

# INVESTIGATIONS

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## **Geology & Ground Water Resources In Vicinity of the Columbia River And Interstate 5, Clark County Washington. No. 4**

state of washington  
**department of ecology**  
daniel j. evans  
governor  
john a. biggs  
director  
**olympia, washington**  
october, 1971

An investigation of the geology and ground-water resources along State Highway 205 from the Columbia River to Interstate 5. Testing was done to determine the quantity and quality of ground water available in the area. Prepared by Paul A. Eddy, Office of Technical Services, Department of Ecology, Olympia, Washington, March 1971.

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## Purpose and Scope of the Investigation

This study was initiated upon receipt of a letter dated September 17, 1970 sent by the Chief Right of Way Agent, Department of Highways, requesting information about present and future ground-water availability and possible adverse effects which could be incurred by construction of the SR 205 freeway.

The scope of this study was set to include several determinations which are:

1. Ascertain the availability of ground water to the present site.
2. Determine direction of ground-water flow.
3. Conduct a pump test in order to obtain specific information about the well behavior.
4. Determine possible damage to the well by nearby construction.

The study consisted of a general geologic reconnaissance of the area and a pump test of the well in question. Additional information was obtained from the files of the Department of Ecology.

## Location and Topography of the Area

The well in question lies geographically near the southwestern edge of Clark County and is within Township 3 North, Range 2 East of the Willamette Meridian, Section 31. The altitude of the well is approximately 255 feet above sea level and lies in a flat area which is southeast of the starting points of an unnamed branch of Salmon Creek. The well is located behind the house approximately 150 feet and on a line with the east edge of the garage. (Fig. 1)

## Geology and Ground Water

The geology of this area consists of three primary rock units and they are as follows:

Older Consolidated Rocks - Included in this group are the Goble volcanic series, the Eagle Creek formation, the Keechelus andesitic series (Skamania andesite series of Felts, 1939), the Columbia River Basalt, and intrusive rocks of one or two areas such as the Silver Spring granodiorite stock (Felts 1939). With few exceptions these older consolidated rocks crop out only in the foothills and are in areas which are largely uninhabited, the rocks are not economically important as aquifers.

Troutdale Formation - This unit consists of: Semiconsolidated clay, silt, sand, and gravel and is the most widespread formation with its' upper unit considered to be one of the most productive aquifers in the county. Wells drilled into the sand and gravel strata of the upper Troutdale formation generally have a moderate to high permeability thus yielding moderate to large supplies of water except where the unit has been badly weathered.

Pleistocene Alluvial Deposits - This unit also goes by the synonym "Portland Delta Gravels" which are sand and gravel which has a comparatively fresh and unweathered appearance. In general the material is well sorted, but the degree of sorting is much better in the finer grained phases than in the coarse phase. In places the gravels are lightly cemented, but not enough so that the porosity is greatly reduced.

The stratigraphic unit in which this well is located is the Pleistocene Alluvial deposits of the Forth Plains Area. It has been indicated that wells located between Salmon Creek and Burntbridge Creek obtain moderate yields from coarse sand and gravel which are chiefly the result of reworking the alluvial delta deposits and part of the upper member of the Troutdale Formation. The reworked gravels are comparatively shallow, 10-25 feet thick, and apparently directly overlie the Troutdale Formation. (Fig. 2)

Pump Test Data

The following table indicates the response of this well to pumping. The pump size was not obtained but it was indicated that it was a 2 or 3 horsepower submersible which yield 5 gallons of water in 32.3 seconds and 33.1 seconds respectively.

General well information is shown on Figure 3.

October 14, 1970

Pumping Data Hour	Water Level below Top of Casing	Remarks and Time Interval
2:02 PM	16.50	Pump on
2:02	16.85	30 Seconds
2:05	16.42	3 Minutes
2:07	17.20	5 "
2:10	17.53	8 "
2:12	17.95	10 "
2:22	21.81	20 "
2:39	21.85	37 "
2:44	21.85	42 "
2:50	21.85	48 "
2:53	21.85	51 "
3:00	21.85	58 "

It is noted that the water level did not change after 37 minutes into the test. It is assumed that the water was drawn down below the top of the submersible pump and the constant reading was obtained by shorting out our measuring device on the top of the pump.

