PERMAFROST
TECHNOLOGY
FOUNDATION

FINAL REPORT

FOUNDATION STABILITY RESEARCH
AT
1.5 MILE BALLAINE RD.
FAIRBANKS ALASKA

JUNE 1999

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on
Foundation Stabilization Research Studies at

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Introduction

The location of this site is the south side of Goldstream Valley. The site is on the north facing side of hills bordering the north side of the city of Fairbanks, Alaska. Because of the northern exposure in this vicinity, soil temperatures are cold and thaw-unstable permafrost is frequently found. The soil is predominantly silt and supports massive ice structures such as ice wedges, pingos, and other permafrost features. Goldstream Valley is known to have ice-rich thaw-unstable permafrost at many locations as well as polygonal ground, thermokarsts, and other features common to permafrost.

Vegetation in this area is largely black spruce which prospers in cold wet soils. Some birch and willows also inhabit this specific site. The site provides a beautiful view of the south side of Goldstream Valley to the southwest. Moose can be seen occasionally throughout the year visiting the site to browse on the willows and other shrubs.

Structure Description

The structure at this location is a large two story residence. It has 4 bedrooms and one bath on the second story. The ground floor has a large living room, an adjoining dining nook, kitchen, dining room, a den that is sometimes used as a 5th bedroom, utility room, and one bath. The living room is a large room stretching across the entire rear of the house. The living room has a hardwood floor and fireplace hearth (see figure 1). Heat is provided by an oil burning boiler and is distributed throughout the house through baseboard hot water radiators.

Potable water for domestic consumption is supplied from a holding tank located at the north corner of the house. The tank is refilled by a water delivery vendor as needed. A well that had previously supplied water failed in 1995 and was replaced with the holding tank and water delivery service. Waste water is handled by a septic tank drain field system which was re-installed in 1995.

Construction style is unique and falls into the category of homeowner design/build. The foundation consists of a spread footing and heavy-duty foundation wall of reinforced concrete. The first floor is supported on the foundation wall by a series of steel trusses. The house itself is frame construction with T-111 type siding. The dining nook (figure 1) is on a separate post foundation (figure 2a) with an open airspace beneath the floor and therefore may need to be releveled occasionally. However, the soil beneath the post supports is relatively dry and little frost heaving was noted during the change of seasons. Some settlement of the post and pad foundation under the nook was noted, but it was easily compensated for twice during the eight years of the project by jacking and shimming the posts. This is common procedure for this type of foundation and access to this area is easily obtained making this an easy chore.

Releveling the Foundation

When the house was acquired by the Permafrost Technology Foundation, initial measurements of the level of the first floor were made, and it was found that the north corner of the floor was 14 in. (350 mm) lower than the south corner (figure 1). Another measurement less than two months later (55 days) showed that the elevation differential at some points had increased by nearly two inches (48 mm). This rapid rate of settlement was reason for alarm, and therefore this structure became the number one priority for stabilization.

The initial action was to re-level the building to relieve stresses that accumulate from the wracking of the structure due to the uneven, differential settling taking place as the permafrost beneath the house thaws. The releveling process was accomplished by excavating around the outside of the foundation wall to expose the concrete footing. Small areas were then excavated beneath the footing to allow inflatable hydraulic pillow jacks (figures. 2b & 2c) to be placed at numerous locations under the footing (approximately 15 jacks were used). The jacks were then carefully inflated with water using a small high pressure/low volume pump normally used for car washing. The pump, which was capable of supplying 500 psi, provided a slow, controlled raising and releveling of the building. This technique allowed the building to be releveled without incurring any structural damage due to over jacking at any one location. The hydraulic lines to the pillow jacks were all connected to a central control board where a valve for each jack could be switched on or off depending on the need (figure 2d). Water filled tubes were connected to a small cup reservoir attached to the foundation at each jack location. The "water level" tubes were also routed back to the central control board so that the level of the foundation at each of the jack points could be monitored at all times (figure 2d). In this manner, one person could control the lifting and releveling operation.

Once the footing was raised above the original bed and the house was as level as it could be made, pea gravel was augured under the footing to support it at the new elevation. This operation filled the space below the footing with compacted gravel to support the foundation in the raised newly-level position.

The concrete foundation wall on the northwest side bowed in the center by 2 to 3 in. which made it impossible to attain a perfect level. However, by carefully averaging the elevation of the positions along the wall, the final result was a ground floor that was only 44 mm (1.75 in.) out of level. This is a very satisfactory result and was not noticeable to

