TO: G. Arthur SHOEMAKER
STATE CONSERVATION ENGINEER

SUBJECT: ENG GEOL - Woodruff RC&D Project, Rich County, Utah

CODE: 210-16-11

LOCATION: Woodruff 7.5 USGS Topo Quad; Woodruff Creek Watershed area.

PURPOSE OF TRIP: The purpose of this trip was to assist the Biologist with groundwater data on wetland evaluations and the Civil Engineer in the a site reconnaissance for an irrigation diversion on Woodruff Creek. The trip was conducted on June 18, 1986.

PARTICIPANTS: Jay White, Civil Engineer, SCS, Logan, Ut
Kieth Lemon, Soil Conservation Tech., SCS, Randolf, UT
Bob Sennett, Biologist, SCS, Salt Lake City, UT
Bob Rasely, Geologist, SCS, Salt Lake City, Ut
Various Sponsors in Field, Woodruff Area.

WETLAND OBSERVATIONS: Woodruff Creek drainage area is approximately 90,000 acres (141 square miles) with the watershed outlet into the Bear River. The valley sides and bottom are underlain by slowly permeable to impermeable sedimentary rock. The valley is filled with highly permeable unconsolidated alluvium. There are extensive wetland areas throughout the lower portions of the watershed that are supported by natural groundwater flowing through the valley fill toward the Bear River. Numerous spring and seeps occur in the lower valley area.

There are two reservoirs upstream of the proposed structure sites: Woodruff Narrows Reservoir and a dam on Birch Creek. These reservoirs have resulted in a perennial flow to the downstream area (Woodruff Creek). These constant flows yield higher flows throughout the growing season then would have naturally occurred. The outflow from the reservoirs is a significant water support to the wetlands during the dry times of the year and therefore enhance the already high volume support the wetlands naturally receive.

The lower portion of the valley area is involved in the RC&D irrigation project. The project involves irrigation water management measures that will replace current pumped sprinklers and flood systems with gravity irrigation systems. This project will not eliminate any existing canals but will decrease the flow in the canal on the north side of Woodruff Creek valley. There are two proposed inlet structure sites located in the south half, section 13, T9N, R6E. These sites are approximately 500 and 2000 feet upstream of the present canal diversion point.

There are two major areas of concern to wetland policy as regards groundwater: (1) Will the project affect the water supply to existing wetlands throughout the project area, (2) Will the proposed upstream relocation of the diversion point and pipeline affect wetlands along the alignment.

WETLAND CONCLUSIONS: The wetlands of Woodruff Creek valley are supported by a regional groundwater regime that results in surface to

near surface flows in the project area. The wetlands appear permanent. Wet soils are present in the project area. The wetlands can be characterized as over-supplied with water. Project implementation will result in no impact to the wetlands of the area.

GEOLOGIC ENGINEERING OBSERVATIONS: Two proposed sites were identified in the field for location of the diversion in Woodruff Creek for purposes of obtaining gravity irrigation. The sites are located in the south half, section 13, T9N, R6E (see attached map). The sites are approximately 1500 linear feet apart. The gradient of the creek is approximately .7 feet per 100 feet; the upstream site will give about 10 feet more head pressure then the downstream site. The upstream site is about 500 feet from the valley wall and the downstream site is about 1000 feet from the valley wall. Both sites will entail buried pipe installation within a high groundwater regime (groundwater at the surface): the upstream site would have about 500 feet and the downstream site would have about 1000 feet.

A major consideration in the design of the diversion inlet structure will be the saturated foundation material. The alluvium at the two proposed sites is SILTY SAND (SM) with a field log of 60% fine sand and 40% silt. Ground water is at the surface at both sites. The (SM) is saturated at both sites.

The (SM) material is moderately erosive. The creek is actively meandering at both sites. The meander process should be taken into consideration in the design of the structure; erosion of the wing walls or abutment walls is a potential problem. Flood flows are a potential erosion problem for the proposed sites. Flood flows could overtop a structure or erode material from the sides of a structure. The design of the structure should allow for flood flows.

The creek is actively meandering and processing sediment through the fluvial system. There is a bar of sediment built up behind drop-diversion structures at both of the proposed sites. The sediment is a silty sand (SM) similar to the stream bank and bottom material. No estimate of sediment transport was made at this time. It appeared that the stream has been affected by Utah's recent set of wetter then normal years. The access road to Woodruff Narrows Reservoir upstream of the proposed sites had been damaged by erosion due to meandering during this Spring. There was two stages of down cutting (encising) of Woodruff Creek in the reaches of Woodruff Creek near the failure of the access road. About 3-4 feet of down cutting with a cross section of about 10 feet in width was evident for each stage. That resulted in an encised channel of 6-8 feet in depth over the last 2 or 3 years. The delivery of the finer portions of the eroded sediment to the lower reaches of Woodruff Creek is causing the active meandering to occur at an increased annual rate. Therefore, the design will have to account for some sediment load.

ENGINEERING GEOLOGY CONCLUSIONS: There are four geologic considerations that should be taken into account in the design of the gravity diversion measures at either of the proposed sites:

(1) Groundwater levels are at or near the surface where buried pipe is proposed. Buoyancy problems should be addressed in the design.

(2) The foundation material is an (SM) and is saturated - bearing capacity of the foundation material should be addressed in the design.

