LINCOLN
APPLIED GEOLOGY, INC.
ENVIRONMENTAL CONSULTANTS

October 19, 1993

Mr. Charles B. Schwer
Petroleum Sites Coordinator
Vermont Department of
Environmental Conservation
103 South Main Street
Waterbury, Vermont 05676

RE: Summary of Environmental Services Completed at The Thetford Village Store, Thetford Center, Vermont (Site #93-1440)

Dear Mr. Schwer:

Lincoln Applied Geology, Inc. (LAG) has completed the tasks outlined in our August 31, 1993 Scope of Work (SOW) for The Village Store, Thetford Center, Vermont (**Figure 1**). The investigation was initiated in response to your August 23, 1993 letter requesting definition of the extent, magnitude, and potential receptors of contamination found during underground storage tank (UST) removal. This letter summarizes the completed tasks along with our recommendation for ground water monitor well locations. The completed tasks include:

1. Identification of potential receptors,

2. development of a regional and preliminary detailed site map including pertinent features and other potential sources of contamination,

3. conductance of file reviews at the Vermont Department of Environmental Conservation (VDEC) offices and Town office to obtain information on past property use of the site and surrounding areas, and

4. completion of a detailed soil vapor survey on September 30, 1993 to determine the extent and magnitude of vapor phase contamination on the property.

Results of our current investigation indicate the presence of two potential receptors of the contamination. These potential receptors are the adjacent Betts residence basement and private drinking water well, and The Village Store drinking water well. The ultimate potential receptor of the contamination is the Ompompanoosuc River that is at least 1,000 feet downgradient. Soil

gas survey results indicate that volatile organic compounds (VOC's) are present beneath the property.

LAG's recommendations for future activities at The Village Store include the installation of four monitor wells to establish the extent and magnitude of gasoline constituents on the property.

A site visit was made by a LAG hydrogeologist on September 30, 1993 to locate potential sensitive receptors, conduct a Town file review, and identify pertinent features on the site and in the surrounding area. **Figure 2** shows the site and the pertinent features in the area including roads, buildings, and topography. **Figure 3** illustrates the pertinent features of the site at a more detailed scale. The Betts residence basement and well along with The Village Store well are identified as the primary potential receptors of contamination detected on the site. The basements of the adjacent church and community center were screened with a photoionization detector (PID). No detectable levels of VOC's were identified at either location. The Bett's could not be contacted, as a result their basement was not screened with the PID. They will remain as a potential receptor until their basement is screened. Both drinking water wells will be sampled during the next site visit.

Town and VDEC files for the area were reviewed to identify property use and any other nearby potential sources of contamination. Records indicate that The Village Store has been a gasoline retail store for over 50 years. The Thetford Highway Department was identified as the only potential source of gasoline contamination. However, it is located several hundred feet down and sidegradient of The Village Store. All the other buildings in the local area are older than 50 years, therefore, it is unlikely that any other sources of contamination are contributing to the VOC's detected beneath The Village Store.

A second site visit was made by the LAG hydrogeologist and technician on September 30, 1993 to conduct a soil gas survey. A copy of the Health and Safety Plan (HASP) utilized for on-site work is included in **Appendix A**. The soil gas survey was conducted by drilling a series of small diameter holes to 3 feet below grade. A PID was inserted into each hole after it was drilled and the maximum reading was recorded. Twenty-two vapor points were drilled and assayed with the PID. **Figure 4** shows the location of each vapor point along with the maximum concentration detected. Survey results indicate that elevated levels of VOC's were detected near the islands and UST's. Elevated concentrations were detected along The Village Store property boundary with the Betts property. The data suggests that migration of vapor phase

contamination may be occurring onto the Betts property, although, the property is probably side gradient of the source area (former and current UST area). The location and depth of the Betts well is not known, as a result, it should be considered a potential receptor along with their basement. These potential receptors should be thoroughly evaluated in the next phase of work.

Based on our on-site observations coupled with the results of the soil gas survey, LAG recommends the installation of four monitor wells utilizing hollow stem auger techniques, with split spoon sampling, to define the extent and magnitude of contamination. **Figure 5** shows the locations of the proposed monitor wells. These locations were chosen based on site topography, accessibility, and the results of the soil gas survey. One well will be placed upgradient to verify ground water flow onto the property. All other wells have been placed in order to intercept contamination from areas identified via the soil gas survey. Once all the new wells are installed, a stadia survey will be conducted and a formal detailed site map will be produced. Ground water from the wells will be sampled for the gasoline constituents BTEX and MTBE. Upon completion of all work a summary report will be prepared including a formal monitoring plan and our recommendations for additional work, if warranted.

