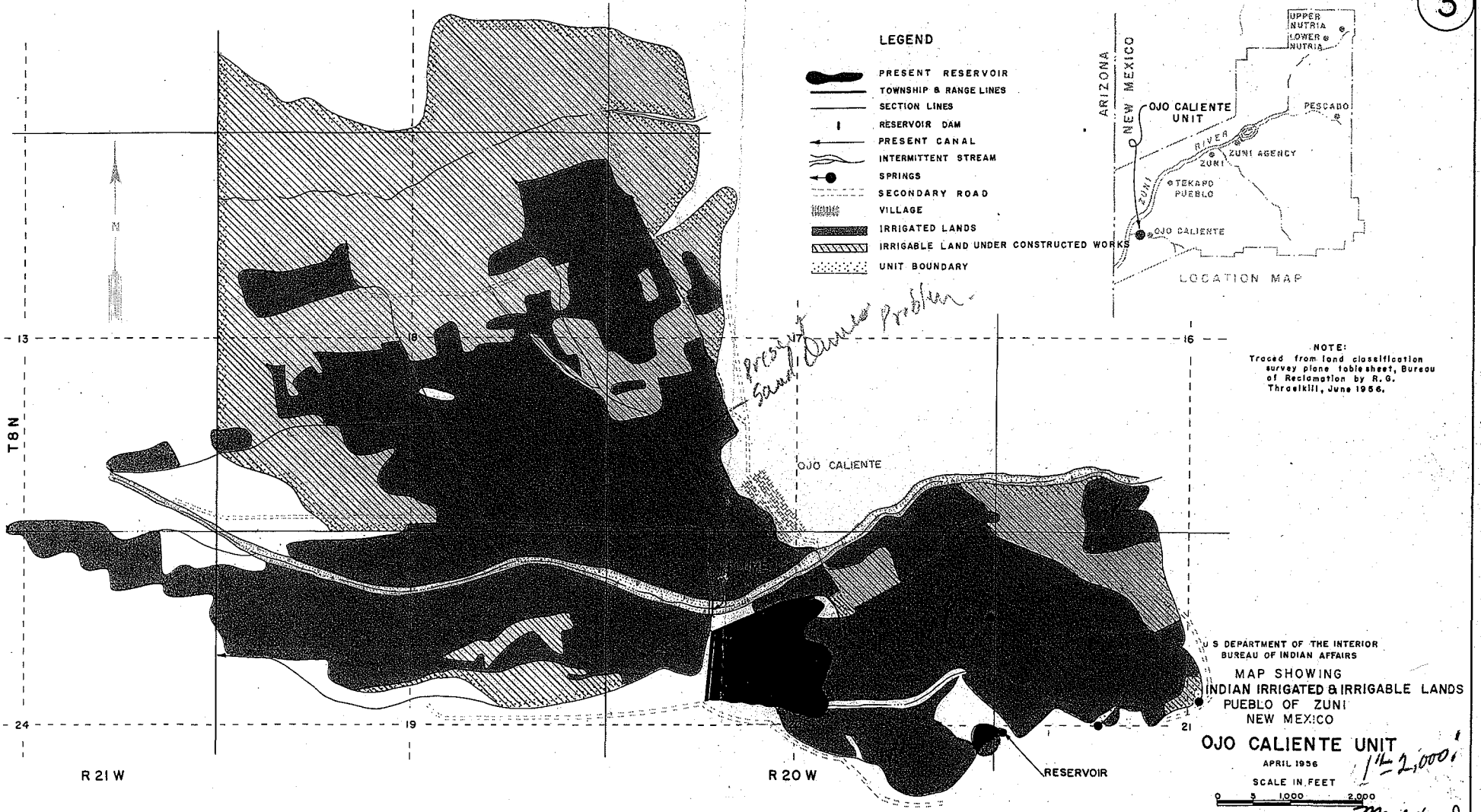
4902-P3 Irrigation Project Case File
TK
OJO CALIENTE IRRIGATION
REHABILITATION PROJECT
FY 1964-69

CUTOFF:
Filing Office: 45
Retention: PERMANENT
Maintain for 5 years after cutoff; retire to records center. Transfer to NARA IAW signed SF 258.

COPY

3




U S DEPARTMENT OF THE INTERIOR
BUREAU OF INDIAN AFFAIRS

MAP SHOWING
INDIAN IRRIGATED & IRRIGABLE LANDS
PUEBLO OF ZUNI
NEW MEXICO

OJO CALIENTE UNIT

APRIL 1956

SCALE IN FEET 1" = 2,000'

