent and duration of disturbance	L	L
	L	16a	Increased turbidity	1,10,19,c	Minimize amount and duration of disturbance	L	L
	L	16b	Potential Petroleum Spills	5,6,c	Minimize amount and duration of	N	N
Crow Creek	L	17	Loss of Habitat	5,6,c	Minimize extent and duration of disturbance	L	L
	L	16a	Increased Turbidity	1,10,19,c	Minimize amount and duration of disturbance	L	L
	L	16b	Potential Petroleum Spills	5,6,c	Minimize amount and duration of disturbance	N	N
ACS Bear Creek	L	16a	Increased Turbidity	1,10,19,c	Minimize amount and duration of disturbance	L	L
	L	16b	Potential Petroleum Spills	5,6,c	Minimize amount and duration of duration	N	N

FOOTNOTES: 1 Unmitigated.
2 Impact Type (1,2,3), see Section 3.3.
3 Assumed Mitigations (1,2,3), see Section 3.2.
4 Suggested Mitigations (4,5,6), see Section 3.7.

Table 3.5.3-1 Continued
BIOLOGICAL IMPACT ASSESSMENT/MITIGATION PLANNING CHART - FISHERIES

LOCATION	IMPACT			MITIGATION		RESIDUAL IMPACT LEVEL	
ACS	LEVEL[1]	TYPE[2]	DESCRIPTION	MEASURE[3,4]	EFFECT	ASSUMED MIT.	SUGGEST. MIT.
Bear Creek	L	13a,17	Loss or Disruption of Salmonid Redds	1,5,19,g	Avoid construction activities during spawning periods	L	N
	L	15	Increased Fishing Pressure	j	Inform staff of potential violation and increased fishing pressure problems	L	L
Bushnell Creek	L	16a	Increased Turbidity	1,10,19,c	Minimize amount and duration of disturbance	N	N
	L	16b	Potential Petroleum Spills	5,16,c	Minimize amount and duration of disturbance	N	N
	L	16a,17	Loss or Disruption of Salmonid Redds	1,5,19,g	Avoid construction activities during spawning periods	L	N
	L	15	Increased Fishing Pressure	j	Inform staff of potential violation and increased fishing pressure problems	L	L
Chugwater Creek	L	16a	Increased Turbidity	1,10,19,c	Minimize amount and duration of disturbance	L	L
	L	16b	Potential Petroleum Spills	5,16,c	Minimize amount and duration of disturbance	N	N
	L	16a,17	Loss or Disruption of Salmonid Redds	1,5,19,g	Avoid construction activities during spawning periods	L	N
	L	15	Increased Fishing Pressure	j	Inform staff of potential violation and increased fishing pressure problems	L	L

Table 3.5.3-1 Continued
BIOLOGICAL IMPACT ASSESSMENT/MITIGATION PLANNING CHART - FISHERIES

LOCATION	IMPACT			MITIGATION		RESIDUAL IMPACT LEVEL	
ACS	LEVEL[1]	TYPE[2]	DESCRIPTION	MEASURE[3,4]	EFFECT	ASSUMED MIT.	SUGGEST. MIT.
Fourmile Draw	L	16a	Increased Turbidity	1,10,19,c	Minimize amount and duration of disturbance	L	L
	L	16b	Potential Petroleum Spill	5,16,c	Minimize amount and duration of disturbance	N	N
Horse Creek	L	16a	Increased urbidity	1,10,19,c	Minimize amount and duration of disturbance	L	L
	L	16b	Potential Petroleum Spill	5,16,c	Minimize amount and duration of disturbance	N	N
	L	16a,17	Loss or Disruption of Salmonid Redds	1,5,10,19,g	Avoid construction activities during spawning periods	L	N
	L	15	Increased Fishing Pressure	j	Inform staff of potential violation and increased fishing pressure problems	L	L
Little Bear Creek	L	16a	Increased Turbidity	1,10,19,c	Minimize amount and duration of disturbance	L	L
	L	16b	Potential Petroleum Spill	5,16,c	Minimize amount and duration of disturbance	N	N
	L	16a,17	Loss or Disruption of Salmonid Redds	1,5,10,19,g	Avoid construction activities during spawning periods	L	N
	L	15	Increased Fishing Pressure	j	Inform staff of potential violation and increased fishing pressure problems	L	L
Little Horse Creek	L	16a	Increased Turbidity	1,10,19,c	Minimize amount and duration of disturbance	L	L

Table 3.5.3-1 Continued
BIOLOGICAL IMPACT ASSESSMENT/MITIGATION PLANNING CHART - FISHERIES

LOCATION	IMPACT			MITIGATION		RESIDUAL IMPACT LEVEL	
ACS	LEVEL[1]	TYPE[2]	DESCRIPTION	MEASURE[3,4]	EFFECT	ASSUMED MIT.	SUGGEST. MIT.
Little Horse Creek	L	16b	Potential Petroleum Spills	5,16,c	Minimize amount and duration of disturbance	N	N
	L	16a,17	Loss or Disruption of Salmonid Redds	1,5,19,c	Avoid construction activities during spawning periods	L	N
	L	15	Increased Fishing Pressure	j	Inform staff of potential violation and increased fishing pressure problems	L	L
Lodgepole Creek	M	16a	Increased Turbidity	1,10,19,c	Minimize amount and duration of disturbance	M	M
	M	16b	Potential Petroleum Spills	5,16,c	Minimize amount and duration of disturbance	N	N
	L	15	Increased Fishing Pressure	j	Inform staff of potential violation and increased fishing pressure problems	L	L
Lonetree Creek	L	16a	Increased Turbidity	1,10,19,c	Minimize amount and duration of disturbance	L	L
	L	16b	Potential Petroleum Spills	5,16,c	Minimize amount and duration of disturbance	N	N
Robb Draw	L	16a	Increased Turbidity	1,10,19,c	Minimize amount and duration of disturbance	L	L
	L	16b	Potential Petroleum Spills	5,16,c	Minimize amount and duration of disturbance	N	N

Table 3.5.3-1 Continued
BIOLOGICAL IMPACT ASSESSMENT/MITIGATION PLANNING CHART - FISHERIES

LOCATION	IMPACT			MITIGATION		RESIDUAL IMPACT LEVEL	
ACS	LEVEL[1]	TYPE[2]	DESCRIPTION	MEASURE[3,4]	EFFECT	ASSUMED MIT.	SUGGEST. MIT.
Robb Draw	L	15	Increased Fishing Pressure	j	Inform staff of potential violation and increased fishing pressure problems	L	L
Spring Creek	L	16a	Increased Turbidity	1,10,19,c	Minimize amount and duration of disturbance	L	L
	L	16b	Potential Petroleum Spills	5,16,c	Minimize amount and duration of disturbance	N	N
	L	16a,17	Loss or Disruption of Salmonid Redds	1,5,19,g	Avoid construction activities during spawning periods	L	N
	L	15	Increased Fishing Pressure	j	Inform staff of potential violation and increased fishing pressure problems	L	L

FOOTNOTES: 1 Unmitigated.
2 Impact Type (1,2,3), see Section 3.3.
3 Assumed Mitigations (1,2,3), see Section 3.2.
4 Suggested Mitigations (a,b,c), see Section 3.7.

Aquatic resources within the ACS may be impacted by project-related population increases and direct construction activities associated with stream crossings.

Construction of proposed access roads and cable paths at stream crossings within and adjacent to the Flights may cause an increase in the turbidity levels in perennial streams. Intermittent drainages are not expected to be impacted if construction activities occur during no-flow periods. Although the effects of relatively long term or heavy silting on fishes have been known to cause egg mortality, tissue, and epithelial damage and the reduction and/or shifting of benthic organisms (Gammon 1970), proposed construction activities at stream crossings are expected to be short term. Fish reportedly tend to avoid turbid waters when possible, and available information suggests fingerling and adult fishes are tolerant to temporary periods of increased turbidities. Impacts resulting from increased turbidity levels are anticipated to be significant, short term, and low level on streams within and adjacent to the Flight areas (Table 3.5.3-1, Figure 3.6.1-1).

Implementation of the assumed mitigation measures (restriction of vehicle maintenance activities to areas away from stream banks, and the placement of construction lay down areas outside of riparian or other sensitive areas) will prevent petroleum spills within streams. Therefore, the impacts are expected to be negligible and not significant. However, in the event of an accidental petroleum spill (motor oil, gasoline, and diesel fuel), impacts due to water quality changes may be short term, low level, and significant. Impacts from habitat degradation due to construction activity in streambeds are expected to be significant, low level, and short term (Table 3.5.3-1, Figure 3.6.1-1).

Project-related population increases may increase the amount of fishing pressure on streams within and adjacent to the Flight areas. Aquatic resources that contain game fish include Horse, Chugwater, Bushnell, Bear, Richeau, Little Horse, Maxwell, and Spring creeks (WGFD 1983-b), and Oliver Reservoir (NGPC, personal communication, 1983).

Oliver Reservoir in Kimball County is expected to receive most of the fishing pressure in Nebraska because it is relatively close to Cheyenne and has recently been renovated.

An increase in fishing violations such as fishing without a proper license and keeping fish over the limit may be expected. Fishing pressure impacts within the ACS are expected to be significant, short term, and low. Long-term impacts are anticipated to be negligible.

Aquatic resources within F.E. Warren AFB that may be directly impacted by construction-related activities with the R1, R2, or R3 alternatives include Crow and Diamond creeks. Increased turbidities may result from construction activities associated with stream crossings. These impacts are expected to be significant, short term, and low (Table 3.5.3-1). Habitat loss due to road grading at Diamond Creek may also occur during construction, and significant, short-term, and low-level impacts will result, as it is anticipated that normal and springtime flows would return streambed conditions to preproject status. Impacts due to population increases on current fishing pressures at Crow and Diamond creeks are expected to be negligible because of the low quality of the existing sport fishery.

Potential removal of sand and gravel from aggregate quarries located in or adjacent to streambeds may cause short-term increased turbidities and habitat loss. These impacts are anticipated to be short term, significant, and low level (Table 3.5.3-1). A long-term impact that may occur as a result of sand and gravel removal from streambeds would be the formation of pools. If properly designed, this could potentially provide improved fish habitat and consequently increased fishing opportunities. No impacts due to construction of the dispatch stations or overpass modifications are expected on fisheries resources.

Overall impact levels on the fisheries will be low and significant in the short term in the Flight areas and on F.E. Warren AFB due to construction-related disturbances such as increased siltation and potential habitat loss. Impact levels due to increased fishing pressures are expected to be short te , significant, and low level in the Flight areas and ROI. Long-term impacts on fisheries are anticipated to be negligible.

3.5.4 Unique and Sensitive Habitats

3.5.4.1 Vegetation

3.5.4 1.1 Baseline Future - No Action Alternative

Past and current trends in human population-related impacts on the unique and sensitive vegetation resources will be expected to continue and be a representative projection of future baseline. Unique and sensitive vegetation communities continue to be impacted by human demands such as grazing, agriculture, and other land use developments. Quantity and quality of unique and sensitive vegetation continues to decline. The rates of change are dependent on management agency and public perceptions of value, usefulness, and/or extent of the resource. Under normal conditions, populations vary in size over time due to natural successional changes, unpredictable weather, wildfire, and floods. Future baseline is expected to continue with the same type of vegetation changes brought about by urban and agricultural land use and wildlife habitat and recreation management policies that influence unique and sensitive vegetation at present. Therefore, the existing conditions are assumed to reflect the general conditions for the future with the expectation that there will be increasing land use and recreational pressures.

3.5.4.1.2 Proposed Action

Analysis of impacts on unique vegetation is based on future conditions. No significant impacts to vegetation are anticipated within the ROI since direct project-related impacts will be limited to the ACS and closely adjacent areas. The impacts to unique and sensitive vegetation are significant because of the unique character of the vegetation.

Riparian zones in the ACS may be adversely affected due to construction-related disturbances. The estimated acreage of riparian vegetation that may be disturbed along road corridors within Flights is delineated on Tables 3.5.1-1 and 3.5.1-2. It is expected that less than 1 acre of riparian vegetation will be disturbed along road corridors outside of the Flight portion of the ACS. The estimated acreage of riparian vegetation that may be disturbed along the 11 alternative cable paths is delineated on Table 3.5.1-3.

Disturbance to riparian and associated wetland areas will constitute significant, moderate, short-term impacts within the Flights and on F.E. Warren AFB. Impacts to riparian and wetland areas are significant due to specific concerns stated in the Council on Environmental Quality regulations such as, "unique characteristics of the geographic area such as the proximity to 'wetlands' or ecologically critical areas." Short-term impacts on riparian areas associated with DAR and cable installation activities include loss of vegetation and increased erosion potential. Long-term impacts reflect the length of time required for revegetation and recovery of the tree and shrub components of riparian and wetland habitats after disturbance. Disturbance impacts to riparian vegetation will be significant and moderate in the short term and significant and low level in the long term.

Impacts related to project activities will have a significant, moderate short-term impact and a significant, low-level, long-term impact on riparian vegetation along Crow and Diamond creeks on F.E. Warren AFB. These impacts will be short and long term, primarily due to the length of time necessary for recovery of shrubs and trees following disturbances and to the loss of riparian habitat due to the expansion, modification, and construction of roads. The riparian vegetation also provides known areas of habitat for the U.S. Fish and Wildlife Service (USFWS) Category One species, the Colorado butterfly plant, as well as potential habitat for expansion of the species population. Impacts which will be significant and which could also affect riparian vegetation in an unnamed drainage near Cheyenne Road and Parade Avenue on F.E. Warren AFB will be moderate over the short term and low level during the long term.

With implementation of the appropriate assumed mitigations, the three alternative new road configurations, i.e., R1, the Proposed Action-R2, and R3, including the offbase circulation corridors, will have significant, moderate, short-term, and low-level, long-term, site-specific impacts to riparian habitat. These impacts will be significant because of the unique character, limited distribution of the riparian vegetation within the region, and its relatively high quality as a result of the general protection afforded by being on F.E. Warren AFB. The offbase impacts are negligible and not significant at the Interstates 25 and 80 interchanges and along Round Top Road south of the F.E. Warren AFB boundary. Low and moderate impacts in both the short and long term which are significant on riparian vegetation will occur at Crow and Diamond creeks, along the Proposed Action north/south roadway alignment which are portions of the R2 and R3 alternatives. High, short and long-term significant impacts will occur at the Crow and Diamond Creek crossings on the Round Top Road design option due to the potential for increased disturbance to the streambed and flow characteristics that may affect downstream riparian habitats. Alternatives R1 and R2 will also have moderate, short-term, low-level and long-term, significant impacts on riparian habitat at an unnamed drainage on the southern roadway alignment although the impact will be somewhat lower than that at the Crow and Diamond Creek crossings. Impacts to riparian vegetation will be negligible if the design option to Alternative R1 is selected. With implementation of the appropriate assumed mitigations, the east/west roadway (Happy Jack Road alignment) associated with the R1 and R2 alignments will have significant moderate, short-term, low-level, long-term impacts on riparian vegetation at the Crow Creek crossing near base Gate No. 2. Impacts on riparian vegetation due to expansion of the cone of depression due to water level lowering around the

Cheyenne wellfield (as described in Water Resources Section 3.2.1.4.4.2) are expected to be short and long term, low and significant. With implementation of the appropriate suggested mitigations, the impacts would be negligible.

If riparian vegetation is present at aggregate quarry sites, impact levels may vary depending on the amount of disturbance. If riparian vegetation occurs near potential dispatch stations, impacts may occur. However, due to the small acreages involved this will be a negligible impact. No impacts on riparian vegetation are expected to occur because of proposed overpass modifications.

Overall impact levels on unique and sensitive vegetation in the Flight and F.E. Warren portions of the ACS are significant and moderate during the short term, and significant and low level during the long term because of vegetation loss and habitat disturbance.

3.5.4.2 Wildlife

3.5.4.2.1 Baseline Future - No Action Alternative

Unique and sensitive wildlife species and habitat resources, under normal conditions, tend to vary in population size over time (and location) due to range or habitat condition, unpredictable weather conditions, and disease. Human population-related pressures have caused most unique and sensitive wildlife populations (species) to come under some degree of direct or indirect human management. Management agencies' goals are to maintain these populations in an approximate equilibrium with the available habitat that can support them. These goals may include preservation of the species, habitat (vegetation) restoration, and/or preservation of specific habitat types that are important or critical to the species survival. Trends in population size for the most actively managed species will vary depending on the agency perception of the need to increase, decrease, or maintain a specific population. These perceptions and goals can and do vary over time because of public and private agency concerns, pressures, and/or perceptions of value, usefulness, and/or extent of the resource. Therefore, the existing conditions are assumed to reflect the general conditions for the future with the expectation that there will be increasing land use and recreational pressures.

3.5.4.2.2 Proposed Action

Analysis of impacts on unique and sensitive wildlife habitat is based on the future baseline conditions. No significant direct impacts are anticipated to occur to unique or sensitive wildlife habitat within the ROI outside the ACS. The project will not directly cause habitat loss, construction activity disturbances, or mortality in the region. Potential indirect impacts occurring to wildlife in the ROI are discussed in Sections 3.5.2.1 through 3.5.2.8.

Unique or sensitive wildlife habitats potentially impacted by the project within the ACS include the pronghorn migration route in the northern portion of Flight Q, and mule deer critical-winter-yearlong habitat along Horse and Chugwater creeks, also within Flight Q. Potential project-related impacts occurring in these areas include construction activity disturbances, increases in mortality from road kills, illegal poaching of big game, and limited

habitat loss. Construction disturbances (including noise and vehicle movement at silos and access roads) and increased mortality (road kills and illegal poaching), may cause significant, short-term, low-level impacts to pronghorn and mule deer within these sensitive areas. Negligible impacts due to habitat loss are anticipated because of the small quantity of affected habitat. The modification of overpasses on State Highway 71 near Kimball and Interstate 25 near Cheyenne will have negligible impacts on unique or sensitive wildlife habitat because of the high level of present disturbances at these sites. Impact levels are based on the localized short duration of activity, species mobility, and the WGFD'S ability to manage big game populations.

No impacts to unique or sensitive wildlife habitat occur within the cable paths or on F.E. Warren AFB. Potential impacts because of the expansion of existing aggregate quarry sites may reduce pronghorn, mule deer, or elk critical-winter-yearlong habitat. Short and long-term loss of habitat and short-term construction disturbances may potentially occur at these sites if critical habitat is affected. Significant, low-level impacts are predicted from these effects because the project would be expanding the extent of a presently disturbed site, with low quantities of habitat affected. A short-term increase in the incidence of road kills and illegal killing of big game may also occur. However, it is expected that these impacts would be negligible since the increase in human activity would be very localized.

Unique or sensitive wildlife habitat will receive no significant impacts from proposed dispatch stations since no unique or sensitive wildlife habitat is known to occur near Cheyenne, on F.E. Warren AFB, or near Chugwater or Kimball, where dispatch stations may be located.

Overall impacts on unique and sensitive wildlife habitat in the Flight and F.E. Warren portions of the ACS and ROI are negligible in the short and long term because of the minimal quantity of dispersed habitat affected.

3.5.4.3 Fisheries Resources

3.5.4.3.1 Baseline Future - No Action Alternative

No unique and sensitive aquatic habitats are known to occur within the study area.

3.5.4.3.2 Proposed Action

No unique and sensitive aquatic habitats are known to occur within the study area.

3.5.5 Threatened and Endangered Species

3.5.5.1 Vegetation

3.5.5.1.1 Baseline Future - No Action Alternative

Past and current trends in human population-related impacts on the native vegetation supporting rare, threatened, and endangered plant resources will be expected to continue and be a representative projection of future baseline. In many cases, native vegetation communities that support such species

continue to be impacted by human demands such as grazing, agriculture, and other land use developments. Quantity and quality of the native vegetation continues to decline. The rates of change are dependent on management agency and public perceptions of value, usefulness, and/or extent of the resource and the legal status of the habitat. Under normal conditions, populations vary in size over time due to natural successional changes, unpredictable weather, wildfire, and floods. Future baseline is expected to continue with the same type of vegetation changes brought about by urban and agricultural land use and wildlife habitat and recreation management policies that influence threatened and endangered plants or their habitat at present. Therefore, the existing conditions are assumed to reflect the general conditions for the future with the expectation that there will be increasing land use and recreational pressures.

3.5.5.1.2 Proposed Action

Analysis of impacts on threatened, endangered, and rare plant species is based on future baseline conditions. Ten federal-listed plant taxa may occur in the ROI; however, only the Colorado butterfly plant, a Category One species, will be adversely affected due to construction-related disturbances at F.E. Warren AFB. The other nine federally designated taxa will not be affected by the proposed project since project-related impacts will be limited to species within the more localized ACS. Fourteen plant species considered rare in either Wyoming or Nebraska are known to occur within the ACS but only the woolly milkvetch will receive project-related impacts.

No known individuals or populations of federal-listed threatened or endangered plant species will be adversely affected due to proposed road modifications within the Flights. The woolly milkvetch, a Wyoming rare species, may be impacted if road widening is necessary 1.5 miles south of Silo R-11. Road widening activities in excess of 10 meters from the existing road edge would result in the removal or burial of some individuals. It is not known if dust deposition from increased vehicular activity on the associated dirt road would adversely affect this late-spring flowering species. Known populations of 13 other state-listed rare species lie outside of a mile-wide corridor along access roads and would not be impacted by proposed project-related construction activities.

No known individuals or populations of federal-listed threatened or endangered, or state-listed rare plant species will be adversely affected due to modification of roadways outside of the Flights.

No known individuals or populations of federal-listed threatened or endangered plant species will be adversely affected due to silo modification. The rare (Wyoming) woolly milkvetch may be directly impacted at Silo P-2, since individuals were observed within a few meters of the access road and security fence around the silo. Short and long-term impacts to the woolly milkvetch at this silo site will be significant and moderate if widening of the access road or silo modification results in removal or burial of individual plants of this species. However, if construction at this site is contained within the already cleared perimeter area outside the security fence and existing access road, and staging and/or disturbance related to vehicle turn-around is minimal, the species will probably not be adversely affected.

No known individuals or populations of federal-listed threatened or endangered, plant species will be adversely affected due to installation of the proposed cables. The woolly milkvetch was observed within cable path SB1 where impacts may be short and long term, significant, and moderate. Similar impacts may be expected along other cable paths if it also occurs there.

The Federal-listed Category One Colorado butterfly plant and its critical habitat will be impacted by the transportation and utility corridor crossings of riparian habitat associated with Crow and Diamond creeks and an unnamed drainage near the intersection of Cheyenne Road and Parade Avenue. With implementation of appropriate assumed mitigations any short or long-term impacts to the population or habitat of the Colorado butterfly plant would be significant and moderate. Proposed facilities-related construction will not impact this species. The implementation of the Colorado butterfly plant biological study plan, to be developed as part of the Endangered Species Act, Section 7 consultation process, will provide the benefit of increased knowledge about the plant's ecology and biological functions. Such a study will help identify the potential for transplanting, or reestablishing and managing populations in appropriate habitat with a higher likelihood of success than might otherwise be possible.

With implementation of assumed mitigations, the three alterative new road configurations (the Proposed Action-R2, R1, and R3) will result in moderate, short and long-term significant impacts to the Colorado butterfly plant population within the base. The offbase circulation components of R1, R2, and R3 at the Interstates 25 and 80 interchanges and along Round Top Road south of the F.E. Warren AFB boundary will not affect the Colorado butterfly plant. Portions of the R2 and R3 alternatives along the north-south alignments will cross Colorado butterfly plant habitats onbase at Crow and Diamond creeks. The Proposed Action-R2 also crosses an unnamed drainage south of the WSA that supports the Colorado butterfly plant. With implementation of appropriate assumed mitigations, proposed new bridge construction at the onbase Crow Creek site and culvert upgrade at the onbase Ninth Street and Diamond Creek site will result in significant, moderate, short and long-term impacts. However, high, short and long-term, significant impacts will occur if the offbase Round Top Road design option to Alternatives R2 and R3 is utilized. Extensive roadwork is required on Round Top Road to provide 1) a temporary structure to maintain traffic over Crow Creek, 2) remove the existing timber trestle bridge, and 3) replace the bridge with a single span structure. In addition, a culvert extension and road widening will be required at the Diamond Creek crossing of the design option.

Portions of the R1 and R2 alternatives along the southern roadway alignments will cross Colorado butterfly plant habitat in an unnamed drainage of Cheyenne Road and Parade Avenue. Proposed road widening and culvert extension at this site will result in moderate, significant, short and long-term impacts. Further east along the southern alignment, moderate, significant, short and long-term impacts to Colorado butterfly plant habitat will also result from bridge construction across Crow Creek near base Gate No. 2. The impact levels for Alternative R1, while moderate, are somewhat lower than R2 and R3 because it does not cross Crow and Diamond creeks near the Colorado butterfly plant population. However, impacts to the Colorado butterfly plant will be negligible if the design option to Alternative R1 is selected.

Impacts at aggregate quarries may vary, depending upon the occurrence of threatened and endangered plant species in or adjacent to quarry sites. No threatened or endangered plant species are known to occur at alternative dispatch stations, therefore impacts would be expected to be negligible. If quarry sites near Laramie, Wyoming are utilized as aggregate sources, then impacts to the Federal Category One Laramie false sagebrush will need to be evaluated.

Overall impact levels for threatened and endangered plant species will be short and long term, moderate and significant in the Flights and F.E. Warren AFB within the ACS due to construction-related habitat disturbances and loss.

3.5.5.2 Wildlife

3.5.5.2.1 Baseline Future - No Action Alternative

Threatened and endangered wildlife resources, under normal conditions, tend to vary in population size over time (and location) due to range or habitat conditions, unpredictable weather conditions, disease, and annual hunting and trapping pressures. Human population-related pressures have caused threatened and endangered populations (species) to come under some degree of direct or indirect human management. Management agency goals are to maintain these populations in an approximate equilibrium with the available habitat that can support them. These management goals may include preservation of the species, habitat (vegetation) restoration, and/or preservation of specific habitat types that are important or critical to the species survival. Trends in population size for the most actively managed species will vary depending on the agency perception of the need to increase, decrease, or maintain a specific population. These perceptions and goals can and do vary over time because of public and private agency concerns, pressures, and/or perceptions of value, usefulness, and/or extent of the resource. Therefore, the existing conditions are assumed to reflect the general conditions for the future with the expectation that there will be increasing land use and recreational pressures.

3.5.5.2.2 Proposed Action

Analysis of impacts on threatened, endangered, and rare wildlife species is based on future baseline conditions. The proposed project could directly and indirectly impact one or more of the federal-listed or proposed species of wildlife. Wildlife species of special state concern may also experience direct or indirect impacts from the proposed project.

Impacts to wildlife species within the ROI would be indirect, resulting from the activities of project-related immigrants. Indiscriminate or random shooting may result in significant indirect impacts to wildlife (Table 3.5.2-1). Generally, indiscriminate shooting is one of the major mortality factors among bald eagles in the west (WGFD, personal communication, 1983). Indiscriminate shooting may have short-term, significant, and low impacts on the bald eagle within the ROI. This impact could peak during the years of maximum construction activity and decrease in the years following this construction period. Impacts from shooting may cause short-term low impacts on the bald eagle within the ACS.

The peregrine falcon, whooping crane, black-footed ferret, and Wyoming toad are not expected to experience significant indirect impacts from the proposed project. Indiscriminate (random) shooting would not significantly impact peregrine falcons or whooping cranes because their low occurrence within the ROI reduces the probability of shooting mortality. Black-footed ferrets and the Wyoming toad are not expected to experience indirect impacts because their potential populations are small and scattered in locations that are not readily accessible.

The burrowing owl and swift fox are two species of special state concern that may experience indirect impacts within the ROI and ACS. The burrowing owl may be impacted by indiscriminate shooting. The probability of this impact is considered to be small because of the owl's low occurrence. Therefore, this impact would be low, short term, and significant. Increased trapping pressure in the ROI due to the proposed project may impact the swift fox. This impact is expected to be significant, low level, and short term, because the human population increase caused by the project is expected to be relatively small.

Direct impacts would occur within the ACS and be associated with permanent and temporary loss of habitat. With the implementation of appropriate assumed mitigations, the types and amounts of habitat anticipated to be disturbed by the proposed project would not impact the peregrine falcon, bald eagle, or whooping crane.

The occurrence, distribution, and abundance of the black-footed ferret within the ACS are unknown. Prairie dog towns are known to occur adjacent to several silos and access roads; therefore, the ferret may also occur near these sites of construction activity. The black-footed ferret would be impacted by the proposed project if a prairie dog town is disrupted and inhabited by ferrets. Impacts will be negligible with implementation of assumed mitigation measures. However, if prairie dog towns inhabited by ferrets are disturbed, the resulting impacts to the black-footed ferret would be short and long term, high, and significant.

The black-footed ferret could experience short and long-term, high, and significant construction-related impacts if they occur in prairie dog towns on cable paths. However, impacts will be negligible with implementation of assumed mitigation measures.

Direct impacts in the ACS may also impact species of special state concern. The burrowing owl, mountain plover, swift fox, meadow jumping mouse, and pale milk snake all potentially occur within the ACS. If any of these species occur within habitat that will be disturbed, the impacts would be short term, low, and significant because the number of individuals potentially affected will be small.

Construction-related activity on F.E. Warren AFB is not expected to adversely affect federal-listed or candidate species of wildlife. The bald eagle, peregrine falcon, and whooping crane do not occur on F.E. Warren AFB except as occasional migrants. Prairie dog towns do not occur on F.E. Warren AFB therefore there is little potential for the black-footed ferret to occur within the base. Impacts to the Wyoming toad are not expected because its distribution is limited to the Laramie Basin.

Project-related construction activities may affect species of special concern to Wyoming. The burrowing owl is known to occur onbase; however, it is not known whether it occurs in the vicinity of the proposed road alternatives (R1, R2, and R3). If the burrowing owl does occur along any of the alternative routes developed, low, short-term, and significant impacts may result from construction of that route.

The occurrence, distribution, and abundance of the meadow jumping mouse on F.E. Warren AFB is unknown. However, suitable habitat does occur on the base along Crow and Diamond creeks. The meadow jumping mouse would be impacted if it occurs within the areas where construction of the proposed new roads cross its habitat. Road Alternatives R2 and R3 have the maximum potential for disturbing habitat suitable for the jumping mouse. Impacts to the meadow jumping mouse would be significant, low, and short term because of its high reproductive rate.

Expansion of aggregate quarries and construction of dispatch stations may impact federal and state species of special concern. However, since the location, amount, and types of habitats that may be disturbed by expansion of existing quarries are not specifically known, precise impacts to the species of special concern cannot be determined. If species of special concern occur on these locations, the impacts would be significant, but short term and low level because of mobility or potential high reproductive rates. Although the occurrence of species of special state concern on potential dispatch stations is unknown, impacts resulting from dispatch stations construction are expected to be negligible because of the small size and urban location of these areas. However, if one or more of these species does occur on a selected dispatch station the impacts would be low, short term, and significant.

Overall impact levels for threatened and endangered wildlife species are anticipated to be short term, significant, and low level in the Flight areas, F.E. Warren AFB, and the ROI due to project-related habitat loss, construction activity disturbances, and random shooting.

3.5.5.3 Fisheries Resources

3.5.5.3.1 Baseline Future - No Action Alternative

Threatened and endangered fisheries resources, under normal conditions, tend to vary in population size over time and location due to habitat condition, unpredictable changes in streamflow, disease, and annual fishing pressures. Human population-related pressures have caused many threatened and endangered fish species to come under some degree of direct or indirect human management. Management agency goals are to maintain these populations in an approximate equilibrium with the available habitat that can support them. These goals may permit preservation of the species by restriction of annual take. Management goals may also include habitat restoration, improvement measures, and preservation of specific habitat types that are important or critical to the species survival. Trends in population size for the most actively managed species will vary depending on the agency perception of the need to increase, decrease, or maintain a specific population. These perceptions and goals can and do vary over time because of public and private agency concerns, pressures, and/or perceptions of value, usefulness, and/or extent of the resource. Therefore, the existing conditions are assumed to

reflect the general conditions for the future with the expectation that there will be increasing land use and recreational pressures.

3.5.5.3.2 Proposed Action

Analysis of impacts on threatened and endangered and rare fish species is based on future baseline conditions.

No direct or indirect impacts from construction activities are expected to affect any state or federal-listed rare, threatened, or endangered fish species in the ROI. The expected minor increase in fishing pressure in the federally endangered greenback cutthroat trout habitat is expected to have negligible impacts on the species.

Direct construction-related activities associated with proposed DAR stream crossings on Lodgepole Creek within the ACS may have significant, short-term, moderate impacts on the orangethroat darter, if the species has become reestablished from downstream populations. This species is listed as an undetermined status by the WGFD and has a high research/management priority to maintain and increase present populations. The common shiner (rare status, Wyoming) may experience short-term, significant, and low impacts related to construction activities at access road and cable path stream crossings within the ACS. This species was collected in Bushnell Creek at cable path RB1 during the November 1983 field survey. Management agency concern is low for this species because populations appear to be stable, and may occur in several streams in southeastern Wyoming (WGFD, personal communication, 1983). Management practices to maintain or increase current population levels have been low.

Direct construction-related activities associated with the proposed access road configurations R1, R2, or R3 at stream crossings at Diamond and Crow creeks on F.E. Warren AFB may impact the common shiner. Although information on the abundance of this species is limited, data collected during the June 1983 field survey from Diamond and Crow creeks indicate common shiner populations appear to be stable within these streams. Construction-related impacts on these species such as increased turbidity levels and disruption of habitat are expected to be significant, short term, and low (WGFD, personal communication, 1983) (Table 3.5.3-1).

Implementation of the assumed mitigation measures (restriction of vehicle maintenance activities to areas away from stream banks, and the placement of construction lay down areas outside of riparian or other sensitive areas) will prevent petroleum spills within streams. Therefore, impacts are expected to be negligible and not significant. However, in the event of an accidental petroleum spill (motor oil, gasoline, and diesel fuel), impacts due to water quality changes may be short term, low level, and significant.

Overall impact levels for threatened and endangered fish species are expected to be short term, significant, and of moderate level within the Flight areas for the orangethroat darter due to construction-related disturbances such as increased turbidities and habitat disturbances. Impact levels will be short term, significant, and low level on F.E. Warren AFB due to construction-related activities for the common shiner.

3.6 Summary of Impacts

3.6.1 Impact Matrix

Using the input developed from the impact evaluation model, impacts to biological resource components (i.e., species, vegetation types, or habitat types) have been summarized (Figure 3.6.1-1) to present impact levels and significance for the Proposed Action. Site-specific areas are the locations within, or adjacent to, the ACS where impacts due to project activities will take place. Site-specific biological impacts occur in two distinct areas within the ACS, 1) the Flight area, and 2) F.E. Warren AFB. Regional impacts indicated in the matrix tables are based on direct or indirect impacts on biological resources that may occur within the broader ROI. There are no biological impacts designated as "local" because the biological impacts are not assessed by city jurisdiction or district boundary. Biological resources include the potentially affected vegetation, wildlife, and aquatic species. Threatened and endangered species are included, but because of their special legal status are discussed separately.

Site-specific impact levels differ between the Flight and F.E. Warren AFB portions of the ACS, with impacts on vegetation generally being higher on F.E. Warren AFB. The impacts in the regional context tend to be lower than site-specific impacts. The alternative cable paths, roads, and dispatch stations exhibit some differences in impact level among biological resource elements and among different alternatives (Figure 3.6.1-2). Nine of the 11 cable paths have low to moderate impact levels which are all significant, and 2 of the corridors have negligible impacts which are not significant based on general biological criteria. Consideration of threatened and endangered species indicates that with implementation of appropriate assumed mitigations, impacts on potential black-footed ferret habitat would be negligible. However, impacts on other species of state concern will be low, short term, and significant if they are present in the cable paths. There are general similarities for biological resource impacts among the road alternatives and among the dispatch station alternatives (Figure 3.6.1-2).

The impact level for biological resources in the Flight portion of the Area of Concentrated Study, excluding threatened and endangered species, is short term, low, and significant due to disruption of vegetation, fisheries, and wildlife habitat, although there are some site specific significant moderate level impacts on raptors (random shooting) and on unique and sensitive vegetation habitats (riparian). With implementation of the appropriate assumed mitigations, the biological impacts at F.E. Warrent AFB are moderate and significant due to disruption and loss of unique vegetation and disruption of raptor nesting for the short term. The overal impact level for the short term for biological resources in the ASC (site) (Figure 3.6.1-3) is moderate due to the weight given to the relatively unique character of the vegetation on F.E. Warren AFB, the impacts to raptors in the Area of Concentrated Study, and impacts to riparian/wetland vegetation in the Flight portion of the Area of Concentrated Study. Within the broader Region of Influence, the impacts are low and significant for the short term, although significant moderate impact levels (recreation pressures and random shooting) are included in the overall impact level.

LEGEND	ADVERSE IMPACTS	SIGNIFICANT ADVERSE IMPACTS
LOW	○	•
MODERATE	○	●
HIGH	◯	●

POTENTIAL BENEFICIAL EFFECTS

* MEASURE OF THE AMOUNT OF ENVIRONMENTAL CHANGE

	SHORT TERM				LONG TERM			
	SITE		LOCAL	REGIONAL	SITE		LOCAL	REGIONAL
	FLIGHTS	F.E. WARREN			FLIGHTS	F.E. WARREN		
BIOLOGICAL RESOURCES (SUMMARY)	•	●		•	• 2	● 1		
VEGETATION	•	●			• 1	● 1		
Prairie								
Short-grass								
Mixed-grass		◐				● 1		
Shrubland	•				• 1			
Meadow	•	●			• 1	● 1		
Woodland	•				• 1			
Rock Outcrop	•				• 1			
WILDLIFE	•	•		●	• 2	• 1		
Big Game	•	•		●		• 1		
Hunting Pressures	•			◦				
Winter-Yearlong- Habitat		•				•		
Yearlong Habitat		•				• 1		
Poaching	•			•				
Road Kills	•			•				
Recreation Pressures				●				
Construction Activity Disturbances	•	•						
Feral/Domestic Dog Kills	•			•				

1 Impacts are those generated by construction activities and having a long duration.

2 Impacts are those generated by construction activities and having a long duration as well as those generated only by operational activities.

BIOLOGICAL RESOURCES SUMMARY IMPACT MATRIX

FIGURE NO. 3.6.1-1

LEGEND	ADVERSE IMPACTS	SIGNIFICANT ADVERSE IMPACTS
LOW	○	•
MODERATE	○	●
HIGH	◯	●
POTENTIAL BIOLOGICAL EFFECTS	▒	
*MEASURE OF THE AMOUNT OF ENVIRONMENTAL CHANGE		

	SHORT TERM				LONG TERM			
	SITE		LOCAL	REGIONAL	SITE		LOCAL	REGIONAL
	FLIGHTS	F.E. WARREN			FLIGHTS	F.E. WARREN		
WILDLIFE (Continued)								
Furbearers, Upland Game and Waterfowl	○	○		○	○[1]	○[1]		
Furbearers Habitat	○	○			○[1]	○[1]		
Hunting/Trapping Pressure (Furbearers)	○			○				
Poaching (Furbearers)	○			○				
Upland Game Habitat	○	○			○[1]	○[1]		
Hunting Pressure (Upland Game)	○			○				
Poaching (Upland Game)	○			○				
Waterfowl Habitat	○	○			○[1]	○[1]		
Hunting Pressure (Waterfowl)	○							
Poaching (Waterfowl)	○							
Nongame Mammals, Other Birds, Reptiles, and Amphibians								
Nongame Mammal Habitat								
Other Bird Habitat								
Reptile and Amphibian Habitat								
Raptors	●	●		●	•[2]	•[1]		•
Raptor Habitat	•	•			•[1]	•[1]		
Random Raptor Shooting	●			●	•			•
Nesting Activity	•	●		•				

[1]Impacts are those generated by construction activities and having a long duration.

[2]Impacts are those generated by construction activities and having a long duration as well as those generated only by operational activities.

BIOLOGICAL RESOURCES SUMMARY IMPACT MATRIX

FIGURE NO. 3.6.1-1
Continued

LEGEND	ADVERSE IMPACTS	SIGNIFICANT ADVERSE IMPACTS
DEGREE OF IMPACT* LOW	○	•
MODERATE	○	●
HIGH	◯	●
POTENTIAL BENEFICAL EFFECTS	▒	

*MEASURE OF THE AMOUNT OF ENVIRONMENTAL CHANGE

	SHORT TERM				LONG TERM			
	SITE		LOCAL	REGIONAL	SITE		LOCAL	REGIONAL
	FLIGHTS	F.E. WARREN			FLIGHTS	F.E. WARREN		
FISHERIES RESOURCES	•	•		•				
Fisheries Habitat	•	•						
Turbidity	•	•						
Fishing Pressure	•			•				
UNIQUE AND SENSITIVE HABITATS	●	●			•[1]	•[1]		
Vegetation Habitat (Riparian)	●	●			•[1]	•[1]		
Wildlife Habitat (Critical-Winter-Yearlong-Habitat)								
Fisheries Habitat								
THREATENED AND ENDANGERED SPECIES	●	●		•	●[1]	●[1]		
Plants	●	●		•	●[1]	●[1]		
Wildlife	•	•		•				
Fish	●	•						

[1]Impacts are those generated by construction activities and having a long duration.

BIOLOGICAL RESOURCES SUMMARY IMPACT MATRIX

FIGURE NO. 3.6.1-1
Continued

LEGEND

LEVEL OF IMPACT Measure of the Amount of Environmental Change		
	Adverse Impacts	Significant Adverse Impacts
Low	o	•
Moderate	○	●
High	◯	◕
Potential Beneficial Effects	▒	

	Cable Paths[1]											Roads[2]			DISPATCH[3] STATIONS		
	Proposed Action					Alternatives											
	PA1	SB1	RB1	PA4	PA5	PD1	SB2	PB1	PA2	PA3	RB2	R1	R2	R3	Proposed	Alt.	None
BIOLOGICAL RESOURCES		●	●	•	●	●	•	●		●	◦	●	●	●			
VEGETATION		●	●	•	●	●	•	●		●	•	●	●	●			
WILDLIFE			•		•	•		•		•		●	●	◦			
FISHERIES			•		•	•		•		•		•	•	•			
THREATENED AND ENDANGERED SPECIES	•	●	•	•	•	•	•	•	•	•	•	●	●	●			

Notes: 1 Denotes specific cable paths. For location of cable paths see Section 1.1
2 For location of alternative routes see Section 1.1
3 For location of dispatch stations see Section 1.1

ALTERNATIVES COMPARISON MATRIX

FIGURE NO. 3.6.1-2

LEGEND		ADVERSE IMPACTS	SIGNIFICANT ADVERSE IMPACTS
LEVEL OF IMPACT*	LOW	○	●
	MODERATE	○	●
	HIGH	○	●
POTENTIAL BENEFICIAL EFFECTS			
* MEASURE OF THE AMOUNT OF ENVIRONMENTAL CHANGE			

	PROJECT IMPACTS					
	SHORT TERM			LONG TERM		
	SITE	LOCAL	REGIONAL	SITE	LOCAL	REGIONAL
Biological Resources	●		•	• [2]		
Threatened and Endangered Species	●		•	● [1]		

Note: [1] Impacts are those generated by construction activities and having a long duration.

[2] Impacts are those generated by construction activities and having a long duration as well as those generated only by operational activities.

SUMMARY OF PROPOSED ACTION IMPACTS

FIGURE NO. 3.6.1-3

With implementation of appropriate mitigation the long term overall impact level in the ACS (site) is low (Figure 3.6.1-3) although the loss of some components of the vegetation (mixed grass prairie and meadow) on F.E. Warren AFB will have moderate impacts (Figure 3.6.1-1). In the broader ROI the long term impacts will be negligible (Figure 3.6.1-3) although there is a long term, low, and significant regional impact due to random shooting.

Threatened and endangered species were not combined into the overall biological summary because of their legal status. Differences in site-specific impact levels within the ACS (Flights and F.E. Warren AFB) are due to differences in the effectiveness of the implementation of one or more of the assumed mitigations for the black-footed ferret and the Colorado butterfly plant. In addition, impact levels also differ due to the potential presence of various state species of concern.

The summarized impact level for the threatened and endangered species element will be significant and moderate for the ACS including the Flight portion and the F.E. Warren AFB area over the short and long term. The impacts will be low and significant in the broader ROI for the short and negligible in the long term.

3.6.2 Aggregation of Elements, Impacts, and Significance

For the Proposed Action (Figure 3.6.1-3) and the alternatives (Figure 3.6.1-2), there are two separate aggregated levels of impact for biological resources. One composite rating aggregates the level of impact ratings for four of the biological resources elements: vegetation, wildlife, fisheries, and unique and sensitive habitats. A separate composite rating is aggregated for threatened and endangered species, due to the unique legal status of these resources.

The aggregated impact levels for biological resources indicated short and long-term impacts are expected to be moderate and signficant of F.E. Warren AFB: low and significant in other portions (Flights) of the Area of Concentrated Study. On a regional basis aggregated impacts would be low and signficant in the short term. Overall, long-term regional impacts will be negligible, although raptors will be subjected to low significant impacts (random shootings). The aggregated impact levels for threatend and endangered species indicate that short-term, moderate, and signficant impacts are anticipated in the Flight Areas and on F.E. Warren AFB of the Area of Concentrated Study. Short-term, low, and signficant impacts may occur regionally on threatened and endangered species. Long-term impacts are expected to be moderate and signficant at the site level, and negligible at the regional level.

3.6.2.1 Biological Resources

Aggregation of impacts took place in two steps. First, levels of impact for the biological resources subelements were aggregated into composite levels of impact for each element. This first level of aggregation was based on an evaluation of the levels of impacts on the subelements and, when appropriate, use of the highest impact level as representative of the impact level for that element. Second, the determination of the overall impact rating for biological resources involved aggregation of the impact ratings for the

elements of the resource. The four biological elements were aggregated to the resource level following an evaluation of the impacts on these resource elements (vegetation, wildlife, fisheries, and unique and sensitive habitats). The impact evaluations were based on data available for each resource element.

The process for the aggregation of impact levels attributed to F.E. Warren AFB and the Flight portion of the ACS to a composite site impact level (Figure 3.6.1-3) is similiar to that used for aggregation of the resource. Within two of the biological resource elements (vegetation and unique and sensitive habitats) moderate, signficant (but mitigated) impacts on riparian, meadow, and mixed-grass prairie vegetation on F.E. Warren AFB are important considerations in aggregating impact levels between the two portions of the Area of Concentrated Study. These impacts are weighted higher than the low to moderate level impacts attributed to vegetation, wildlife, fisheries, and unique and sensitive habitats elsewhere in the Area of Concentrated Study.

3.6.2.2 Threatened and Endangered Species

Determination of the overall impact rating for threatened and endangered species involved aggregation of the impact ratings for the elements of this resource. Threatened and endangered species were left at the resource level and not combined into the biological category for summarization due to their legal status. The aggregated impact levels within threatened and endangered species are based on a similar approach to that described above. In this case the residual moderate, significant impacts are related to potential impacts on the Colorado butterfly plant populations at F.E. Warren AFB and potential similar level impacts on the woolly milkvetch in the Flight portion of the ACS. The potential for impacts on prairie dog towns (possible black-footed ferret habitat) in other areas of the ACS will be negligible with the implementation of appropriate assumed mitigation measures.

3.7 Mitigation Measures

Potential mitigation measures that will be considered are identified below. One, some, or all of the mitigation measures may ultimately be selected. Each measure identifies the party responsible to implement, but not necessarily to pay for, the measure.

a. Scheduling of construction activity to minimize disturbance during raptor nesting periods. Construction activity within the ACS would not take place within 1 mile of an unobstructed, active raptor nest during the nesting season. This mitigation measure may be effective in reducing the level of impact on nesting raptors from significant and moderate to negligible. If selected, implementation of this mitigation plan should occur during the March through July period from 1985 through 1990. The responsible agency for implementing this mitigation measure is the Air Force or appropriate agencies.

b. Scheduling of construction activity to minimize disturbance during pronghorn migration periods. No project-related construction activity would occur at Silos Q-9, Q-2, and their access roads during the time periods when pronghorn are moving between summer and winter ranges. This mitigation measure will be effective in

reducing the potential level of impact along the pronghorn migration route from significant and low to negligible, and if selected, should be implemented during October and November and April to May from 1985 through 1990. The responsible agency for implementing this mitigation measure is the Air Force.

c. Design and construct roads and stream crossings to minimize encroachment into stream channels and adjacent riparian vegetation within the ACS. This mitigation measure will be effective in minimizing the impact of increased turbidities and potential petroleum spills on the fisheries resources and reducing the impact level on riparian vegetation from significant and moderate to significant and low. If selected, this mitigation measure should be implemented year-round from 1985 to 1990. The responsible agencies for implementing this mitigation measure are the Wyoming Highway Department and Nebraska Department of Roads.

d. Conduct site-specific biological inventories and surveys of culvert upgrade, and other road modification locations wherever these potential actions intersect or parallel sensitive vegetation types within the ACS. This mitigation measure will be effective in minimizing the disturbance associated with construction activities in woodland, shrubland, riparian, and meadow areas, and should be implemented year-round from 1985 to 1990. The responsible agencies for implementing this measure are the Air Force or the appropriate agencies.

e. Schedule the timing of construction on DAR and cable path stream crossings to avoid salmonid spawning periods. This mitigation measure will help maintain the self-propagating populations of salmonid species by avoiding construction activities that may cause siltation and/or disruption of reeds during spawning periods (December-March and July-August 1985 to 1990). The responsible agency for implementing this mitigation measure is the Air Force or the appropriate state highway department.

f. Increase monitoring and modeling of the Cheyenne wellfield operations and raw water supply in the Crow Creek watershed to better define production capacity. Groundwater model simulation was done for the Crow Creek wellfields and will continue to be refined into 1984. A better understanding of the impact of operations, rehabilitation or relocation of wells, and monitoring would allow the wellfields to be used to meet all project-related water demands in Cheyenne with only low or negligible effects on water resources. It would provide long-term benefit to the Cheyenne area. This mitigation measure will be effective in providing information about groundwater fluctuations and potential habitat modifications prior to any irreversible commitment of natural resources, and if selected should be implemented as soon as possible, since current levels of information provide an inadequate base for future analysis. The responsible agency for implementing this mitigation measure is the Cheyenne Board of Public Utilities.

g. Institute a conservation area on Air Force fee title land for riparian/wetland habitats. This mitigation measure will be effective in compensating for impacts to other areas on F.E. Warren AFB. The responsible agency for implementing this measure will be the Air Force.

h. Develop a management plan for protection of rare plant species and sensitive habitats on F.E. Warren AFB. This mitigation measure will be effective in maintaining and protecting rare plant species and sensitive habitats. The responsible agency for implementing this measure will be the Air Force.

i. Increase productivity on selected areas of wildlife habitat on F.E. Warren AFB through promotion of range improvement programs. This mitigation measure will be effective in compensating for construction-related impacts to vegetation and wildlife habitat. The responsible agency for implementation of this measure is the Air Force.

j. Implement an environmental awareness program for all project-related employees to educate inmigrants about problems associated with poaching, illegal hunting and fishing, vandalism, violation of park regulations, off-road vehicle abuse, etc.

3.8 Unavoidable Adverse Impacts

Unavoidable adverse impacts due to the proposed project would include:

- Random (indiscriminate) shooting of raptors;
- Permanent loss of riparian habitat;
- Temporary and permanent disturbance to shrubland; and
- Permanent and temporary disturbance and loss of Colorado butterfly plant habitat along Diamond and Crow creeks.

3.9 Irreversible and Irretrievable Resource Commitments

Irreversible and irretrievable commitment of resources include:

- Loss of about 2 acres of critical habitat for the Colorado butterfly plant;
- Loss of a small amount (< 30 acres) of riparian and meadow vegetation;
- Loss of a low amount of native grassland; and
- Loss of about 200 acres of big game habitat (on F.E. Warren AFB).

3.10 The Relationship Between Local Short-Term Use of Man's Environment and Maintenance and Enhancement of Long-Term Productivity

Short-term uses of the biological components of man's environment include direct construction-related disturbances and direct impacts associated with an increase in population which occurs over a period of less than 5 years. Long-term uses of man's environment include those impacts occurring over a period of more than 5 years, including permanent habitat loss.

The relationship of the Proposed Action and the assumed mitigations to the goal of the National Environmental Policy Act is expressed in terms of a National Environmental Policy Act objective to maintain and enhance the long-term productivity of the biological components of the environment. It is assumed future trends will reflect current conditions with the expectation that there will be increasing land use and recreation pressures on the biological systems in the project area. The evaluation of the short-term use of the biological components of the environment, with the implementation of the Proposed Action and the assumed mitigations, was made with respect to the existing biological environment, and long-term environmental trends within the ROI. Implementation of the assumed mitigations on short-term impacts will lead to maintenance of long-term productivity for most biological resources.

Short-term uses would create an environmental trade-off situation with respect to long-term productivity of some biological resources. The main trade-off involves the use of some Colorado butterfly plant habitat and the loss of some individuals of this species due to road construction and upgrade on F.E. Warren AFB. Through implementation of assumed mitigations, the direct impact (loss of habitat and individuals) on the Colorado butterfly plant will be minimized, and the long-term maintenance and enhancement of the onbase population, and perhaps the enhancement (through transplanting) of offbase populations, is provided for as well.

4.0 GLOSSARY

4.1 Terms

Area of Concentrated Study: an area(s) within the Region of Influence which will receive the majority of environmental impacts. Environmental existing conditions and impact analyses are focused within the Area of Concentrated Study for this EPTR. The Area of Concentrated Study is defined for each environmental resource.

Baseline: the existing characterization of an area under no-project conditions.

Big Game Critical-Winter-Yearlong Habitat: a portion of the big game winter-yearlong habitat which determines an animal population's status and potential for growth and usually provides food, water, and cover during severe weather. Winter-yearlong habitat is occupied by animals during more than one season, but is most important to the herd during winter.

Big Game Winter-Yearlong Habitat: habitat occupied by animals during more than one season, but most important to the herd during winter.

Big Game Yearlong Habitat: includes areas where all or part of a herd is found throughout the year.

Biochemical Oxygen Demand (BOD): the amount of dissolved oxygen, in milligrams per liter, used by microorganisms in the biochemical oxidation of organic matter.

Biota: all of the organisms of an area; the flora and fauna of a region.

Calving Grounds: specific areas, identified by state management agencies, which are traditionally used by elk or moose to give birth to calves. These areas are used because of specific habitat characteristics, such as cover and/or food supply.

Candidate Species (also candidate threatened or endangered species): taxa (species or subspecies) of plants and animals currently being considered for listing by the U.S. Fish and Wildlife Service.

Category One Species: taxa for which the U.S. Fish and Wildlife Service presently has sufficient information on hand to support the biological appropriateness of their being listed as endangered or threatened species.

Category Two Species: taxa for which information now in the possession of the U.S. Fish and Wildlife Service indicates the probable appropriateness of citing as endangered or threatened, but for which sufficient information is not presently available to biologically support a proposed rule.

Codominant Vegetation Types: vegetation cover with two plant species of equal dominance.

Conductivity: a numerical expression of the ability of a water sample to carry an electric current.

Corridor: a strip of land of various widths described on both sides of a particular linear facility such as a highway or transmission line.

Disclimax: an ecological community normally stable under certain climatic conditions, that has been altered by human or other influences, e.g., fire, grazing, etc.

Ecology: the study of the interrelationship of organisms with and within their environment.

Ecosystem: a group of plants and animals, including their environment, arranged in a trophic structure and participating in energy flow nutrient cycling.

Edaphic: of or relating to the soil.

Effect: a change in an attribute. Effects can be caused by a variety of events, including those that result from project attributes acting on the resource attribute (direct effect); those that do not result directly from the action or from the attributes of other resources acting on the attribute being studied; those that result from attributes of other projects or other attributes that change due to other projects (cumulative effects); and those that result from natural causes (e.g., seasonal change).

Endangered Species: a species that is threatened with extinction throughout all or a significant portion of its range.

Endemic Species: a species whose natural distribution is confined to a specific locality, area, or region.

Environment: the sum total or the result of all the external conditions which act upon an organism.

Ephemeral Stream: a stream that flows briefly only in response to precipitation in the immediate vicinity and whose channel is at all times above the water table.

Fauna: animals; organisms of the animal kingdom of a given area taken collectively.

Fawning Grounds: specific areas, identified by state management agencies, which are traditionally used by deer or pronghorn to give birth to fawns or kids. These are used because of specific habitat characteristics, such as cover or food supply.

Feral: refers to a domestic animal that has become wild.

Floodplain: for inland waters, the area subject to a 1 percent or greater chance of flooding in any given year (i.e., the area adjacent to a stream expected to be inundated in a 100-year flood). Executive Order 11988, Floodplain Management, places limitations on the construction of projects in floodplains and promulgates guidelines to ensure public health and

safety both to protect against property loss and to protect natural and beneficial values of floodplains.

Flora: plants; organisms of the plant kingdom taken collectively.

Fugitive Dust Emissions: emissions released directly into the atmosphere, which could not reasonably pass through a stack, chimney, vent, or other functionally equivalent opening.

Furbearers: mammal species which are harvested by trappers - such as muskrat, raccoon, or beaver.

Gallinaceous Birds: birds of the Order Galliformes. Includes pheasant, grouse, and quail.

Game Fish: fish species generally found on the higher end of the food chain that are considered sport fishes by anglers.

Habitat: places or physical areas with particular kinds of environments in which organisms live.

Habitat, Big Game Critical-Winter-Yearlong: a portion of the big game winter-yearlong habitat which determines an animal population's status and potential for growth and usually provides food, water, and cover during severe weather. Winter-yearlong habitat is occupied by animals during more than one season, but is most important to the herd during winter.

Habitat, Big Game Winter-Yearlong : habitat occupied by animals during more than one season, but most important to the herd during winter.

Habitat, Big Game Yearlong: includes areas where all or part of a herd is found throughout the year.

Impact: an assessment of the meaning of changes in all attributes being studied for a given resource, an aggregation of all the effects, usually measured using a qualitative and nominally subjective technique.

Immigrants: all people relocating into a defined geographic area usually calculated on an annual basis.

Intermittent Stream: a stream that does not have continuous flow during all periods of the year.

Irrigated Cropland: land devoted to the production of crops which require and benefit from periodic irrigation.

Lambing Grounds: specific areas, identified by state management agencies, which are traditionally utilized by bighorn sheep to give birth to lambs. These are used because of habitat characteristics, such as cover and/or food supply.

Level of Impact: for each environmental resource there are specific definitions for negligible, low, moderate, and high impacts for this EPTR.

Long Duration: Recovery of a biological resource following disturbance related to construction, operation, and/or termination and abandonment of the project will take more than 5 years.

Long-Term Impact: Generally, long-term impacts will occur during operation after 1990, but may also occur during construction and continue beyond.

Mho: a measurement of conductivity.

Microenvironment: the environmental conditions actually experienced by an organism in its environment. Examples of microenvironments experiencing very different environmental conditions within the same locale would be a burrow, the area under a rock, a shaded surface, and a sunny surface.

Mitigations: methods to reduce or eliminate adverse project impacts.

Nongame Fish: fish species that are generally found near the lower end of the food chain and are not considered sport fishes by anglers.

Peak Flow: the maximum discharge of a stream during a specified period of time.

Peak Year: the year in which some particular project-related effect, e.g., total employment, is greatest.

Perennial Stream: a stream that has continuous flow during all periods of the year.

Peripheral Species: a species whose distribution extends only into a small portion of the Region of Influence.

Rangeland: that land devoted to the grazing and keeping of animals such as cattle, sheep, and horses.

Raptors: birds of prey, such as eagles, hawks, falcons, vultures, and owls.

Rare Animal: an animal species that occupies only a small percentage of the preferred habitat within its range or a species that is found throughout its range in extremely low densities; cannot always be found by a skilled observer even during intensive survey work.

Reclamation: the process of restoration of an area which has been disturbed.

Redd: the nest of (various) spawning fishes.

Region of Influence: the largest region which would be expected to receive measurable impacts from the Proposed Action.

Revegetation: regrowth or replacement of a plant community on a disturbed site. Revegetation may be assisted by site preparation, planting, and treatment, or it may occur naturally (secondary succession).

Riffles: turbulent water resulting from a high rate of flow through a shallow area of a stream channel with a congregation of larger particles (boulders, gravel) in the substratum.

Riparian: pertaining to features on the bank of a natural watercourse.

Short Duration: recovery of a biological resource following disturbance related to construction, operation, and/or termination and abandonment of the project will take less than 5 years.

Short-Term Impact: Generally, short-term impacts will occur during construction before 1990, but may also occur during operation.

Significance: the importance to the resource of the impact on the resource. Council of Environmental Quality (CEQ) regulations specify several tests to determine whether an action will significantly affect the quality of the human environment. While these tests apply to the entire action, they can also be used in an amended form to judge impact significance for individual resources. It is important to note that a high impact may not be significant, while a low impact may. Significance is an either/or determination: the level of impact described either is significant or is not significant. Additionally, beneficial significance must be determined at the same level as adverse significance. As specified in the CEQ regulations, significance needs to be determined for each of three geographic areas: local, regional, and national. This places the impact into context. Significance is also determined in terms of intensity.

Species of Special Concern: species protected by state legislation and/or species identified by state agencies as requiring special attention due to limited distribution and/or population declines.

Threatened Species: a species that is likely to become endangered in the foreseeable future.

Turbidity: measurement of suspended foreign particles or sediment.

Unavoidable Adverse Impact: a project-induced effect determined to be adverse that cannot, or will not, be mitigated or avoided.

Upland Game: hunted species other than big game or waterfowl, including gallinaceous birds, cottontails, and squirrels.

Velocity: measurement of stream flow in feet per second.

Wetlands: areas defined by the prevailing vegetation and soil moisture content and consisting of vegetation typical of soils that are saturated for a major portion of the year.

Xeric: characterized by, or requiring, only a small amount of moisture; dry conditions.

4.2 Acronyms

ACS	Area of Concentrated Study
AFB	Air Force Base
AFRCE	Air Force Regional Civil Engineer
AFRCE-BMS	Air Force Regional Civil Engineer - Ballistic Missile Support
AFSEM	Air Force Systems Evaluation Model
AOU	American Ornithologists' Union
BLM	Bureau of Land Management
BMO	Ballistic Missile Office
BMS	Ballistic Missile Support
CDOW	Colorado Division of Wildlife
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CNHP	Colorado Natural Heritage Program
DAR	Defense Access Road
DAU	Data Analysis Unit
DEIS	Draft Environmental Impact Statement
DoD	Department of Defense
EIAP	Environmental Impact Analysis Process
EIS	Environmental Impact Statement
EPA	U.S. Environmental Protection Agency
EPTR	Environmental Planning Technical Report
FEIS	Final Environmental Impact Statement
FY	Fiscal Year
LCF	Launch Control Facility
LEIS	Legislative Environmental Impact Statement
MSL	Mean Sea Level
M-X	Missile Experimental
NGPC	Nebraska Game and Parks Commission
ROI	Region of Influence
SCS	Soil Conservation Service
SDDWNR	South Dakota Department of Water and Natural Resources
SDGFPD	South Dakota Game, Fish, and Parks Department
SSA	Stage Storage Area
S/T	Stage Transporter
USAF	United States Air Force
USDA	United States Department of Agriculture
USFS	United States Forest Service
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
WDEQ	Wyoming Department of Environmental Quality
WGFD	Wyoming Game and Fish Department
WISA	Wyoming Industrial Siting Administration
WNHP	Wyoming Natural Heritage Program
WSA	Weapons Storage Area

4.3 Units of Measurement

^{o}C	degrees Centigrade
DAU	Data Analysis Unit
dbh	diameter at breast height
DO	dissolved oxygen
ft	foot/feet
ft/s	feet/second
g	gram
ha	hectare
kg	kilogram
kV	kilovolt
lbs	pounds
m_2	meter
m^2	square meter
mi	mile
ml	milliliters
mm	millimeters
mS/cm	millimhos/centimeter
pH	hydrogen ion concentration
ppm	parts per million
ppt	parts per thousand
sq ft	square foot/feet
sq mi	square mile
umhos/cm	micromhos/centimeter

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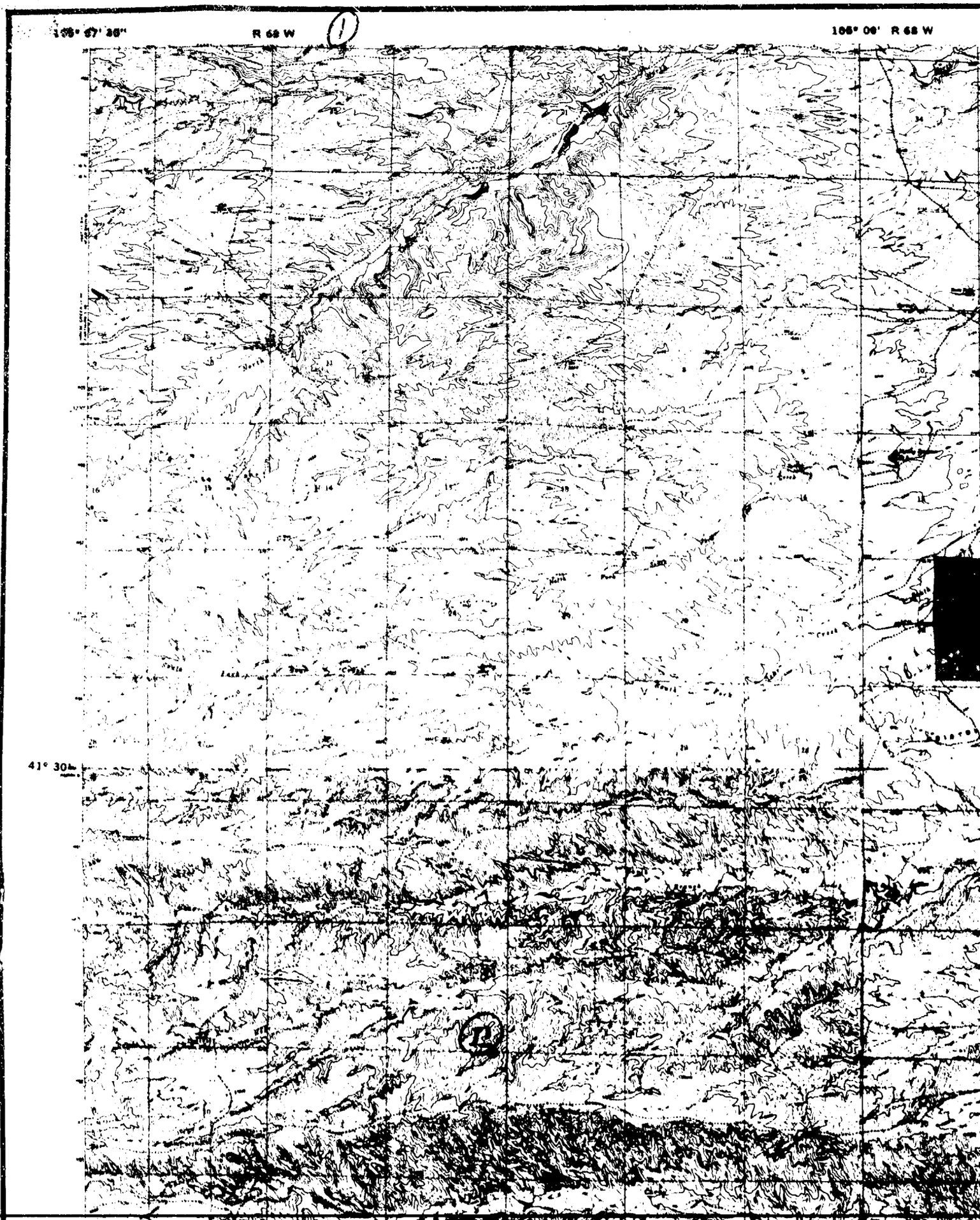
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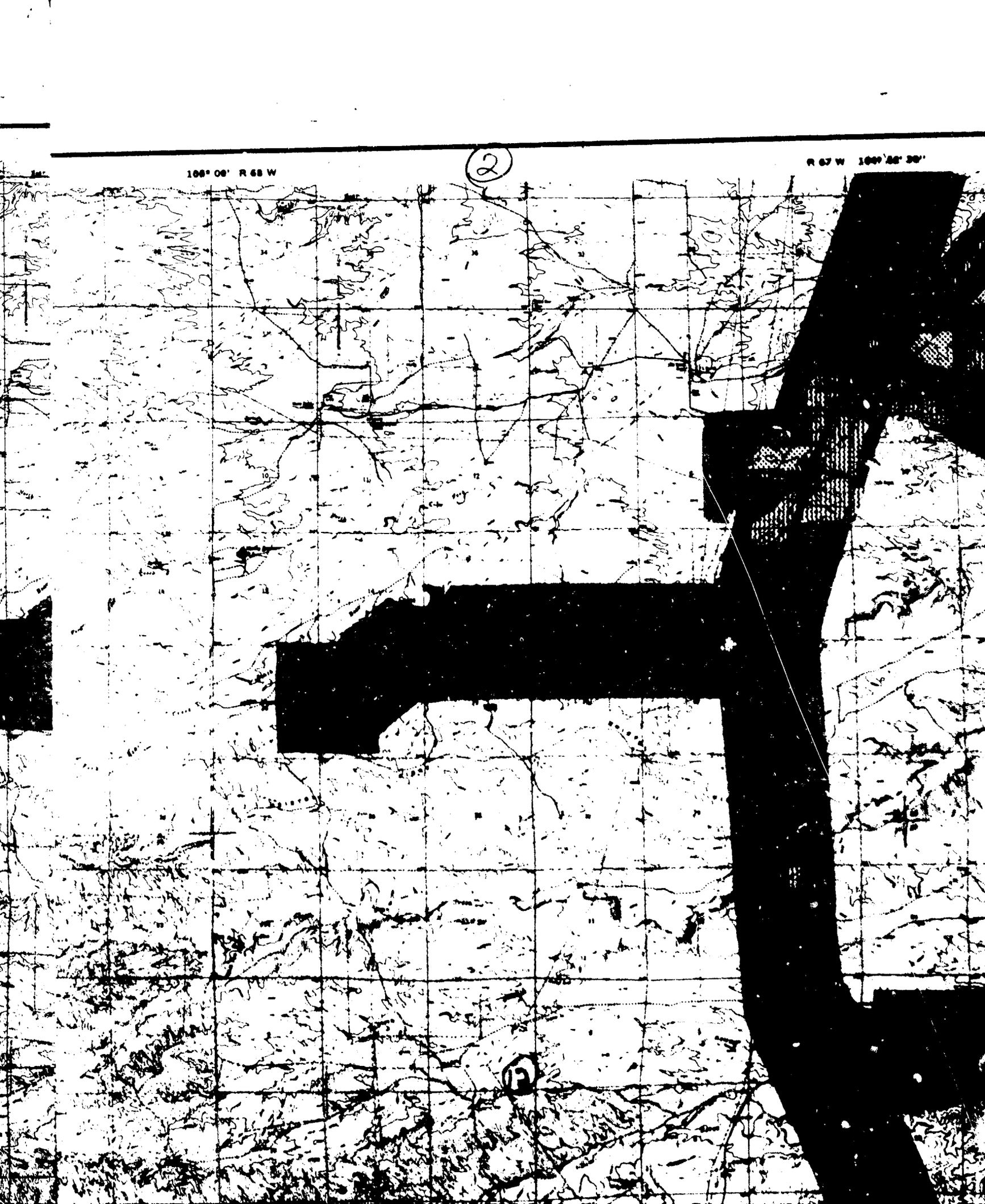
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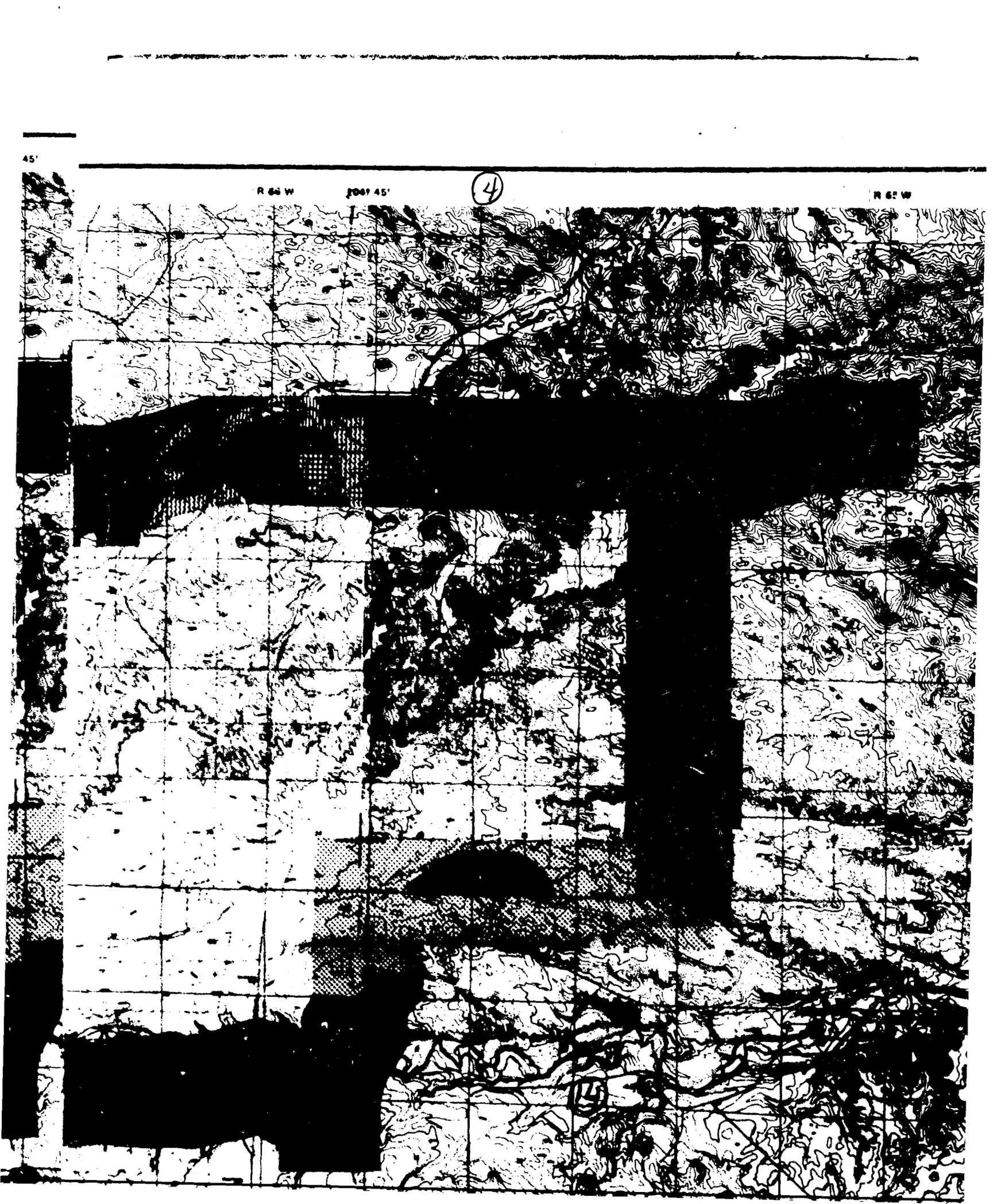
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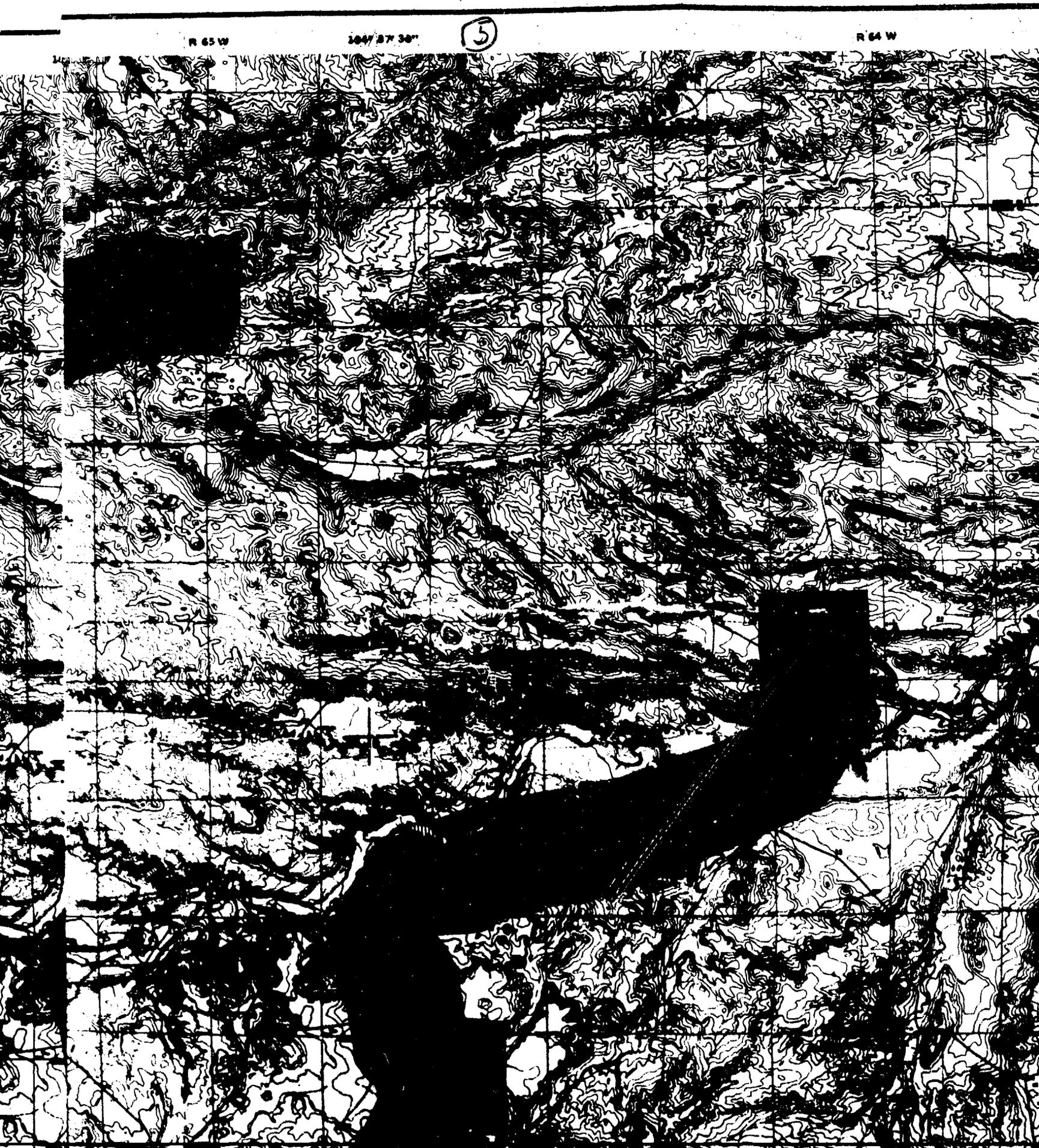
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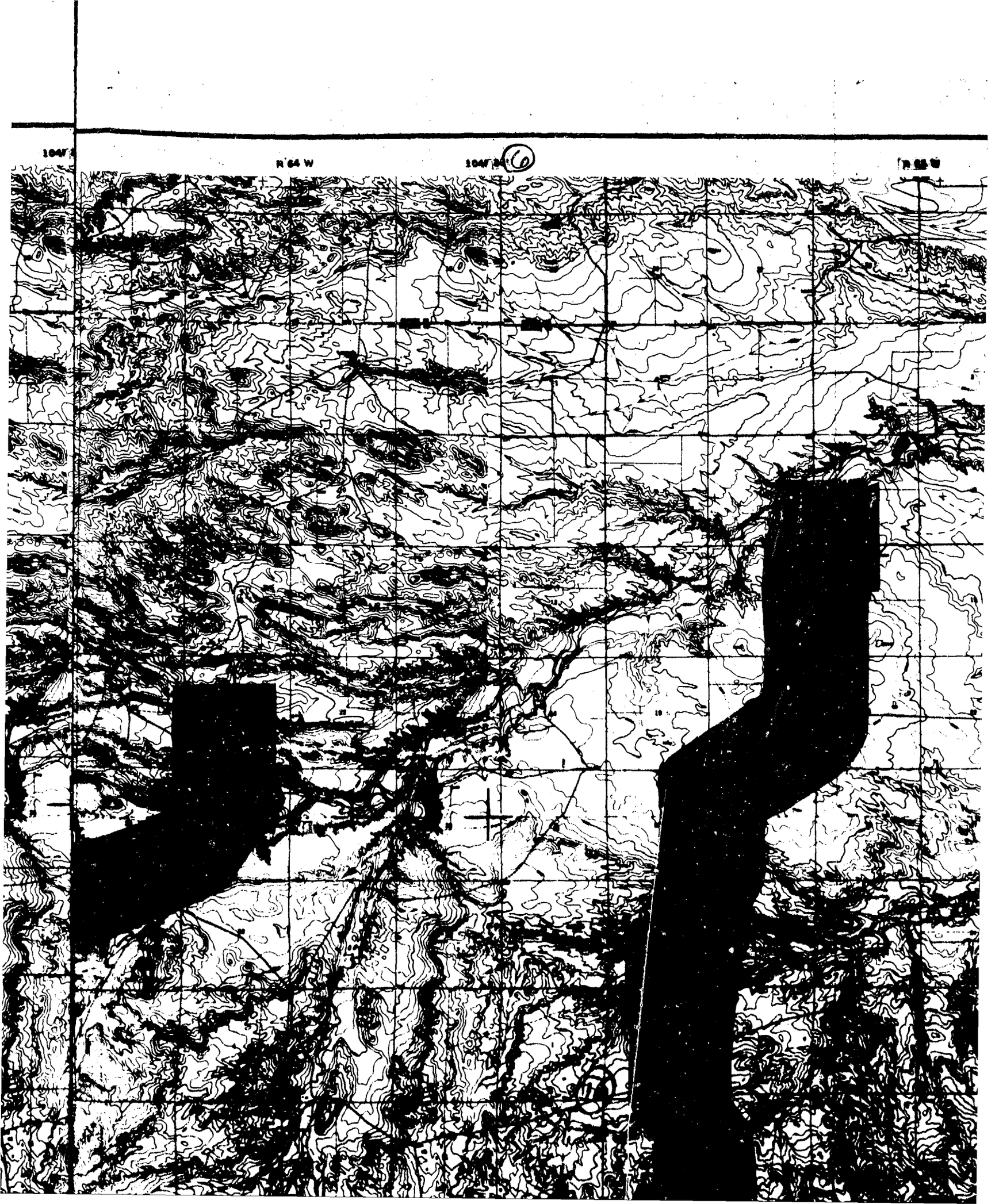