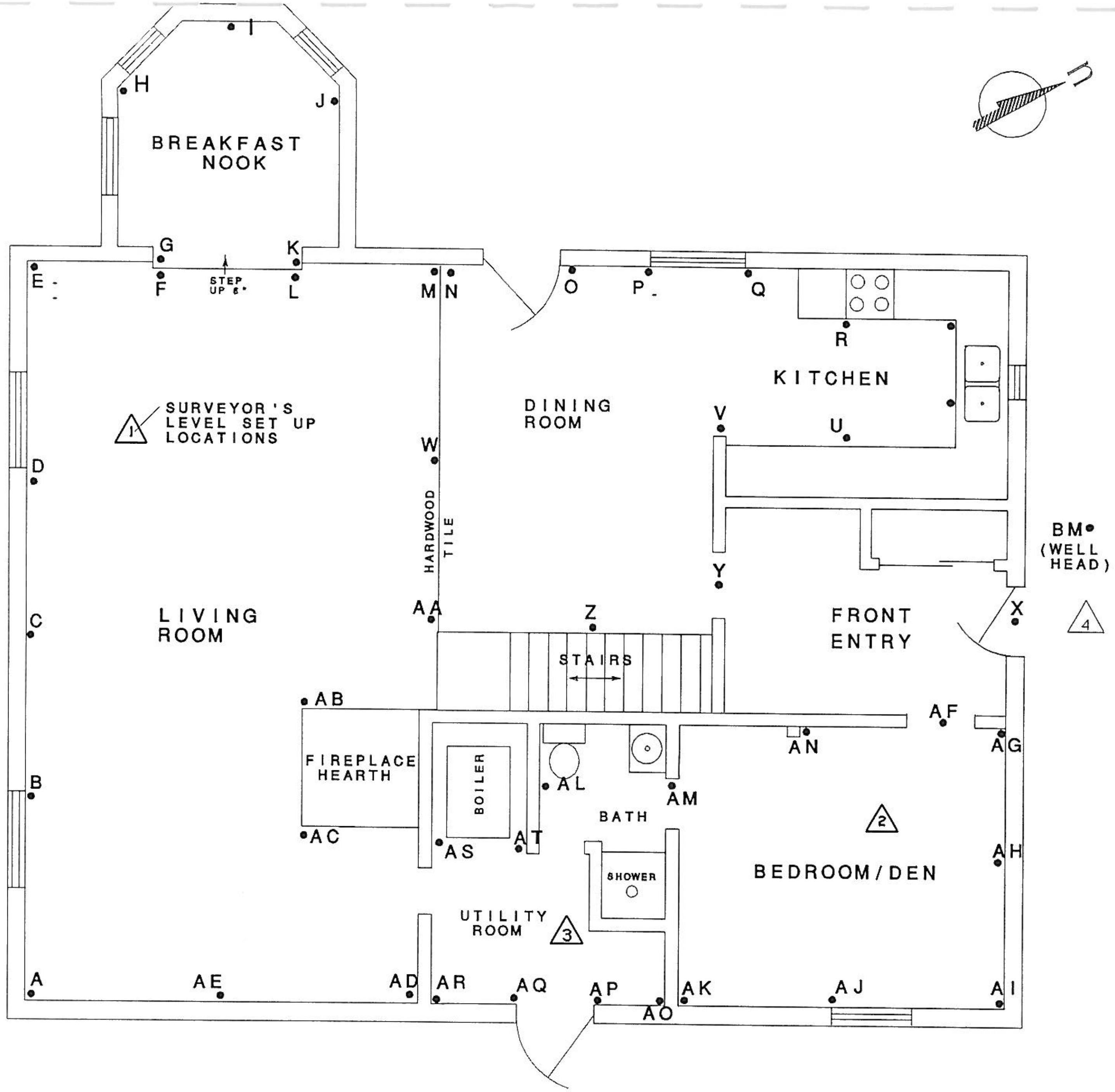


FIGURE 1-BALLAINE GROUND FLOOR PLAN AND LEVEL LOCATIONS

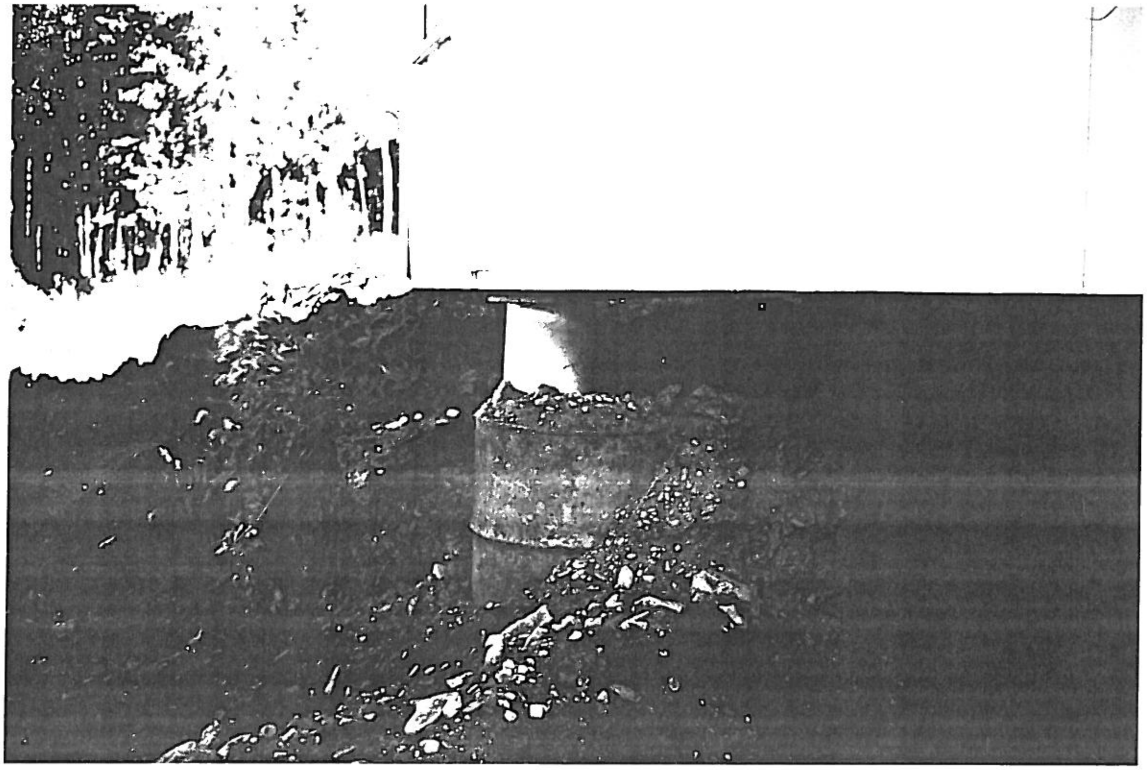


Figure 2a Post and Pad Foundation Under the Dining Nook

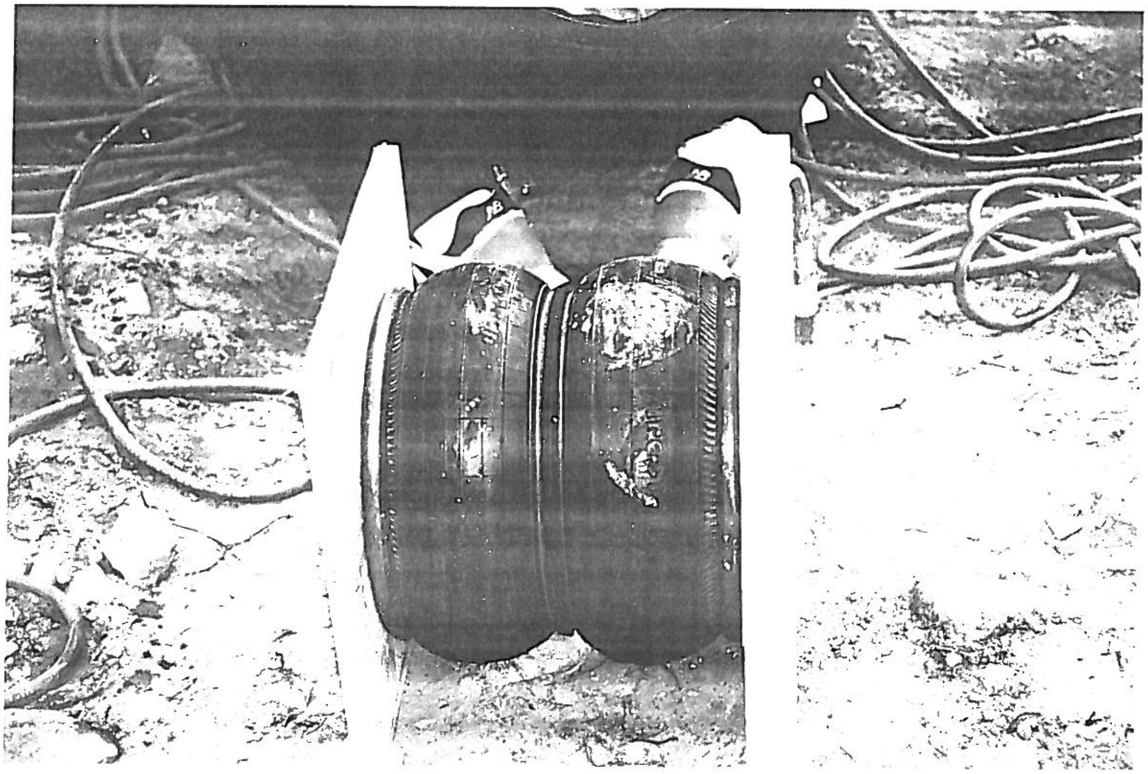


Figure 2b Hydraulic Pillow Jack

Figure 2c Pillow Jacks Installed Beneath the Footing

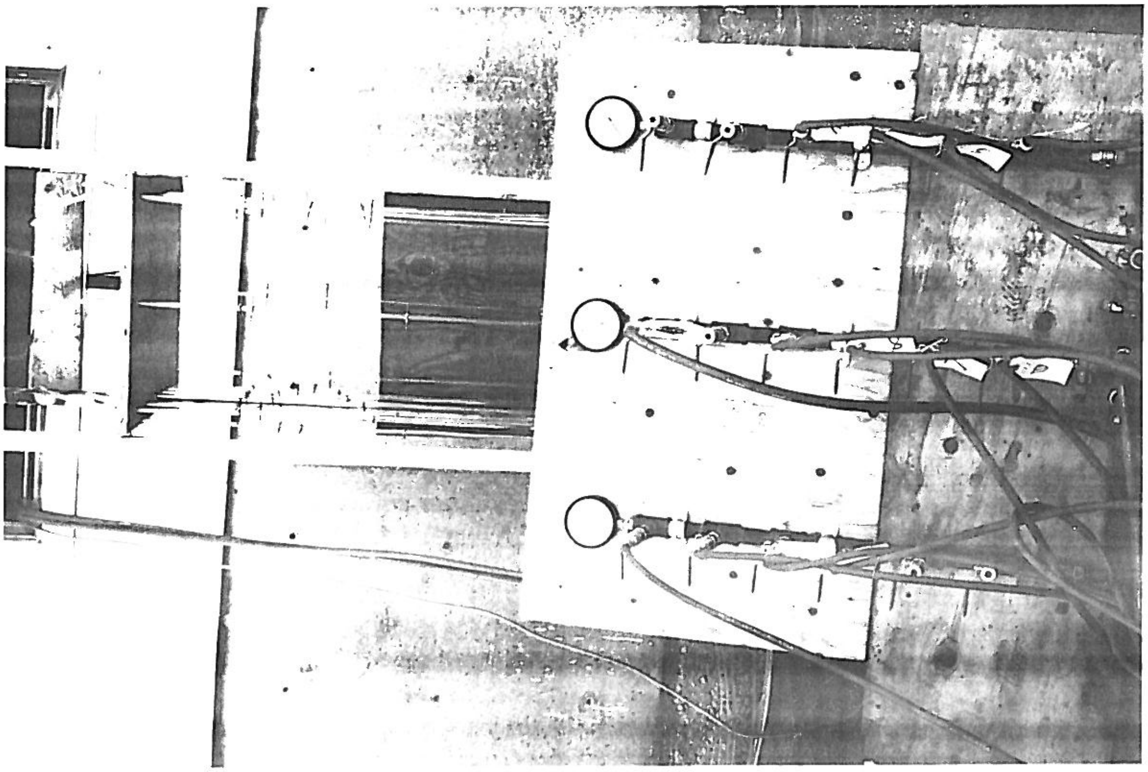


Figure 2d Pillow Jack Valve Control Panel and Water Level Display

occupants in the building. Once the releveling and pea gravel compaction operations were finished, the trenches around the outside of the foundation wall were back filled. The pillow jacks were removed, but boxes surrounding them were left in place so that if another releveling were to be required in the future it would be a simple matter to place the pillow jacks and relevel using the same technique as before but without all of the excavation.

The next chore was to stop further thawing of the permafrost beneath the house. This was done by isolating the crawl space from the heated part of the house. An insulated plenum was constructed below the ground floor at the top of the crawl space. All piping and utility services were contained in this plenum which was thermally connected to the heated portion of the house so that it would remain near the indoor temperature of the building regardless of the temperature in the crawl space. The crawl space was then ventilated to the outside air using a forced convection system. The system consisted of two openings through the concrete foundation wall on the northeast side of the house and corresponding two openings on the southwest side of the house. Ventilation fans were installed in the two openings in the southwest wall to force air out of the crawl space and subsequently create a flow of cold outside air through the crawl space. (figure 3).