0 5 1,000 2,000

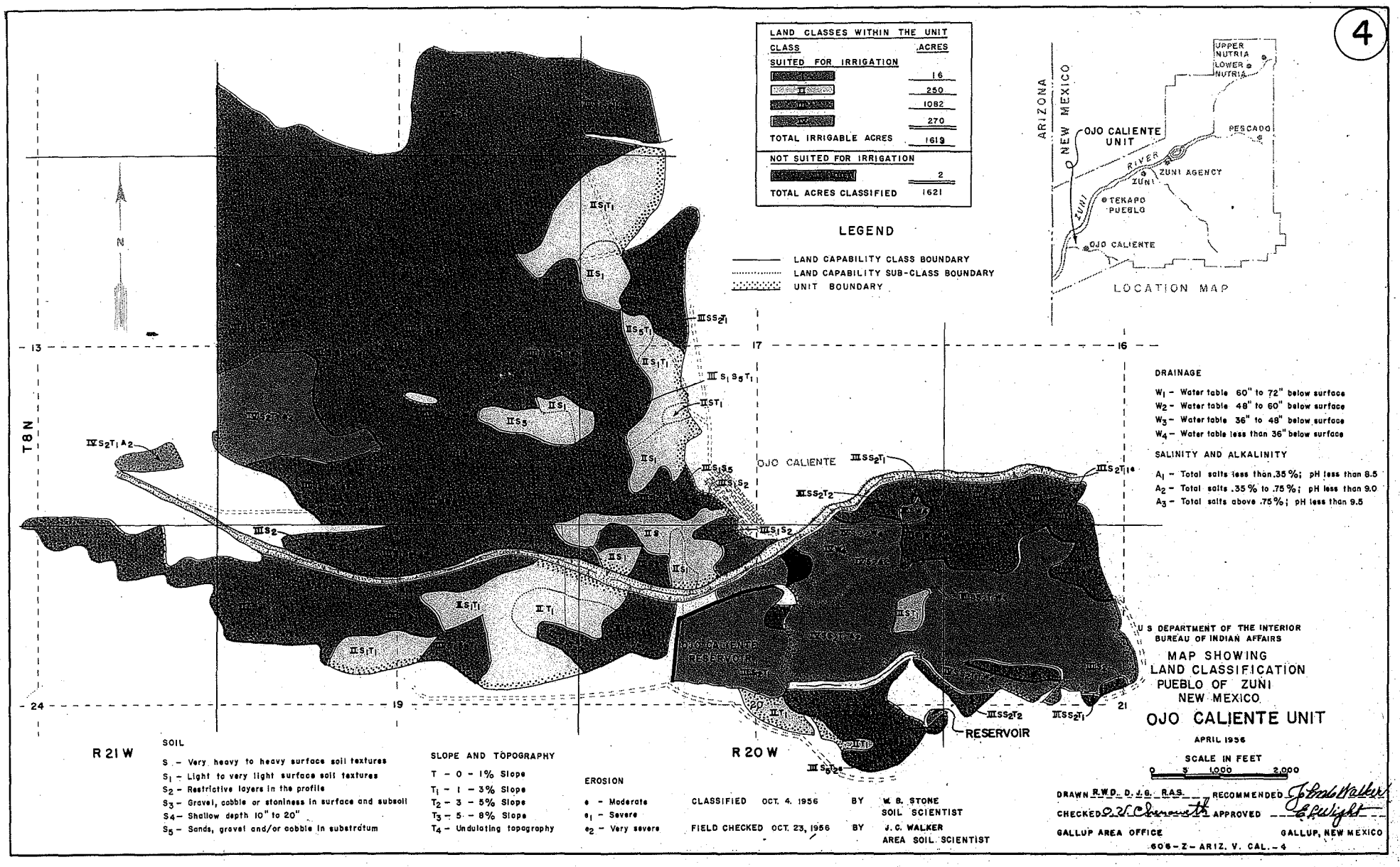
DRAWN _____ RECOMMENDED _____

CHECKED _____ APPROVED _____

GALLUP AREA OFFICE GALLUP, NEW MEXICO

606-Z-ARIZ. V. CAL.-3

COPY


4
LAND CLASSES WITHIN THE UNIT
CLASS ACRES
SUITED FOR IRRIGATION
I 16
II 250
III 1082
IV 270
TOTAL IRRIGABLE ACRES 1619
NOT SUITED FOR IRRIGATION
VI 2
TOTAL ACRES CLASSIFIED 1621
LEGEND
LAND CAPABILITY CLASS BOUNDARY
LAND CAPABILITY SUB-CLASS BOUNDARY
UNIT BOUNDARY
ARIZONA
NEW MEXICO
UPPER NUTRIA
LOWER NUTRIA
OJO CALIENTE UNIT
PESCADO
RIVER
ZUNI AGENCY
ZUNI
TEKAPO PUEBLO
ZUNI
OJO CALIENTE
LOCATION MAP
T 8 N
R 21 W
R 20 W
13
17
16
24
19
21
OJO CALIENTE
RESERVOIR
DRAINAGE
W1 – Water table 60" to 72" below surface
W2 – Water table 48" to 60" below surface
W3 – Water table 36" to 48" below surface
W4 – Water table less than 36" below surface
SALINITY AND ALKALINITY
A1 – Total salts less than .35 %; pH less than 8.5
A2 – Total salts .35 % to .75 %; pH less than 9.0
A3 – Total salts above .75 %; pH less than 9.5
SOIL
S – Very heavy to heavy surface soil textures
S1 – Light to very light surface soil textures
S2 – Restrictive layers in the profile
S3 – Gravel, cobble or stoniness in surface and subsoil
S4 – Shallow depth 10" to 20"
S5 – Sands, gravel and/or cobble in substratum
SLOPE AND TOPOGRAPHY
T – 0 – 1% Slope
T1 – 1 – 3% Slope
T2 – 3 – 5% Slope
T3 – 5 – 8% Slope
T4 – Undulating topography
EROSION
e – Moderate
e1 – Severe
e2 – Very severe
CLASSIFIED OCT. 4. 1956 BY W. B. STONE SOIL SCIENTIST
FIELD CHECKED OCT. 23, 1956 BY J. C. WALKER AREA SOIL SCIENTIST
U S DEPARTMENT OF THE INTERIOR
BUREAU OF INDIAN AFFAIRS
MAP SHOWING
LAND CLASSIFICATION
PUEBLO OF ZUNI
NEW MEXICO
OJO CALIENTE UNIT
APRIL 1956
SCALE IN FEET
0 500 1,000 2,000
DRAWN R.W.D. D.J.S. R.A.S. RECOMMENDED J. Boyd Walker
CHECKED O.V.C. APPROVED E.P. Wright
GALLUP AREA OFFICE GALLUP, NEW MEXICO
606-Z-ARIZ. V. CAL.-4