A cost estimate to complete this second phase of the remedial investigation is attached as **Appendix B**. If you have any questions or concerns with regard to this matter, please do not hesitate to call me or LAG project manager, John Amadon, at 453-4384. We look forward to receiving your concurrence on our proposed monitor array in the near future so that we may continue to expedite this investigation.

Sincerely yours,

Richard S. Vandenberg

Richard S. Vandenberg
Hydrogeologist

RV/tasp
Enclosures
cc: William Sellinger

Lincoln Applied Geology, Inc.
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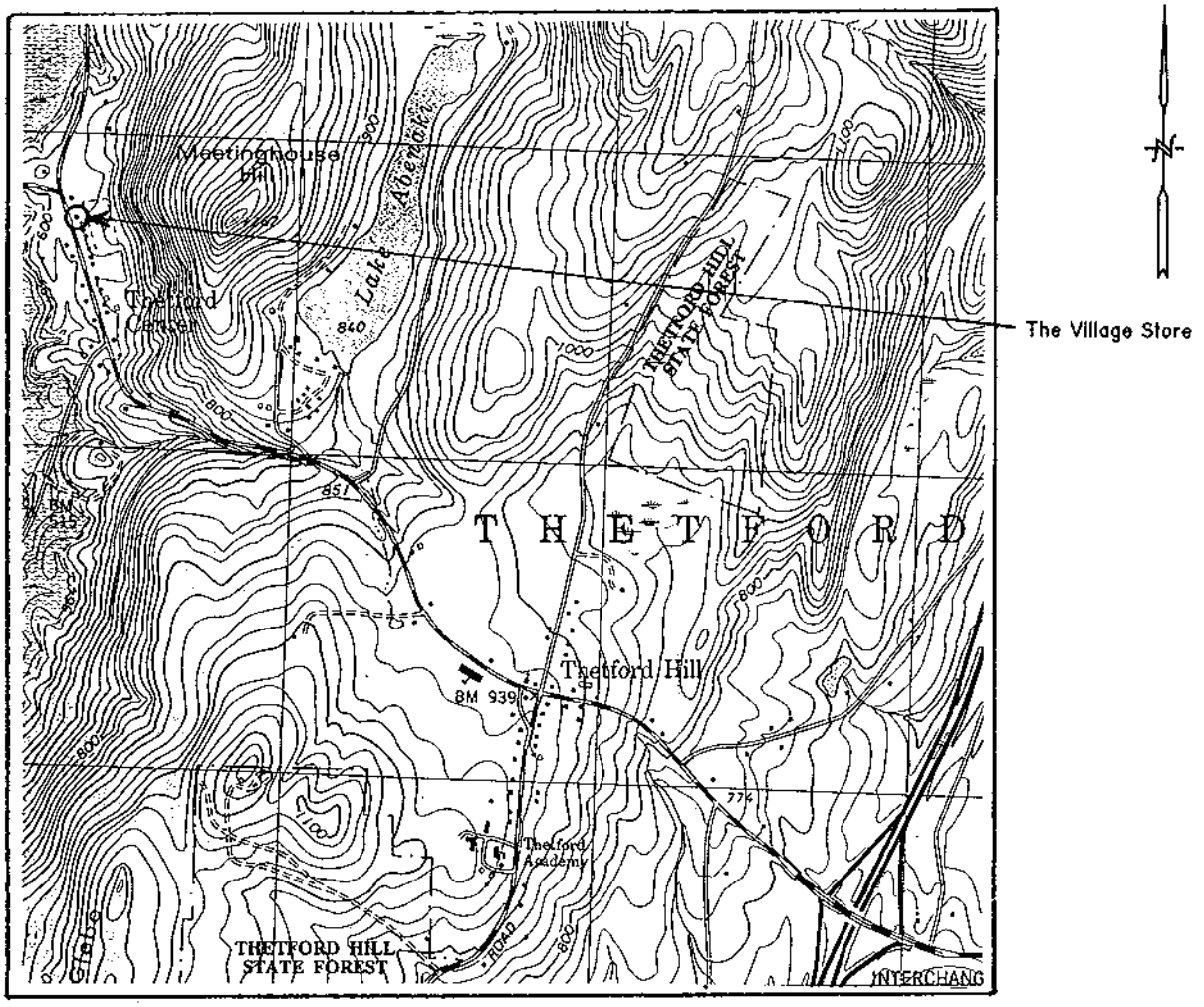
The Village Store
Thetford Center, Vt.
GENERAL LOCATION MAP