This system cools the crawl space whenever the outside air is colder than the dirt floor in the crawl space. This situation works well during the winter months, and the fans can then be turned off during the summer months when air temperatures are warmer than the soil in the crawl space. However, in Fairbanks there exists a significant time period when the air temperature is colder than the crawl space for part of the day (or night) but warmer during the other half of the day. This condition exists frequently during the fall and spring. It accounts for a substantial amount of time when the fans cannot be left on because they will warm the crawl space, but shouldn't be left off because valuable cooling time is lost. It is necessary to turn the fans on and off whenever the conditions exits where the air temperature is warmer than the crawl space soil temperature. A monitoring control circuit (discussed later) was developed for this purpose.

Geotechnical exploration consisting of two boreholes revealed that the permafrost table was just 15 feet below the ground level on the northwest side and 12.5 ft below on the southeast side of the structure. Five feet of clear ice underlay the structure at the drill sites. (see drill logs in the appendix). Melting of the clear ice at this relatively shallow depth was the most likely explanation for the rapid settlement.

Level Measurements

Level measurement were taken to determine the relative elevation of the floor. The level measurements were made using a small precise telescopic level mounted on a tripod (sometime referred to as a "contractor's level") and a surveyor's rod calibrated in millimeters. The millimeter rod was used instead of a standard surveyor's rod to give

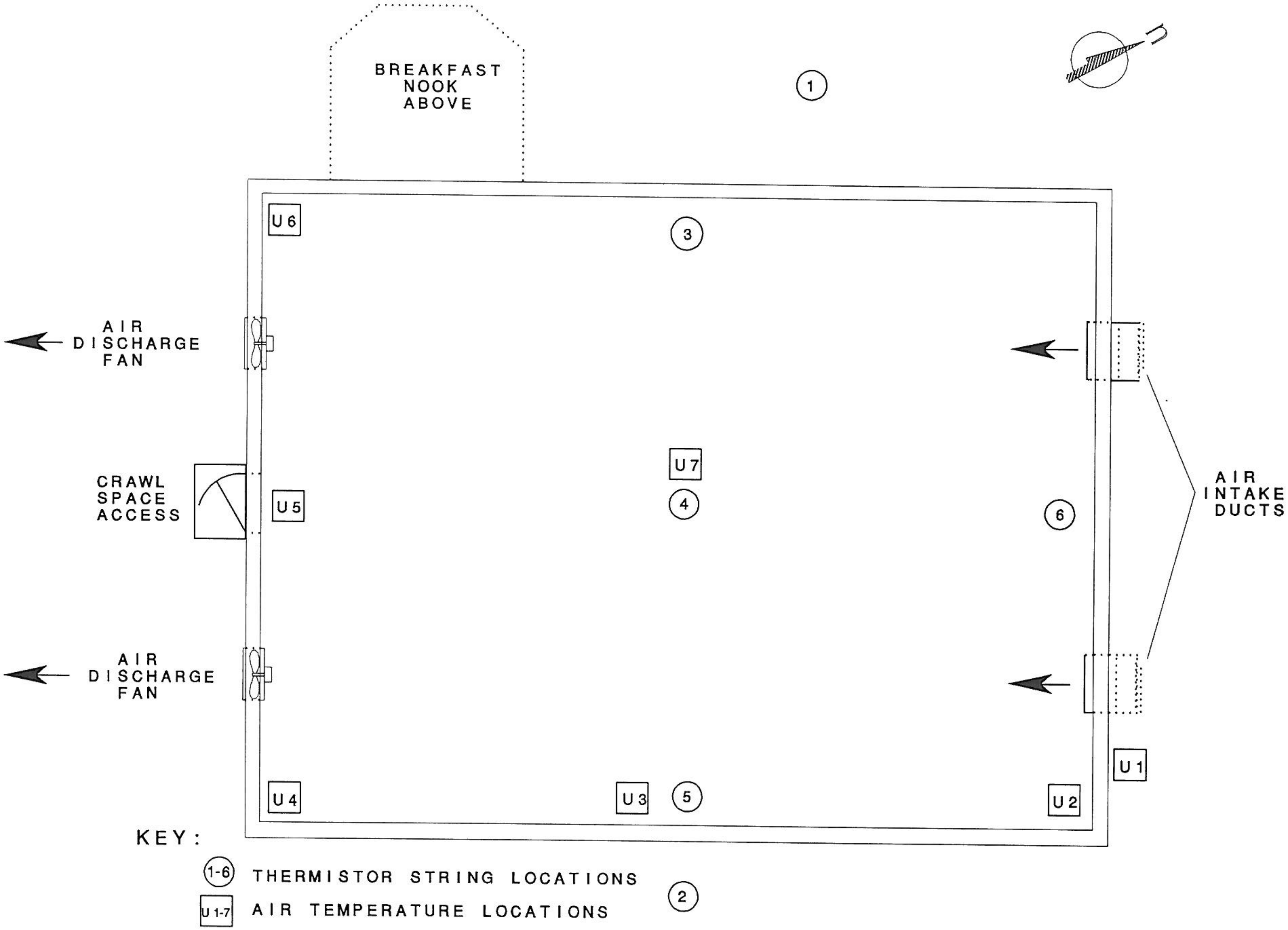


FIGURE 3- CRAWL SPACE DETAILS AND TEMPERATURE MEASUREMENT LOCATIONS

more precision to the measurements. Since the distance from the level to the rod was rarely over 15 feet, the rod could easily be read to the nearest millimeter (0.04 inch).

