Oregon Department of Transportation

BID FORM AND INTERIM SALES AGREEMENT

FILE NUMBER	44465
DISTRICT NUMBER	5
COUNTY NUMBER	20
AREA (SQ.FT./ACRES)	13,068 +/-

OPEN BID

APPRAISED VALUE: $74,000

AMOUNT OF BID $ _____

LESS DEPOSIT $ _____

TOTAL BALANCE DUE $ _____

CONDITIONS OF SALE:

- Subject to the completion and approval of the Legal Lot Validation, or other procedure(s) as required by the County of Springfield Planning Department to establish 'Legal Lot Status'. Buyer to complete and assume all costs.
- Special assessments, existing restrictions, reservations and easements, if any
- Subject to the rights of any utilities located within said property and further subject to the rights of said existing facilities, if any there be, to operate, reconstruct, and maintain their utility facilities presently located within said property.
- State shall deliver an Oregon Department of Transportation Bargain and Sale Deed. State's deed shall be subject to all standard covenants, conditions, restrictions, and reservations contained therein.
- State will not retain mineral and geothermal rights.
- The State of Oregon does **not** provide Title Insurance.
- Access: No access language will be included for the parcel.
- Access to this property is not guaranteed by the State of Oregon. The purchaser is advised to contact the local jurisdiction to assure that they will have the ability to use such access when the purchased property is used for any particular purpose. ODOT makes no representation concerning access to local streets or roads.
- Property Sold AS-IS: Property to be sold “As Is” with all defects, if any. Grantee waives, releases and forever discharges Grantors of and from all claims, actions, causes of action, fines, penalties, damages (including consequential, incidental and special damages), costs (including the cost of complying with any judicial or governmental order), and expenses (including attorney fees), direct or indirect, known or unknown, foreseen or unforeseen, which may arise on account of or in any way growing out of or in connection with any physical characteristic or condition of the Property, including any surface or subsurface condition, or any law, rule or regulation applicable to the Property.

- Purchaser will have an opportunity to examine the Property to its own satisfaction and will form its own opinion as to the condition (including environmental condition) and value thereof. State will not provide, and Purchaser shall not rely on, any statements or representations from State or any person acting on behalf of State concerning any of the following, except as expressly provided otherwise in the Agreement, including the following:

a) the size or area of the Property or any of the parcels of the Property;
b) the location of corners or boundaries of any parcel of the Property;
c) except as disclosed in the Agreement, the condition of the Property, including but not limited to, environmental conditions above or below the surface of the Property or compliance with environmental laws and other governmental requirements;
d) the availability of services to the Property;
e) the ability of Purchaser to use the Property or any portion thereof for any intended purpose;
f) or any other matter affecting or relating to the Property or any portion thereof.
g) Grantee is acquiring the Property, both above surface and below surface, in the condition existing at the time of closing.

The undersigned as bidder, hereinafter referred to as "Purchaser" agrees to the terms set forth in the "Terms of Sale", which terms are incorporated herein by reference and made a part hereof and agrees to pay the STATE OF OREGON, by and through its Department of Transportation, hereinafter referred to as "State" the sum indicated above as the "Amount of Bid", for parcel described on Exhibit "A" attached.

Accompanying the bid is a check payable to the Department of Transportation, in the amount of $_____. Property to be purchased on a (☐cash ☐contract) basis. Balance of (☐purchase price ☐down payment), in the amount of $_____, to be in the form of a Cashier's Check to be paid by _____. Contract interest shall be _____. Contract balance will be amortized over _____ years.

The payment shall be applied to the bid for the property on which the undersigned is the successful Purchaser. In the event Purchaser fails to pay the balance due in the time specified, or meet contract terms when executed, all rights of the Purchaser in said real property shall cease and all right, title and interest in said real property shall continue to remain vested in the State, free of any claim or equity in the undersigned Purchaser or those claiming through the Purchaser, and the State shall retain all payments or deposits as liquidated damages for failure of Purchaser to complete the purchase or meet the conditions of the contract.

PLEASE READ THE FOLLOWING BEFORE SIGNING

REAL PROPERTY TERMS OF SALE

CASH SALE: Cash or check in the amount stated in the sale advertisement at time of bid, balance to be paid WITHIN 60 DAYS. It is understood that the bidder acquires no right, title, interest or equity in or to said real property until full purchase price has been paid.
CONTRACT SALE: Final contract terms will be as provided in the sale advertisement for this property, plus the following:
UNPAID BALANCE: Purchasers may pay all or any part of the balance due on this contract at any time prior to the time herein specified and required.
IMPROVEMENTS: All existing buildings and improvements and those hereafter placed upon premises shall be kept in good repair by Purchasers and not be removed prior to final payment under this contract. Purchasers will obtain State's written consent before altering or adding to any building on premises.
INSURANCE: Purchasers shall keep the buildings now located or hereafter placed on premises constantly insured against loss by fire in amounts which are at least equal to the balances due State under this contract. The fire insurance which shall include extended coverage shall be written in the name of the Purchasers with loss, if any, payable to State to the extent of its interest, balance, if any, payable to Purchasers. Purchasers shall deliver to State certificates of coverage from each insurer containing a stipulation that coverage shall not be canceled or diminished without a minimum of 30 days written notice to State. In the event of loss, Purchasers shall give immediate notice to State. State may make proof of loss if Purchasers fail to do so within 15 days of the loss.
INSURANCE FOR OTHER THAN SINGLE FAMILY DWELLING, in addition to the above insurance requirements; During the term of this contract, Purchasers shall maintain public liability and property damage insurance with limits of not less than $50,000 for any number of claims for any number of claims for damages to or destruction of property, including consequential damages, arising out of a single accident or occurrence; $100,000 for all other claims arising out of a single accident or occurrence and $1,000,000 for any number of claims arising out of a single accident or occurrence. Such insurance shall cover all risks arising directly or indirectly out of Purchasers' activities on or any condition of Premises whether or not related to an occurrence caused or contributed to by State's negligence; shall protect Purchasers against the claims of State on account of the obligation assumed by Purchasers under the contract, and shall protect State and Purchasers against claims of third persons. State shall be named an additional insured to such policy. Such policies shall be written in such form with such terms and by such insurance companies acceptable to State. Purchasers shall deliver to State certificates of coverage from each insurer containing a stipulation that coverage will not be cancelled or diminished without a 30 day prior written notice to State.
TAXES AND ASSESSMENTS: State will pay all real property taxes assessed against premises and improvements thereon, as said real property taxes become due, or in advance of the due date thereof and add said taxes to the principal balance due on the purchase price of premises. Except as herein otherwise provided, the amount of the monthly payments under this contract will be adjusted on January 1st of each year thereafter to reflect the amount of the annual real property taxes assessed against premises and improvements thereon. Except for the real property taxes as hereinabove provided, Purchasers agree to regularly and seasonally pay all other liens, assessments and charges, including local improvement assessments, which are or may be hereafter lawfully imposed or which constitute or will constitute liens or encumbrances against premises. If Purchasers fail or refuse to pay and discharge any of the above mentioned liens, assessments or charges prior to the time they are to become delinquent, State, at its option, may pay the same and add the amount expended to the balance of the purchase price.
DEED: In case Purchasers, their legal representatives or assigns, shall pay the several sums of money aforesaid, punctually and at the time above specified, and shall strictly and literally perform all and singular the agreements and stipulations aforesaid, according to the time, intent, and tenor thereof, then State will give unto Purchasers, their heirs or assigns, upon request and upon surrender of this contract, a deed of conveyance conveying premises.