COPY

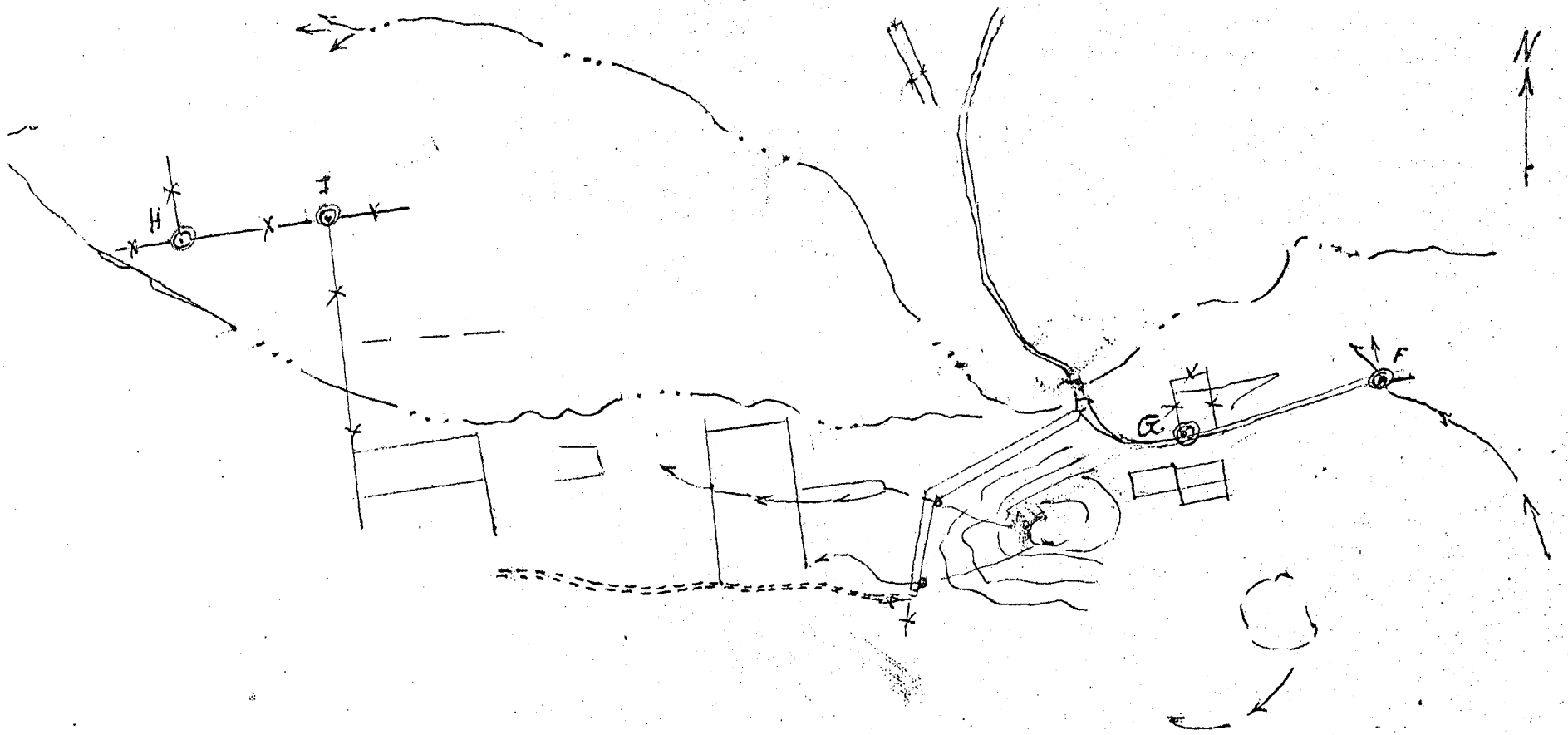
ZUNI RESERVATION

OJO CALIENTE IRRIGATION PROJECT
GROUND CONTROL - (for) AERIAL MAPS

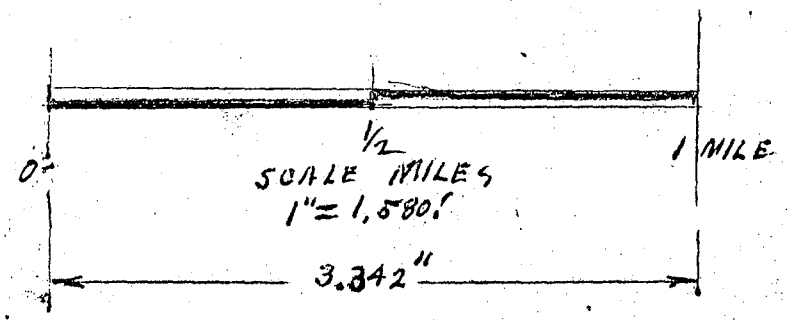
| POINT | DESCRIPTION |
|---|---|
| F | SOUTH EDGE OF ROAD BED OVER IRR.-DITCH CULVERT |
| G | SOUTHWEST CORNER OF FIELD (FENCE CORNER) |
| H | SOUTHWEST CORNER OF FIELD (ON NORTH SIDE OF FENC |
| I | NORTHEAST CORNER OF FIELD (ON SOUTH SIDE OF FENCE |

| POINTS | | DISTANCES | | | | |
|---|---|---|---|---|---|---|
| FROM | TO | AERIAL MAP INCHES | CHAINED DISTANCE FEET | APPARENT MAP SCALE 1" = ?' | MAP INCHES FOR 1" = 1580. | MAP INCHES FOR 8" = 1 MILE |
| F | G | 1.26 | 1,996.6 | 1,584.6 | 1.264 | 3.025 |
| H | I | 0.91 | 1,430.9 | 1,572.4 | 0.906 | 2.168 |
| 0.00 | 1 MILE | — | 5,280 | 1,580. | 3.342 | 8.000 |

COPY




ZUNI RESERVATION
OJO CALIENTE
IRRIGATION UNIT
SKETCH MAP
FROM
AERIAL PHOTO'S.
626 AND 625
F-6 F-6




DISTANCE: F - G = 1,996.6 FEET
H - I = 1,430.9 FEET

COPY

# Ojo caliente Reservoir

| | | |
|---|---|---|
| Built | 1885 - - | small capacity |
| enlarged | 1937 | ~~243~~ ac.ft. |
| enlarged | 1954 | ~~375~~ ac. ft. ~~3~~ surface ac. |

300 acres Irrigated Pasture flood irrigated from side arroyo

| | | |
|---|---|---|
| Bridge Project | 1956 | $41,937.33 |
| | 1962 | 15,000.00 |
| | Total | 56,937.83 |
| Additional work at the Bridge | Est for 1963 → | 50,000.00 |

(without revetment walls to protect North abutment area)

Big Spr. Q = 3.12 c.f.s (Oct. 1964) = 3278 ac.ft/yr
Below " " Q = 2.15 ( " " ) = 1565 ac.ft/yr
above Reservoir

water some Travertine Material
(crystalline Calcium Carbonate, either Aragonite or Calcite.