It should be noted, however, that when level measurement are this precise, perturbations can and do occur. These small changes are due to the placement of the rod from one measurement set to the next. Often the rod had to be placed behind furniture, and it was impossible to determine if it was sitting on the same spot as the previous measurement or if an electrical cord or a magazine etc. happened to be under the rod (even the thickness of several sheets of paper will show up at this precision). There was also the possibility for a gross error in reading the rod, since the level had the standard three cross hairs (center, upper and lower) used for measuring distances in surveying. If the operator was inexperienced (student labor was used for these measurements) a reading could be made using either the upper or lower cross hair instead of the center one. This error would yield an elevation that was in error by several tens of millimeters to as much as a few inches. These errors, however, are readily discernible when all the data is plotted as a function of time (see the appendix).

Level data on the ground floor of the structure was collected several times a year and accumulated for a period of eight years. The level data plotted as a function of time are shown in the appendix of this report. Each measurement location is designated on the floor plan by a letter. Different groups of letters were plotted together on the charts to show relevant comparisons such as the south wall or the diagonal across the structure. In each chart, all levels are referenced to a single reference point "A". This allows the elevation of each point to be compared as a relative elevation on the floor plan with respect to point A. From this data, differential elevations between different parts of the floor can be seen easily and tracked with time.

This system, however, does not give information as to the absolute elevation of the house with respect to the ground outside, and therefore any elevation variation of point A is also reflected in all other points. Determining absolute elevations requires a stable surveyor's benchmark or other stable reference outside of the structure. No such reference or benchmark was available at this location, so the top of the well pipe was used in an attempt to provide a stable reference. The relative elevation between the benchmark and the reference point indicated a change of approximately 150 mm (6 inches) over the six years that this data was recorded. Unfortunately, the well casing had to be opened on several occasions due to well failure so the top of the casing was compromised as a stable benchmark. The relative elevations, however, allow differential settlement to be tracked, and that is the most important information for these studies.

For perspective, a differential floor elevation of one to two inches (25 mm to 50 mm) across the length of an average room is not noticeable to the unaided eye. Up to four inches (100 mm) over the distance across a normal room, although noticeable, is not an overly unpleasant condition with which to live.

Loose soils also raise the concern of settlement during a dynamic event such as an earthquake. During the period over which the level measurements were made on this house there were 15 earthquakes in the Fairbanks vicinity (approximately a 30 mile radius) over Richter 4.0. Of those 15, one was ranked at 5.0 on November 1, 1992 and one was 6.2 on October 6, 1995. This last one was the most significant event, since it was not only the largest but also the shallowest at only 9 km below the surface. It was felt very strongly by residents of Fairbanks.

Upon review of the level measurement data, no significant, measurable settlement events can be identified that correlate with any of the above seismic events. This suggests that either conditions are such that settlement into the loose soils beneath the structure was not triggered by a dynamic event of this magnitude or that settlement into the loose soils was already complete before the Permafrost Technology Foundation started monitoring the structure. These circumstances and observations do not preclude the possibility of settlement during a more severe earthquake or other type of dynamic event, but surviving both the 6.2 and 5.0 earthquakes suggests a relative stability of the structure.

Temperature Measurement

When the permafrost test borings were drilled, a thermistor string with 12 thermistors was placed in each hole. The thermistor strings were positioned to measure temperatures at the surface of the ground and at various depths to the bottom of the hole. In addition to these thermistor strings, five other strings were installed to measure soil and air temperatures. Four strings (no's three, four, five and six) were installed in pipes that were hand-driven into the soil at various locations in the crawl space beneath the ground floor. Due to their location in the crawl space, the pipes had to be hand driven and are therefore not as deep as the first two holes which were drilled with a large truck-mounted commercial drill. These four strings extend from the surface of the ground in the crawl space to the top of the permafrost. The fifth string was used to measure air temperatures at various locations within the crawl space (thermistors U2 through U7) and one thermistor was positioned to measure outside air temperature (thermistor U1). The thermistor strings are routed to and terminate in a box located on the east corner of the house. They can be monitored without entering the house. Thermistor strings were all monitored periodically whenever the level measurements were taken (and often more frequently) resulting in a temperature data base of 8 years of soil temperatures for the site. The temperature data was plotted with respect to time on charts to give a graphic indication of the soil temperature trends over the duration of the study. These charts are included in the appendix of this report.

Thermistors are capable of measuring temperature to the nearest one thousandth of a °C. Thermistors were used because they provide greater precision and are easier to read than thermocouples; however, they have the disadvantage of being more fragile, and they can drift a few thousands of a degree over time. To obtain the maximum accuracy, the strings must be calibrated in a reference bath both before and after their use. These thermistor strings were calibrated before placing them in the hole, but since once installed they are buried, it is impractical to remove them without destroying them, therefore the secondary calibration cannot be made. The temperatures, therefore, are reliable to about a tenth of a degree Celsius. However, for the purposes required for these studies, an accuracy of one tenth of a degree Celsius is adequate.

Thermistors located at various depths allow us to track the temperatures at those depths to determine if the permafrost is getting deeper, remaining stable, or actually rising. The data also alerts us to any anomalies in temperature that may occur due to outside influences such as new construction nearby, landscaping modifications, or damage or deterioration of protective insulation.

Geotechnical Exploration

In order to determine the condition of the soils below the structure, two boreholes were drilled and samples of the soil were taken at regular intervals of depth (see appendix for borehole logs). Samples were collected by driving a split-spoon sample core barrel through the hollow stem using a 300 pound hammer and a 30 inch drop. The number of hammer blows required to drive the core barrel gives information on the competency of the soil at each sample depth. These samples are considered "disturbed samples." However, since they are retrieved essentially intact in their natural state, they provide useful information about the soil. This method of sampling was continued until frozen ground was encountered. Below this, the soils were sampled with a dry core barrel. This brings to the surface a five-foot-long, three-inch-diameter, intact soil sample. Representative soil samples were then sent to the laboratory for analysis of grain size and water content. With this data, a model of the soil conditions and types was constructed for the hole. This model does not necessarily apply to the soils under the structure since soil conditions can, and often do, change radically over short distances, but if boreholes on both sides of the structure are similar in nature, then the condition of the soils beneath the house at least can be inferred.

Results and Conclusions

The strategy used to stabilize the permafrost was designed to:

1. Reduce the heat input from the house to the soil to an amount that will reduce or stop the thawing at the permafrost table.
2. Increase the exposure of the soil in the crawl space to colder temperatures in order to lower the soil temperatures, reduce the potential thawing during the summer months and thus make the permafrost more stable and better able to support the foundation.

To reduce the heat flowing into the soil, the crawl space was isolated from the heat of the house with an insulated plenum installed at the top of the crawl space between the crawl space and the ground floor. The plenum also provided a freeze protected zone for the water and sewer utilities. This allowed the crawl space below the insulated plenum to be cooled without endangering the plumbing.

Cooling the crawl space was accomplished by circulating cold outside air through the space using two fans located in the southwest wall (figure 3). The cold air carried away any heat that escaped through the floor/plenum of the house into the crawl space and also cooled the soil. As the soil temperature dropped it was important not to bring in air that was warmer than the soil temperature. A monitoring system consisting of a small logic circuit (figure 4) was used to measure and compare the soil temperature in the center of the crawl space with the outside air temperature. If the air temperature was colder, the fans would be activated. When the air temperature rose above the soil temperature, the fans were turned off. This allowed maximum use of winter cooling without the danger of warming the soil when outside air temperatures rose quickly as they so often do during spring and fall. During spring in Fairbanks, many days occur when the night-time air temperatures are well below freezing, but during the day temperatures rise above freezing for a few hours.