ASSIGNMENT: Purchaser shall not sell, assign, or transfer this contract without the prior written consent of State. As a condition to such consent, State will collect a transfer fee and may elect to increase the interest rate hereunder from the date of such transfer of sale. Any such increase in interest shall entitle State to increase the monthly payments hereunder so as to retire the obligation created by the contract within the advertised term.

DEFAULTS: Time and the prompt and punctual payment of all sums payable hereunder, and the exact performance and observance of each and all of the agreements and provisions herein contained, are in each and every case of the essence of this contract. If Purchasers fail to pay, when the same becomes due as herein provided, any of the installments specified herein, or become delinquent in the payment of said installments or any of them or in the payment of any assessments levied or assessed or becoming payable against premises, or fail to keep premises free from liens and encumbrances accruing after this date, or otherwise fail to keep and perform the agreements herein, State may take any one or more of the following steps: (a) Terminate this contract by giving Purchasers a 30-day notice in writing of its intentions to do so, and upon the expiration of said 30-day period and the continued default in any covenant or condition by Purchasers during such period, then State may, without tender of performance or suit or action, declare this contract null and void, and all the rights of Purchasers in said contract and all their estate, equity interest or right of possession in premises shall cease and terminate, and all payments made by Purchasers to State, whether principal or interest, or for taxes, liens or assessments, and including any and all buildings and improvements upon premises, shall be forfeited to State, the same being considered liquidated damages for the nonperformance of this contract, and State shall have the right of immediate possession of premises without the necessity of court action; (b) Elect to consider this contract existing, and, in case of a continued default by Purchasers for a period of 30 days after notice to Purchasers calling attention to such default, State may declare the whole of the unpaid balance due on this contract, together with all accrued interest, immediately due and payable; (c) Foreclose this contract by a suit in equity; and/or (d) Specifically enforce the terms of this contract by a suit in equity.

In the event any suit or action is brought by State to enforce the collection of the balance due on this contract and interest, or to obtain possession of premises in the event Purchasers fail to surrender the same peaceably on default or for the collection of any unpaid installment or installments, Purchasers agree to pay such reasonable attorney's fees and other costs as the court may allow the State.

DEFAULTS FOR OTHER THAN SINGLE FAMILY DWELLINGS: In addition to the above default provisions; State shall be entitled to the appointment of a receiver as a matter of right, whether or not the apparent value of the premises exceeds the amount of the balance due under this contract, and any receiver appointed may serve without bond. Employment by State shall not disqualify a person from serving as a receiver. Upon taking possession of all or any part of premises, the receiver shall (a) Use, operate, manage, control, and conduct business on premises and make necessary expenditures for all maintenance and improvements as in its judgement are proper; (b) Collect all rents, revenue, income, issues, and profits from premises and apply such sums to the necessary expenses of use, operation and management; and/or (c) At State's option, complete any construction in progress on premises, and in that connection pay all bills, borrow funds, employ contractors, and make any changes in plans and specifications as State deems appropriate.

Purchasers hereby assign to State all rents, revenues, income issues from premises, whether now or hereafter due. Prior to default, Purchasers may operate and manage premises and collect the income from premises. In the event of default and at any time hereafter, State may revoke Purchasers right to collect the income from premises and may, either itself, or through a receiver, collect the same. To facilitate collection, State may notify any tenant or other user to make payments or rents or use fees directly to State. If the income is collected by State, then Purchasers irrevocably designate State as Purchasers attorney-in-fact to endorse instruments received in payment thereof in the name of Purchasers and to negotiate the same and collect the proceeds. Payment by Tenants or other users to State in response to State's demand, shall satisfy the obligations for which the payments are made, whether or not any proper grounds for the demand existed. State shall apply the income first to the expenses of renting or collection and the balance, if any, to payment of sums due from Purchasers to State under this contract.

REPRESENTATIONS: Purchasers accept the land, buildings, improvements and all other aspects of premises in their present condition, (and any personal property sold under this contract), without any representations or warranties, expressed or implied, unless they are expressly set forth in this contract or are in writing signed by State. Purchasers agree that Purchasers have ascertained, from sources other than State, the applicable zoning, building, housing, and other regulatory ordinances and laws as they may affect the present use or any intended future use of premises, and State has made no representations with respect to such laws or ordinances.

It is understood that the Purchaser acquires no right, title, interest or equity in or to said real property until the full down payment has been paid, the buyer's credit approved, and the contract executed.

GENERAL: All payments must be made in cash or check payable to the Department of Transportation. In the event Purchaser fails to pay the balance due in the time specified, or meet contract terms when executed, all rights of the Purchaser in said real property shall cease and all right, title and interest in said property shall continue to remain vested in the State, free of any claim or equity in the undersigned Purchaser or those claiming through Purchaser, and the State shall retain all payments or deposits as liquidated damages for failure of Purchaser to complete the purchase or meet the conditions of the contract.

The State shall convey by Deed only such right, title and interest in said real property as is now vested in State. The sale of this property is subject to special assessments, if any, existing restrictions, reservations and easements. Unless specifically provided for herein, State will not provide title insurance.

It is understood that the State shall record said Deed or Contract. Purchaser may take possession of said real property as described in the sale advertisement. Real property taxes shall be prorated to the date of sale.