15-65

COPY

Zuni Agency | Branch of Land Operations | Zuni Reservation

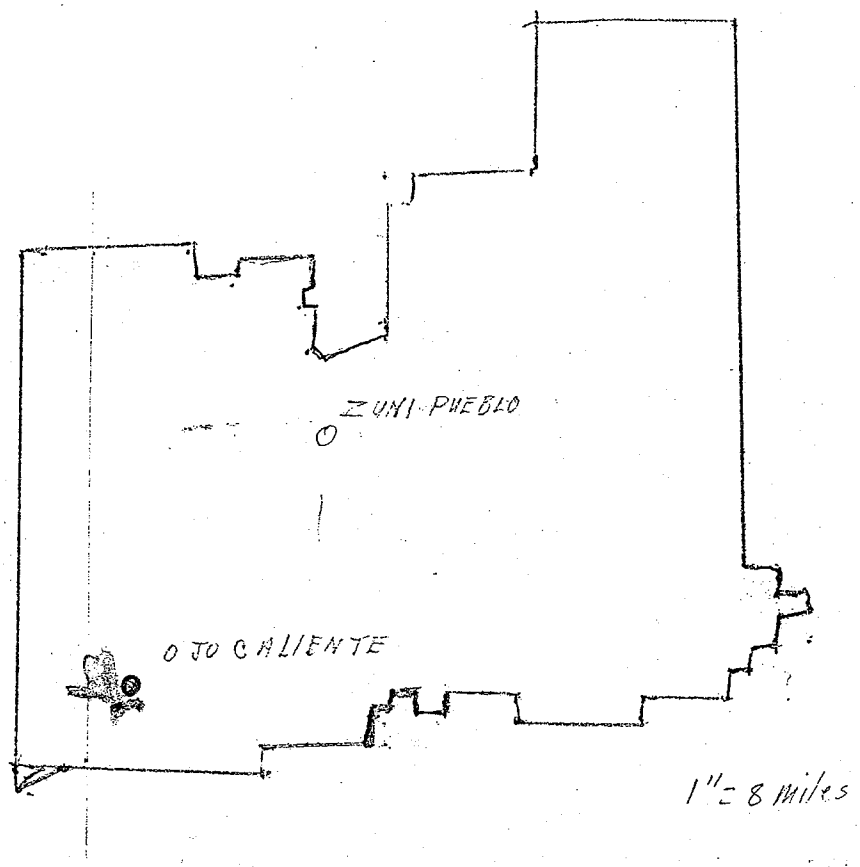
## Ojo Caliente Spring

| Elevation | Station | |
|---|---|---|
| 93.8 | | Ojo Caliente Spring ditch profile from spring to the first road crossing (inlet). |
| 91.1 | 0+00 | Ojo Caliente Spring ditch profile from spring to the first road crossing (outlet). |
| 92.4 | 1+00 | |
| 91.7 | 2+00 | |
| 92.5 | 2+00 | First turnout (inlet). |
| 92.6 | | First turnout (outlet). |
| 91.3 | 3+00 | |
| 91.7 | 3+85 | Diversion gate (bottom). |
| 91.6 | 4+00 | |
| 91.1 | 5+00 | |
| 90.9 | 6+00 | |
| 90.6 | 7+00 | |
| 90.6 | 7+60 | Diversion box (bottom). |
| 89.6 | 8+00 | |
| 88.0 | 9+00 | |
| 86.8 | 10+00 | |
| 86.3 | 11+00 | |
| 86.0 | 12+00 | |
| 85.3 | 13+00 | Bottom of diversion box where alternate feeder ditch takes off to the lake. |
| 83.8 | 13+04 | Drop $S_6$ (Design - Sta. 0+00 to Sta 13+04) = 0.0056 |
| 82.6 | 14+00 | |
| 81.9 | 15+00 | |
| 81.5 | *16+00 | *Ditch needs repairs between these stations. |
| 81.5 | *17+00 | |
| 80.1 | 18+00 | |
| 79.4 | 19+00 | |
| 79.2 | 20+00 | |
| 78.5 | 21+00 | |
| 77.8 | 22+00 | |
| 77.1 | 23+00 | |
| 76.7 | 24+00 | |
| 76.2 | 25+00 | |
| 75.9 | 25+15 | Inlet of pipe at first road crossing. |

Length of underground pipe at spring 142.2 feet, size of pipe is 18 inches.

DRAFT

PRELIMINARY ENGINEERING REPORT




# OJO CALIENTE IRRIGATION REHABILITATION

FEBRUARY 1969

ZUNI PUEBLO

ALBUQUERQUE AREA OFFICE

ZUNI AGENCY

COPY

DRAFT

# STATISTICAL SUMMARY

Ojo Caliente Irrigation Rehabilitation: The primary purpose of this rehabilitation is to make more efficient use of the water available on the farm land in the project.

Plan for Development: The proposed plan is grouped into seven categories: Irrigation Project Supply System, Storage Reservoir Enlargement, Farm Distribution System, Soils Survey, Land Leveling, Farm Land Flood Controls, and Designation Survey.