Source: U.S.G.S. 7.5 min. Topo Series
Lyme NH - VT Quad

Scale: 1" = 2000'

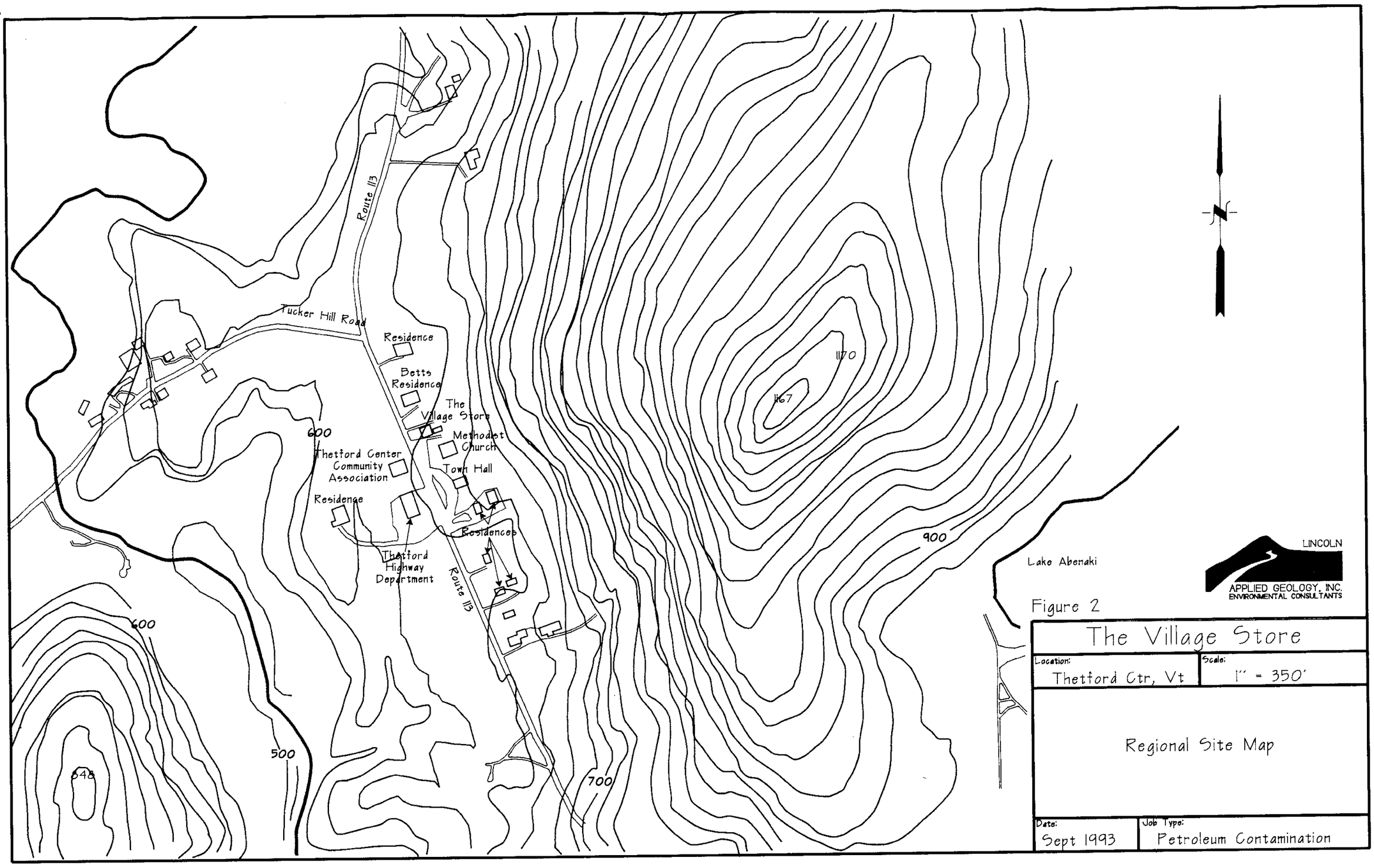


Figure 2

The Village Store

Location:	Scale:
Thetford Ctr, Vt	1" = 350'