Temperature Measurements

The performance of the cooling system can best be assessed by examining the temperature history of the soil at various depths in the crawl space. The temperature data show that the temperature of the soil beneath the house (thermistor strings 3 through 6) has dropped at virtually every level and has done so for the entire eight year period of the data base since the cooling system was installed in 1991. The temperature drop averaged approximately 0.1 °C. Seasonal temperature fluctuations occur in the top12 ft, but even these levels show a slow decline of temperature over the years of record with smaller excursions into the above freezing levels each summer (figures 5 & 6). The level of the permafrost in the center of the crawl space (thermistor string #4) has risen by as much as 8 ft during this period from 16.5 ft in 1992 to 8 ft as early as 1995 (figure 6). Thermistor string #3 is on the northwest side of the crawl space. Temperatures in this area show a similar rise in the top of the permafrost from 13 ft in 1992 to approximately 4 ft in approximately 1995 (figures 7 and 8). The temperature of the lower depths also show a cooling trend confirming that the permafrost is being reinforced by active cooling in the crawl space (figure 8). Thermistor string 6 near the northeast wall of the crawl space has a similar temperature history and permafrost rise as seen in figures 9 and 10.

In contrast, the two thermistor strings outside the foundation of the house (strings 1 & 2) show the condition of permafrost in the surrounding vicinity. This permafrost is not being directly affected by the cooling system in the crawl space and is subject to the effects of the summer weather without benefit of shade. In addition, during the winter, ground surface outside the crawl space is covered with an insulating blanket of snow which attenuates the effect of winter cooling. In both locations (thermistor string #1 on the northwest side of the house and thermistor string #2 on the southeast side) the permafrost has warmed measurably (approximately 0.05 °C outside the northwest side of