Estimated Costs:

1. Irrigation Supply System . . . . . $_____
2. Storage Reservoir Enlargement . . . . . $ 190,000.
3. Farm Distribution System . . . . . $_____
4. Soils Survey . . . . . $_____
5. Land Leveling . . . . . $_____
6. Farm Land (local) Flood Control . . . . . $_____
7. Designation Survey . . . . . $_____

Project Features:

Average frost free period: 147 days

Elevation at project site: Bridge Deck - 6,260. feet

Source of water: springs - Big Spring, Sacred Sp. and two others

Water quantity available, acre feet year:

| | Present Time | Upon Rehabilitation |
|---|---|---|
| At source Big Spring | 2300. | 2300 |
| Other- For private owners | | |
| Beneficially Applied to land | 1000. | |
| Potential with closed conveyance system | — | 1800. |
| Acres that can be properly irrd @ 3 Ac. Ft/Yr./Ac. | 333 | 600. |

COPY

Lake Statistics:

| | Present | Enlarged |
|---|---|---|
| Capacity, Ac. ft. | 158 | 1377 |
| Surface area, acres | 51 | 102 |
| Maximum depth | 8 | 17 |
| Assumed storage Elev. Ft. | 140 | 149 |
| Evaporation & Seepage losses AC.FT. | 250 | 400 |

Dam Statistics:

| | | |
|---|---|---|
| Length, feet | 2500. | 3,400. |
| Top width, feet | Variable | 16. |
| Crest elevation, feet | 143. | 153 |
| Increased Fill Volume | ——— | 121,000. |
| Total Enlargement Cost | ——— | $190,000. |

Built: 1885, Enlarged 1937, and 1954.

Bridge Project
Built: 1956 - $41,937.33
Rebuilt 1962 - 15,000.00
Lower, and lengthened
1965
Total $



COPY

INDEX



COPY

INDEX (Cont'd)

# OJO CALIENTE IRRIGATION REHABILITATION
NARRATIVE

The Ojo Caliente community is located on the Zuni Indian Reservation 55 miles south and west of Gallup, New Mexico, and 15 miles southwest of Zuni village.

There are approximately 62 owners of land under the constructed ditch system. Only two to eight families live year long at Ojo Caliente. Others live at Zuni village and commute to farm. A few other families live at Ojo Caliente during the summer months. Some owners no longer farm, but live in other states. The individual tract sizes vary from one acre to 150 acres. Crops grown include: Alfalfa, corn, beans, small grain and miscellaneous garden crops. 1,564 acres have been mapped as irrigable. 1,349 acres are under ditch. From 1931 through 1950, 400 acres were reported as farmed. The 1963 crop census shows 150 acres in crops, 200 acres idle and 250 acres in irrigated pasture. Some or all of this irrigated pasture may have been located on a side arroyo and seasonally flood irrigated.

The irrigation water source is from springs. One (sacred) spring and another small spring are used by their owners on small farms. The Big Spring with a measured outflow of 3.2 C.F.S. is the water source for the main area of irrigated land. 30% of this quantity is canal loss before the water reaches the village, or the storage reservoir. Probably another 30% is lost before reaching the farmland.

Certain owners farming above the reservoir and on the east side of the arroyo have use of the water during the irrigation season. Other land owners, mainly on the west side of the arroyo, irrigate only, from what is stored in the reservoir during the winter months.

The project's main irrigation water source is the Big Spring. With assumed present water losses of 60%, water is available to properly irrigate 230 acres. If the whole conveyance system was underground pipe lines, the only loss would be in the reservoir, leaving adequate water for 650 acres.

Historical Data
(1966)

The Zuni Pueblo (Reservation) is 640 square miles with a population of 5,000 people. Of these 344 are self-employed full-time silversmiths, and 1,400 are unemployed employable persons.

The income is from hand-made siver craft, sheep and cattle raising, seasonal fire-fighting, railroad and forest work.

The per capita income is $590.00. Mora County, the lowest income county in New Mexico, has $732.00 per capita. The average for the state is $2,300 per person (1966).

The Ojo Caliente arroyo was relocated in 1934 by the construction of a diversion dam across the channel and construction of a new channel. This was to protect the embankment of the irrigation reservoir from erosion by flood water. The new channel has, and still is, degrading in depth. Two flumes have been washed out, a road crossing washed out, then a bridge was built and washed out. The bridge has now been rebuilt, and one flume installed on the side of it.

The arroyo flooded bank full in 1963 at an estimated 13,000 c.f.s. The arroyo is now deeper. In 1966 the flood of 16,000 c.f.s. flowed over the bank below the village.

Recorded flood dates are: 1919, '28, '33, '36, '39, '41, '44, '54, '61, '63 and '66. The worst flood of these was in 1928.

A Public Law 566 flood control project was determined to be economically unfeasible. The farmland flooded in 1966 can be given some protection by dike construction along the arroyo banks.

# Ojo Caliente Rehab. Stdy.

## Irrigation Supply Line, -- Big Spring to Reservoir.

Distance: Big Spring to North Road Culvert, South of Arroyo Bridge, -- 5,700. Ft.

At Present time conveyance is an open canal. with checks and turnouts, some of which are Armco Model 101 gates. water loss, measured once with two parshall flume = 29.5%
Yearly Maintenance costs required for cleaning Canal.