The State reserves the right to reject any or all bids at any time prior to recording the Deed or Contract. In the event sale is withdrawn by State after bid, all monies deposited shall be refunded without payment of interest.

PRINT NAME(S) TO BE PLACED ON CONVEYANCE DOCUMENT - DEED

APPROVED BY:

STATE RIGHT OF WAY MANAGER	DATE	PURCHASER (signature)	DATE
PROPERTY AGENT	DATE	PURCHASER (signature)	DATE

MAILING ADDRESS
CITY STATE AND ZIP CODE
TELEPHONE NUMBER

NOTE: SAID STATE OF OREGON, DEPARTMENT OF TRANSPORTATION, RESERVES THE RIGHT TO REJECT ANY OR ALL BIDS AT ANY TIME PRIOR TO RECORDING OF DEED OR EXECUTION OF CONTRACT

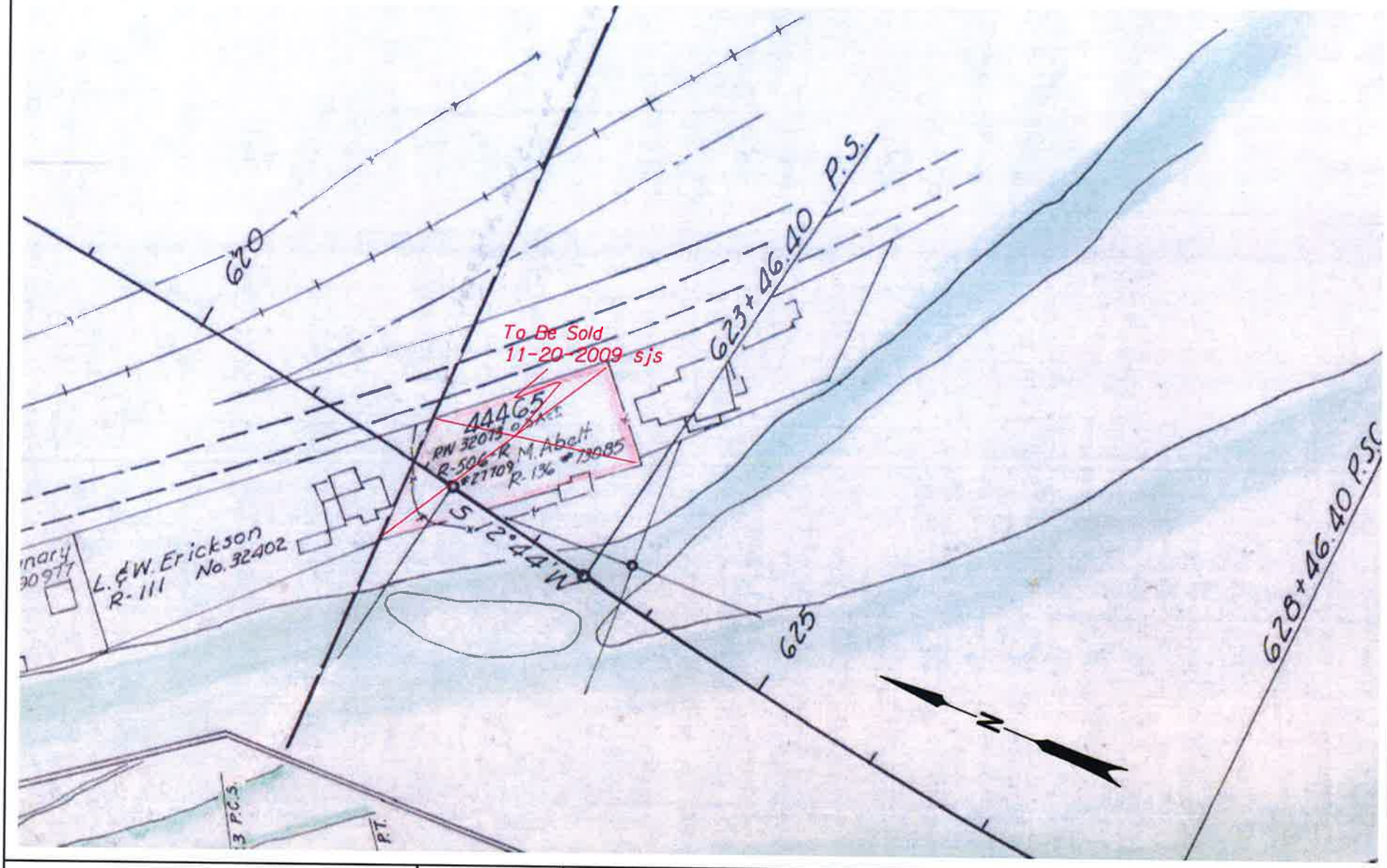
File 44465A
Drawing 9B-8-16
November 23, 2009

To Be Sold

A tract of land lying in the NE¼ of Section 15, Township 18 South, Range 2 West, W.M., Lane County, Oregon and being that property described in that Warranty Deed to the State of Oregon, by and through its State Highway Commission, recorded November 20, 1970, on Reel 506R, Instrument No. 27709 of Lane County Official Records.

This parcel of land contains 0.3 Acre, more or less, outside of the existing right of way.

SEC. 15, T. 18 S., R. 2 W., W.M.



OREGON DEPARTMENT OF TRANSPORTATION RIGHT OF WAY ENGINEERING SKETCH MAP	Section	McKenzie Hwy - Jasper	Scale	1" = 100'
	Highway	Springfield - Creswell No. 222	Date	Nov. 2009
	County	Lane	File	44465
	Purpose	Proposed Sale	See Drawing 9B-8-16	