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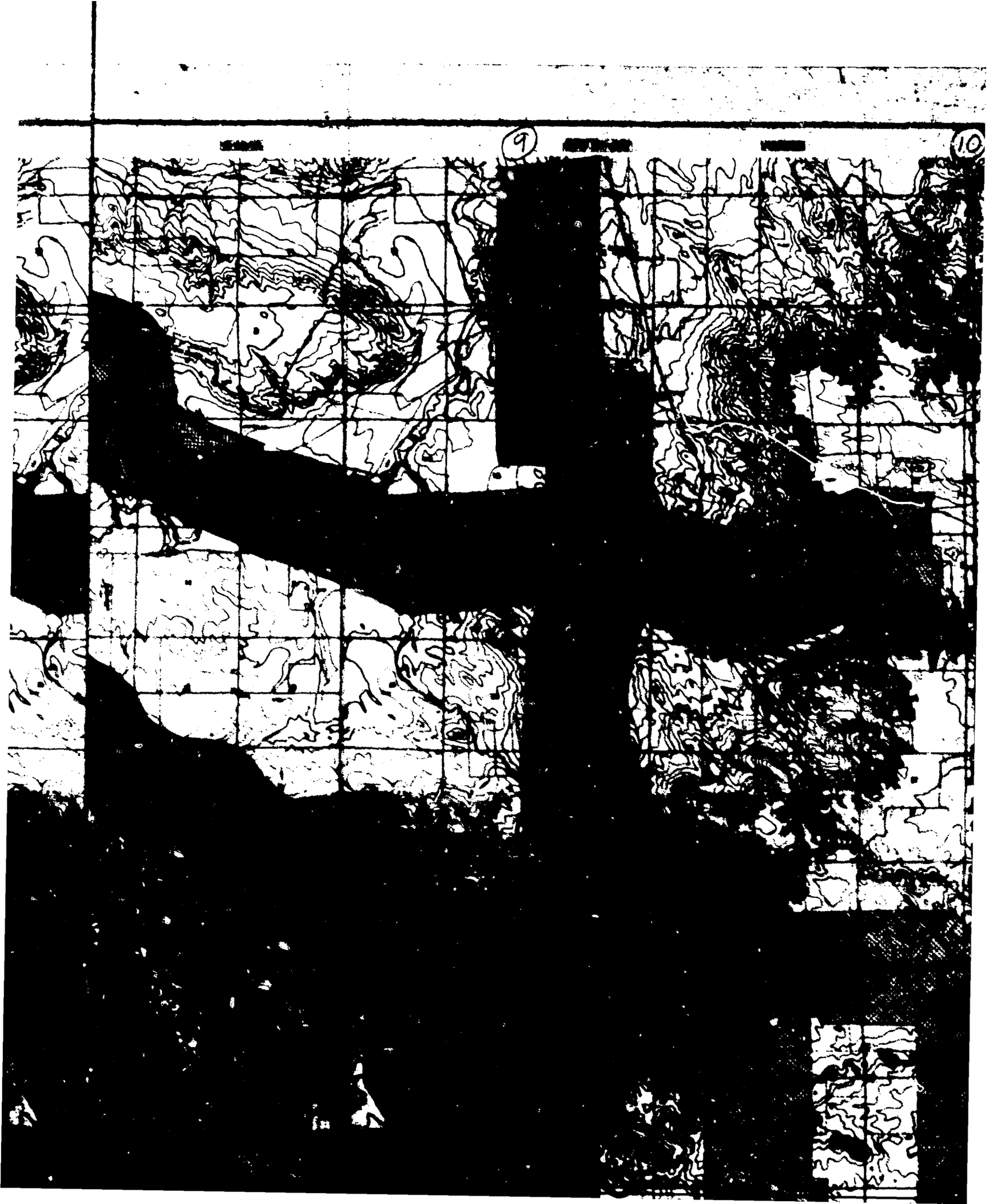

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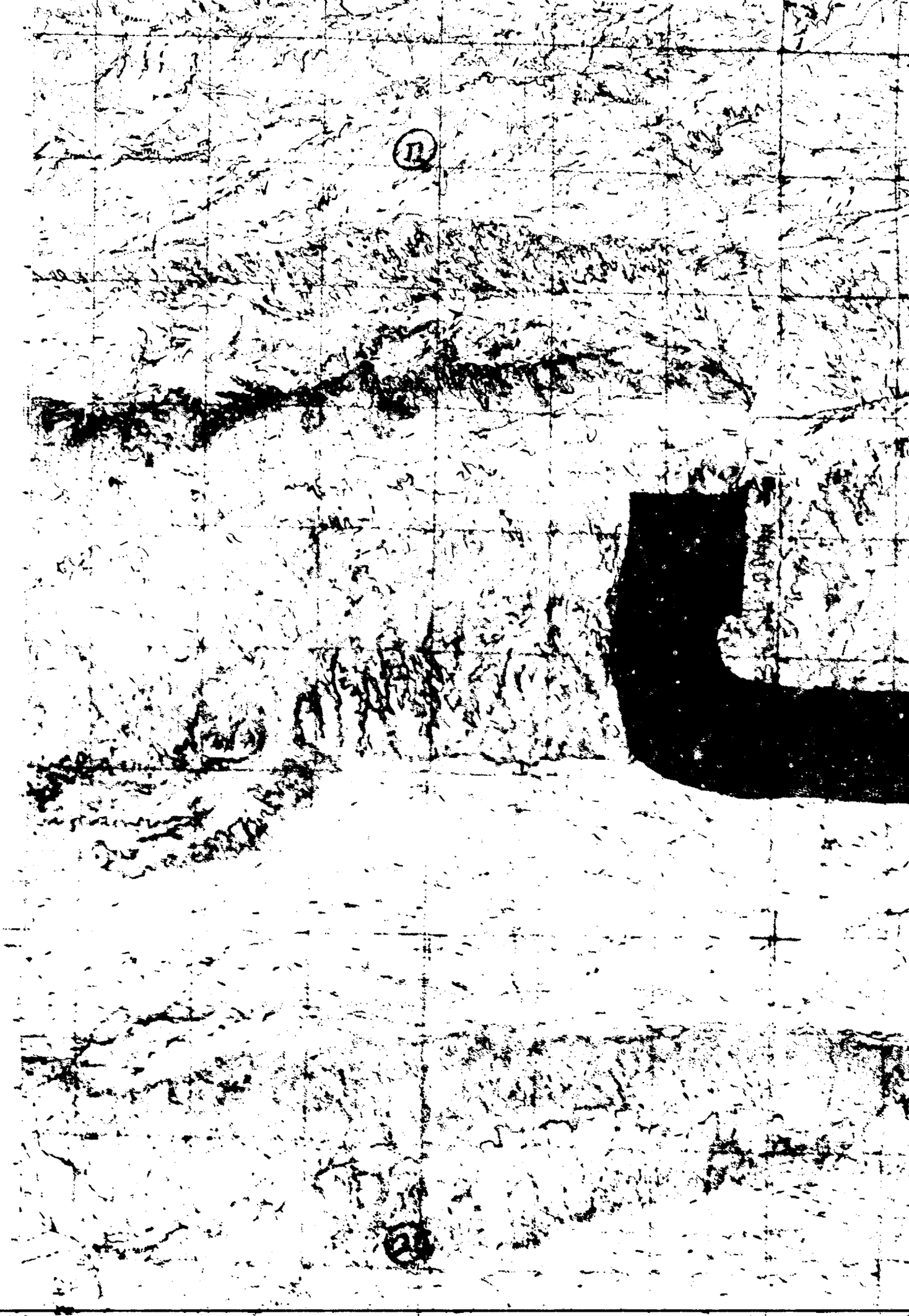




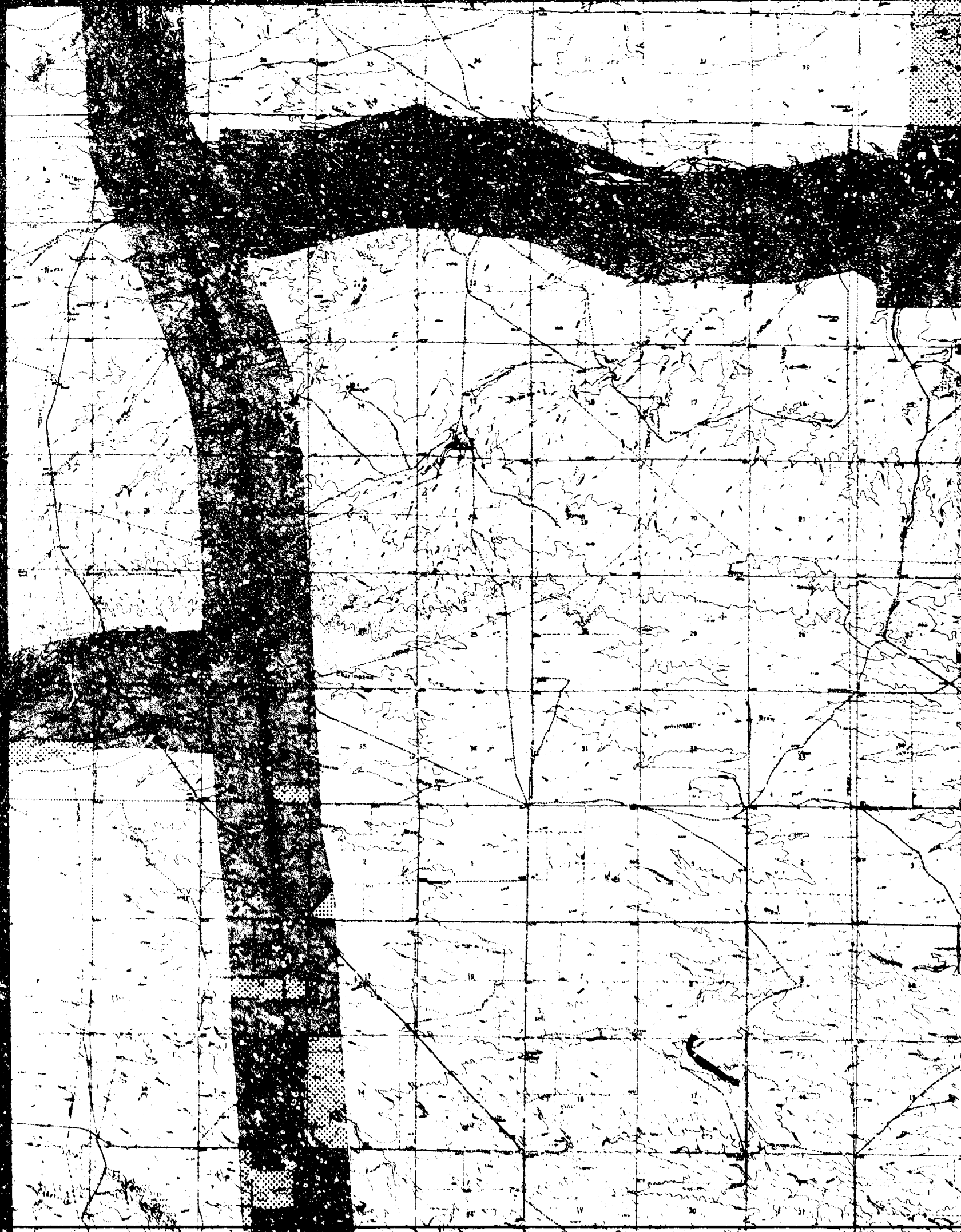


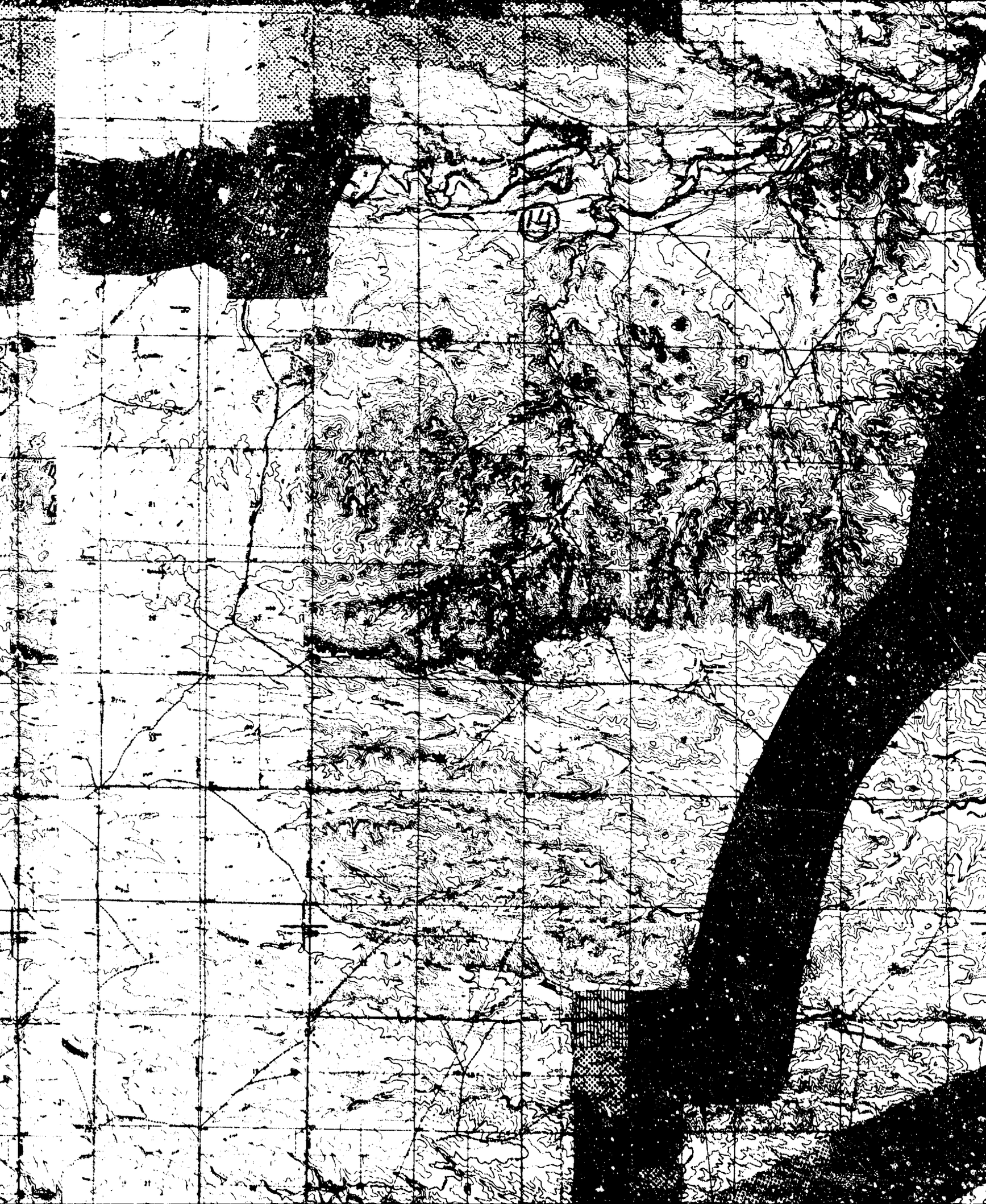

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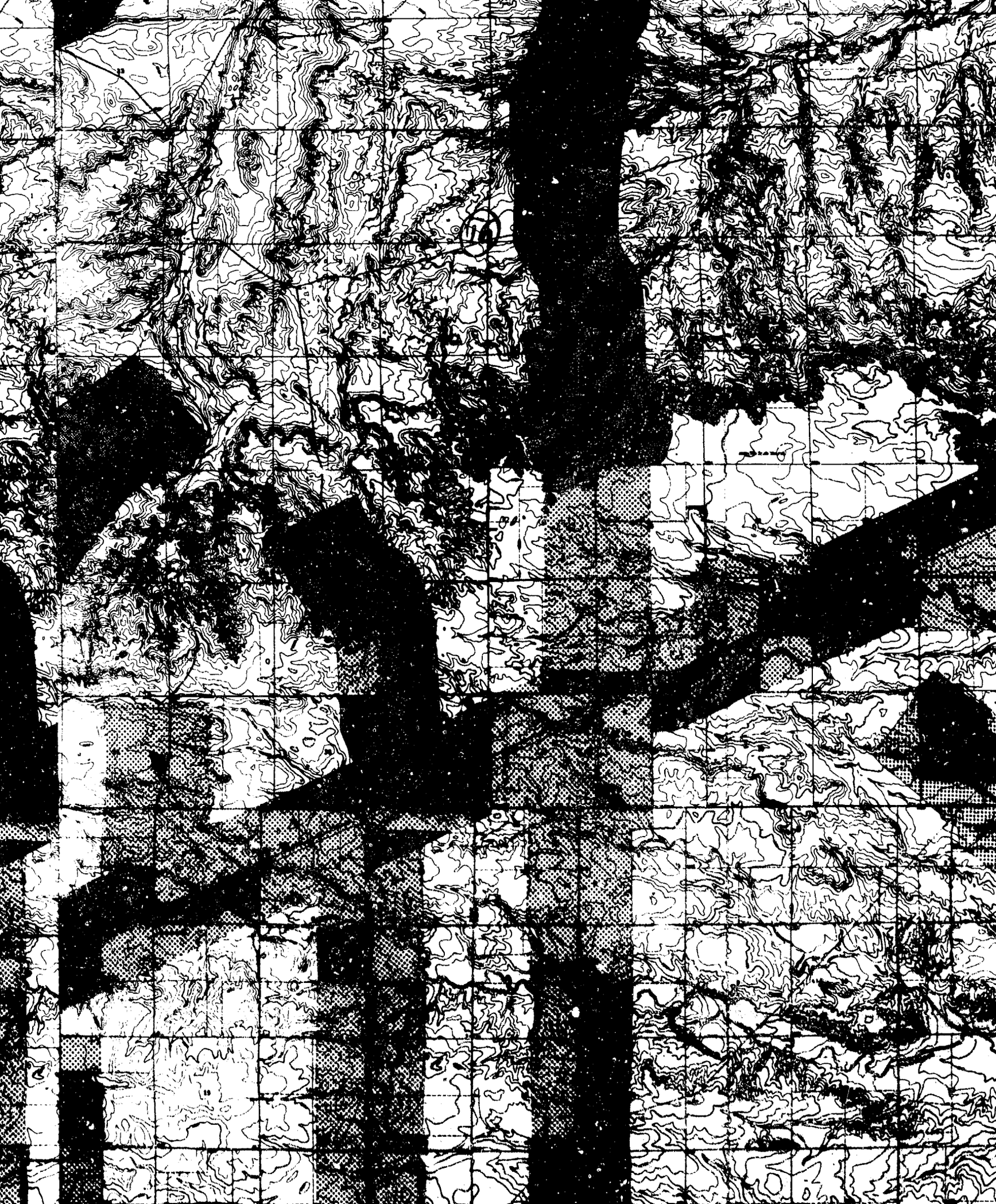








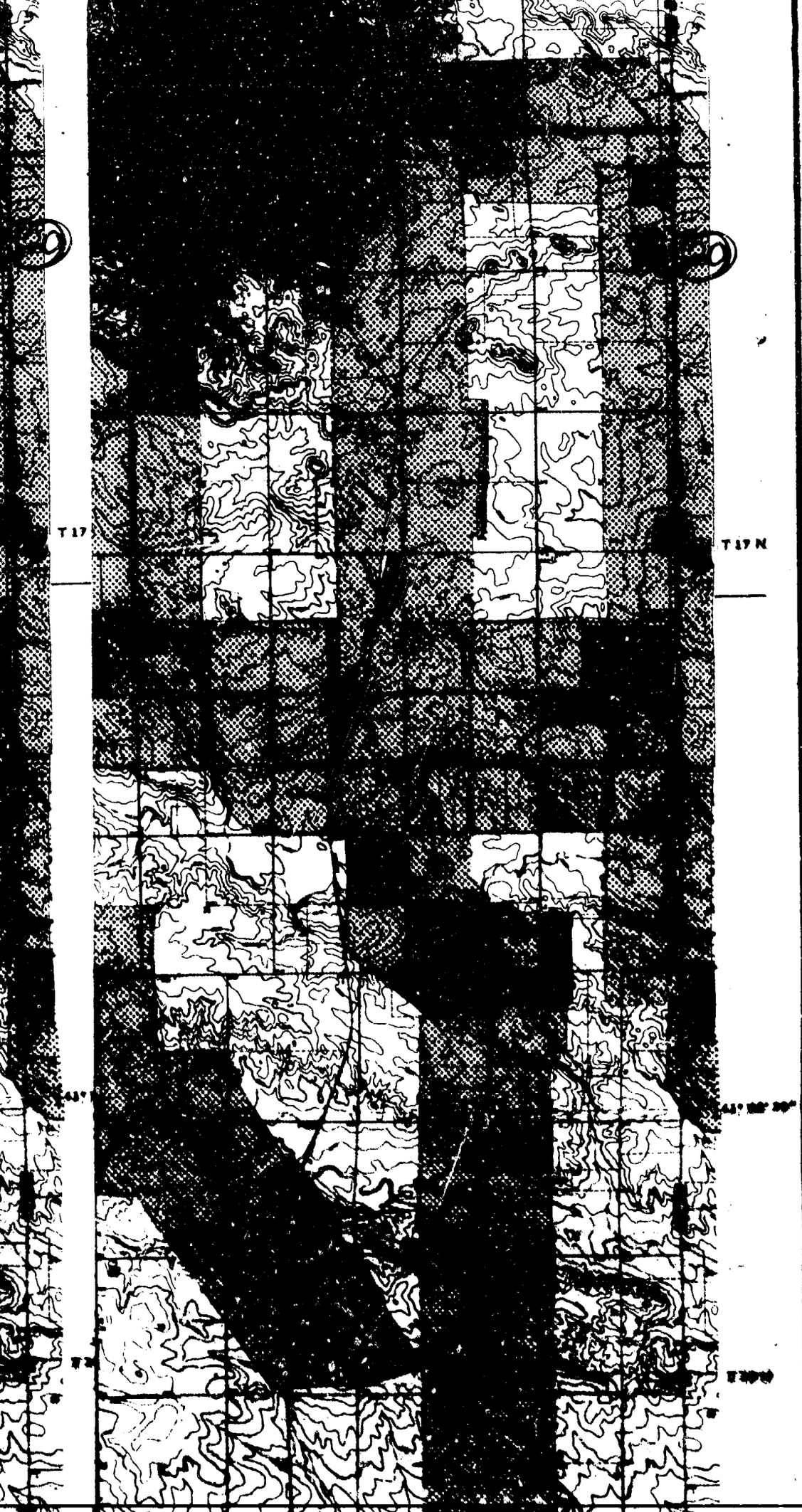


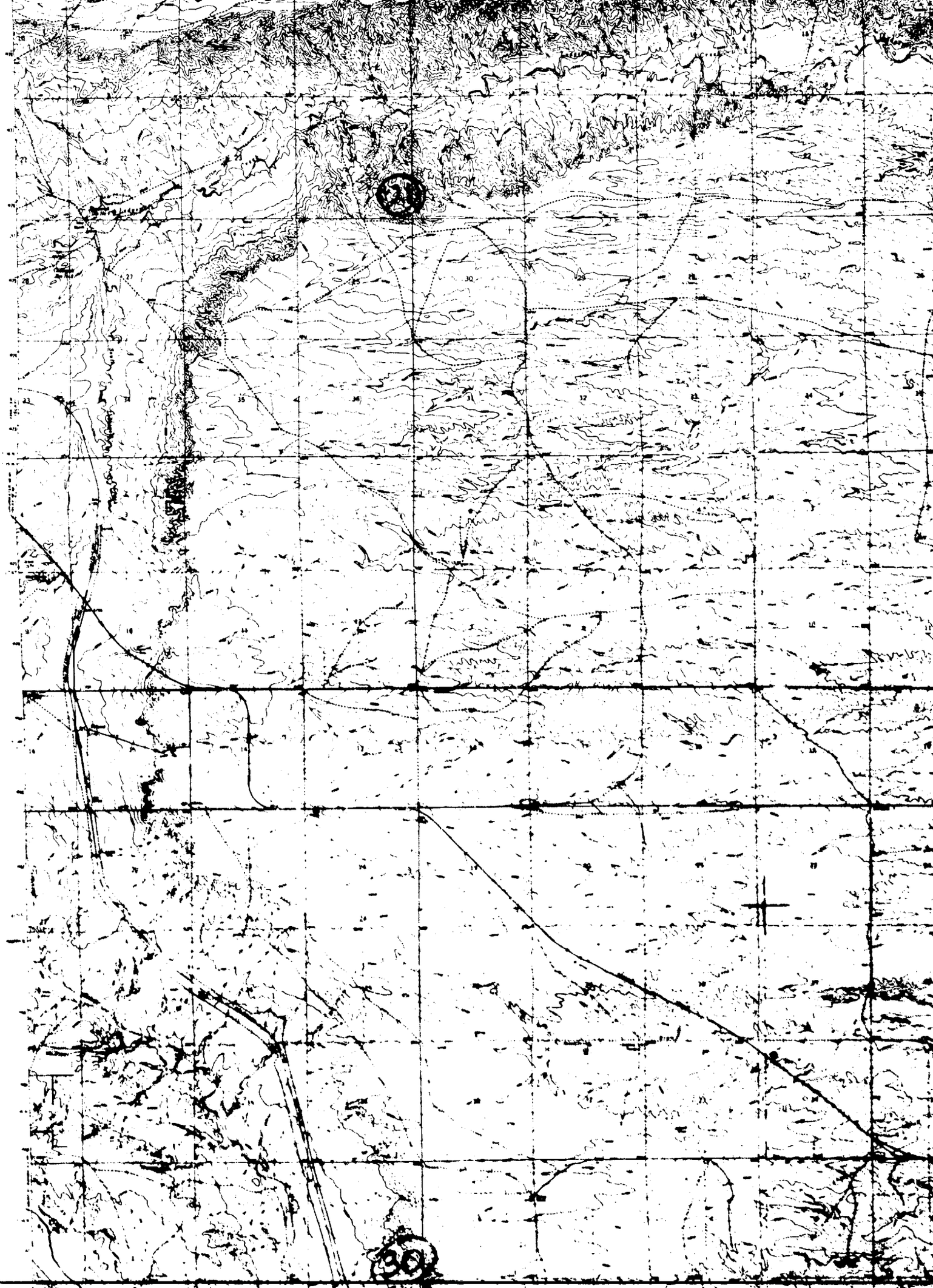


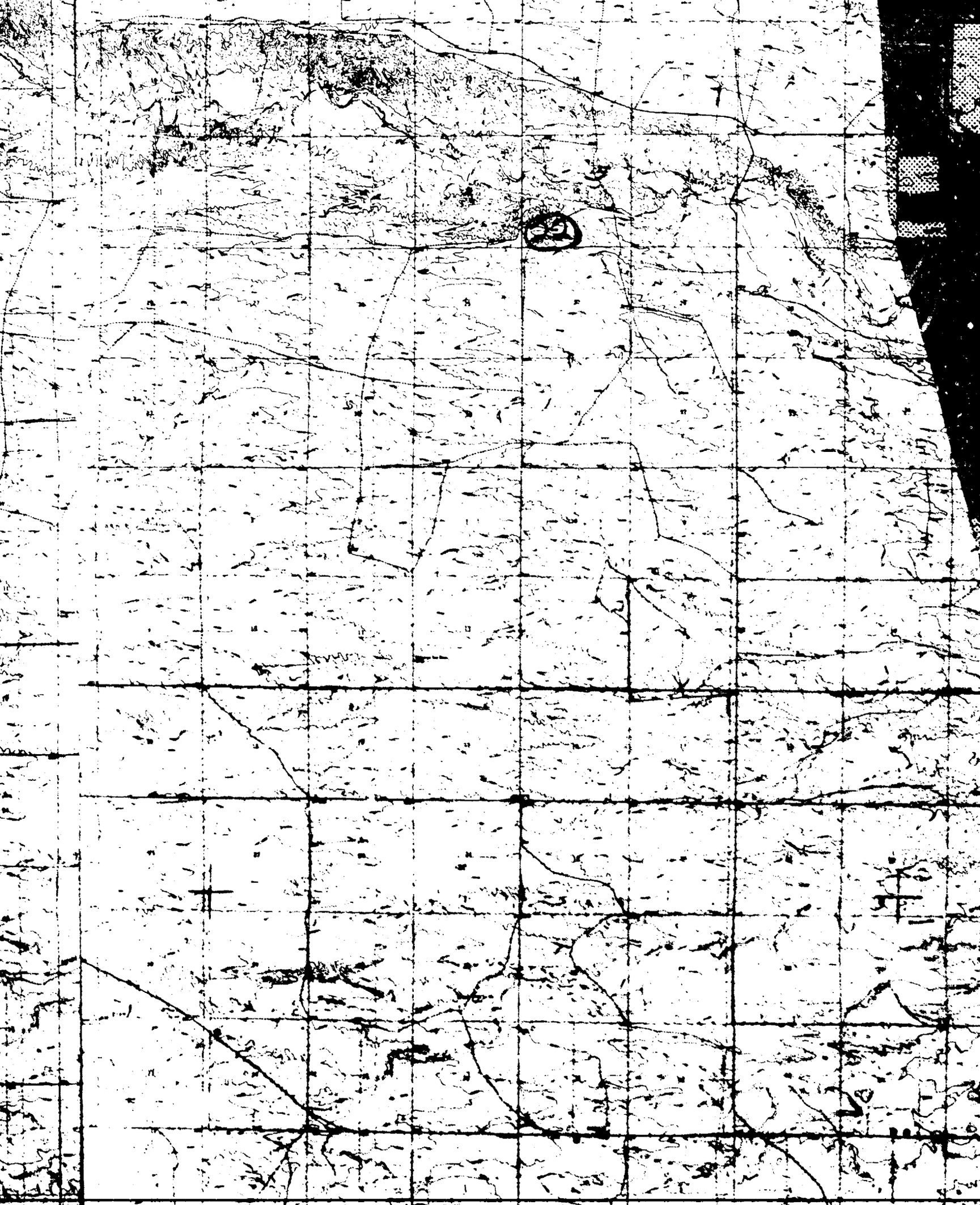


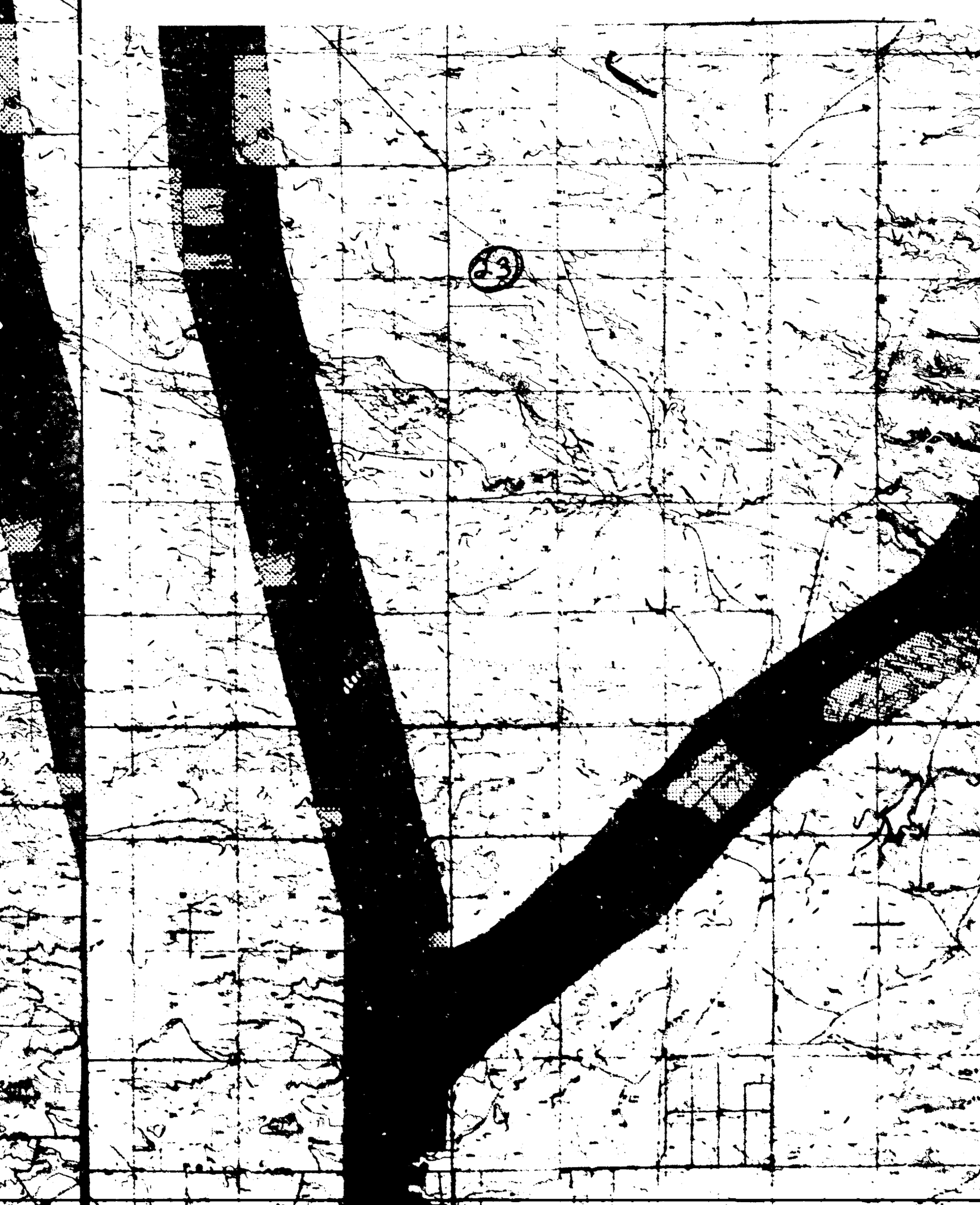


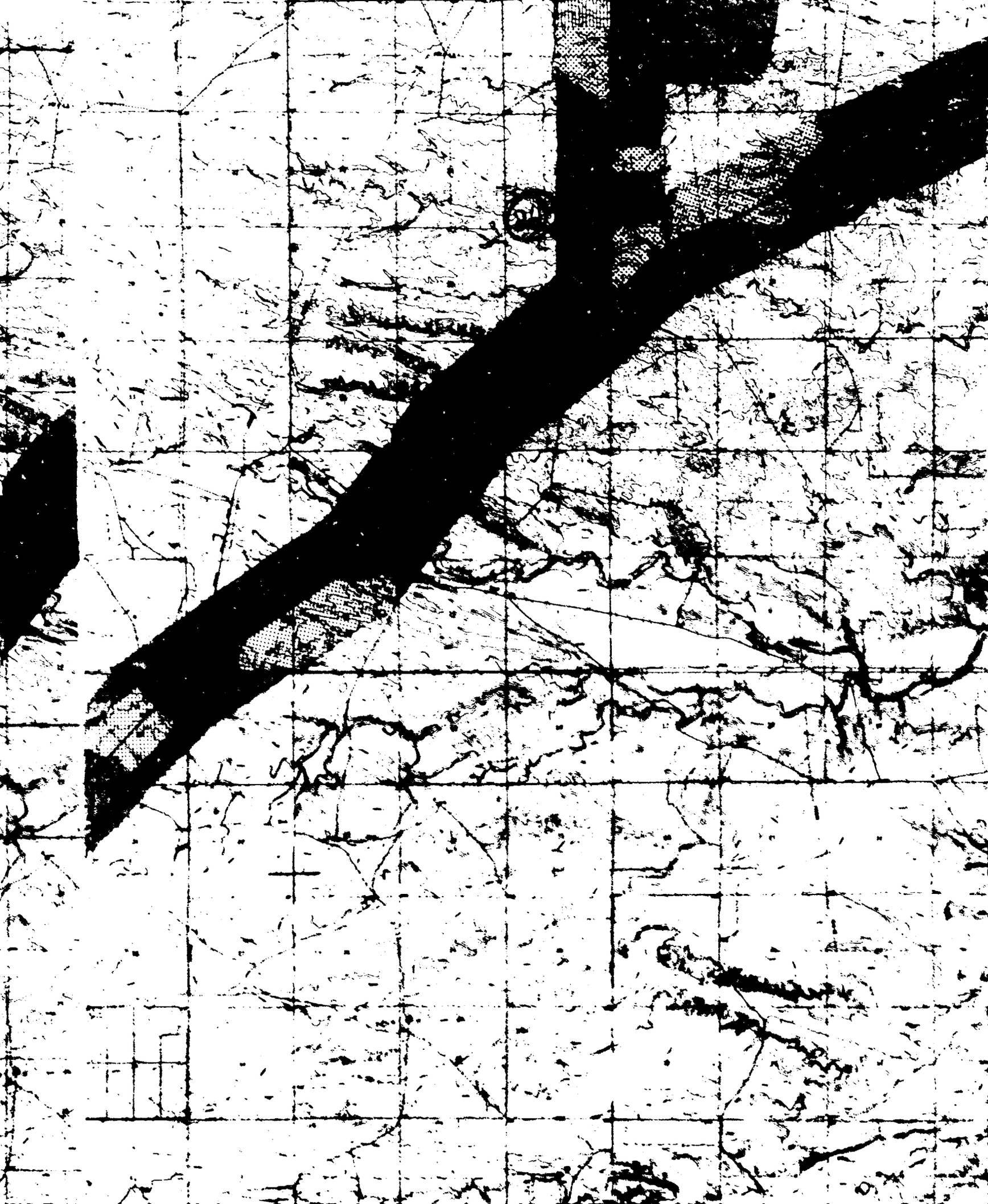


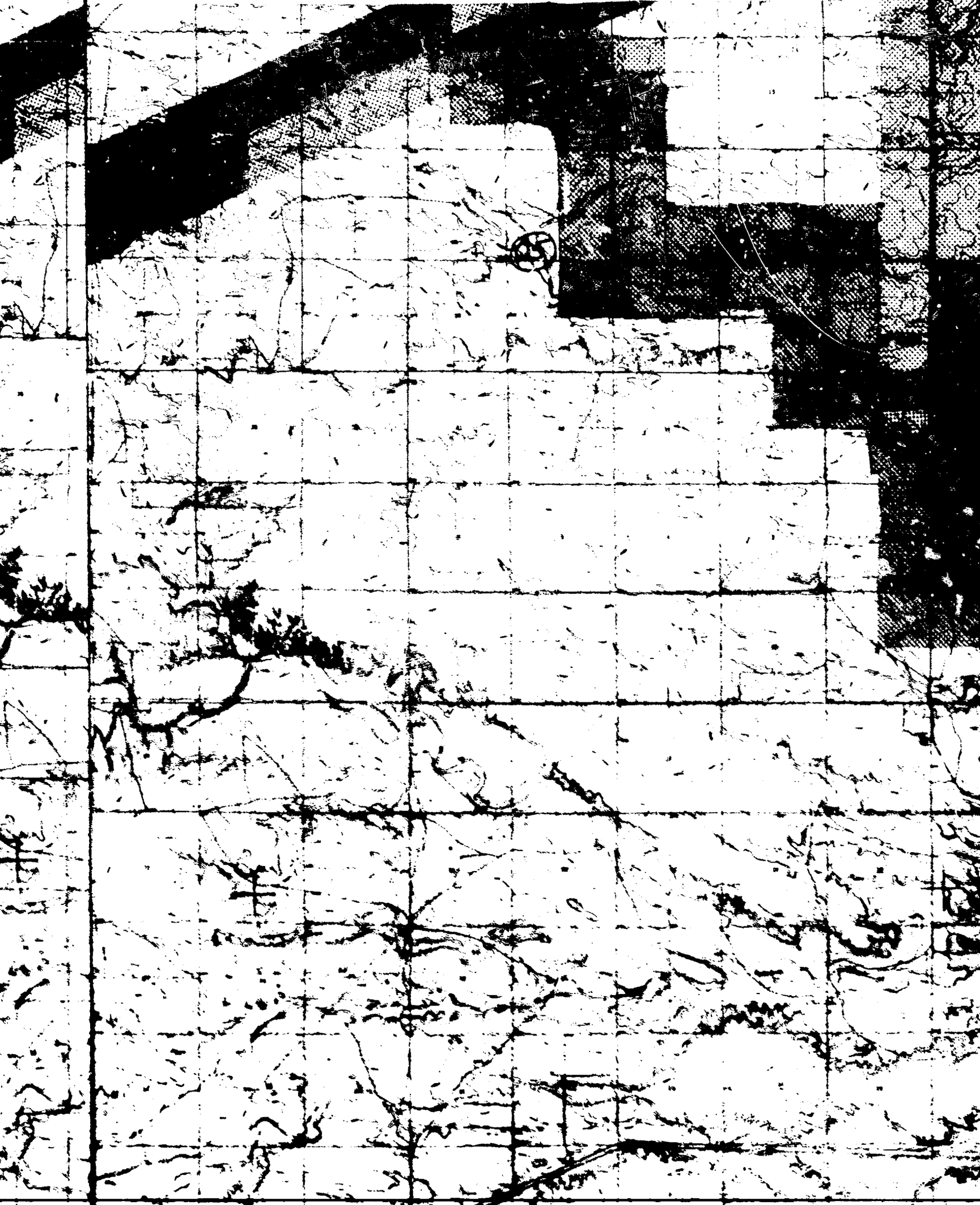

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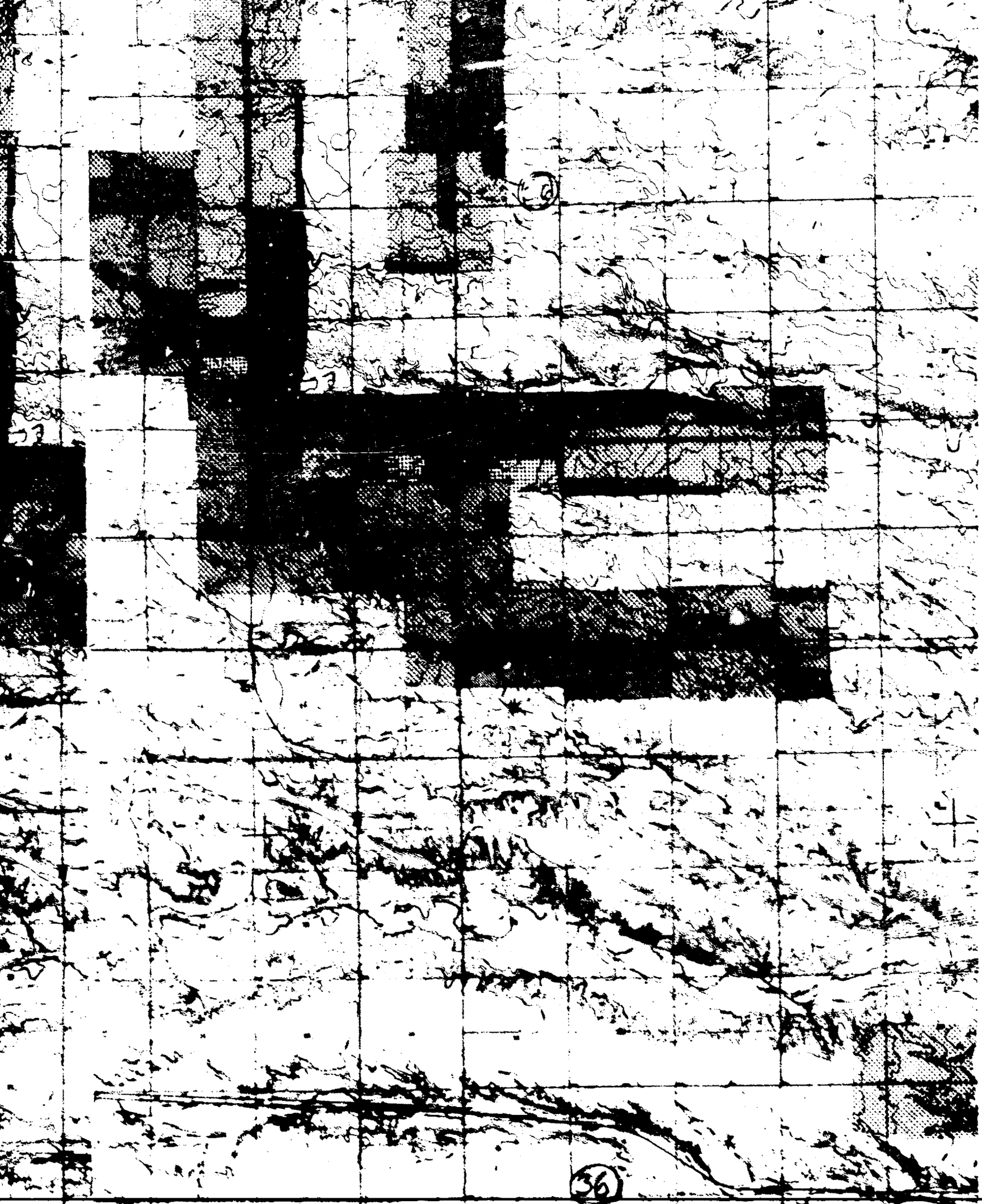


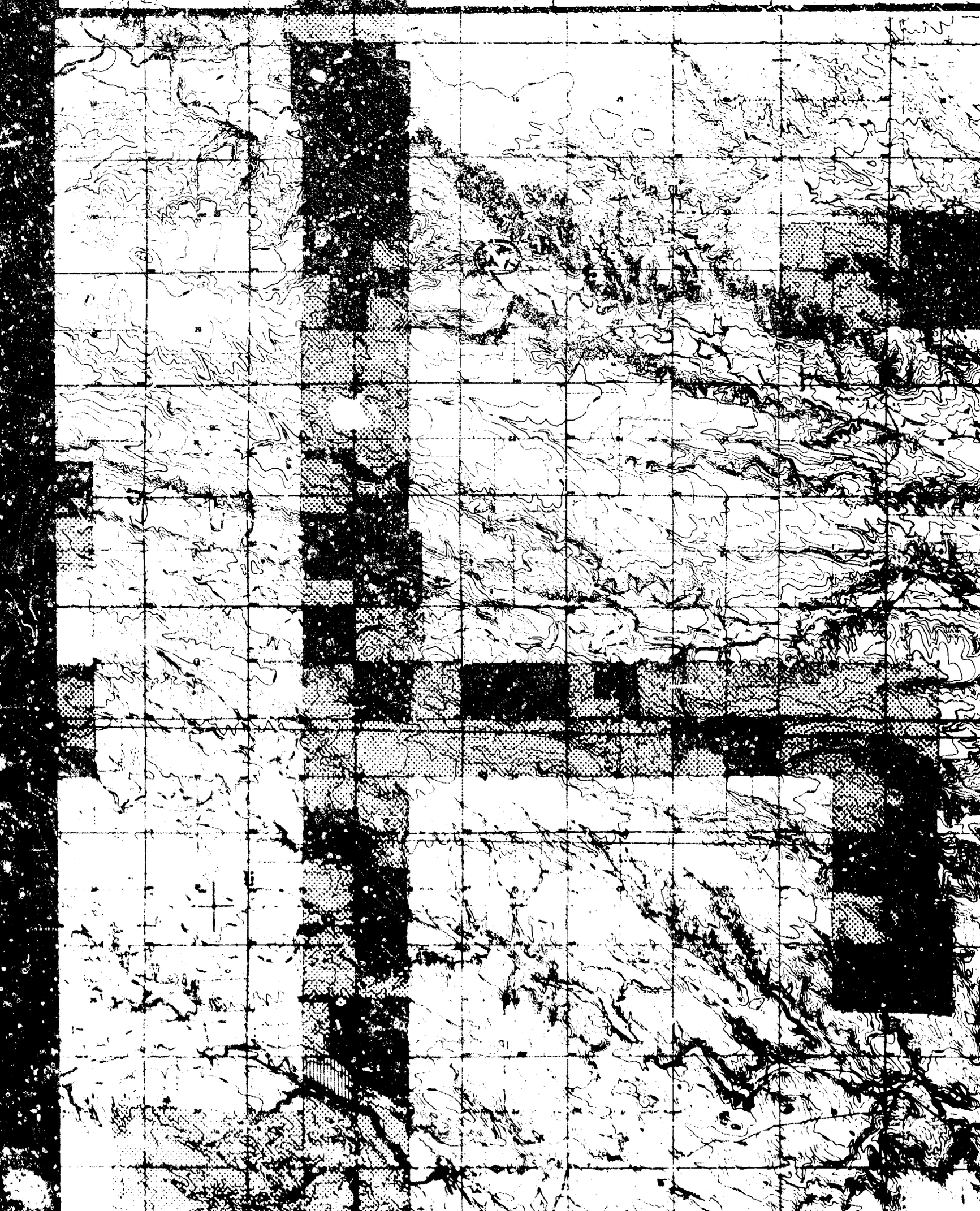


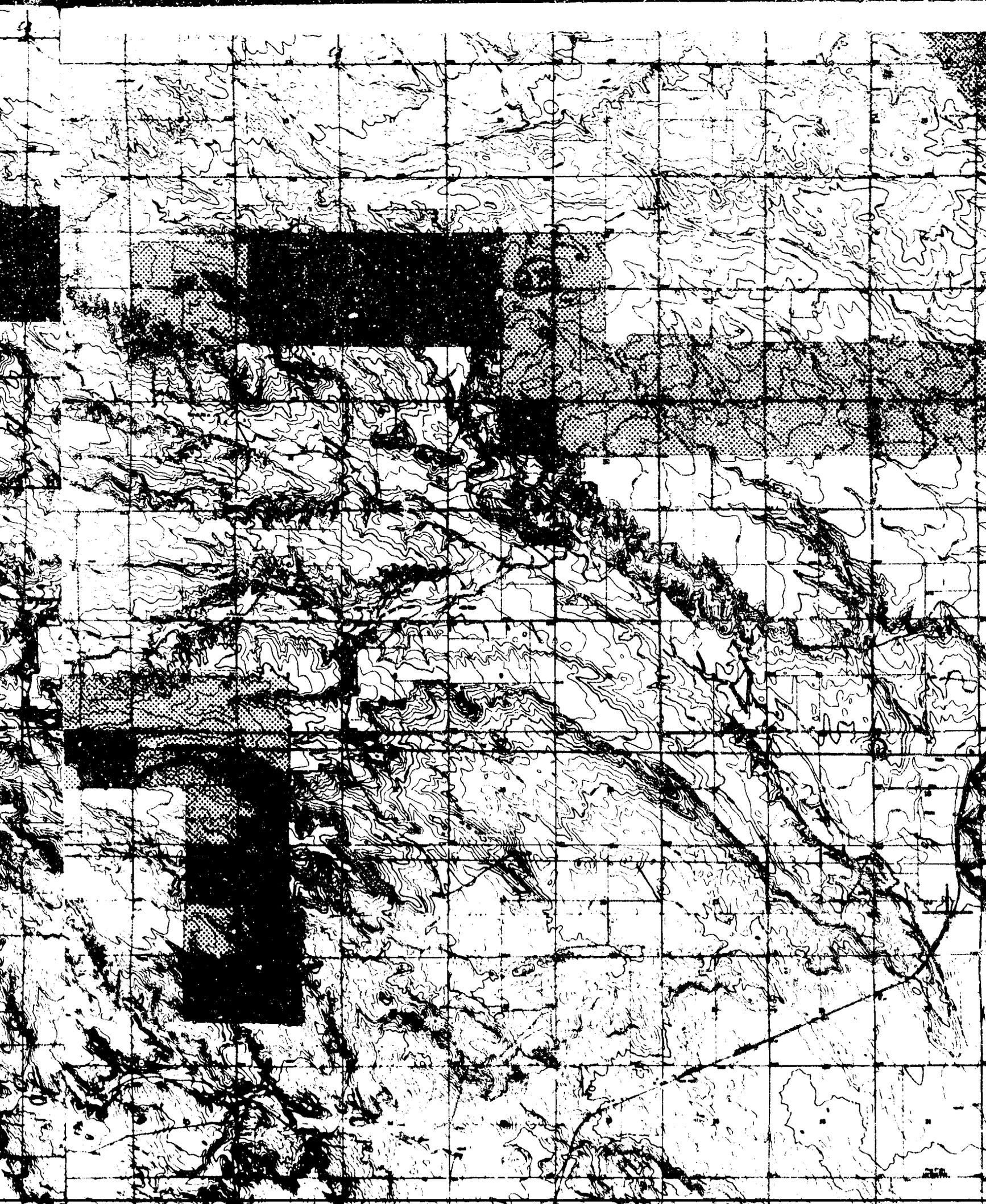

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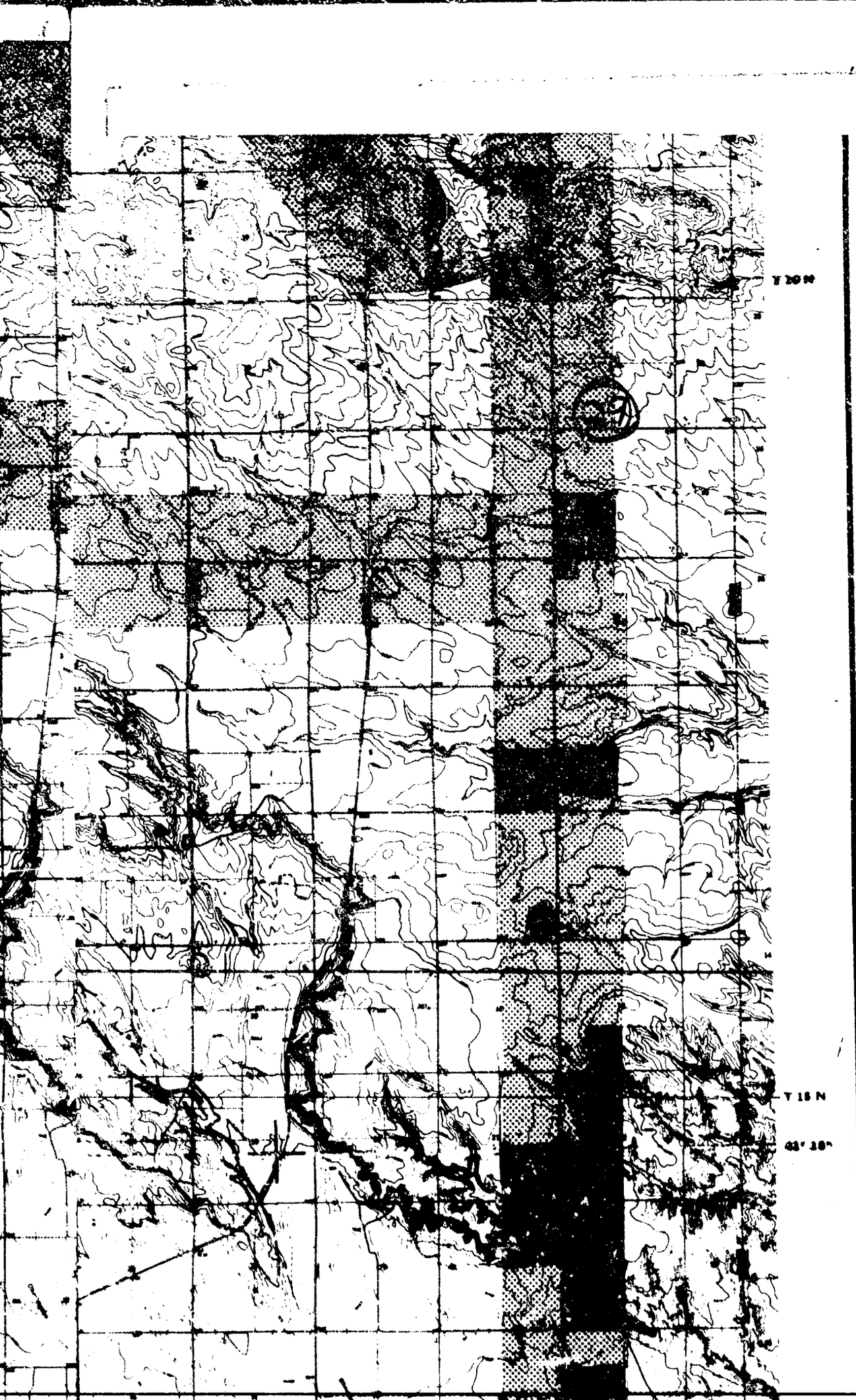


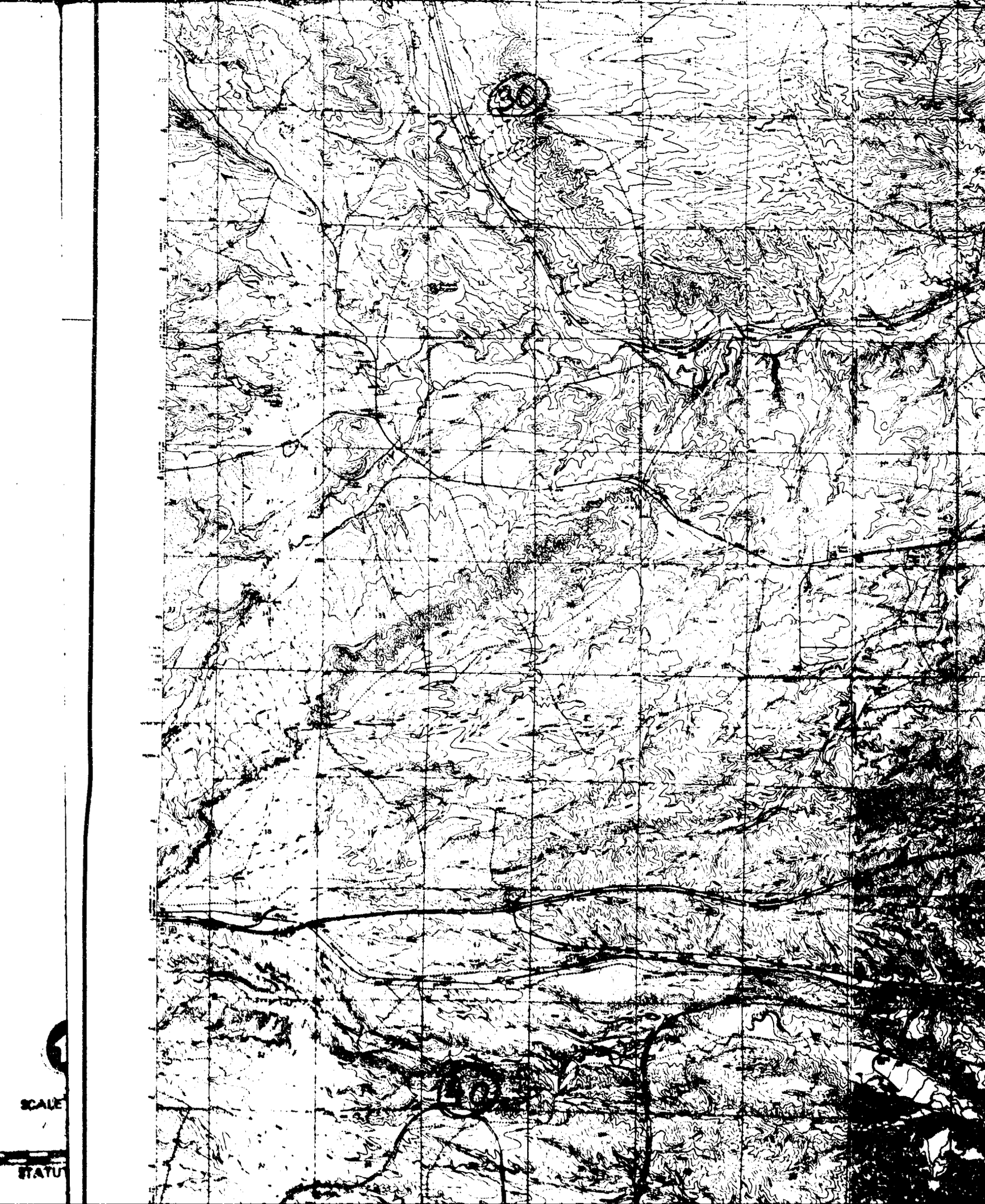


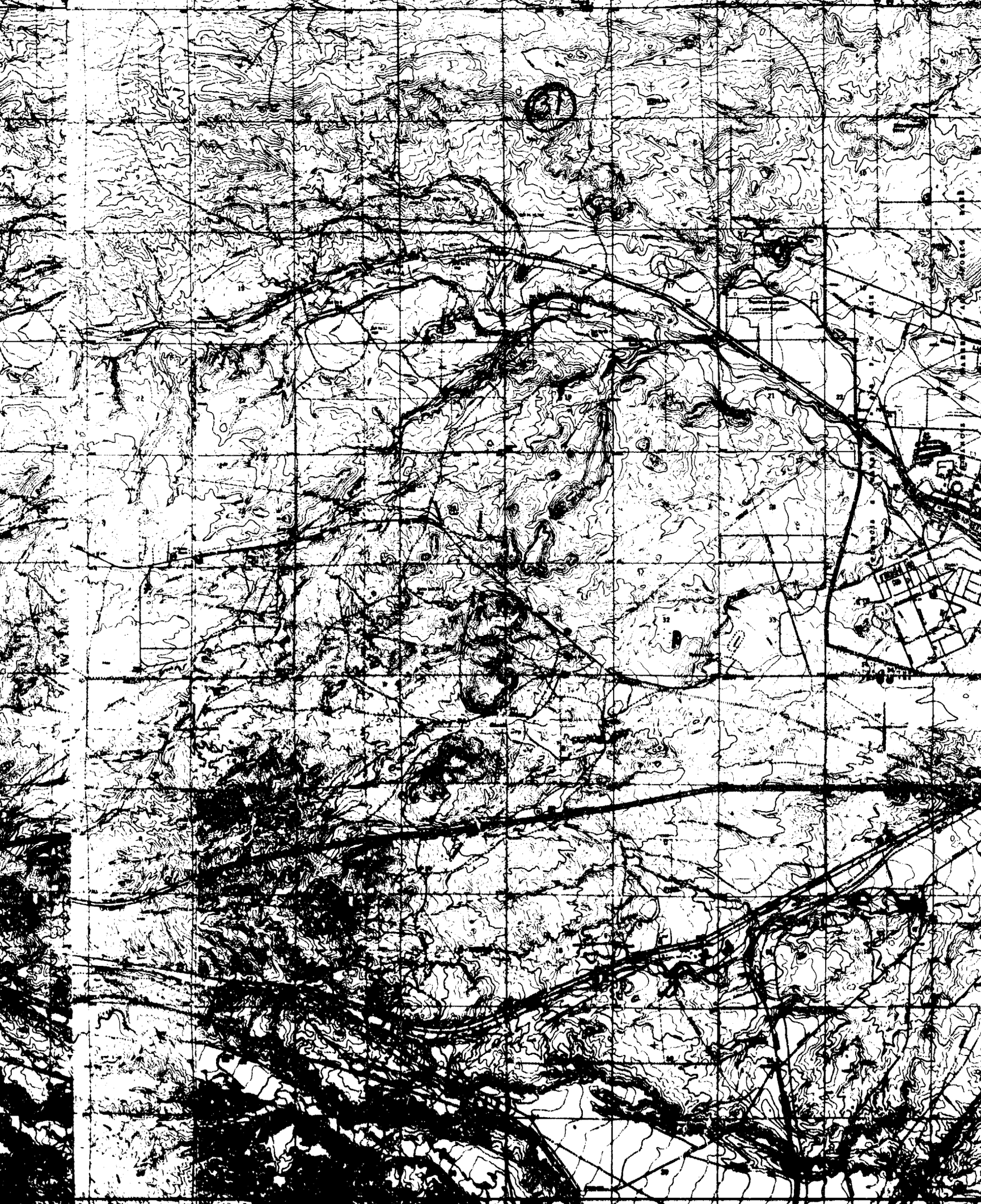


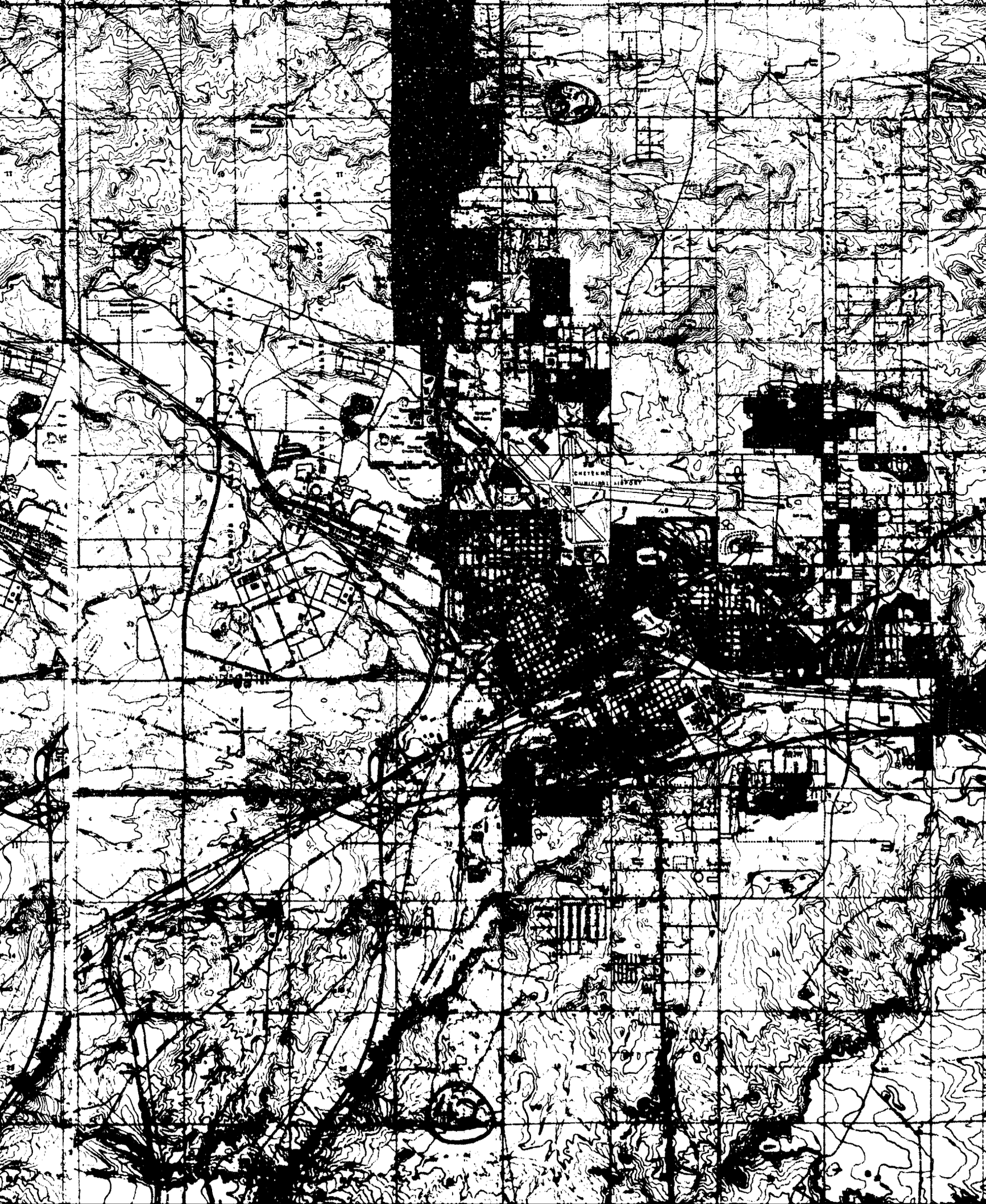


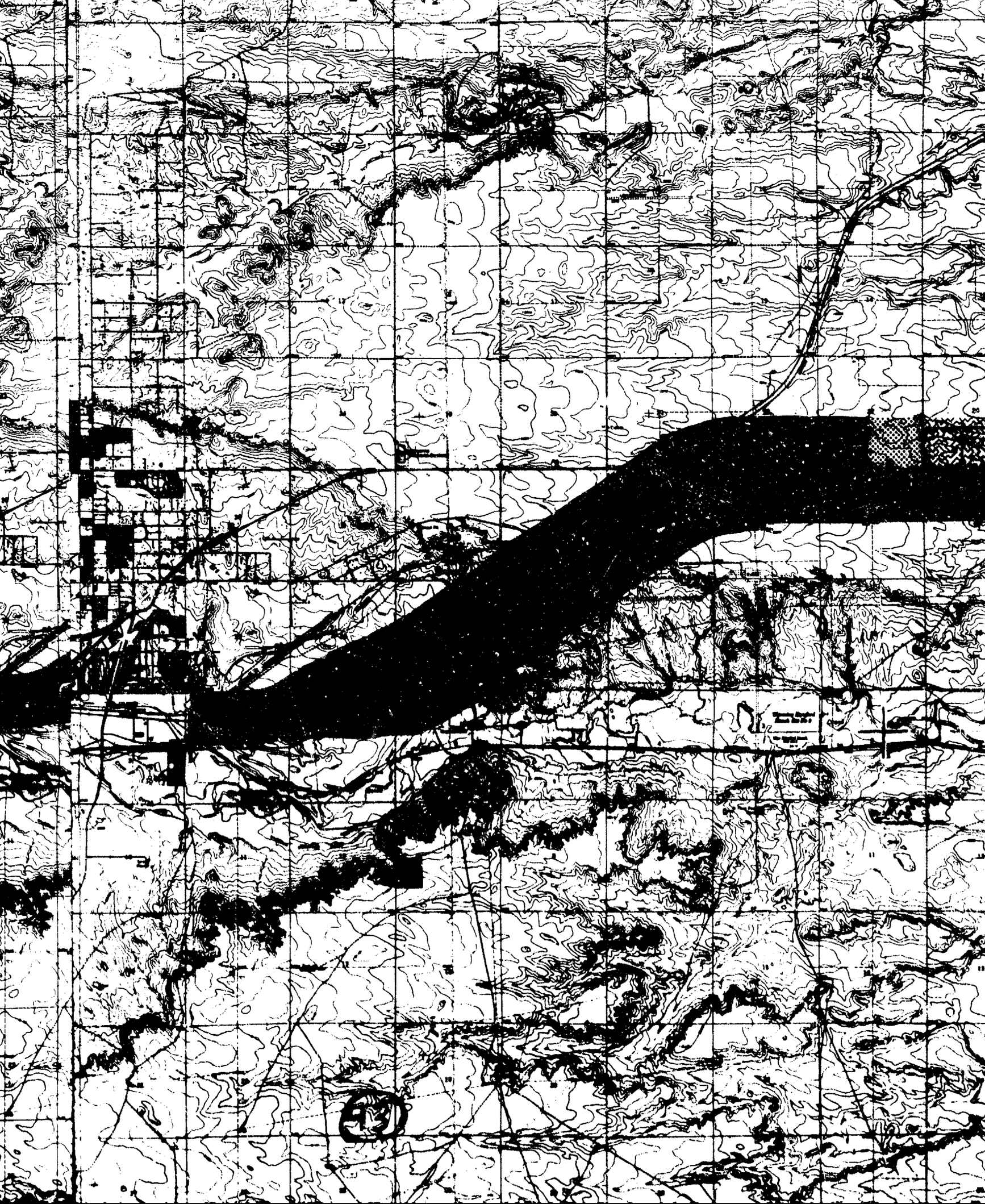


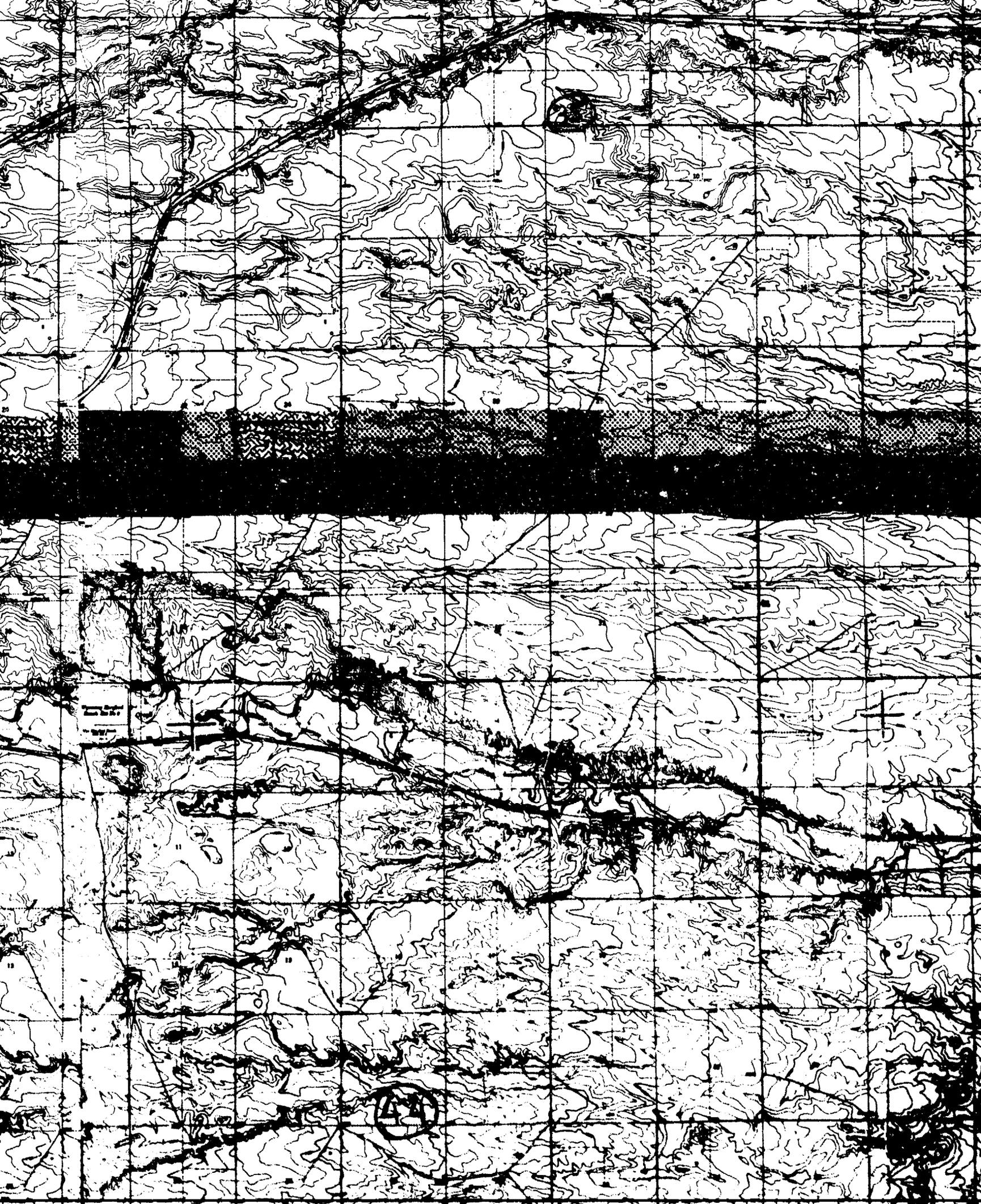

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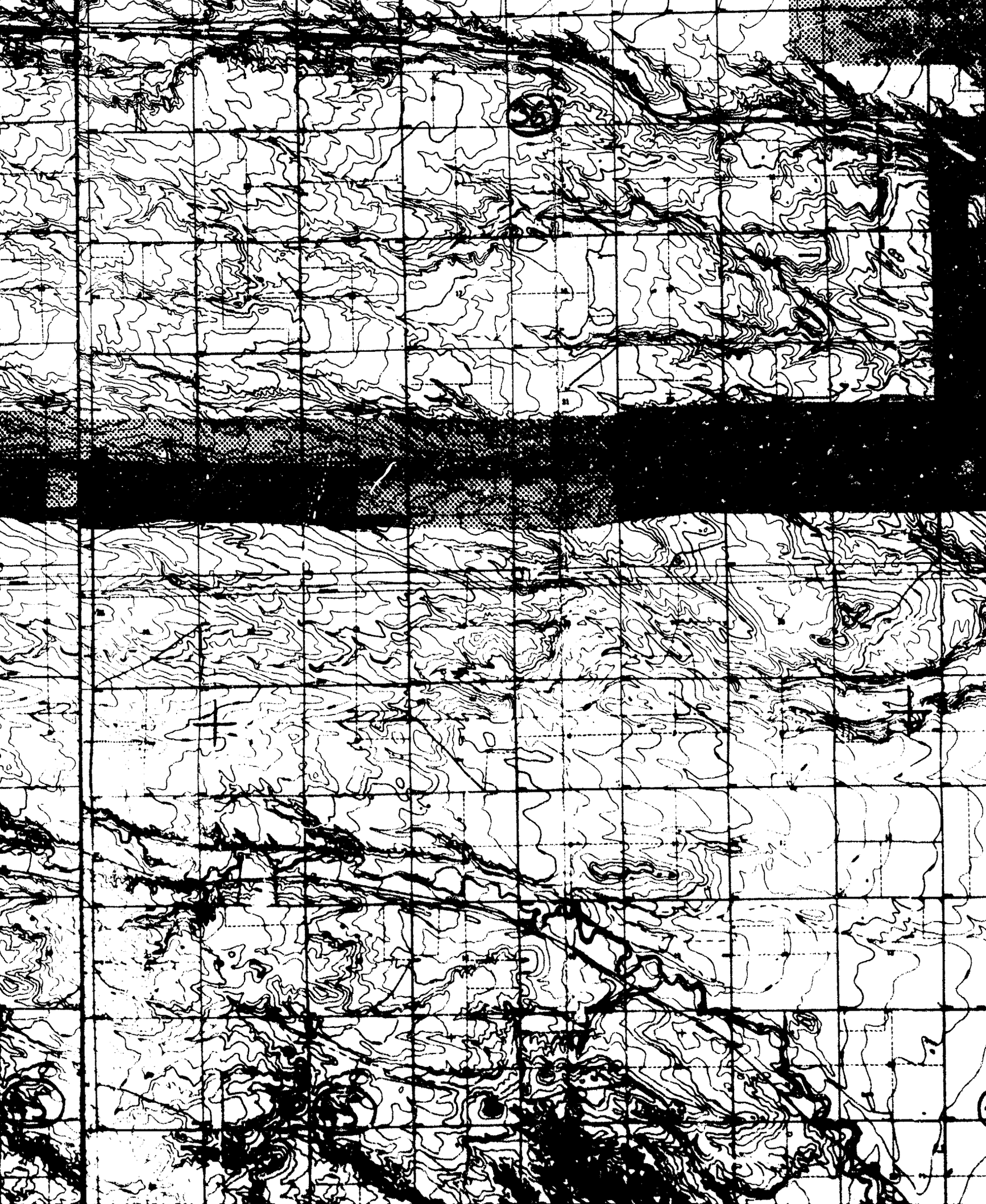

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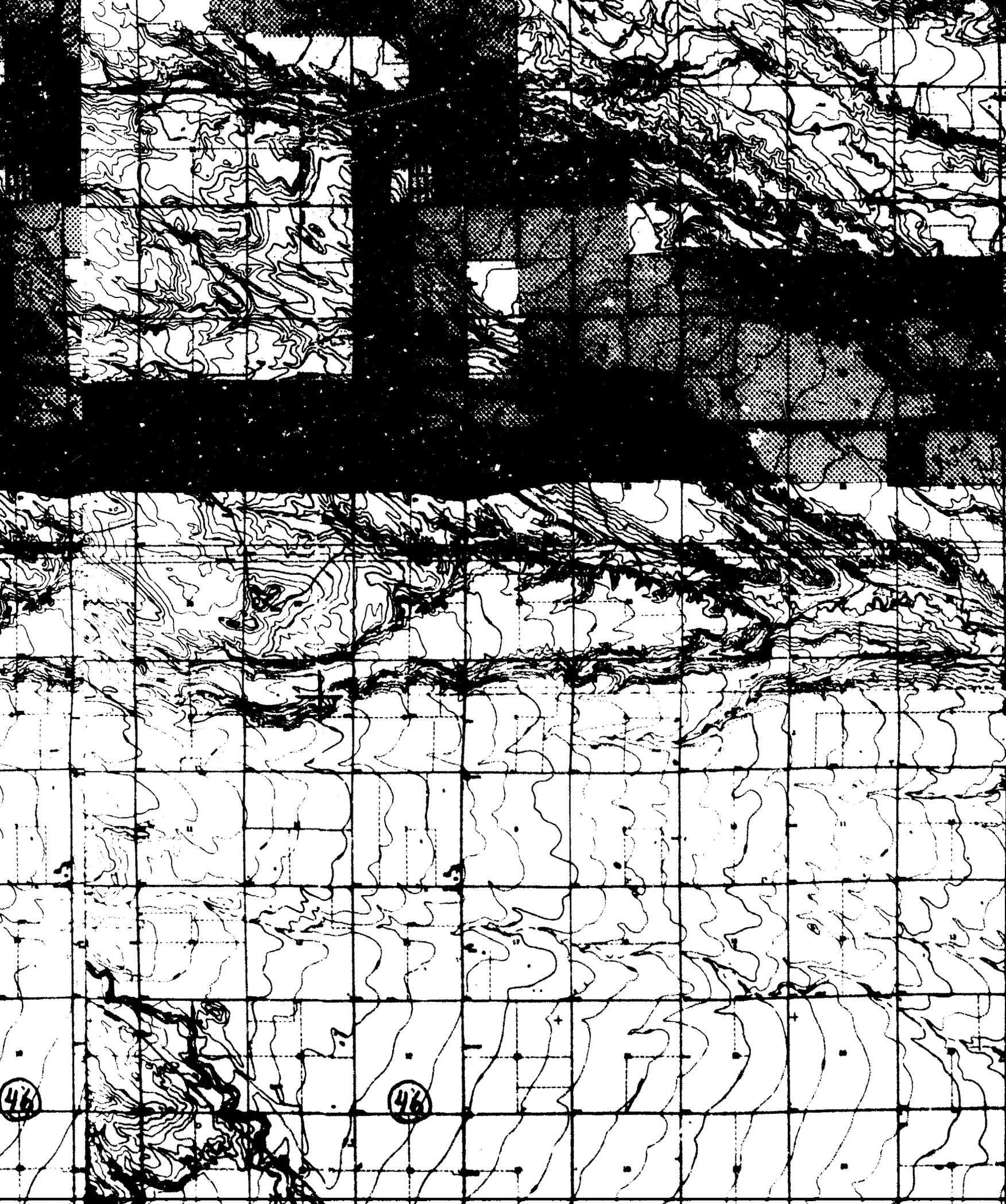