Proposed: (~~several~~ alternates)

| Item | unit | Quantity | Installed unit cost $ | Installed Total cost $ |
|---|---|---|---|---|
| 1. Concrete Ditch Lining | L.F. | 5700. | 3.50 | 20,000. |
| Gates | No. | 12(±) | 35.00 | 420. |
| 2. Low Pressure (50' Head) Plastic Pipeline (10" & 12") | L.F. | 5700. | | |
| Gate valves | No. | 3. | | |
| Alfalfa Valves | | 8. | 25.00 | 200. |
| Home made Parshall Flume | | 8 | 50.00 | 400. |

COPY

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Working Copy
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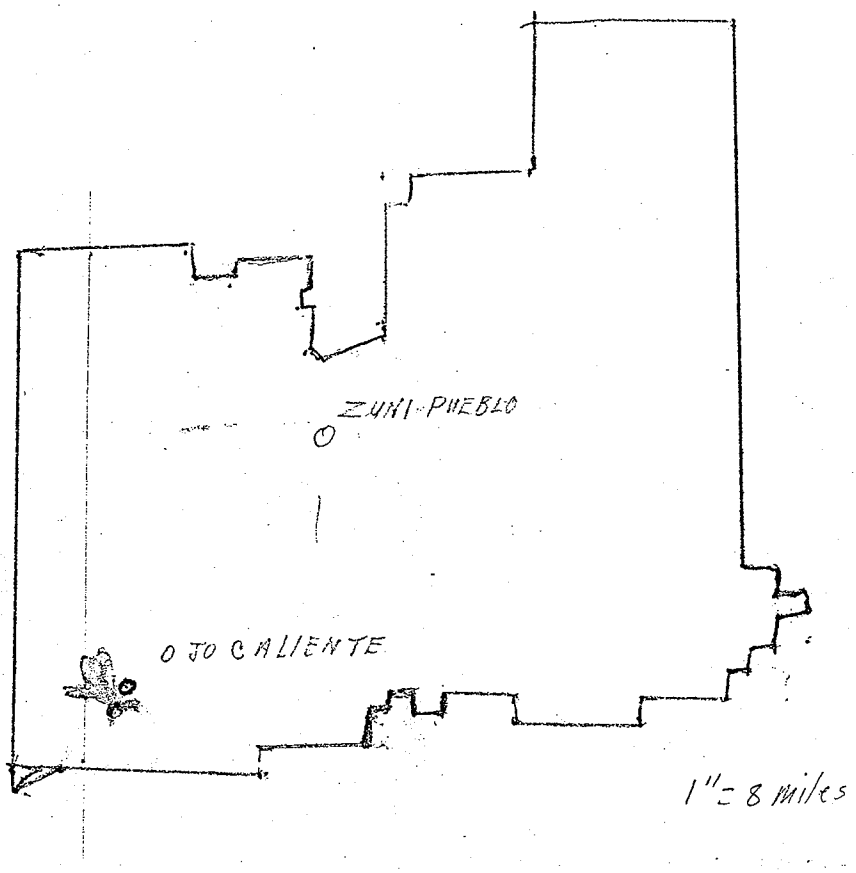
# PRELIMINARY ENGINEERING REPORT




## OJO CALIENTE IRRIGATION REHABILITATION

FEBRUARY 1969

ZUNI PUEBLO

ALBUQUERQUE AREA OFFICE

ZUNI AGENCY

COPY

DRAFT

# STATISTICAL SUMMARY

Ojo Caliente Irrigation Rehabilitation: The primary purpose of this rehabilitation is to make more efficient use of the water available on the farm land in the project.

Plan for Development: The proposed plan is grouped into seven categories: Irrigation Project Supply System, Storage Reservoir Enlargement, Farm Distribution System, Soils Survey, Land Leveling, Farm Land Flood Controls, and Designation Survey.

Estimated Costs:

1. Irrigation Supply System . (to Reservoir) . . . . . $_____
2. Storage Reservoir Enlargement . . . . . $190,000.
3. Farm Distribution System . . . . . $_____
4. Soils Survey . . . . . $_____
5. Land Leveling . . . . . $_____
6. Farm Land (local) Flood Control . . . . . $_____
7. Designation Survey . . . . . $_____

Project Features:

Average frost free period: 147 days

Elevation at project site: (Bridge deck) 6,260. feet sea

Source of water: springs

Water quantity available, acre feet year: *AC. FT.

| | Present Time | Upon Rehabilitation |
|---|---|---|
| At source (Big Spring 3.2 C.F.S. Sacred Spring?) | 2300+ | 2300 |
| Beneficially Applied to land | 1,000. (±) | — |
| Potential with closed conveyance system | 333. | 1800 |
| Acres can be properly irrigated (3 Ac. Ft/Ac./yr.) | | 600. |

* 1. C.F.S year long = 723.58 AC. FT.

Lake Statistics:

| | Present | Enlarged |
|---|---|---|
| Capacity, Ac. ft. | 158. | 1377 |
| Surface area, acres | 51. | 102 |
| Maximum depth | 8. | 17. |
| Storage Elevation (Assumed) Ft. | 140 | 149. |
| (Evaporation + Seepage Losses) Ac. Ft. | 250. | 400 |

Dam Statistics:

| | | |
|---|---|---|
| Length, feet | 2,500. | 3,400. |
| Top width, feet | variable | 16. |
| Crest elevation, feet | 143. | 153. |
| Increased Fill Volume cu. yd. | | 121,000. |
| Total Enlargement Cost | | 190,000.00 |

Irrigation Supply Line to Reservoir

Present Length 5,700 L.Ft, open ditch w Armco Gates at turnouts.
High maintenance costs; 30% Ditch (water) losses.

Proposed:

1. concrete ditch linning w Gates at turnouts.
High potential winter deterioration of Concrete;
Evaporation losses
2. Underground plastic Pipeline with check gates and concrete riser boxes.
3. Underground plastic Pipeline line with Alfa/Fa valve turnouts; risers, air vents, and/or pressure valves.

| type (above NO.) | *Estimated Costs Conveyance | Gates etc. |
|---|---|---|
| 1. concrete ditch | 56,000. | 27,000. |
| 2. Pipe line | 106,000. | 23,000. |
| 3. Pipeline | 106,000. | 4,000. |

4

* includes 15% for Contingencies
+ 20% for Engineering, Investigations, and General Expenses

COPY

INDEX

INDEX (Cont'd)

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Recorded flood dates are: 1919, '28, '33, '36, '39, '41, '44, '54, '61, '63 and '66. The worst flood of these was in 1928.