At 20 minutes into the test it was noted that air was being pumped along with the water which also indicates that the water level had dropped to the level of intake.

3:00 PM	21.85	Pump Off
3:00	19.40	30 Seconds
3:02	18.40	2 Minutes
3:03	18.20	3 "
3:04	18.00	4 "
3:06	17.90	6 "
3:08	17.75	8 "
3:10	17.66	10 "
3:12	17.45	12 "
3:15	17.23	15 "
3:19	17.00	19 "
3:24	16.68	24 "
3:27 PM	16.50	27 Minutes

Full recovery of the well.

#### Conclusion

Over the 58 minute pump test this well produced approximately 580 gallons of water. The well showed no indication of pumping dry. It appears that the present pump has too large of a capacity for the well. It probably produced in excess of 10 gallons per minute until the water level was drawn down to the intake. At this point the discharge most likely decreased to the quantity which was measured and the well then maintained an equilibrium at the discharge.

The specific capacity of the well is 1.9 gallons per minute per foot of drawdown based on the conducted pump test. (Fig. 4)

The total recovery time for this pump test was 27 minutes.

This well will produce the required water of 300 gallons per day (4 person family, 200 gallons per person) pumped on a continuous basis.

The sample tested by the County Health Office indicated that the (M-F) of bacteria of the coliform group had a count which was less than 1 per 100 milliliter of water. At this level of contamination by non-pathogenic coliform, the risk of contracting disease by drinking the water is virtually zero. This water did however have a soapy taste. Source unknown.

The general direction of ground-water flow appears to be from the southeast through an old abandoned canal of the Columbia River. For this reason it does not appear that contamination from construction should occur. However, the owner stated that a large cut is to be constructed in this area. The well should therefore be monitored if ground-water is found in the proposed cut. A possible drop of the water table might result if said water table is encountered in the road cut. (Fig. 5)



## REFERENCES

Mundorff, M. J., 1964, Geology and Ground-water Conditions of Clark County, Washington, with a Description of a Major Alluvial Aquifer Along the Columbia River: Washington Department of Conservation Water Supply Bulletin No. 9, pgs. 31, 32, 33, and 49.