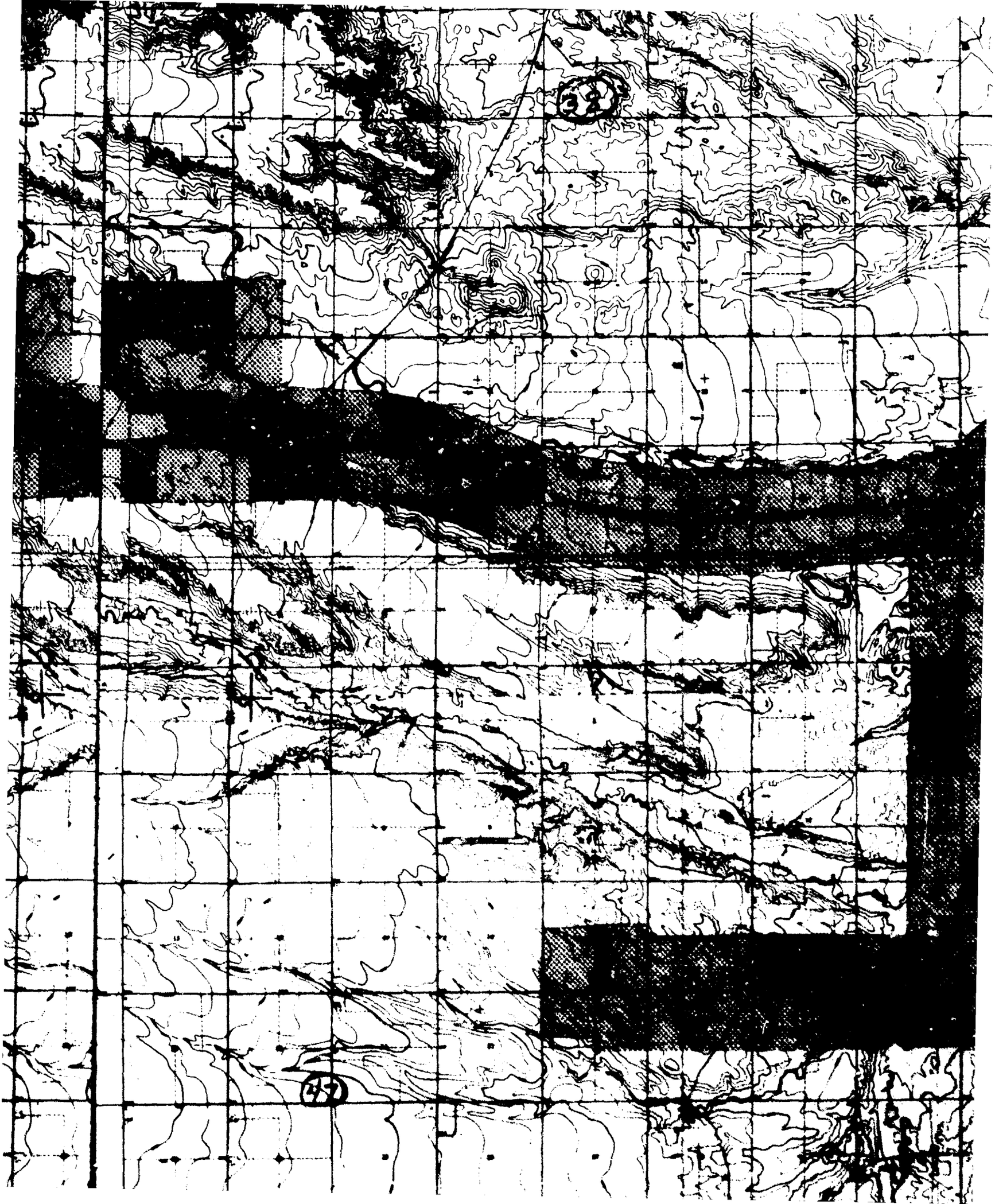




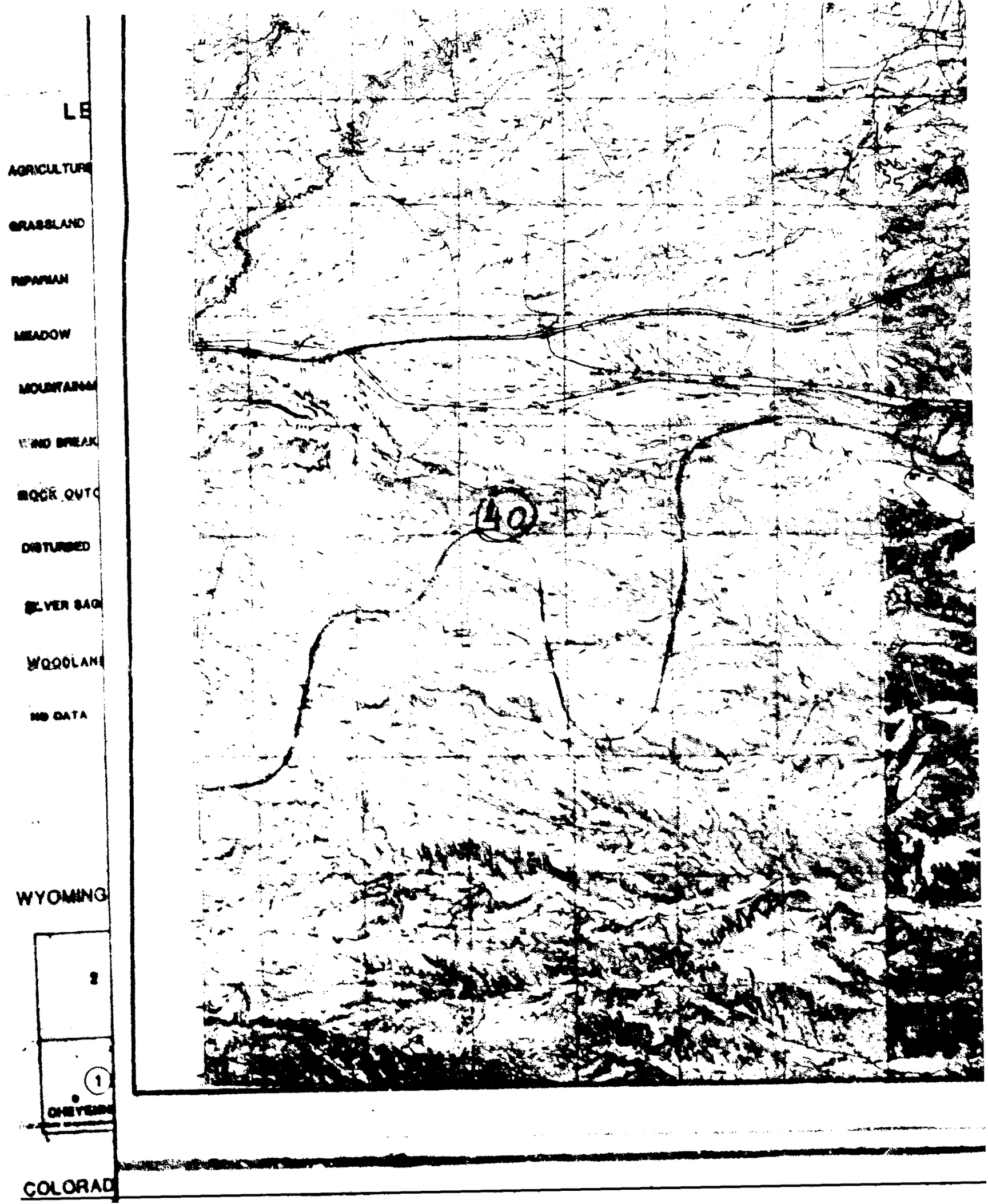


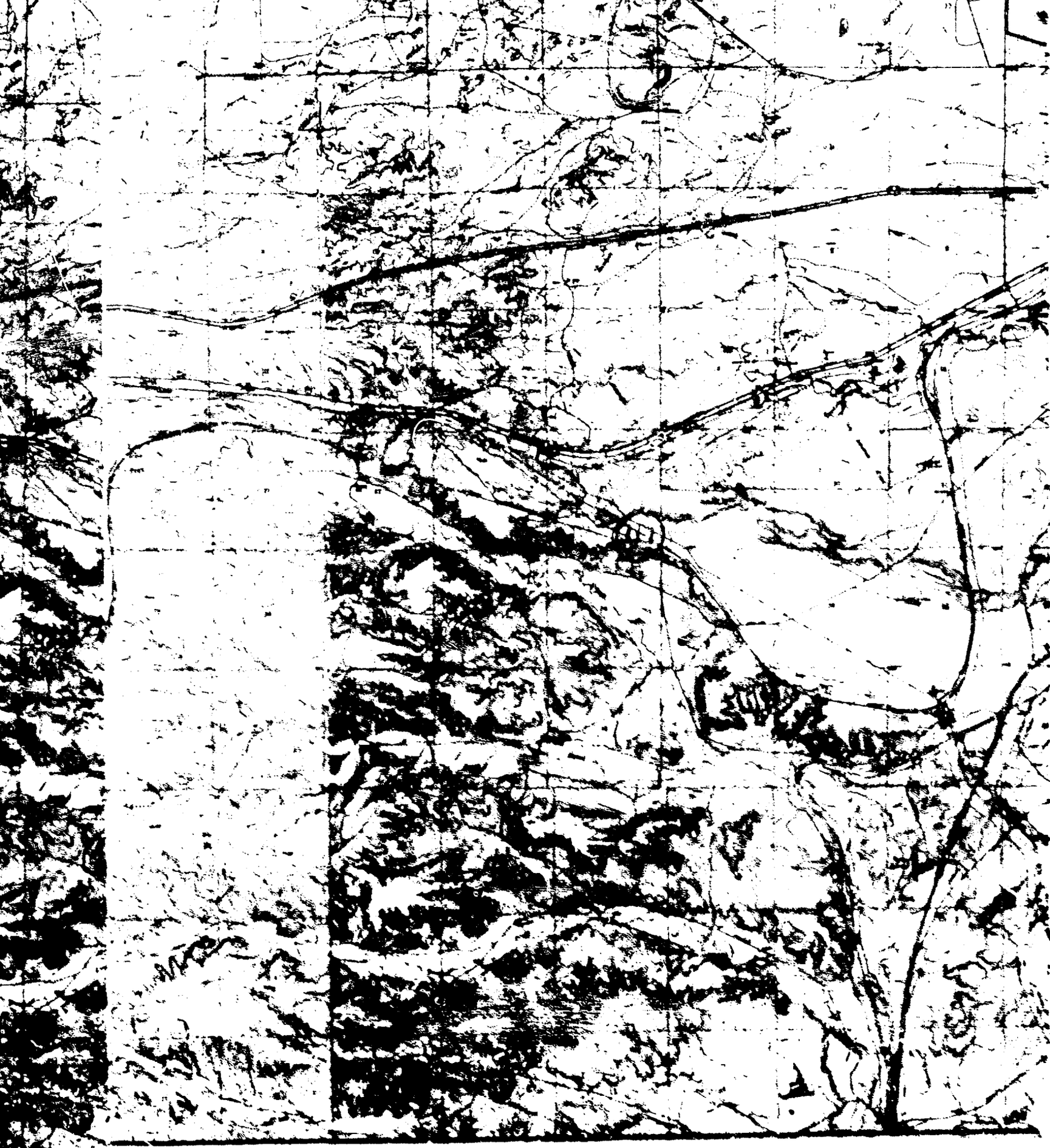


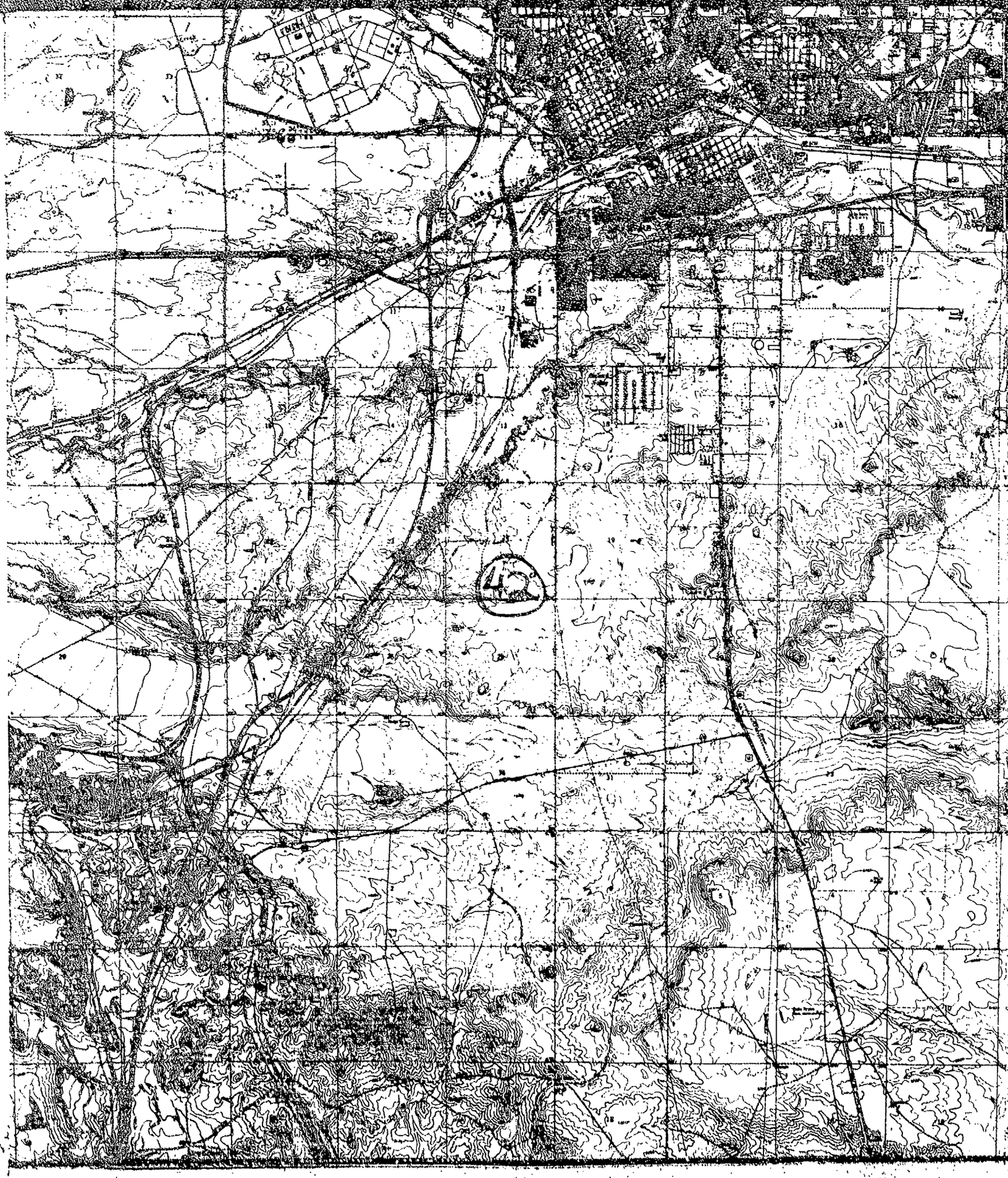

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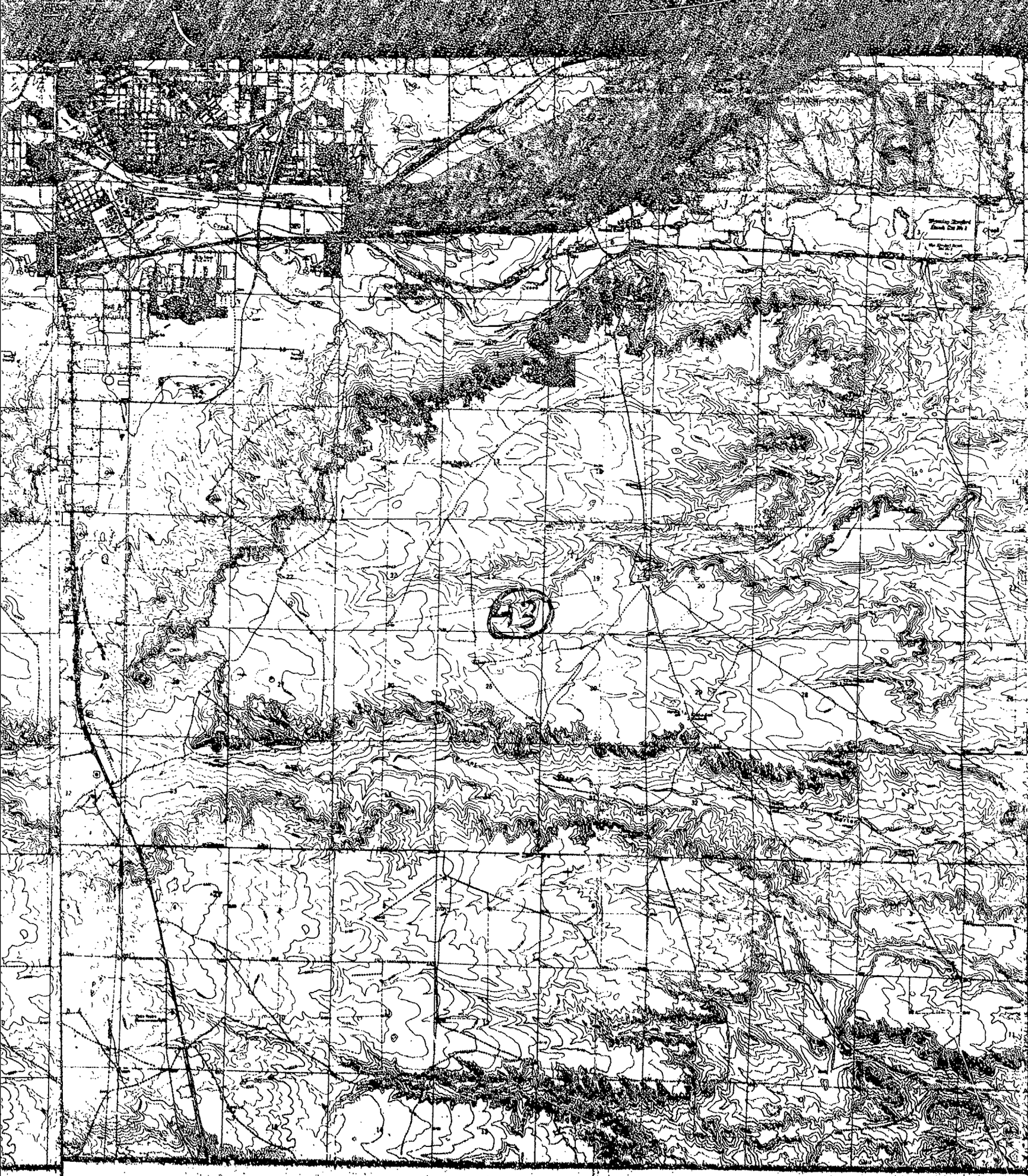


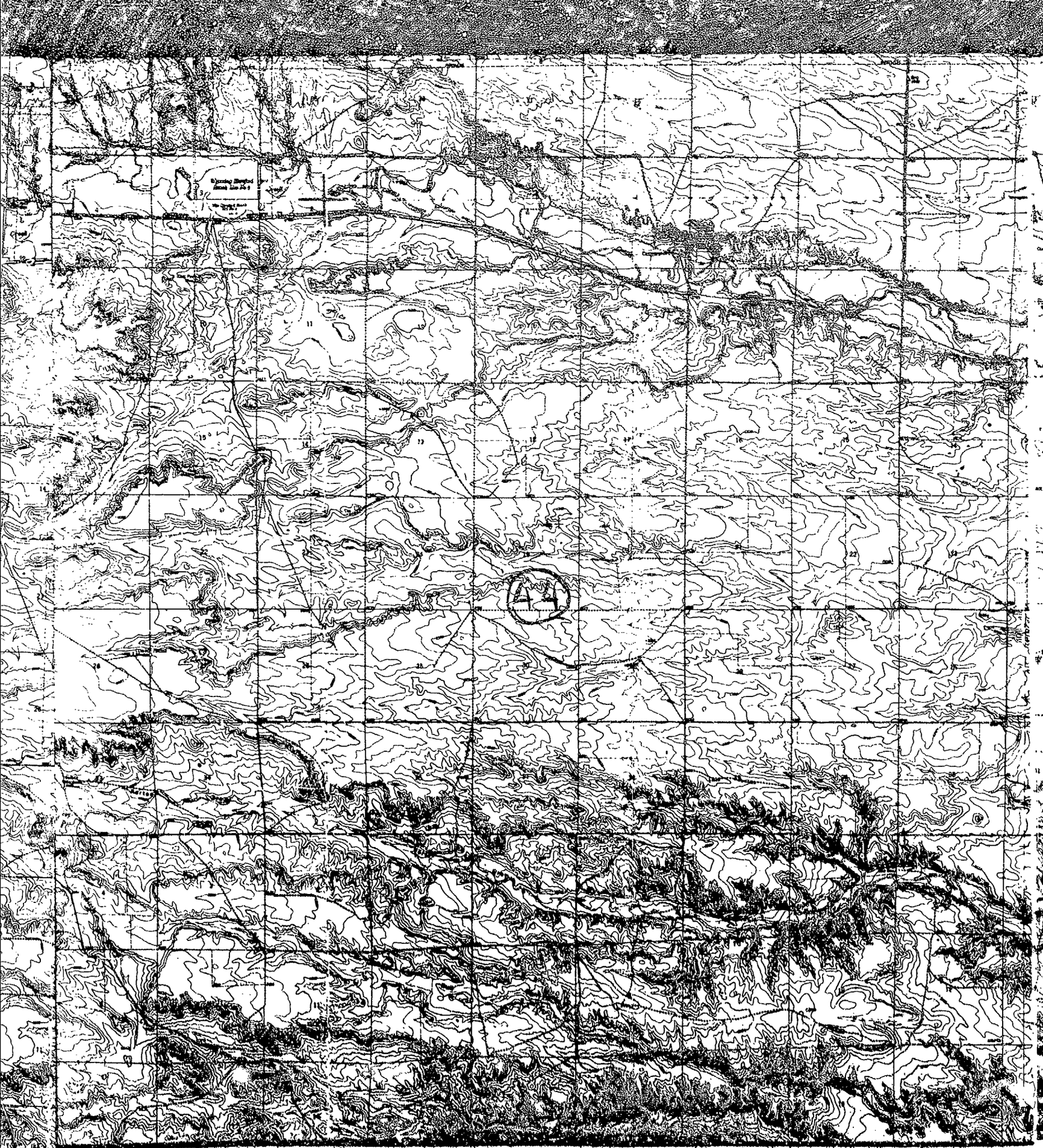


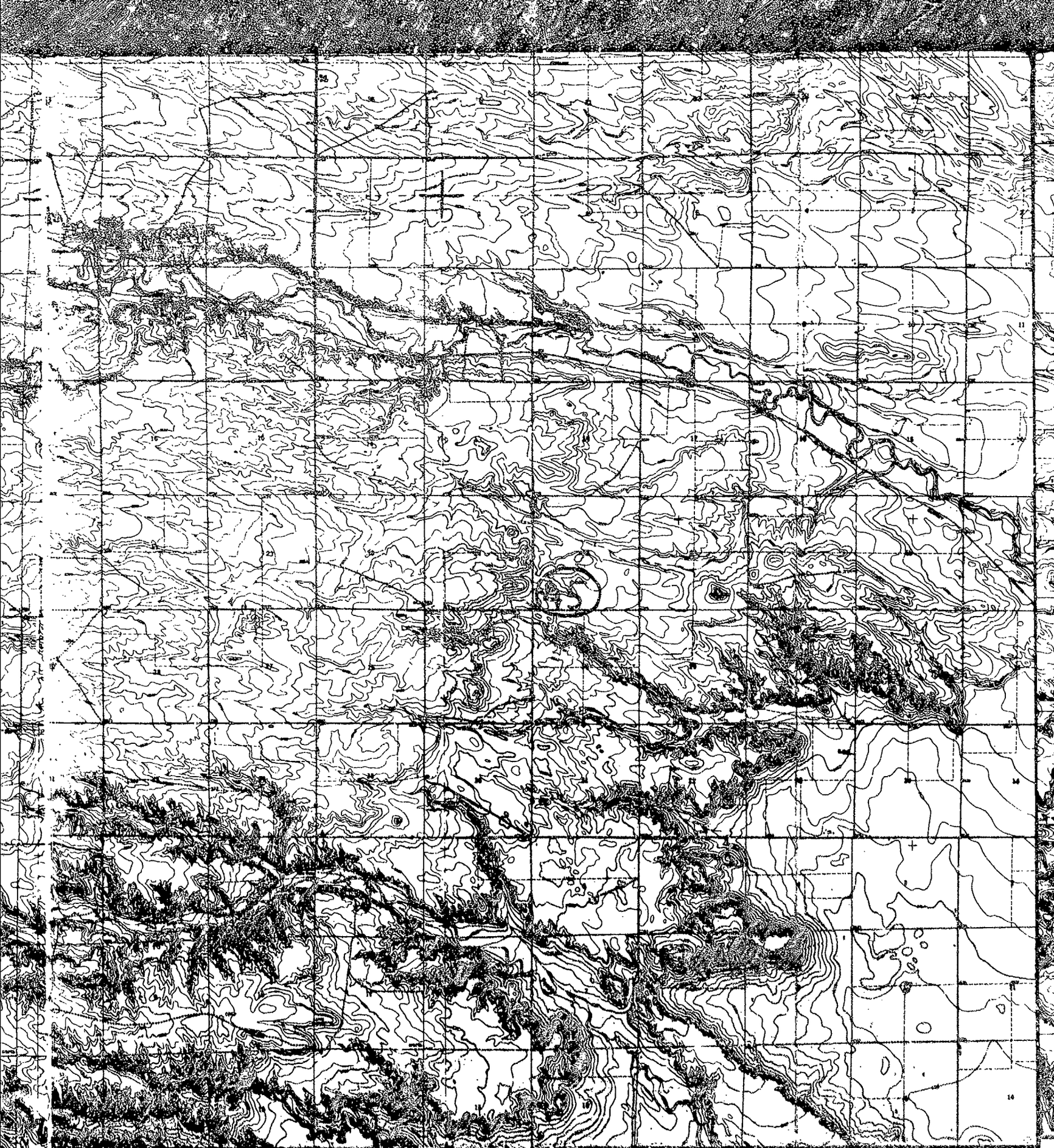

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MOUNTAIN
WIND BREAK
ROCK OUTC
DISTURBED
SILVER SAG
WOODLAN
NO DATA
40
WYOMING
2
1
COLORAD

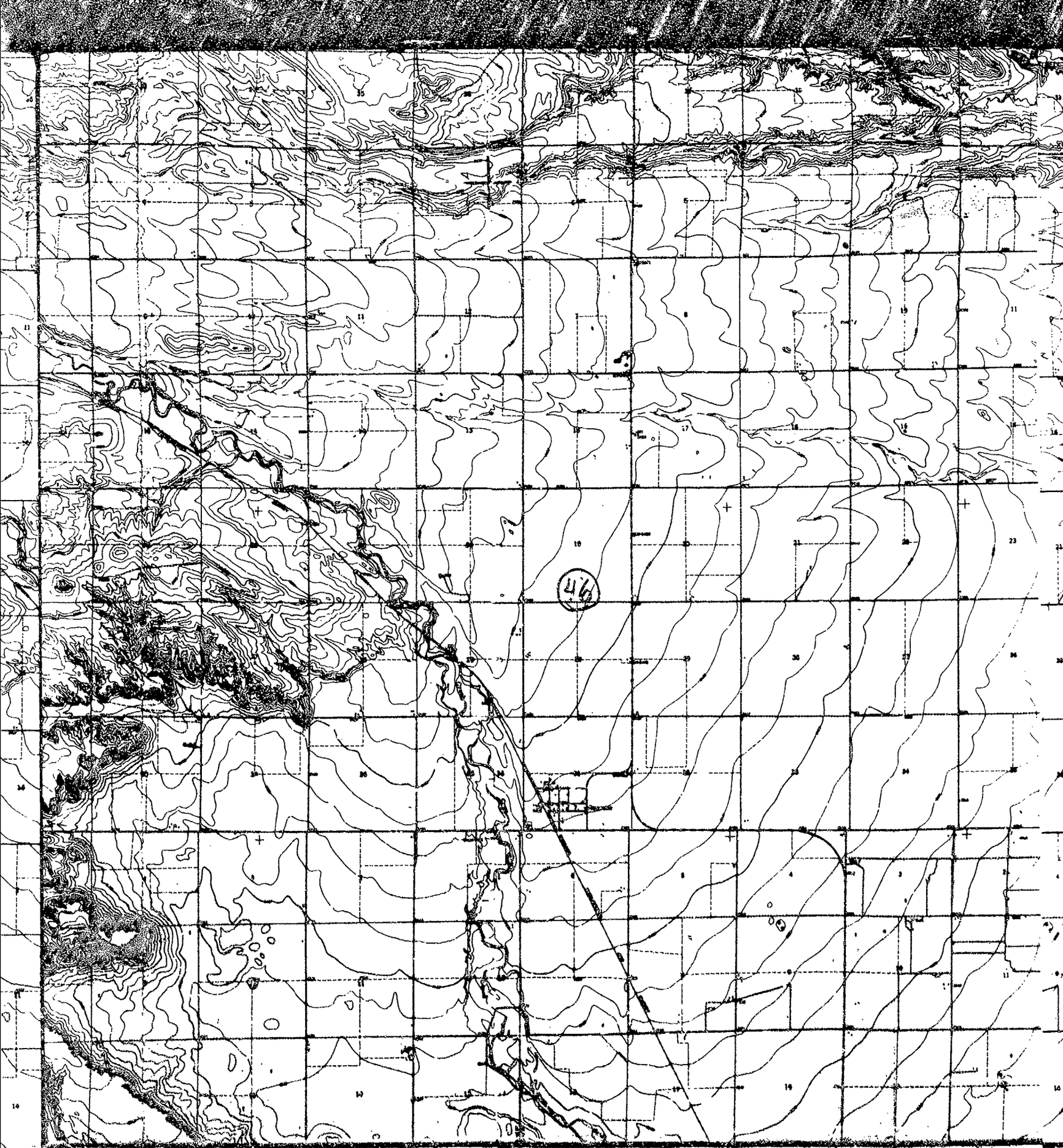


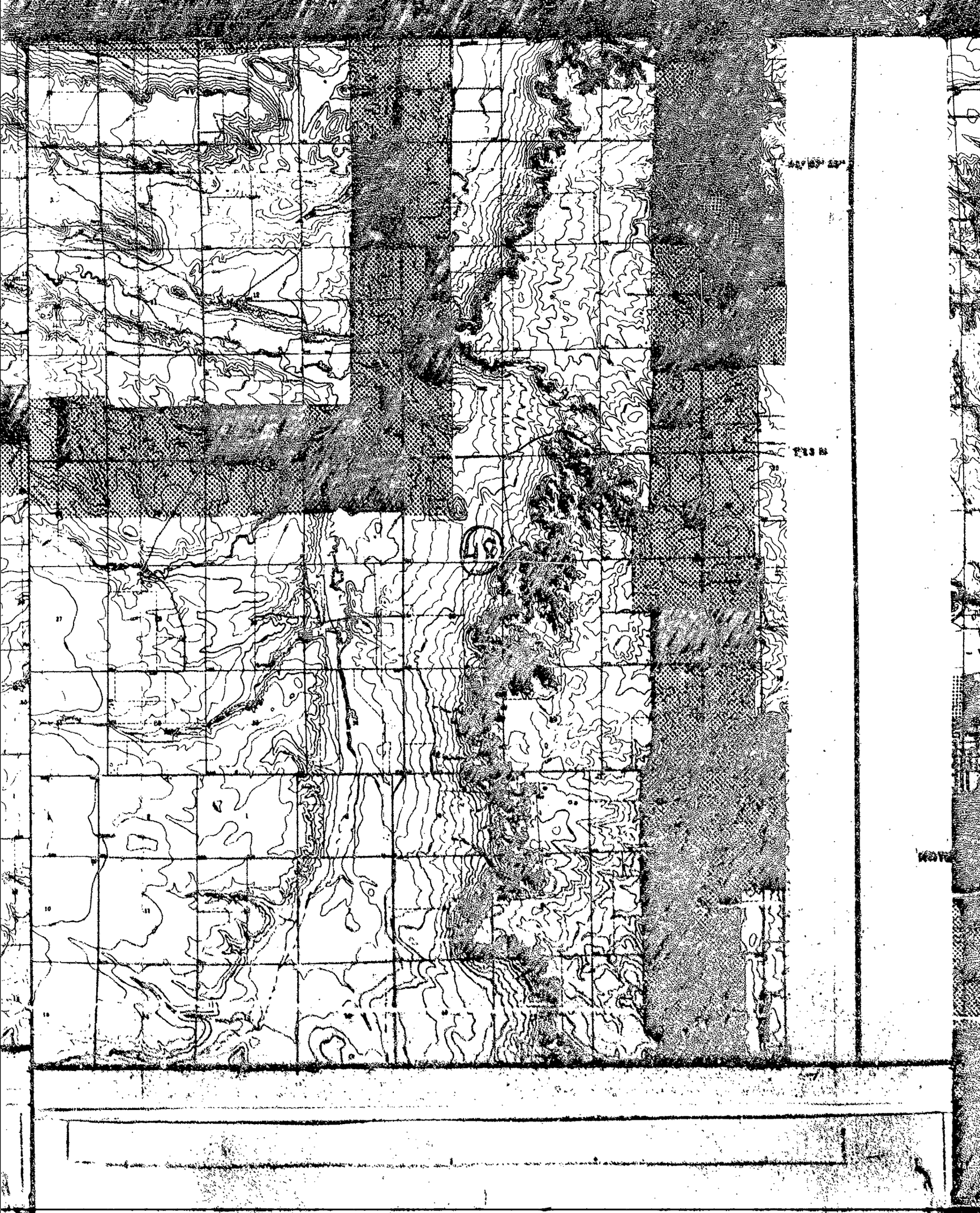

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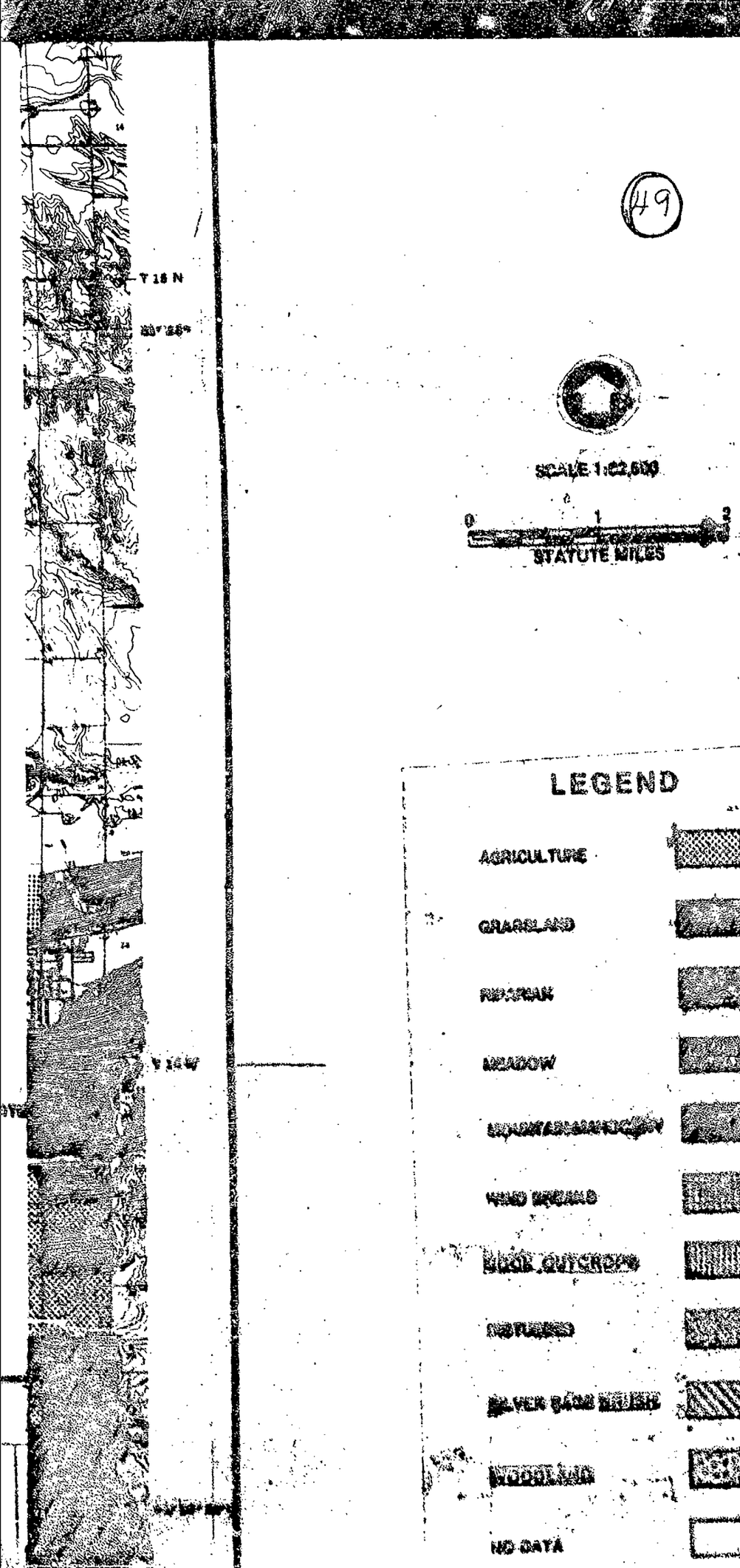

(4)




46



(49)



SCALE 1:62,500

0 1 2

STATUTE MILES

LEGEND

AGRICULTURE

GRASSLAND

RIPARIAN

MEADOW

WILD RICE/MARSH

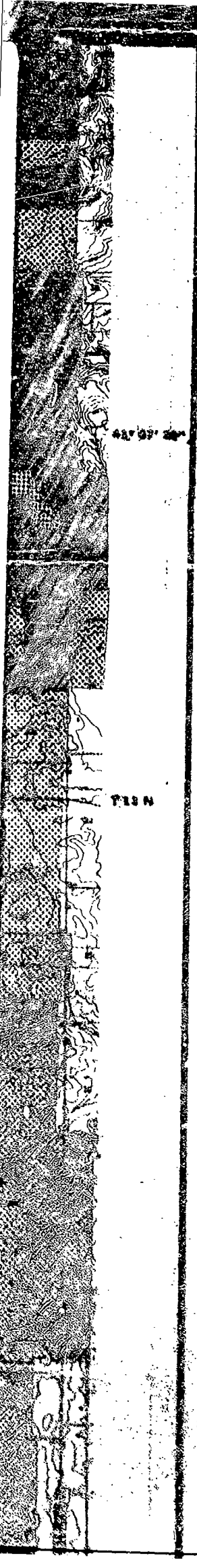
BARE GROUND

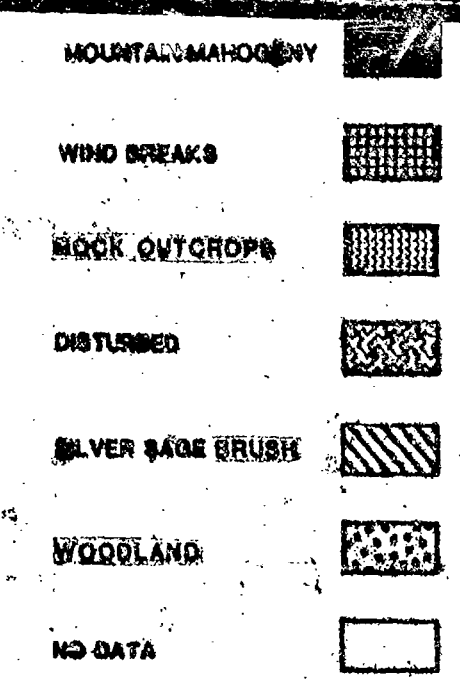
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SILVER SAGE BRUSH

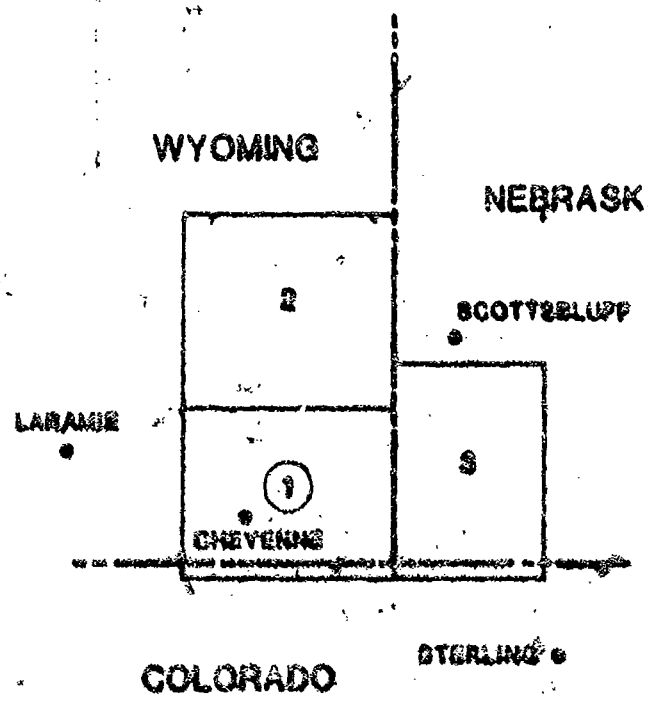
WOODLAND

NO DATA





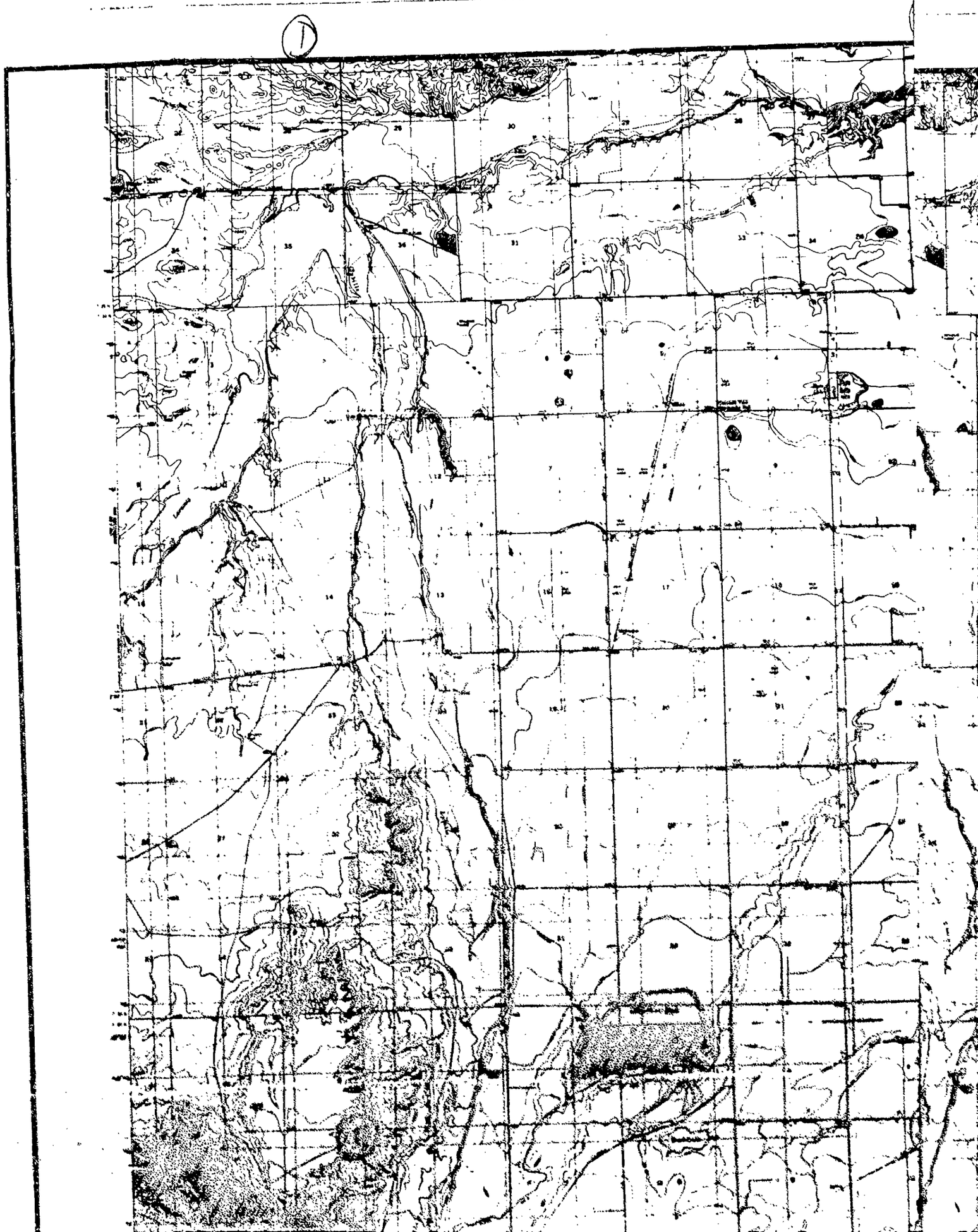
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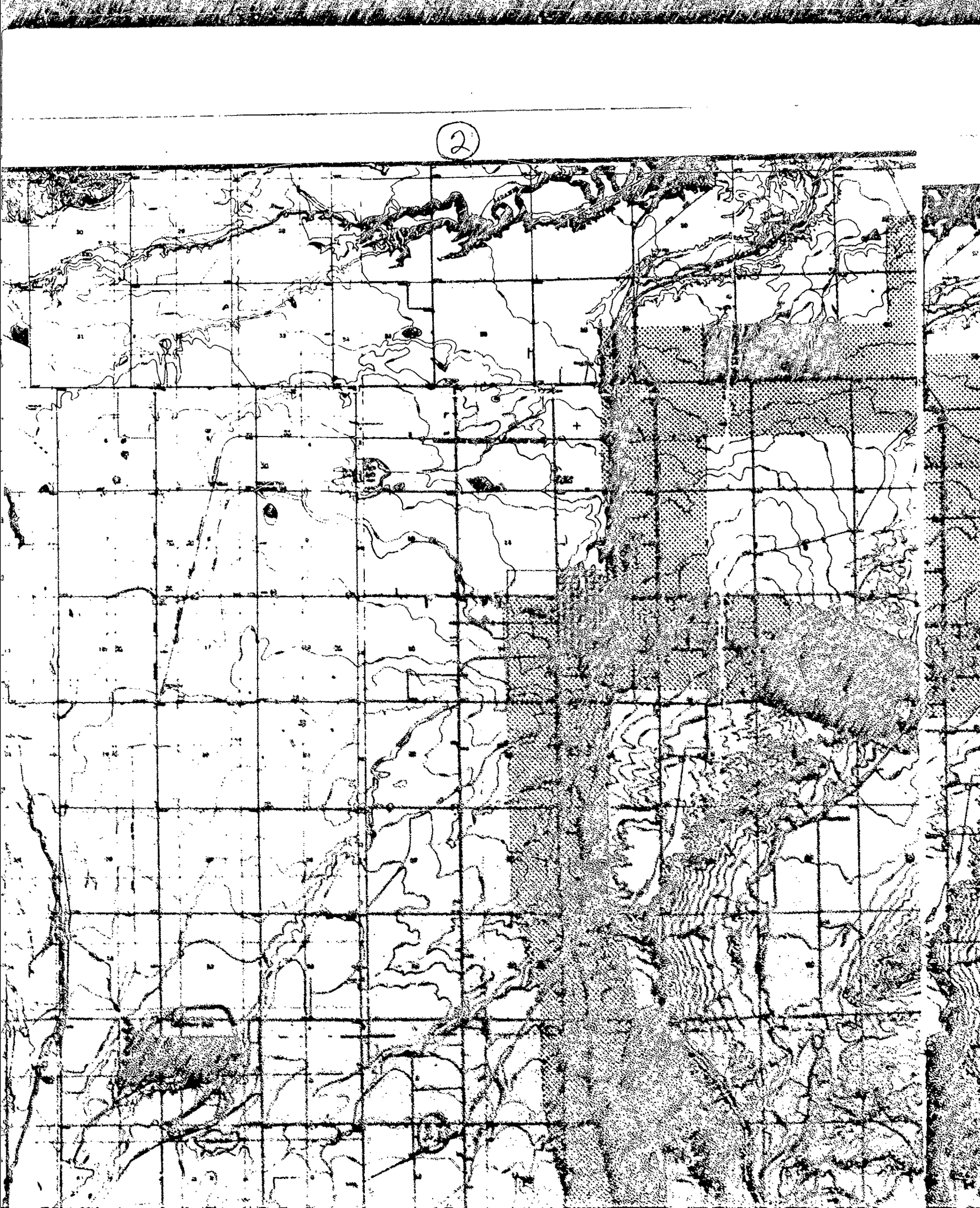


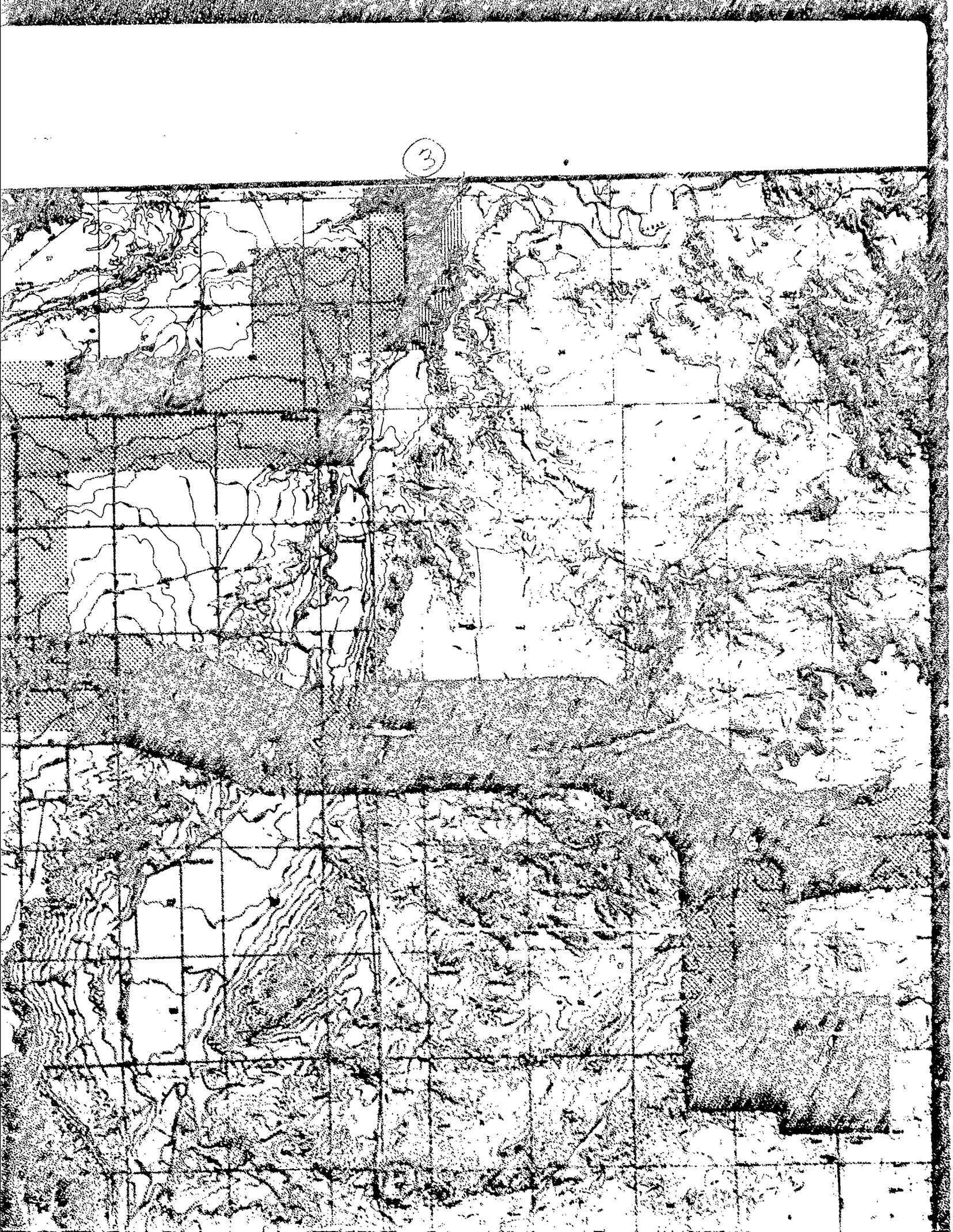
VEGETATION TYPES PRESENT ALONG ACCESS ROADS AND CABLE PATH CORRIDORS IN THE ACS

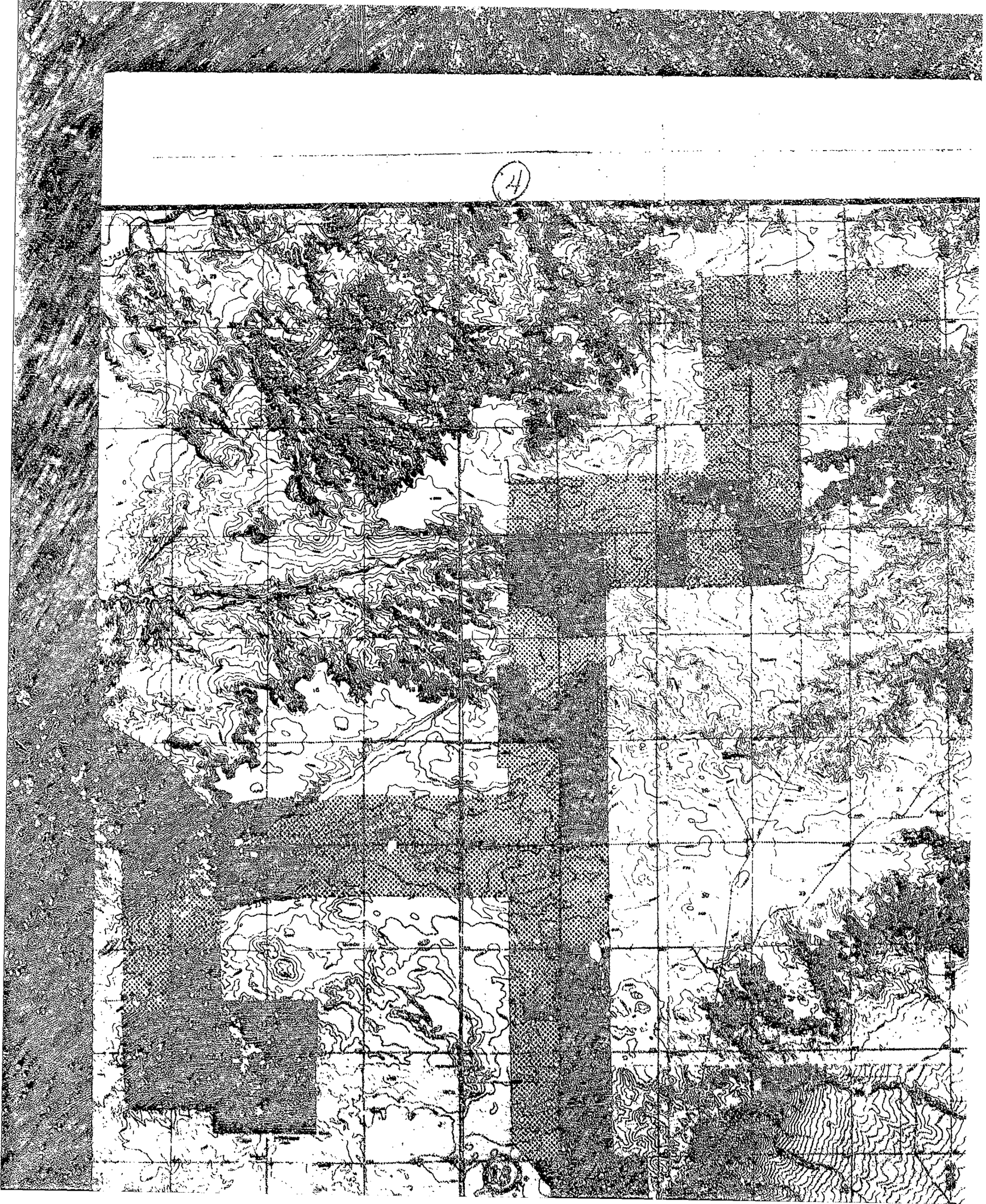
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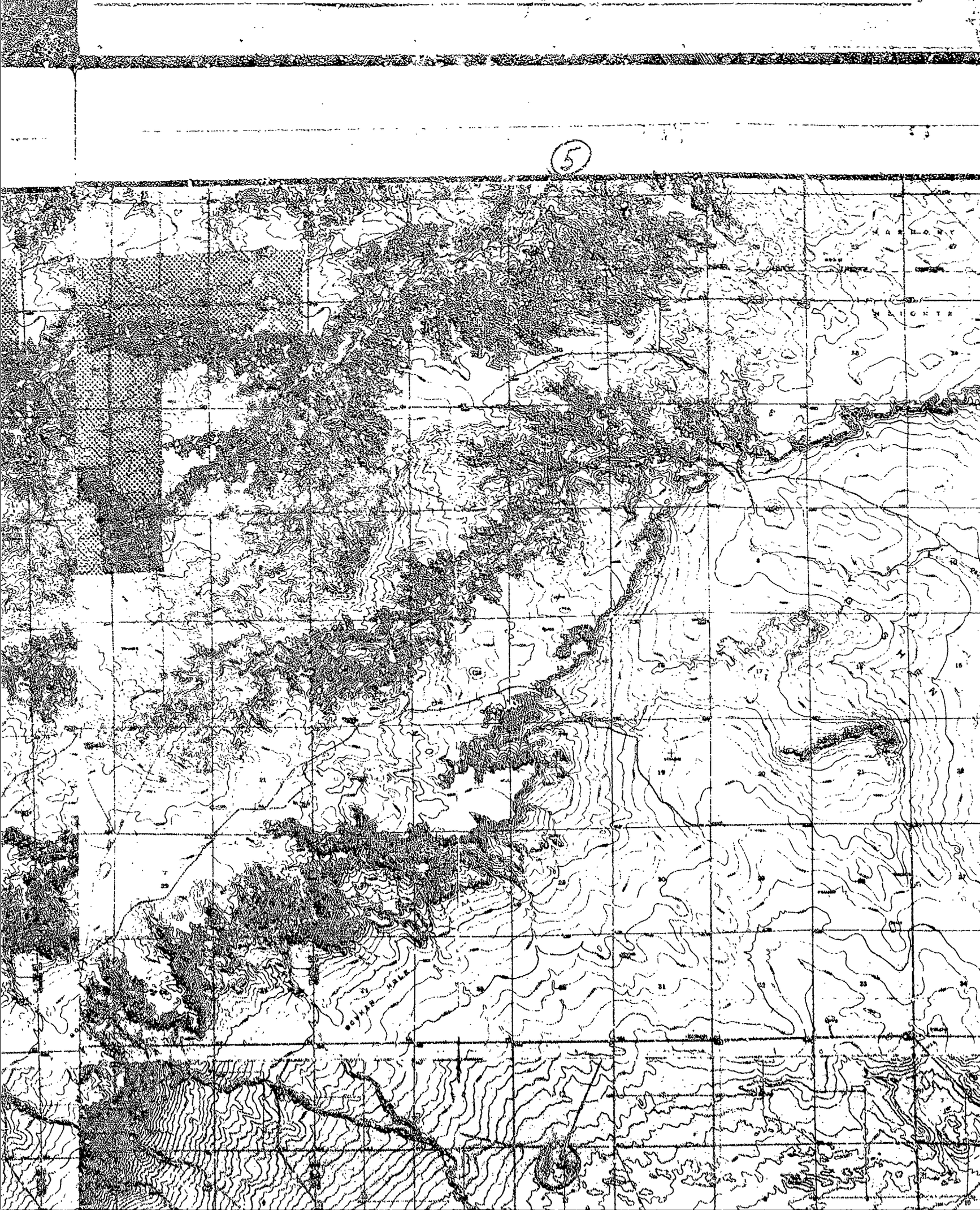
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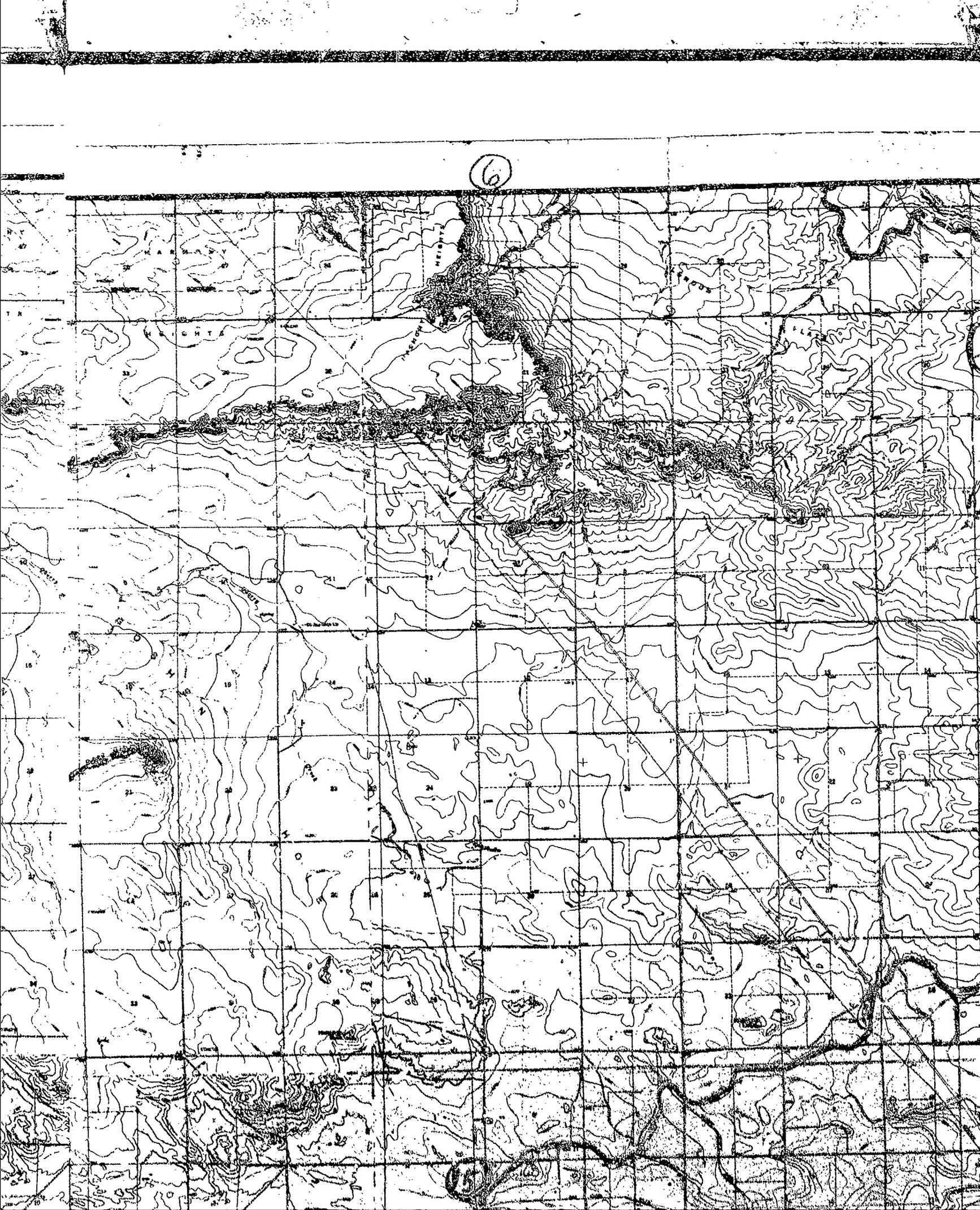


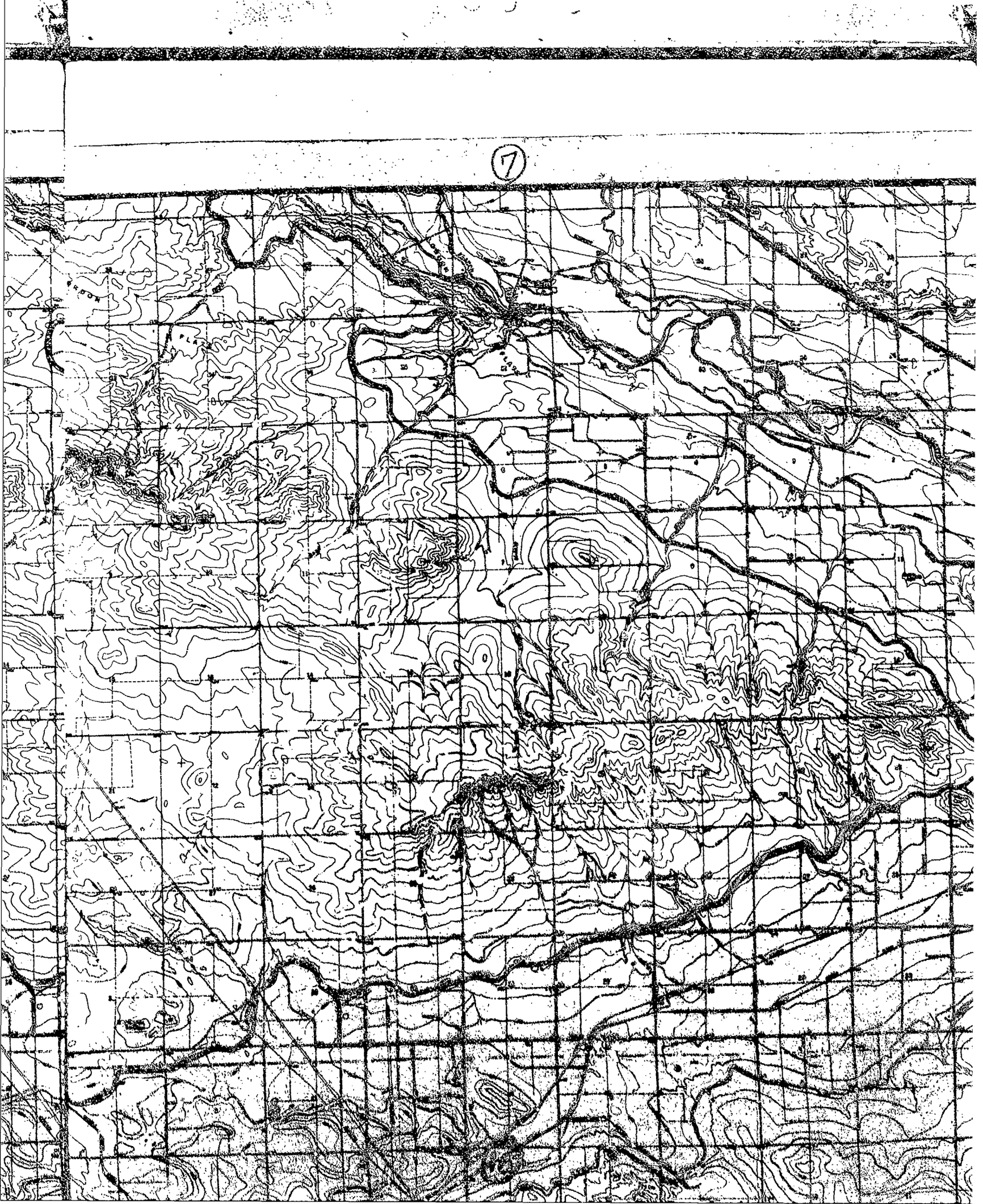

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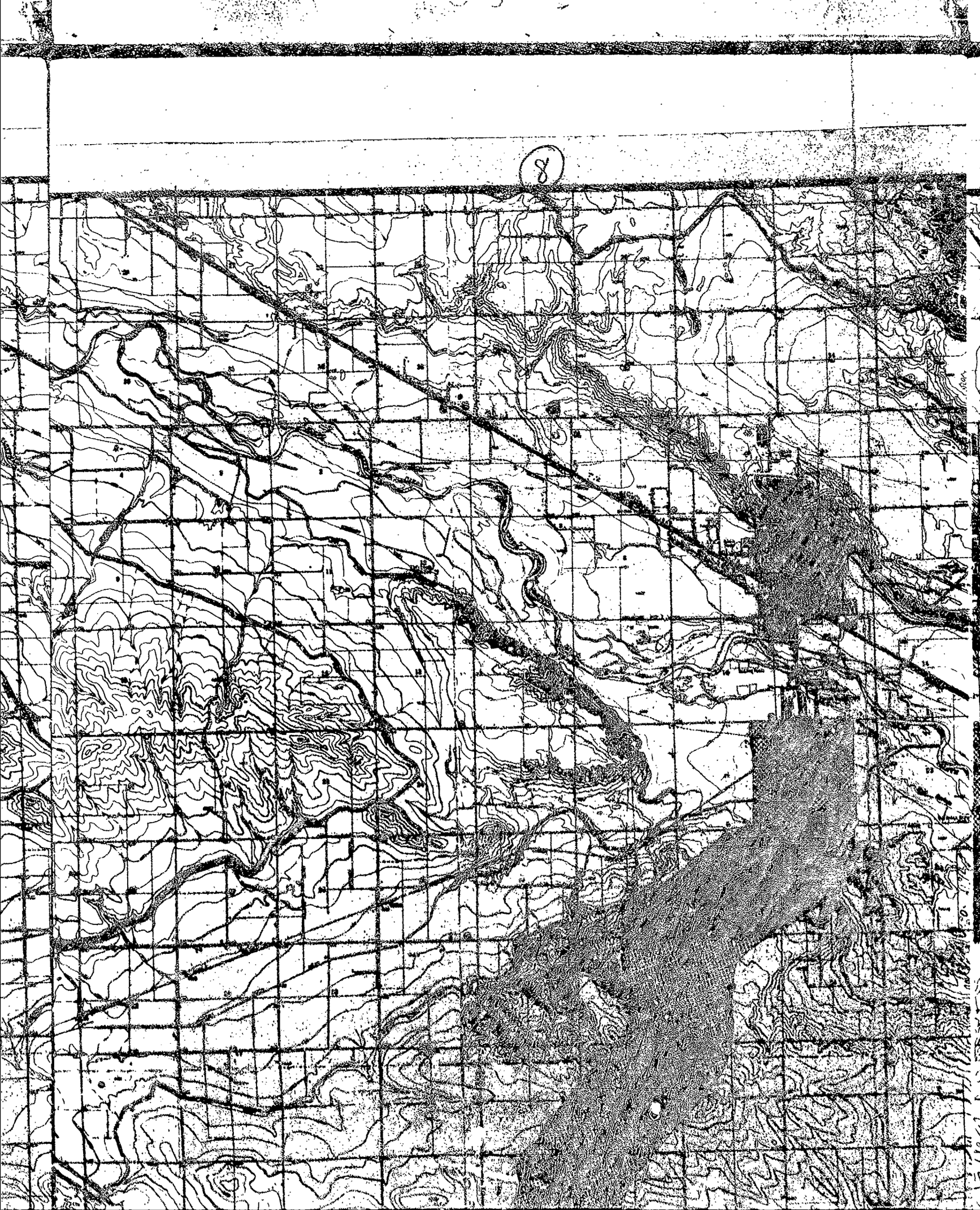

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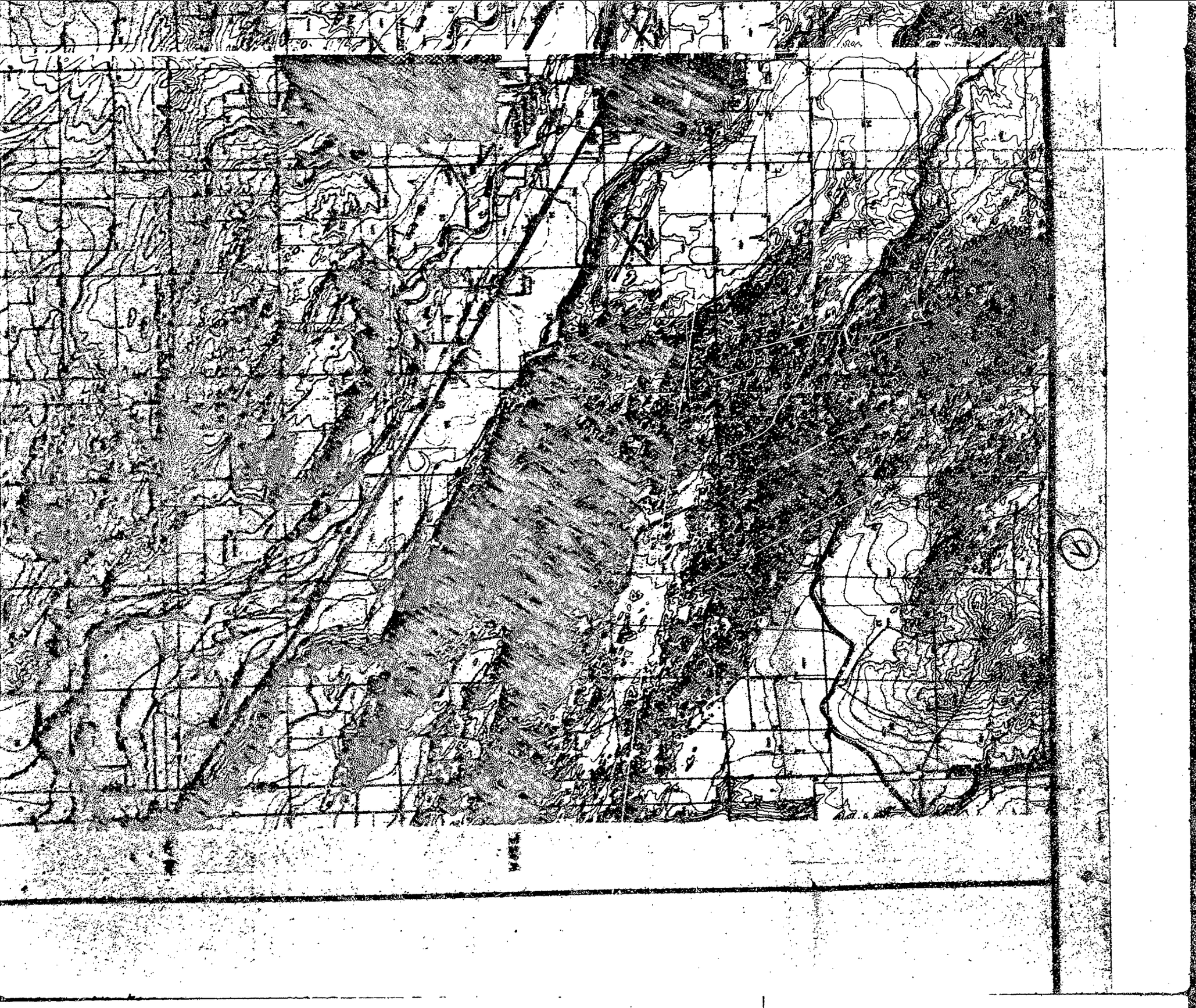