sjs

11/20/2009

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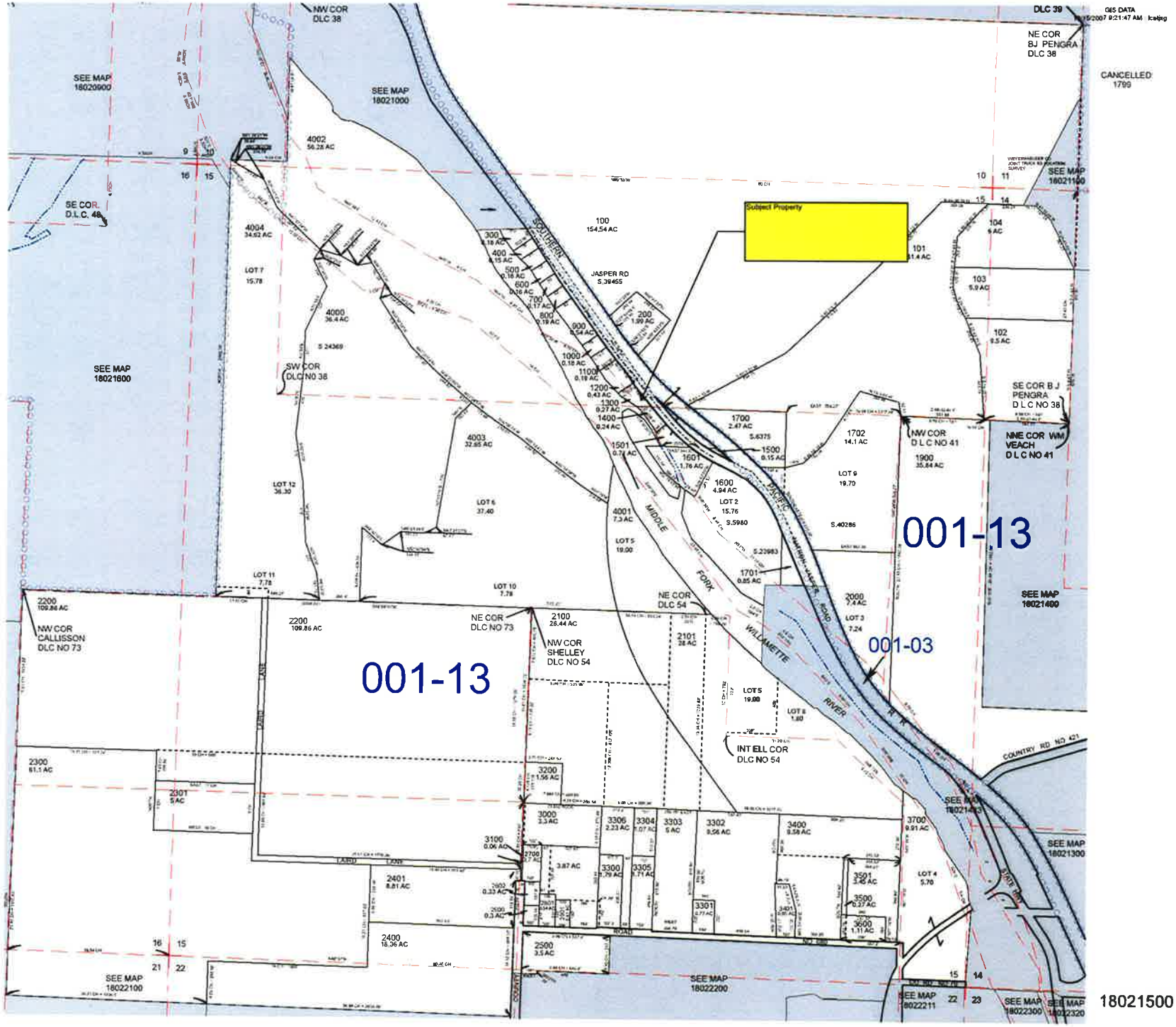
FOR ASSESSMENT AND TAXATION ONLY

SECTION 15 T.18S. R.2W. W.M.
Lane County
1" = 400'

REVISIONS
07/2006 - LCAT130 - CONVERT MAP TO GIS
07/2006 - LCAT130 - SEQ 101-104 O.O. 100 & 1702 O.O 1799
4/30/2007 - LCAT115 - L.L.A. BETWEEN TL'S 1702 & 2000
10/2/2007 - LCAT113 - CORR MERGE TL 1700, 1799
13/4/2007 - LCAT113 - AC CORR TL 1501, 1600
10/15/2007 - LCAT135 - PTN 1200 & 1300 OUT TO JASPER ROAD

18021500



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SUMMARY REPORT

SUBSURFACE MAPPING SURVEY TO DETECT UNDERGROUND STORAGE TANKS

FORMER GAS STATION
36526 JASPER ROAD
PORTLAND, OREGON

CLIENT

Oregon Department of Transportation
Region 2 Procurement Specialist
455 Airport Road SE, Building K
Salem, OR 97301

DATE OF SURVEY

December 9, 2009

GeoPotential Project Number: 8384

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SUMMARY

A geophysical survey was conducted over the driveway, parking lot and yard of a former gas station in Springfield, Oregon for the purpose of detecting underground storage tanks (USTs).

A Magnetic Survey and hand held magnetic and electromagnetic scanners were used for the UST search.

No USTs were detected at this site.

INTRODUCTION

Ralph Soule and Carrie Beveridge of GeoPotential conducted the Subsurface Mapping Survey. Bart Bretherton was ODOT'S on-site representative. Fieldwork was conducted on December 9, 2009. The report was completed and e-mailed to ODOT on December 10, 2009.

Subsurface mapping surveys are geophysical surveys utilizing geophysical methods and data to detect and locate natural and manmade subsurface features. Magnetic Surveys are used to detect and map the locations of buried **ferrous** (iron-bearing) objects (see Appendix 1). Ground Penetrating Radar (GPR) Surveys are used to map both natural and manmade subsurface features such as USTs, utilities, backfilled pits, etc. (see Appendix 2.). Pipe and cable locators are used to map the locations of buried utilities and piping.

Once subsurface ferrous objects are detected from a magnetic survey then hand held scanners and GPR surveys are used to map the locations, depths, sizes and shapes of the objects.

SURVEY OBJECTIVES

The objectives of this subsurface mapping survey are:

1. Search for an underground storage tank or UST pit.
2. Map ancillary piping and utilities.

SURVEY SITE

The survey area is shown outlined on Figure 1. The Site consists of one residence with attached garage and gravel parking lot and driveway. The remnants of a former pump island are also visible.

SURVEY EQUIPMENT

The following geophysical instruments were used to conduct the survey:

- GEOMETRICS 858G Cesium Vapor Magnetometer (Magnetic Survey).
- Schonstedt GA52 Magnetic Gradiometer.
- Aqua-Tronics A6 Pipe & Cable locator.
- Heath Shurlock Pipe & Cable locator.

This equipment and the procedures used to meet the survey objectives of this project have been proven effective in detecting USTs, utilities and UST pits..