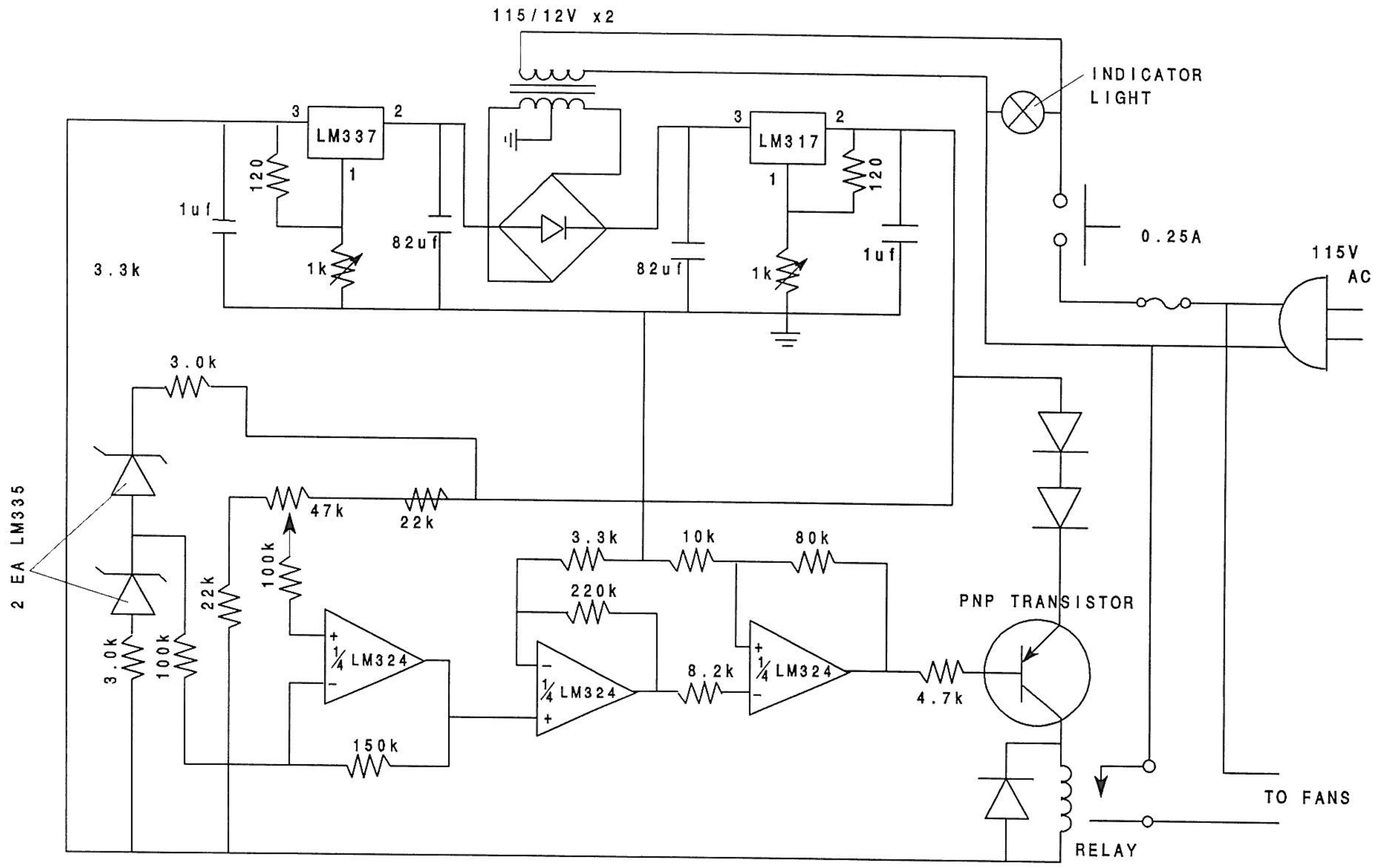


FIGURE 4 - COOLING FAN MONITORING CIRCUIT SCHEMATIC

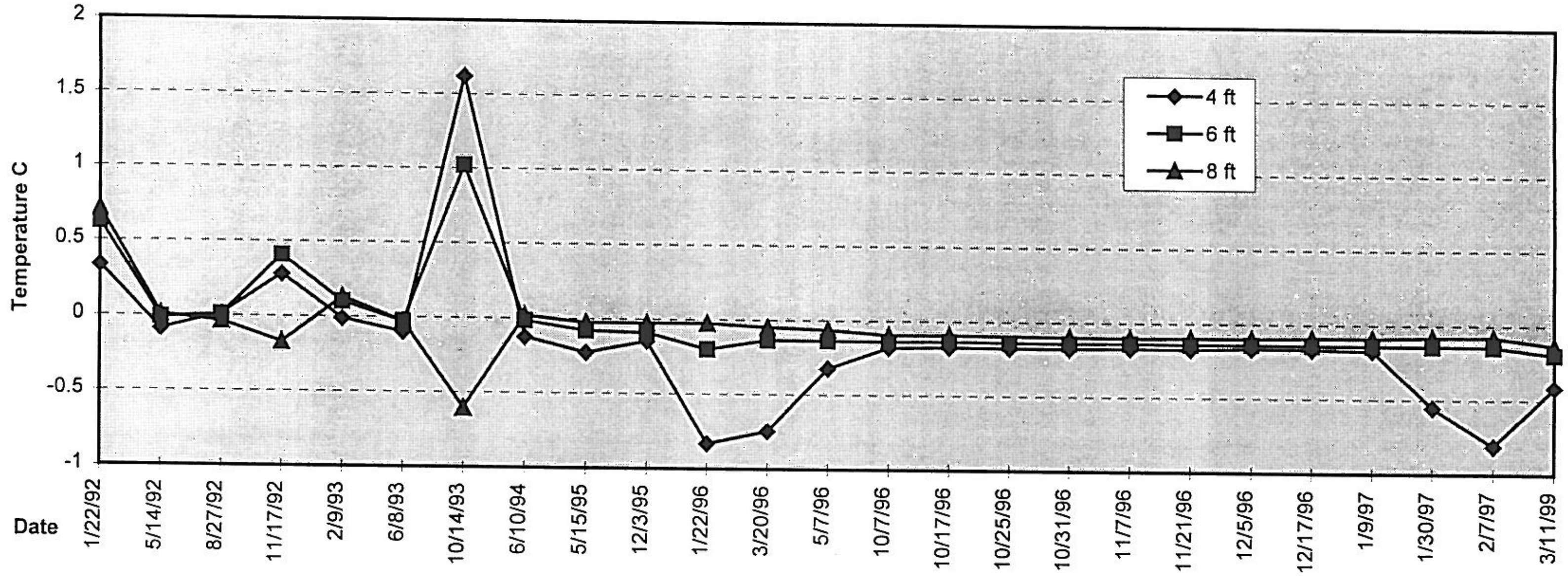


Figure 5 - Thermistor String #4 at 4, 6, & 8 ft Depths

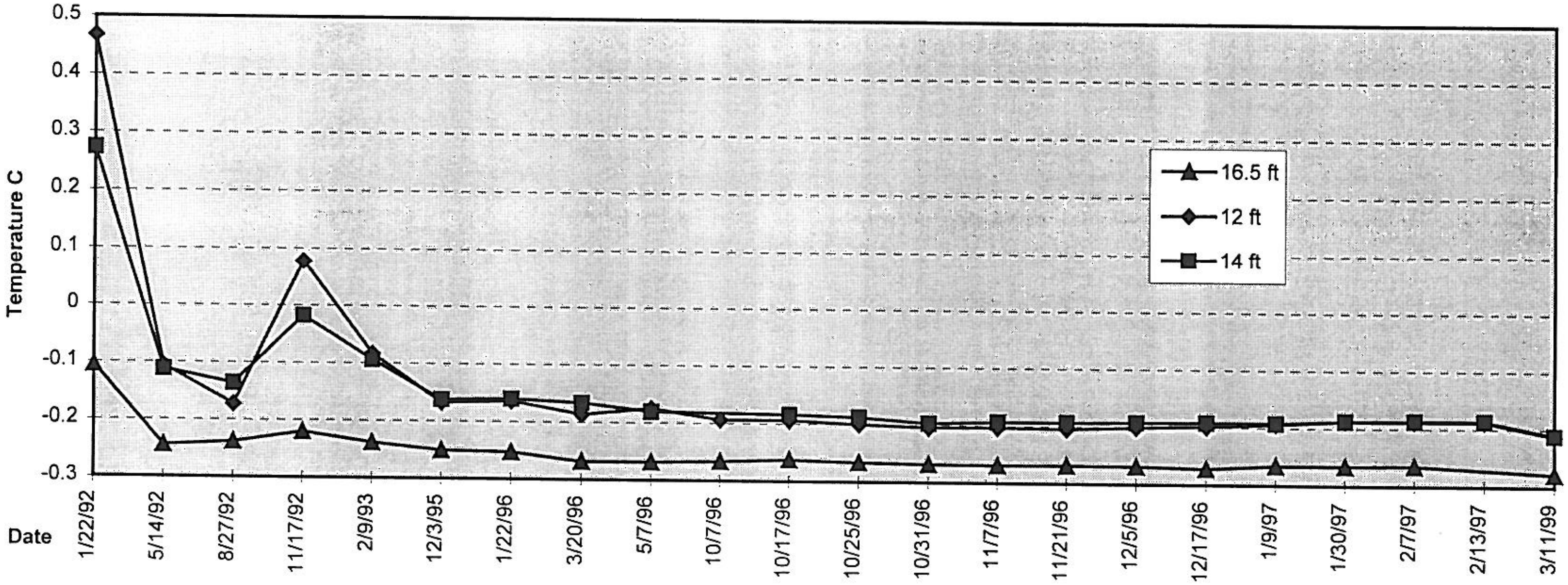


Figure 6 - Thermistor String 4 @ 12, 14 & 16.5 ft depths

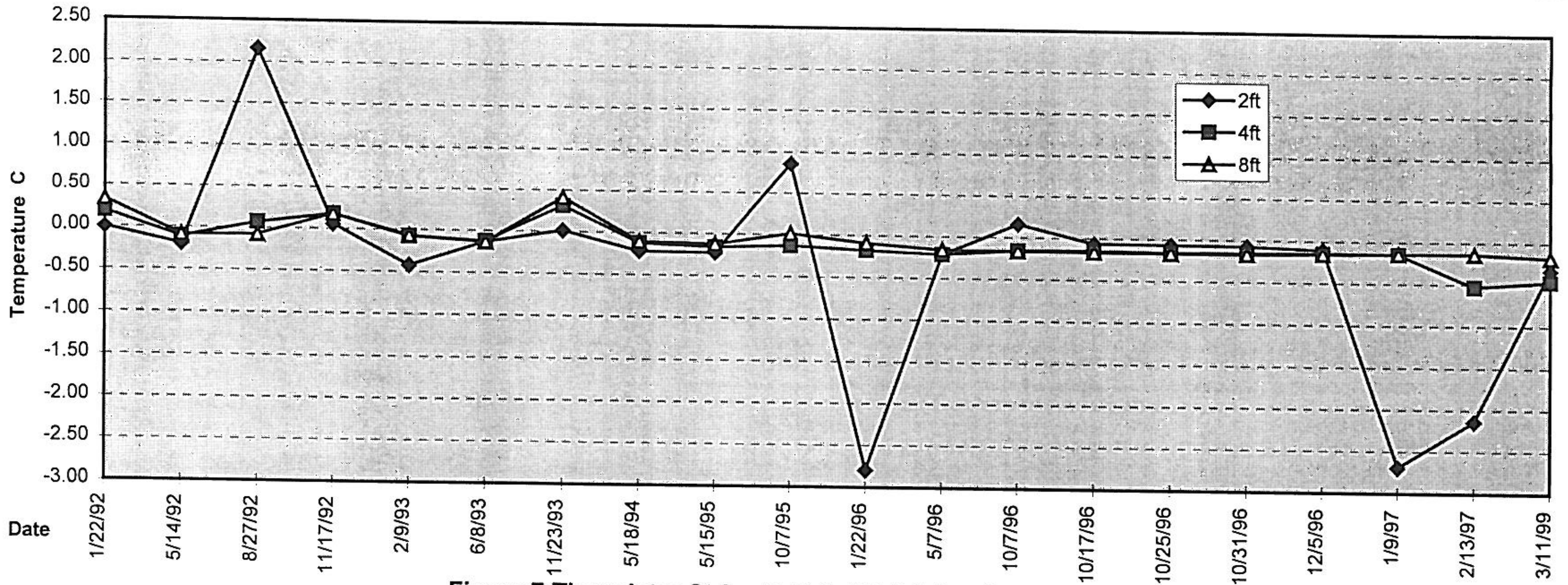


Figure 7 Thermistor String 3 @ 2, 4 & 8 ft Depths

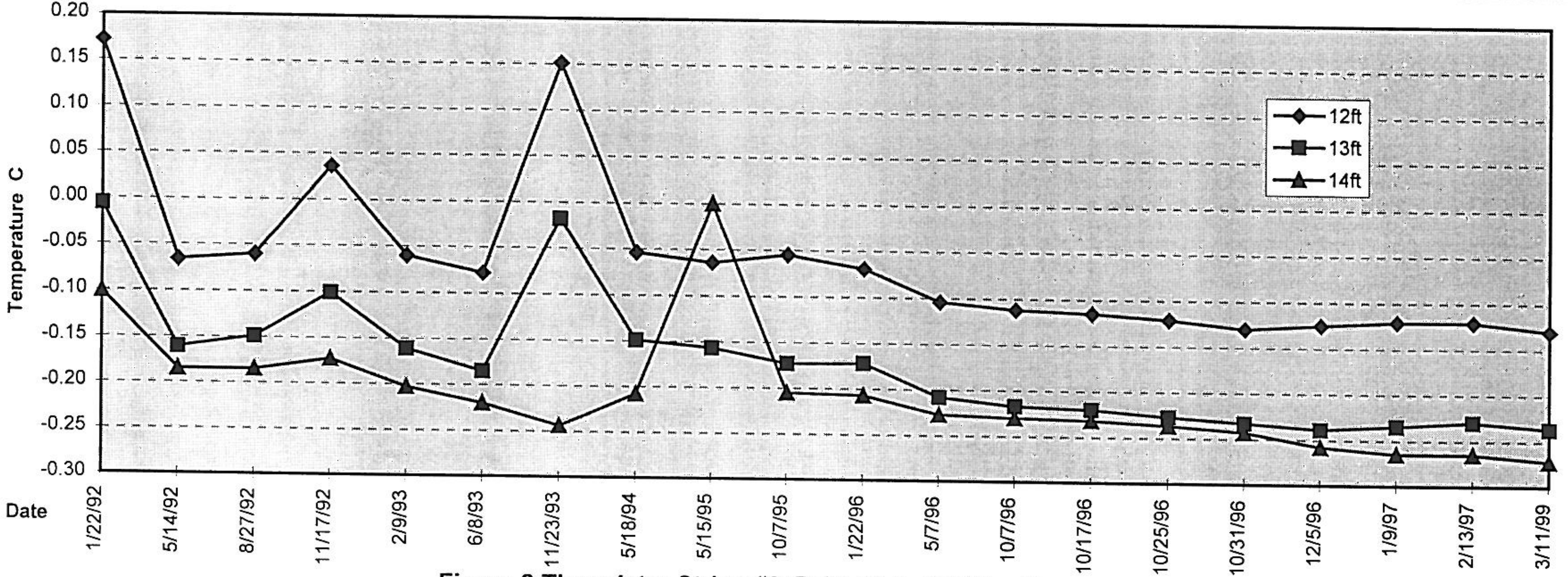


Figure 8 Thermistor String #3 @ 12, 13 & 14 ft Depths

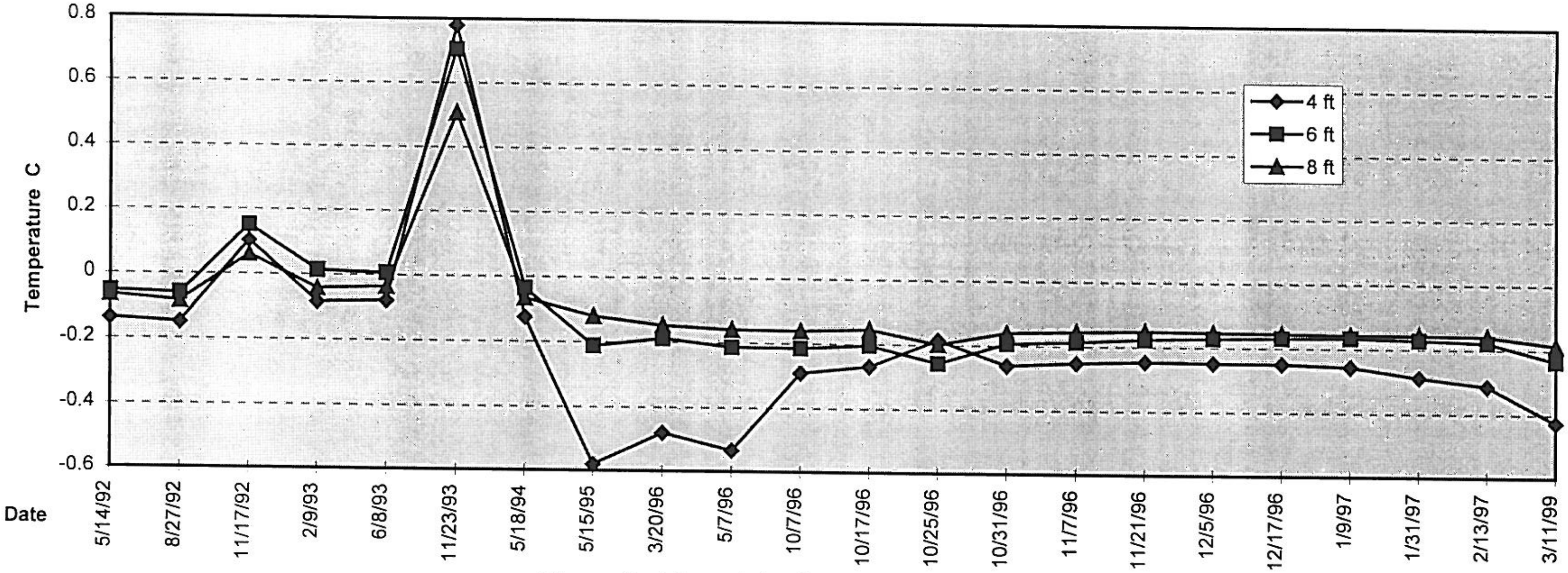