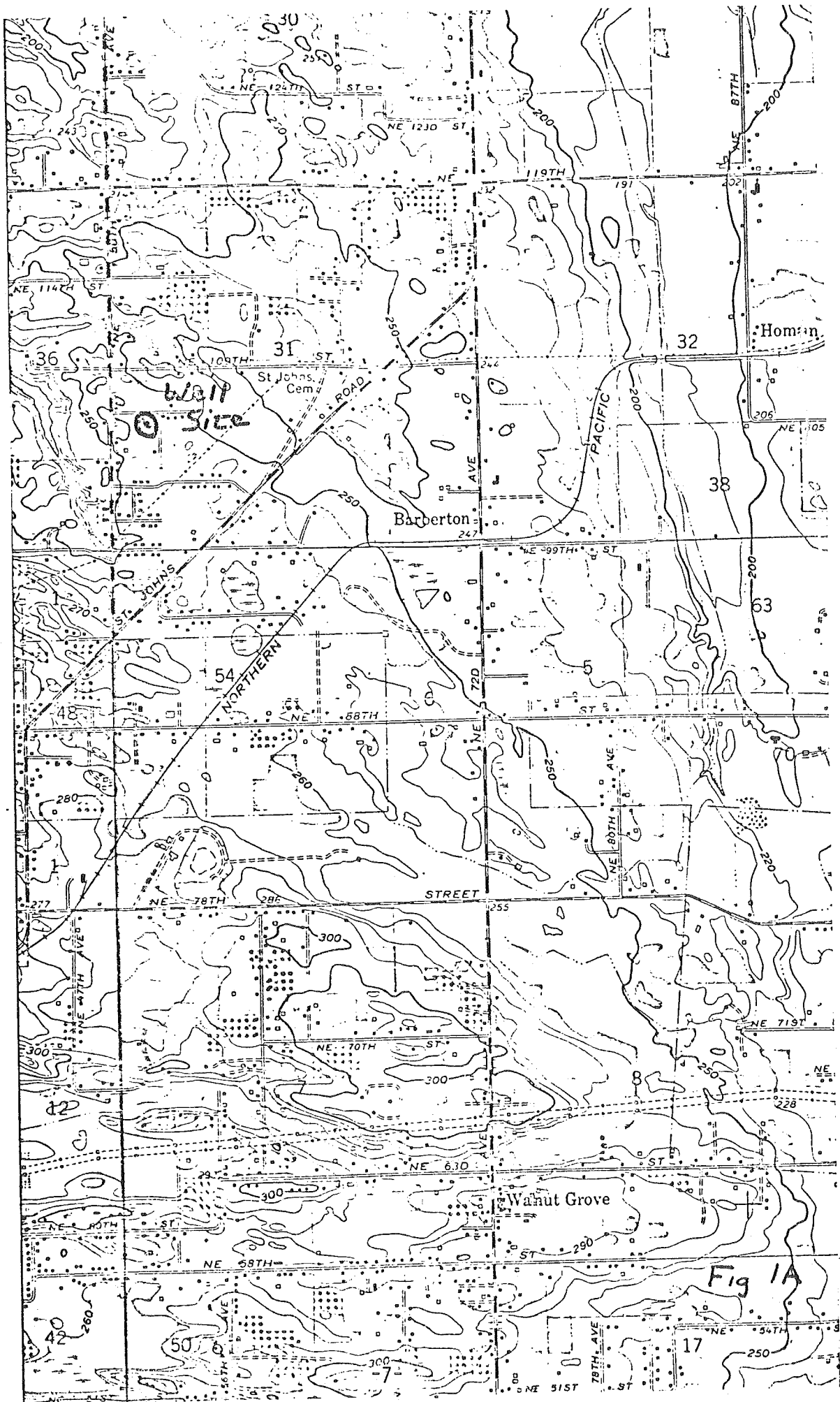
Washington State Department of Health, Bulletin ES No. 4, pg. 10.