Regional Site Map

Date:	Job Type:
Sept 1993	Petroleum Contamination

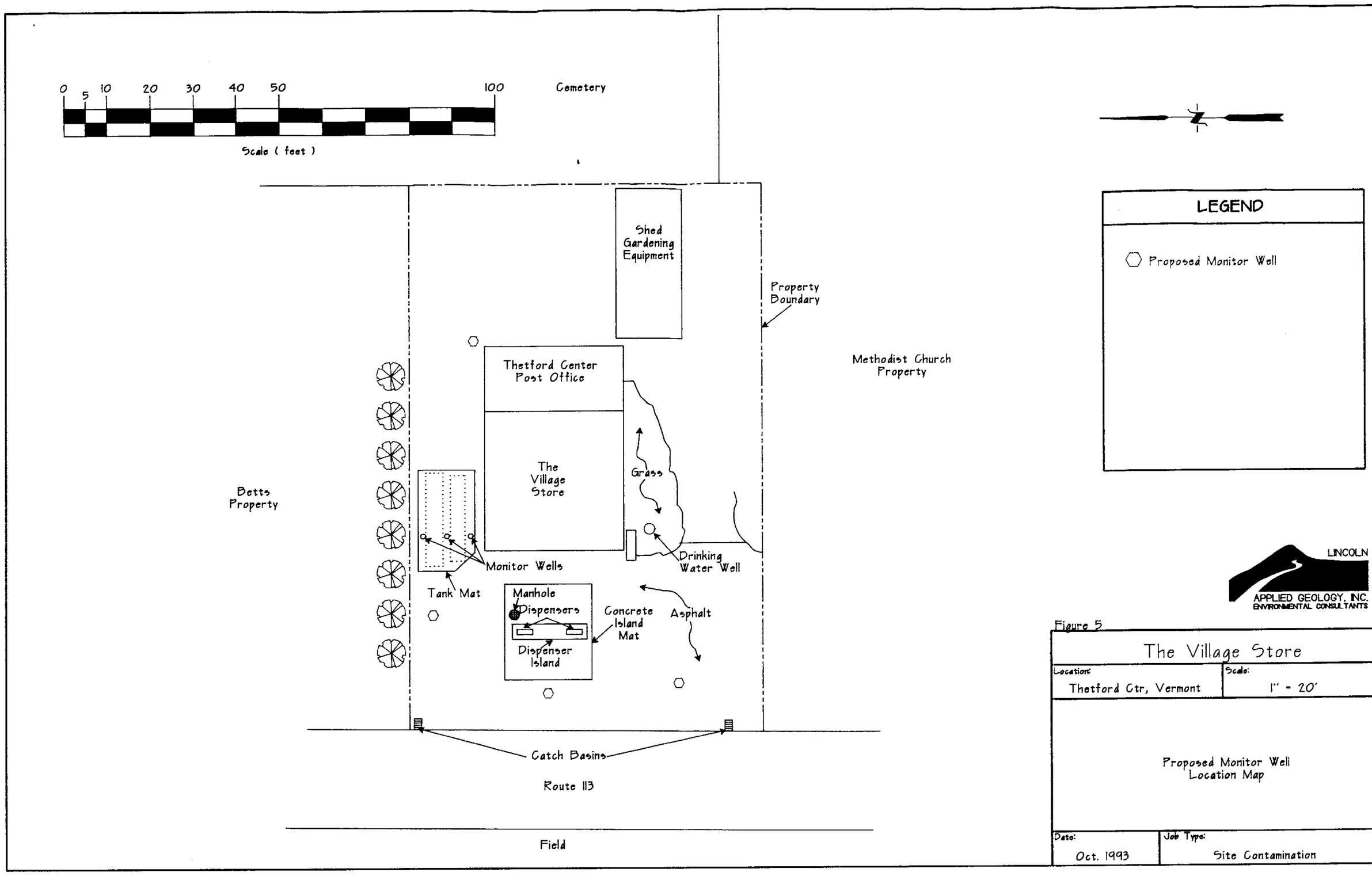


Figure 5

The Village Store

Location:	Scale:
Thetford Ctr, Vermont	1" = 20'