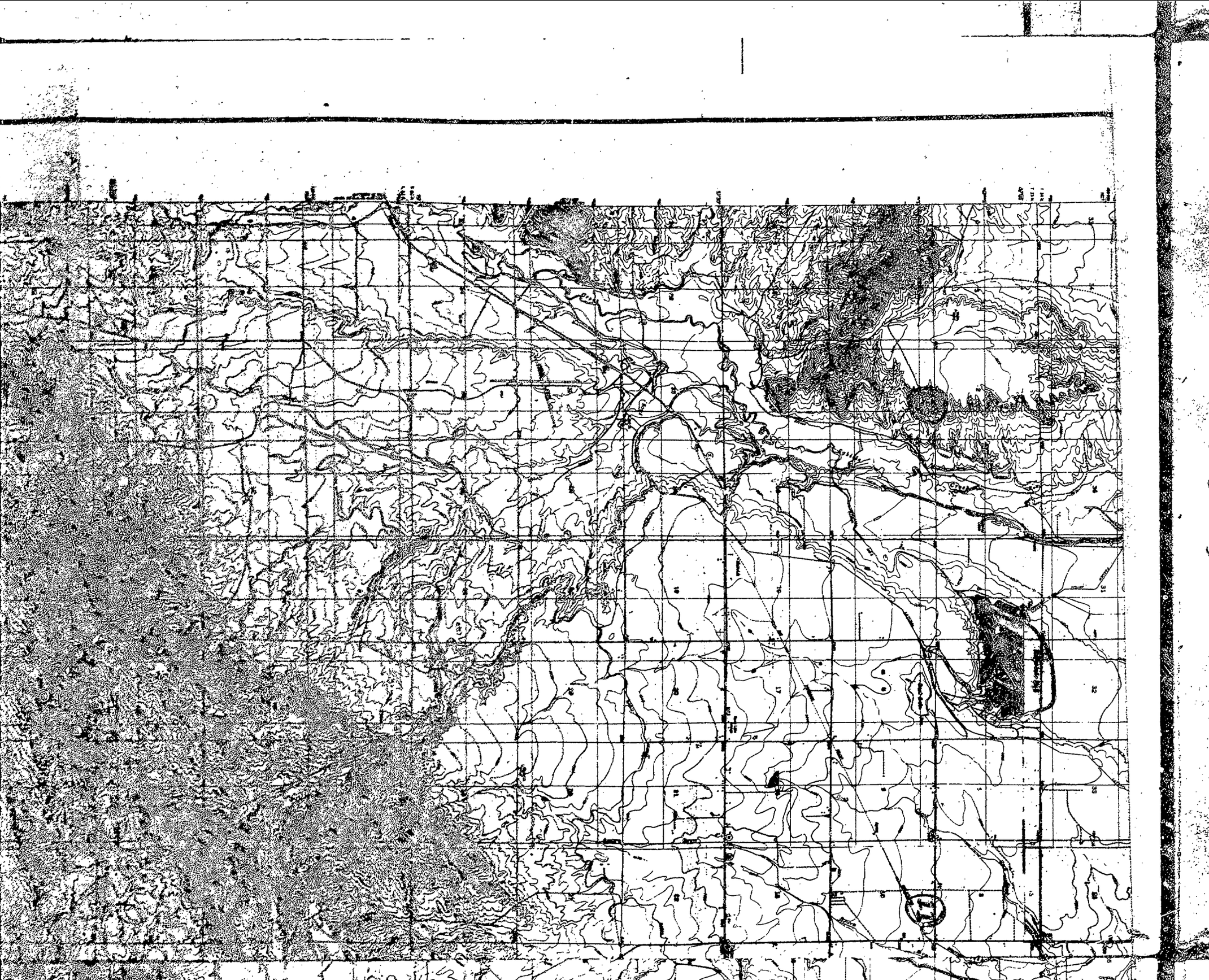

5
MARMONT
HEIGHTS
BOWMAN HALL

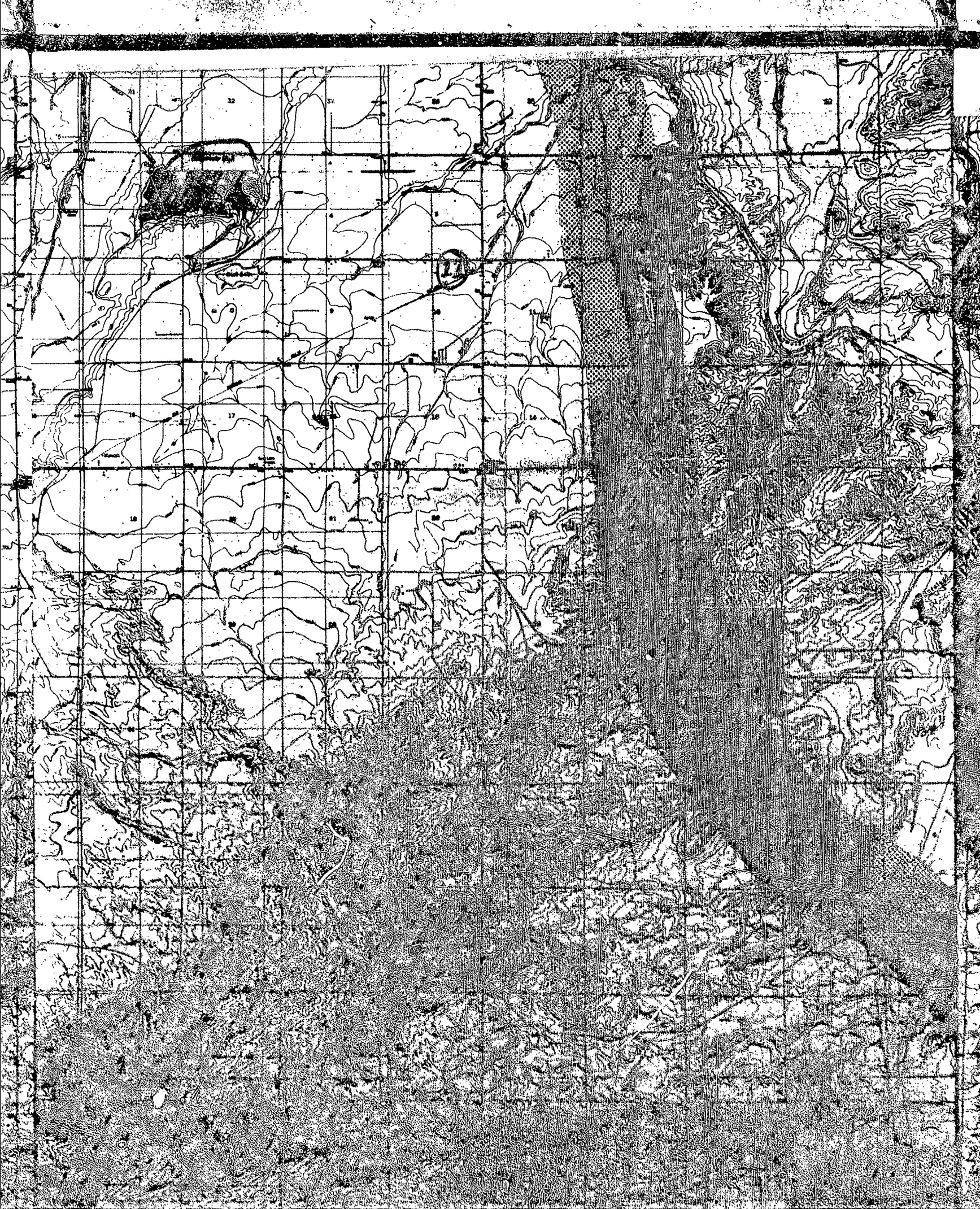


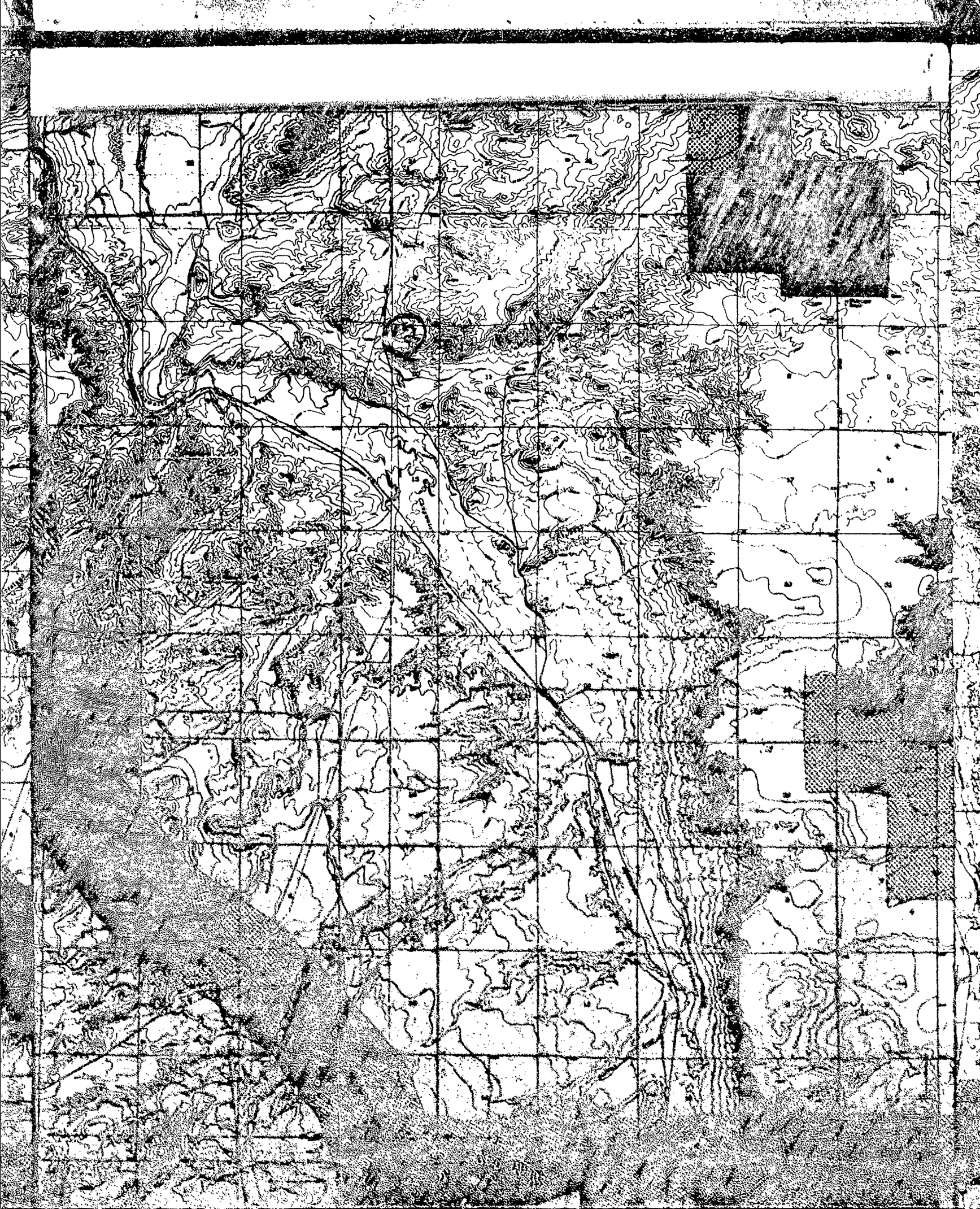


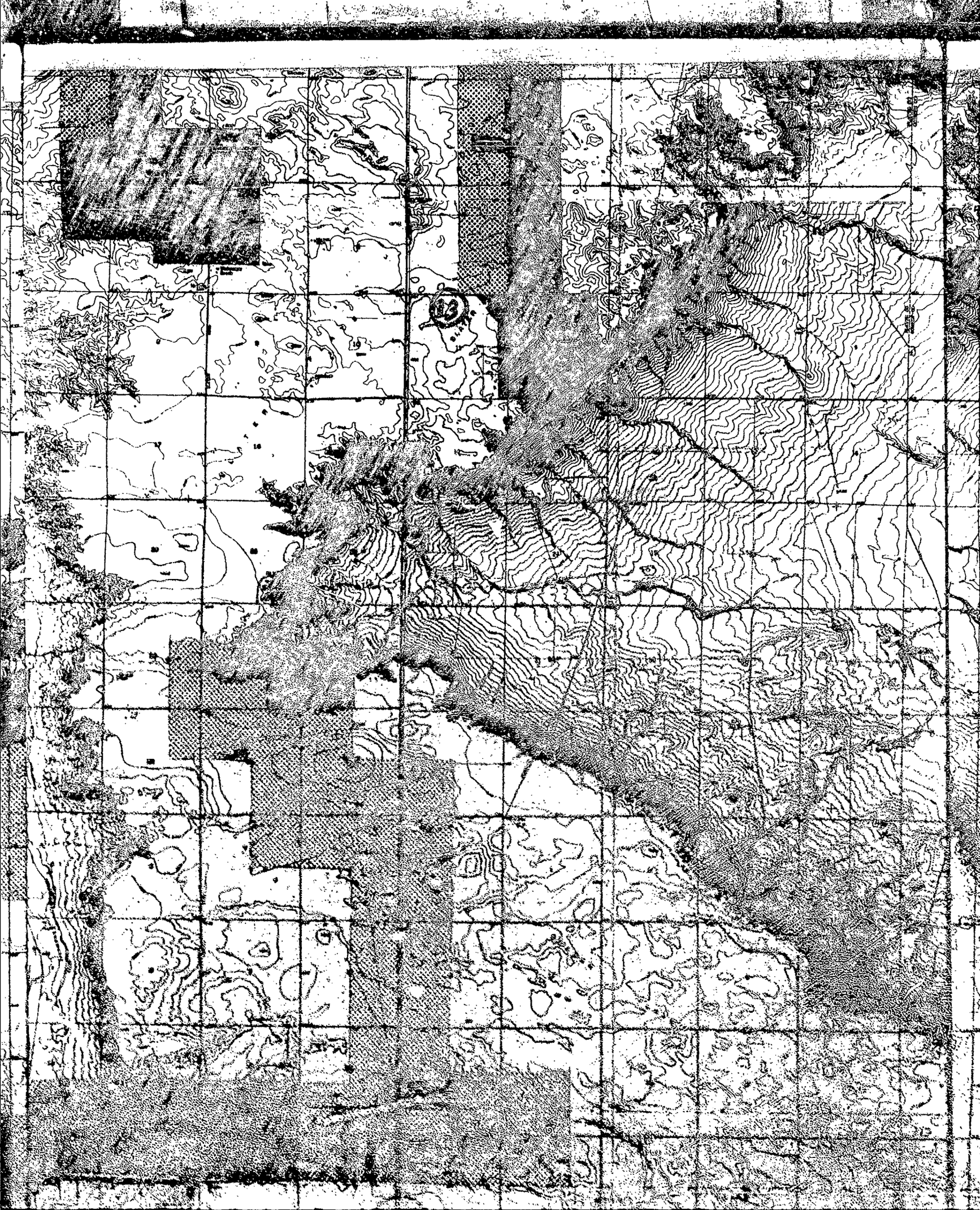


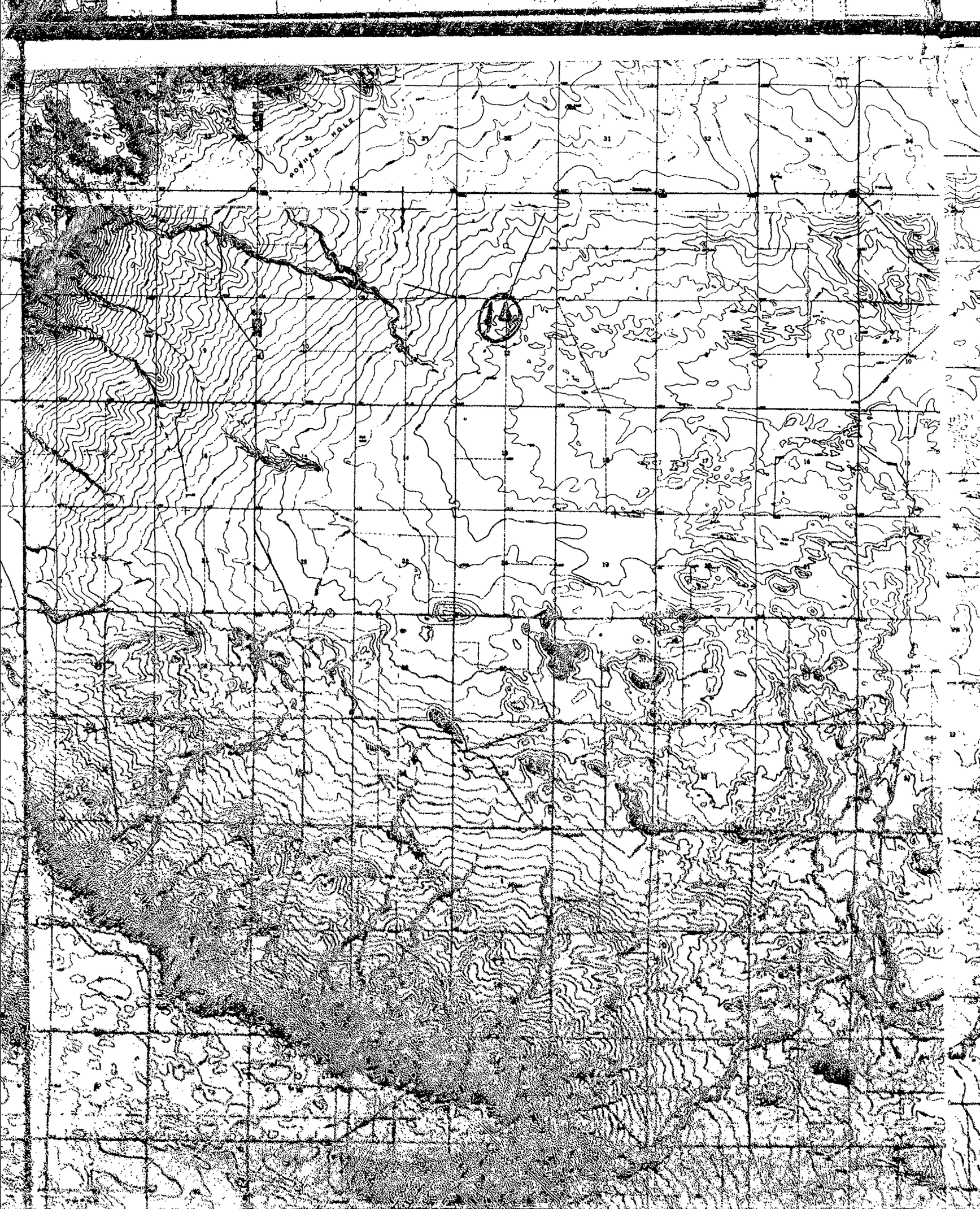


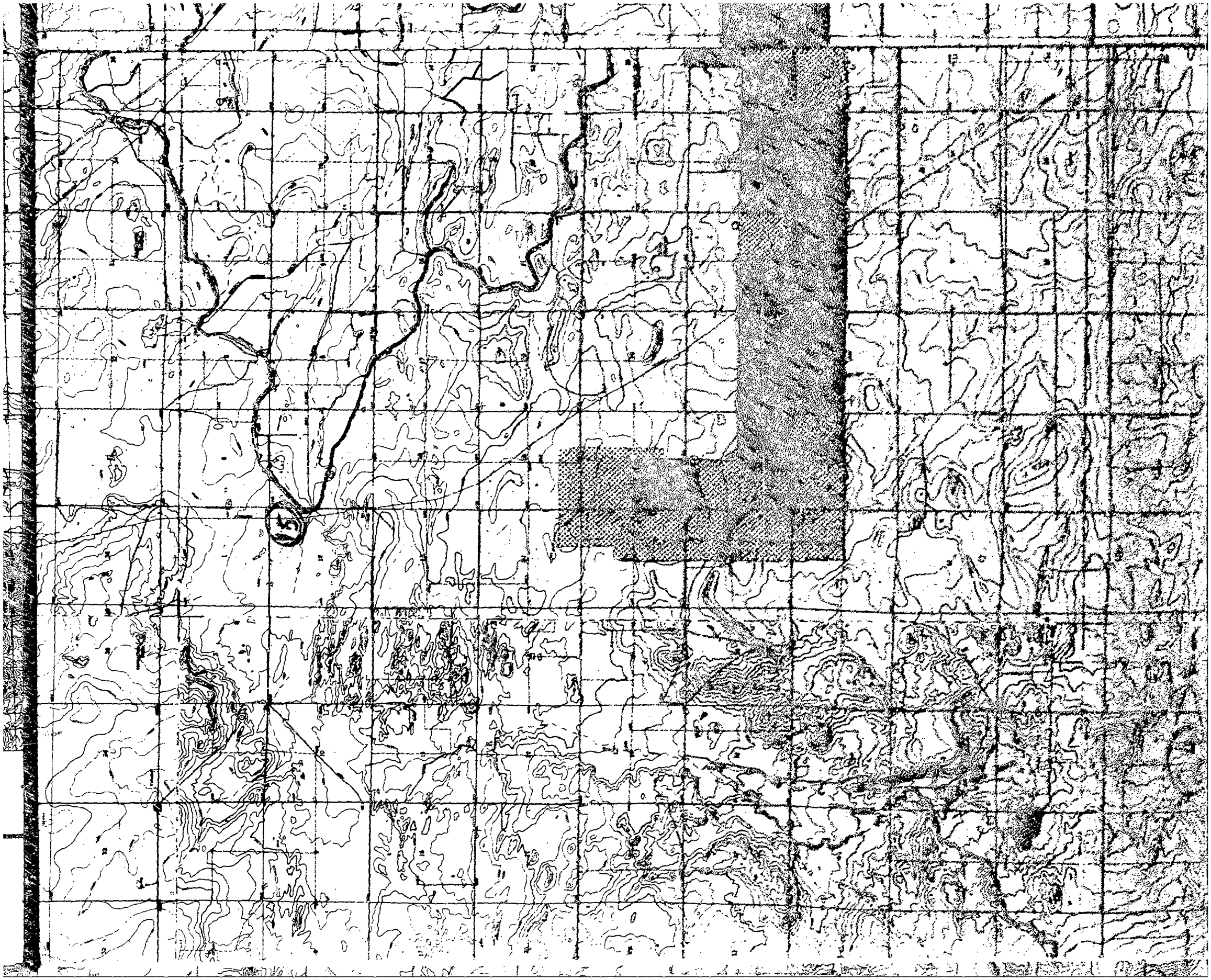


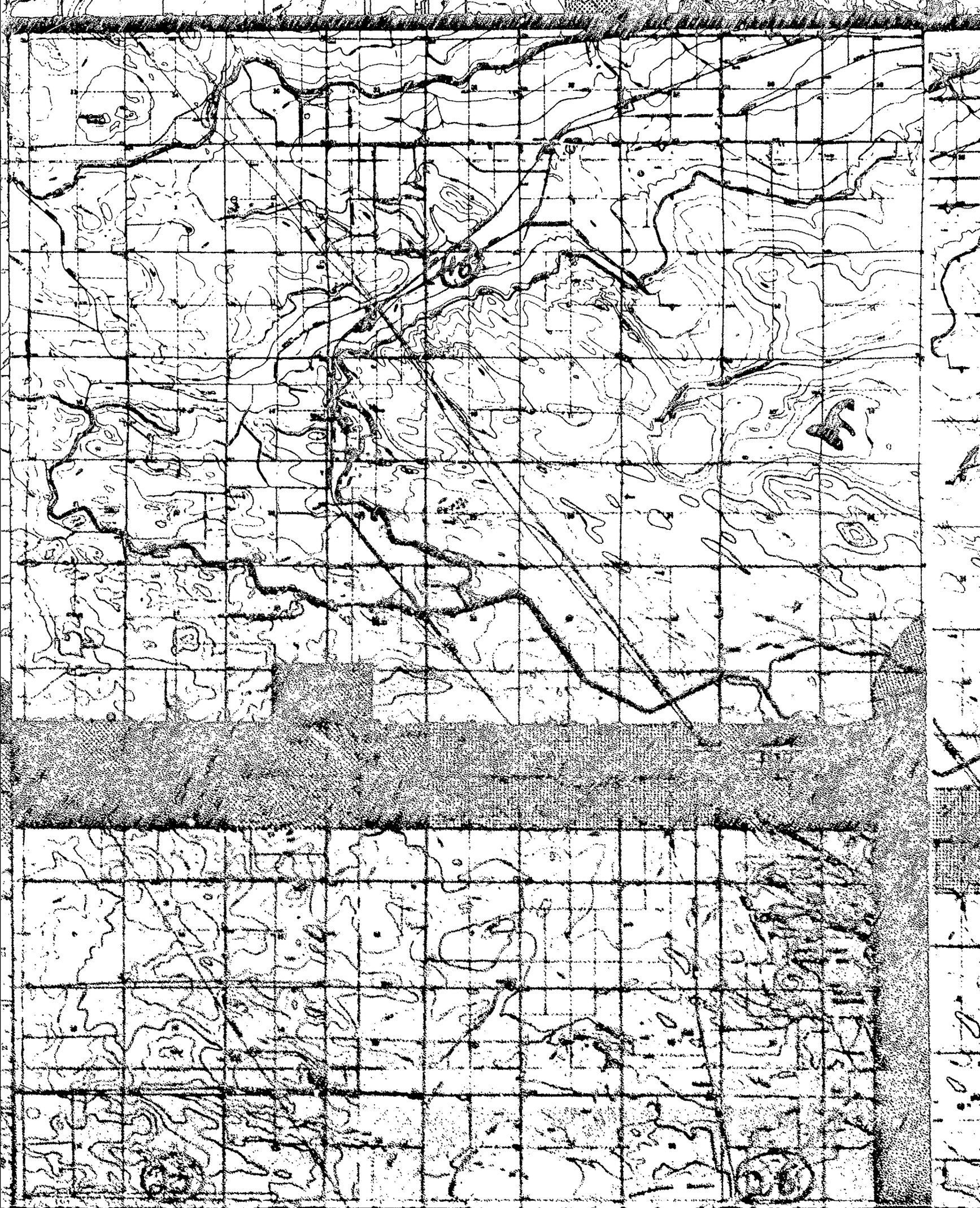


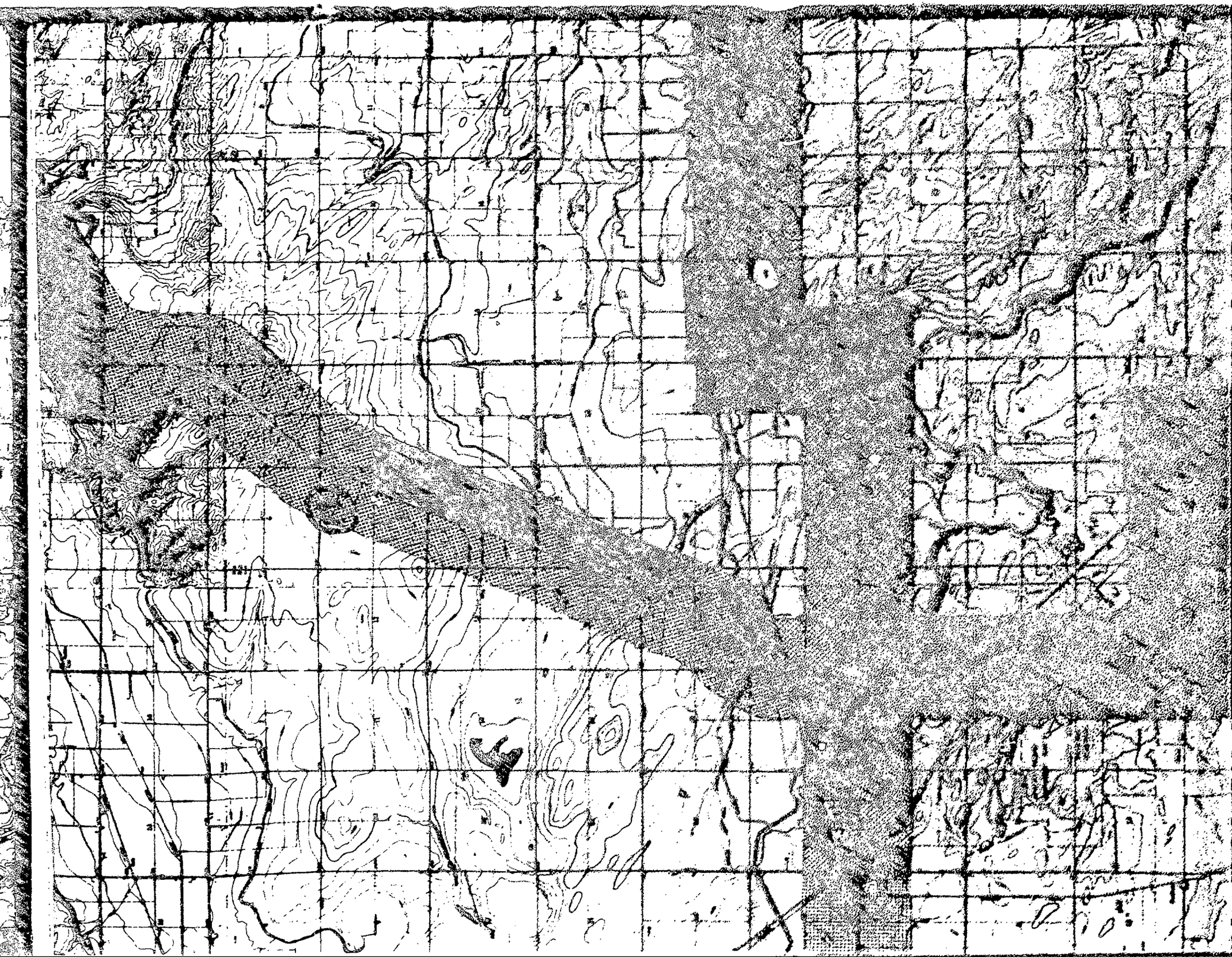


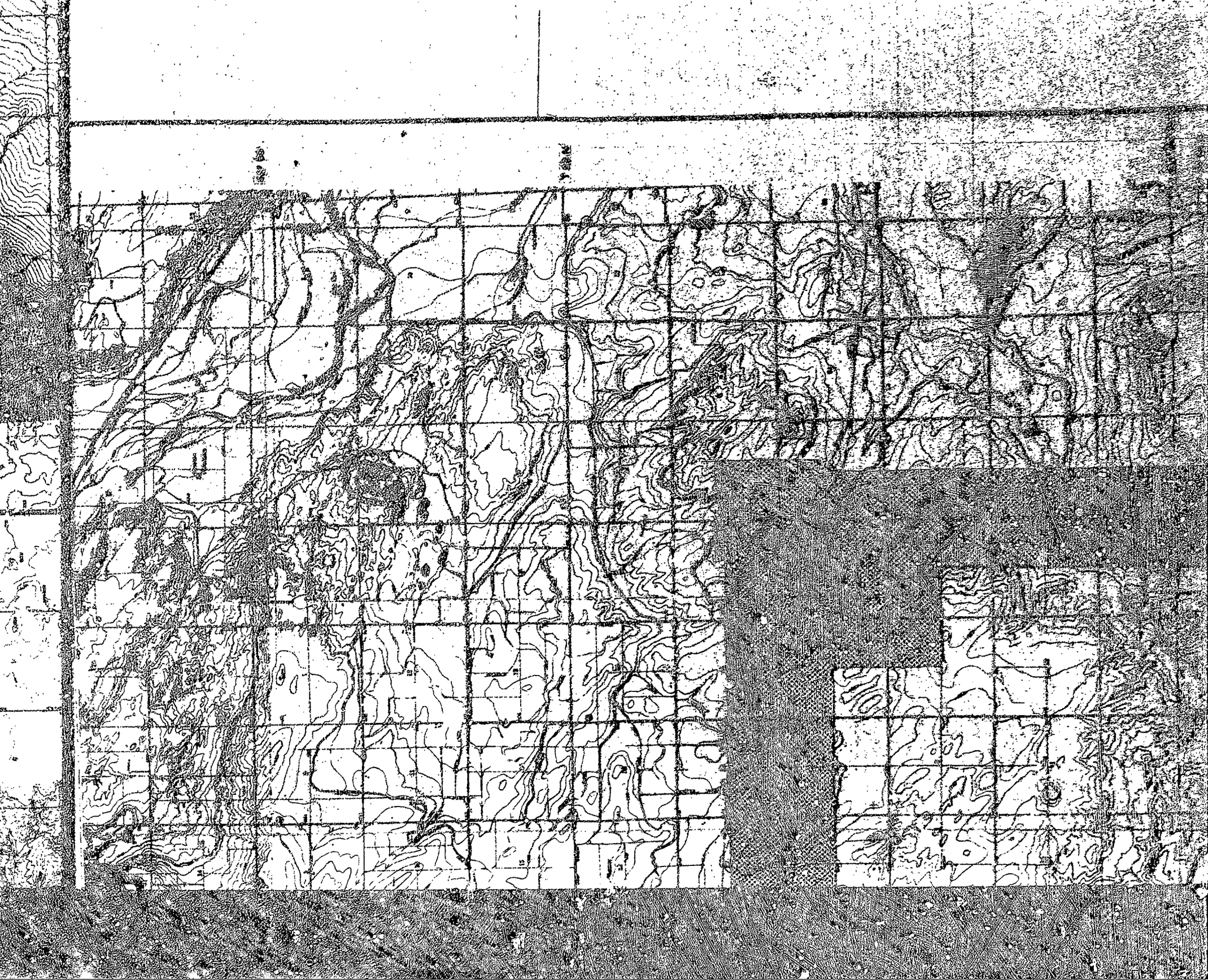


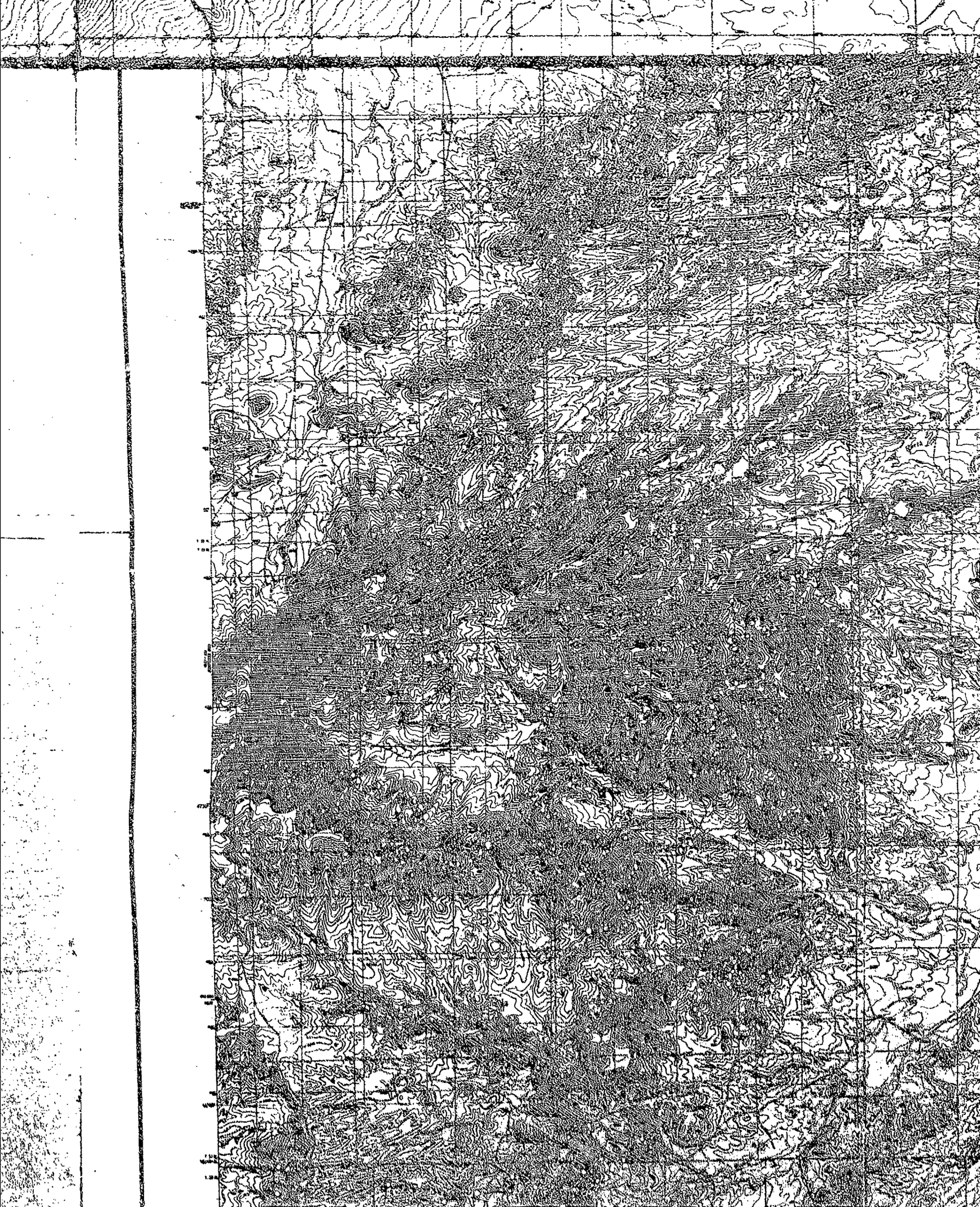

GOPHER HOLE
14



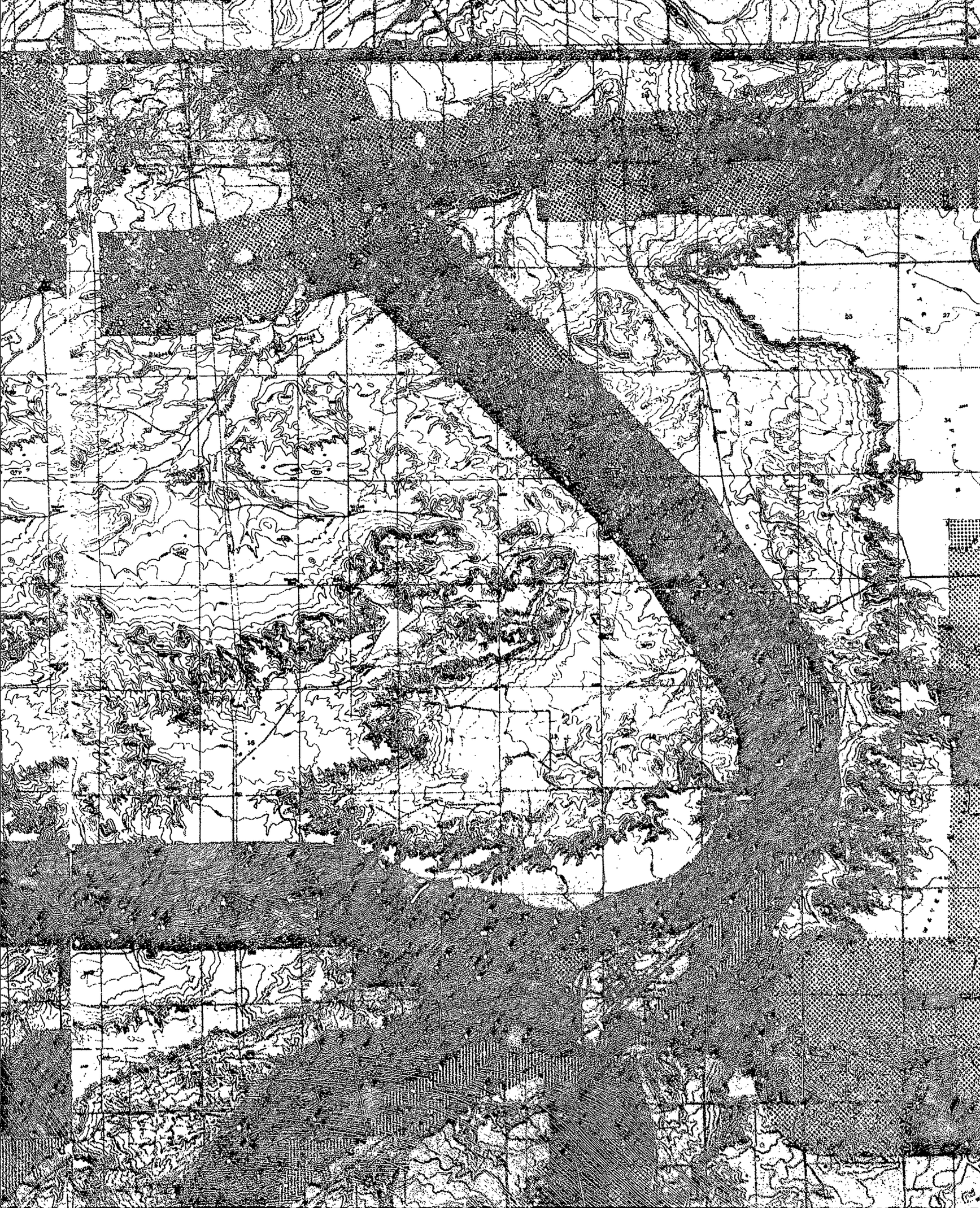


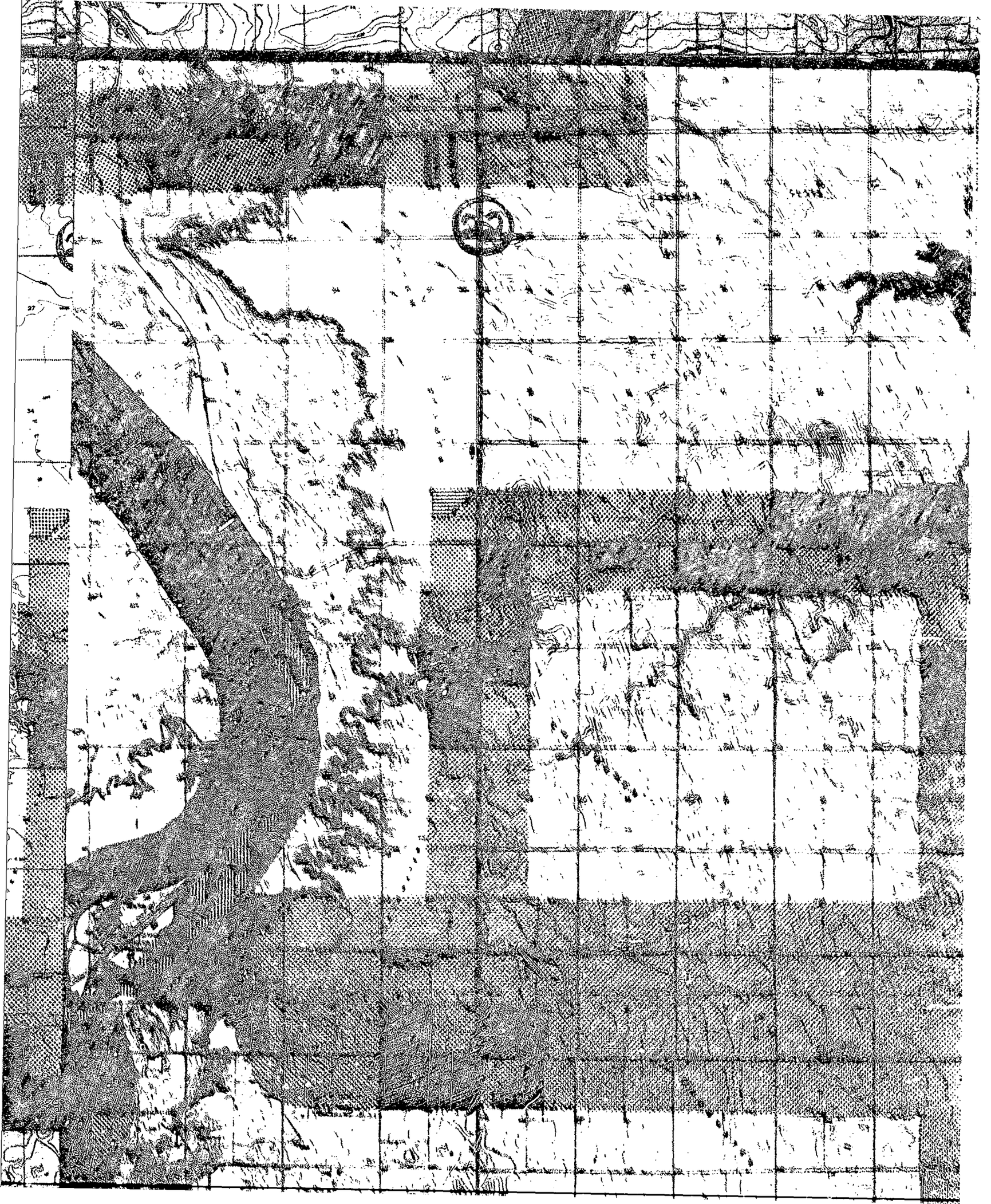


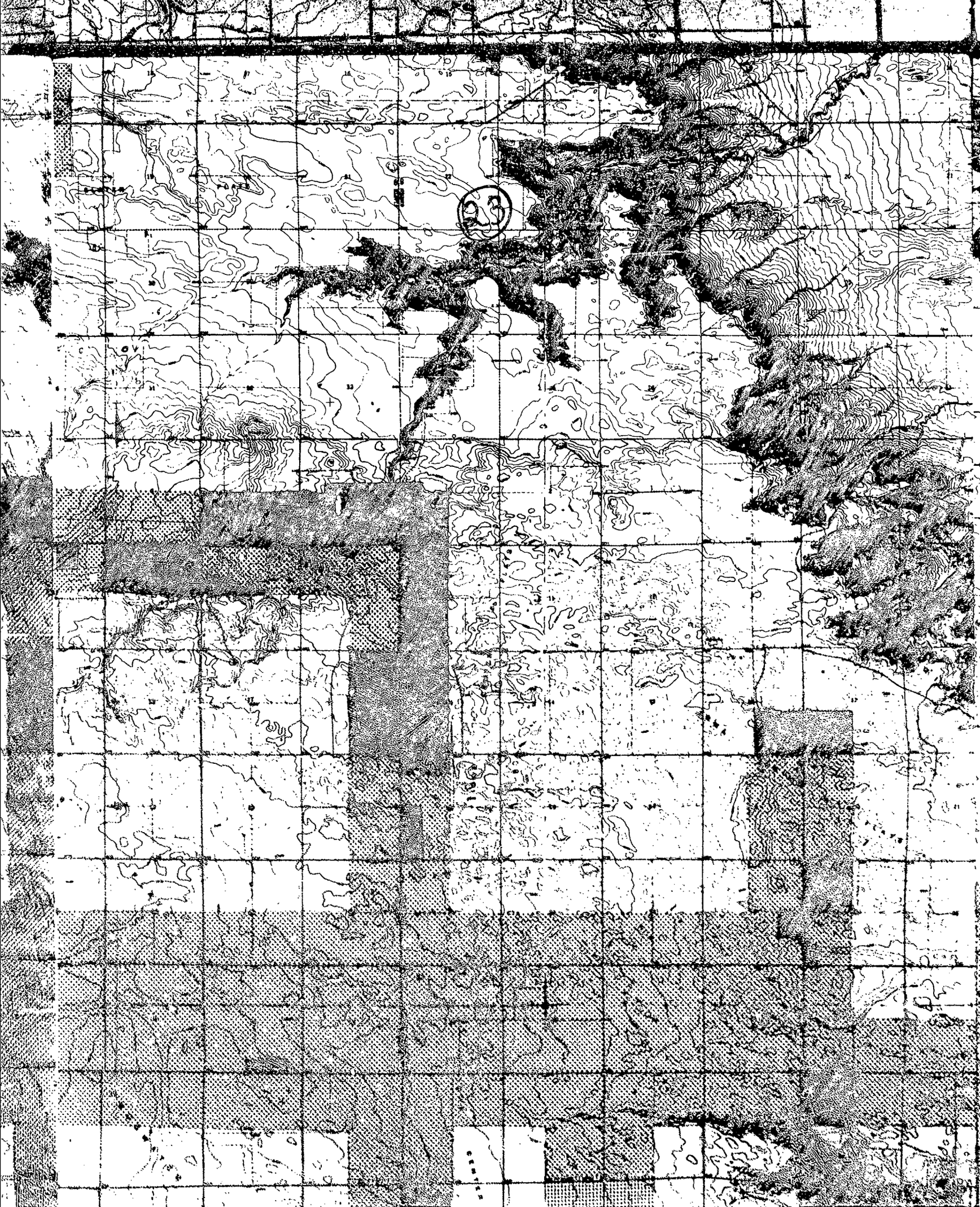


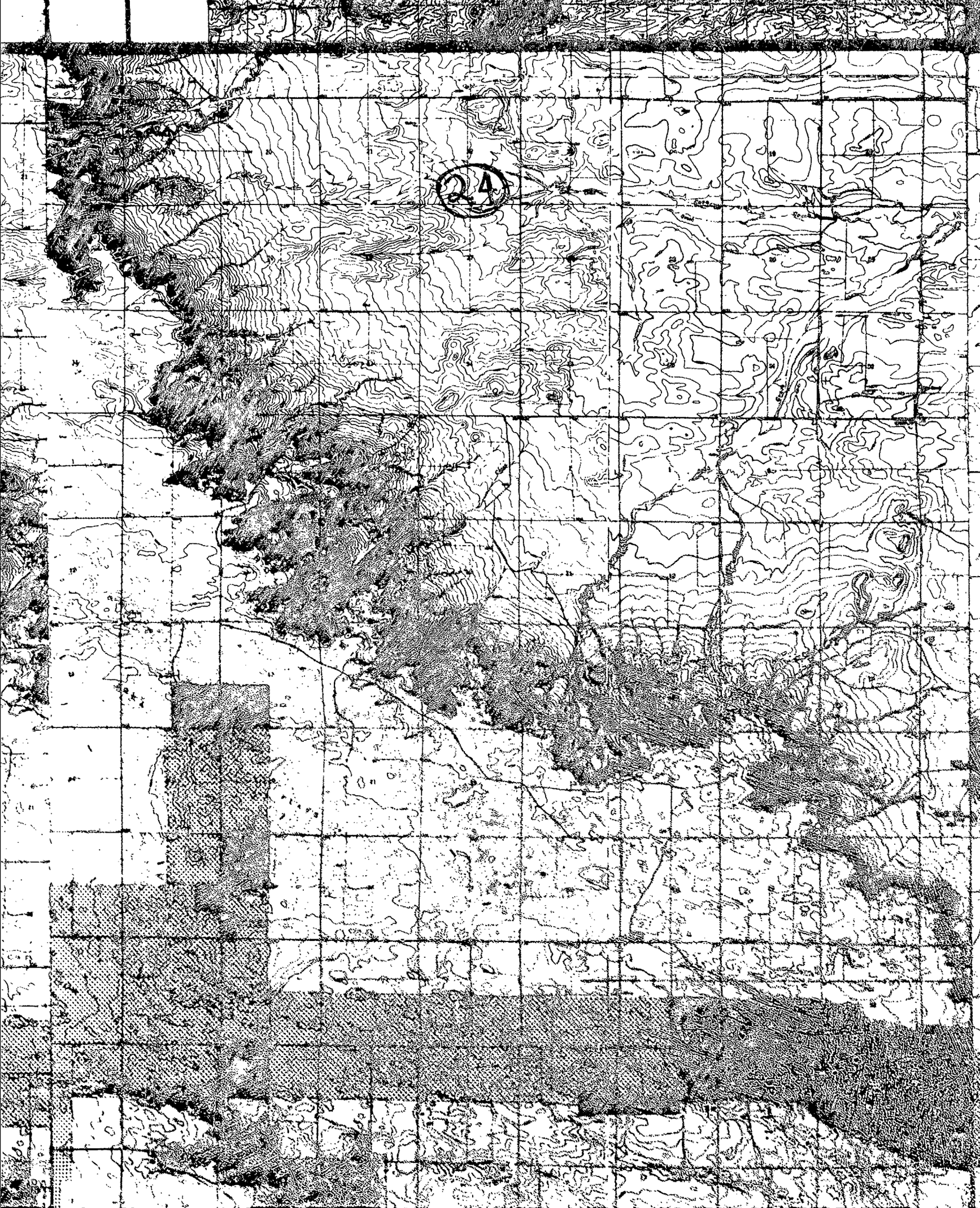


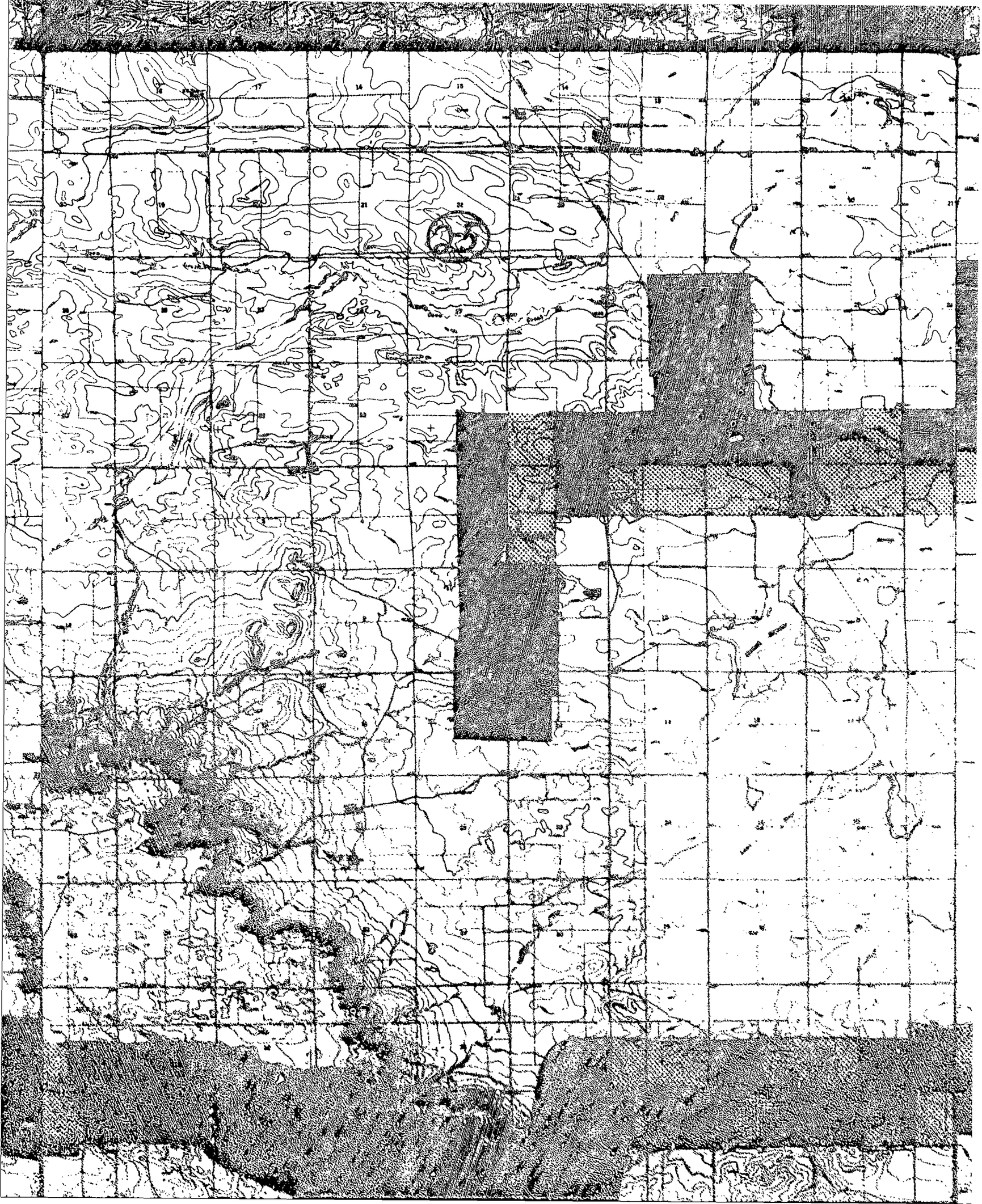


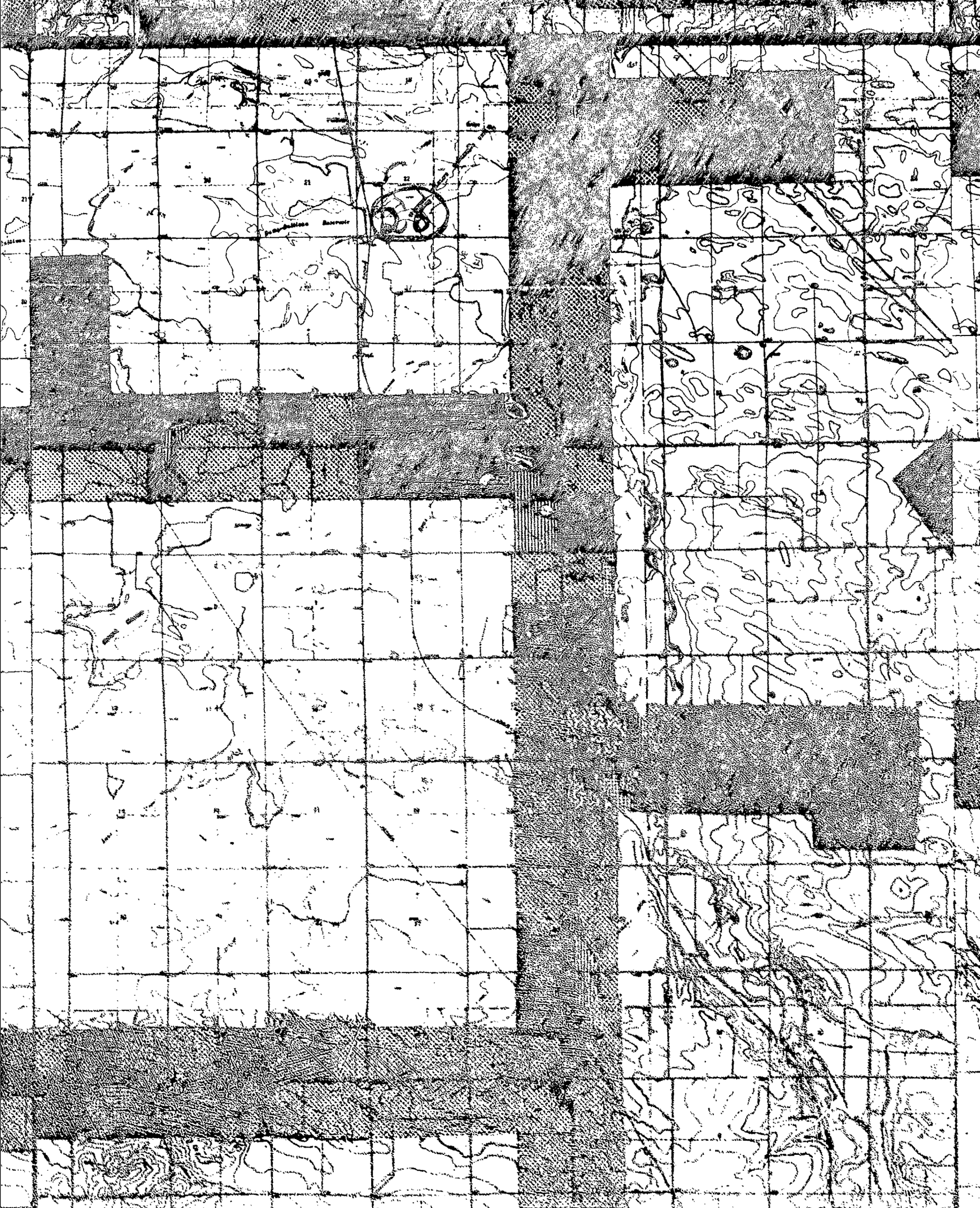


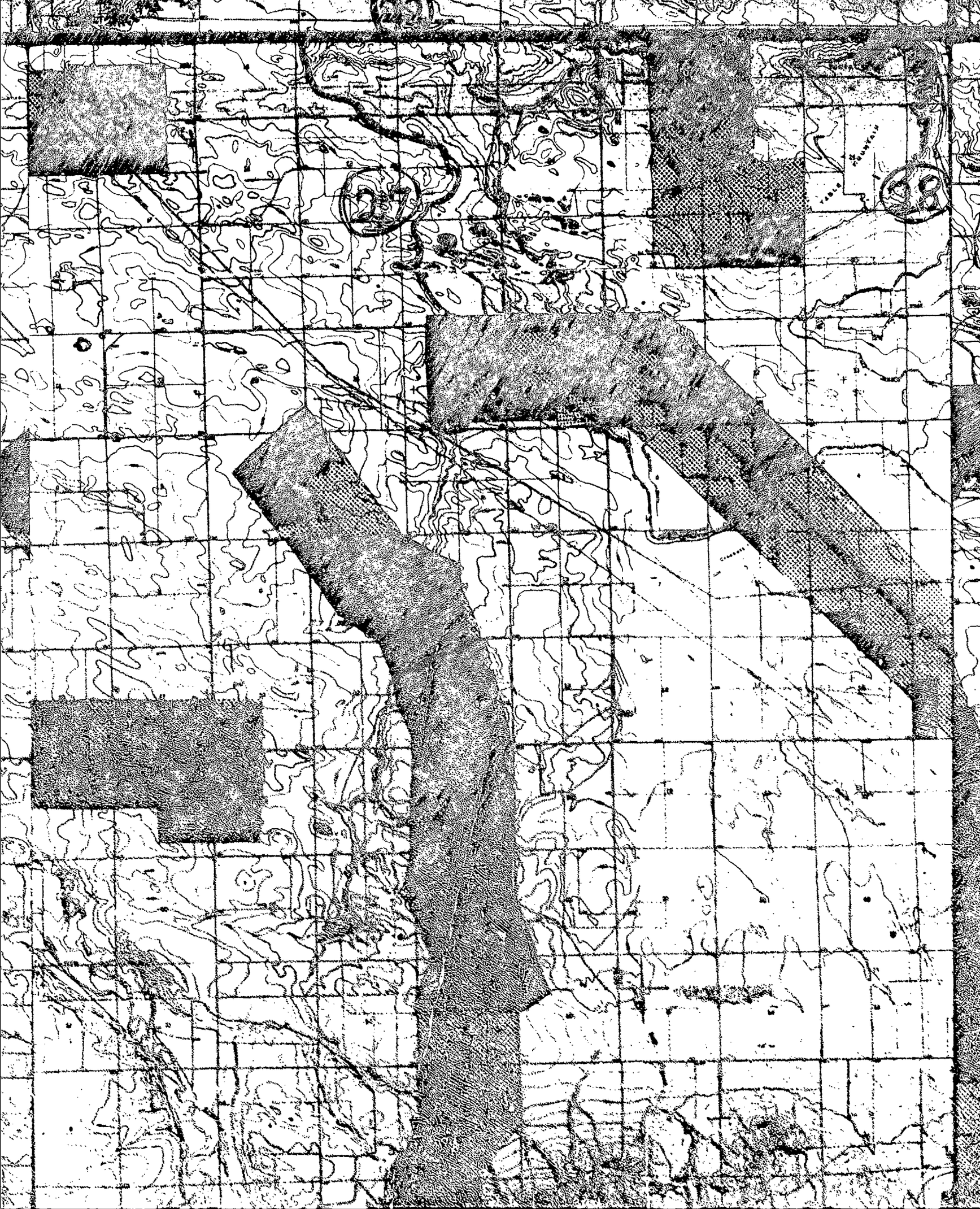


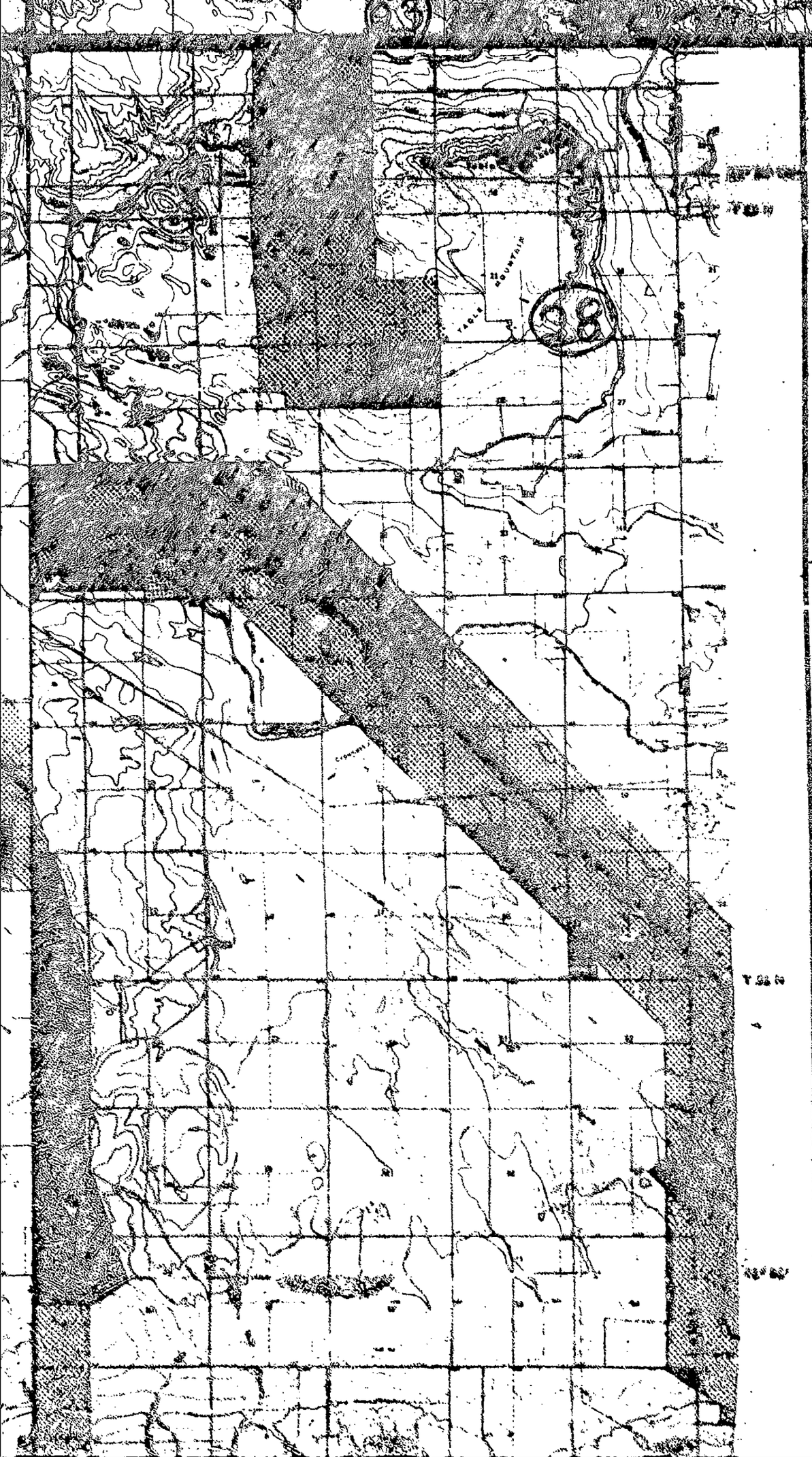



24









STAT

SCAL

LE

AGRICULTURI

GRASSLAND

RIPARIAN

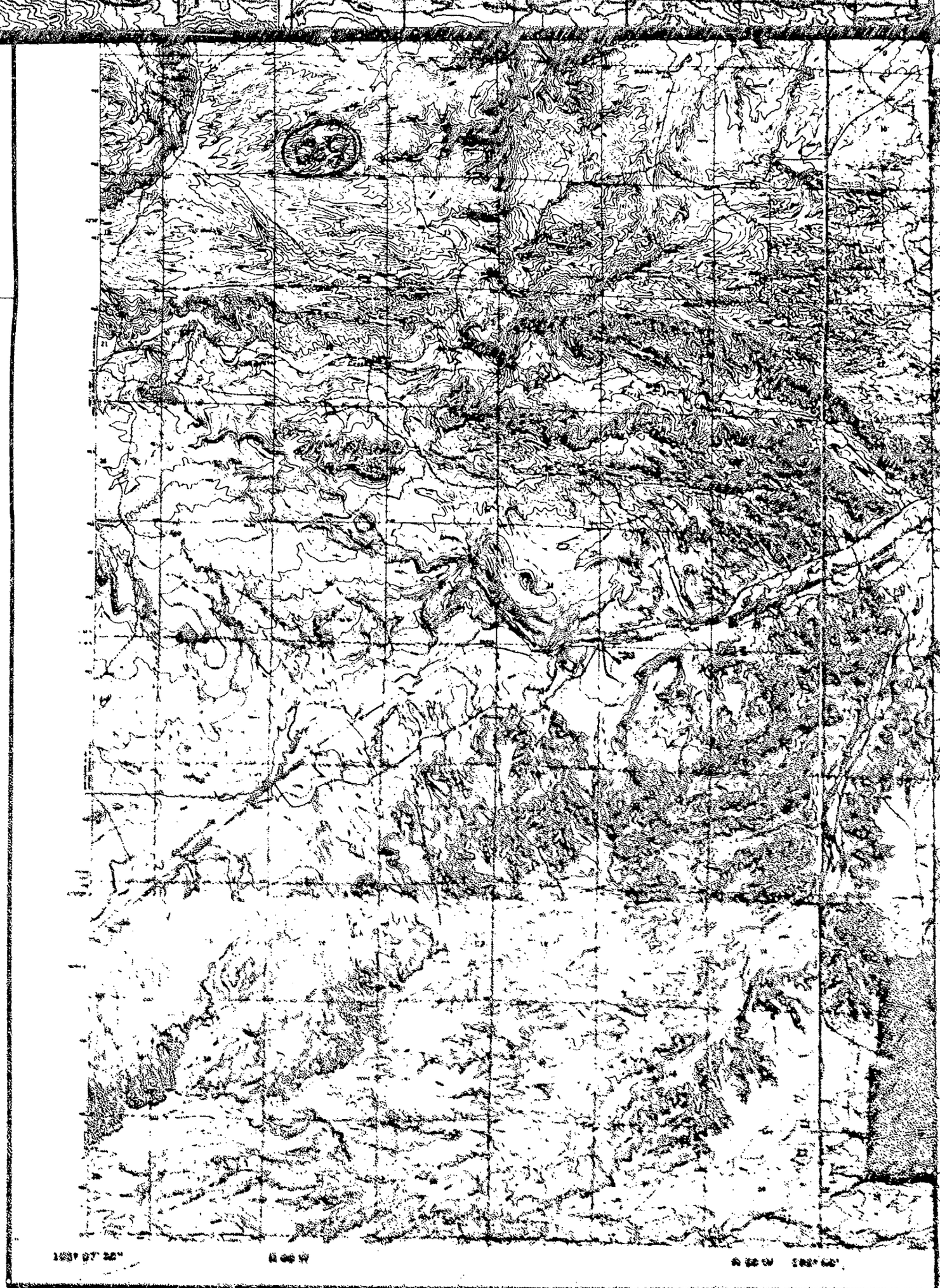
MEADOW

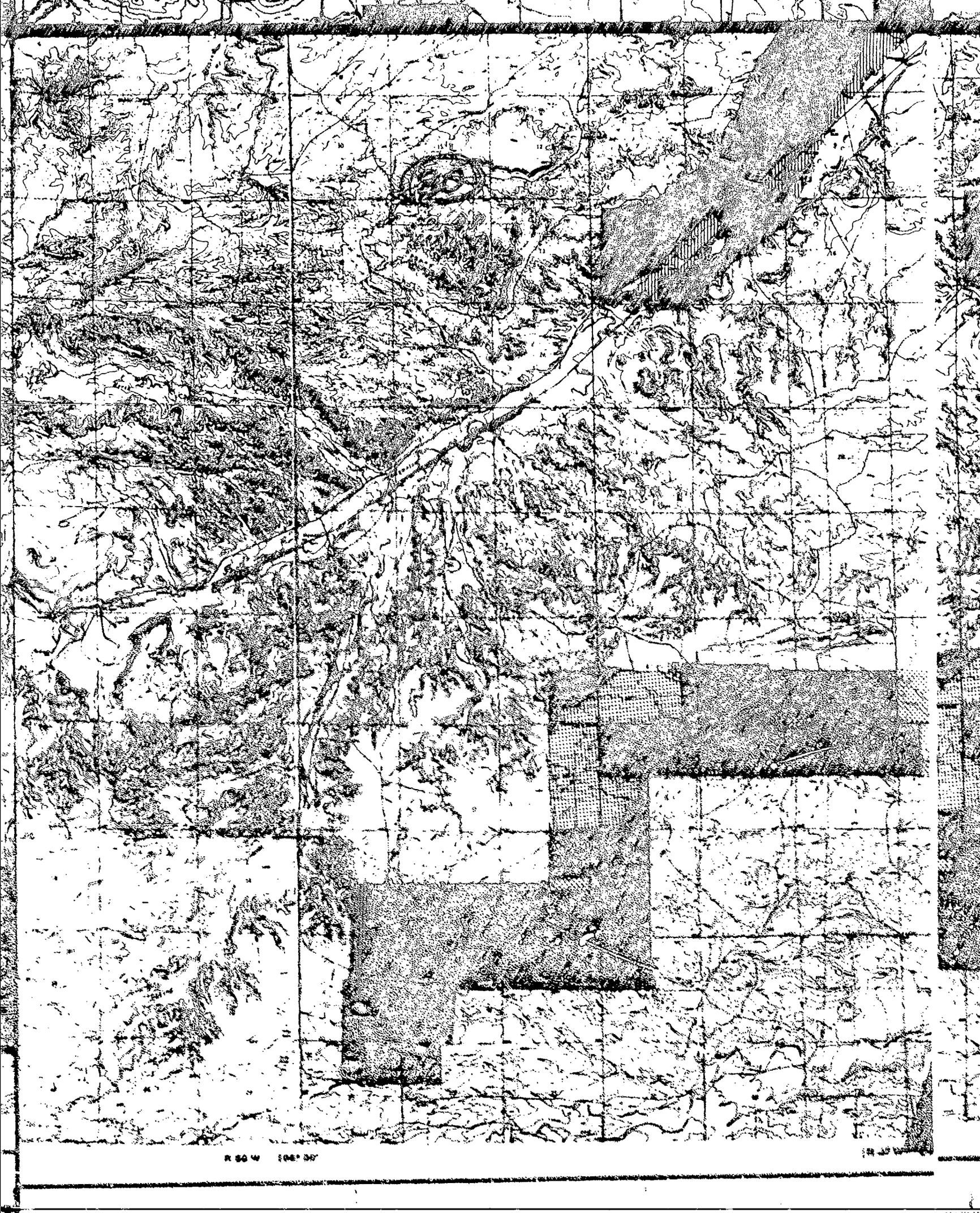
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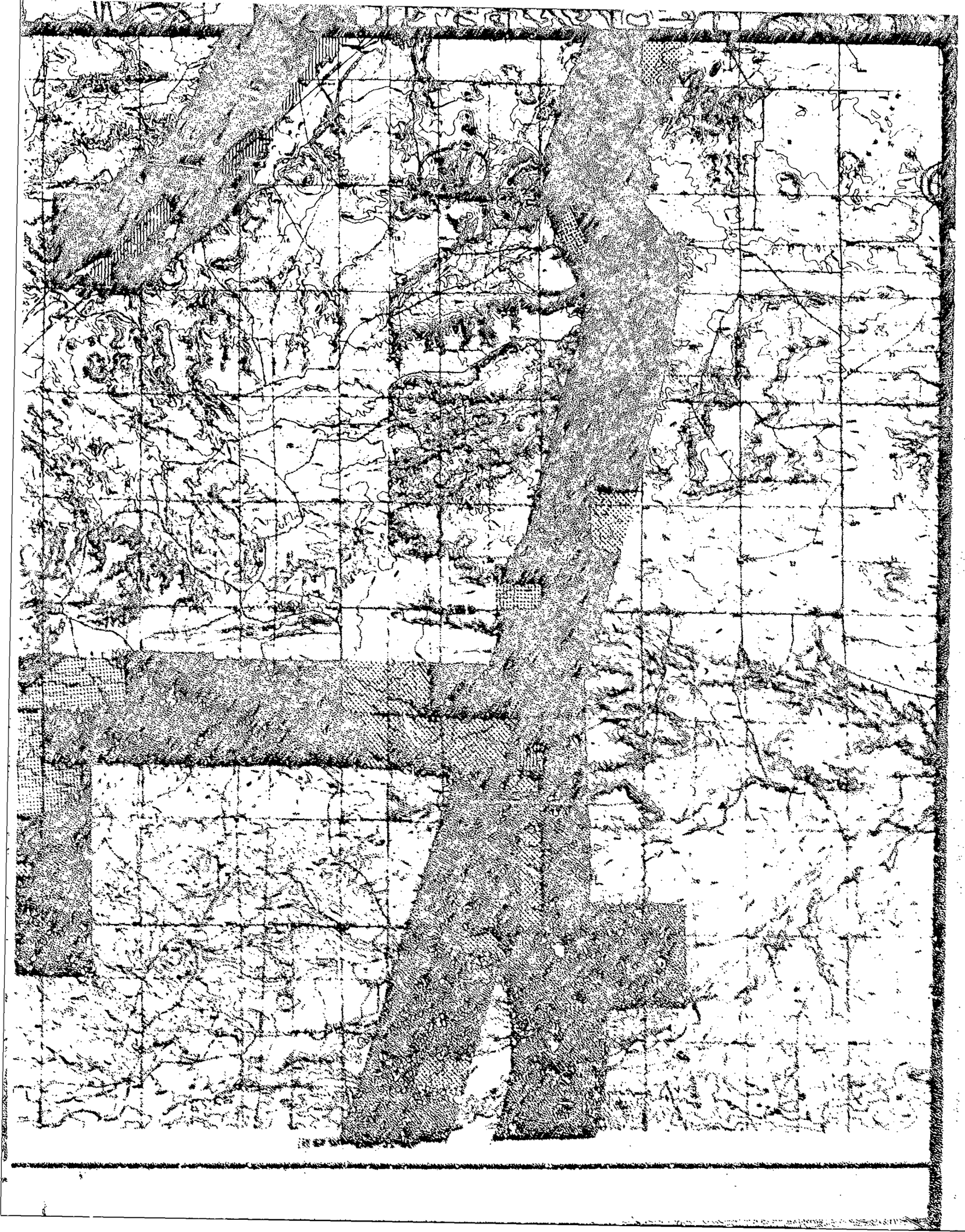
WIND BREAK

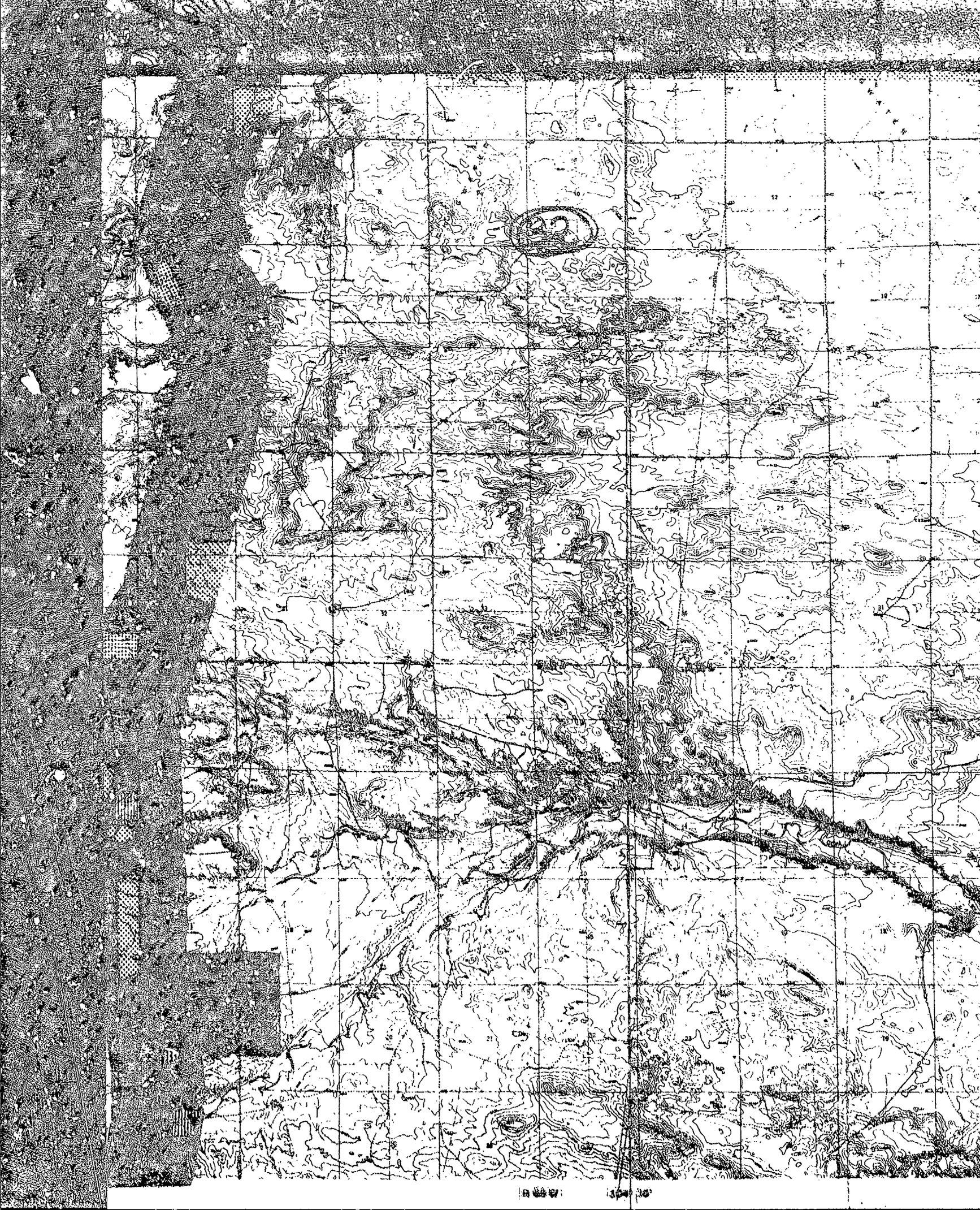
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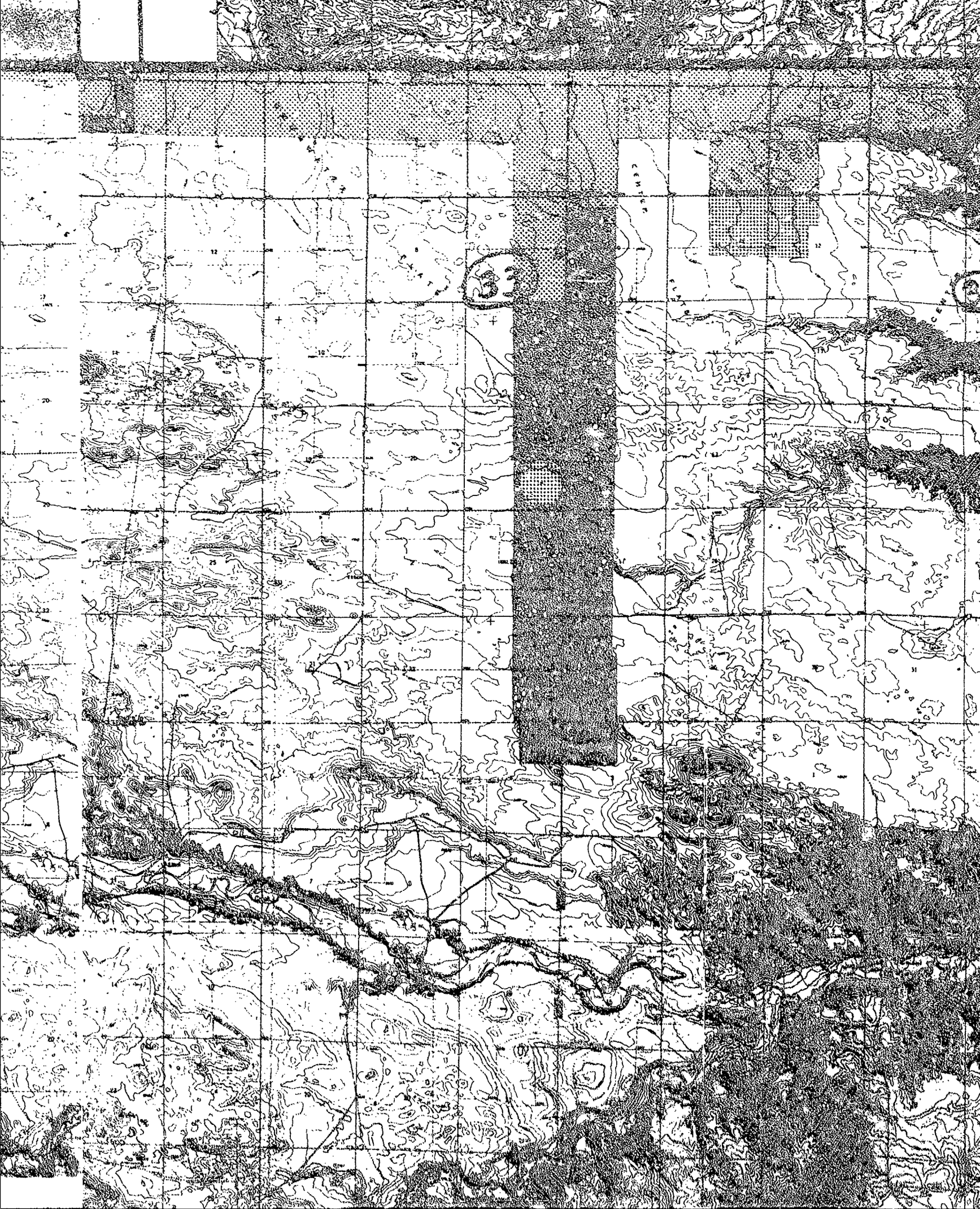
SILVER SAGE