APPENDIX I

FIGURES 1-5

PAGES 7-12



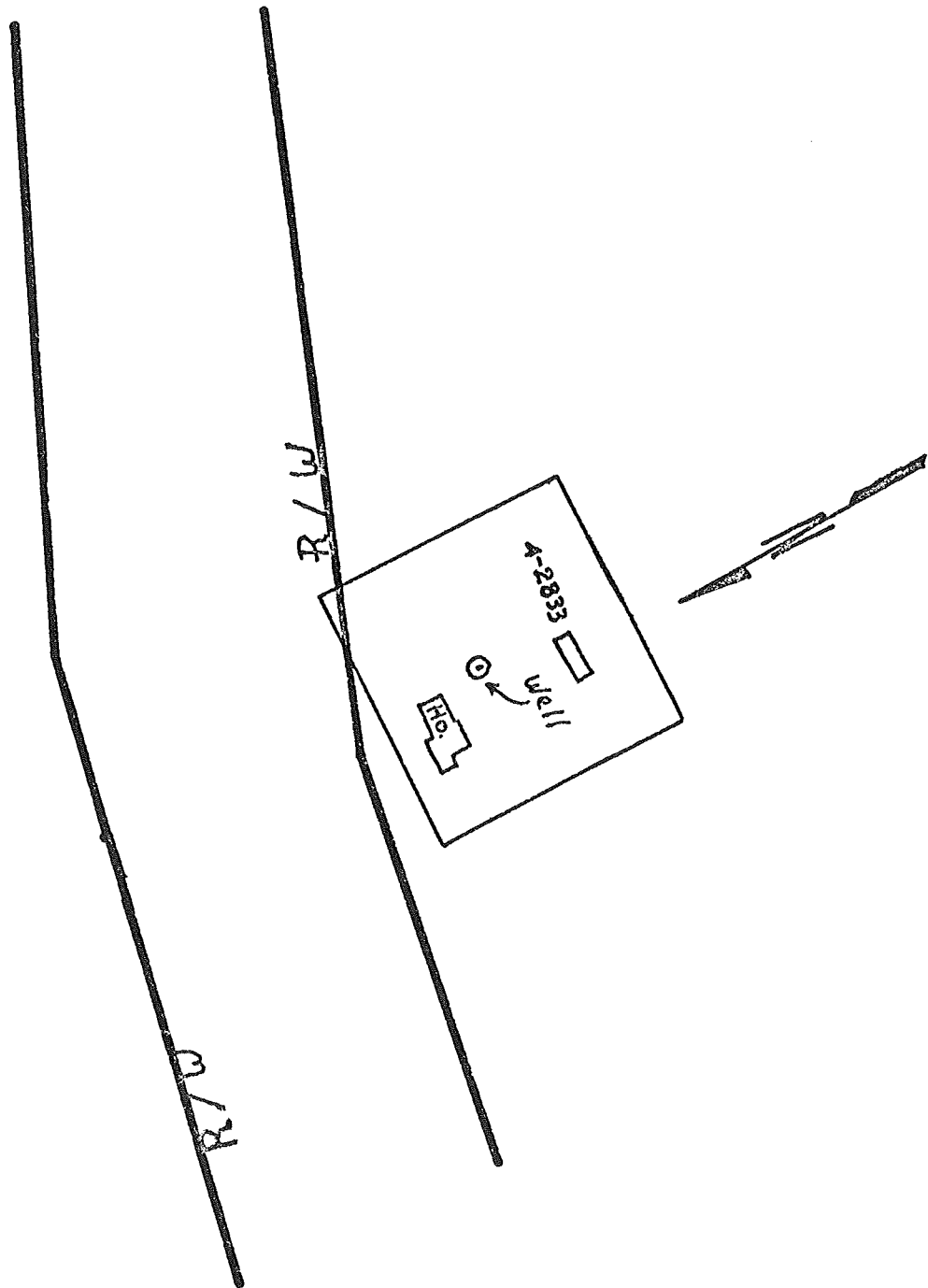


Figure 1

WELL SCHEDULE

Date October 19 70

Record by Paul A. Eddy

Source of data Field

1. Location: State Washington County Clark

Map Orchards Well No. 3/2E-31 NW 1/4 SW1/4

2. Owner Ray T. Stillman Address 5115 N. E. 107th St.

Tenant \_\_\_\_\_ Address \_\_\_\_\_

Driller \_\_\_\_\_ Address \_\_\_\_\_

3. Topography Flatland

4. Elevation 255 ft. ~~below~~ <sup>above</sup> Sea level

5. Type: Dug, drilled, driven, bored, jetted \_\_\_\_\_ 19 \_\_\_\_\_

6. Depth: Rept. 23 ft. Meas. 30.5 ft.

7. Casing: Diam. 6 in., to \_\_\_\_\_ in., Type \_\_\_\_\_

Depth \_\_\_\_\_ ft., Finish \_\_\_\_\_

8. Chief Aquifer \_\_\_\_\_ From \_\_\_\_\_ ft. to \_\_\_\_\_ ft.

Others \_\_\_\_\_

9. Water level 16.5 ft. ~~Rept.~~ <sup>meas.</sup> October 19 70 ~~below~~ <sup>above</sup> T/C \_\_\_\_\_

\_\_\_\_\_ which is 0.4 ft. ~~below~~ <sup>above</sup> surface

10. Pump: Type Submersible Capacity 10 G.M. \_\_\_\_\_

Power: Kind \_\_\_\_\_ Horsepower \_\_\_\_\_

11. Yield: Flow \_\_\_\_\_ G.M., Pump \_\_\_\_\_ G.M., Meas., Rept., Est. \_\_\_\_\_

Drawdown 5.25 ft. after 1 hours pumping 10 G.M.