Proposed Monitor Well
Location Map

Date:	Job Type:
Oct. 1993	Site Contamination

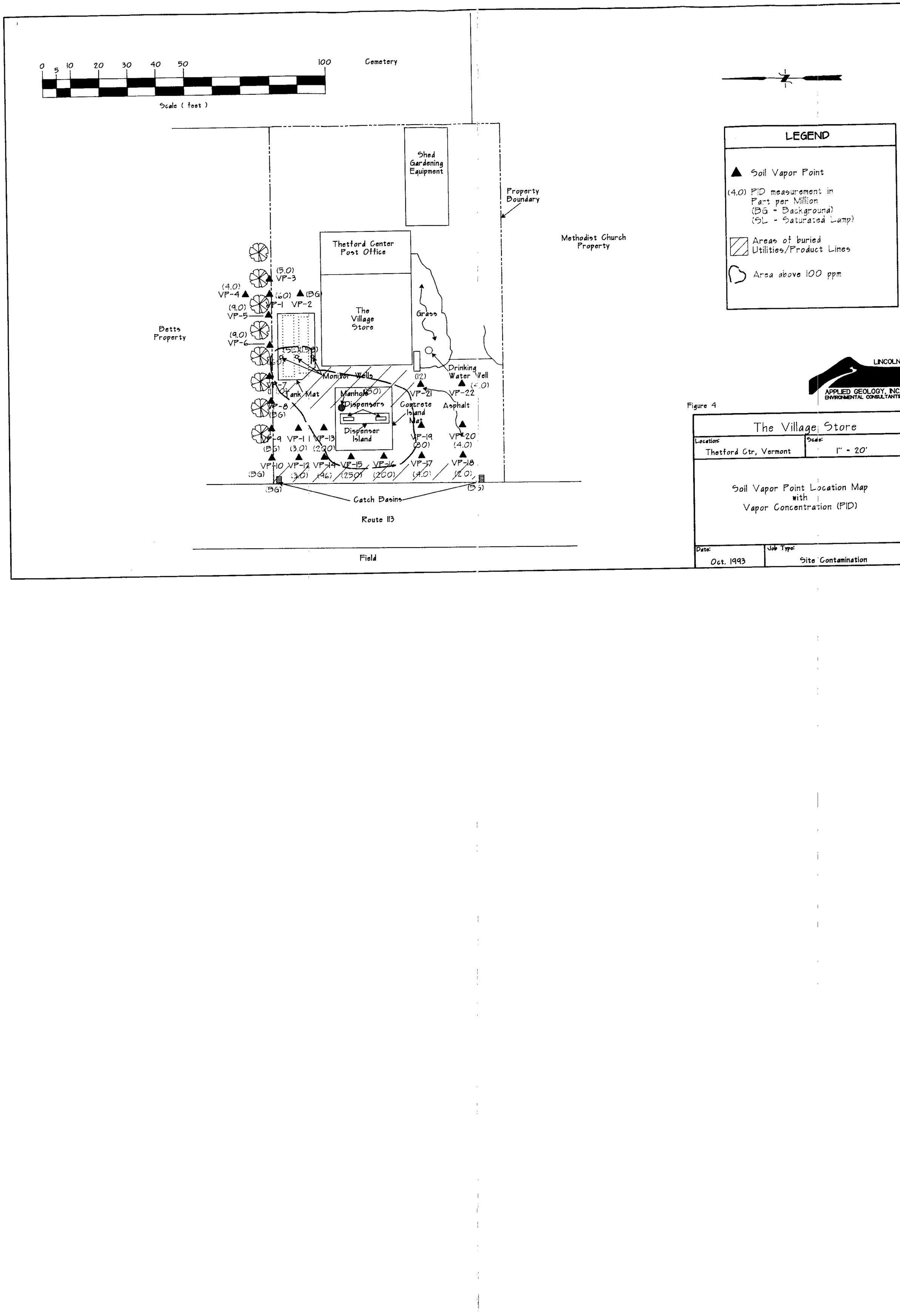


Figure 4

The Village Store	
Location: Thetford Ctr, Vermont	Scale: 1" - 20'
Soil Vapor Point Location Map with Vapor Concentration (PID)	
Date: Oct. 1993	Job Type: Site Contamination