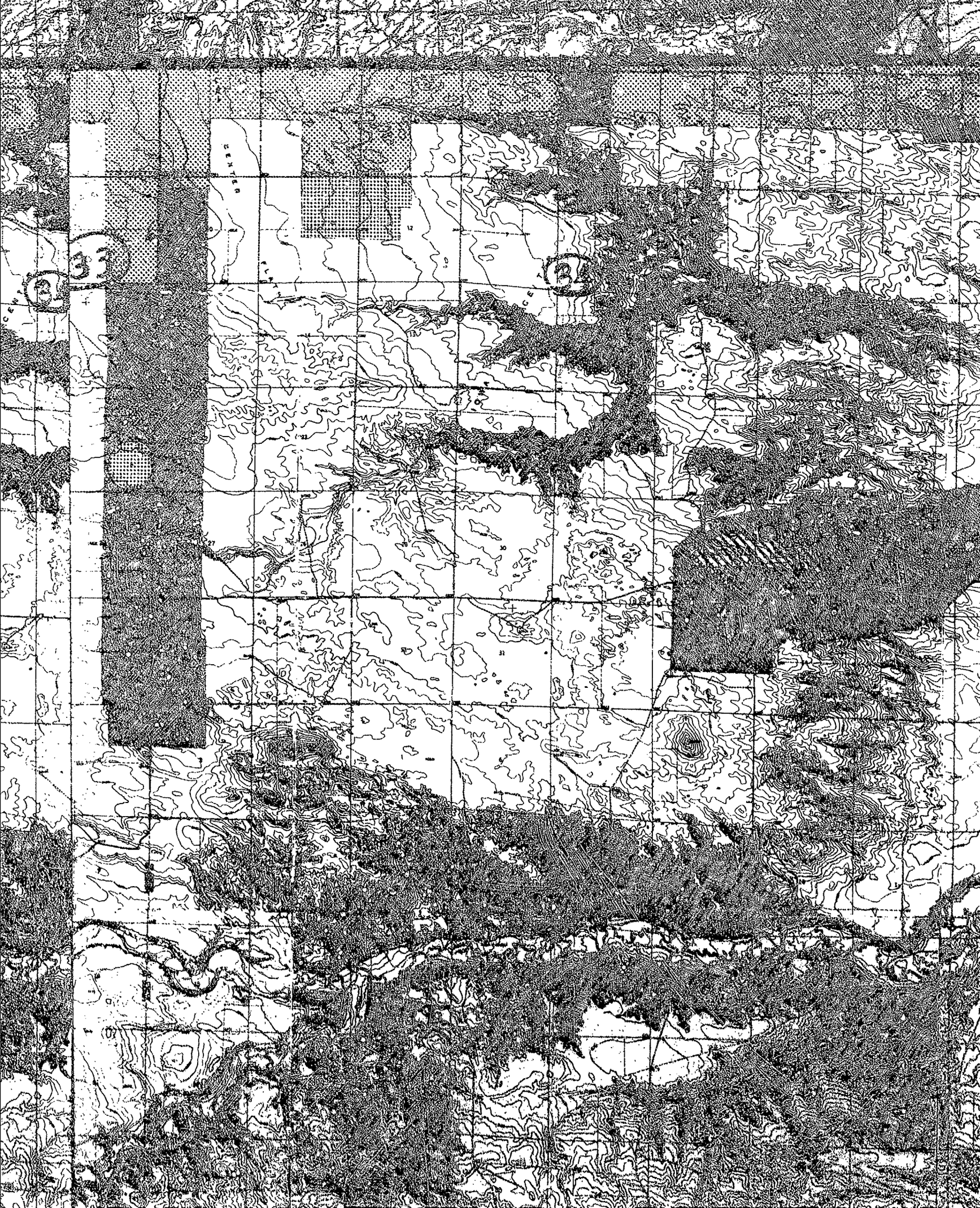




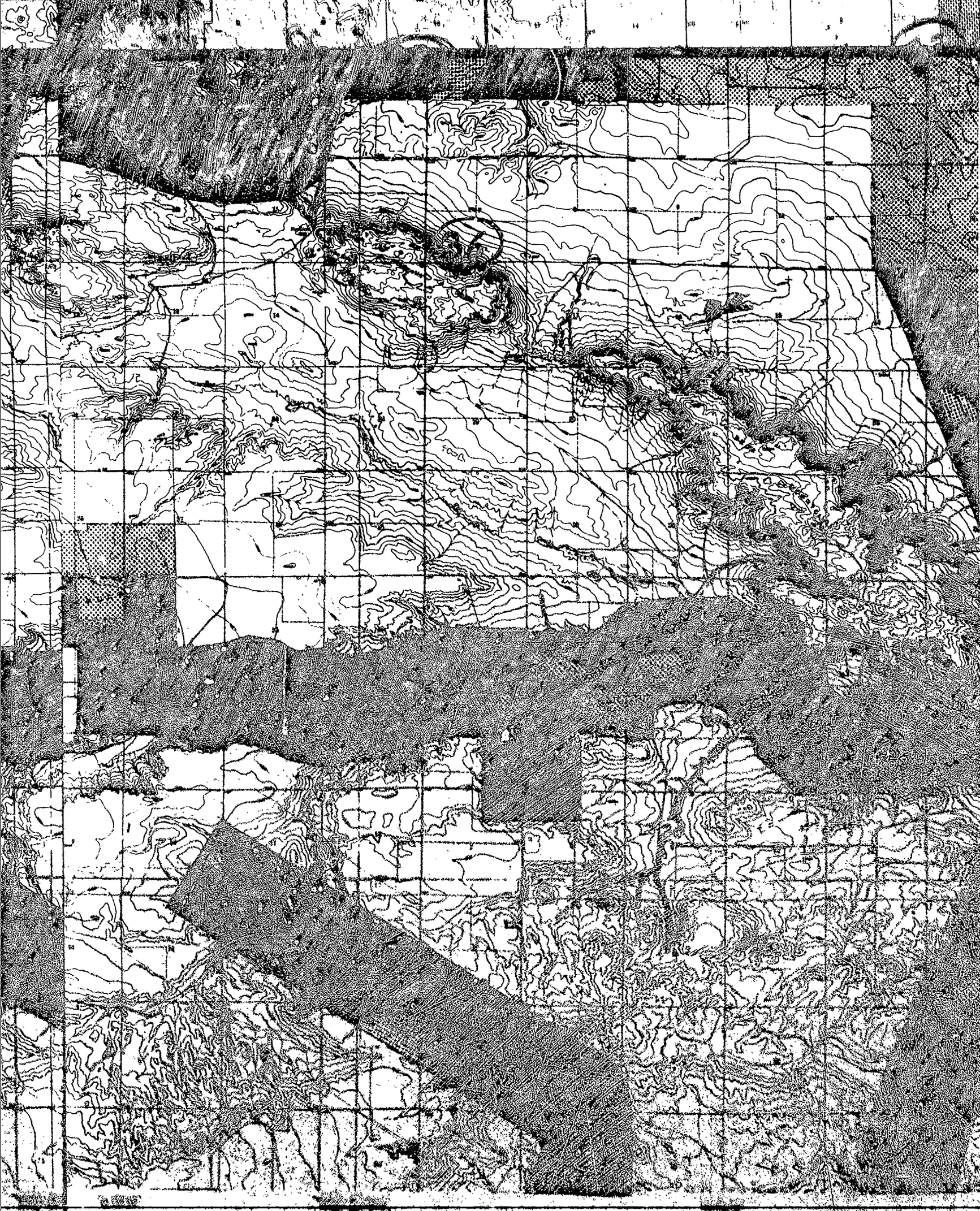


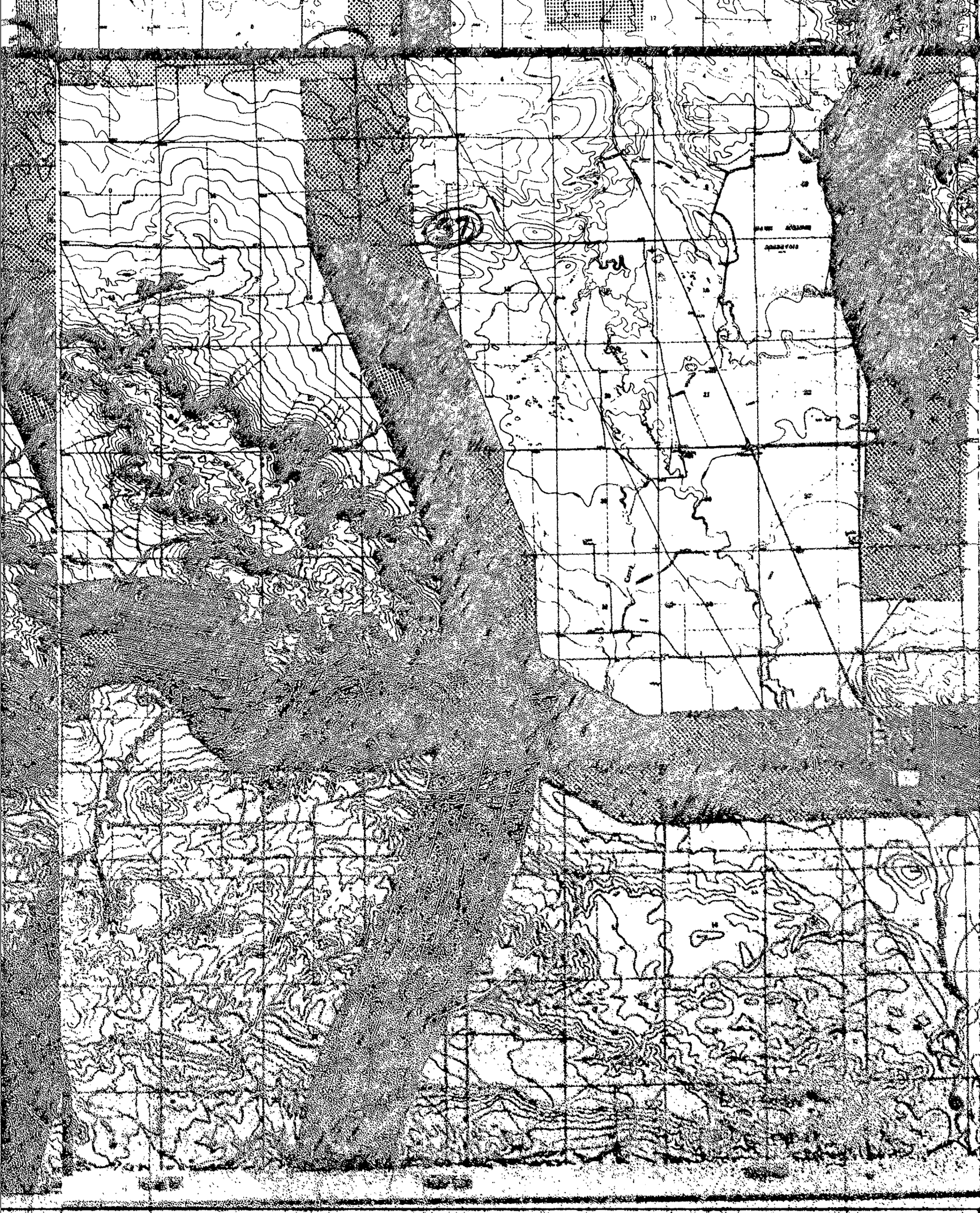


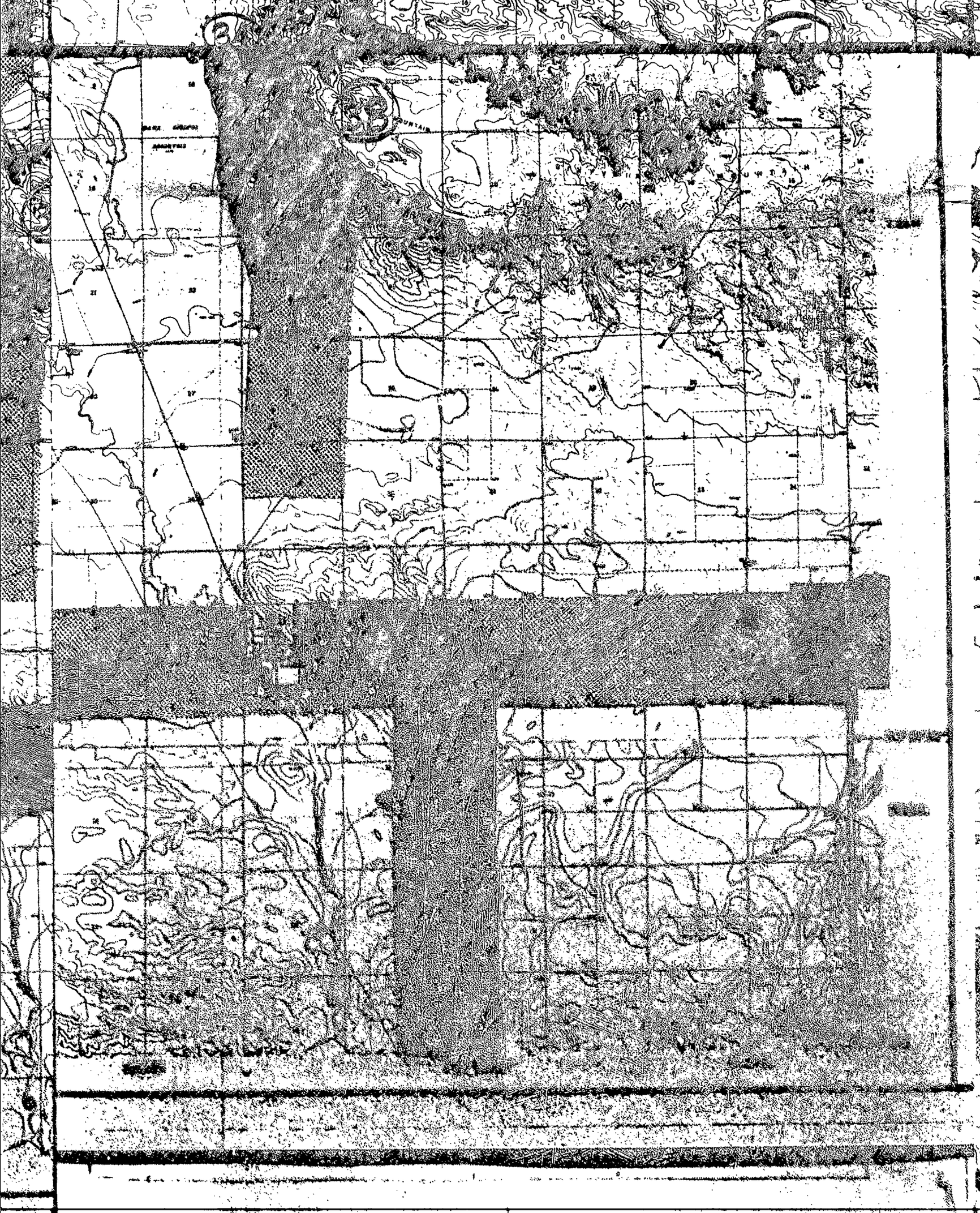




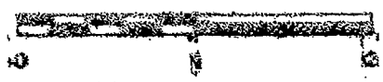

86







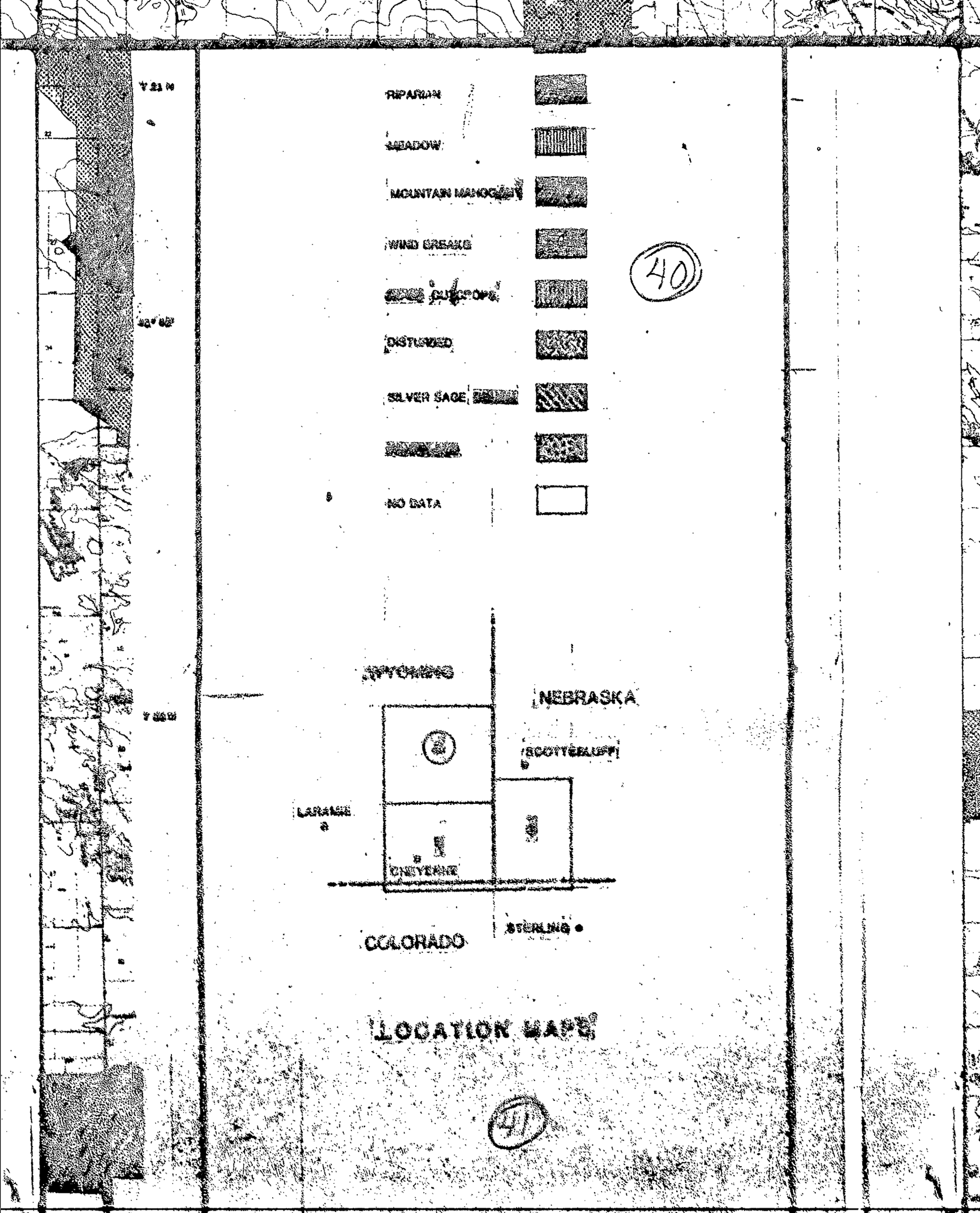
39



STATUTE MILES

SCALE 1:62,500

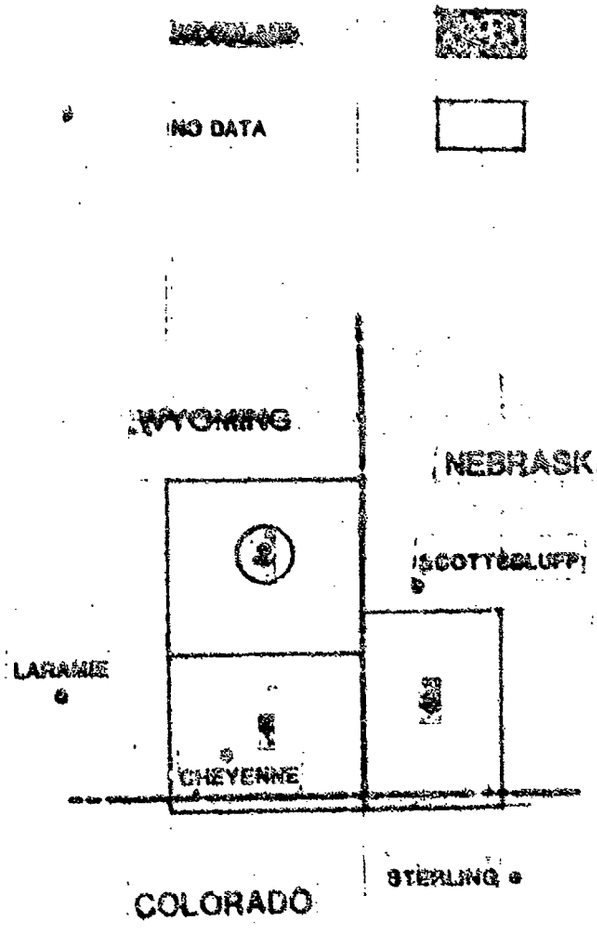
LEGEND



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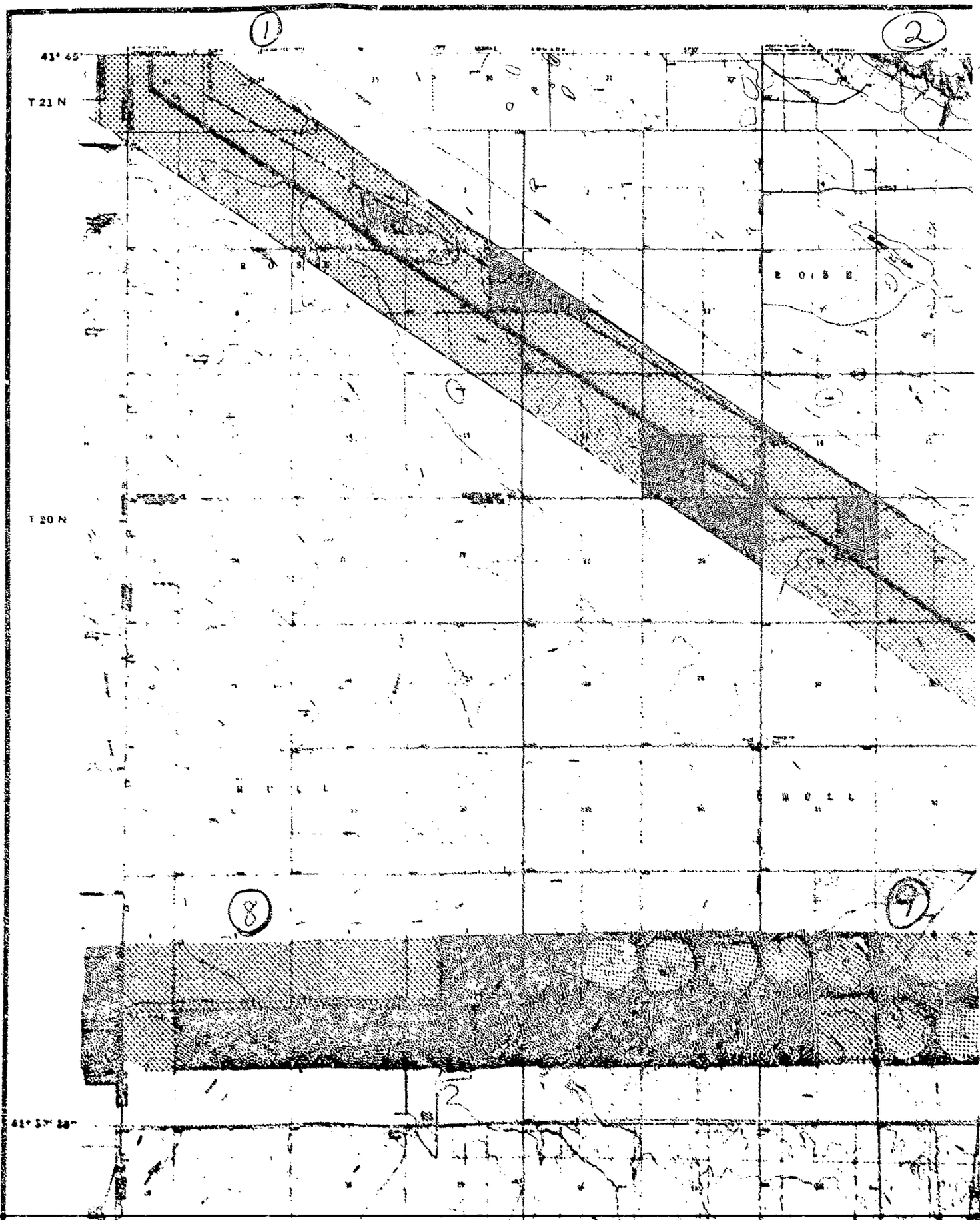
LOCATION MAPS

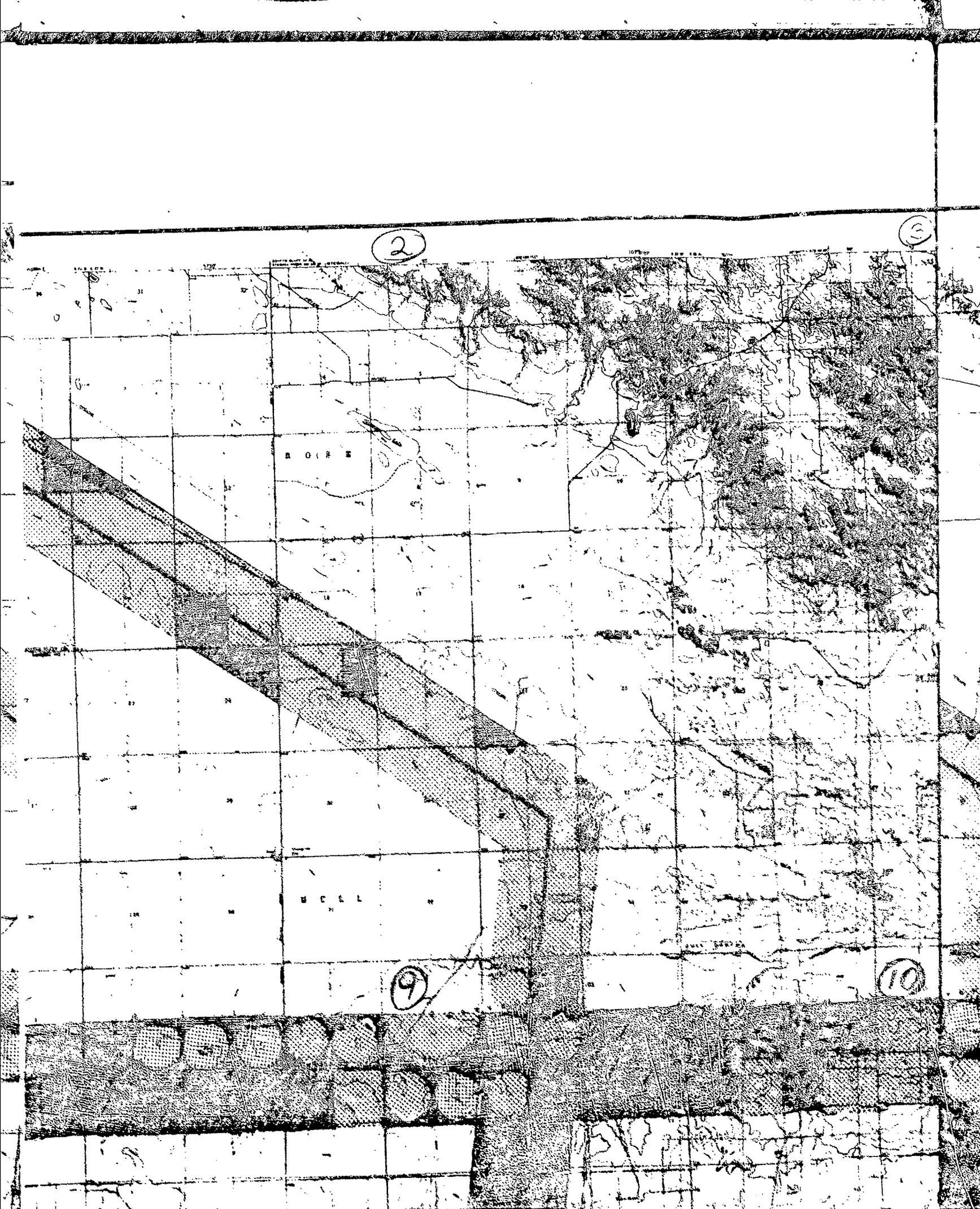
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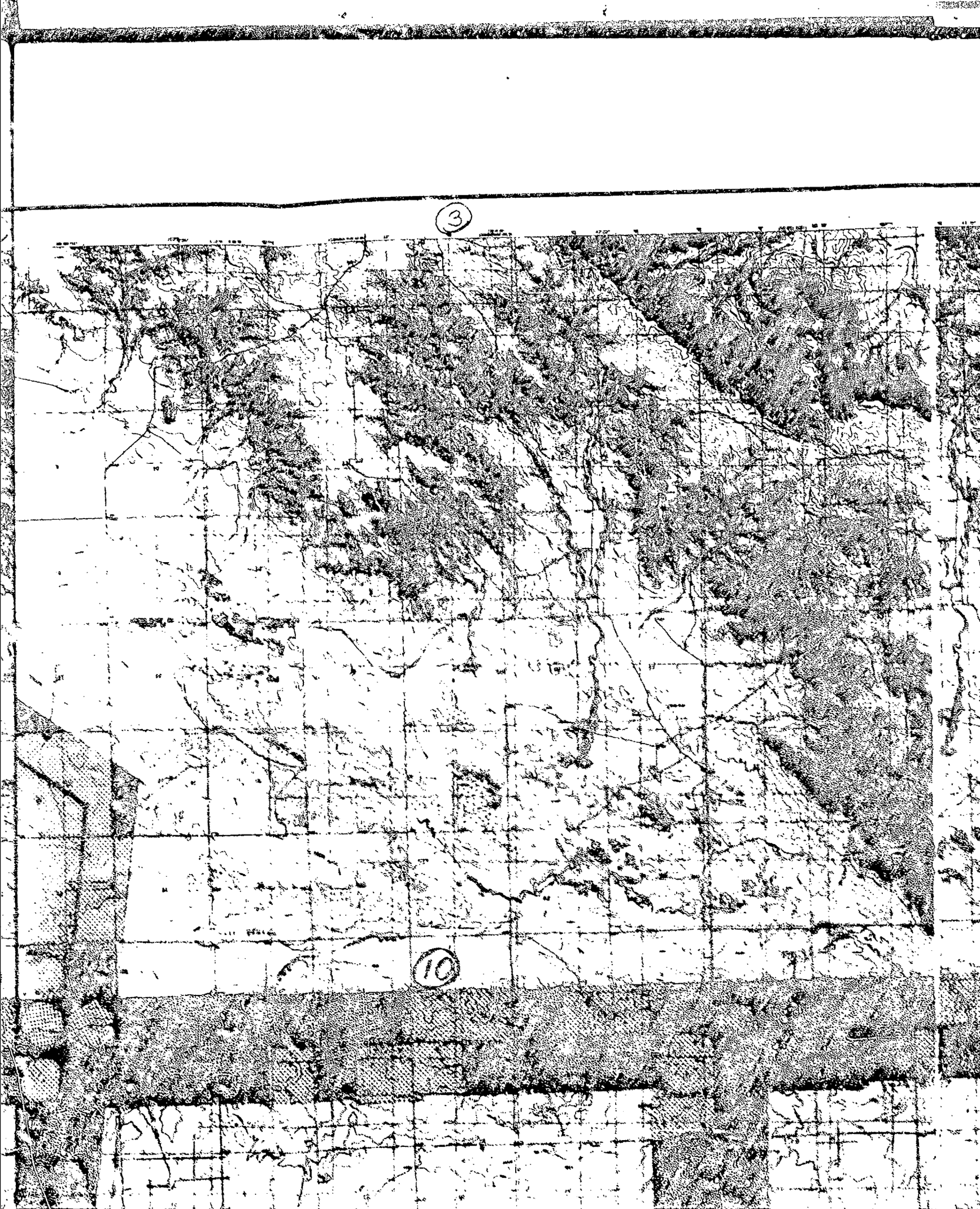


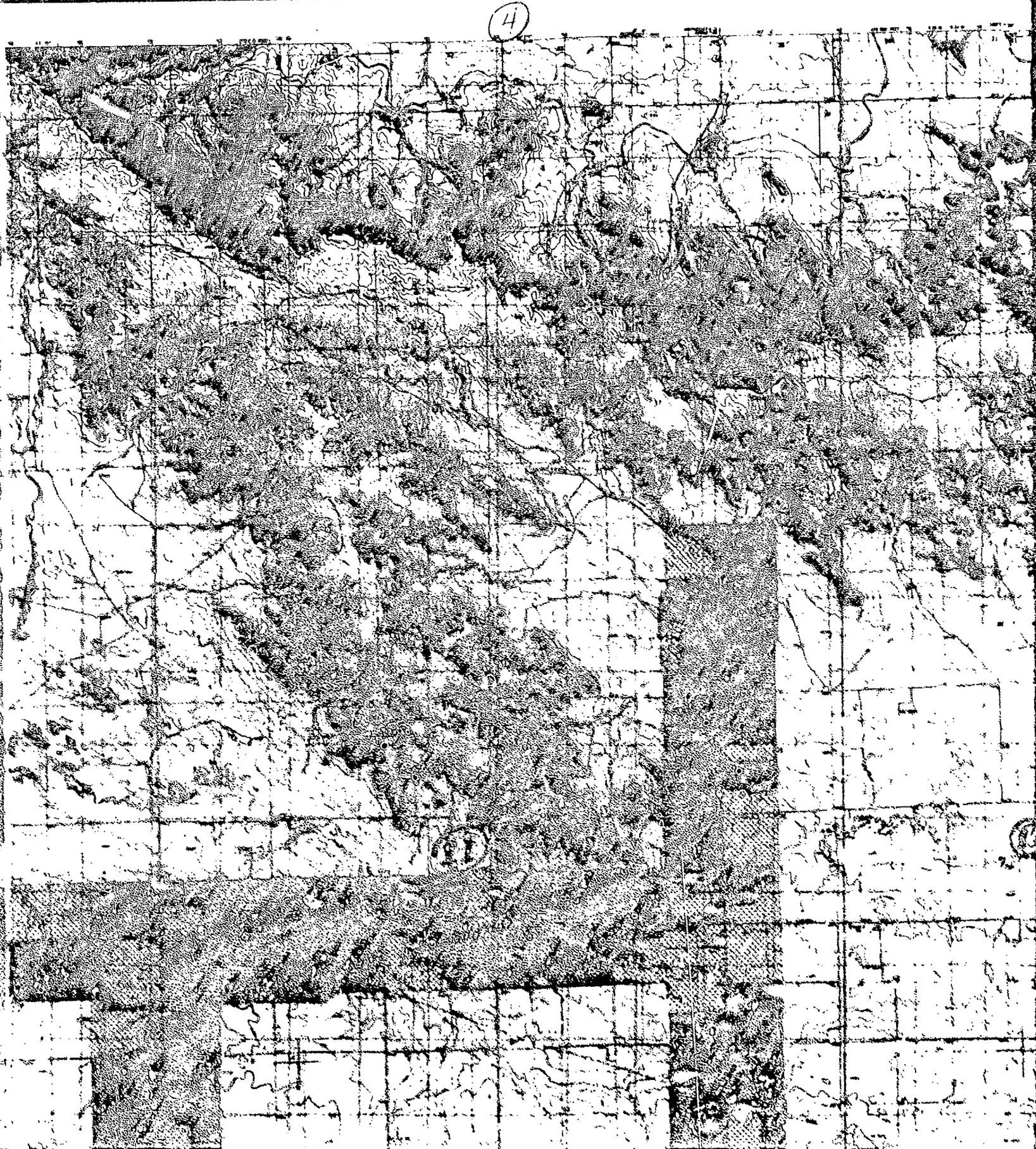
LOCATION MAPS

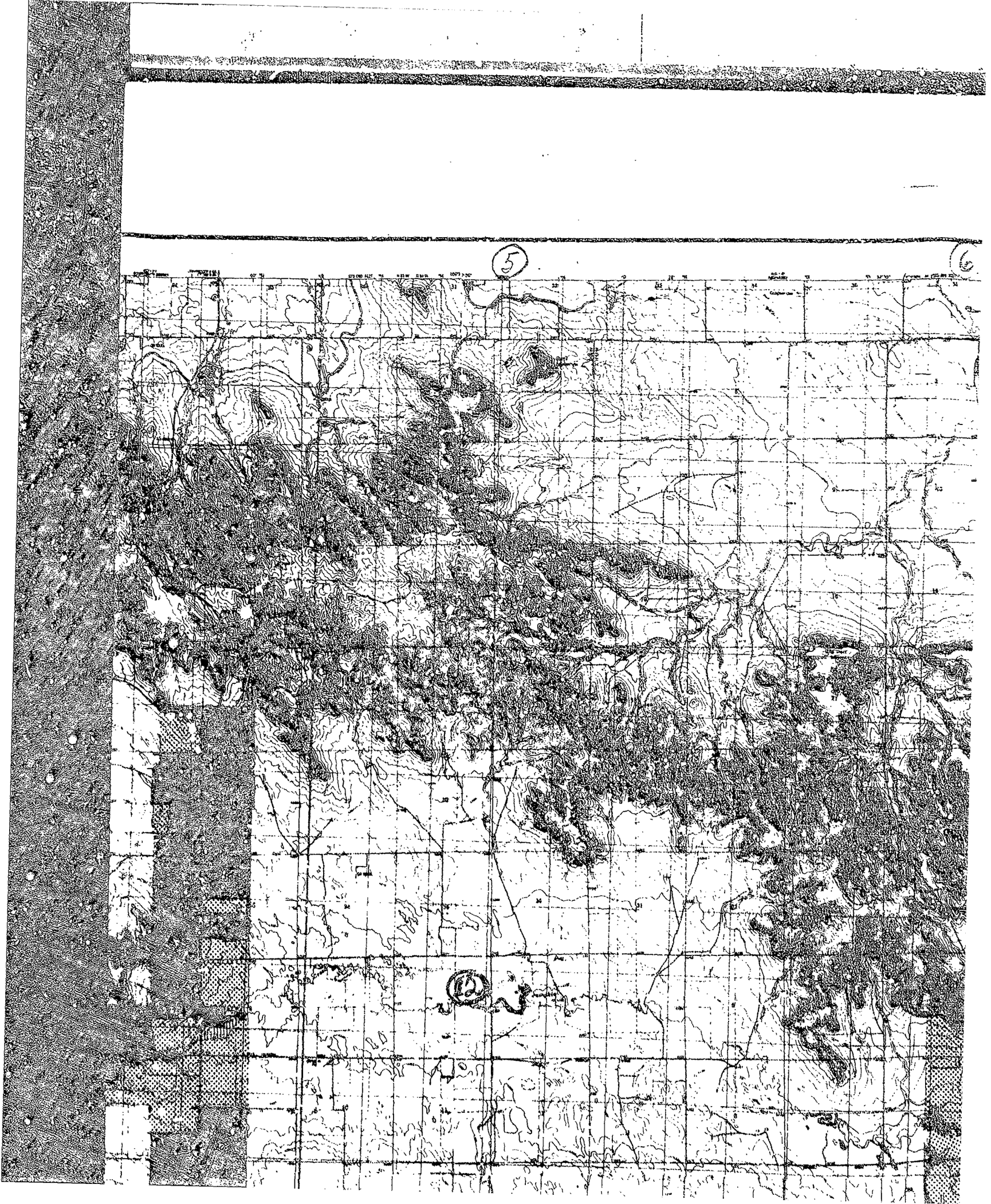
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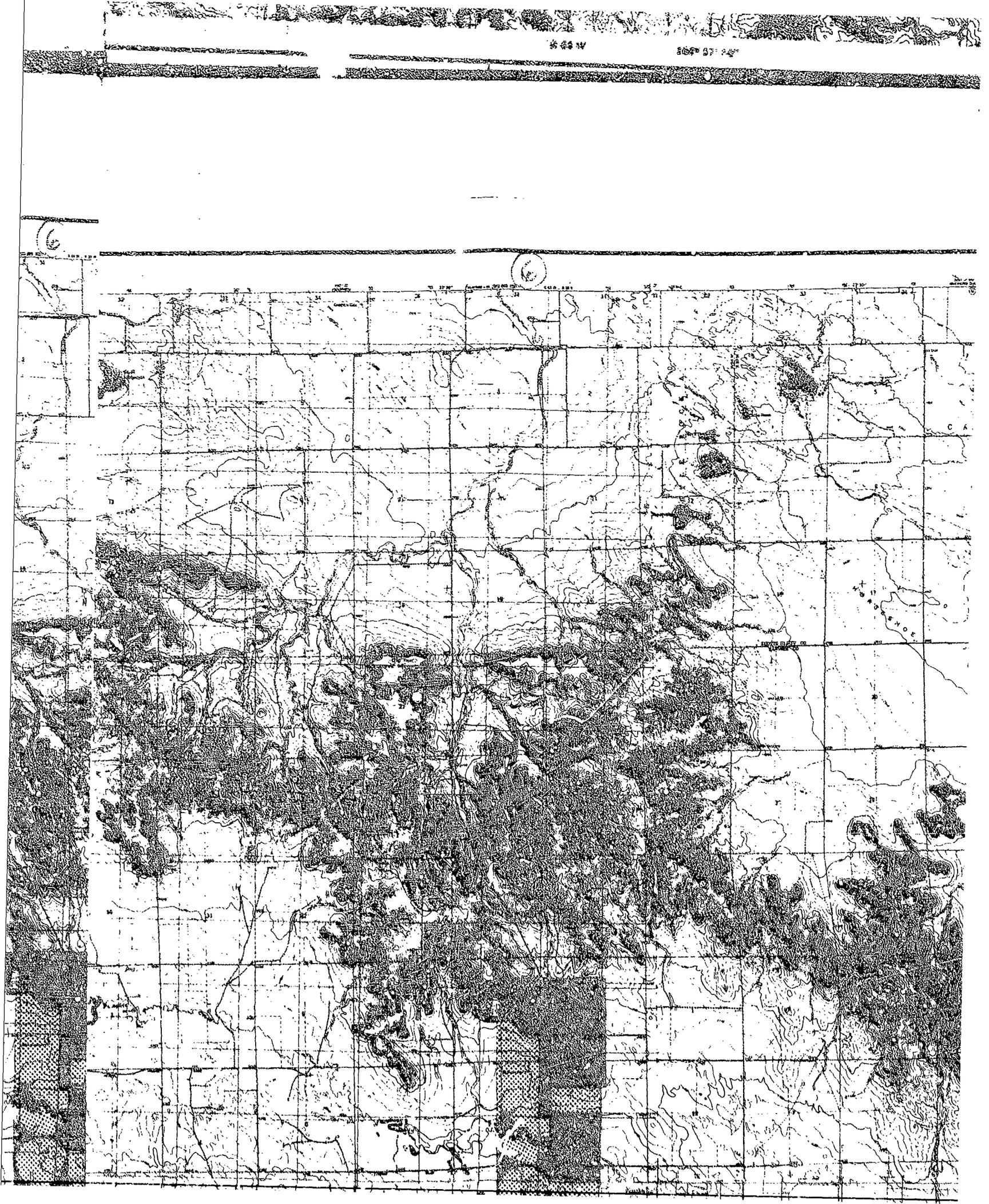

NO DATA
43° 45'
T 21 N
T 20 N
41° 37' 30"
1
2
8
9

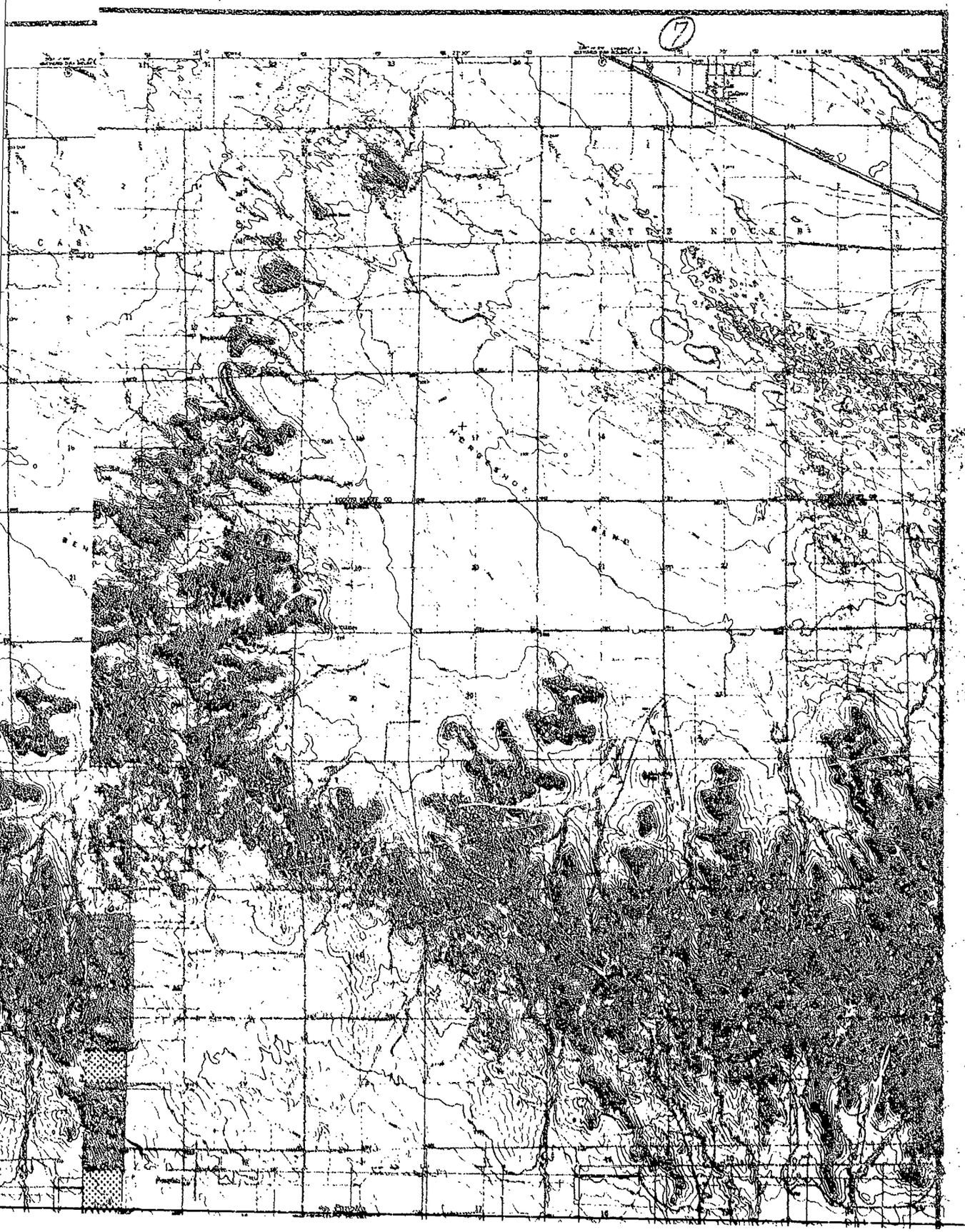

2
3
BOISE
BELL
9
10

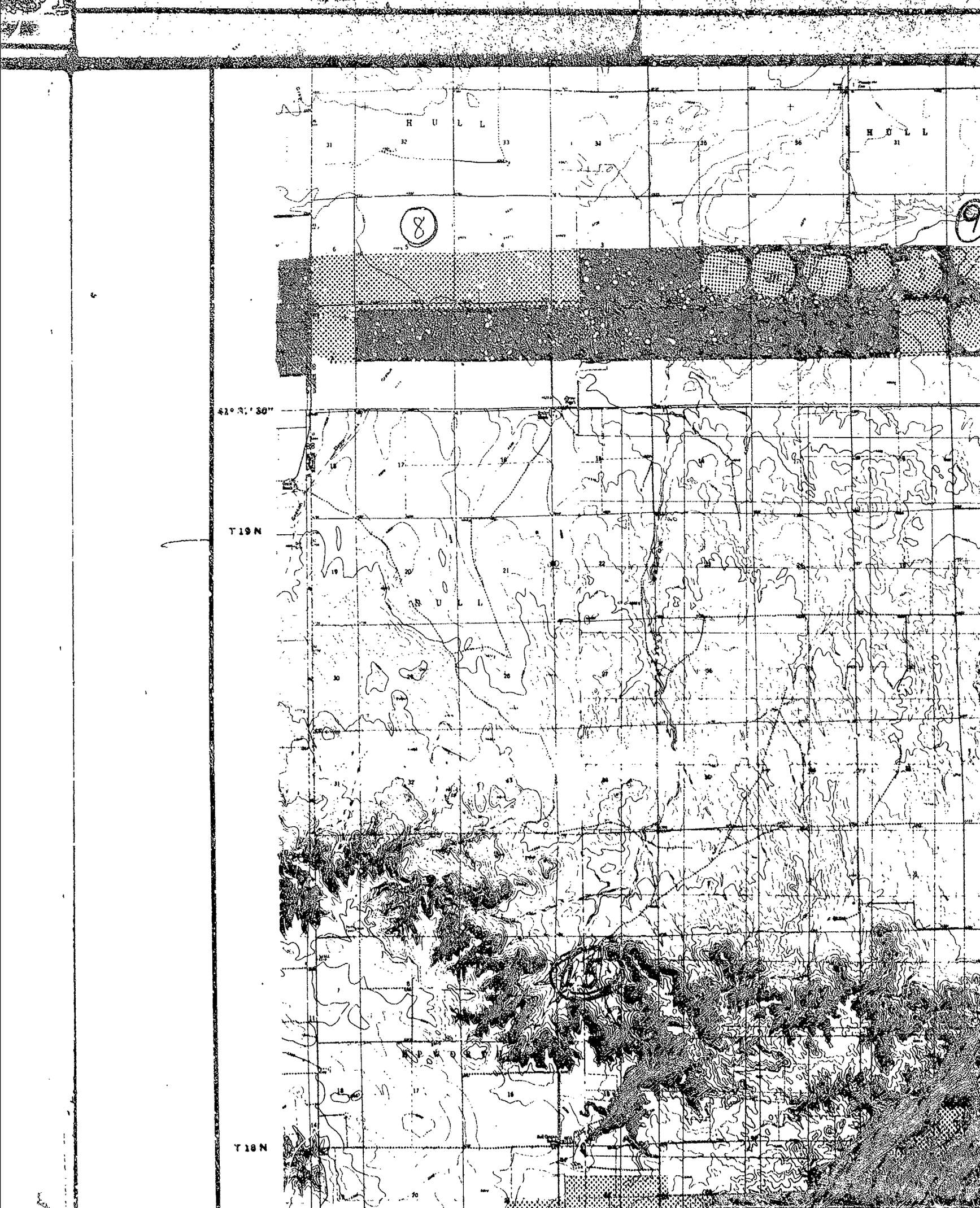

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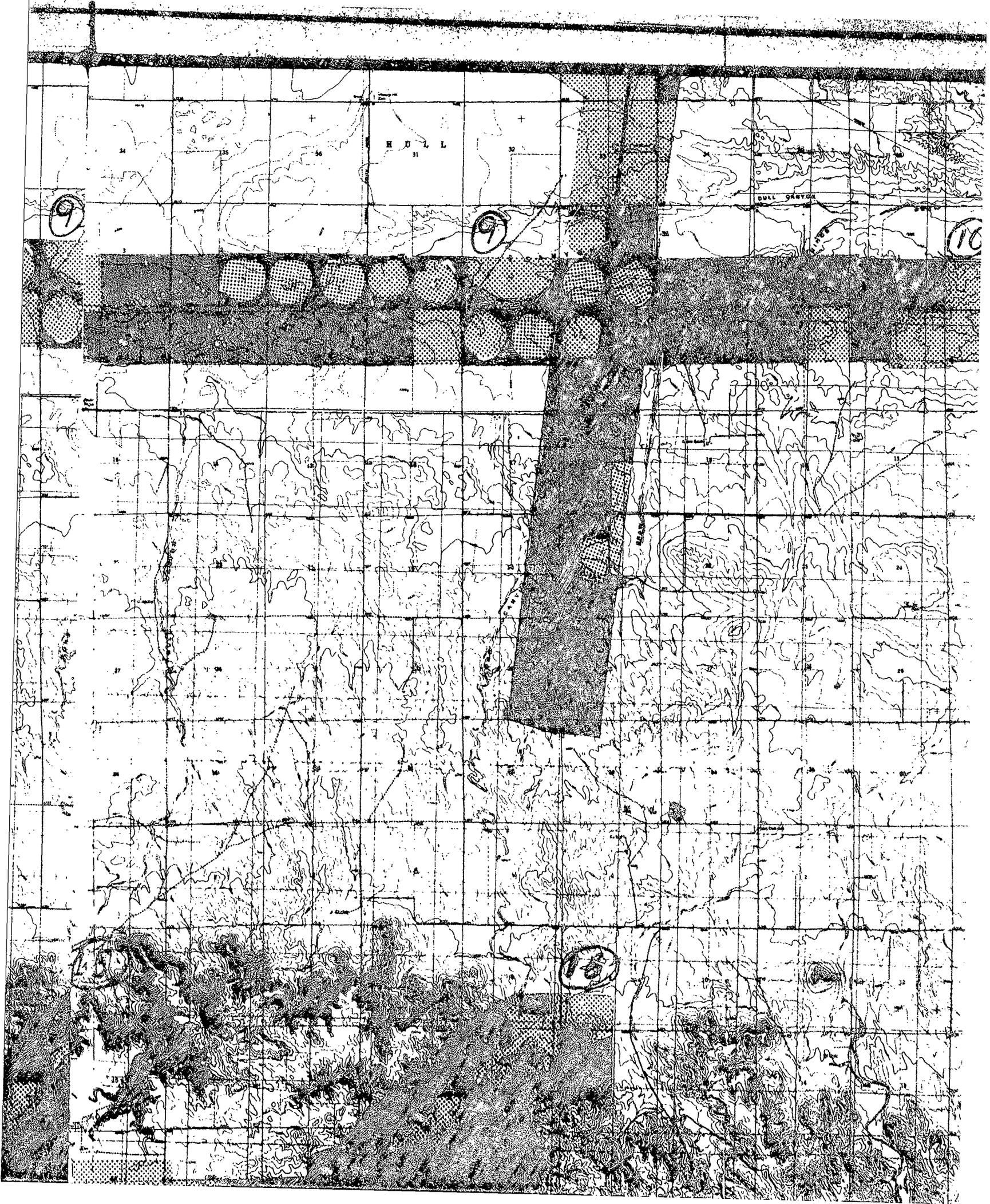


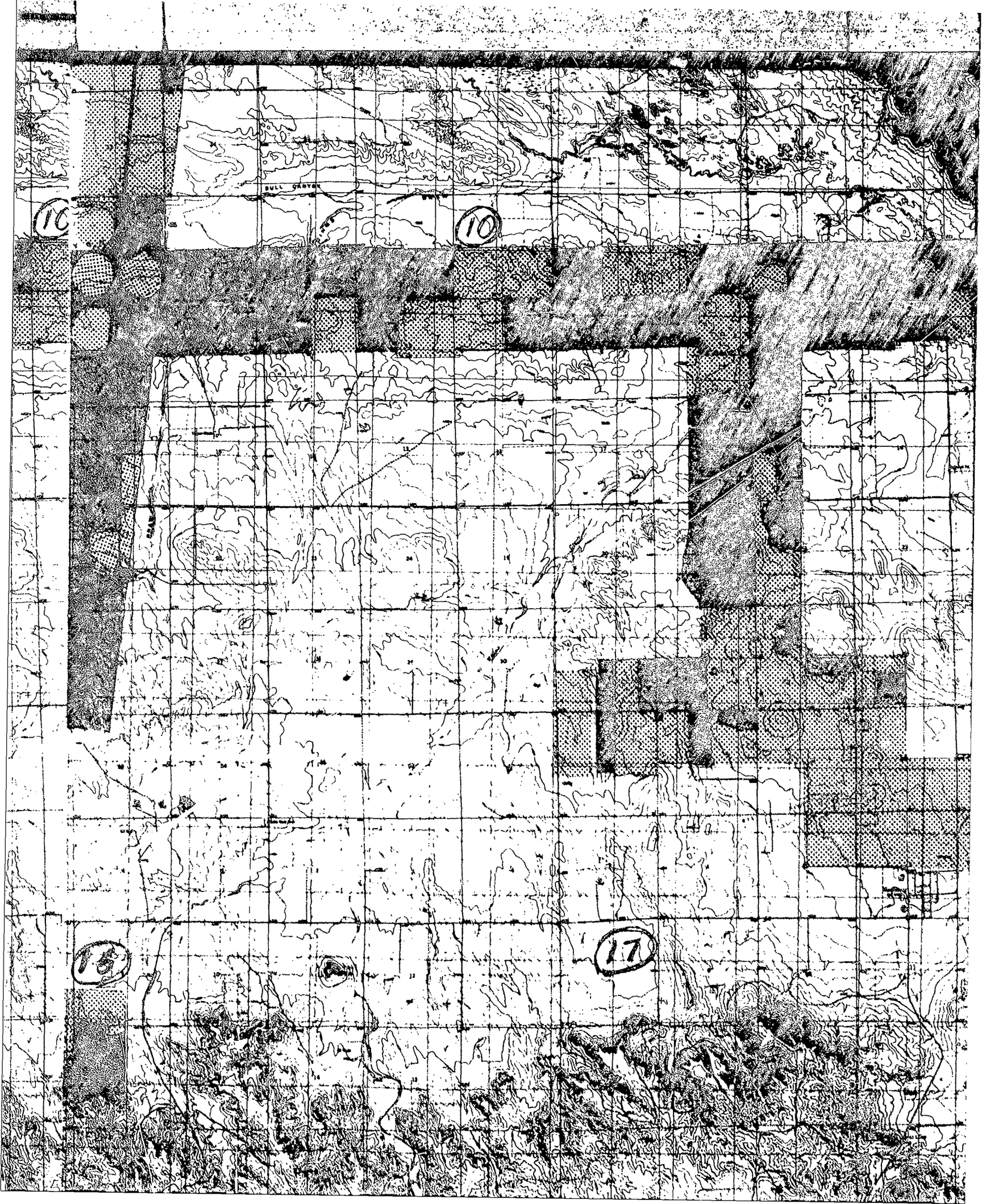

5
6

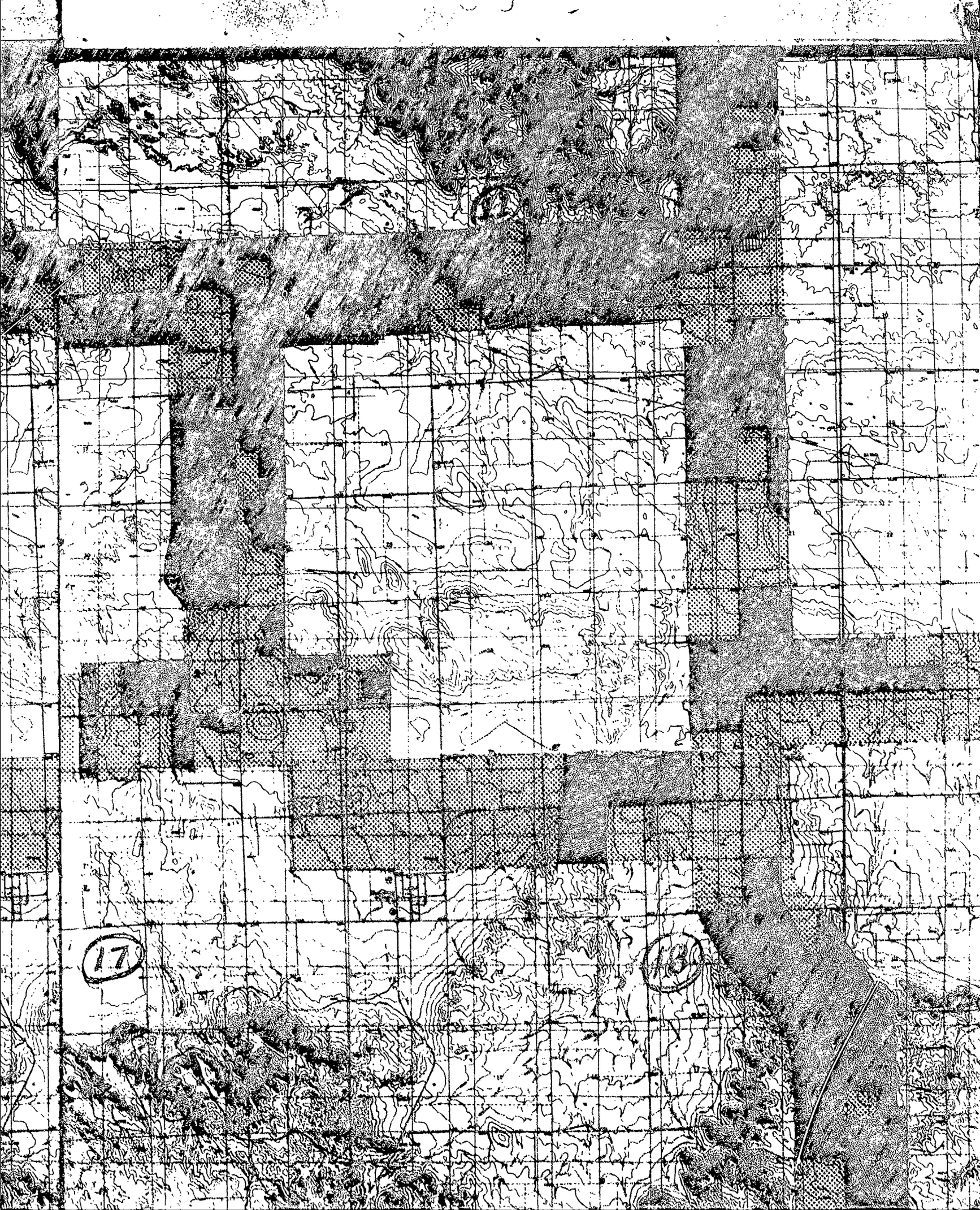


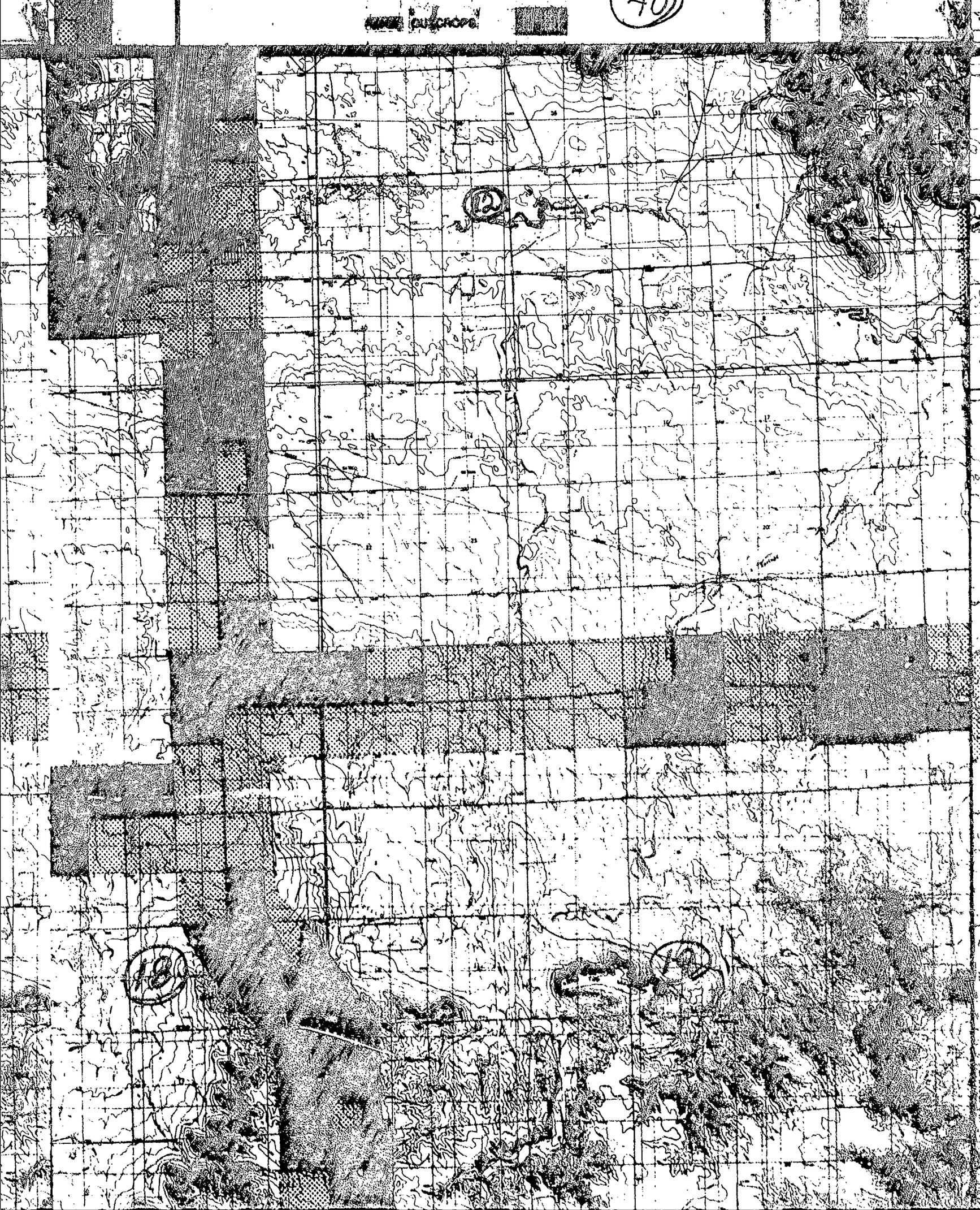

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CASTLE ROCK

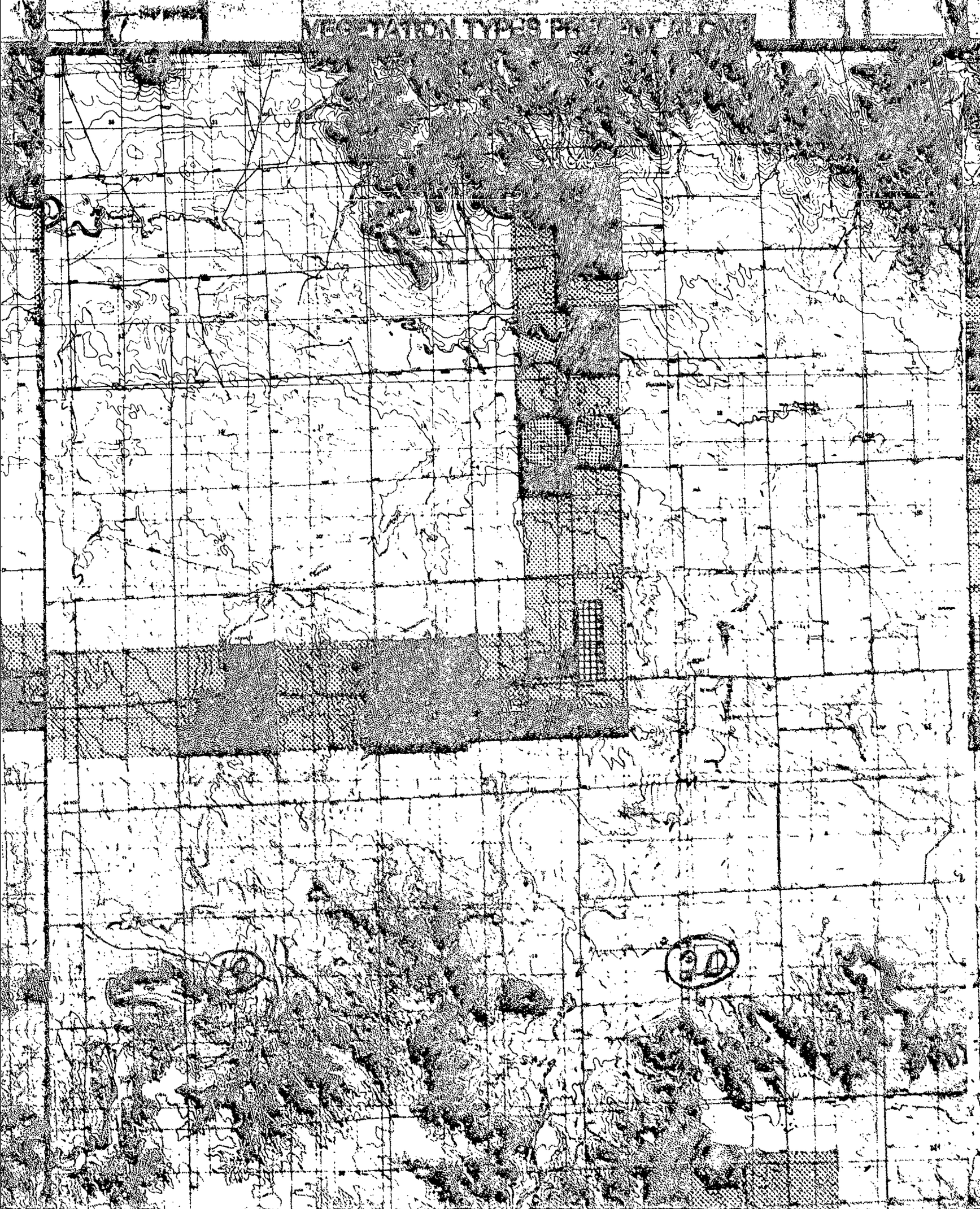

HULL
HULL
8
9
41° 37' 30"
T 19 N
HULL
T 18 N

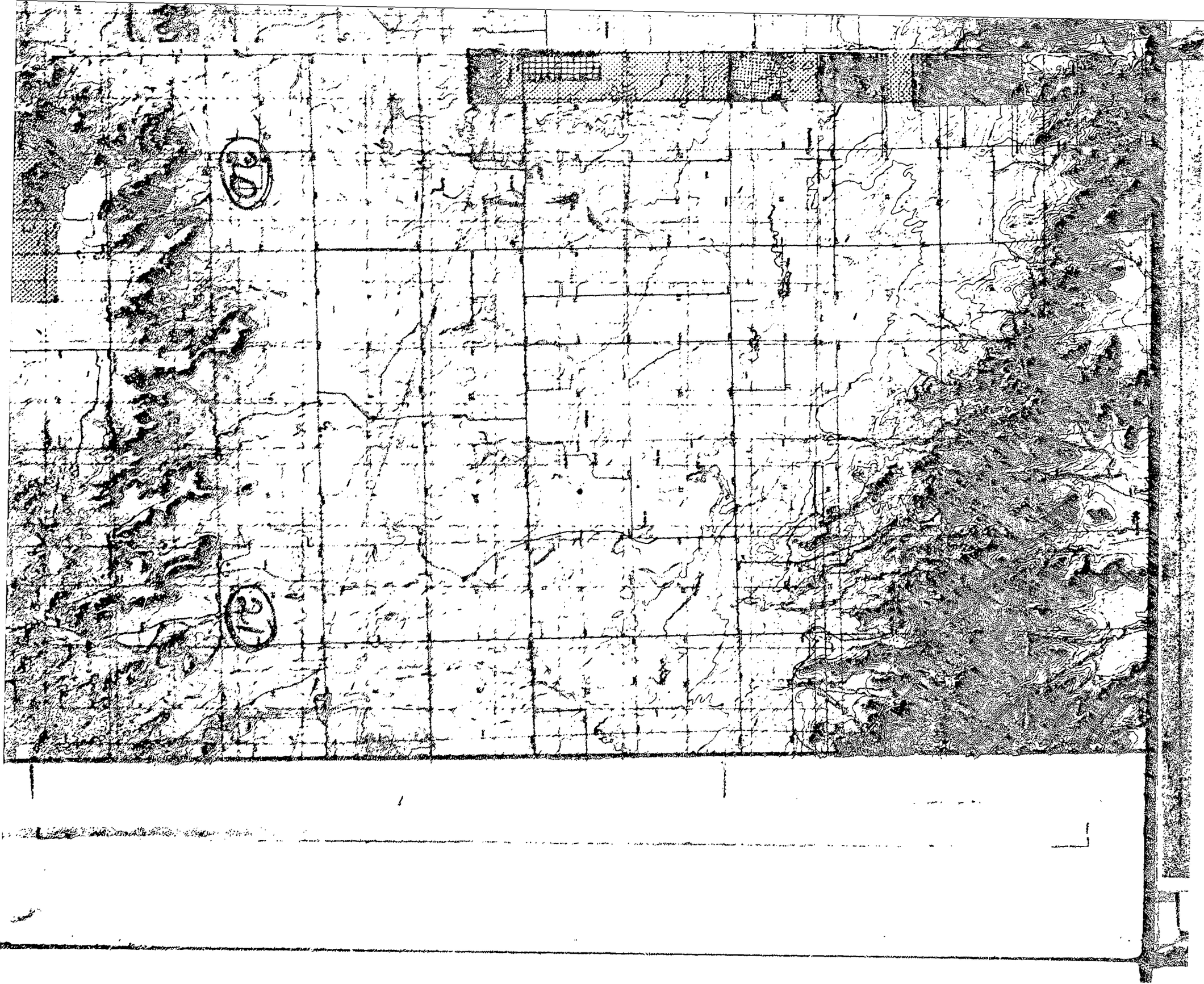

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DULL CANYON

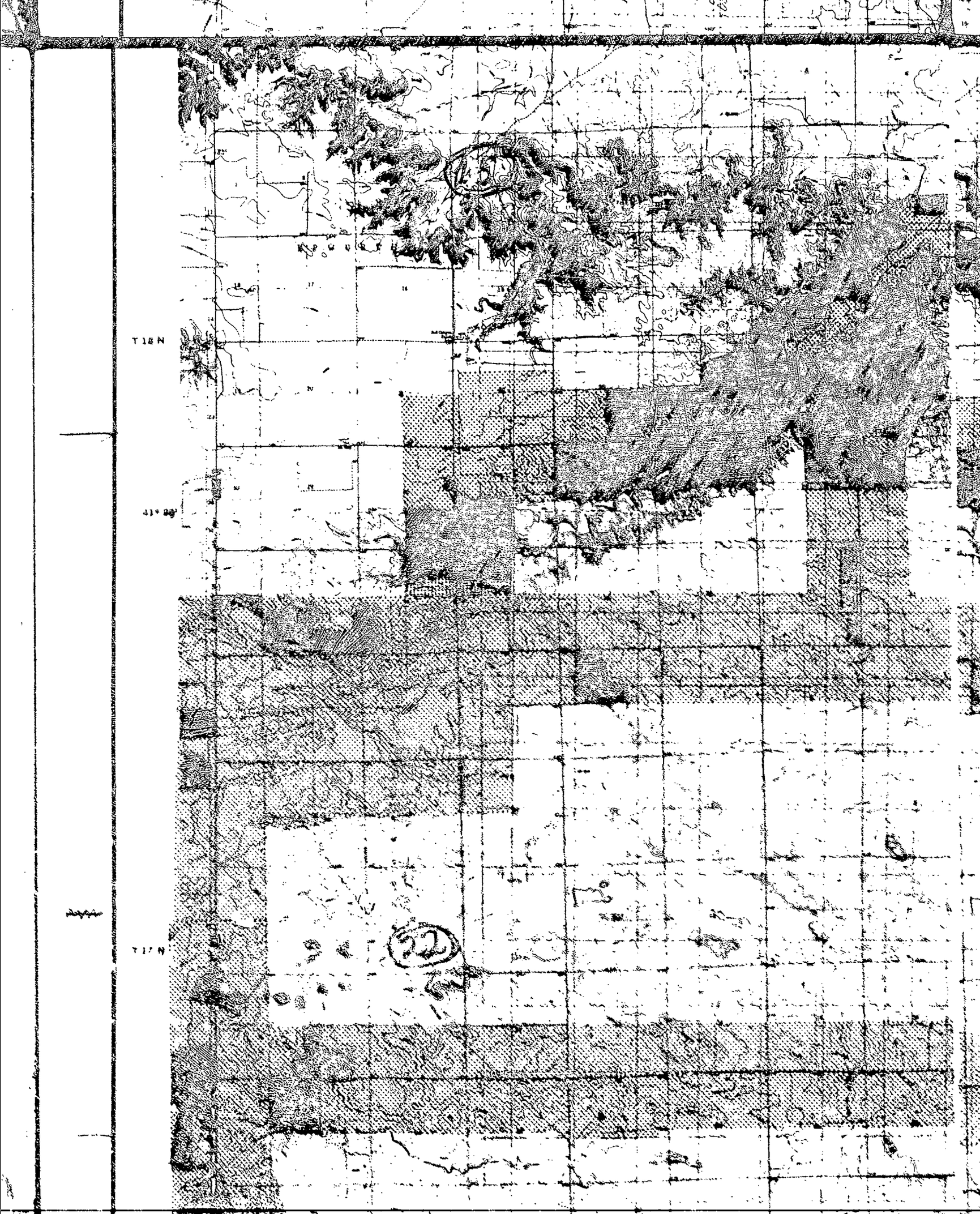

BULL CANYON
16
10
17

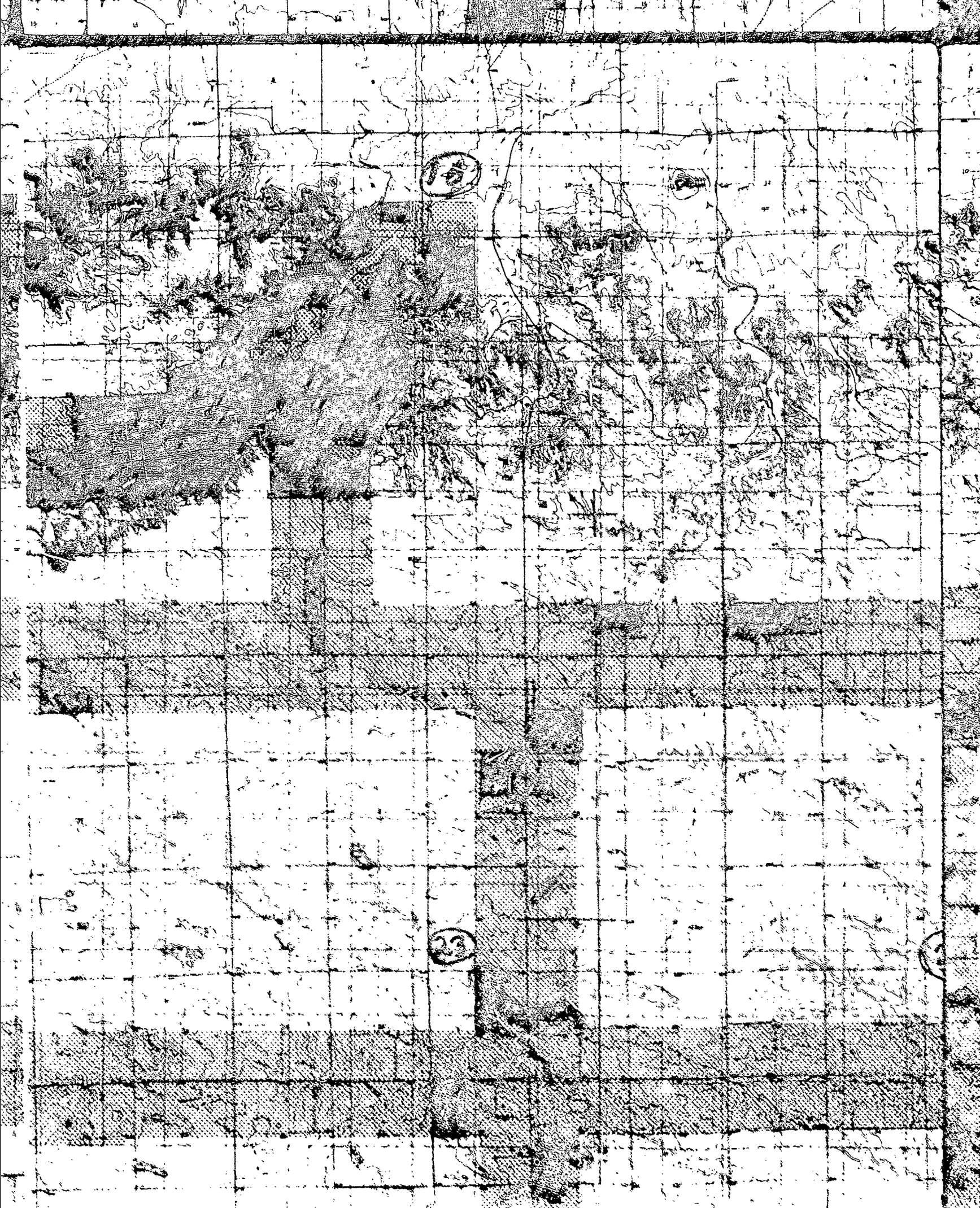

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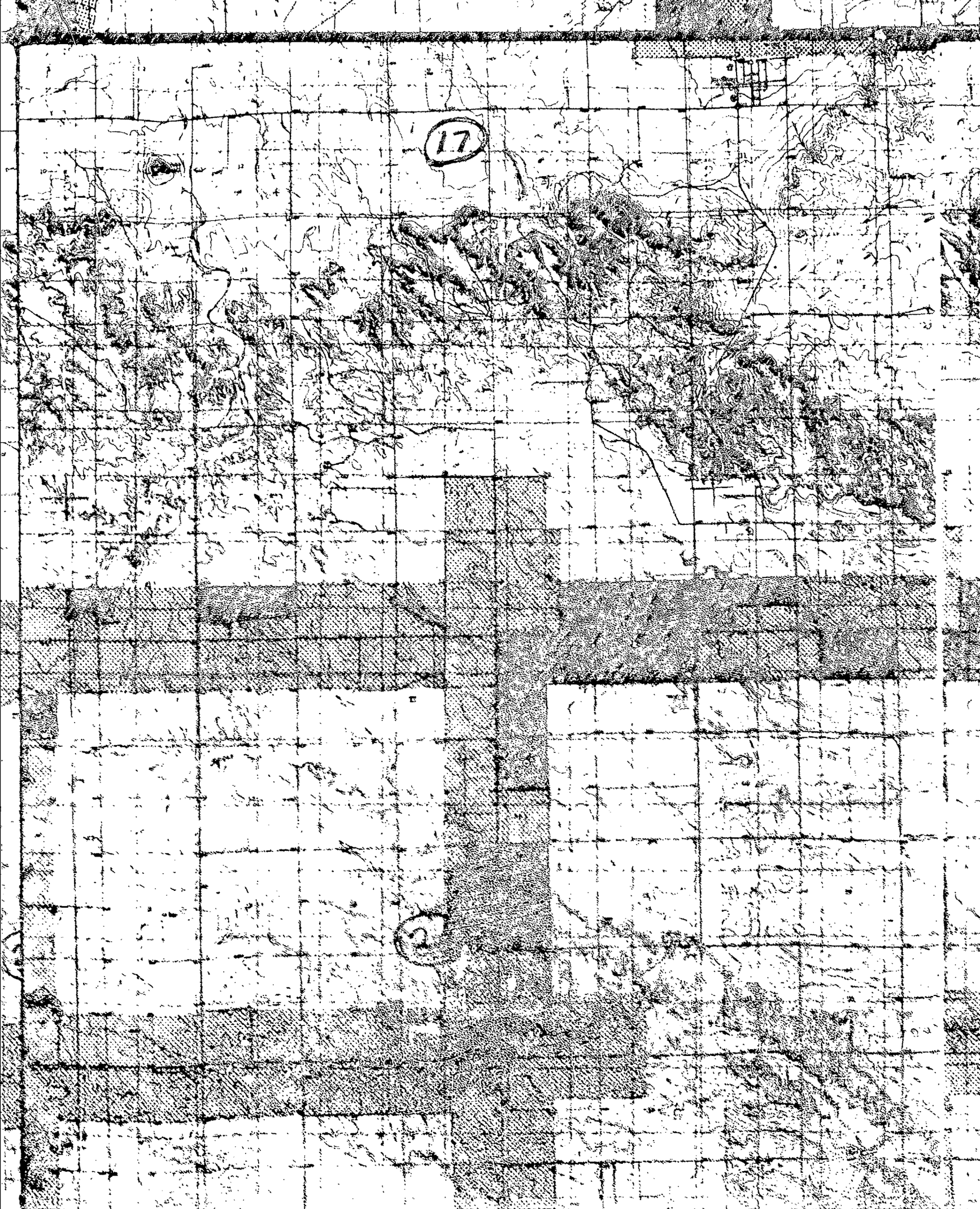