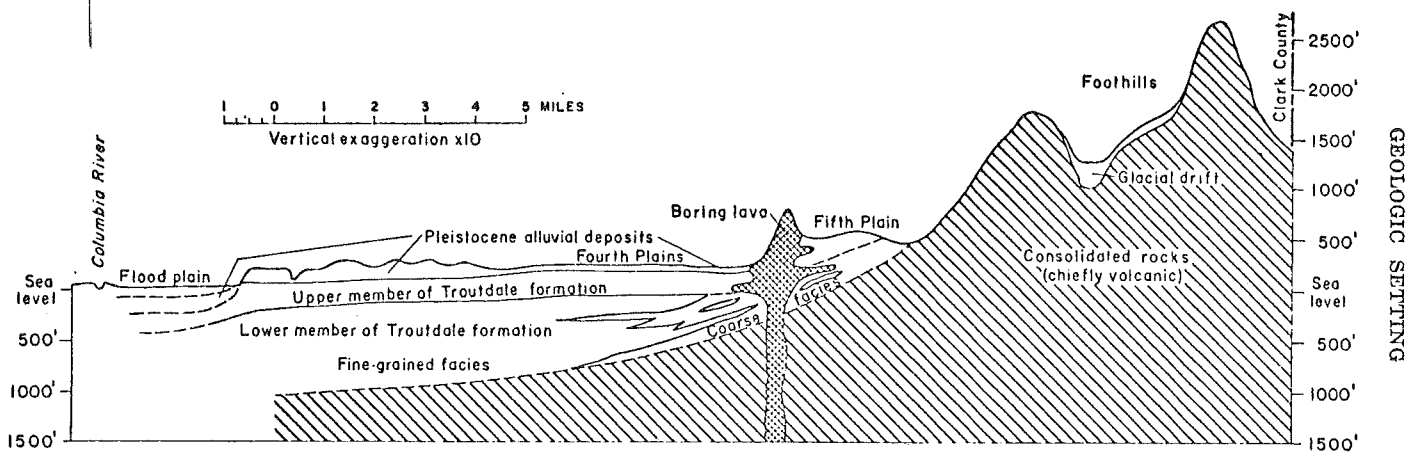
12. User: Dom., Stock, PS., RR., Ind., Irr., Obs. \_\_\_\_\_

13. Quality \_\_\_\_\_ Temp. 12 °C

Taste, odor, color Soapy, none, none Sample Yes No \_\_\_\_\_

< 1/100 ml Coliform \_\_\_\_\_

14. Remarks: (Log, Analyses, etc.) \_\_\_\_\_



Generalized east-west section across Clark County.