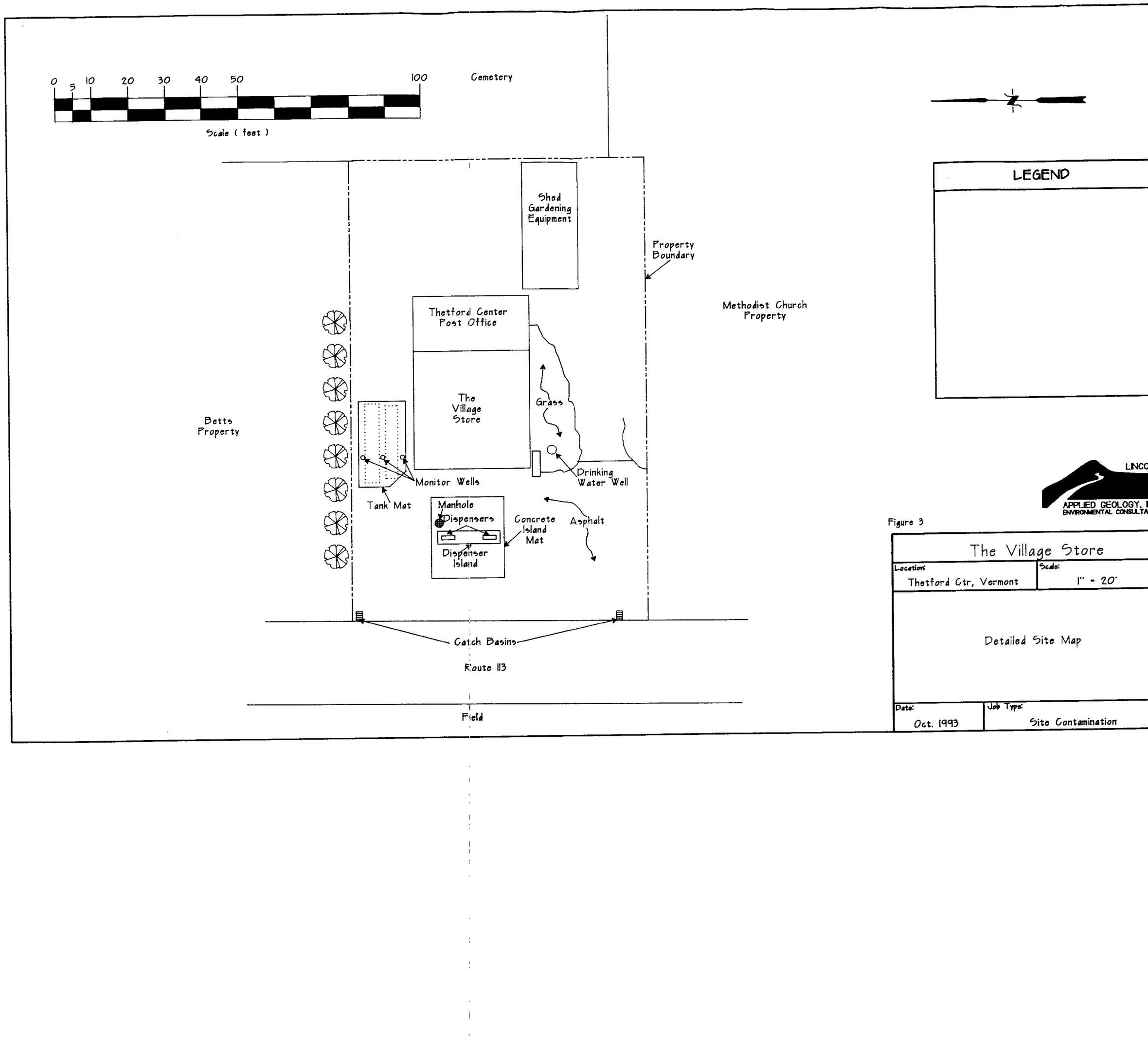


Figure 3

The Village Store	
Location: Thetford Ctr, Vermont	Scale: 1" = 20'
Detailed Site Map	
Date: Oct. 1993	Job Type: Site Contamination

APPENDIX A

Site Health and Safety Plan

SITE HEALTH AND SAFETY PLAN

Site Name: Thetford - The Village Store

Date: September

Site Address: Route 113A; Thetford Center, VT.