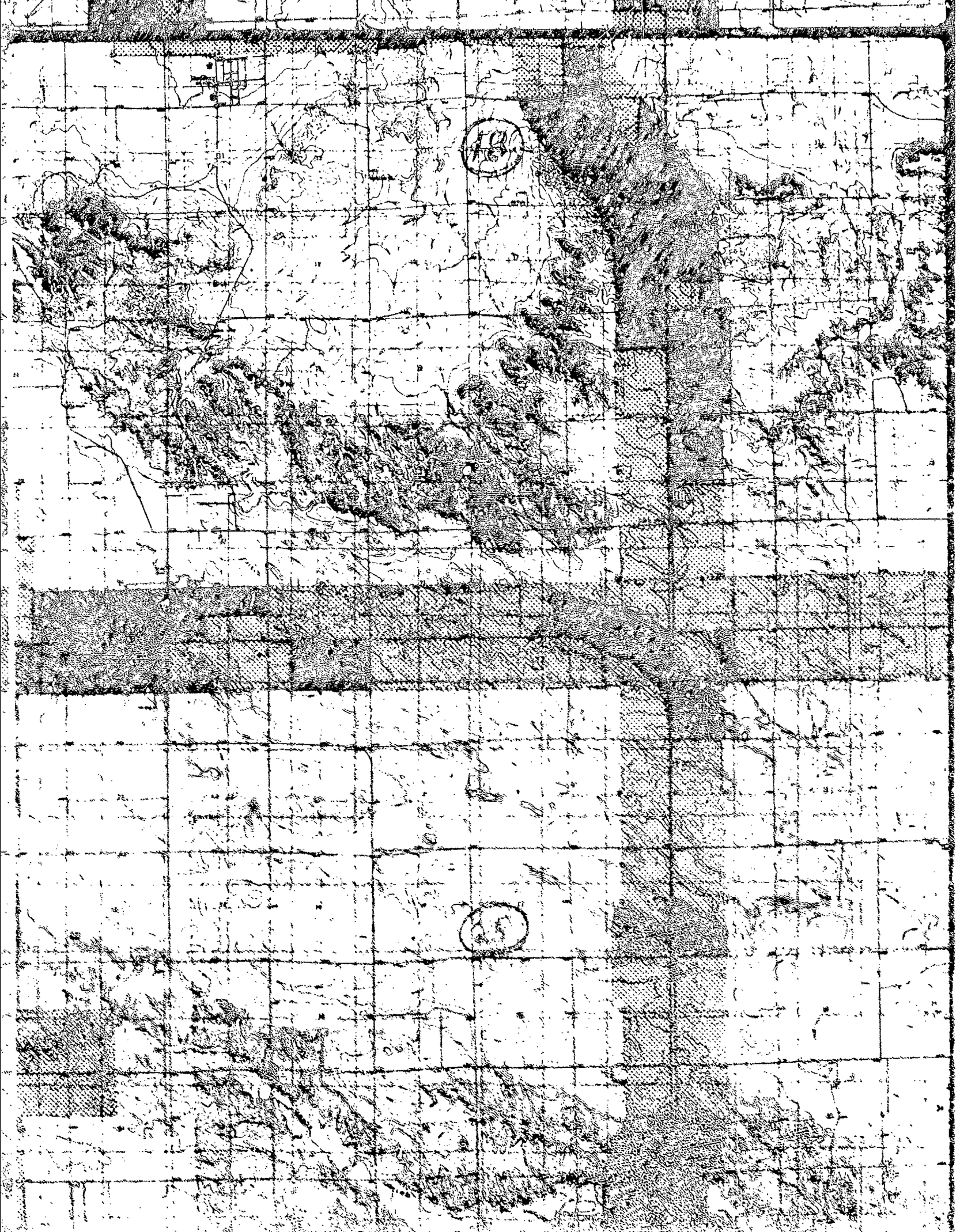


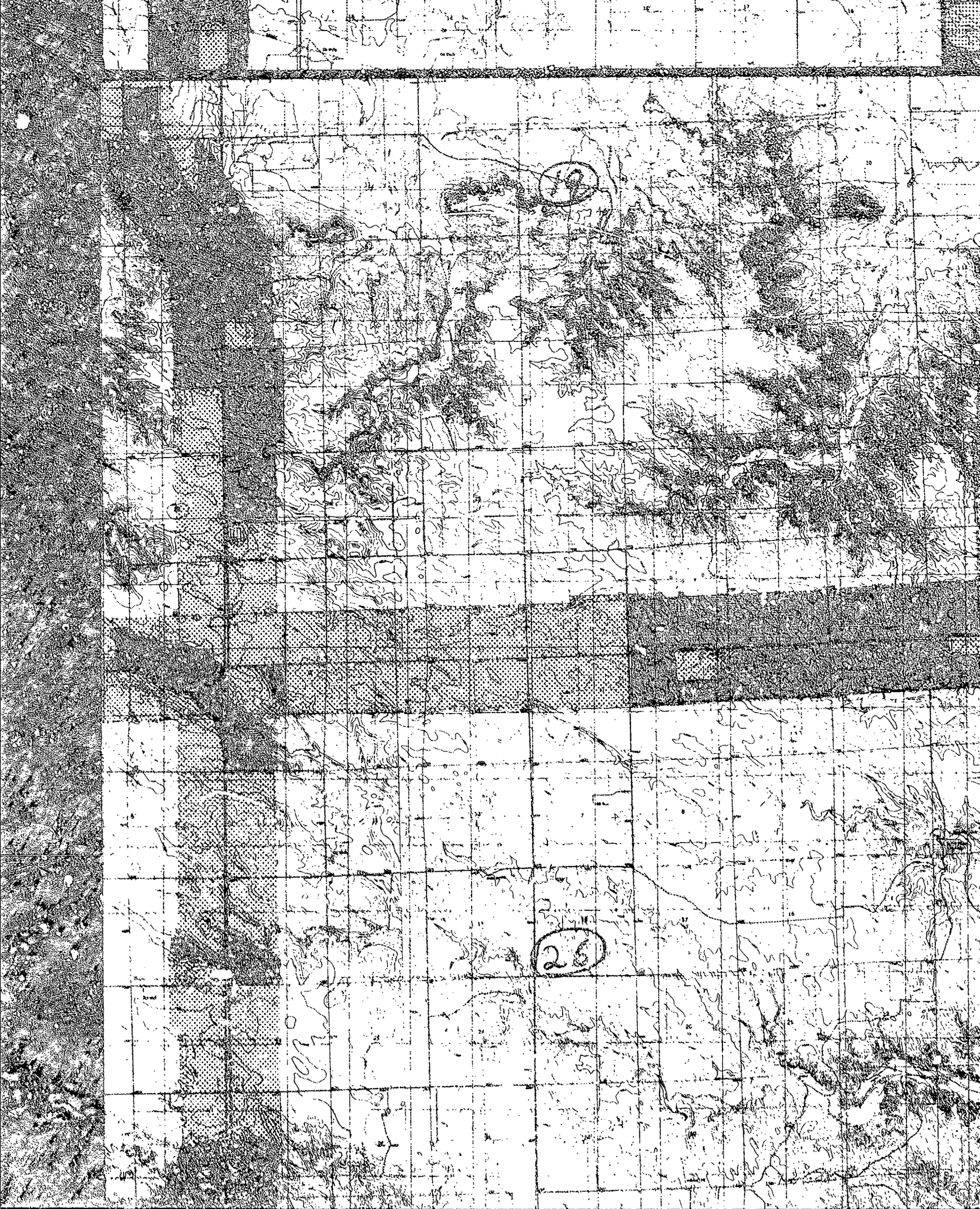


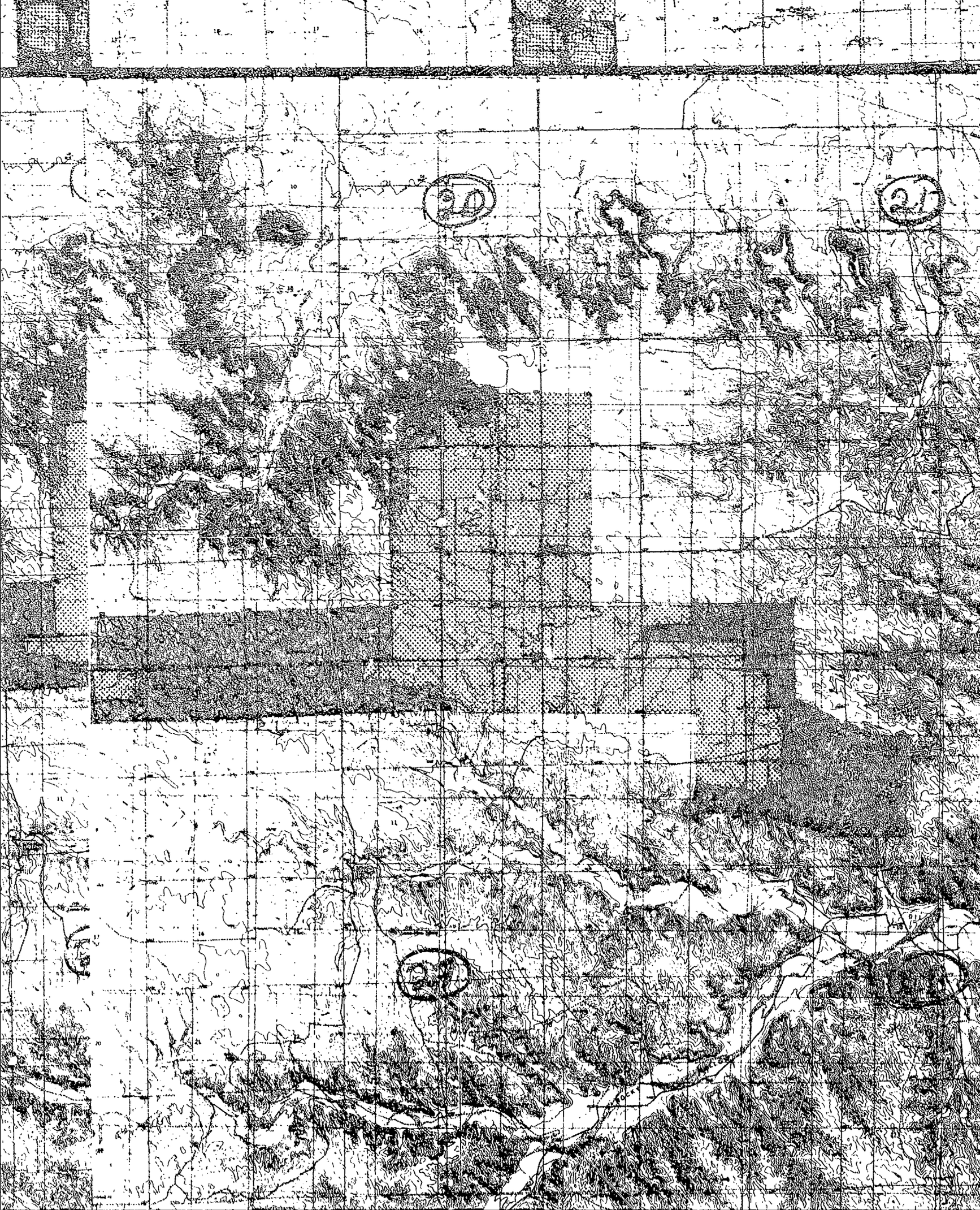

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T 17 N

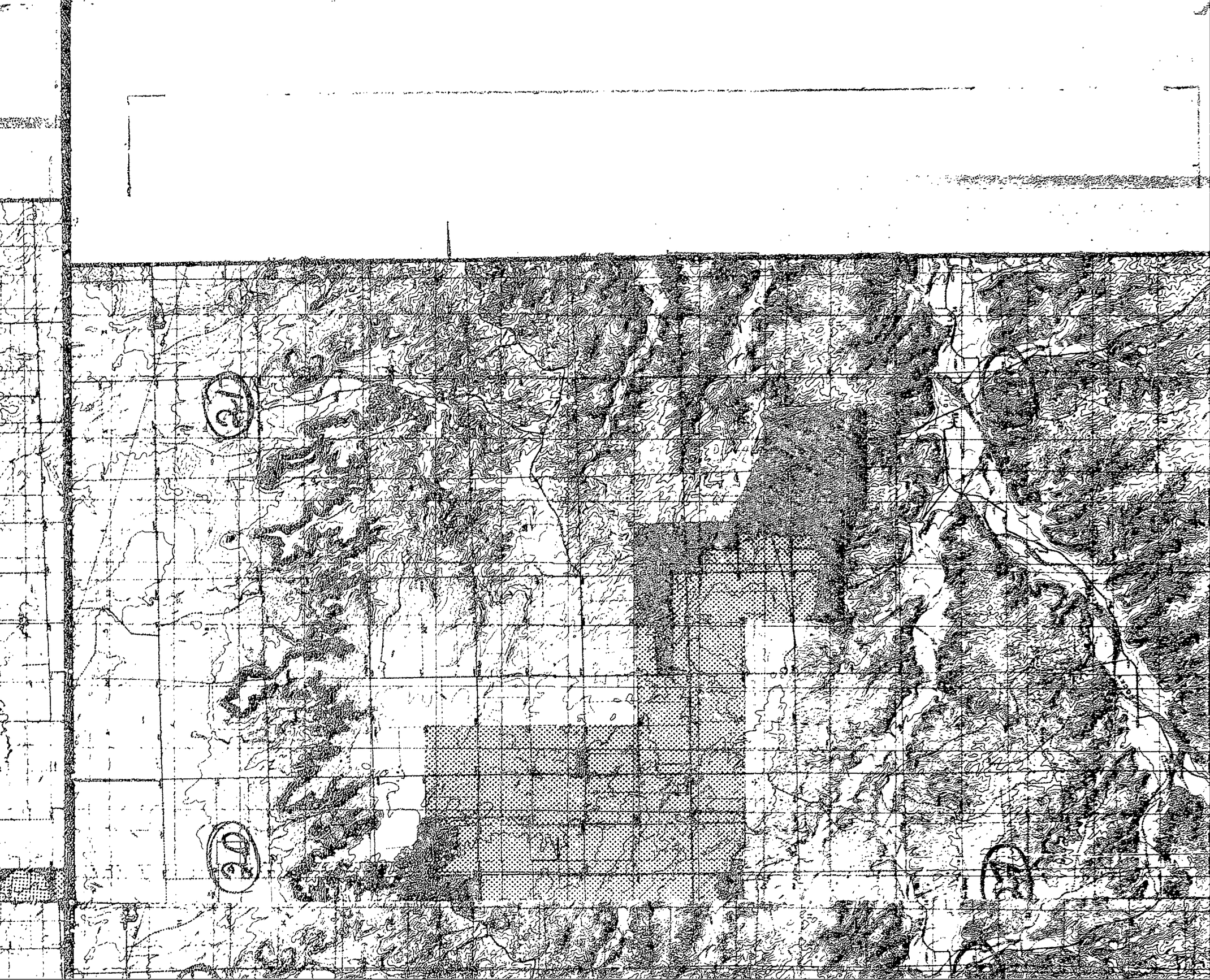


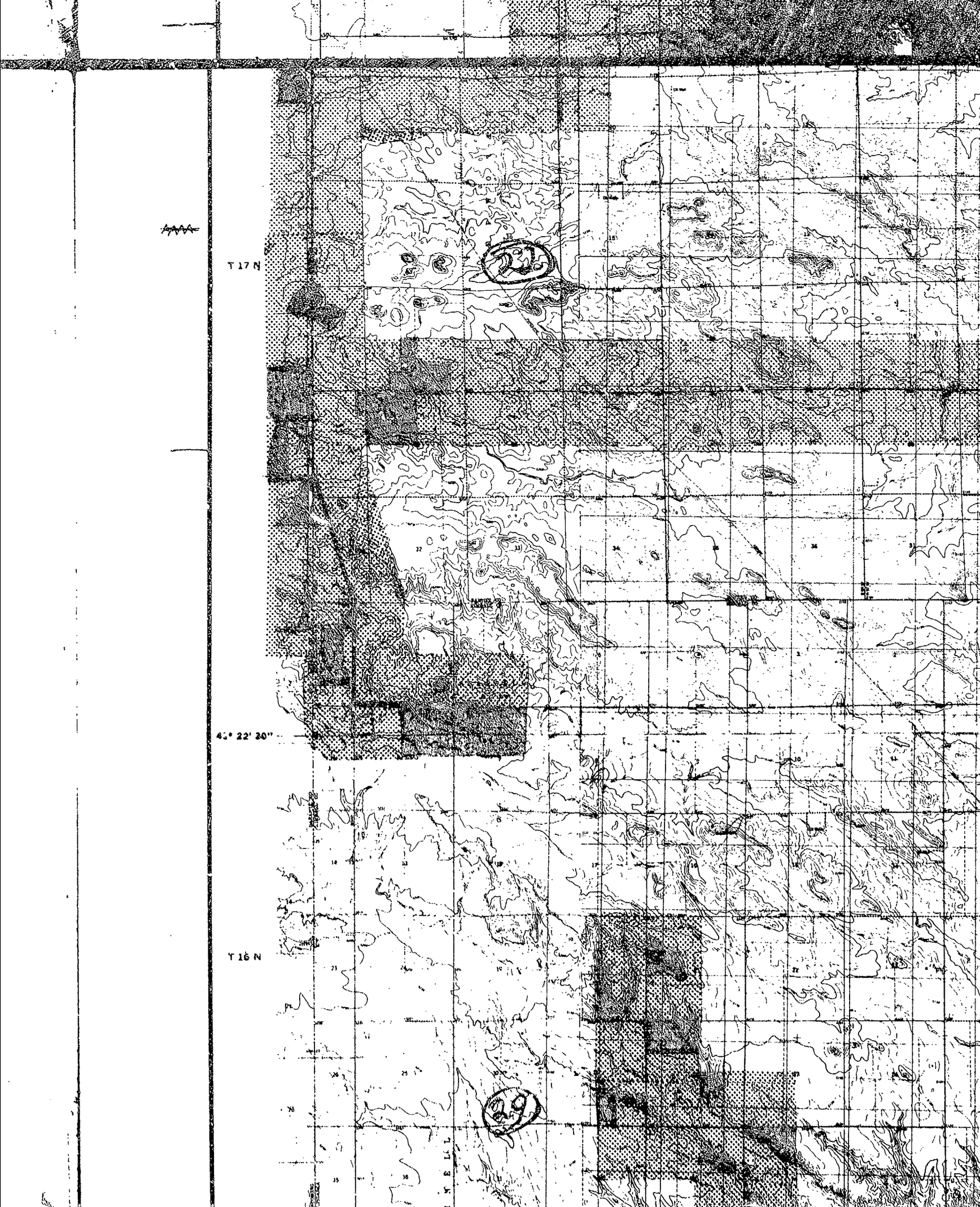

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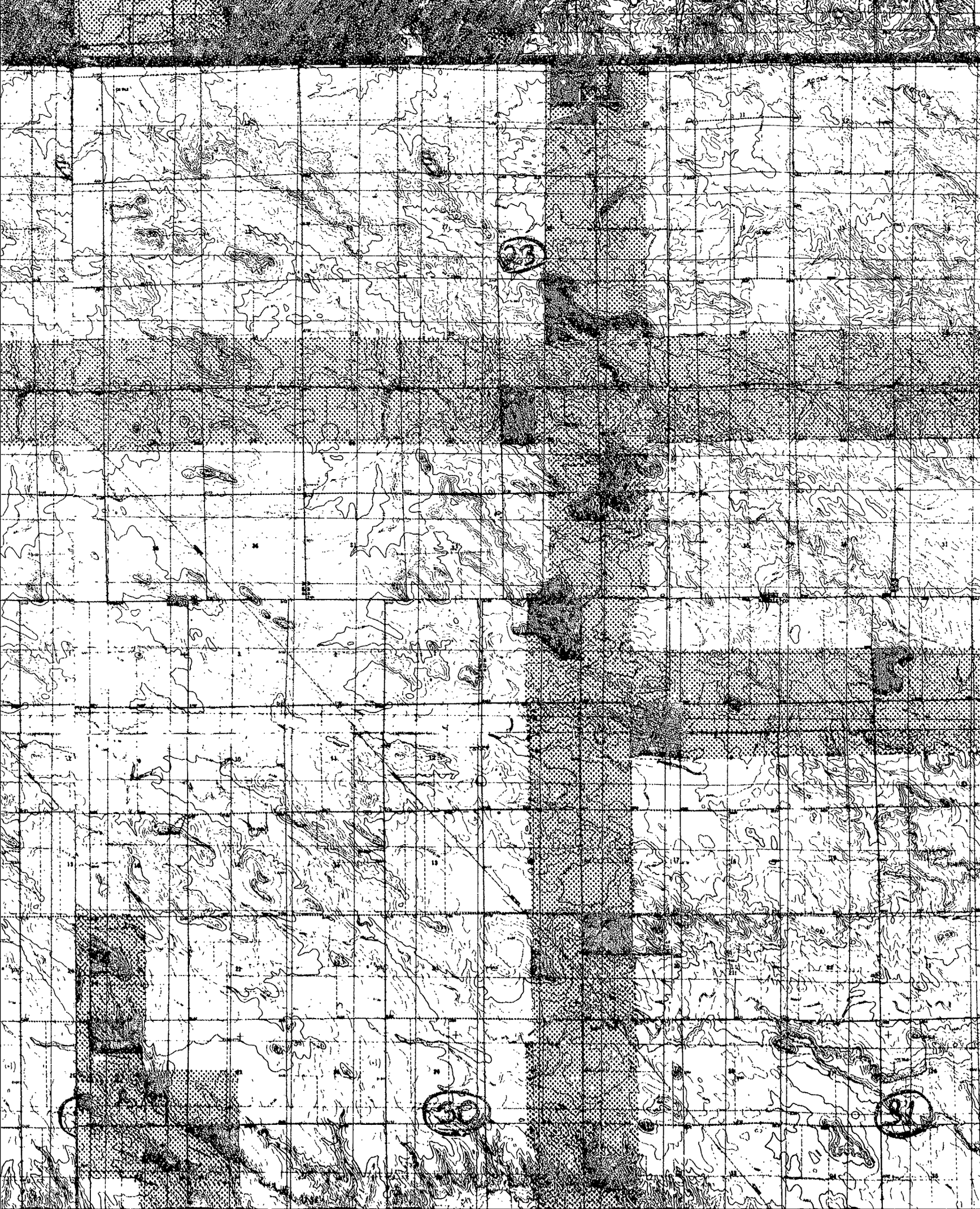


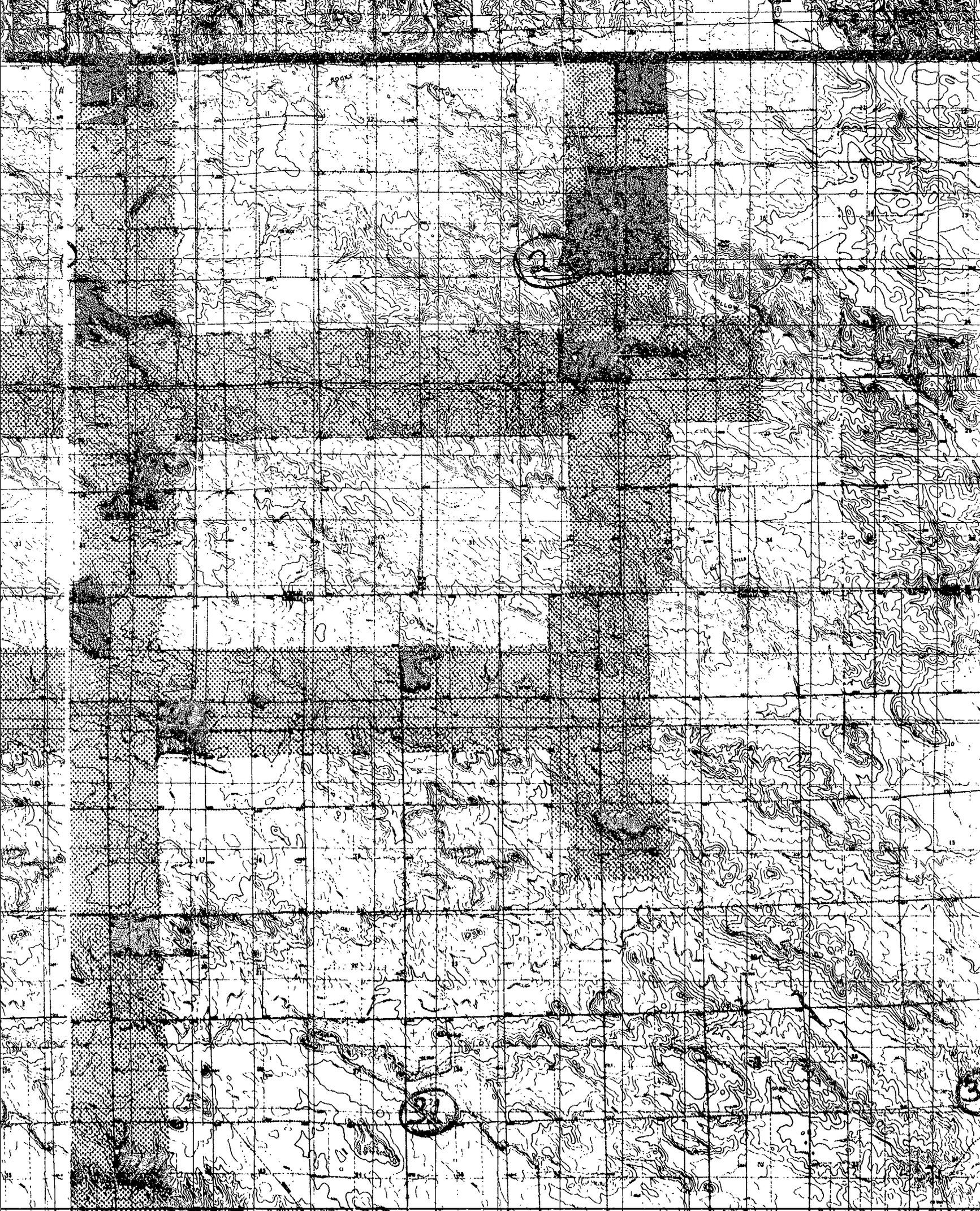

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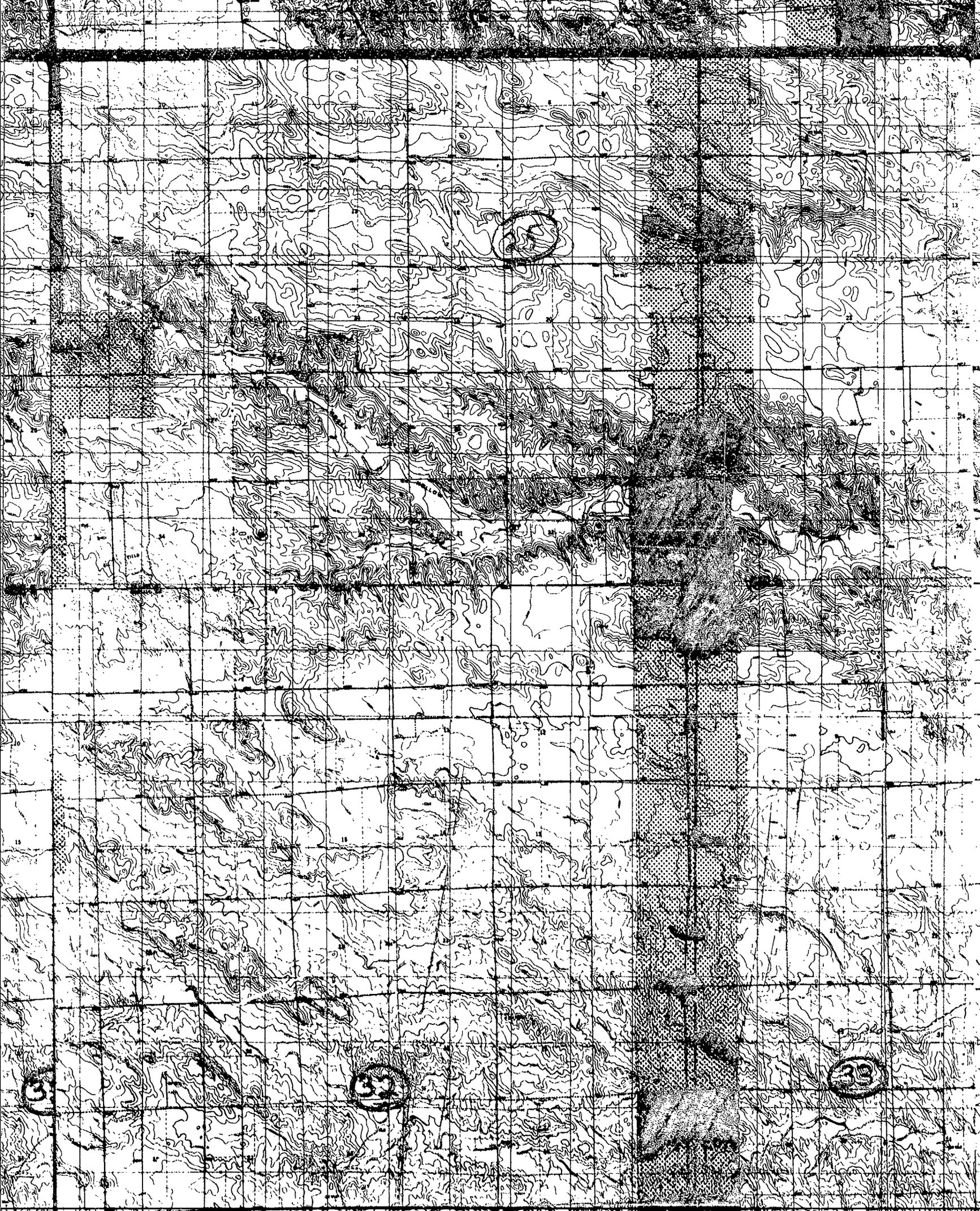

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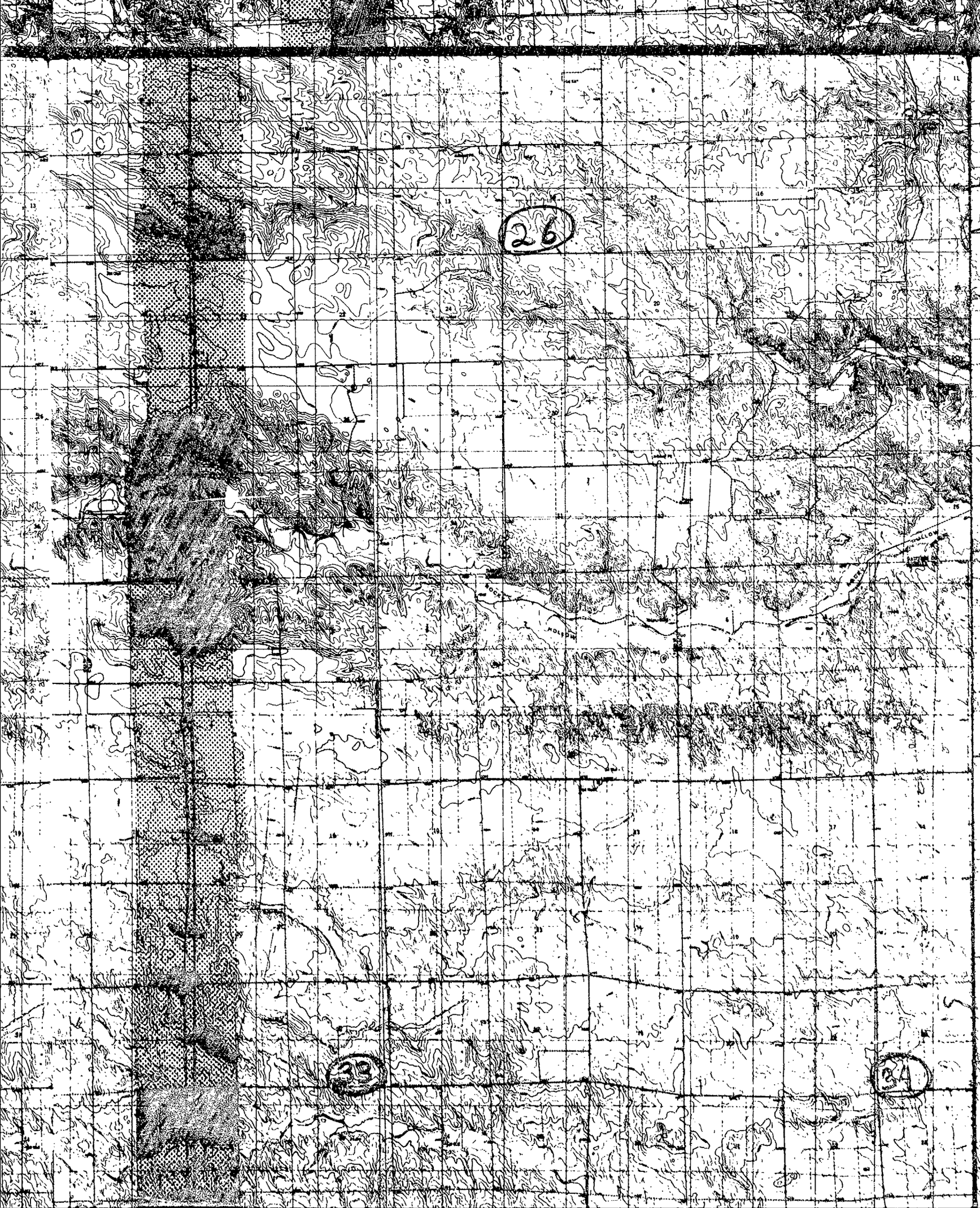


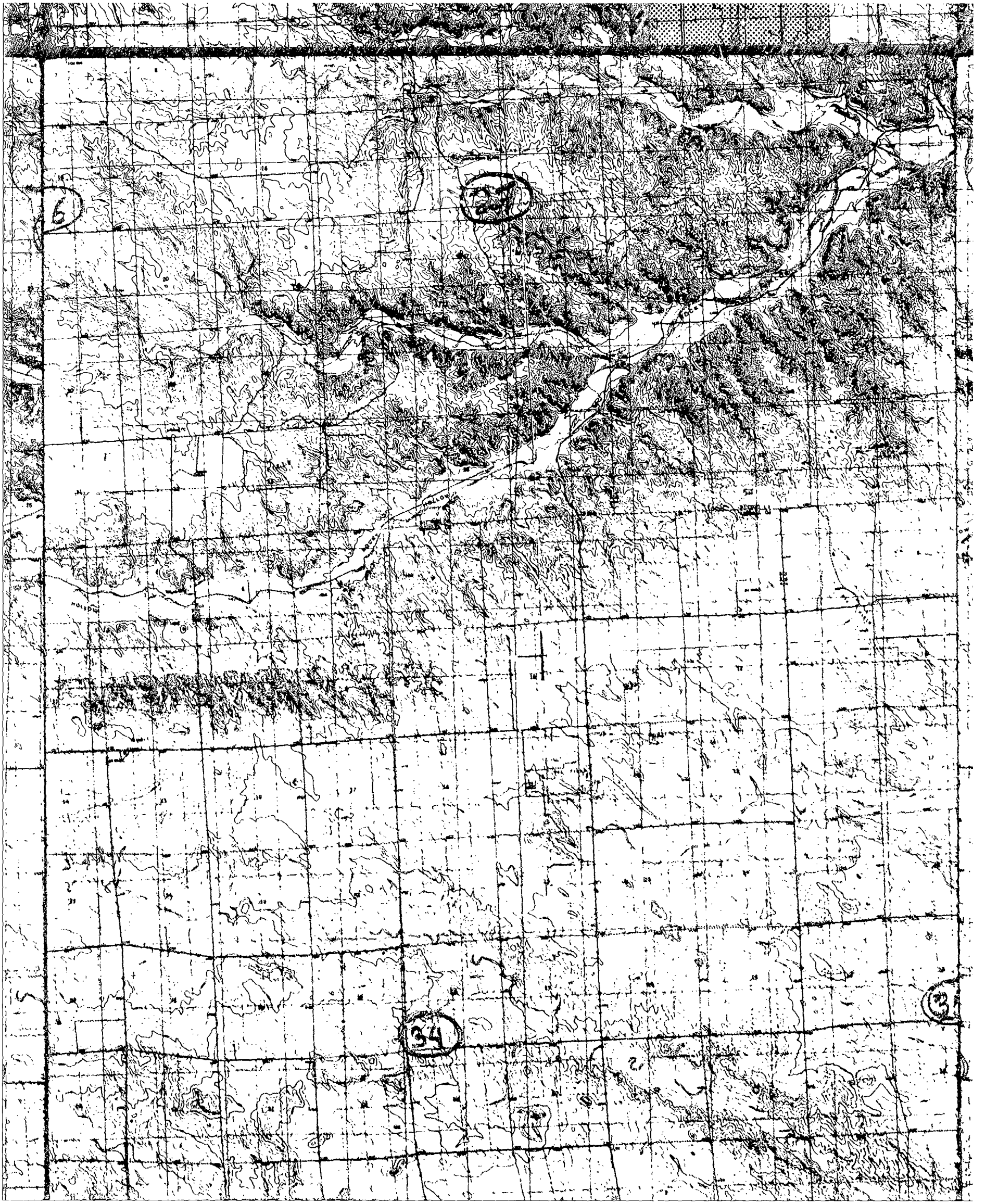

T 17 N
T 16 N
43° 22' 30"
28
29

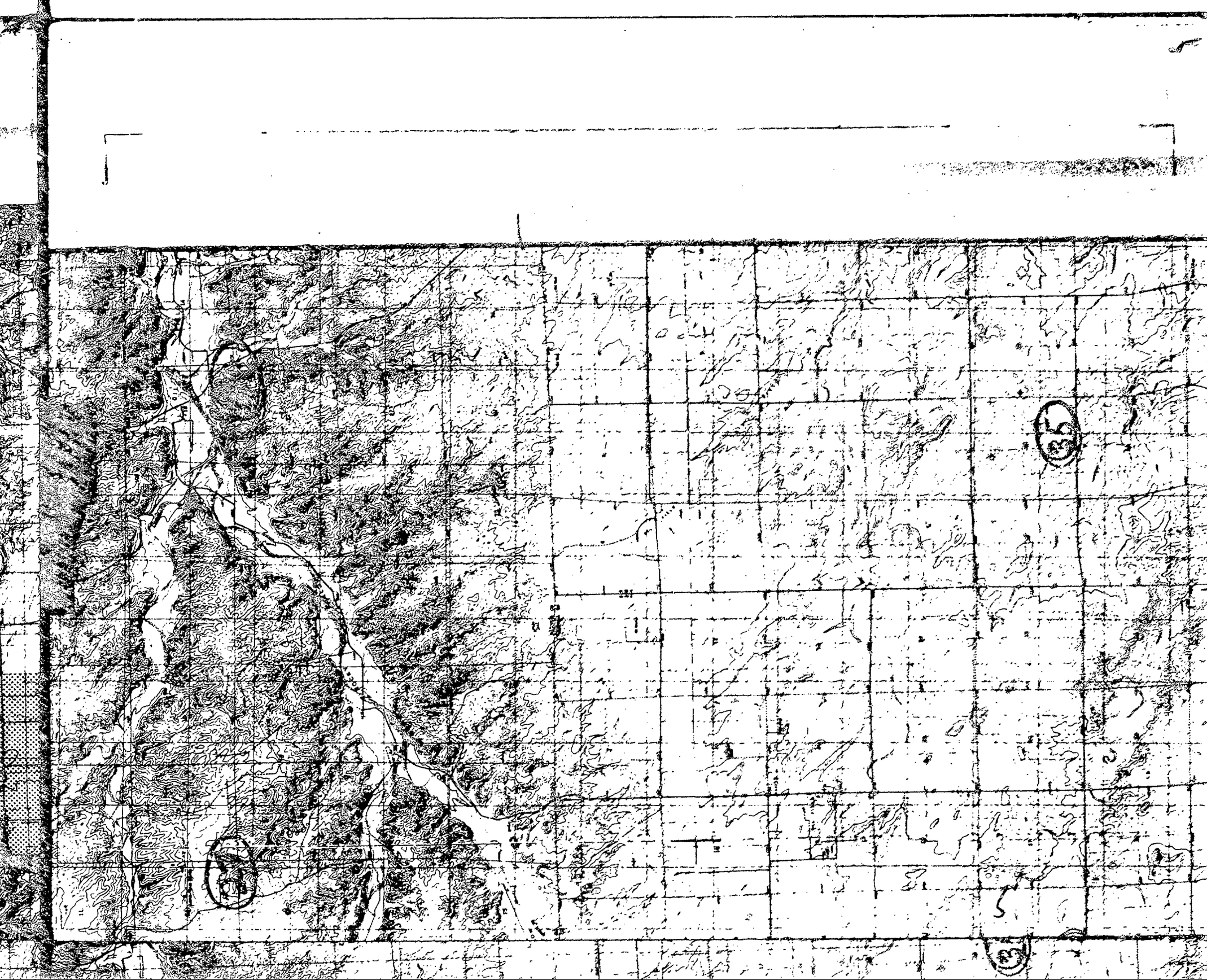

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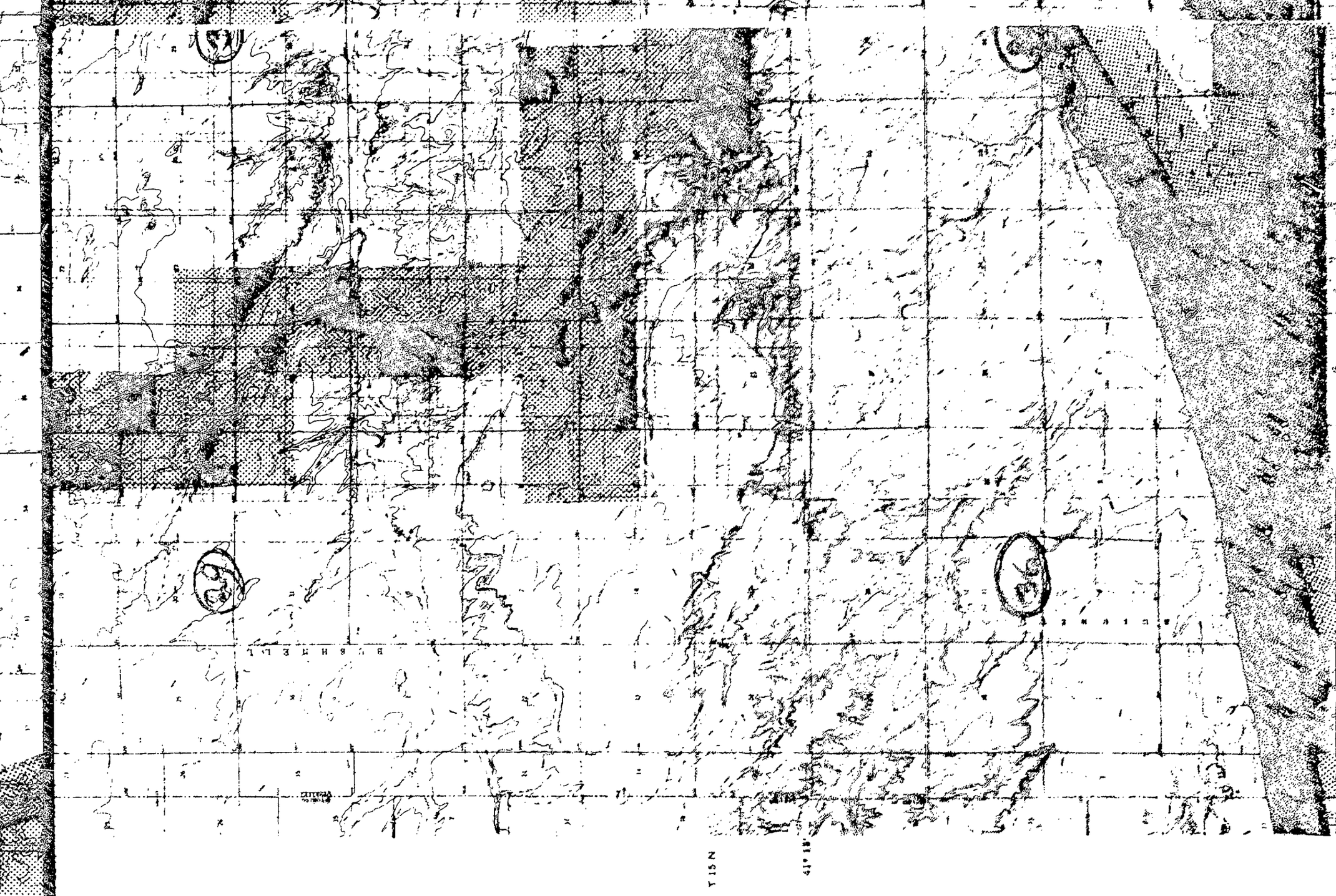




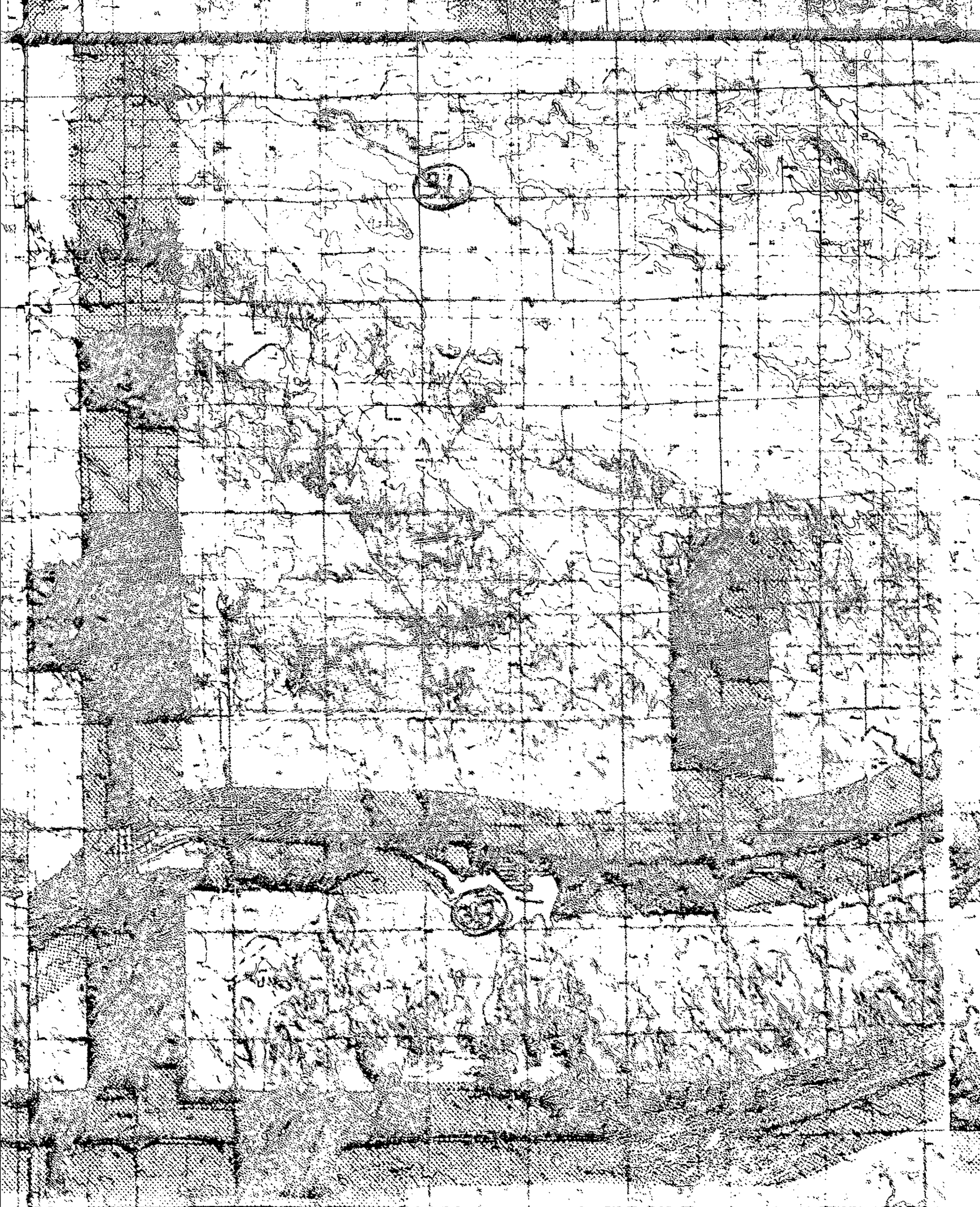

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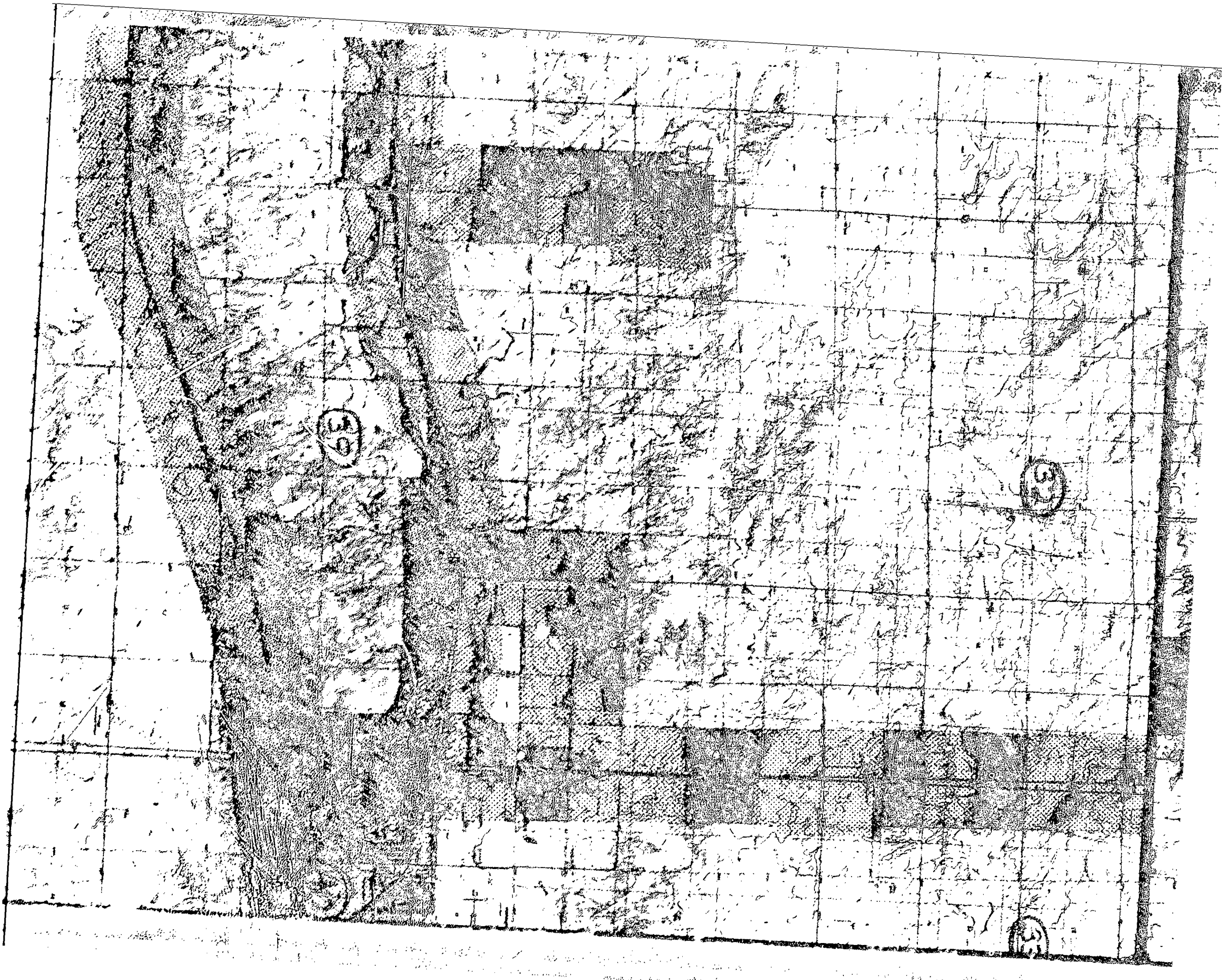


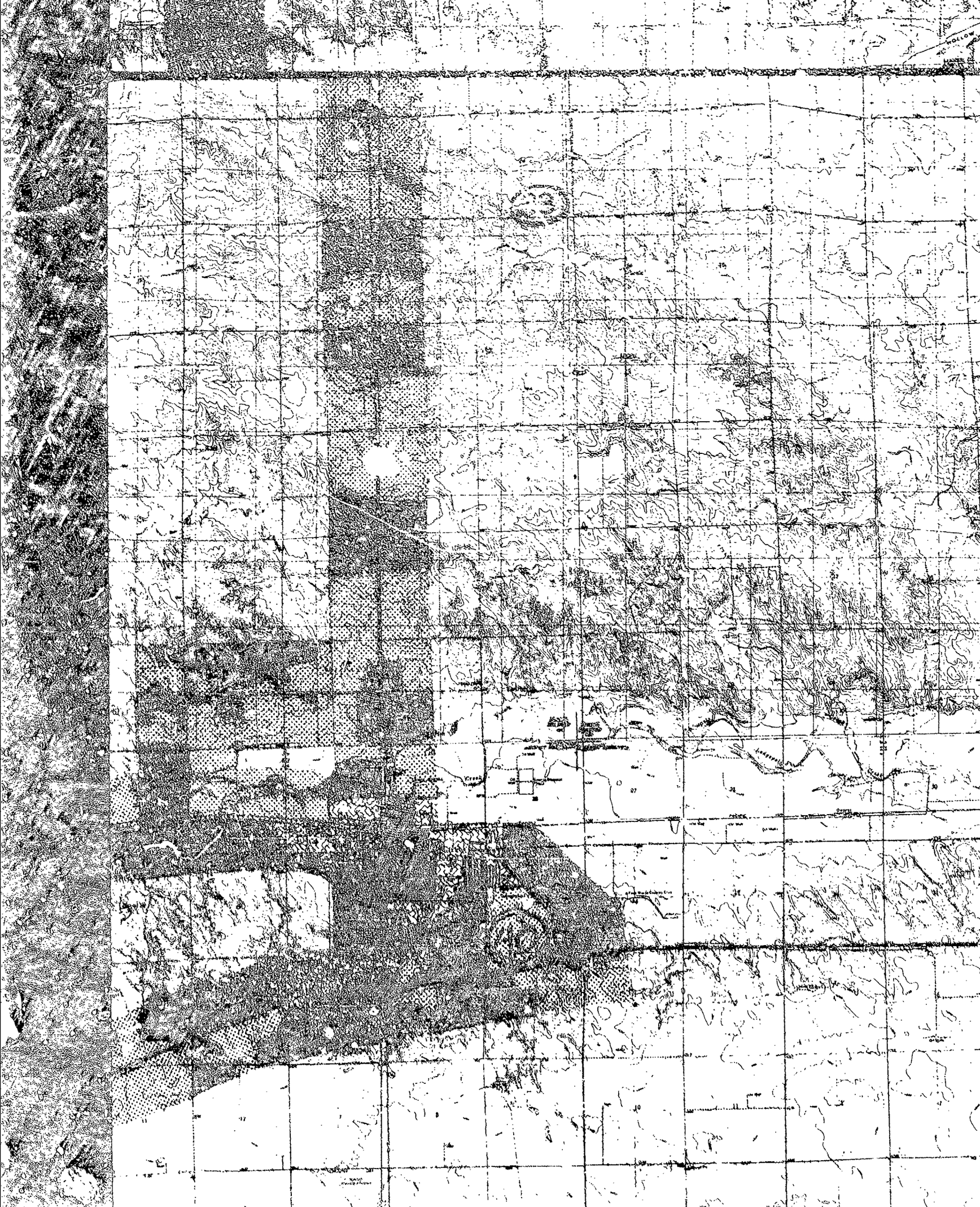


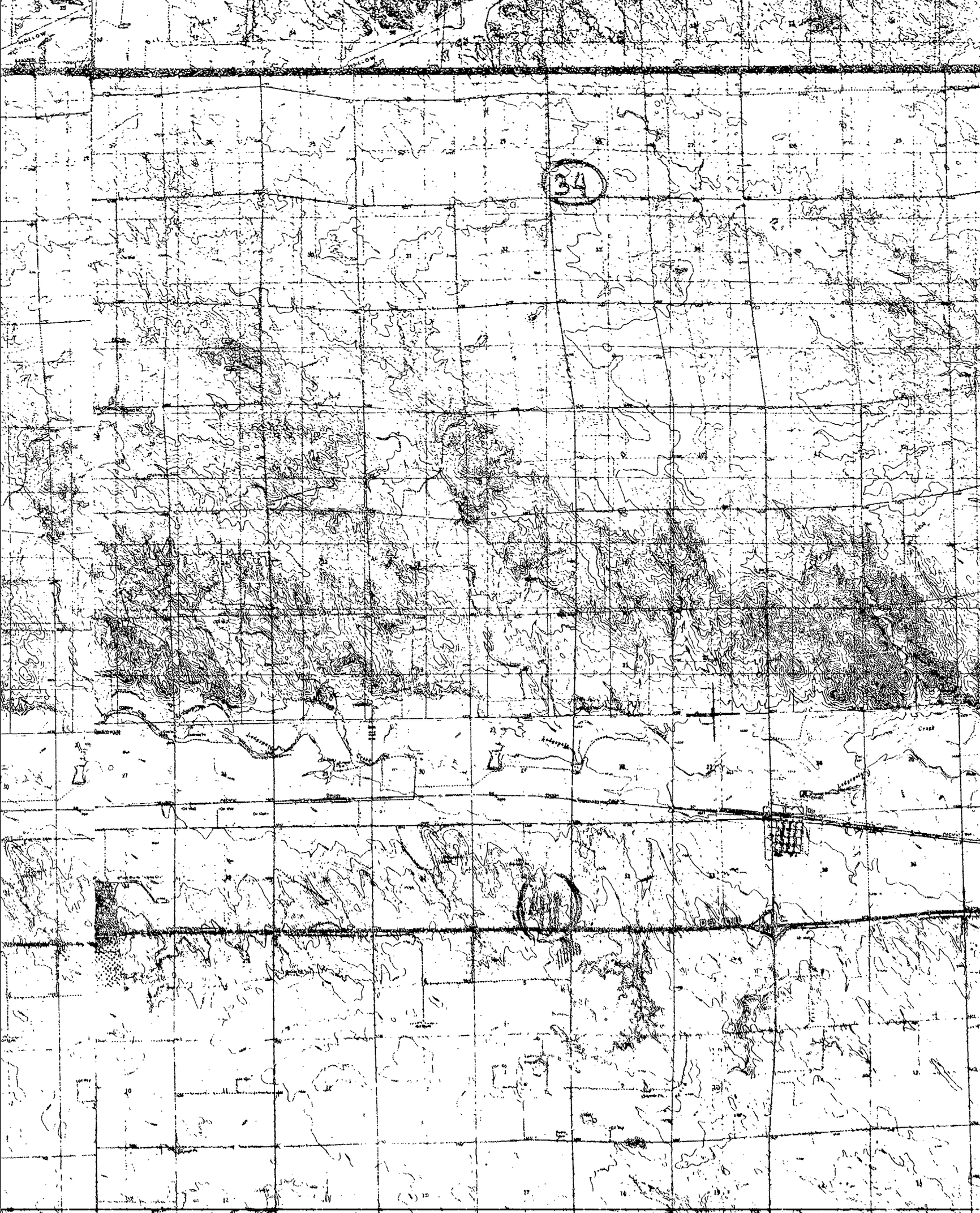


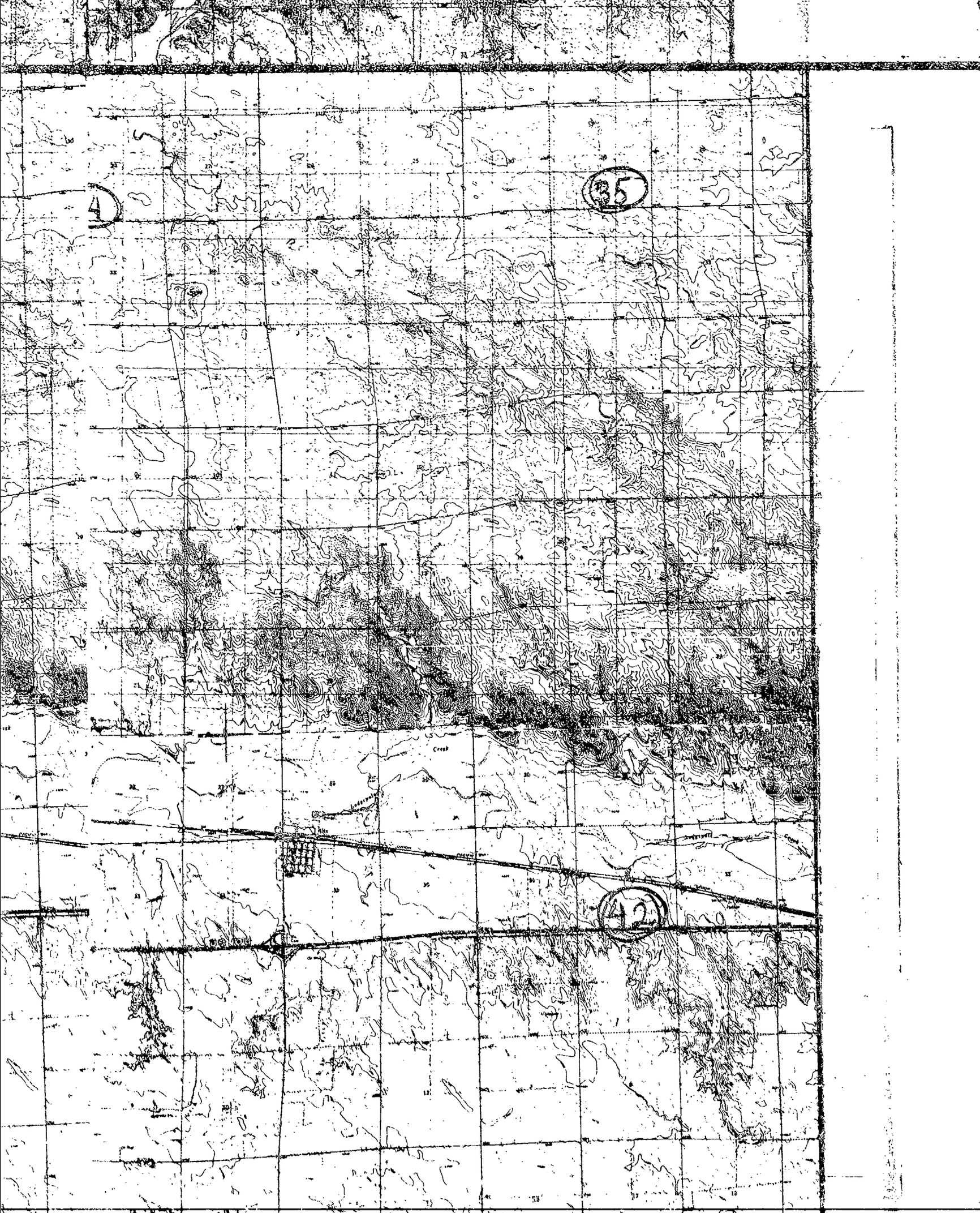


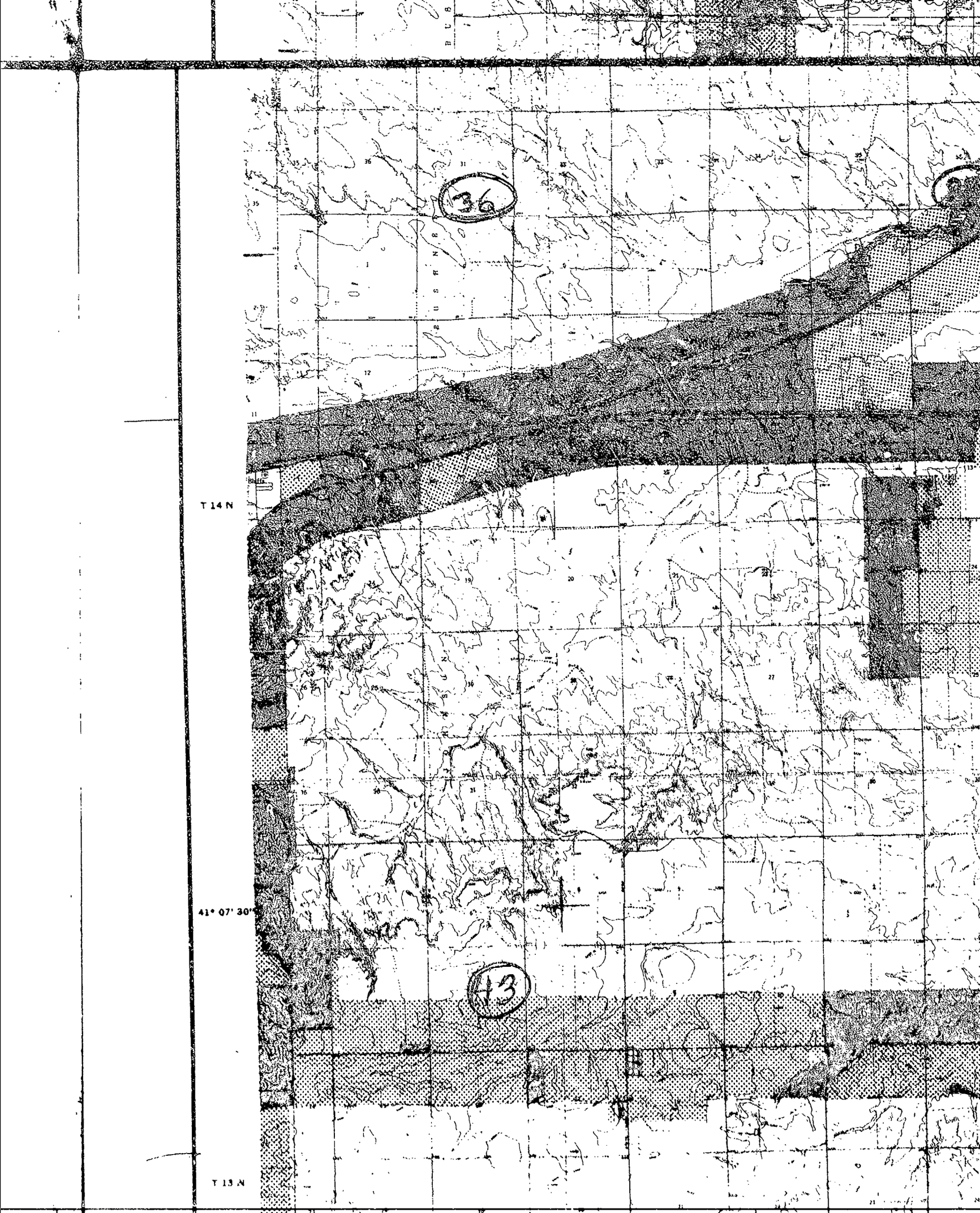


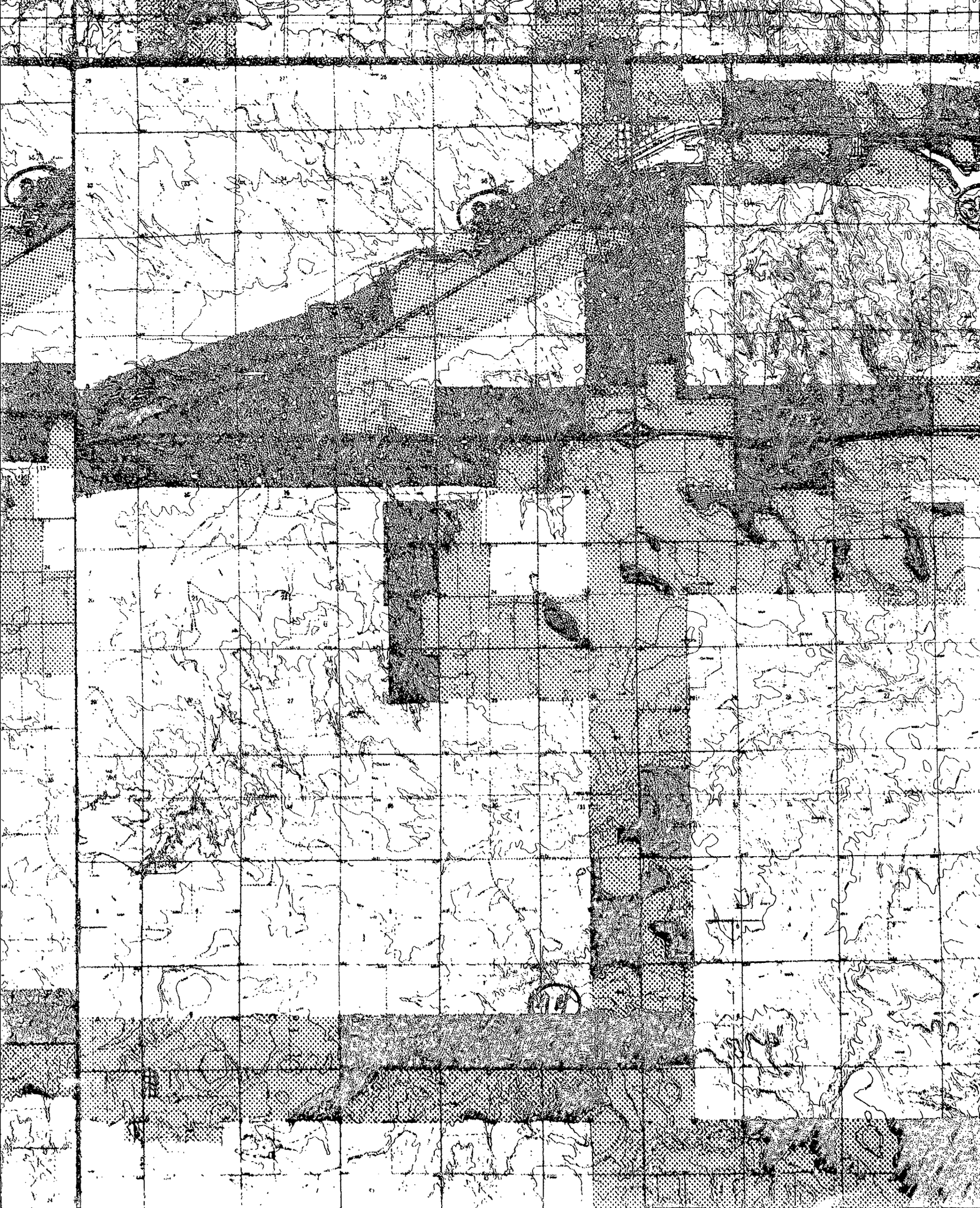





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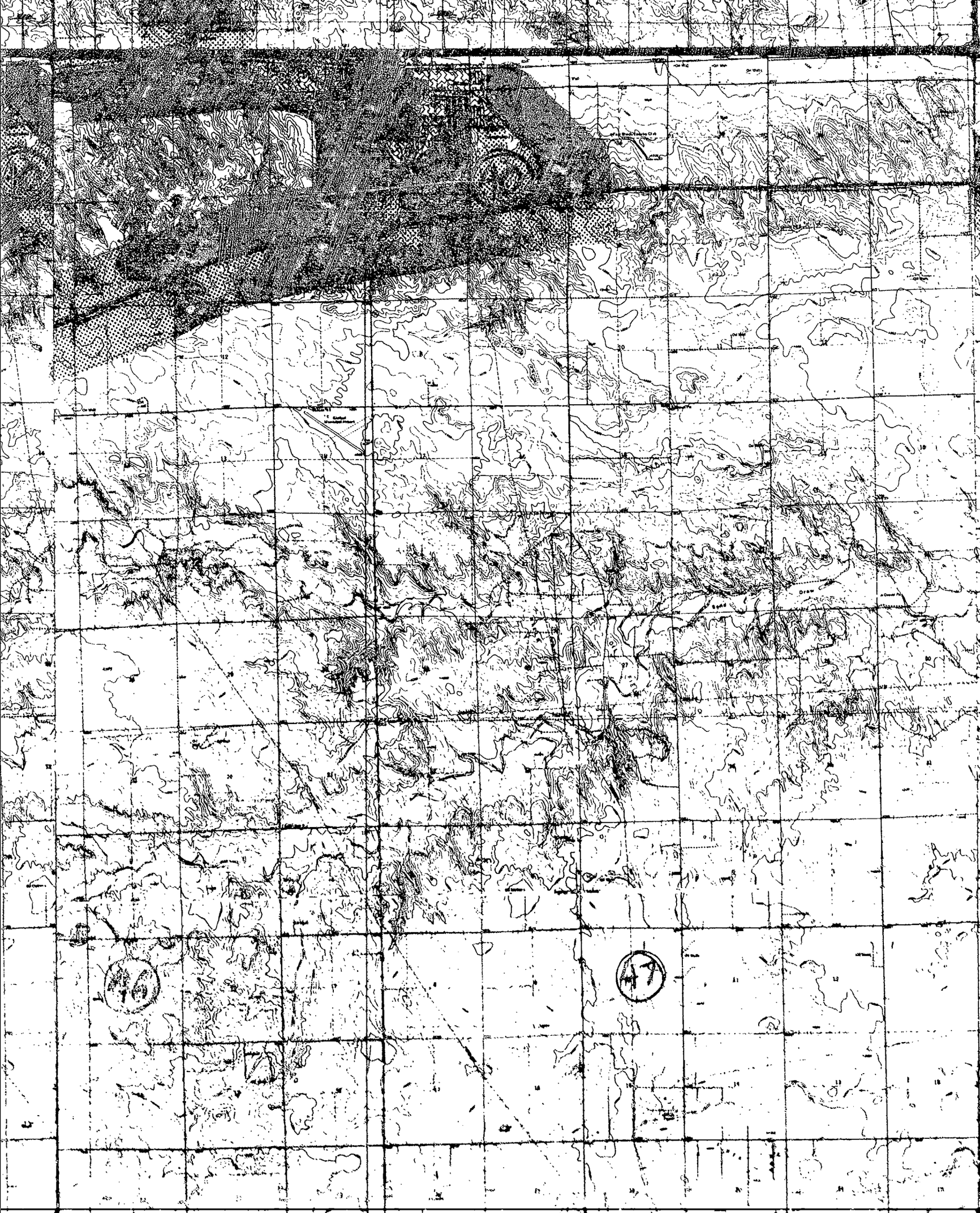


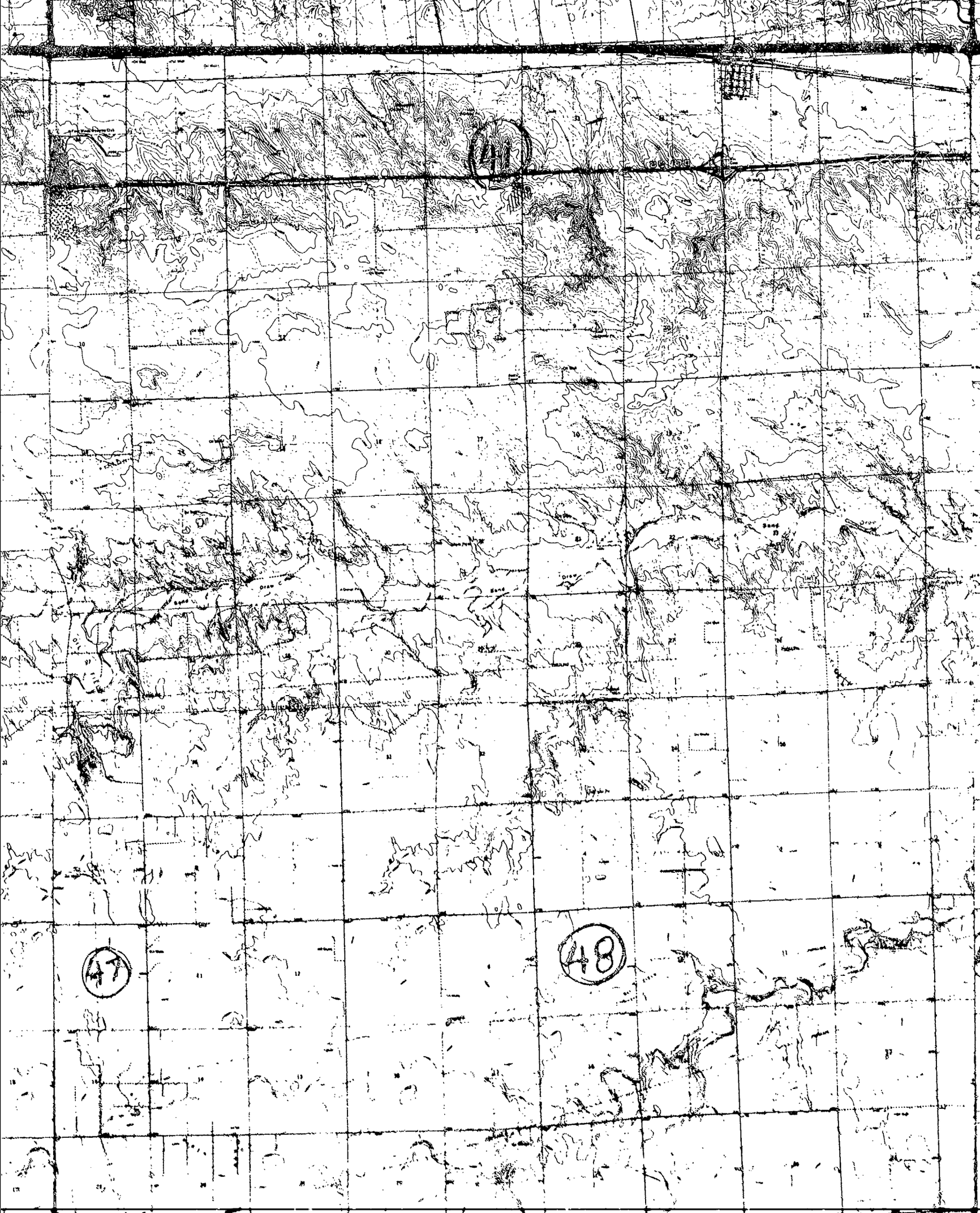

T 14 N
41° 07' 30"
T 13 N

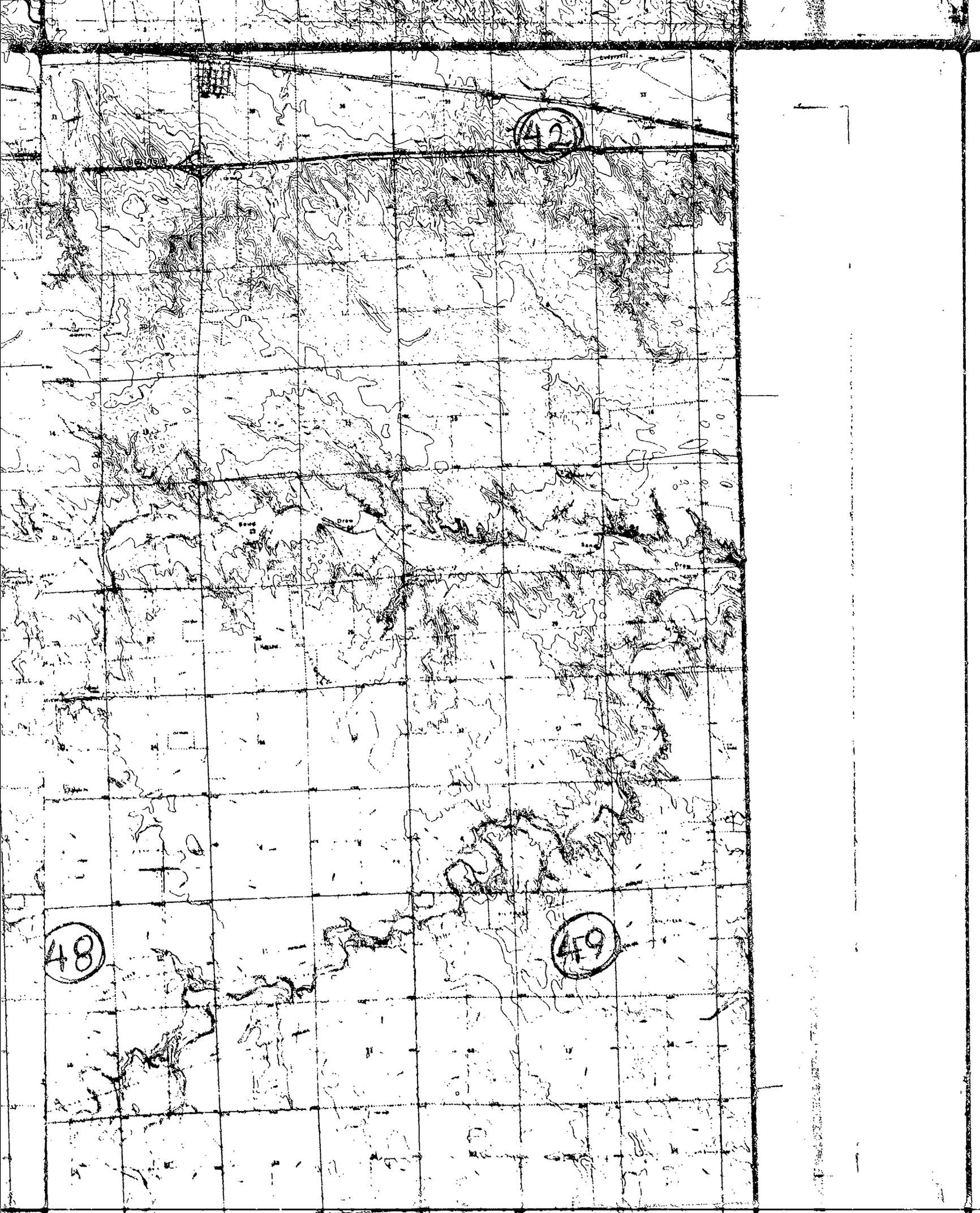


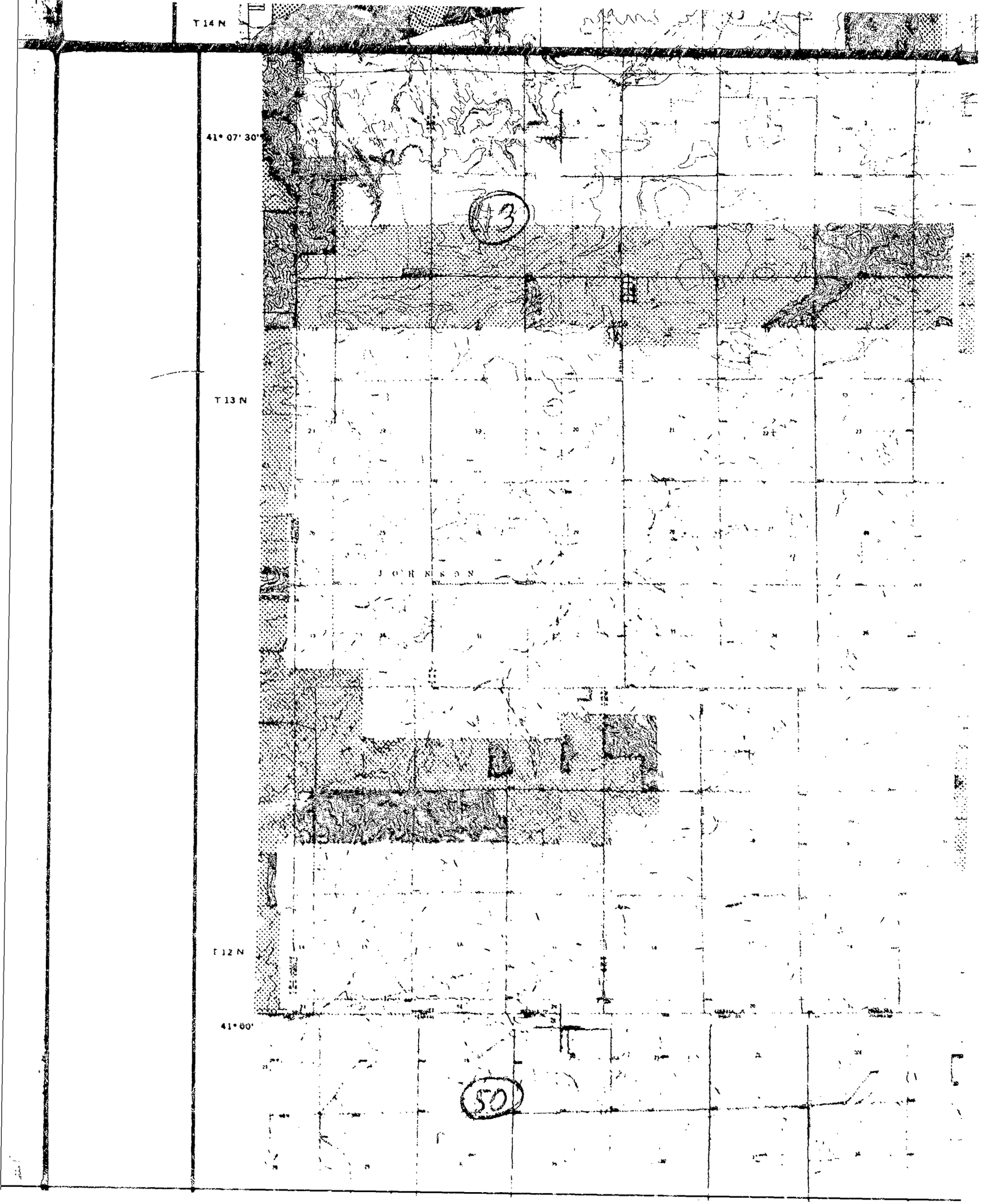


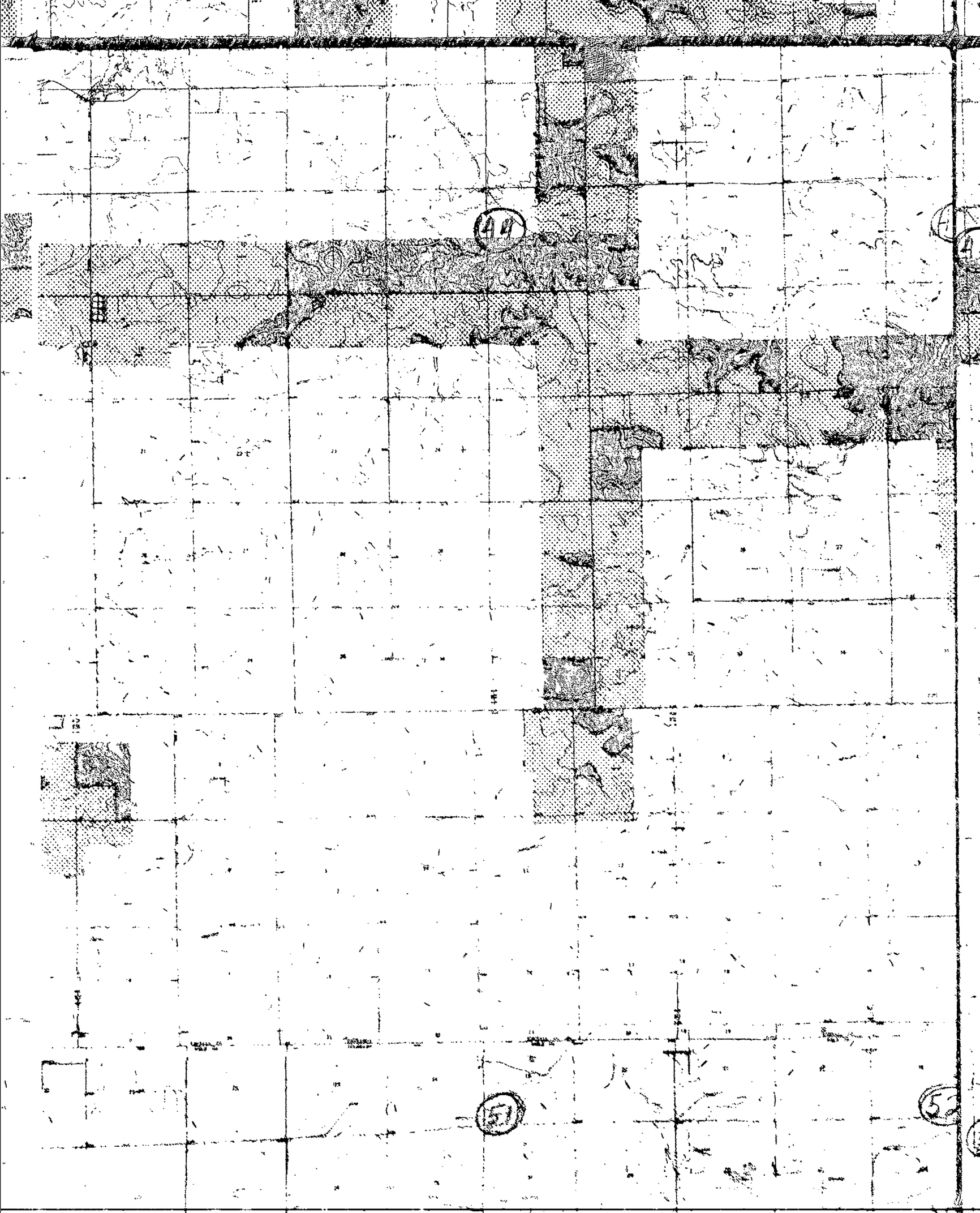

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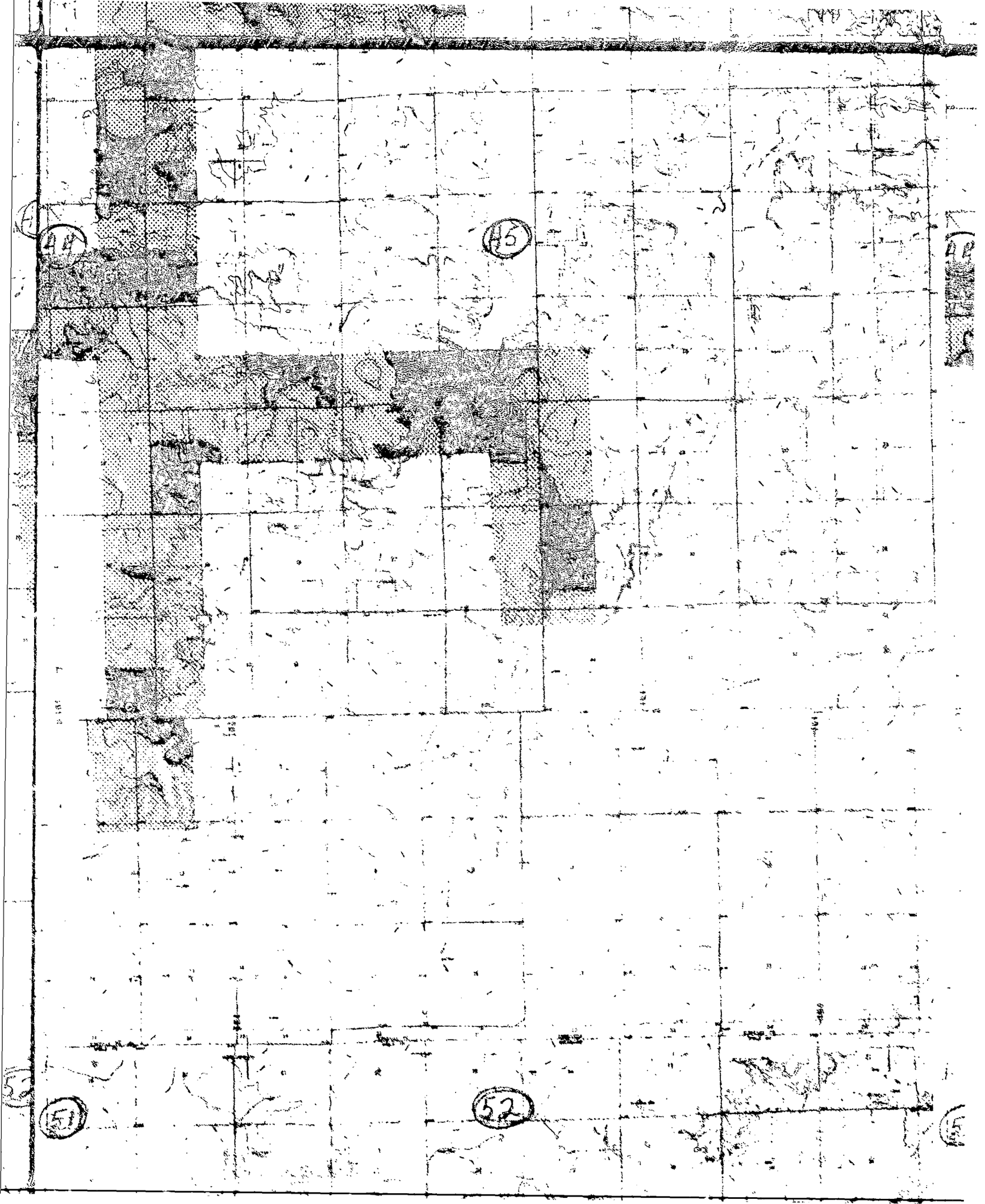