Figure 3

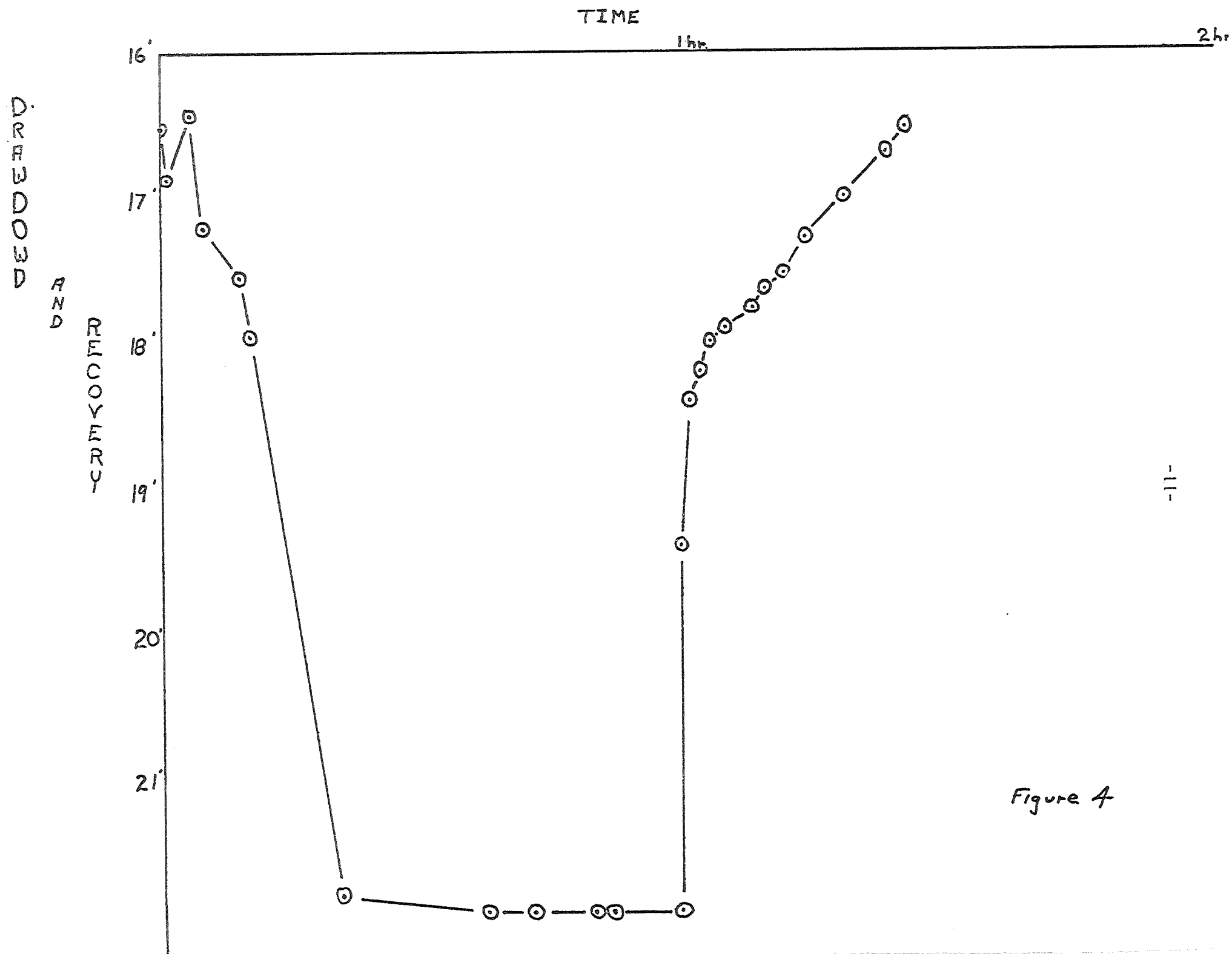
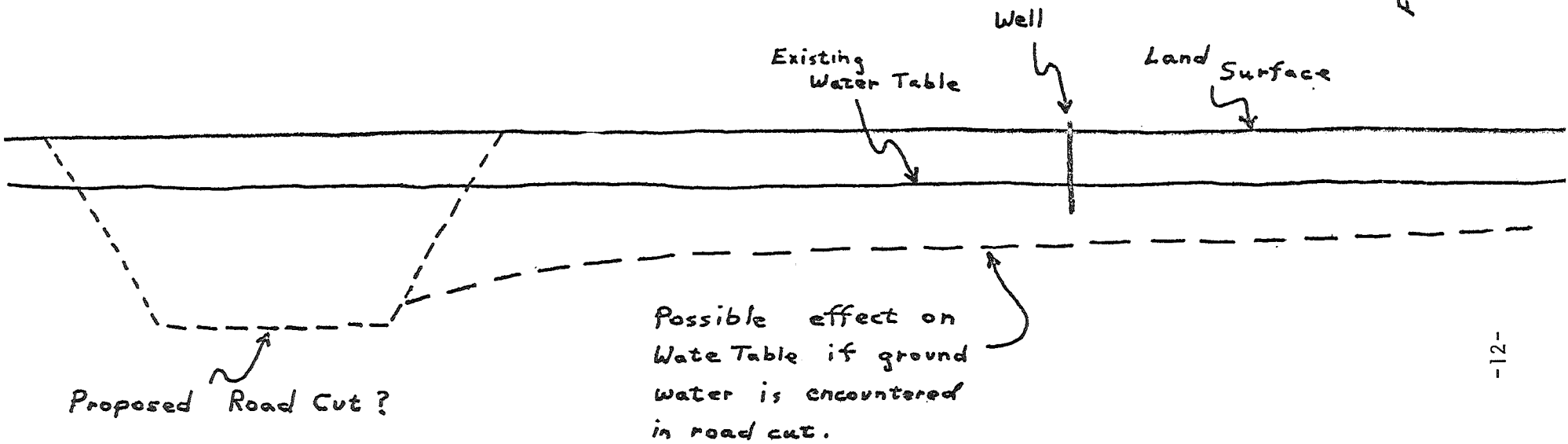