Geophysical techniques are excellent at detecting changes in the subsurface caused by natural and manmade objects; however, they are poor at actually identifying subsurface features. Complementary methods may be used to assist in the interpretation; however, the only sure way of identifying a buried feature is by excavation.

Brief descriptions of the magnetic method and the radar method are included in the Appendices.

PROCEDURE

Magnetic Survey

The Magnetic Survey consisted of acquiring magnetic readings along traverses using a 5-foot spacing between traverses. Magnetic data were downloaded to a computer, processed and contoured to produce Figure 2. Magnetic Map. In general buried ferriferous objects will produce stronger positive magnetic anomalies that are shown as red contours on the Magnetic Map. Surface ferriferous objects such as the chain link fence will produce negative magnetic anomalies that are shown as blue contours on the magnetic map.

Pipe & Cable Survey

Magnetic and electromagnetic scans were conducted to search for USTs and utilities. A tracing current was transmitted down the stub of a former product line in the pump island and the location of the line was mapped.

RESULTS

Results were marked on the Site and are shown on Figure 3.

No USTs were detected from the Subsurface Mapping Survey.

The product line was found to extend from the pump island to a pit to the Southwest of the pump island where it terminated at the edge of a pit. The pit is interpreted to be the location of former UST(S).

A magnetic anomaly was detected off the Southeast corner of the house. This magnetic anomaly is interpreted to be the location of a water well.

Two additional pipes were detected as shown on Figure 3.

LIMITATIONS

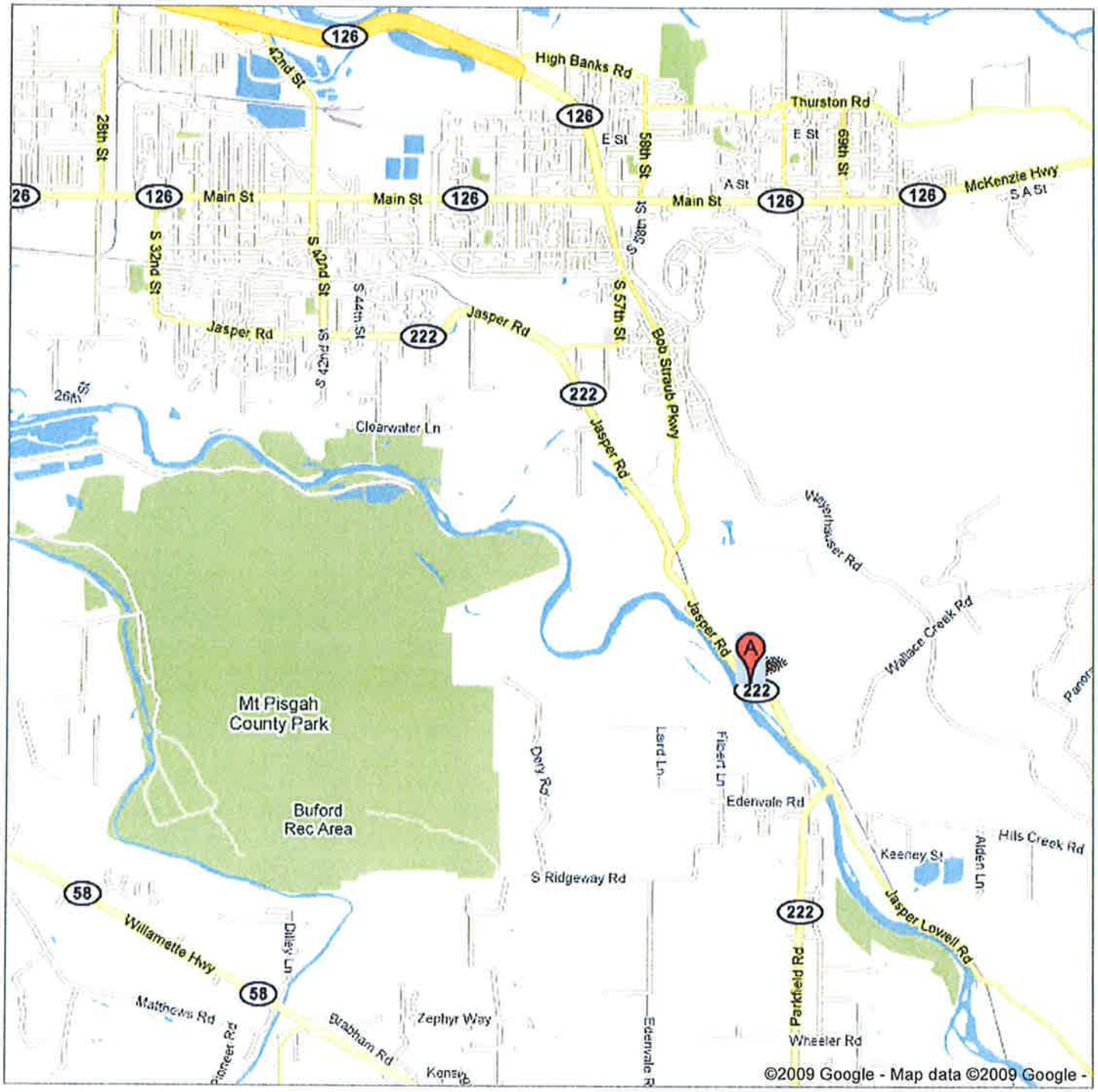
Limitations of magnetometer and GPR surveys can be seen in the Appendices.

Geophysical surveys consist of interpreting geophysical responses from subsurface features. Since a variety of subsurface features can produce identical geophysical responses, it is necessary to confirm the geophysical interpretation with intrusive investigations such as excavating or drilling. In addition, many subsurface features may produce no geophysical response.