Project Manager: Richard S. Vandenberg, Lincoln Applied Geology, Inc.

Client Contact: William Sellinger - Bradford Oil

Site and Project Description: The Village Store has been identified as a potential source of subsurface petroleum contamination. Pursuant to Vermont regulations, a site investigation is being completed. Upon completion of the site investigation, a site monitoring and remediation may be required.

Site Health and Safety Information: Petroleum products of gasoline was reported to have leaked into the subsurface environment.

Site Personnel Protection Requirements:

Activity	Level of Protection	Special Equipment Requirements
Ground Water Monitor Well Installation, Soil Vapor Study, Sample Collection and Monitoring. Installation of remediation system.	D	Work Clothes, steel toe shank boot; surgical gloves, hard hat

Monitoring: During monitor well installation and installation of any subsurface remedial system monitor every 15 minutes with HNU PID in area of soil boring.

Contingency:

PID	10 - 20 ppm	Monitor Continuously
PID	20 - 100 ppm	Upgrade to level C
PID	>100 ppm	Shut down activities and evacuate

Decontamination: Personnel protective equipment shall be rinsed and washed with Liquinox Soap solution, hands and face shall be washed in the same manner.

IMPORTANT PHONE NUMBERS

Local Police: (see State Police)
Fire Department: 785-2412
Ambulance: 603-453-4347; 603-643-3610
Local Hospital: Dartmouth Hitchcock, Lebanon, NH
State Police: 333-9414
Safety Director: Steve Revell 453-4384 (office) 453-3122 (home)
Safety Officer(s): Richard Vandenberg 453-4384 (office) 453-4764 (home)

Project Manager: John Amadon - Lincoln Applied Geology, Inc. - 453-4384
Client Contact: Maynard Farr, Northern Petroleum - 748-8934

Directions to Hospital: Take Route 91 South to Norwich, Take exit 13. Turn left after exit, follow road to Hanover, take a right at light. At next light turn left, follow blue hospital signs to Dartmouth Hitchcock Medical Center.

Site Personnel:

James Robideau | James Holman

Richard Vandenberg | Subcontractor | Subcontractor

Other Comments:

Site Manager _____

Safety Officer _____

This site ____ does _x_ does not require a detailed site safety plan.

APPENDIX B

Cost Estimate for Additional Work

October, 1993

BRADFORD OIL/THE VILLAGE STORE
THETFORD CENTER, VERMONT
COST ESTIMATE FOR ADDITIONAL WORK
OCTOBER, 1993

A. Monitor Well Installation

(All wells will be installed in conformance with generally accepted standards utilized in Vermont and will be developed at the time of installation.)

Driller Charges (4 wells)	**$ 2,367.20**
Project manager oversight 1.5 hrs. @ $50/hr.	$ 75.00
Hydrogeologist 16 hrs. @ $45/hr.	$ 720.00
PID and Interface Probe @ $100/day	$ 200.00
Mileage 250 miles @ $0.30/mile	$ 75.00
Metal Detector 1 day @ $35/day	$ 35.00
Subtotal	**$ 3,472.20**

B. Monitor Well Sampling

Technician 6 hrs. @ $30/hr.	$ 180.00
PID and Interface Probe @ $100/day	$ 100.00
Pump and Generator @ $110.00/day	$ 110.00
6 EPA Method 8020 + MTBE @ $62/each	$ 372.00
6 Bailers @ $6.70/each	$ 40.20
Mileage 320 miles @ $0.30/mile	$ 96.00
Subtotal	**$ 898.20**

C. Summary Report and further Recommendations for additional phases of monitoring or CAP design and implementation

Senior Hydrogeologist 1 hr. @ $75/hr.	$ 75.00
Project Manager 4 hrs. @ $50/hr.	$ 200.00
Hydrogeologist 12 hrs. @ $45/hr.	$ 540.00
Computer Technician 4 hrs. @ $30/hr.	$ 120.00
Administrative Assistant 6 hrs. @ $30/hr.	$ 180.00
Subtotal	**$ 1,115.00**
Grand Total	**$ 7,852.60**

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