A Public Law 566 flood control project was determined to be economically unfeasible. The farmland flooded in 1966 can be given some protection by dike construction along the arroyo banks.

Ojo caliente Lake

## Lake Statistics

| | Present | Enlarged |
|---|---|---|
| Capacity, Ac. Ft. | 158. | 1377. |
| Surface Area, Acres | 51 | 102. |
| Maximum depth, feet | 8 | 17 |
| Assumed storage Elev., feet | 140 | 149 |
| Evaporation plus seepage losses | 250 | 400. |

## Dam Stastics

| | | |
|---|---|---|
| Length, feet | 2,500 | 3,400 |
| Top Width, feet | Variable | 16 |
| Crest Elev., feet | 143 | 153 |
| Increased Fill Volume, ~~feet~~ cu.yds. | — | 121,000. |
| Total Enlargement Cost | — | $190,000. |

COPY

Irrigation Supply line, Spring to Reservoir

Length Spring to North road culvert 5700 feet.
Av. H. G. ~~Ft~~/Ft 0.0097
Present: - open ditch with some ~~A~~rmco Gates for checks and turn Outs. High maintenance costs. 30 % water loss.

Proposed: (several Alternates)

~~1. Concrete ditch L~~

| Item ~~Installed~~ | unit | Quantity | ~~Installed~~ unit cost $ | Total cost $ |
|---|---|---|---|---|
| 1. Concrete Ditch Lining | ~~5700~~ L.F. | 5700. | 3.50 | 20,000. |
| Gates | NO. | 12 (±) | 35.00 | 420. |
| 2. Low Pressure (50' Head) plastic 10" & 12" | L.F. | 5700 | | |
| ~~10~~ 12" ~~Gates~~ Gate valves | | 3 | | |
| ~~Ga~~ ~~Gates~~ V | | | | |
| 12" Alfa/Alfa Values | | 8 | 25.00 | 200. |
| (Homemade) Parshal Flumes | | 8 | 50 | 400. |

COPY

# Culiente Rehab. study.

Irrigation Supply Line, - Big Spring to Reservoir.

Distance: Big Spring to North Road Culvert, South of Arroyo Bridges -- 5,700. Ft.

At Present time conveyance is an open canal. with checks and turnouts, some of which are Armco Model 101 gates. Water loss, measured once with two parshall flume = 29.4 %
Yearly Maintenance costs required for cleaning canal.

Proposed: (~~several~~ alternates)

| Item | unit | Quantity | Installed unit cost $ | Installed Total cost $ |
|---|---|---|---|---|
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| Gate valves | No. | 3. | | |
| Alfalfa Valves | | 8. | 25.00 | 200. |
| House made Parshall Flume | | 8 | 50.00 | 400. |

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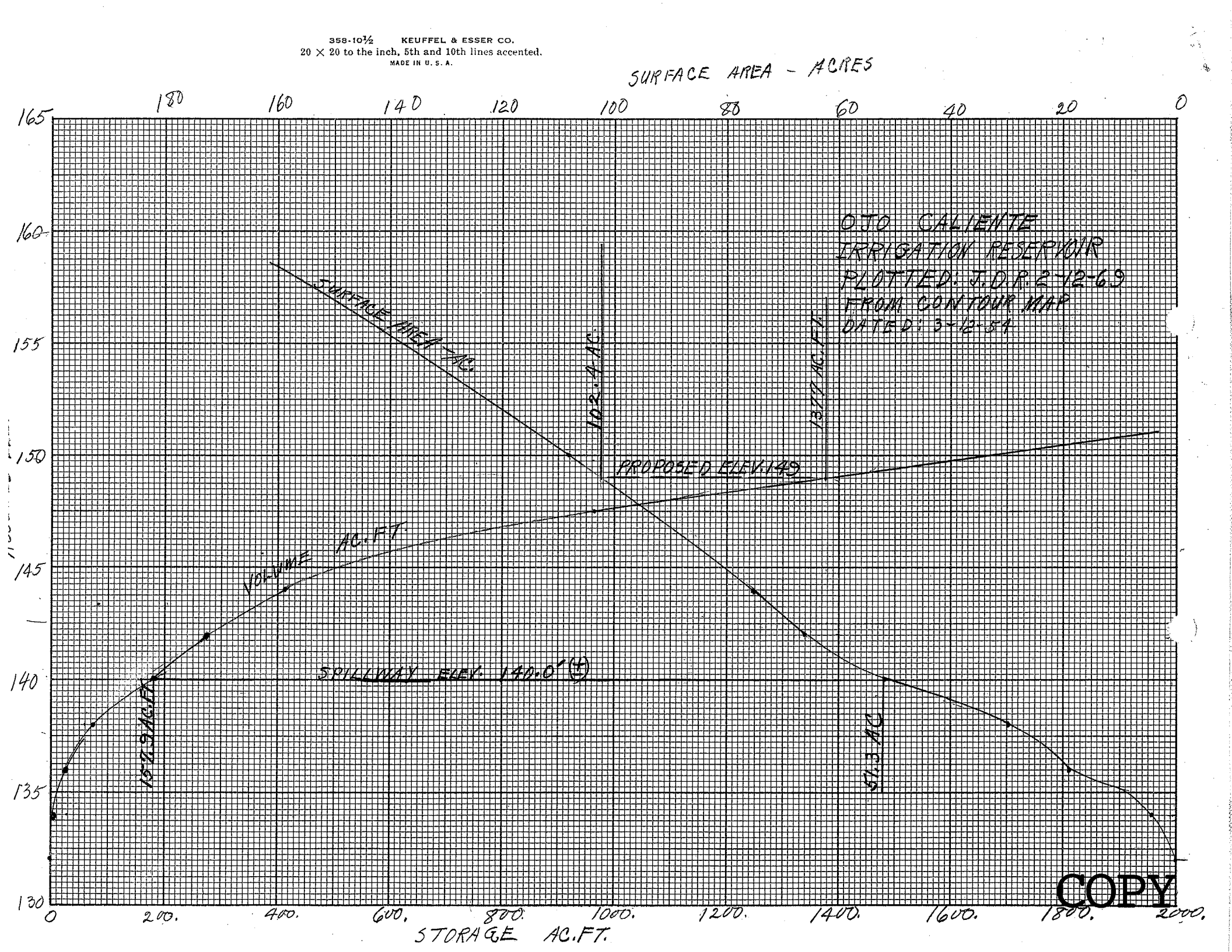