Figure 4

Figure 5



No Scale



APPENDIX II

REQUEST LETTER

STATE OF WASHINGTON  
DANIEL J. EVANS, GOVERNOR



WASHINGTON  
STATE HIGHWAY COMMISSION  
DEPARTMENT OF HIGHWAYS

G. H. ANDREWS, DIRECTOR  
HIGHWAYS-LICENSES BUILDING  
OLYMPIA

May 11, 1970

DISTRICT OFFICES

- NO. 1 SEATTLE 98103  
8431 SO. CORSON AVE.
- NO. 2 WENATCHEE 98901  
P. O. BOX 93
- NO. 3 OLYMPIA 98501  
P. O. BOX 327
- NO. 4 VANCOUVER 98663  
4200 MAIN STREET
- NO. 5 YAKIMA 98901  
P. O. BOX 52
- NO. 6 SPOKANE 99205  
N. 2714 MAYFAIR ST.
- NO. 7 BELLEVUE 98004  
10506 N.E. 4TH ST.

- COMMISSIONERS
- GEORGE D. ZAHN, CHAIRMAN  
METHUEN
  - ROBERT L. MIKALSON  
CENTRALIA
  - HAROLD WALSH  
EVERETT
  - BAKER FERGUSON  
WALLA WALLA
  - JOHN N. RUPP  
SEATTLE
- 
- LORENZ GOETZ, SECRETARY  
OLYMPIA

Department of Water Resources  
General Administration Building  
Olympia, Washington 98501

Attn: Glen H. Fiedler  
Water Management Division

Re: SR 205, Columbia River to  
Jct. SR 5; Parcel 4-2833

Gentlemen:

Attached hereto is a map showing a portion of the above-mentioned highway as it relates to a parcel recently purchased from Raymond Stillman, and wife. Stillman's original ownership is shown outlined in yellow, the portion acquired by the State shaded in green and the location of an existing shallow well outlined in red. Included as a condition in acquiring the above-mentioned parcel is that should any legally compensable damages occur to said well by reason of the construction, operation or maintenance of said highway, it shall be the subject of further negotiations.

In order to provide a basis for such further negotiations, if necessary, we would like to ask your department's assistance in making a test of the well as to volume and potability.

It is our feeling that a complete chemical analysis is not needed. The Negotiating Agent points out that this is a shallow well and probably should not be tested during a wet season or a dry season as it would tend to reflect maximum and minimum flows.

For purposes of arranging for, and accomplishing this test, our Mr. John Logan in Vancouver (Scan Telephone No. 8-732-1251) stands ready to assist you in any way necessary. Thank you for your help in this matter.

Very truly yours,

G. H. ANDREWS  
Director of Highways

By: J. ARNOLD COBLEY  
Chief Right of Way Agent

RECEIVED  
DEPARTMENT OF WATER RESOURCES

MAY 12 1970

110 111 112 113 114 115 116 117 118 119 120 P.M.

GHA:bb  
TBC  
Encl.

cc: R. L. Carroll  
John Logan, Dist. #4