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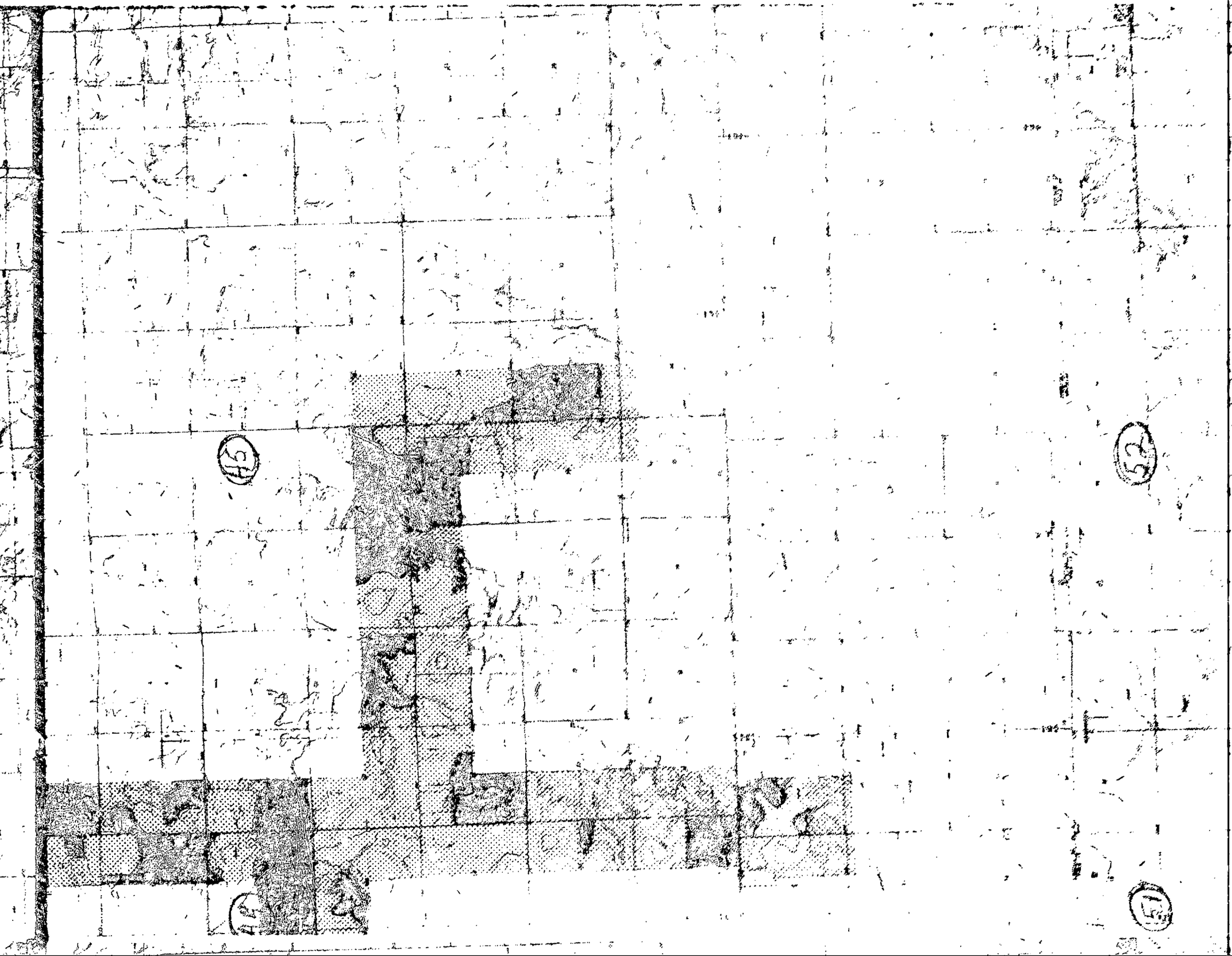

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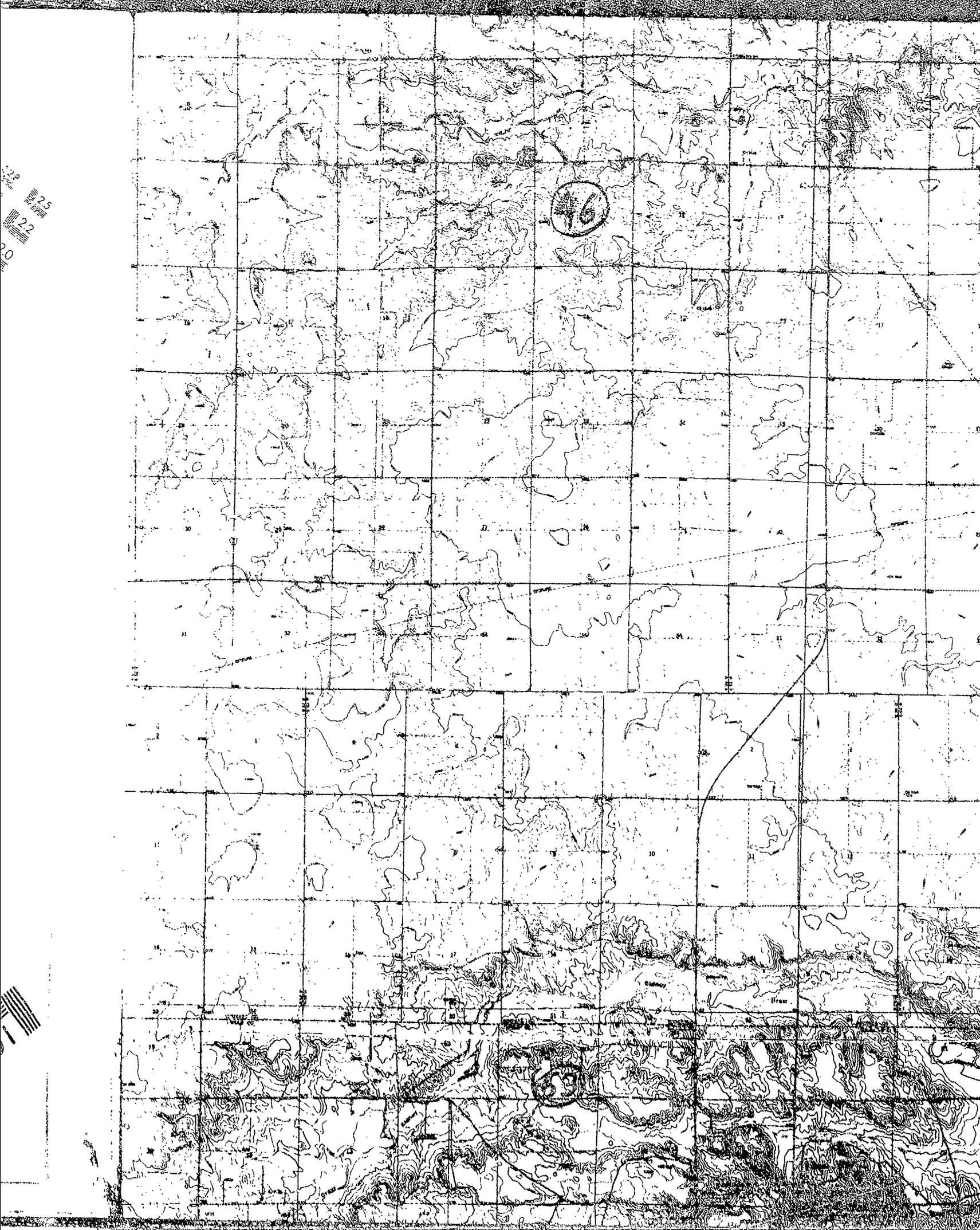

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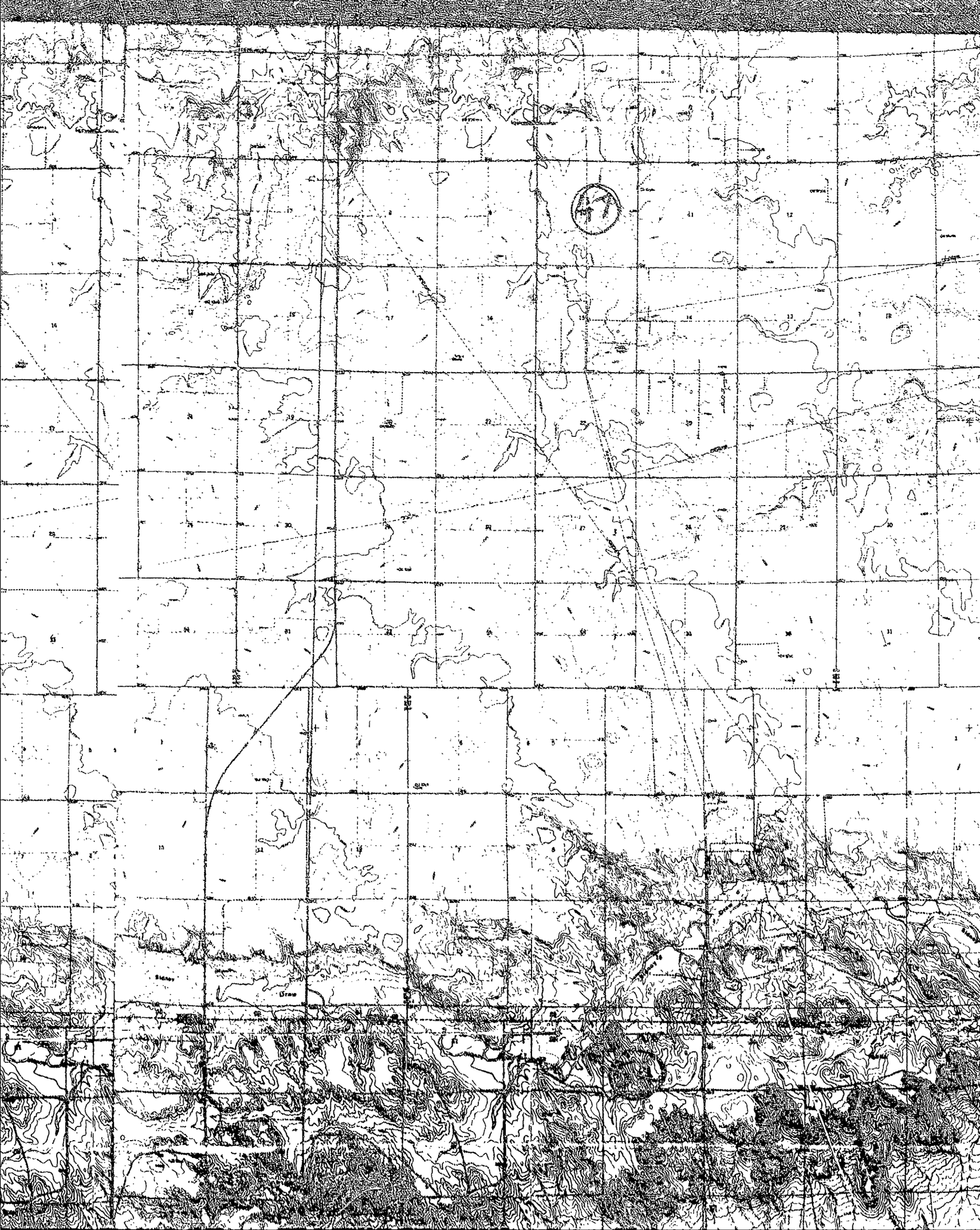

T 14 N
41° 07' 30"
T 13 N
JOHNSON
T 12 N
41° 00'

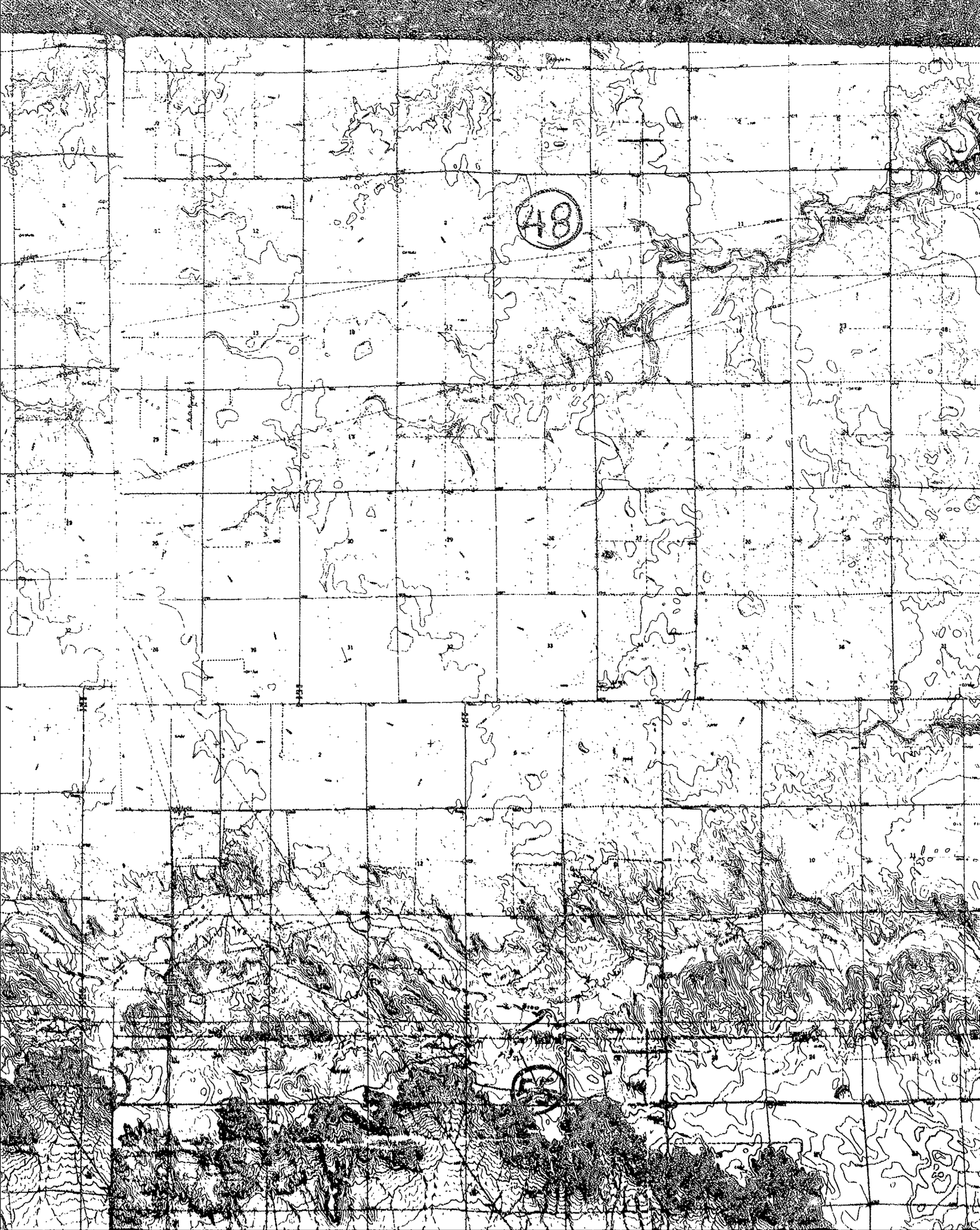


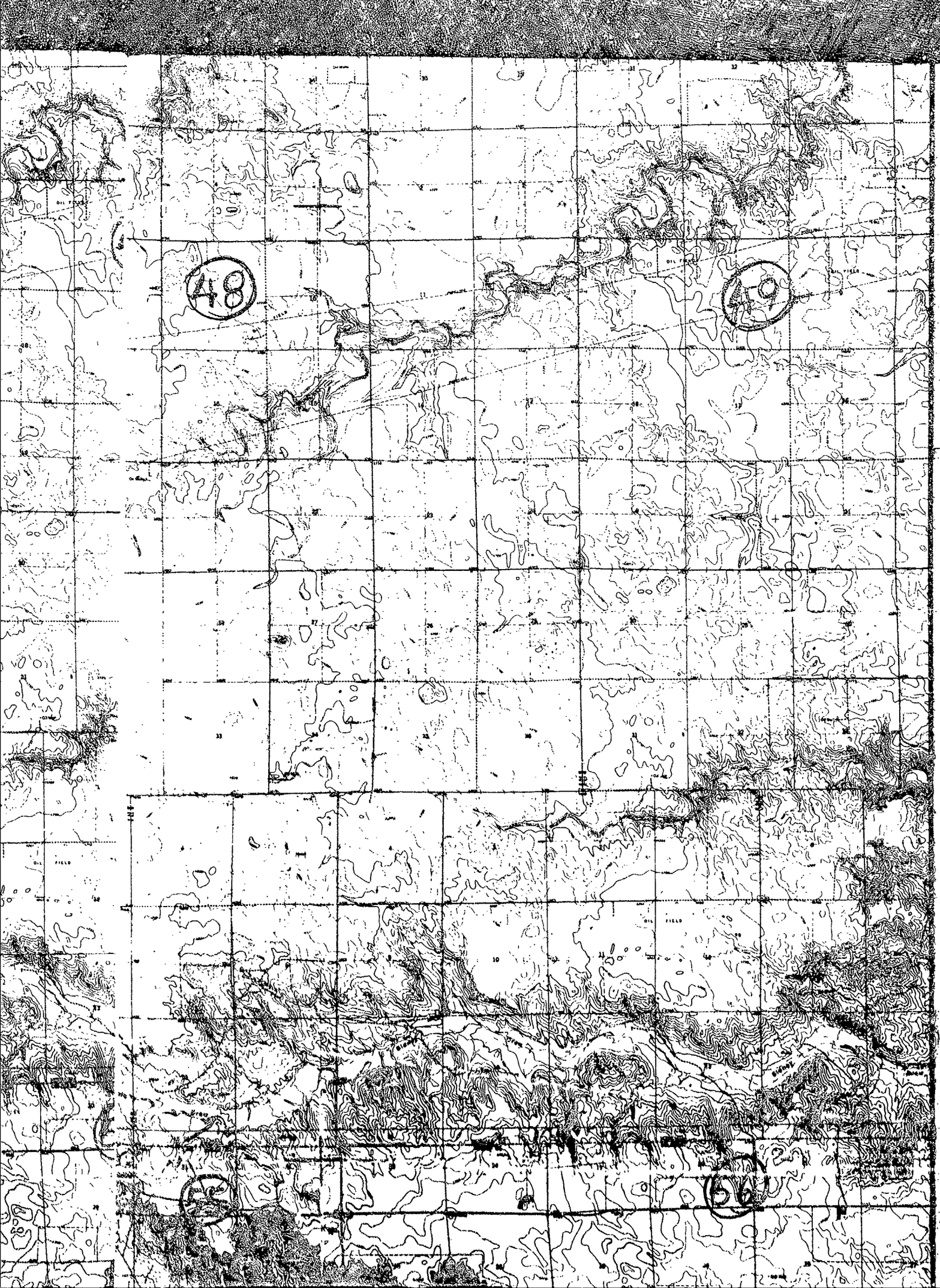

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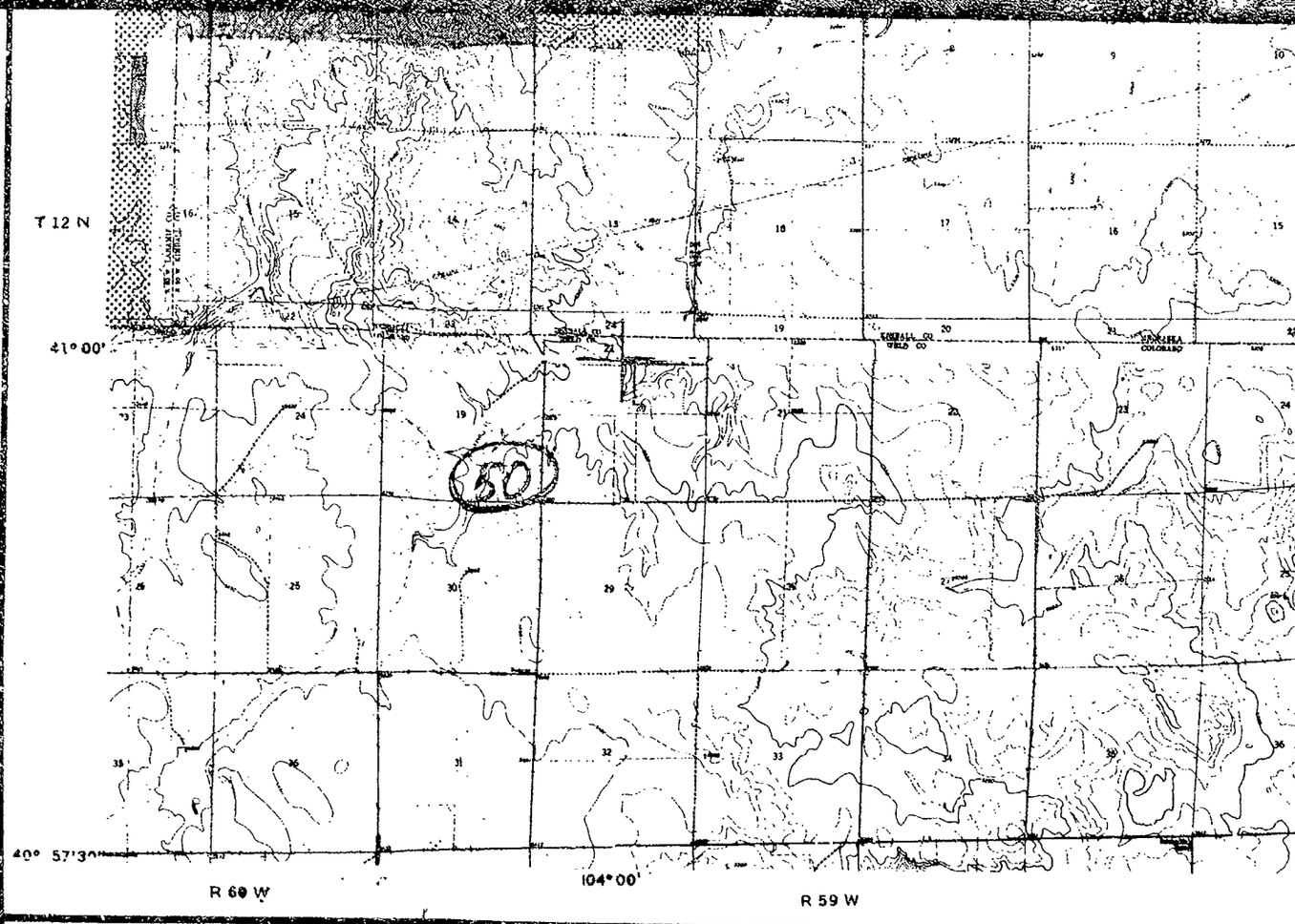



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Oldney
Draw

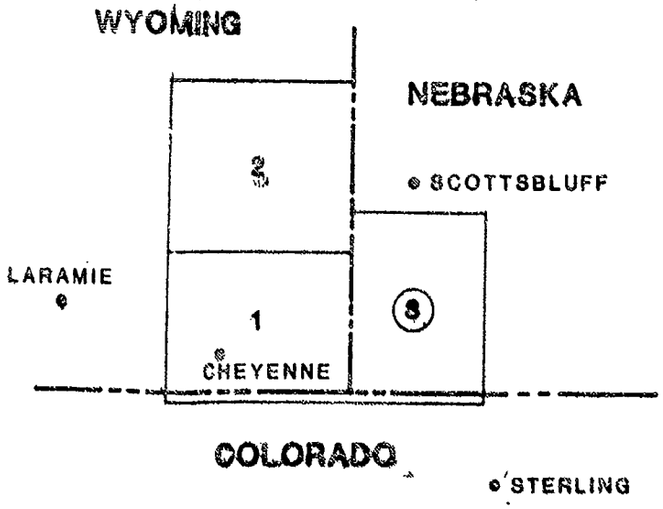


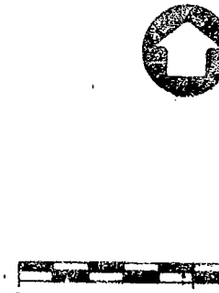

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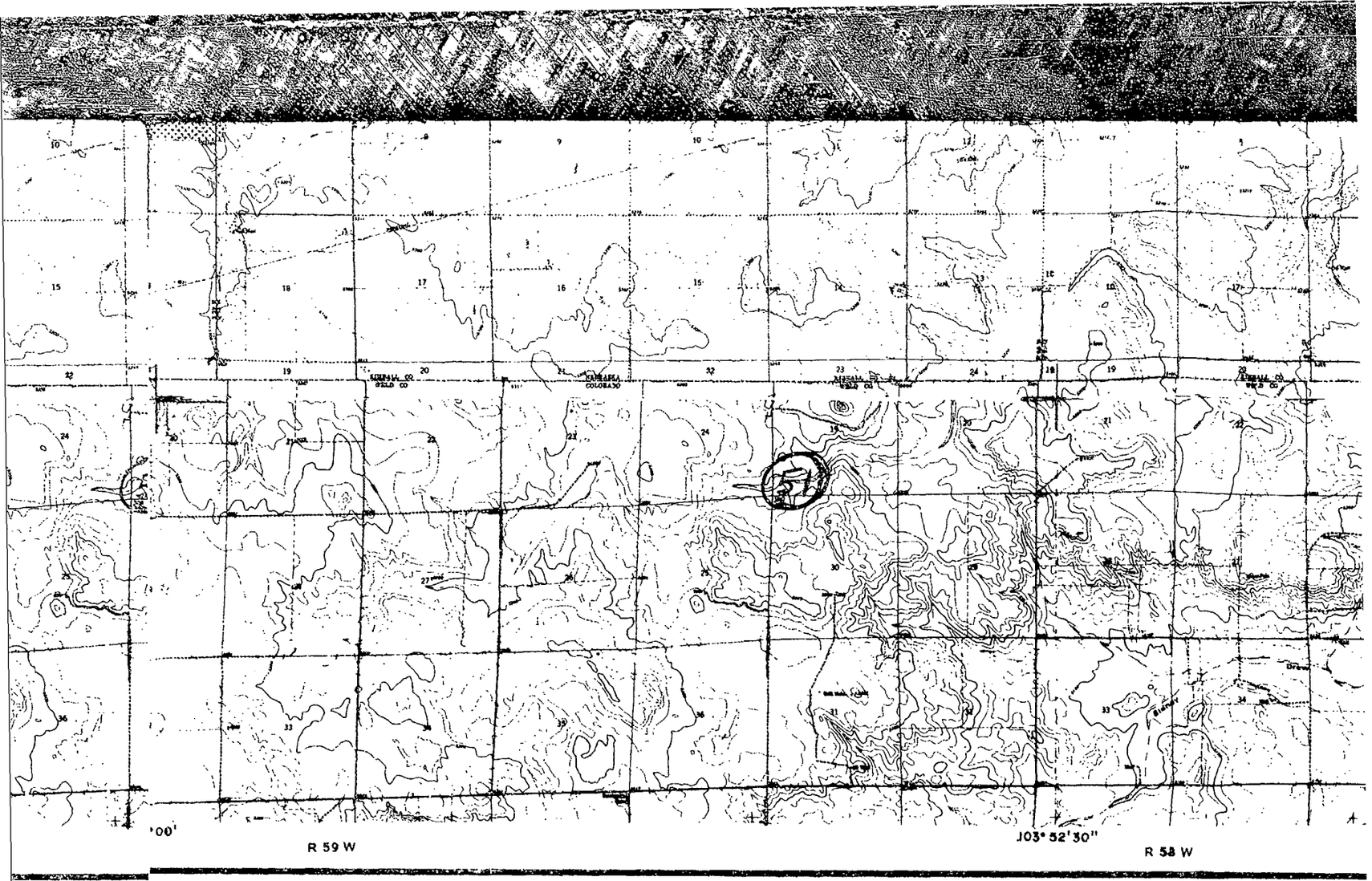

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66



LOCATION MAP







N MAP

NEBRASKA

• SCOTTSBLUFF

• STERLING

1

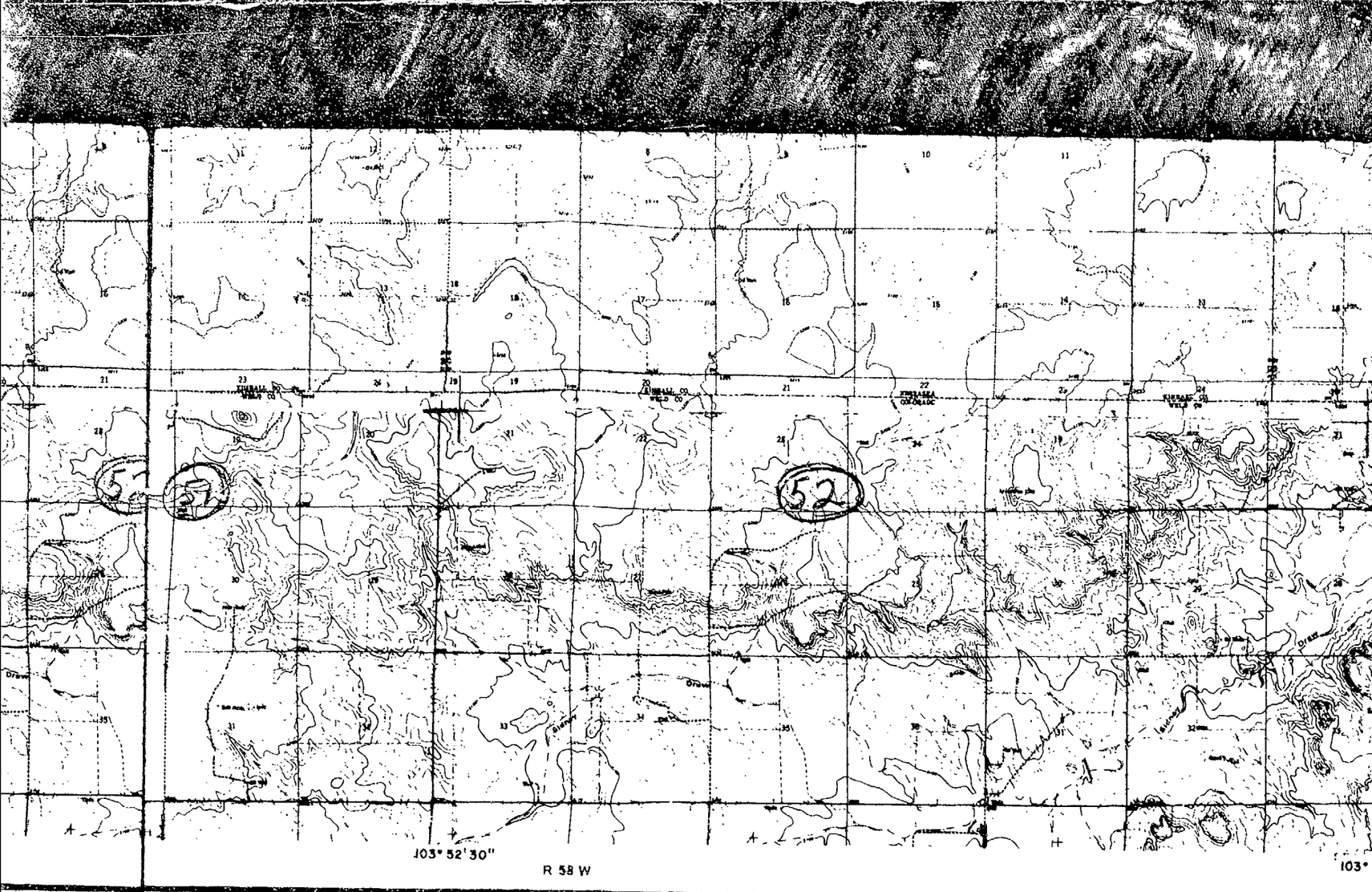
ATUTE MILES
ALE 1:62,500

0 1 2

STATUTE MILES
SCALE 1:62,500

LEGEND

- AGRICULTURE
- GRASSLAND
- RIPARIAN
- MEADOW
- MOUNTAIN MAHOGANY
- WIND BREAKS
- WOODLAND



LEGEND

AGRICULTURE

GRASSLAND

RIPARIAN

MEADOW

MOUNTAIN MAHOGANY

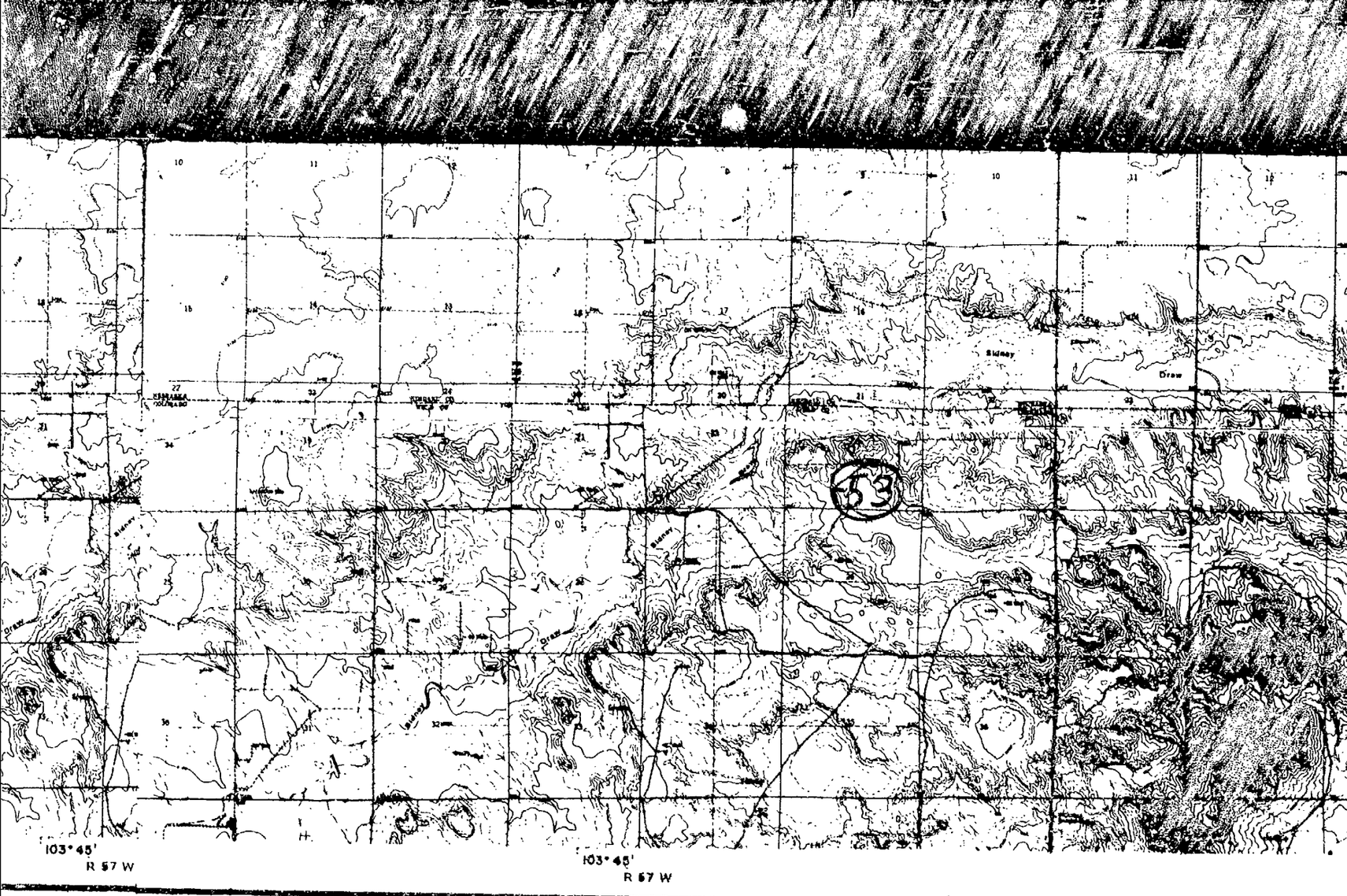
WIND BREAKS

WOODLAND

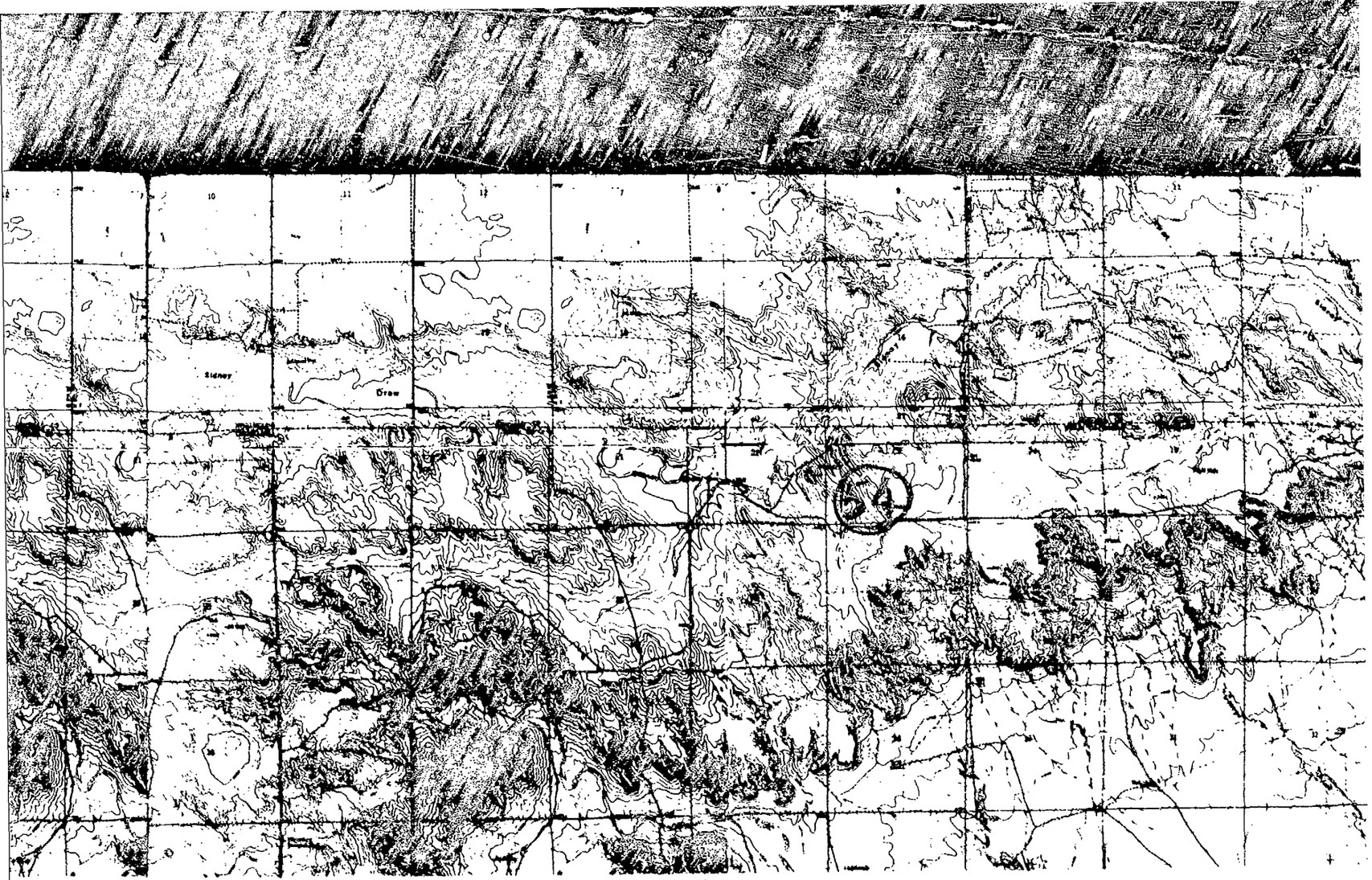
VEGETATION TYPES AND CABLE PATH

2

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VEGETATION TYPES ALONG ACCESS ROADS AND CABLE PATH CORRIDORS IN THE ACS



ESS ROADS
N THE ACS

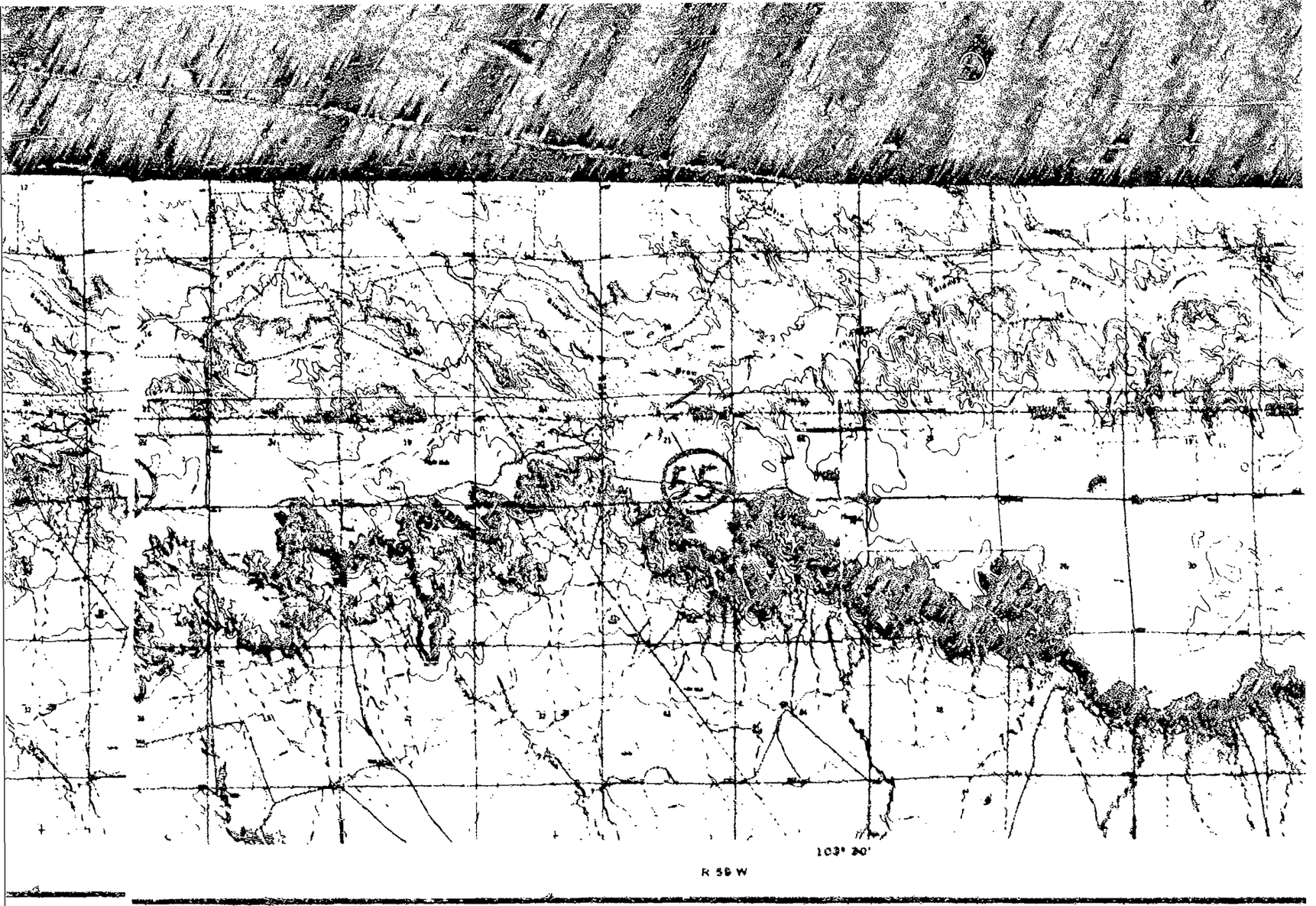


FIGURE NO. 2.6.1-1

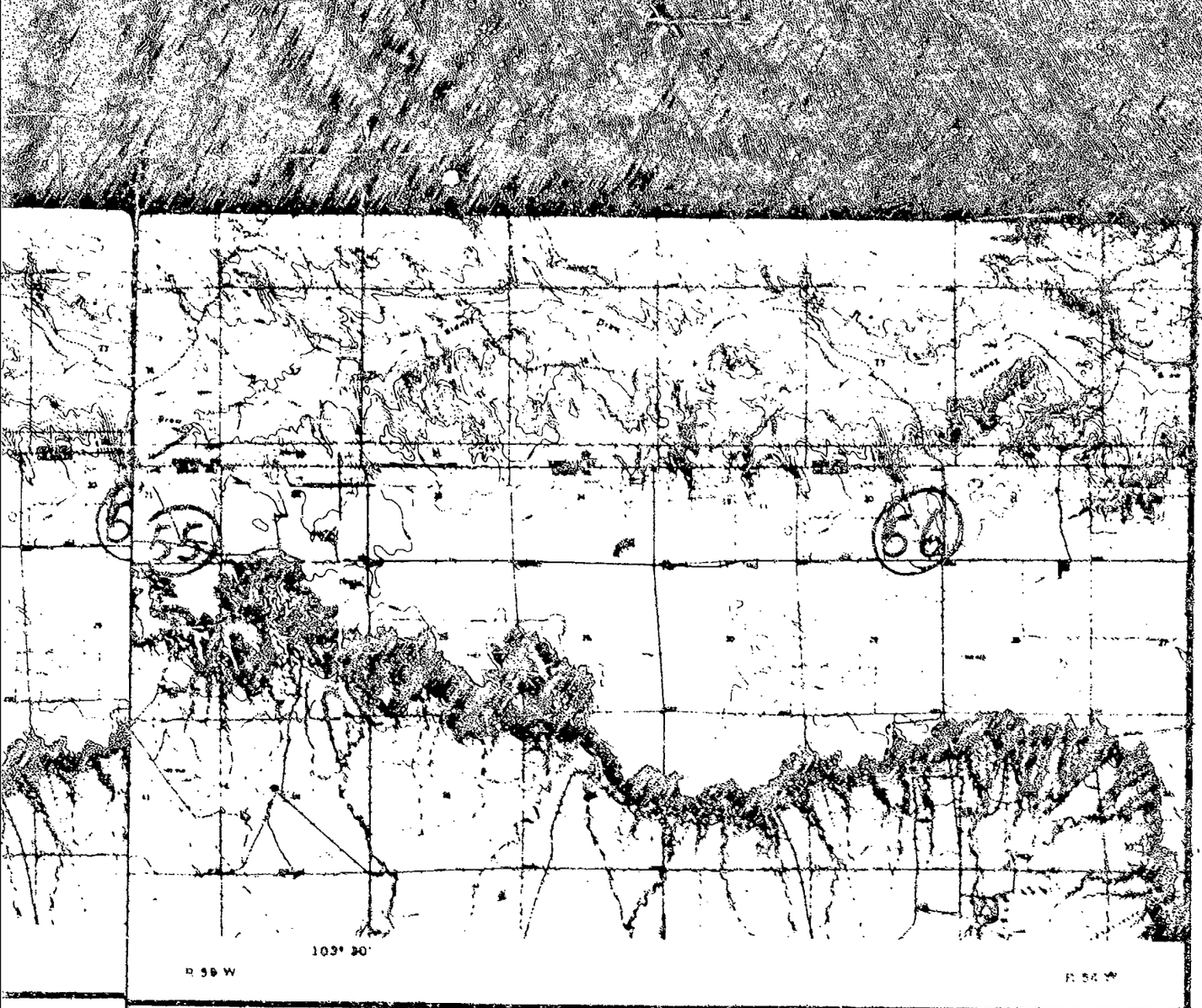
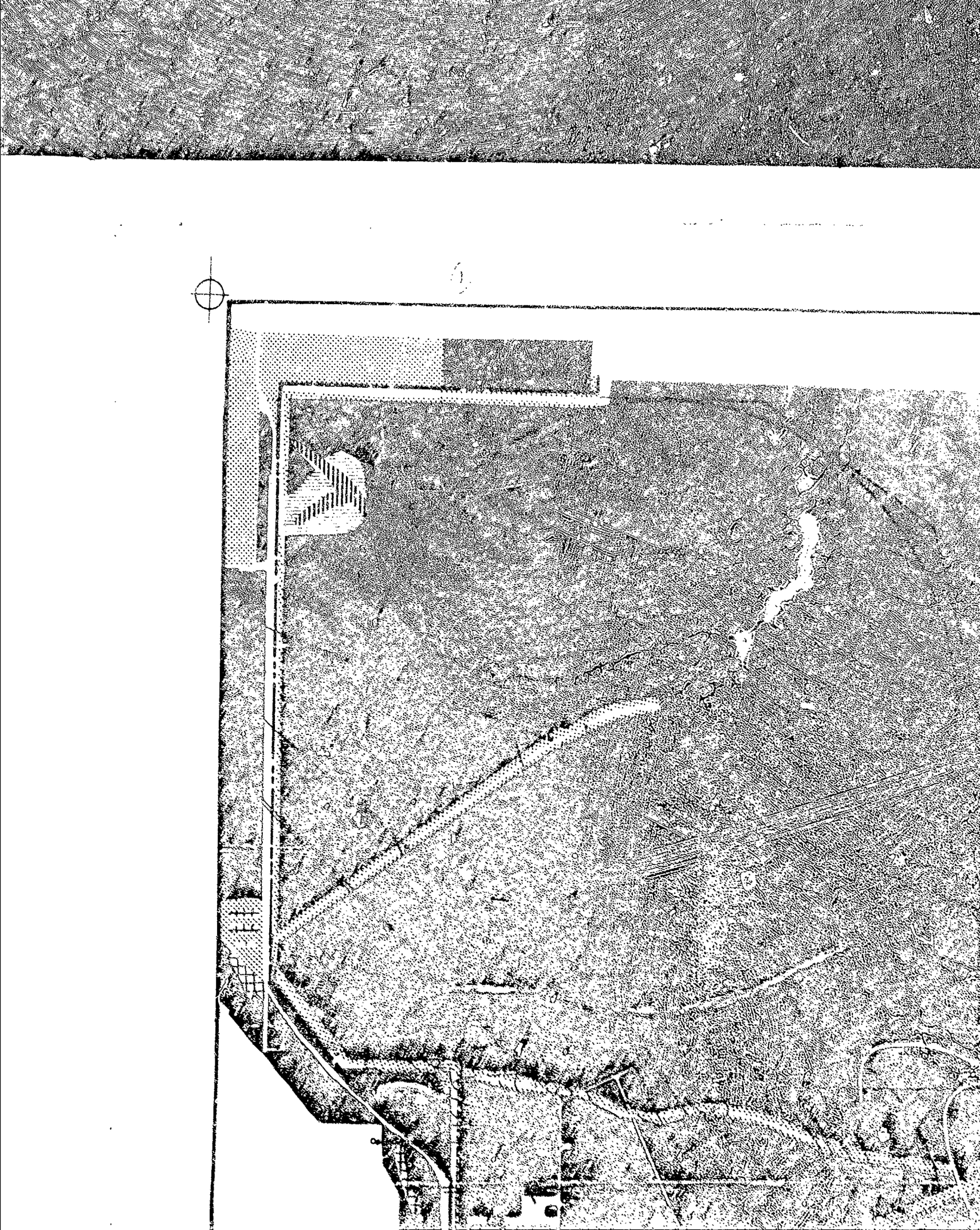
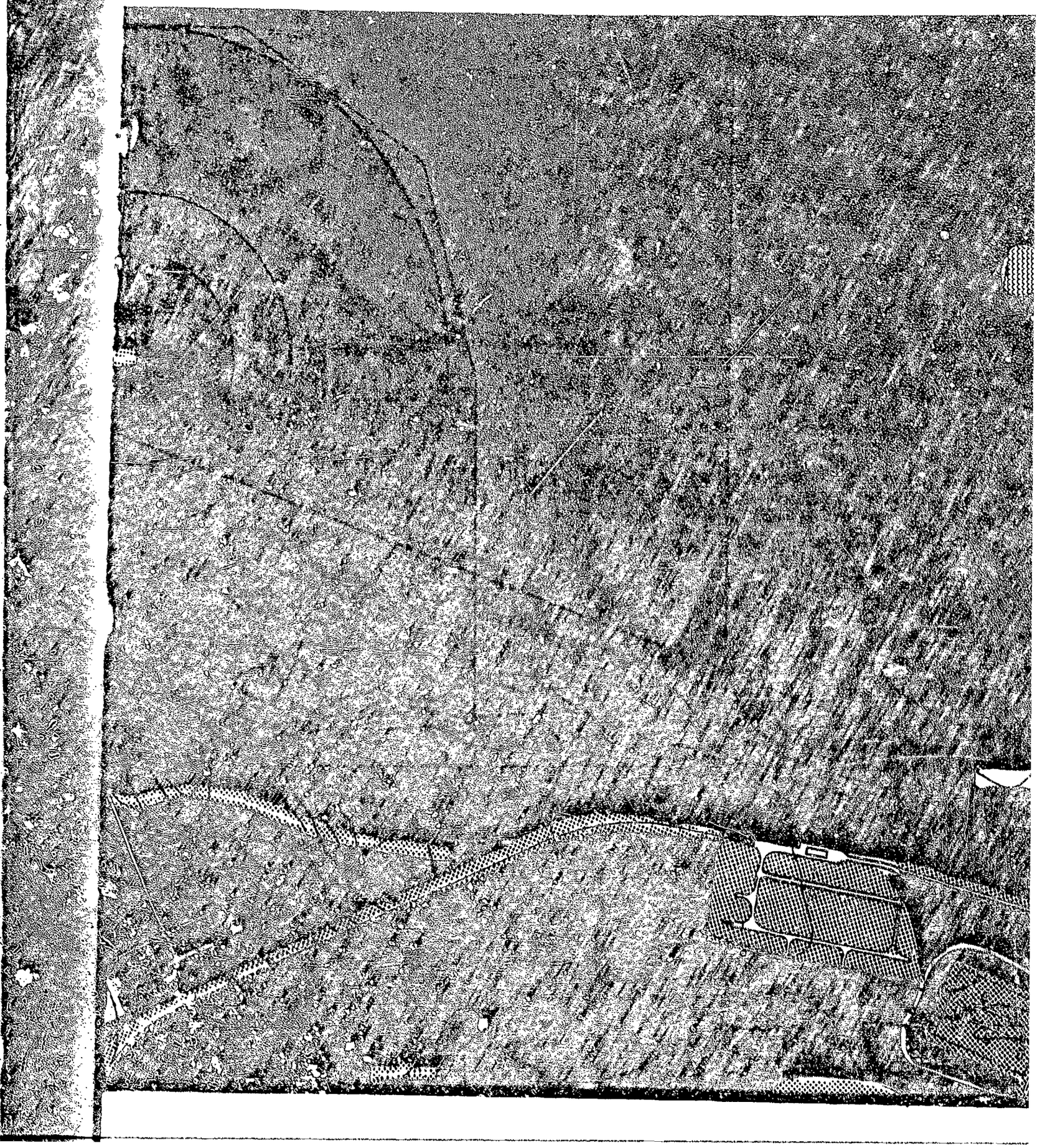


FIGURE NO. 2.6.1-1 (sheet 3 of 3)

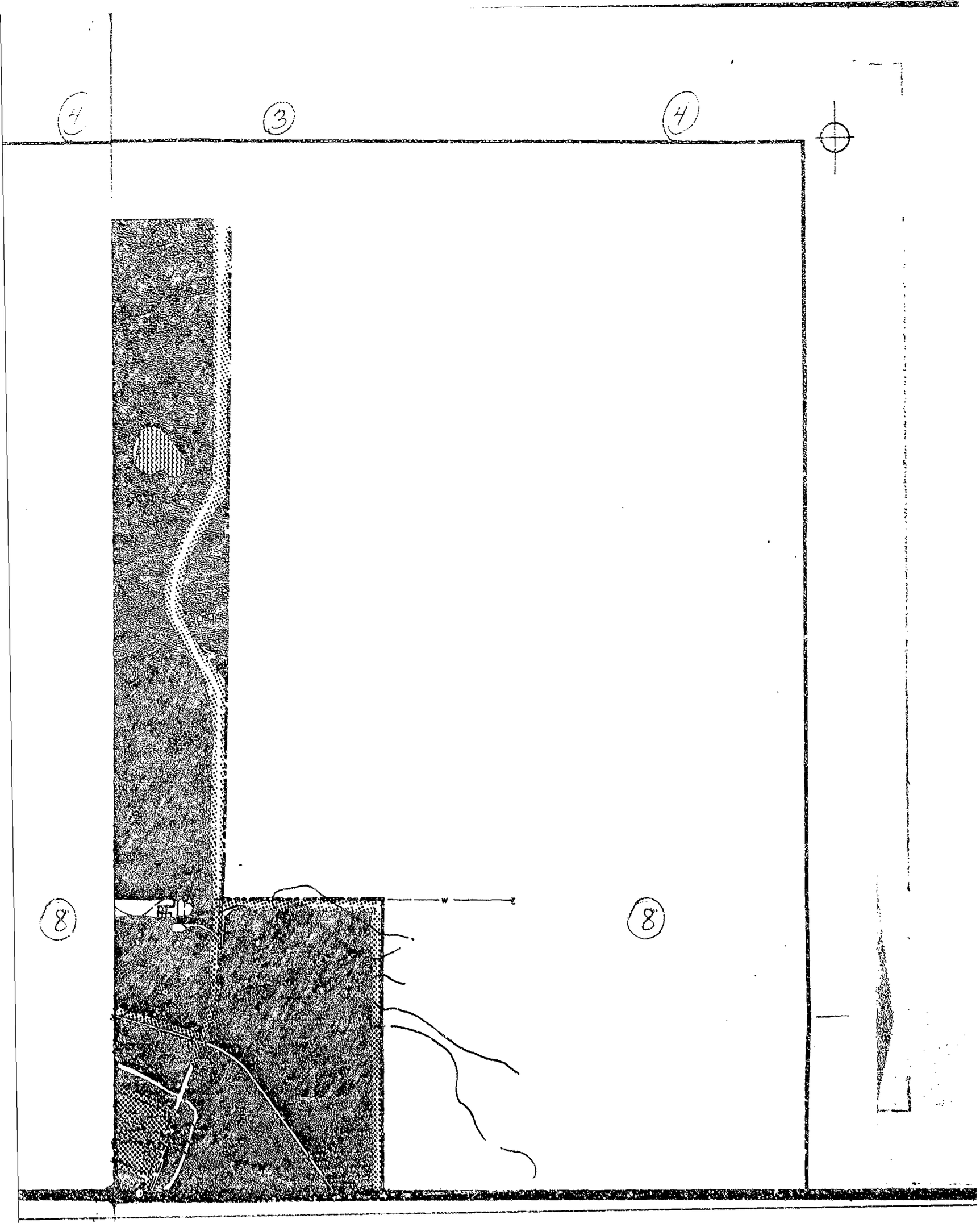


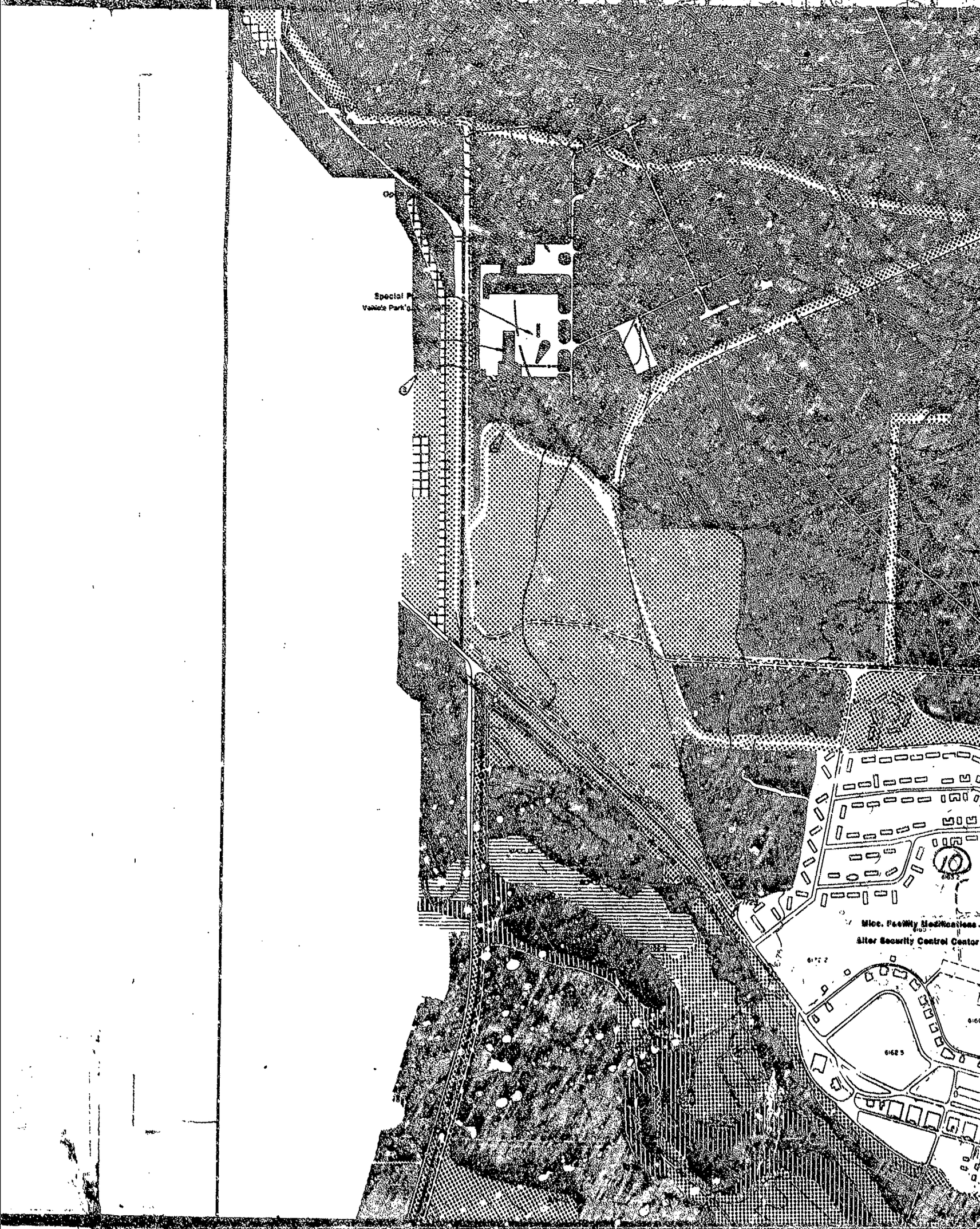


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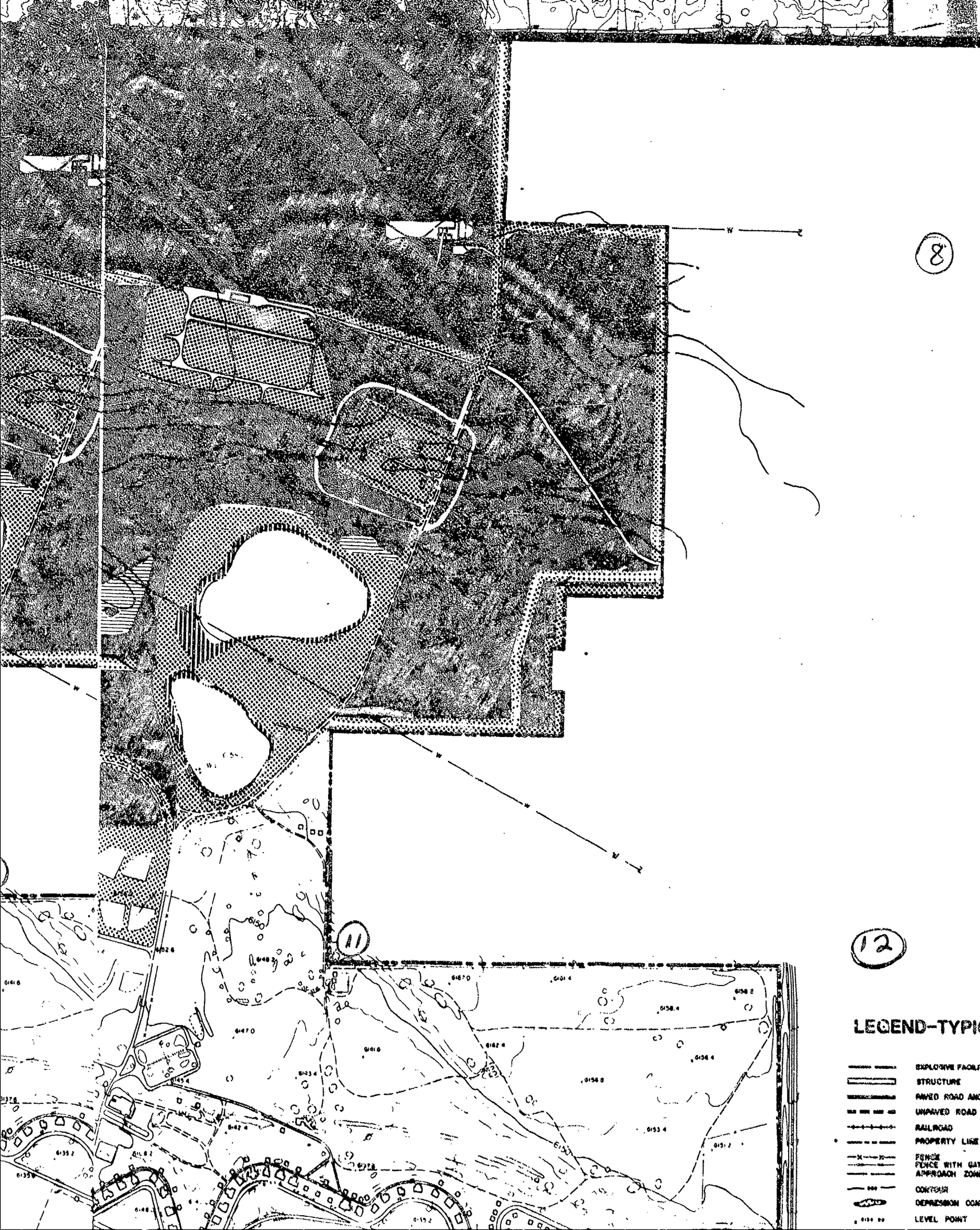


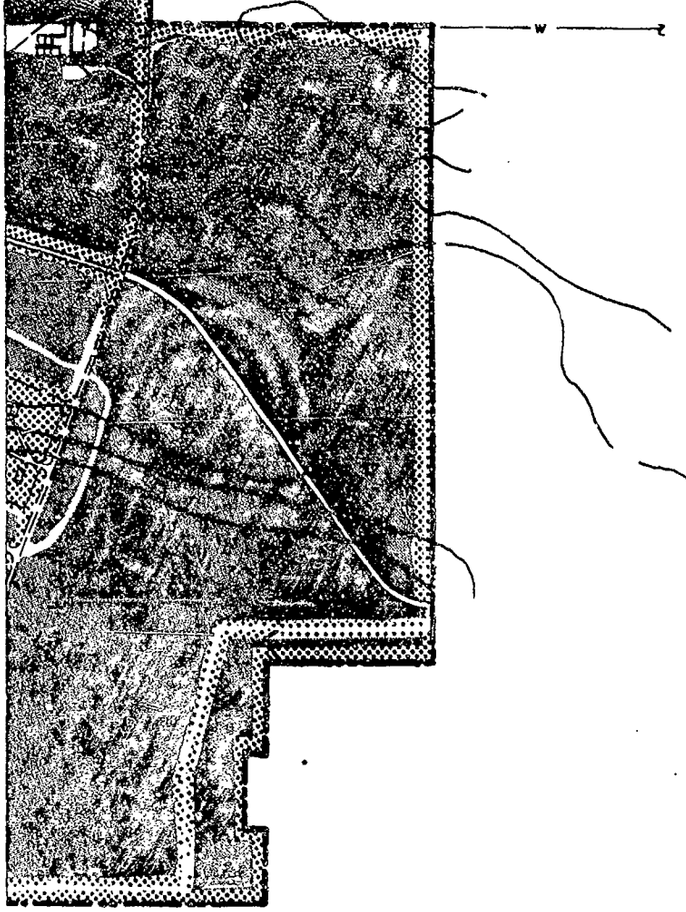
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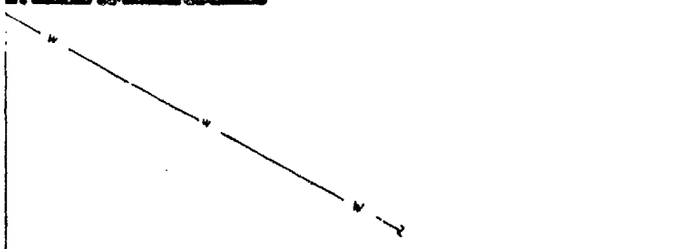

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3
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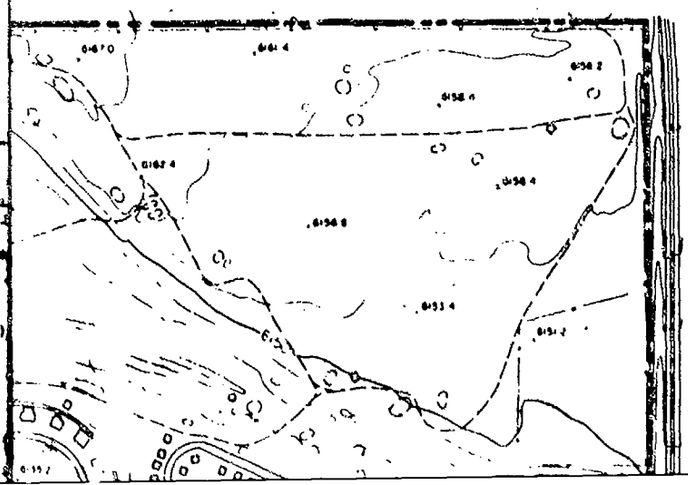

Special P
Vehicle Park'
Misc. Facility Modifications
Alter Security Control Center


Misc. Facility Modifications
After Security Control Center


8
11
12
LEGEND-TYPI
EXPLOSIVE FACIL
STRUCTURE
PAVED ROAD AN
UNPAVED ROAD
RAILROAD
PROPERTY LINE
FENCE
FENCE WITH GA
APPROACH ZON
CONTOUR
DEPRESSION CON
LEVEL POINT





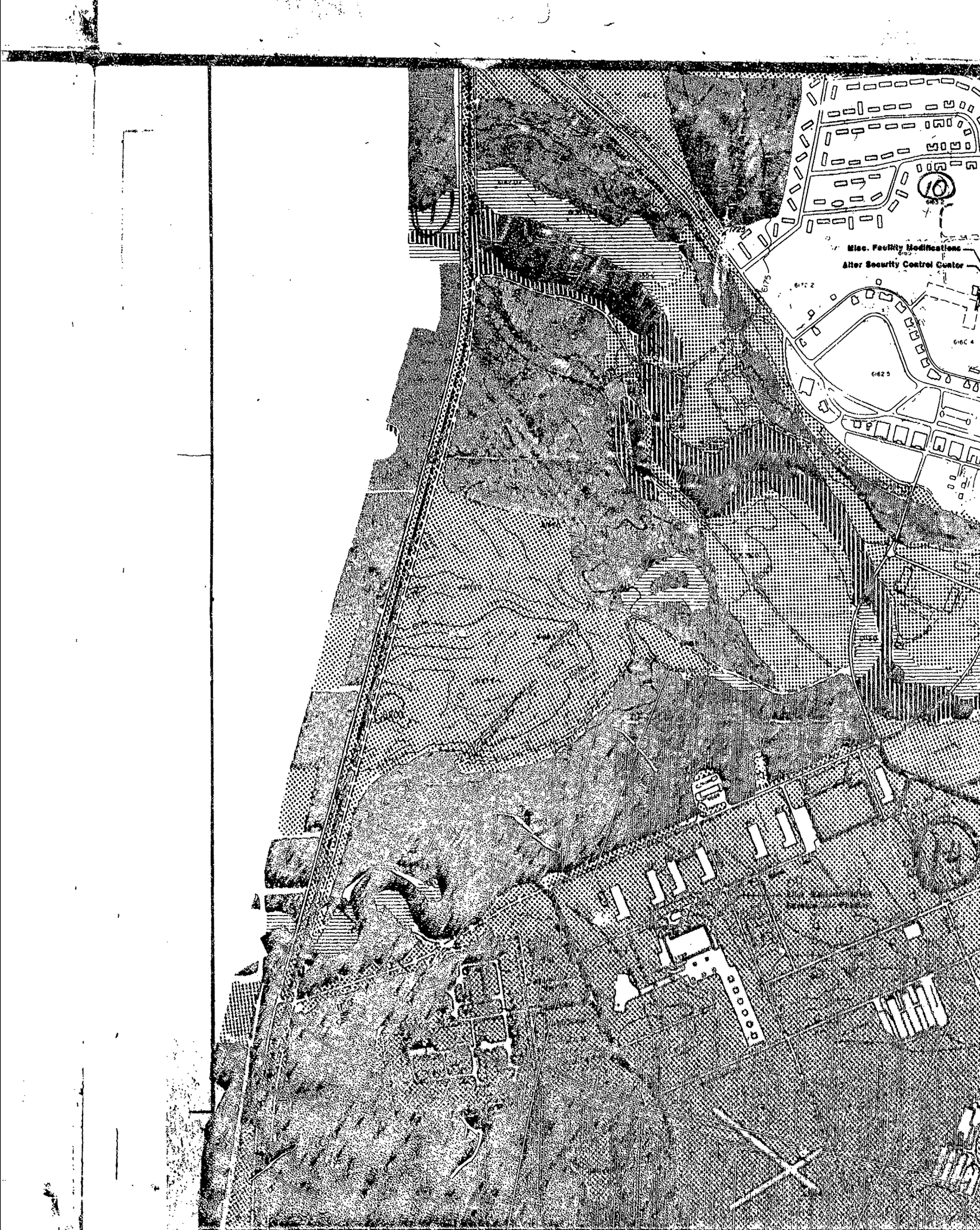


-TYPICAL

- PLOSIVE FACILITY QD CL
- RUCTURE
- VED ROAD AND PARKIN
- PAVED ROAD
- ILROAD
- OPERTY LINE (PES)
- NCE
- NCE WITH GATES
- PROACH ZONE
- NTOUR
- PRESSION CONTOUR
- VEL POINT

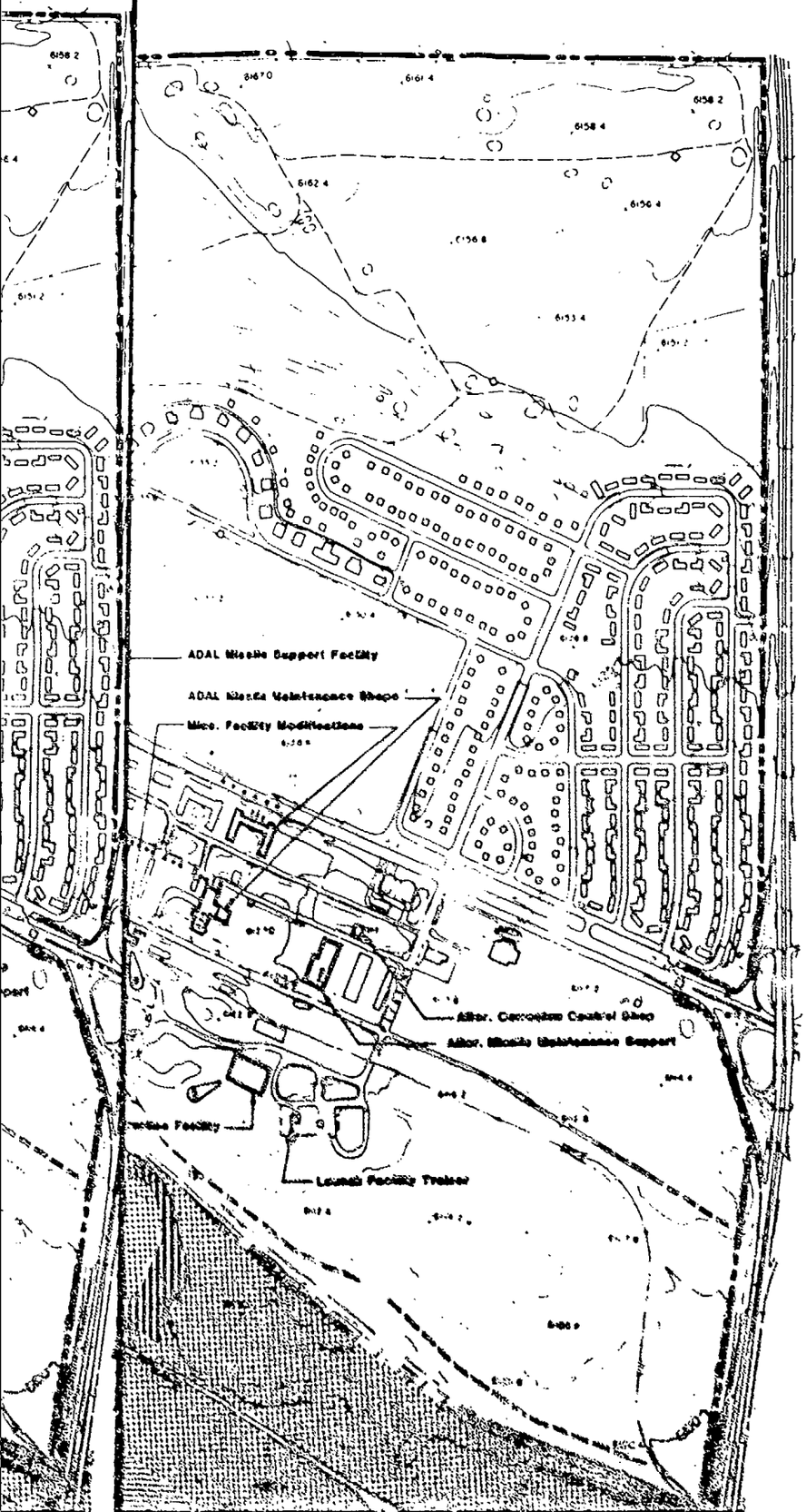
LEGEND-TYPICAL

- EXPLOSIVE FACILITY QD CLEARANCE
- STRUCTURE
- PAVED ROAD AND PARKING AREA
- UNPAVED ROAD
- RAILROAD
- PROPERTY LINE (PES)
- FENCE
- FENCE WITH GATES
- APPROACH ZONE
- CONTOUR
- DEPRESSION CONTOUR
- LEVEL POINT


Misc. Facility Modifications
Alter Security Control Center


Misc. Facility Modifications
Alter Security Control Center


ADAL Missile Support Facility
ADAL Missile Maintenance Shops
Misc. Facility Modifications
Misc. Corrective Control Shop
Misc. Missile Maintenance Support
Launch Facility Trainer



(12)

LEGEND–TYPICAL

- EXPLOSIVE FACILITY QD CLEARANCE
- STRUCTURE
- PAVED ROAD AND PARKING AREA
- UNPAVED ROAD
- RAILROAD
- PROPERTY LINE (FEE)
- FENCE
- FENCE WITH GATES
- APPROACH ZONE
- CONTOUR
- DEPRESSION CONTOUR
- LEVEL POINT
- SPOT ELEVATION
- NATURAL DRAINAGE AND CULVERT
- BRIDGE
- POLE
- TREE COVER
- U/G UNDERGROUND BUILDING
- EXISTING ROAD – ABANDON
- PEACEKEEPER ROADS
- PARKING (PAVED)
- PARKING (DIRT OR GRAVEL)