Form 5-161
(May 1951)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF INDIAN AFFAIRS

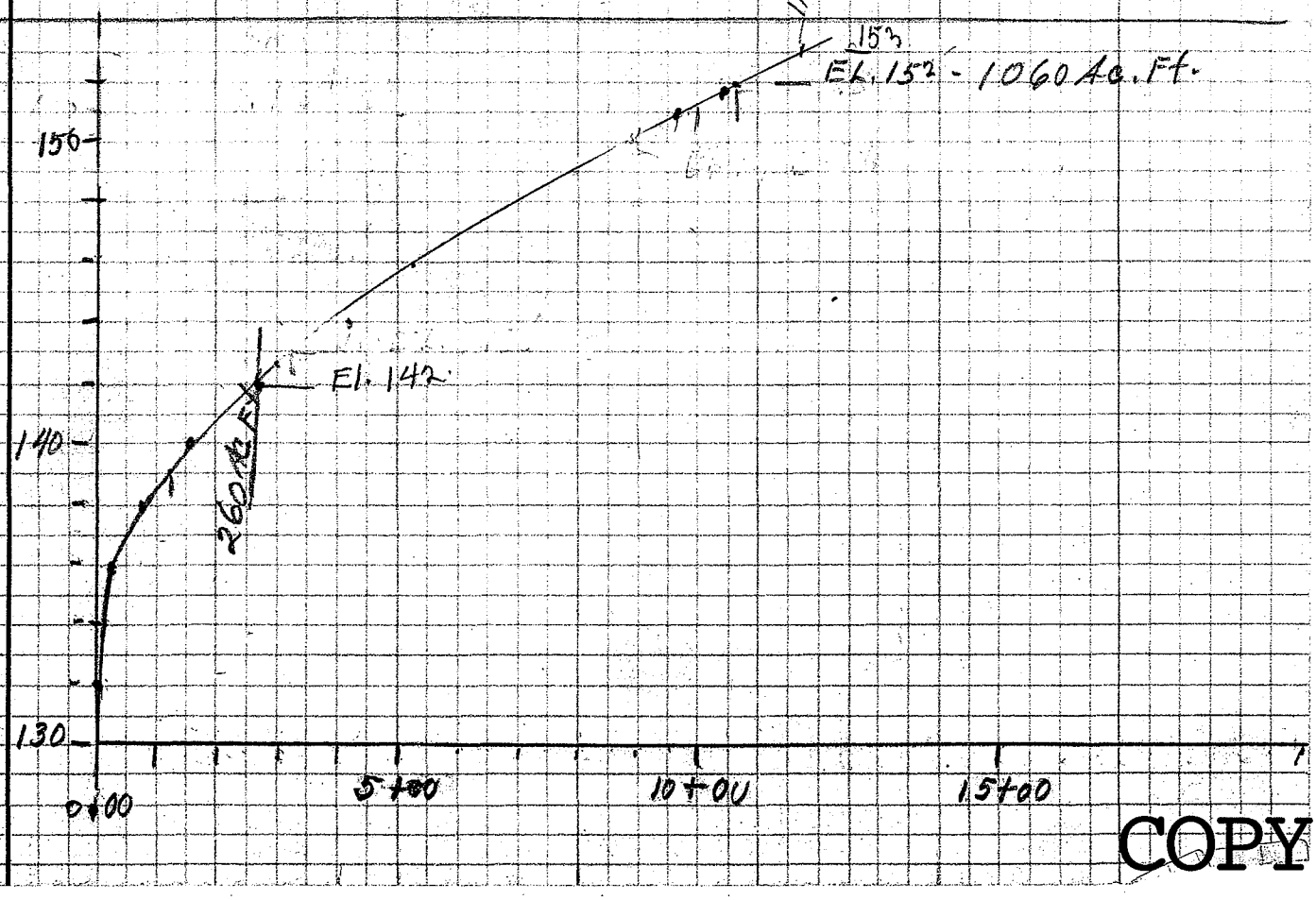
Subject Zuni Agency - Ojo Caliente Project (Irrigation Reservoir)

Date Febr. 11, 1965 Computer John D. Rigg

For other references see _____ Checked by _____

16—64642-1 U. S. GOVERNMENT PRINTING OFFICE

| CONTOUR ELEV. | READING SQ. IN. | AREA ACRES | INCREMENT STORAGE AC. FT. | ACCUM. STORAGE AC. FT. | | Map Scale 1" = 200' Dated |
|---|---|---|---|---|---|---|
| 132 | 0.35 | 0.32 | 4.78 | 4.78 | 134 | Mar. 12, 1954 |
| 134 | 4.86 | 4.46 | 23.36 | 28.14 | 136 | |
| 136 | 20.58 | 18.9 | 48.7 | 76.8 | 138 | |
| 138 | 32.57 | 29.8 | 81.1 | 157.9 | 140 | |
| 140 | 38.36+17.50 | 51.3 | 117.3 | 275.2 | 142 | 3.25. |
| 142 | 42.84+29.07 | 66.0 | 141.0 | 416.2 | 144 | |
| 144 | 47.96+33.74 | 75.0 | 549.0 | 965.2 | 150 | 10.45 |
| 150 | 35.7+81.70 117.4 | 108. | | | | |

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