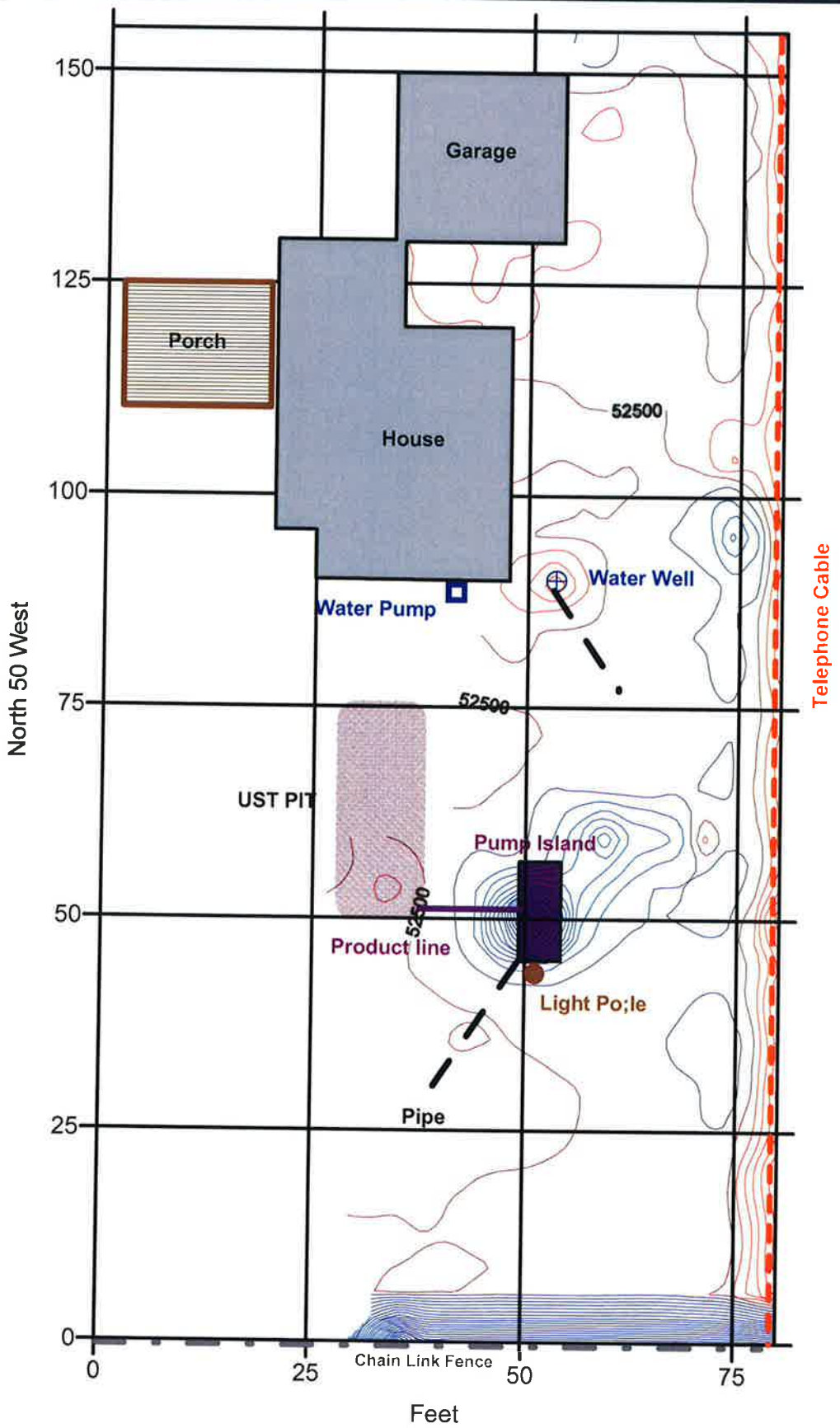
Ralph Soule

Ralph Soule
GeoPotential

December 10, 2009



GeoPotential ENVIRONMENTAL & EXPLORATION GEOPHYSICS 22333 East Mill Fern Lane, Brightwood, Oregon 97011 • PH (503) 622-0154• FAX (503) 622-0526 WEB http://www.geopotential.biz E-MAIL GeoPotential@geopotential.biz	LOCATION: Former Service Station Site 36526 Jasper Road Springfield, Oregon	Figure 1. Location Map
DATE: December 9, 2009 SUBSURFACE MAPPING SURVEY PROJECT No. 8384	CLIENT: ODOT	



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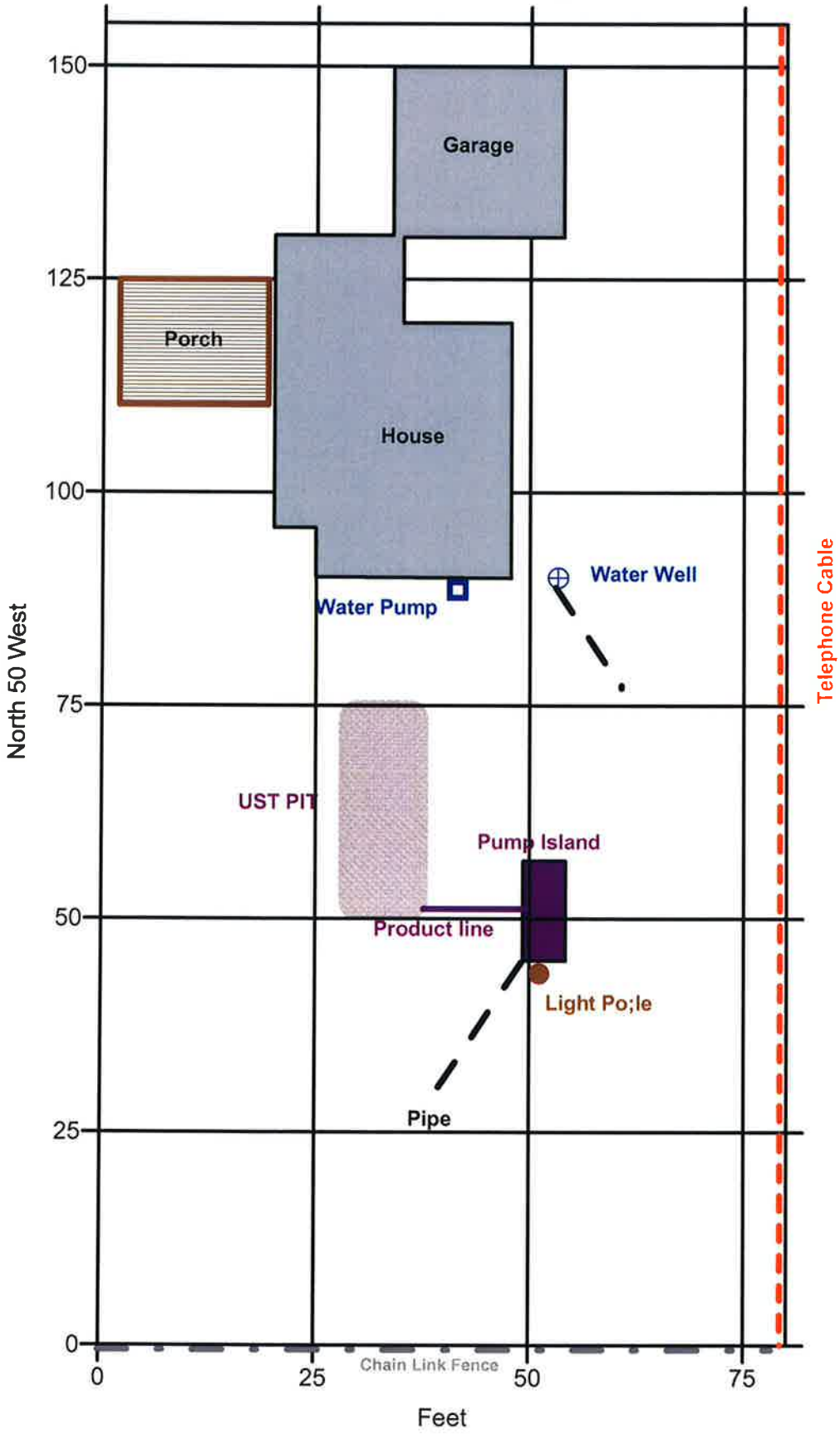
DATE: December 9, 2009 SUBSURFACE MAPPING SURVEY PROJECT No. 8384