Figure 9 - Thermistor String #6 @ 4, 6 & 8 ft Depths

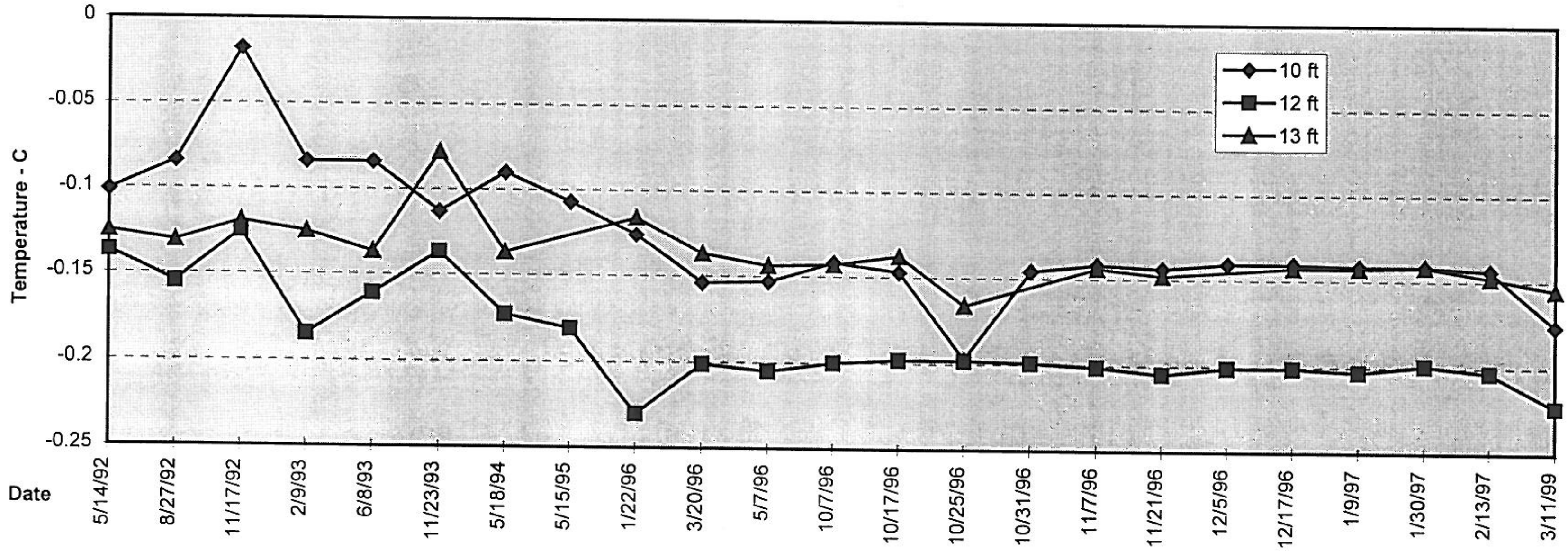


Figure 10 - Thermistor String 6 @ 10, 12 &13 ft Depths

the house and over 0.1 °C outside the southeast side) as shown in figures 11 and 12. The top of the permafrost subsided from 13 feet deep in 1991 to nearly 16 feet deep in 1996. This degradation of permafrost outside the crawl space while the permafrost was reinforced and raised inside confirms the performance of the forced convection cooling system in stabilizing permafrost in a crawl space.