MAG 13°19 E
DATE OF DATA 1971
ANNUAL CHANGE 2.5'W

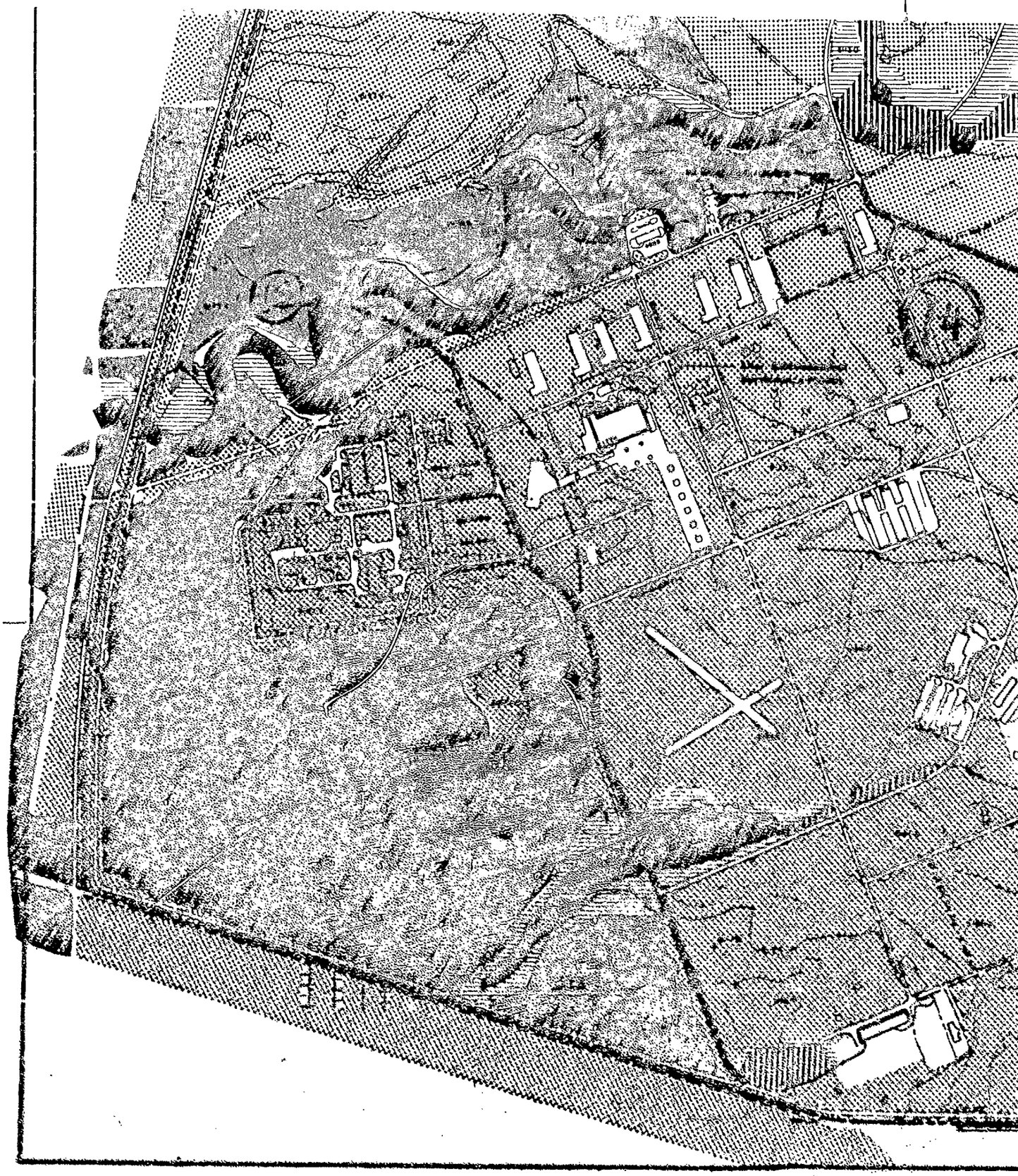
NORTH

(16)

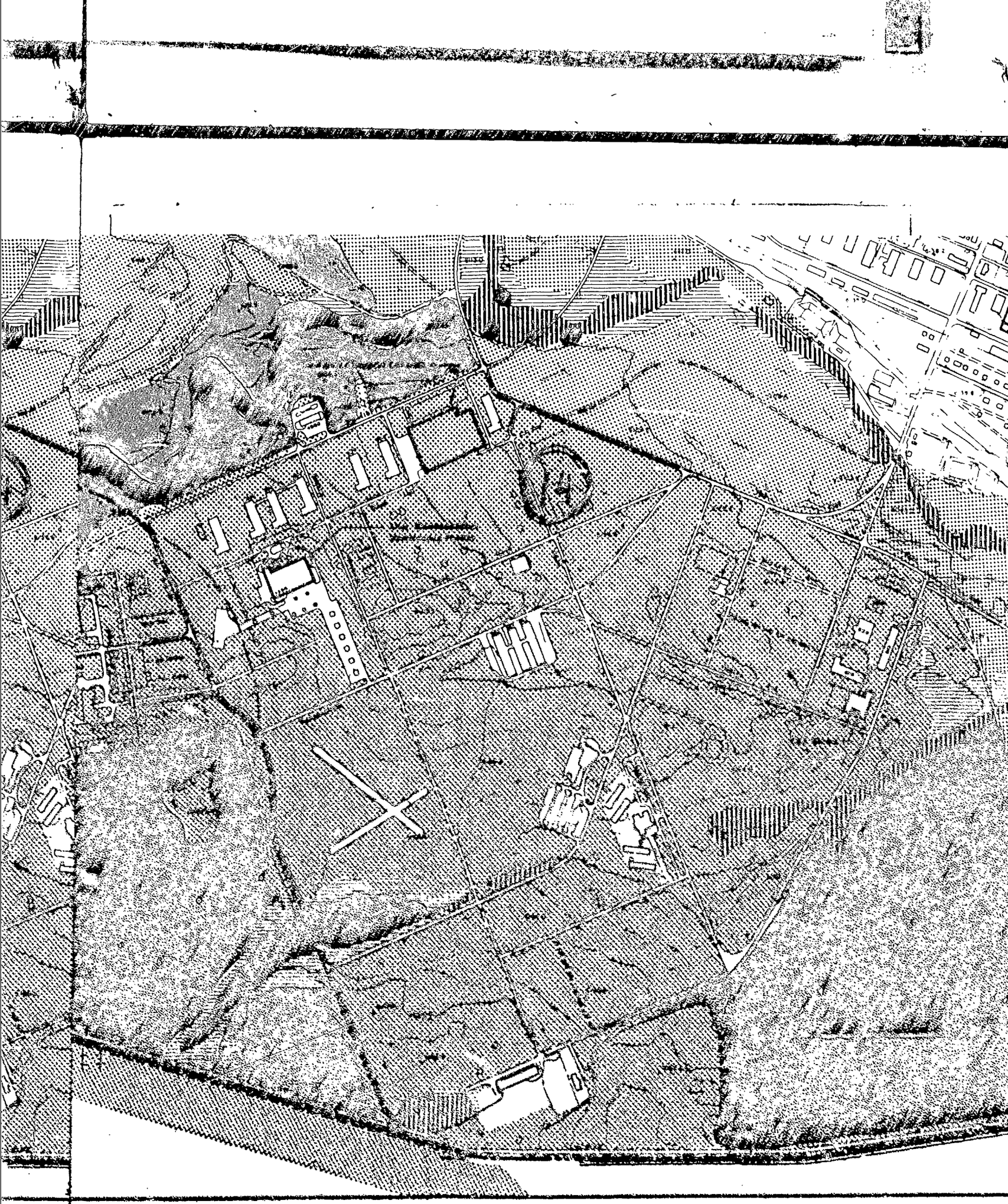
0 400 600 800
SCALE IN FEET

LEGEND–VEGETATION

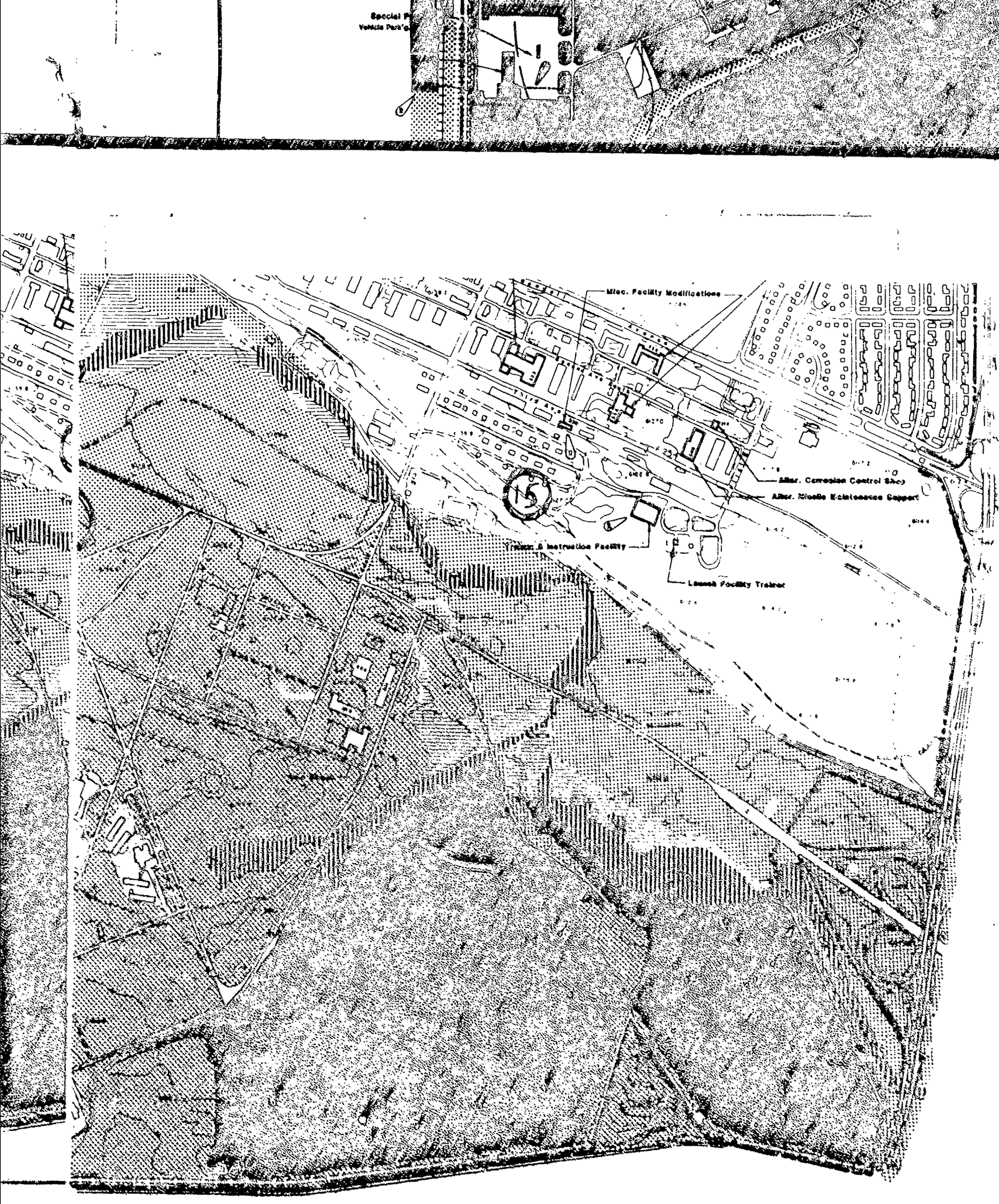
- DISTURBED
- GRASSLAND
- RIPARIAN
- MEADOW



VEGETATION TYPES PRESENT AT F.E. WARREN AFB



S PRESENT AT F.E. WARREN AFB


Misc. Facility Modifications
Trainer & Instruction Facility
Launch Facility Trainer

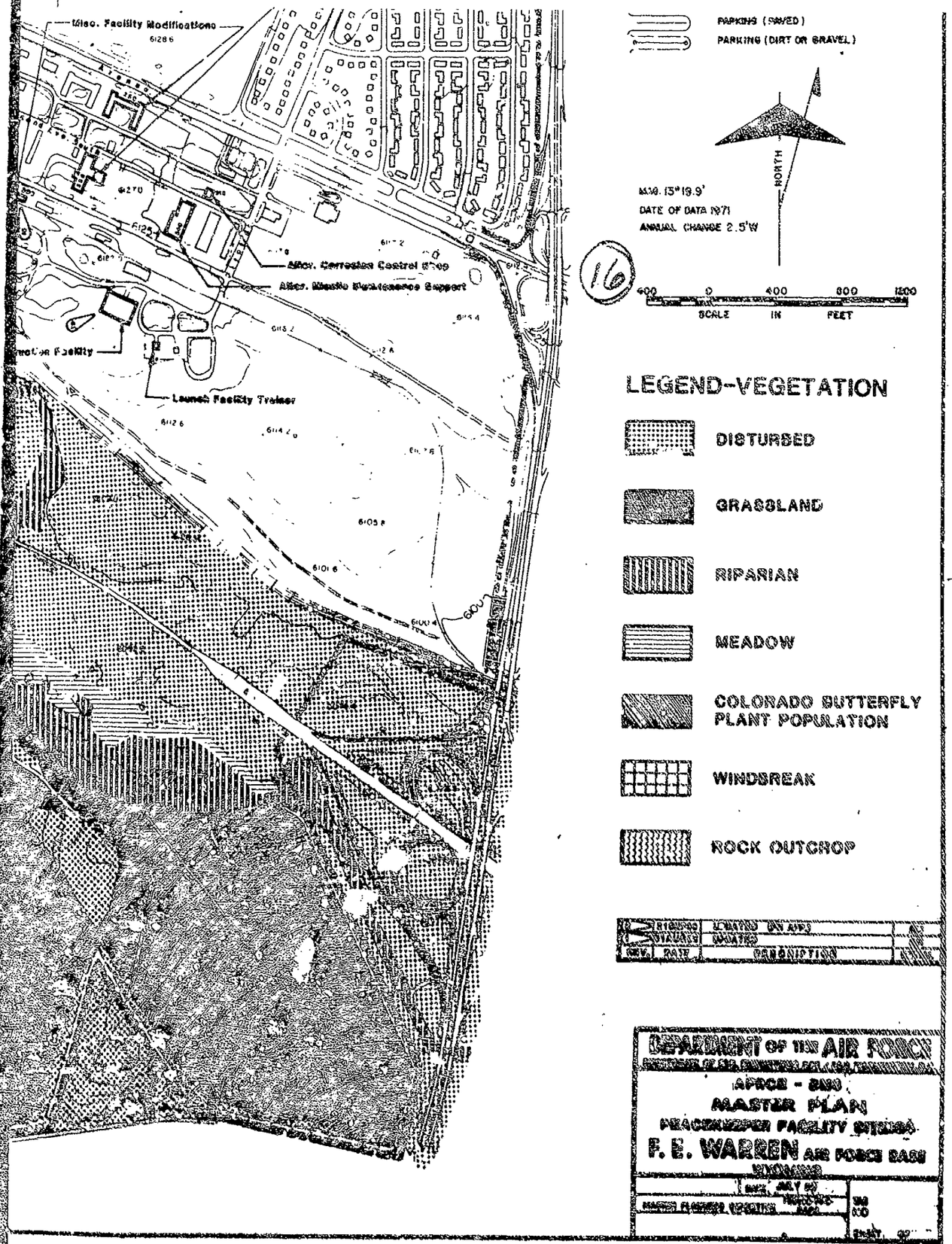
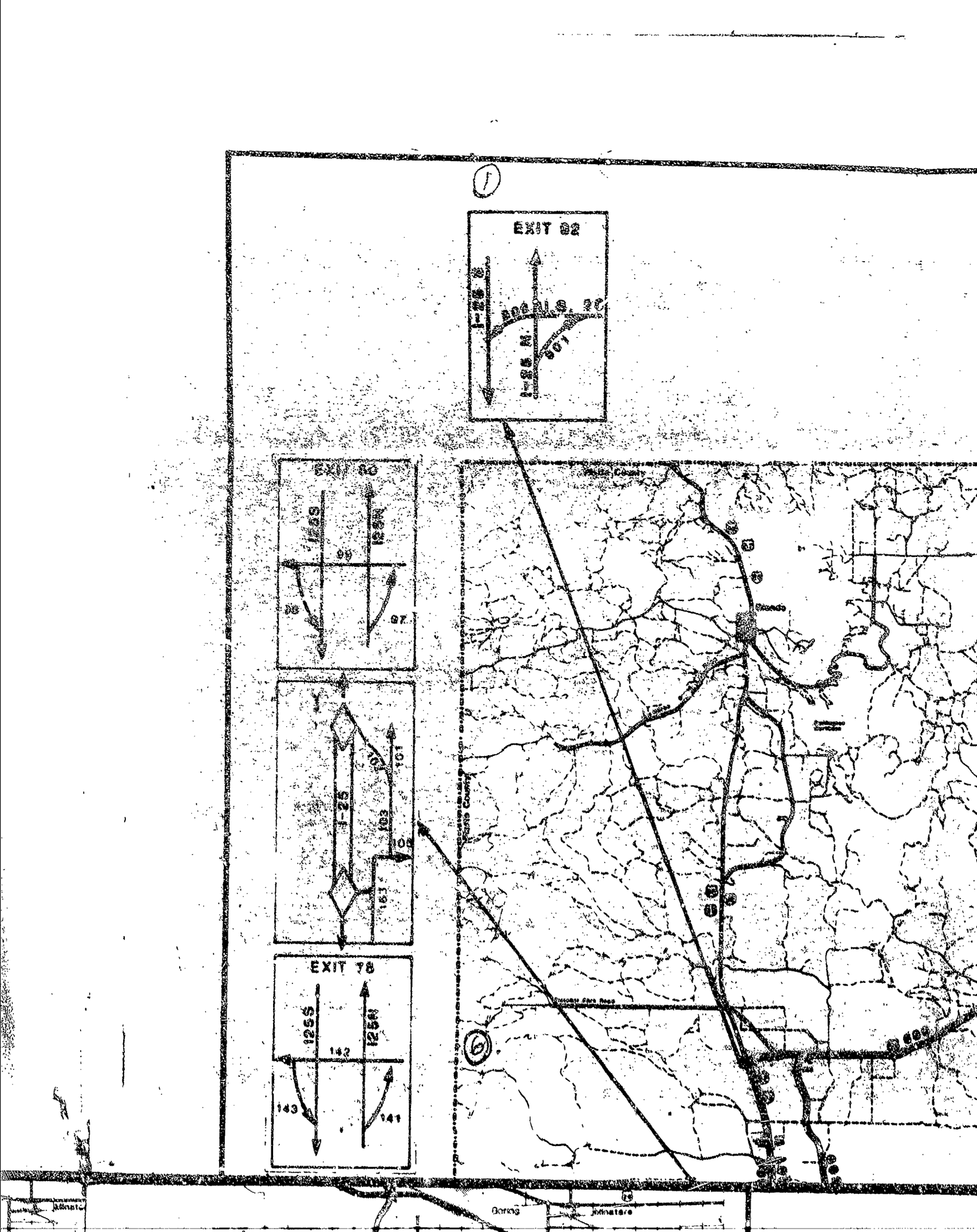
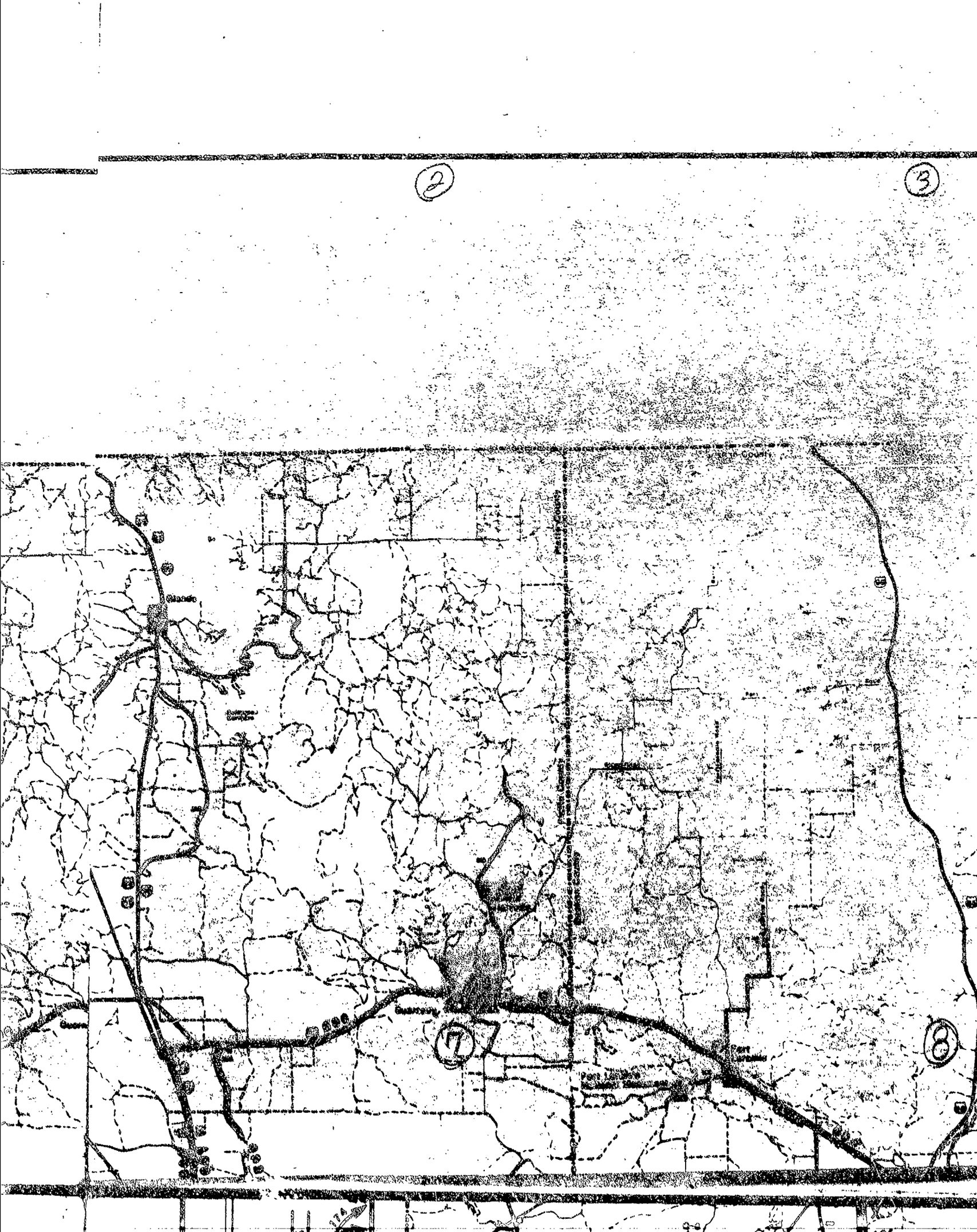
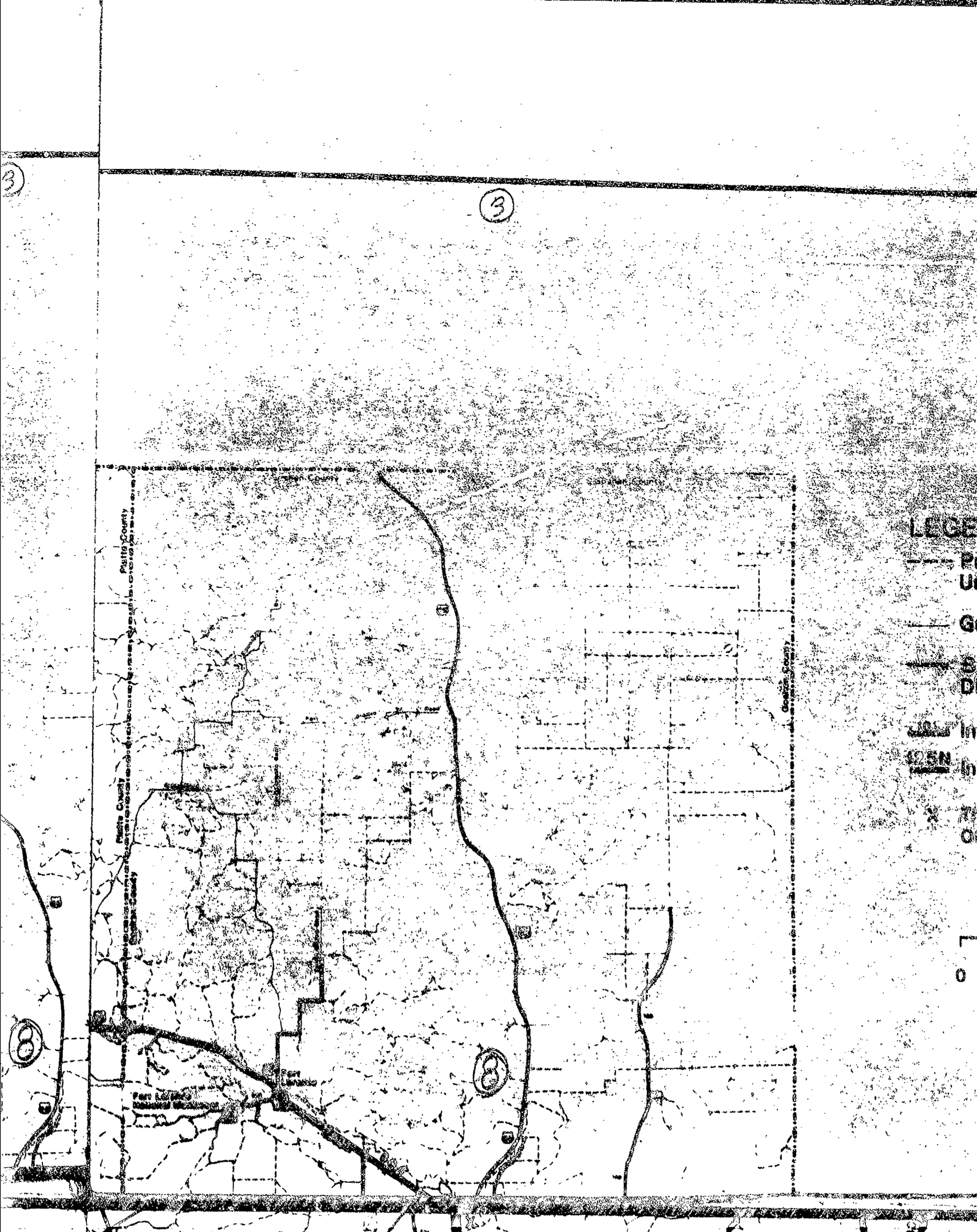
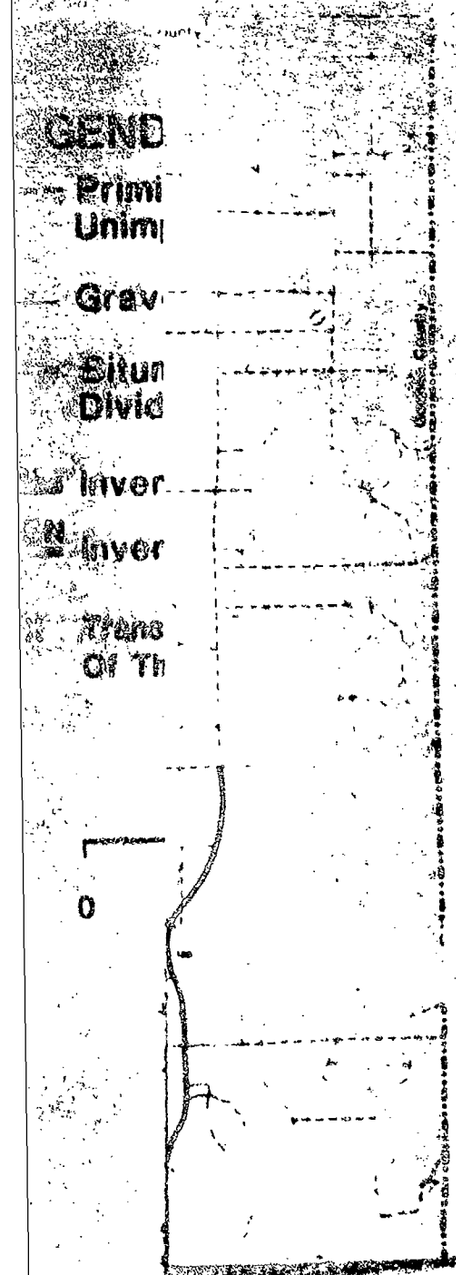


FIGURE NO. 2.6.1-2


EXIT 82
I-25 S.
SOUTH ACCESS RD.
I-25 N.
EXIT 99
I-25 S.
I-25 N.
99
98
97
EXIT 78
I-25
I-25
103
101
105
EXIT 78
125S
125N
142
143
141
Colorado Springs
Fountain
Security
Widefield
Black Forest
Falcon
Peyton
Ellicott
Calhan
Yoder
Stratmoor
Boring
Johnstown
Longmont
Loveland
Fort Collins
Greeley
Brighton
Denver
Aurora
Parker
Castle Rock
Monument
Palmer Lake
Woodland Park
Cripple Creek
Victor
Florissant
Divide
Manitou Springs
Colorado City
Rye
Wetmore
Westcliffe
Silver Cliff
Beulah
Pueblo
Pueblo West
Boone
Rocky Ford
La Junta
Las Animas
Lamar
Springfield
Trinidad
Walsenburg
La Veta
Gardner
Huerfano County
Las Animas County
Bent County
Prowers County
Baca County
Kiowa County
Crowley County
Otero County
Pueblo County
Fremont County
Teller County
El Paso County
Park County
Douglas County
Elbert County
Lincoln County
Kit Carson County
Cheyenne County
Arapahoe County
Adams County
Weld County
Larimer County
Boulder County
Jefferson County
Clear Creek County
Gilpin County
Chaffee County
Custer County
Saguache County
Alamosa County
Conejos County
Costilla County
Rio Grande County
Mineral County
Archuleta County
La Plata County
Montezuma County
Dolores County
San Miguel County
Ouray County
San Juan County
Hinsdale County
Gunnison County
Saguache County
Mesa County
Delta County
Montrose County
San Miguel County
Dolores County
Montezuma County
La Plata County
Archuleta County
Rio Blanco County
Moffat County
Routt County
Jackson County
Grand County
Summit County
Eagle County
Garfield County
Pitkin County
Lake County
Clear Creek County
Gilpin County
Jefferson County
Boulder County
Larimer County
Weld County
Adams County
Arapahoe County
Douglas County
Elbert County
Lincoln County
Kit Carson County
Cheyenne County
Kiowa County
Crowley County
Otero County
Bent County
Prowers County
Baca County
Las Animas County
Huerfano County
Pueblo County
Fremont County
Teller County
El Paso County
Park County
Chaffee County
Custer County
Saguache County
Alamosa County
Conejos County
Costilla County
Rio Grande County
Mineral County
Archuleta County
La Plata County
Montezuma County
Dolores County
San Miguel County
Ouray County
San Juan County
Hinsdale County
Gunnison County
Mesa County
Delta County
Montrose County
Rio Blanco County
Moffat County
Routt County
Jackson County
Grand County
Summit County
Eagle County
Garfield County
Pitkin County
Lake County
I-25
I-70
I-76
I-225
I-270
I-76
I-70
I-25
I-225
I-270
I-76
I-70
I-25
I-225
I-270
I-76
I-70
I-25


2
3
7
8


3
3
Pasco County
Pasco County
Pasco County



LEGEND

Primitive Road, Unimproved Road Graded & Primitive, Unimproved, Graded & Drained Roads

Gravel or Stone Roads

Bituminous Road-Low Type, Paved Roads, Interstates Divided Highway

Inventory Links

Inventory Arterials

X Transportation Links To Be Modified In The Flight Portion Of The ACS

Scale in Miles

0 4.5 9 13.5

(1) (5) (9) (10)

(4) (5)

ive,

tes

EGEND

-- Primitive Road, Unimproved Road Graded & Primitive, Unimproved, Graded & Drained Roads

— Gravel or Stone Roads

— Bituminous Road-Low Type, Paved Roads, Interstates Divided Highway

Inventory Links

SN Inventory Arterials

X Transportation Links To Be Modified In The Flight Portion Of The ADS

Scale in Miles

0 4.6 9 13.6

(9) (10)

SPOT ELEVATION

NATURAL DRAINAGE AND CULVERT

EXIT 78

125S

125N

142

143

141

EXIT 73

125S

125N

124

WYO 34

114

119

EXIT 70

125S

125N

122

Bourdeux Rd

133

134

EXIT 65

125S

125N

146

Rd 10

Sisley

147

148

EXIT 64

125S

125N

132

Rd 10

Chugwater

131

130

EXIT 47

Platte County

Laramie County

Chugwater

Pioneer Park Road

Platte County

101

106

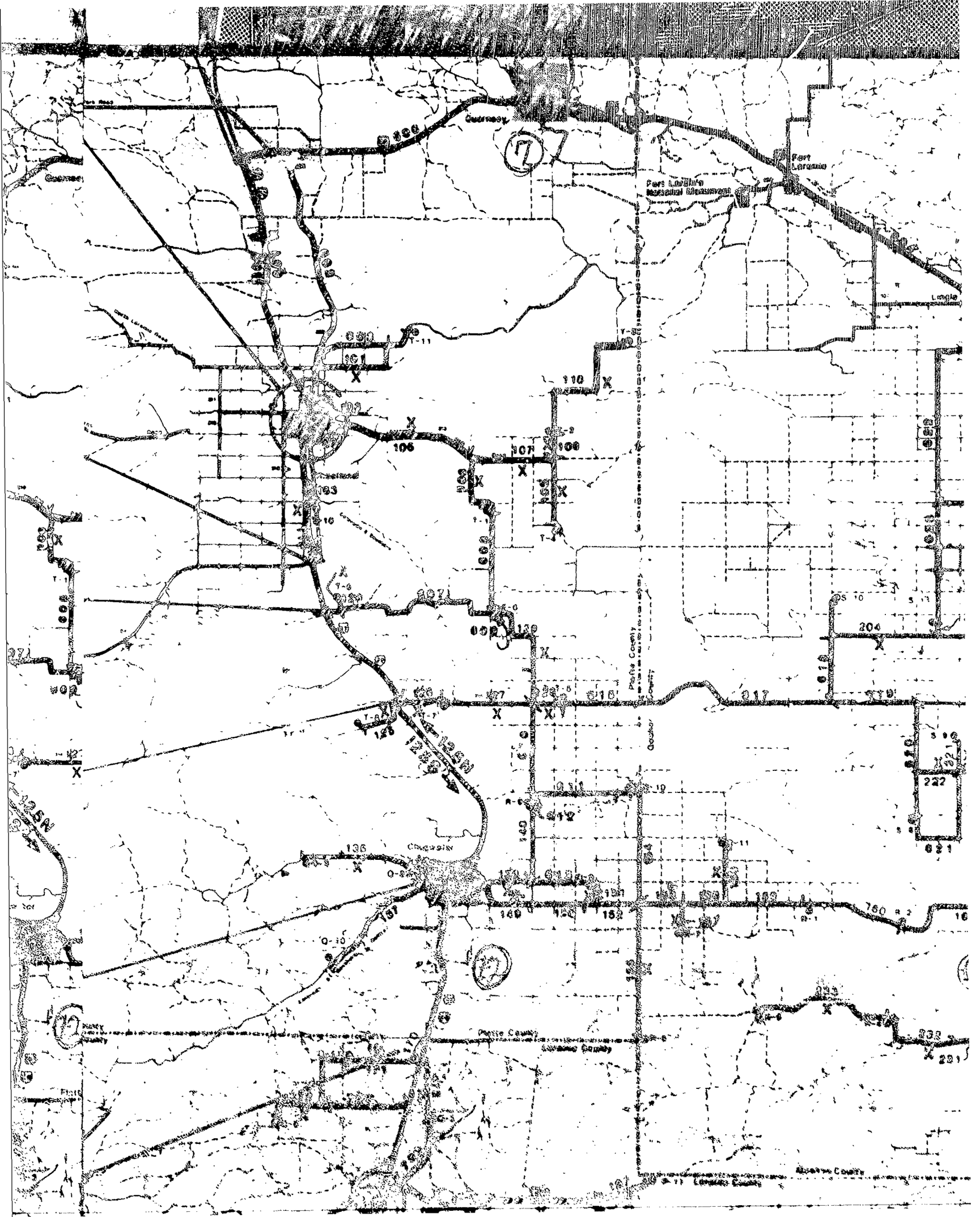
103

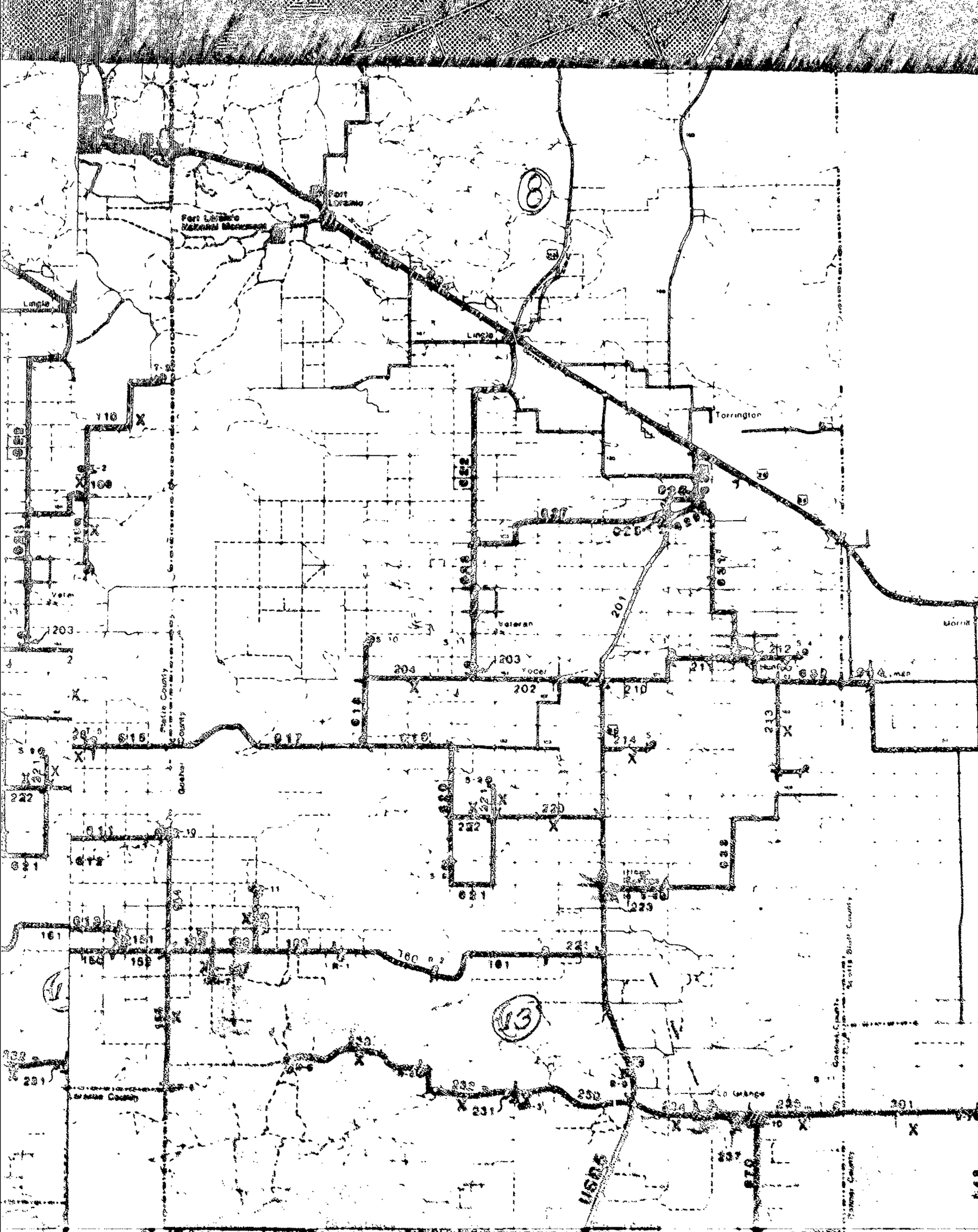
125S

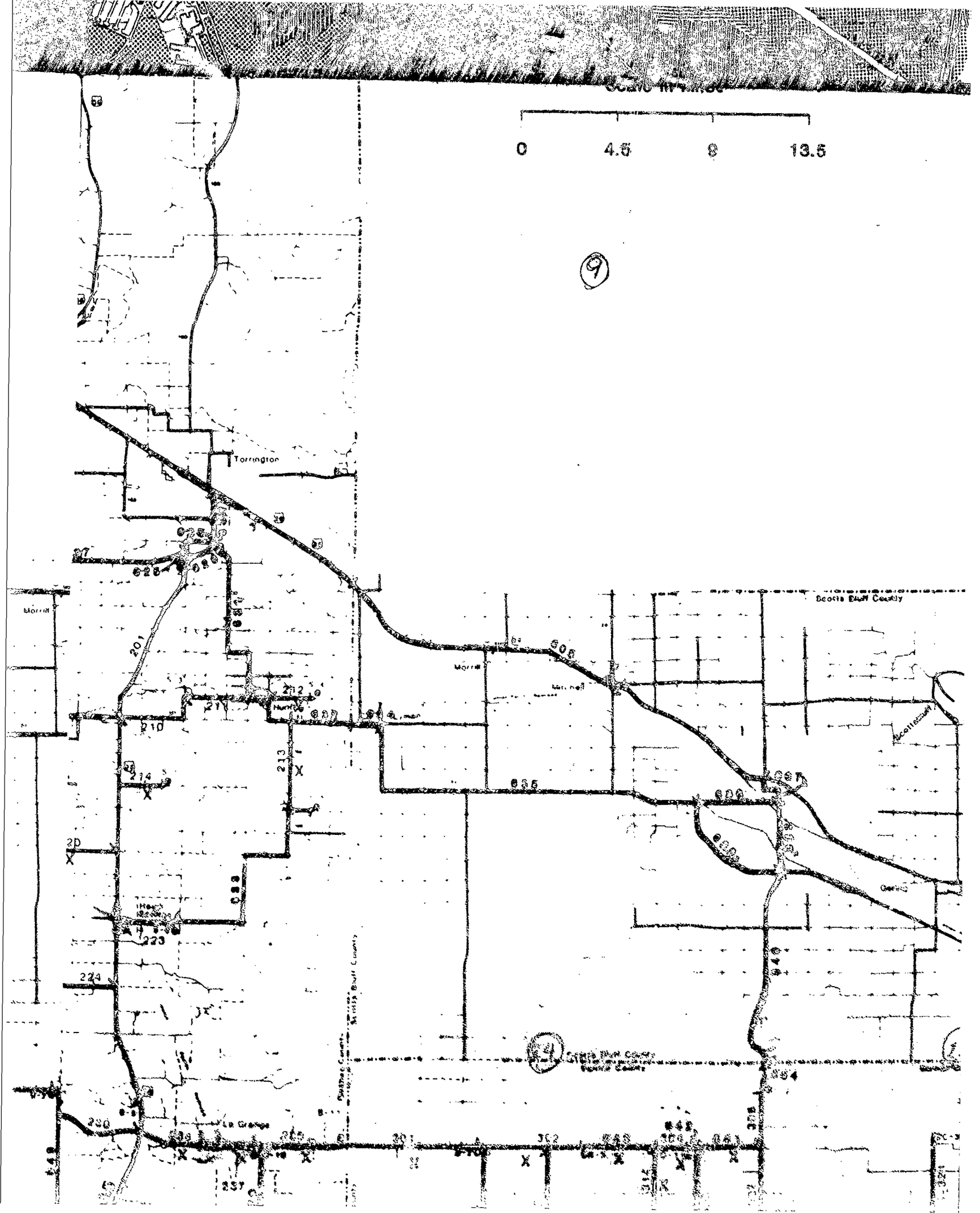
125N

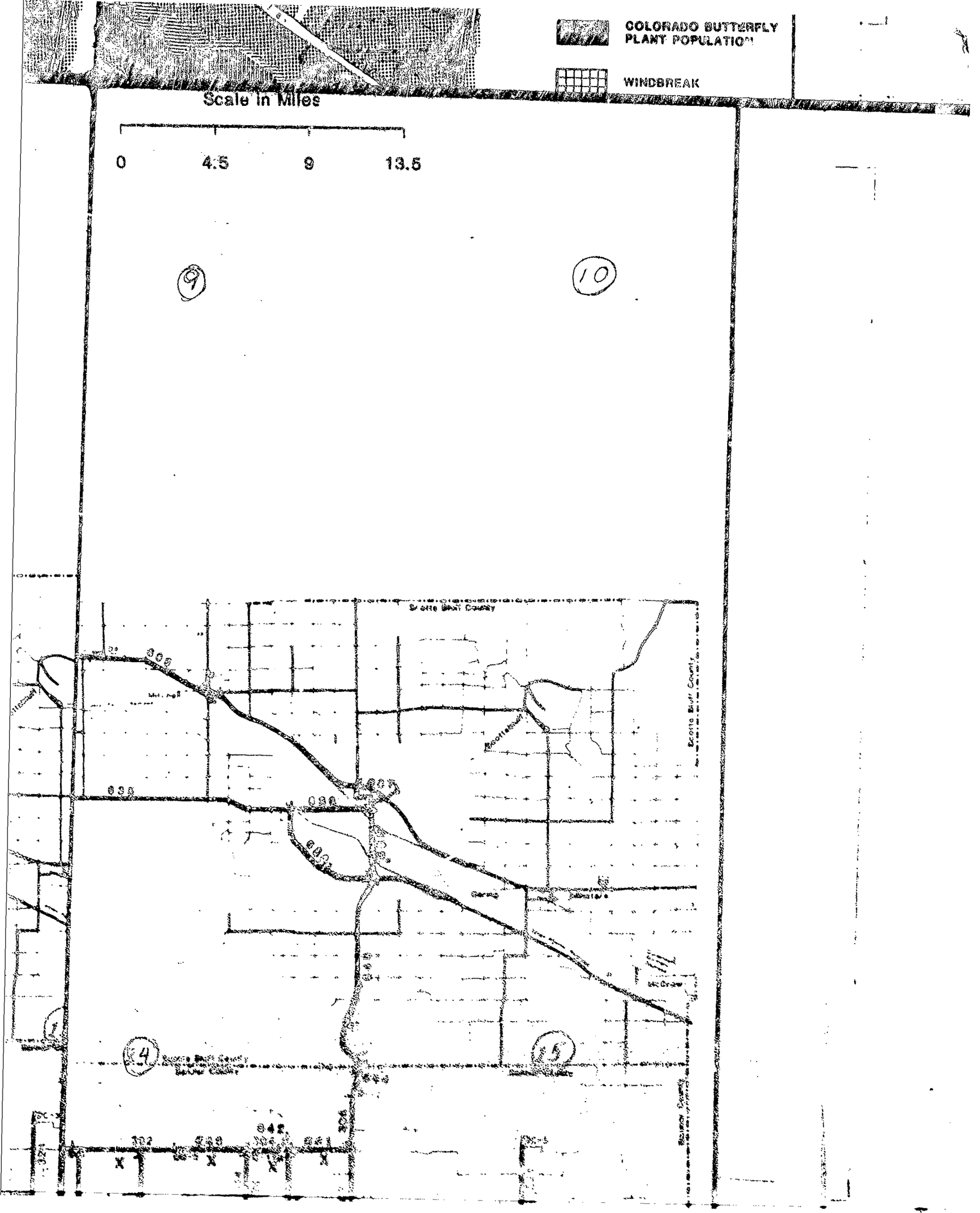
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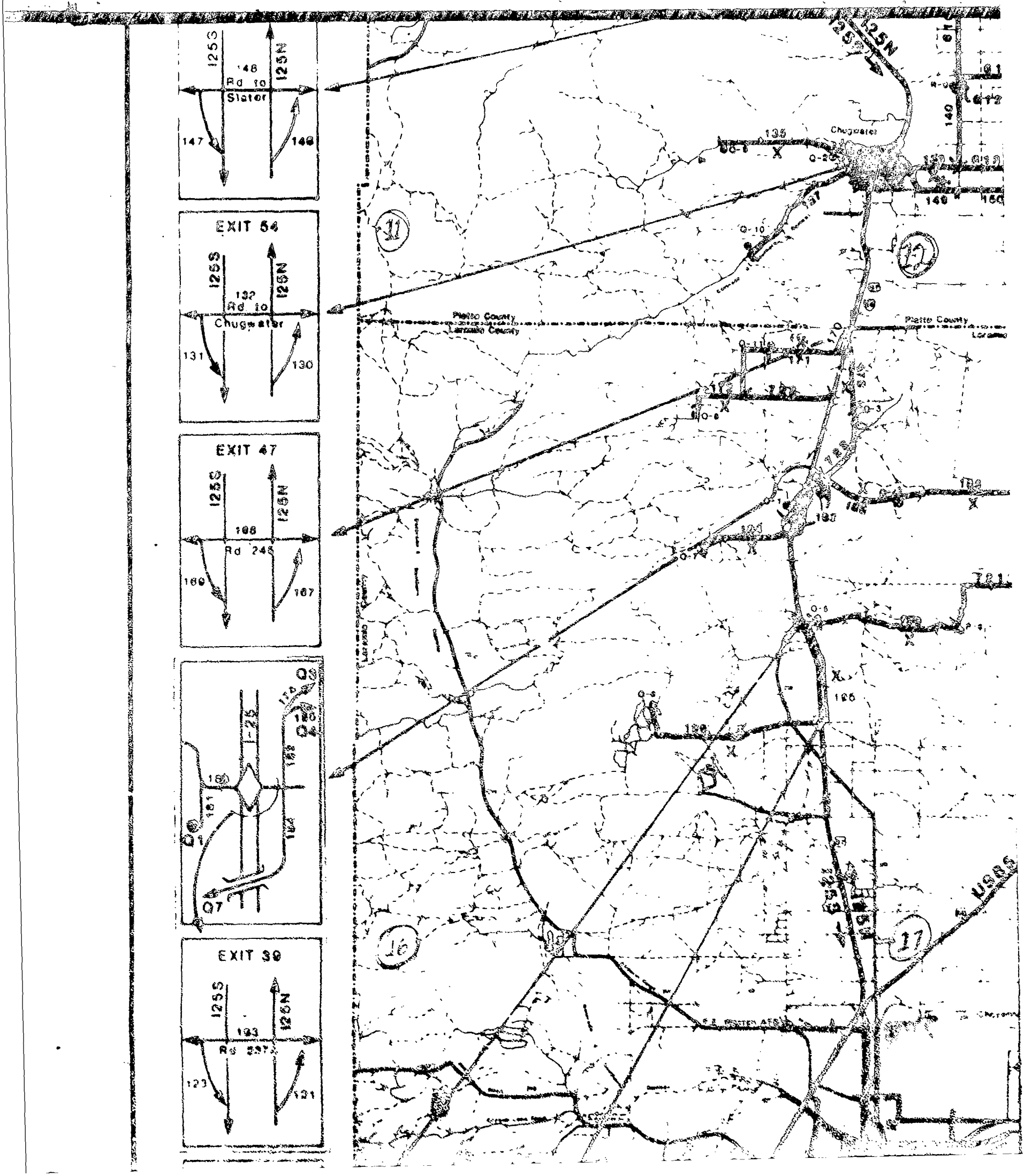
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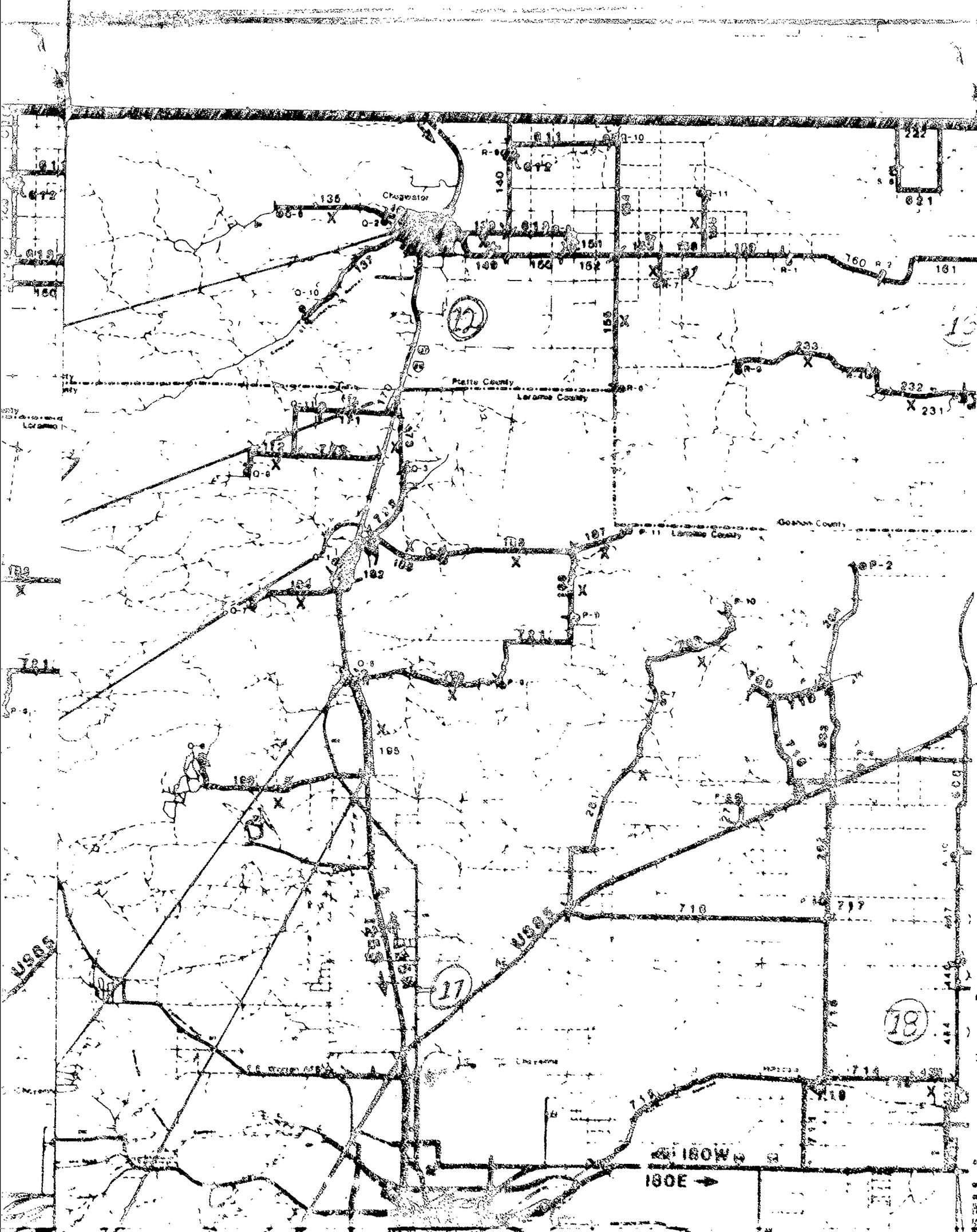

Gurnsey
Fort Laramie
Fort Laramie Historical Monument
Platte County
Goshen
Chugwater
Platte County
Laramie County
Albany County
Laramie County
106
107
110
204
232
231
125N
125N
125N
136
Chugwater
140
150
152
153
760
16
231

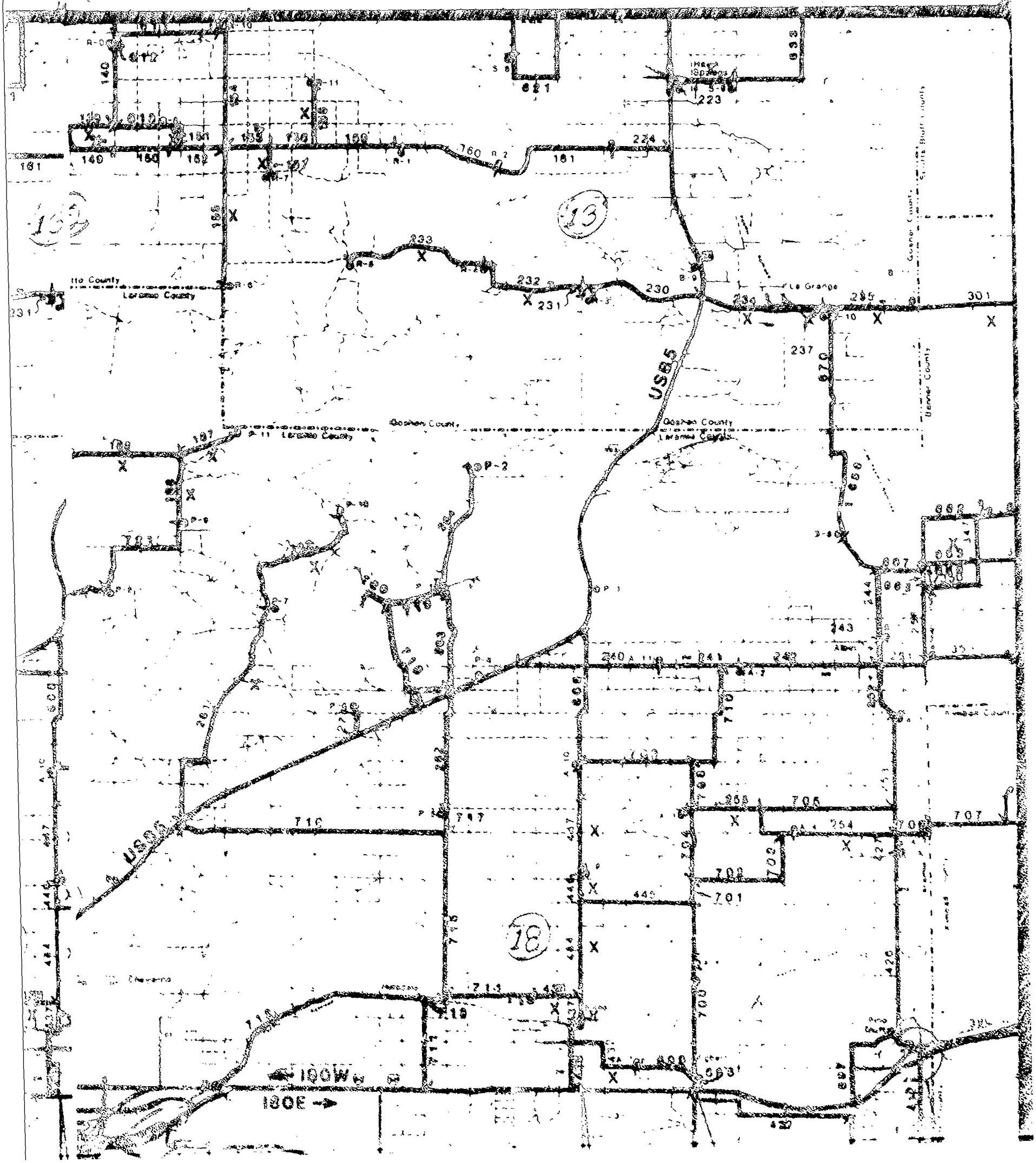

Fort Laramie
Fort Laramie National Monument
Torrington
Veteran
Yoder
Platte County
Goshen
Laramie
Guernsey
Converse County
Niobrara County
116
108
203
204
202
210
212
213
214
215
217
218
220
222
223
229
161
160
232
231
230
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235
237
238
239
201
8
11
13

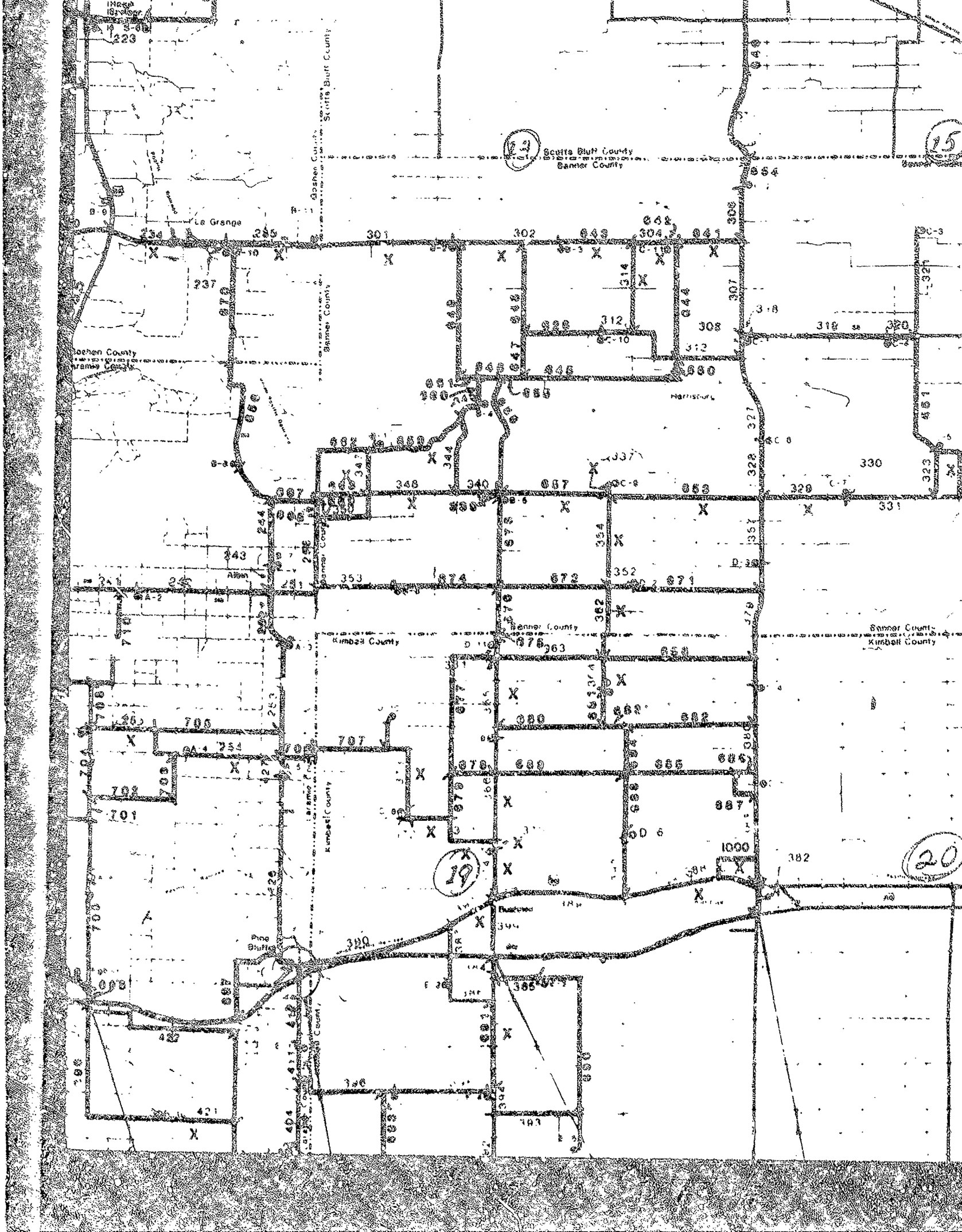

0
4.5
9
13.5
Torrington
Morrill
Scotts Bluff County
Morrill
Morrill
Morrill


COLORADO BUTTERFLY PLANT POPULATION
WINDBREAK
Scale in Miles
0
4.5
9
13.5
9
10
4
5

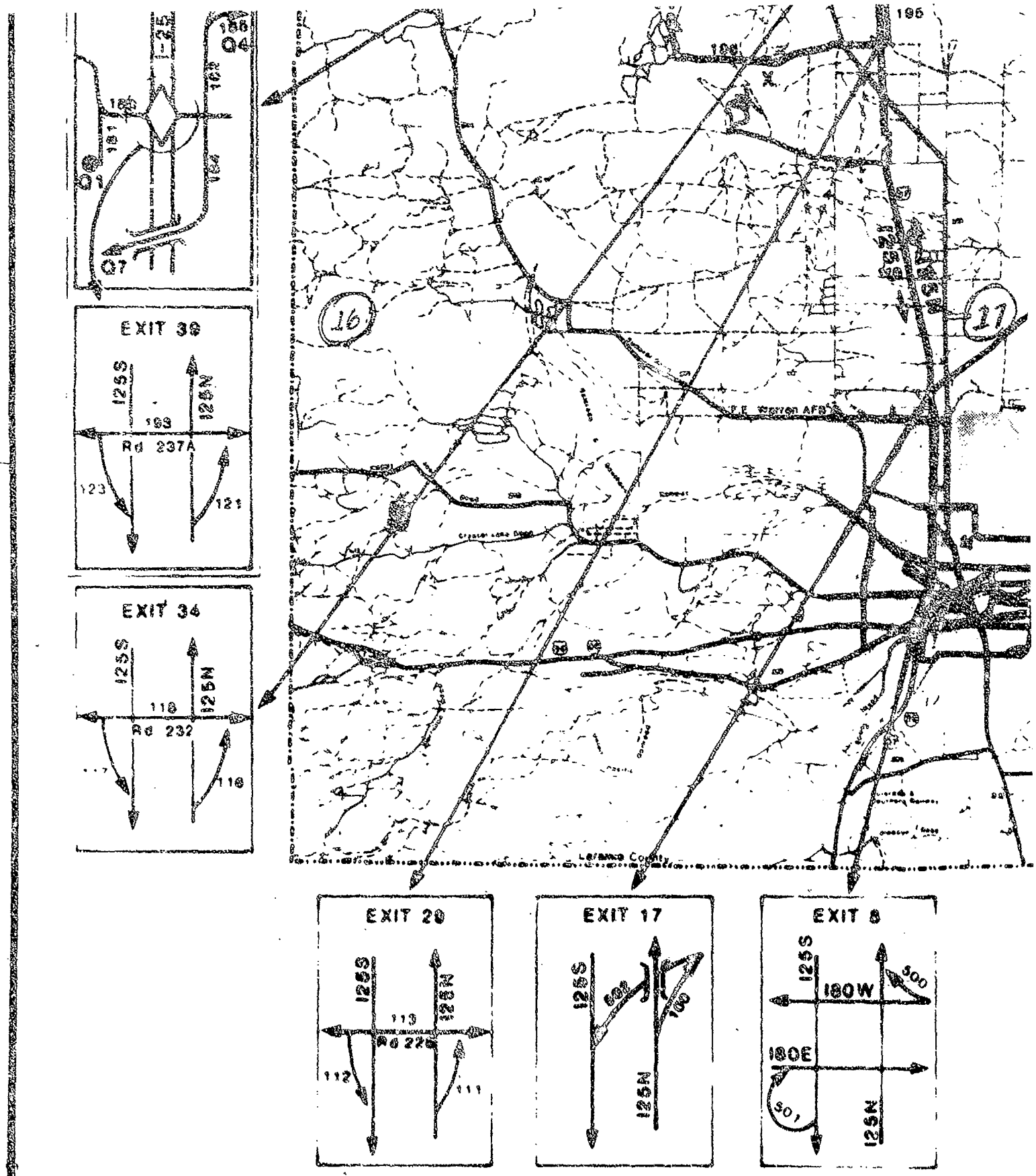

125S
148
Rd 10
125N
Slater
147
146
EXIT 54
125S
132
Rd 10
126N
Chugwater
131
130
EXIT 47
125S
188
126N
Rd 245
189
187
I-25
EXIT 30
125S
123
126N
Rd 237
123
121
Chugwater
135
Q-1
Q-2
137
Q-10
Platte County
Laramie County
Q-11
Q-9
Q-8
Q-3
Q-6
185
186
Q-5
Q-4
Q-7
Q-12
140
141
142
150
11
12
16
17
US85


Chugwater
Platte County
Laramie County
Goshen County
R-11
R-10
R-9
R-8
R-7
R-6
R-5
R-4
R-3
R-2
R-1
Q-10
Q-8
Q-3
Q-2
P-9
P-2
135
137
139
140
141
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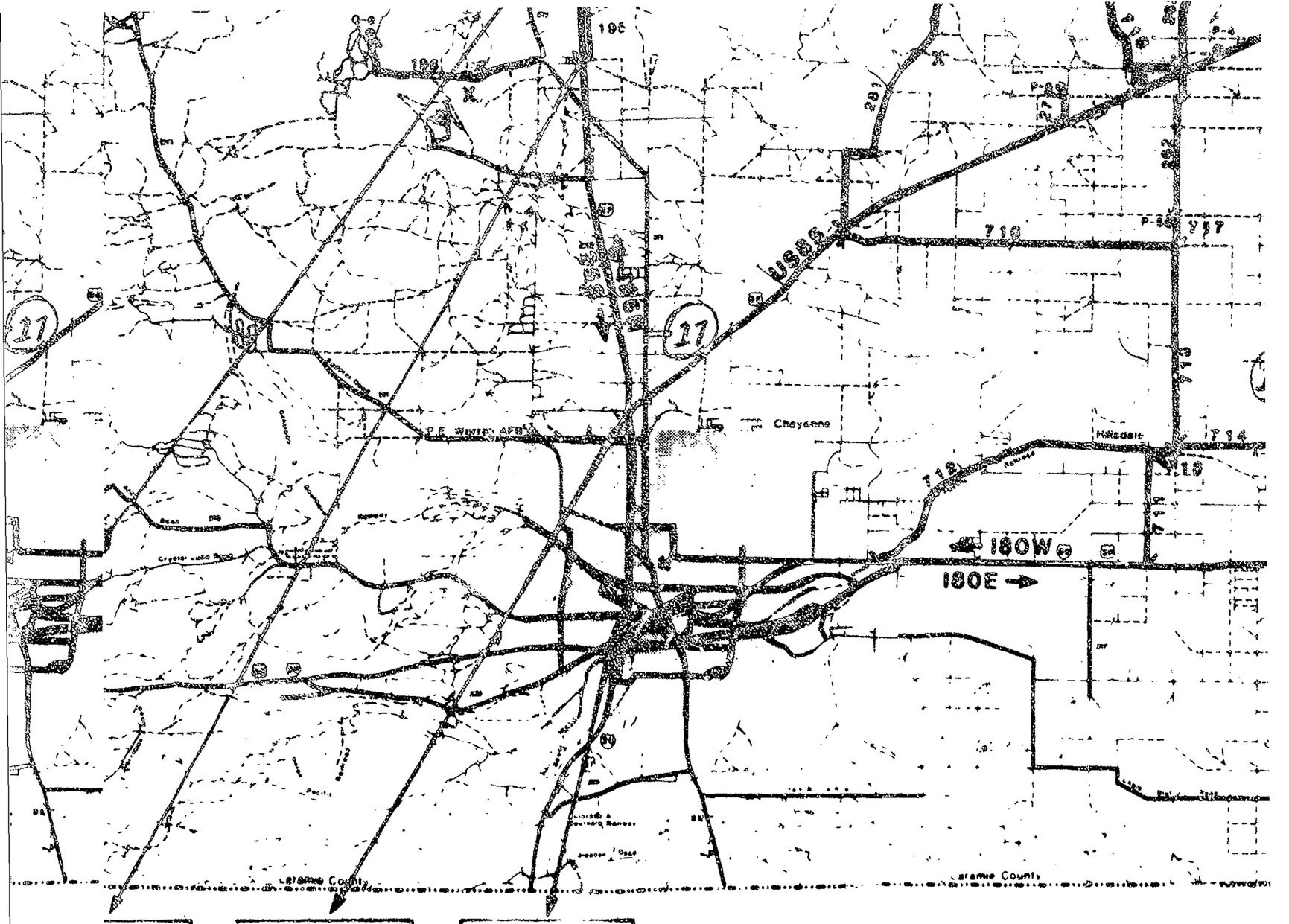

Ito County
Laramie County
Goshen County
Laramie County
Goshen County
Laramie County
Goshen County
Laramie County
Goshen County
Bennet County
La Grange
Goshen County
Scotts Bluff County
US85
US85
180W
180E
13
18

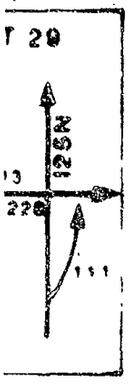

Scotts Bluff County
Banner County
Gosher County
Kimball County
La Grange
Pine Bluffs
Harrisburg
19
20

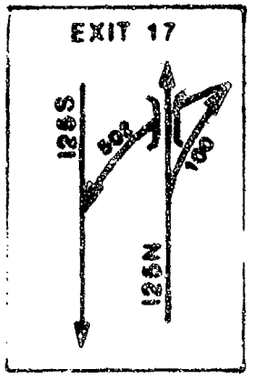
Scotts Bluff County
Banner County
Kimball County
308
330
331
352
382
1000
15
20

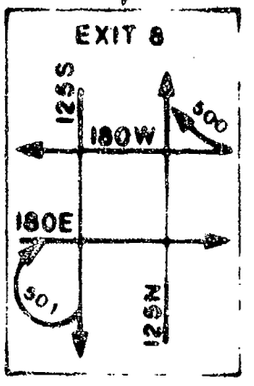


TRANSPORTATION CORRIDOR LINKS IN THE FLIC

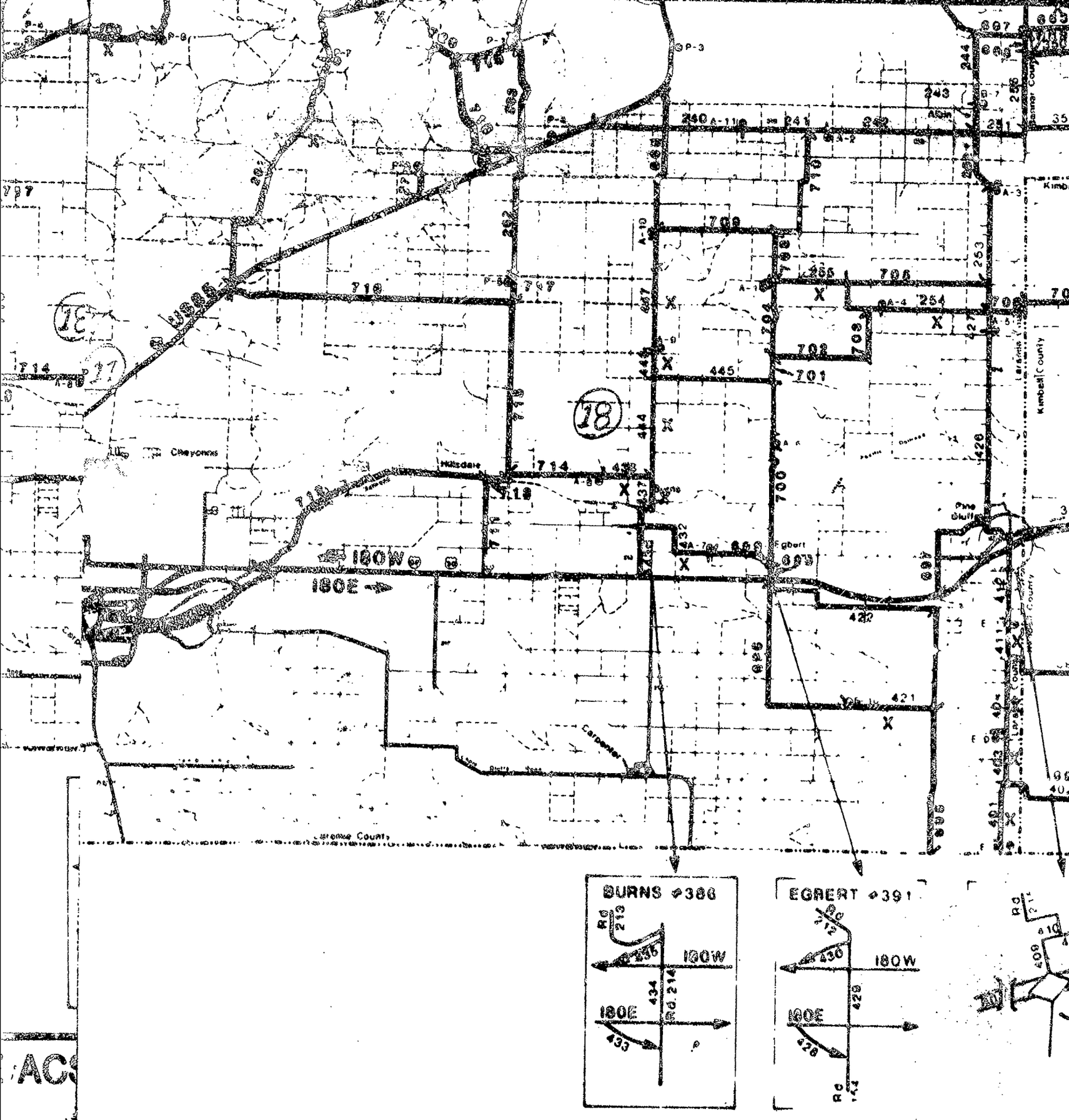




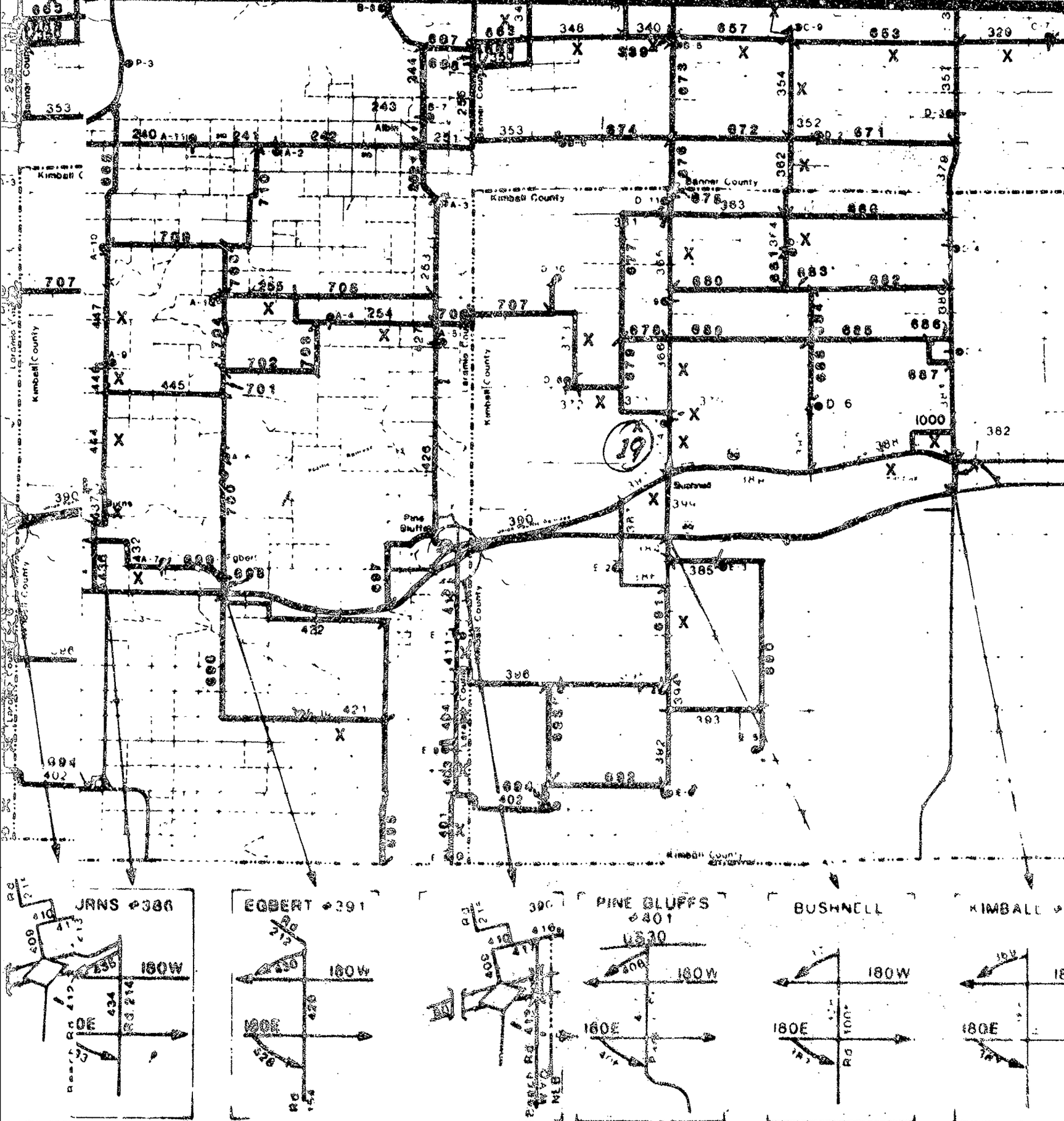




LIGI CORRIDOR LINKS IN THE FLIGHT PORTION OF THE AC



FLIGHT PORTION OF THE ACS


Kimball County
Banner County
Laramie County
Logan County
Pine Bluffs
1000
19
JRNS #386
EGBERT #391
PINE BLUFFS #401
BUSHNELL
KIMBALL
US30
180W
180E
160E

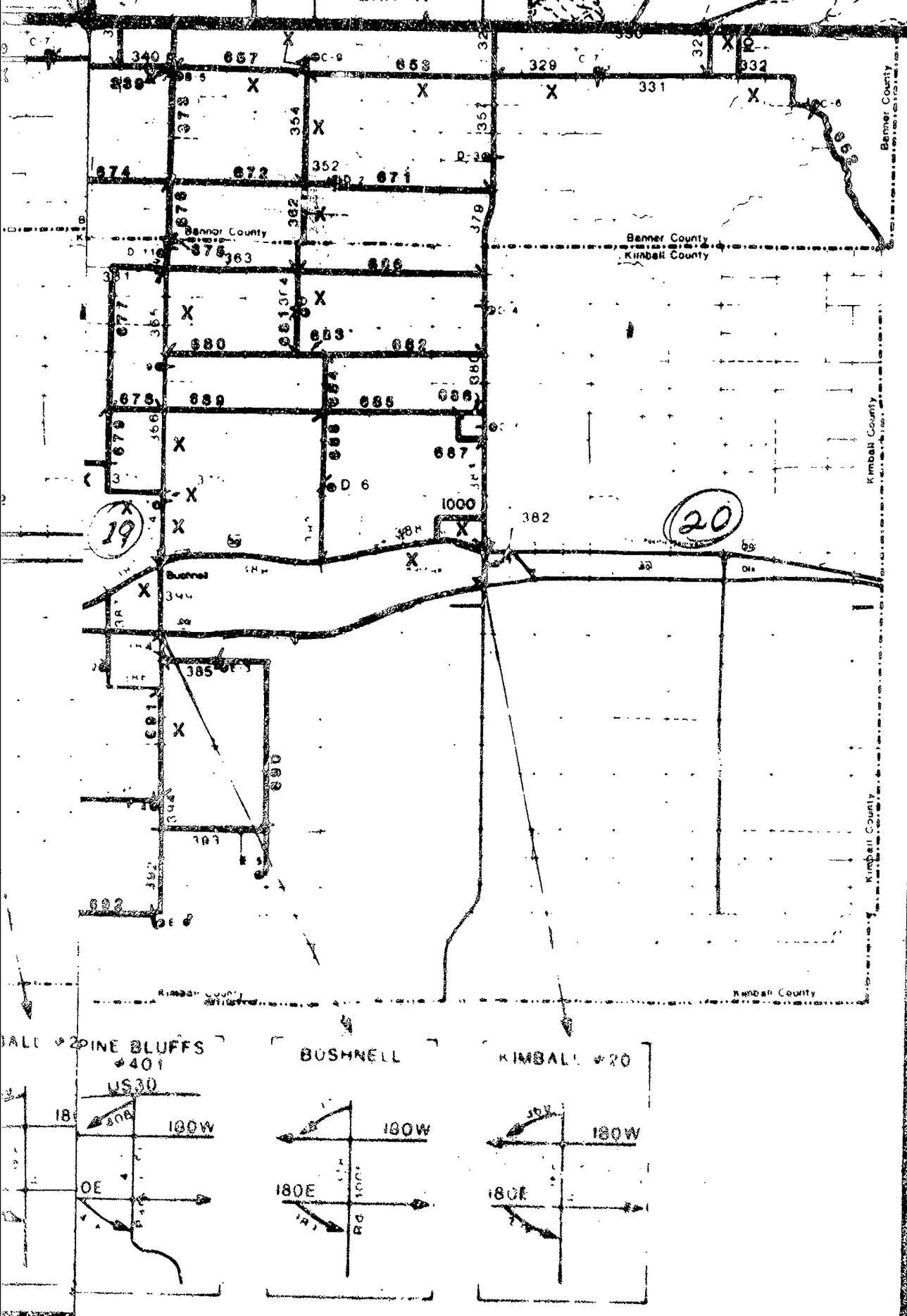


FIGURE NO. 3.5.1-1