LOCATION: Former Service Station Site, 36526 Jasper Road, Springfield, Oregon

CLIENT: ODOT

Figure 2. Magnetic Map (C.I. = 500 nT)



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DATE: December 9, 2009 SUBSURFACE MAPPING SURVEY PROJECT No. 8384

LOCATION: Former Service Station Site
36526 Jasper Road
Springfield, Oregon

CLIENT: ODOT

Figure 3.
Interpretation Map

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APPENDIX A
MAGNETOMETER SURVEYS

The earth's magnetic field, measured in "nano Teslas" (nT), behaves like a bar magnet (a dipolar field), with the strongest magnetic field located at the poles, and the weakest field located near the equator. In the continental United States, the average field intensity varies widely, however, the average value is about 50,000 nT. Also, like the magnetic field around the bar magnet, the earth's magnetic field is inclined. This inclination in the continental United States varies between 60 and 75 degrees, generally depending upon the latitude of the measuring location. The earth's magnetic field varies constantly and, during sunspot activity, quite dramatically. A magnetometer is an electronic device that measures the intensity of the earth's magnetic field.

Naturally occurring geologic features and buried ferrous metal objects such as underground storage tanks, drums, ordnance, pipes and debris filled trenches produce both horizontal and vertical disturbances to the earth's local magnetic field. The objects causing these "anomalies" can be detected quickly and reliably using portable magnetometers.

The intensity of an anomaly is a function of the size, depth of burial and magnetic susceptibility of the object. As a rule of thumb, single drums buried several feet below the surface produce anomalies of about 200 nT relative to the normal undisturbed background and can be detected at a horizontal distance of about 15 feet, while large caches of drums can produce anomalies of many thousands of nT and may be detectable 50 feet away.

Magnetometers generally measure total intensity of the local magnetic field. A magnetic gradiometer is a variant of the magnetometer that measures both the horizontal and the vertical magnetic field at each survey point. It consists of two identical sensors located vertically on a staff and having a fixed separation. The intensity of the magnetic field caused by a buried metal object varies inversely with the distance between the object and the sensor. The relative intensities measured simultaneously at each sensor are used to determine the relative depth of burial of an object.

Relative depth estimates of buried metal objects can be made using a single sensor. In general, for a given object, the deeper the object is buried, the lower the amplitude and the wider the anomaly. Shallowly buried objects produce higher amplitude anomalies with closely spaced contour lines.

Magnetic surveys can only detect **ferrous metal** objects and cannot be used to identify the buried object. Estimates of the total mass of a buried object are difficult due to the physical properties of the object and other factors. Interference caused by observed surface metal objects limits the accuracy of the survey. The anomalies produced by fences, power lines, cars and buildings can easily mask the anomaly caused by an underground target.

Magnetic surveys are cost effective. Using the standard "step and wait" magnetometer, data from approximately 1000 points can be obtained in one field day corresponding to between 1 acre and about 5 acres depending on site conditions and survey goals. More modern cesium magnetometers collect up to 10 readings per second continuously, thus the operator can proceed without stopping. Many modern magnetometers use an audible signal to call attention to anomalous data as it is obtained. At some sites metallic objects can be detected and marked in the field at the time of the survey.

The use of a second, automatically recording "base station" magnetometer is highly recommended due to temporal variations in the earth's magnetic field. These changes must be removed from the field data before an accurate interpretation can be made, particularly when searching for small-buried objects.

Magnetic data are most commonly presented in two contour maps. The TOTAL MAGNETIC FIELD CONTOUR MAP shows the horizontal variation of the total intensity of the magnetic field and, therefore, the areal extent of anomalies. The GRADIOMETER CONTOUR MAPS show the horizontal variation of the vertical gradient of the magnetic field and indicate the relative depth of burial of the objects causing those anomalies. Color versions of these maps may be produced showing only the magnetic highs and lows.

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APPENDIX B
GROUND PENETRATING RADAR SURVEYS

Ground Penetrating Radar (GPR) can be a valuable tool to accurately locate both metallic and non-metallic UST's and utilities, buried drums and hazardous material at some sites. It may detect objects below reinforced concrete floors and slabs. GPR may delineate trenches and excavations and, under some conditions, it may be used to locate contaminant plumes. It has been used as an archaeological tool to look for buried artifacts. It may accurately profile fresh water lake bottoms either from a boat or from a frozen lake surface. GPR may be used to locate voids below roads and runways. GPR has numerous engineering applications. It can be used in non-destructive testing of engineering material, for example, locating rebar in concrete structures and determining the thickness of concrete and other structural material.

GPR uses short impulses of high frequency radio waves directed into the ground to acquire information about the subsurface. The energy radiated into the ground is reflected back to the antenna by features having different electrical properties to that of the surrounding material. The greater the contrast, the stronger the reflection. Typical reflectors include water table, bedrock, bedding, fractures, voids, contaminant plumes and man-made objects such as UST's and metal and plastic utilities. Materials having little electrical contrast like clay and concrete pipes may not produce strong reflections and may not be seen. Data are digitally recorded or downloaded to a laptop computer for filtering and processing.