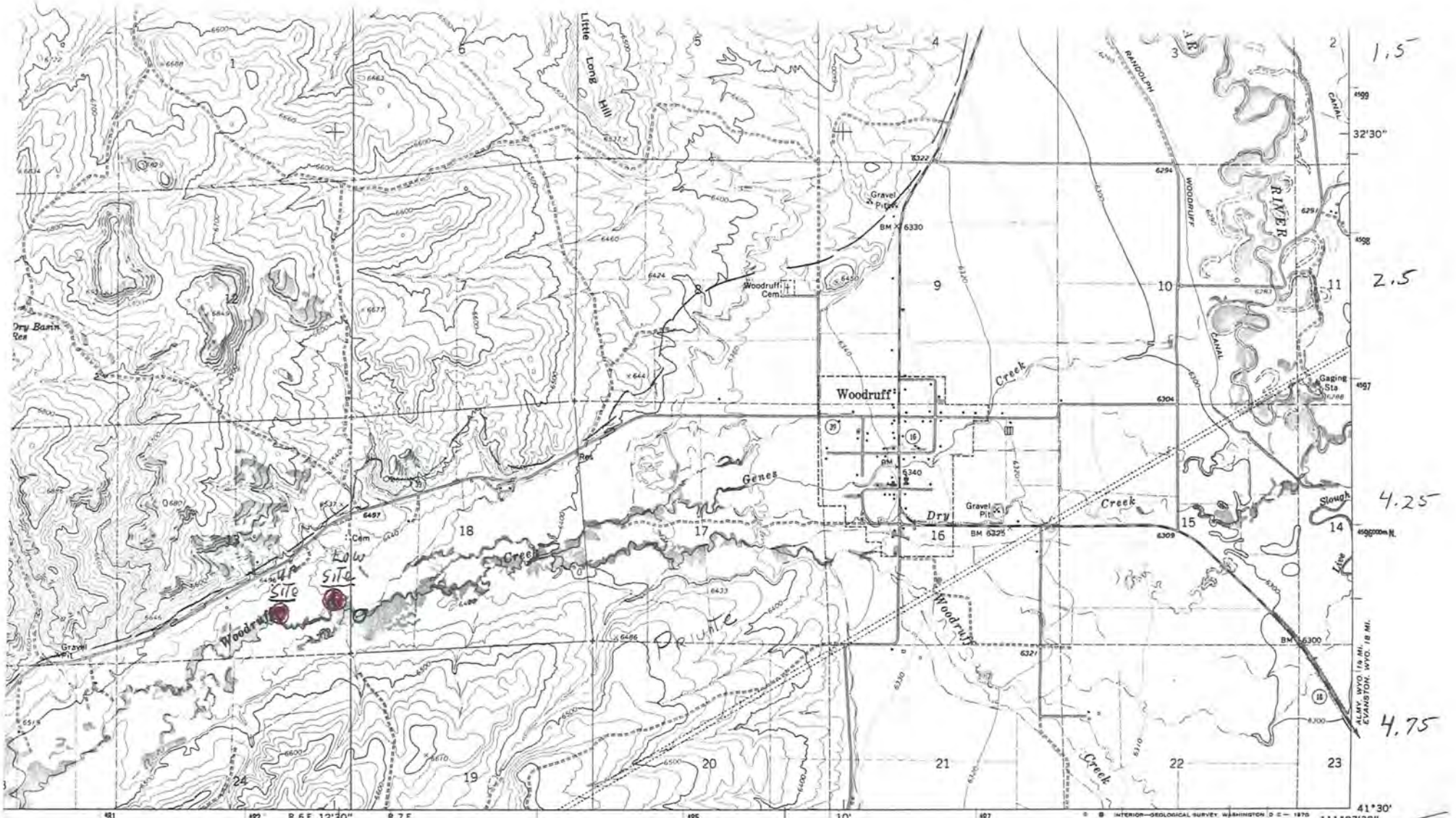
(3) The creek bank and bottom material is erosive. Whatever type of abutment is considered should account for erosion and overtopping by flood flows.

(4) The creek is actively transporting sediment by suspension and bedload. The sediment load should be taken into account in the design of the inlet structure. At each proposed site there was a sediment bar deposited behind a grade drop-diversion structure in the creek bed.

The support of the field office personnel was very helpful in rapid accomplishment of the purpose of this trip. The scheduling of the geologist at an early stage in the development of structure locations is appreciated; it allows for interdisciplinary coordination in site determinations before a site becomes a problem to reconsider.

Robert C Rasely

ROBERT C. RASELY
Geologist



the Geological Survey

ods from aerial
ked 1968

merican datum
dinate system, north zone
rcator grid ticks,

d fence lines

UTM GRID AND 1968 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

SCALE 1:24 000

1 MILE
1000 0 1000 2000 3000 4000 5000 6000 7000 FEET
1 KILOMETER

CONTOUR INTERVAL 20 FEET
DOTTED LINES REPRESENT 10-FOOT CONTOURS
DATUM IS MEAN SEA LEVEL

ROAD CLASSIFICATION

Secondary highway, all weather, hard surface
Light-duty road, all weather, improved surface
Unimproved road, fair or dry weather
State Route

UTAH
QUADRANGLE LOCATION

THIS MAP COMPLIES WITH NATIONAL MAP ACCURACY STANDARDS
FOR SALE BY U.S. GEOLOGICAL SURVEY, DENVER, COLORADO 80225, OR WASHINGTON, D.C. 20242
A FOLDER DESCRIBING TOPOGRAPHIC MAPS AND SYMBOLS IS AVAILABLE ON REQUEST

WOODRUFF, UTAH

N4130—W11107.5/7.5

1968

AMS 3767 II SW—SERIES V897