The frequency of the radar signal used for a survey is a trade off. Low frequencies (250 MHz – 50 MHz) give better penetration but low resolution so that pipes and utilities may not be seen. Pipes and utilities may be seen using higher frequencies (500 MHz) but the depth of penetration may be limited to only a few feet especially in the wet, clayey soils found in many areas of the NW USA. The GPR frequency is dependent upon the antenna. Once an antenna is selected, nothing the operator can do can increase the depth of penetration.

Radar data is ambiguous. Many buried objects produce echoes that may be similar to the echo expected from the target object. Boulders and debris produce reflections that are similar to pipes and tanks. Subtle changes in the electrical properties along a traverse caused by changes in soil type, mineralogy, grain size, and moisture content all produce "noise" that can make interpretation difficult. Interpreting radargrams is an art as much as a science.

Under some conditions, although a UST itself may not be clearly visible in a GPR record, the excavation or trench in which the UST is buried is evident. Usually GPR data is used to compliment data from other "tools". For example, a trench-like reflection but no clear UST reflection, combined with a "tank" shaped magnetic anomaly suggests the presence of a UST. Although the UST itself could not be seen using GPR, the radar showed a trench-like reflection. The magnetic data showed a large ferrous object. We would report a possible UST at that location.

GPR is often used in conjunction with magnetometer surveys. Magnetometer Surveys are very fast and large areas can be covered cost effectively. Magnetic anomalies are marked in the field, and then may be further investigated using radar.

GPR, like other geophysical tools, is excellent at detecting changes across a site, but it is poor at actually identifying the cause of the change. **The only definite way to identify buried objects is through excavation.**

ADVANTAGES - General

- When GPR data is properly interpreted subsurface objects can usually be confidently identified. This often requires the GPR data be combined with other geophysical data, surface features and historical information.
- GPR provides continuous records along traverses which, depending on the goal of the survey, may be interpreted in the field.
- At flat, open sites, for reconnaissance purposes, the antenna can be towed behind a vehicle at several mph.
- Many GPR antennas are shielded and are unaffected by surface and overhead objects and power lines.
- GPR can be used in conjunction with magnetic or EM surveys to accurately locate buried objects.

ADVANTAGES – Site specific

- With a low frequency antenna, in clean, dry, sandy soil, reflections from targets as deep as 100 feet are possible. Geologic features such as bedrock and cross bedding may be seen at some sites.
- The resolution of data is very high particularly for high frequency antennas.
- Shallow, man-made objects generally can be detected.
- Fiberglass UST's and plastic pipes can be detected using GPR.

LIMITATIONS - General

- To acquire the highest quality data, proper coupling between the antenna and the ground surface is necessary. Poor data may be obtained at sites covered with debris, an uneven surface, tall grass and brush. Objects located at curbs are difficult to see.
- Acquiring GPR data is slow. The antenna must be over the target. The signal from the antenna is cone-shaped. Reflections from objects to the side of the antenna may be seen, but their actual location relative to the antenna is not obvious.
- Penetration of the GPR signal is "site specific" and its depth of penetration at a particular site cannot be predicted ahead of time. Near surface conductive material, such as salty or contaminated ground water and wet, clay-rich soil, may attenuate the radar signal, limiting the effective depth of the survey to several feet. Reinforced concrete also can attenuate the signal. Rebar may produce reflections that look like pipes.

- GPR may not be cost-effective for some projects. For a detailed survey mapping underground storage tanks and utilities, it may be necessary to collect data in orthogonal directions at 5-foot line spacing.

LIMITATIONS – Interpretation

- Interpretation can be difficult. Radar data are ambiguous. Subsurface objects can be detected but, in general, they cannot be identified. USTs and utilities have a characteristic reflection, however, large rocks and boulders have a similar reflection.

- The reflection visible in a GPR record is very complex and may be caused by small changes in the electrical properties of the soil. The target in mind may not produce the reflection. Due to "noise", the target may be missed. USTs and deep utilities may be missed if they are under debris and/or other pipes.

- Other methods may be necessary to aid in the interpretation of the data (use a magnetometer to detect a large metallic mass, then GPR to determine if the object is tank-like, or a utility locator to determine if there are feed lines and fill pipes leading to the object).

- Adequate contrast between the ground and the target is required to obtain reflections. UST's may be missed if they are badly corroded. Utilities made of "earth" materials like clay and concrete may not be detected since their electrical properties are similar to the surrounding soil.

- To determine the depth to an object without "ground truth", assumptions must be made regarding soil properties. Even with ground truth at several locations on the same site, changes in material across a site (therefore changes in signal velocity) can cause errors in depth measurements at other locations.

DELTA ENVIRONMENTAL

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Drinking Water Laboratory Report

Christensen Well Drilling
33132 Coleman Road
Eugene OR 97408

Project Number: 101100

Sample Location: 36526 Jasper Road (ODOT)
Springfield, OR

Collection Date: 03/10/2010
Collected By: David
Date Received: 03/10/2010
Type of Treatment: None

Collection Time: 10:15 AM
Water Source: Well
Received By: LH

TEST RESULTS

PARAMETER	METHOD	MDL	MCL	RESULT	UNITS
* Arsenic, Total	EPA 200.9	0.003	0.010	**ND**	mg/L
* Nitrate	SM 4500-NO3- D	1.0	10	**ND**	mg/L
Conductivity	EPA 120.1	0.5	No Limit	**503**	umhos/cm
Hardness	SM 2340 C	1	250	**13**	mg/L
Iron, Total	SM 3500D	0.05	0.3	**0.60**	mg/L
pH	SM 4500-H+ B	1	6.5-8.5	**8.1**	pH Units
Total Dissolved Solids	SM 1030 F	10	500	**352**	mg/L
Turbidity	SM 2130 B	0.05	No Limit	**7.9**	NTU
* Total Coliform	SM 9223 P/A	Absent	Absent	**Absent**	/100 mL
* E. coli	SM 9223 P/A	Absent	Absent	**Absent**	/100 mL

MDL: Method Detection Limit is the level at which the parameter can be detected.
MCL: Maximum Contamination Level allowed by the Oregon State Health Division.
ND: None Detected at or above the MDL.

Danielle N. Fisher
Quality Assurance Officer

3-12-10
Date

ORELAP CERTIFIED ID #OR100024
* These results meet all requirements of NELAC unless otherwise noted.

Test results relate only to the parameters tested and to the samples as received by the laboratory. This report shall not be reproduced, except in full, without written consent of this laboratory.