Floor Level Measurements

One of the measures of the stability of a foundation is the degree to which the floor of the structure remains level over the years. Level measurement of the ground floor were done periodically on a more or less regular basis. Data collection was more frequent in the beginning and then spaced farther apart as familiarity and confidence in the system grew. The measurements were made using a telescopic surveyor's level and a rod calibrated in millimeters as discussed above. The measurements, covering a span of approximately 8 years showed that once the house was releveled and the cooling system installed, the foundation stability improved by well over an order of magnitude (i.e. subsidence was reduced by approximately 26 times). Level measurements during the summer of 1991 shortly after the house was acquired from AHFC, showed a rate of subsidence of as much as 46 mm (1.8 inches) in a 55 day period (0.84 mm per day) at point "T" (table 1).

Table 1 Elevation of Points "E" and "T" in mm referenced to point "A"

Date	6/25/91	8/19/91	change	re-level	12/19/91	3/8/99	change
Point "E"	-99	-132	-33		-5	-39	-34
Point "T"	-347	-301	+46		-53	-51	-2

After the stabilization system was activated the subsidence was reduced to an average of 0.013 mm (0.0005 inches) per day (34 mm over the eight year period) at point "E" as shown in Table 1 and figure 13. Note that point "T" only changed elevation by 2 mm during that same eight year period.

Figure 13 shows the elevation changes for all measurement points during the eight years of record. Positive elevation changes indicate that the point is higher with respect to the reference point "A" and of course negative changes indicate that the point is lower. Positive values could be the result of frost heaving under this portion of the foundation wall. However, since the absolute elevation of point "A" in space is unknown it is just as likely that point "A" has moved. The elevation of "A" was recorded with respect to the top of the well casing located in the front yard. The well casing was used as it was thought to be the most stable reference benchmark available. However, work on the well at several times during the experiment disturbed this point and made this benchmark somewhat less than reliable. Nevertheless, it does give an indication of the relationship of point "A" with respect to absolute elevation. Figure14 shows the relationship between the top of the well casing and point "A". If the well casing were considered to be stable in space, then point "A" can be seen to be subsiding. This fits with the overall conditions at the site. If permafrost in the local area is degrading as thermistor strings 1 and 2 suggest, the south and west sides of the house would be the most likely areas to subside

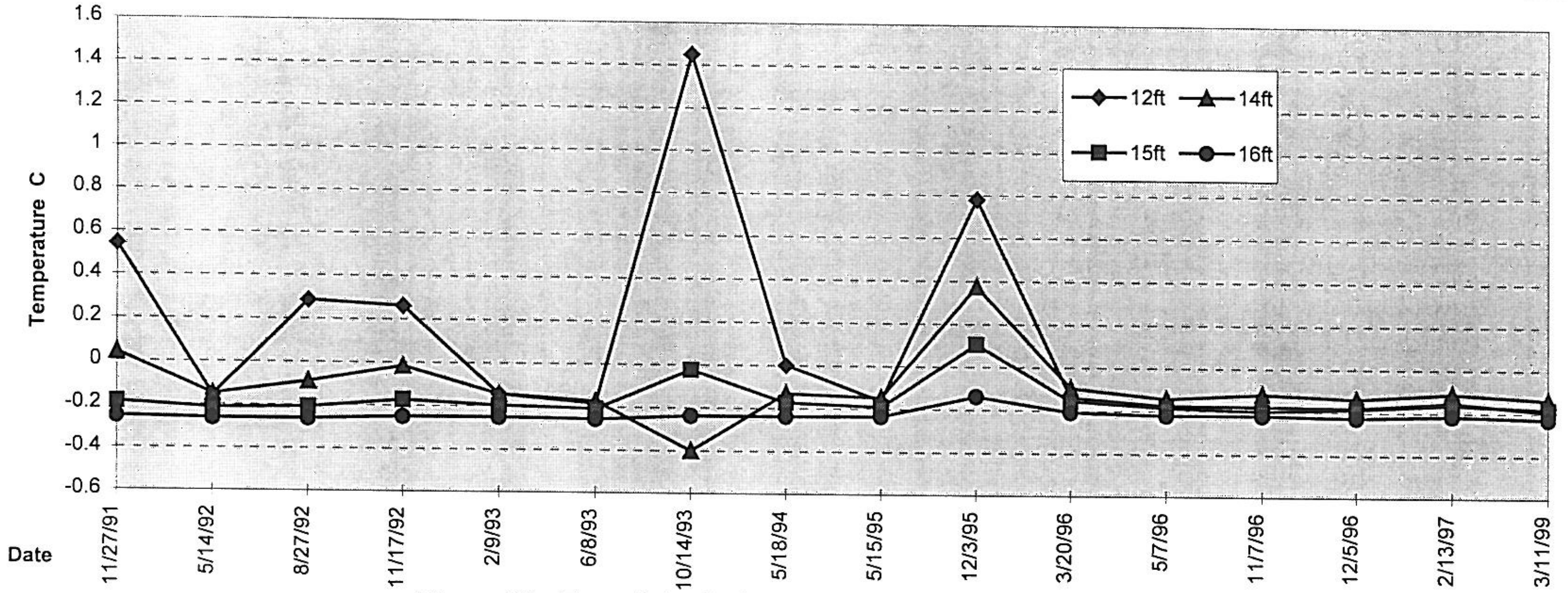


Figure 11 - Thermistor String #1 @ 12, 14, 15, & 16 ft Depths

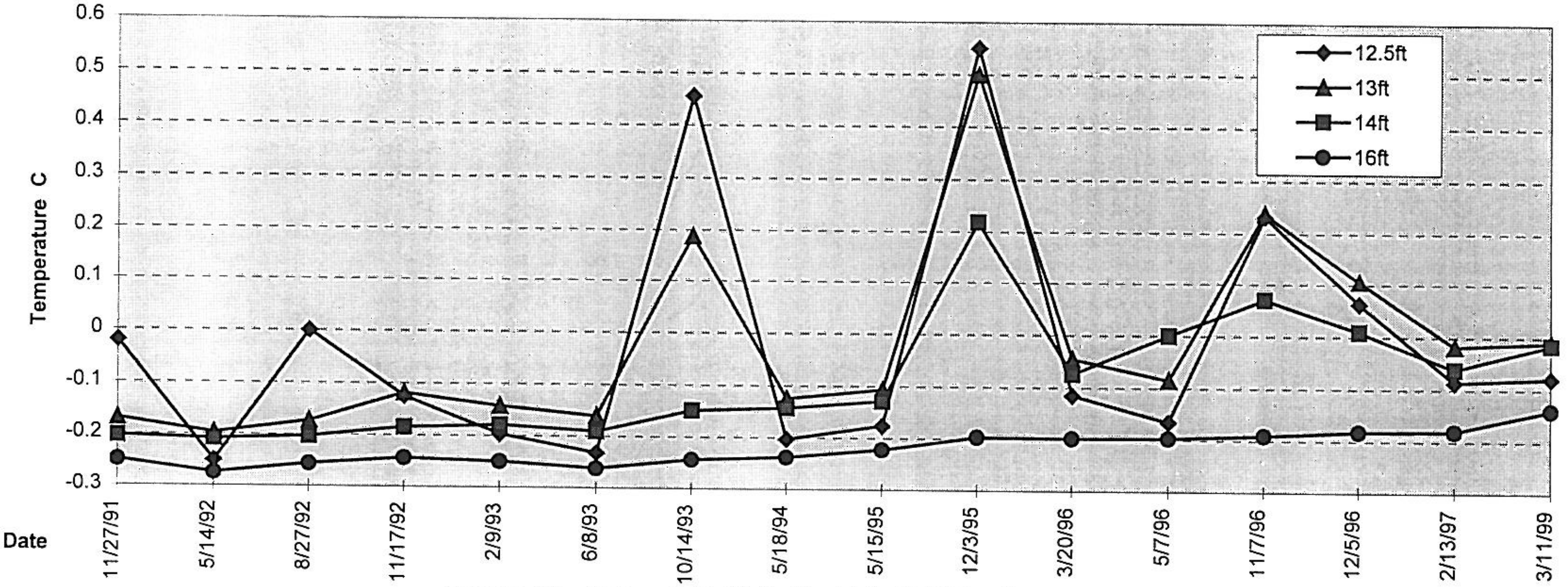
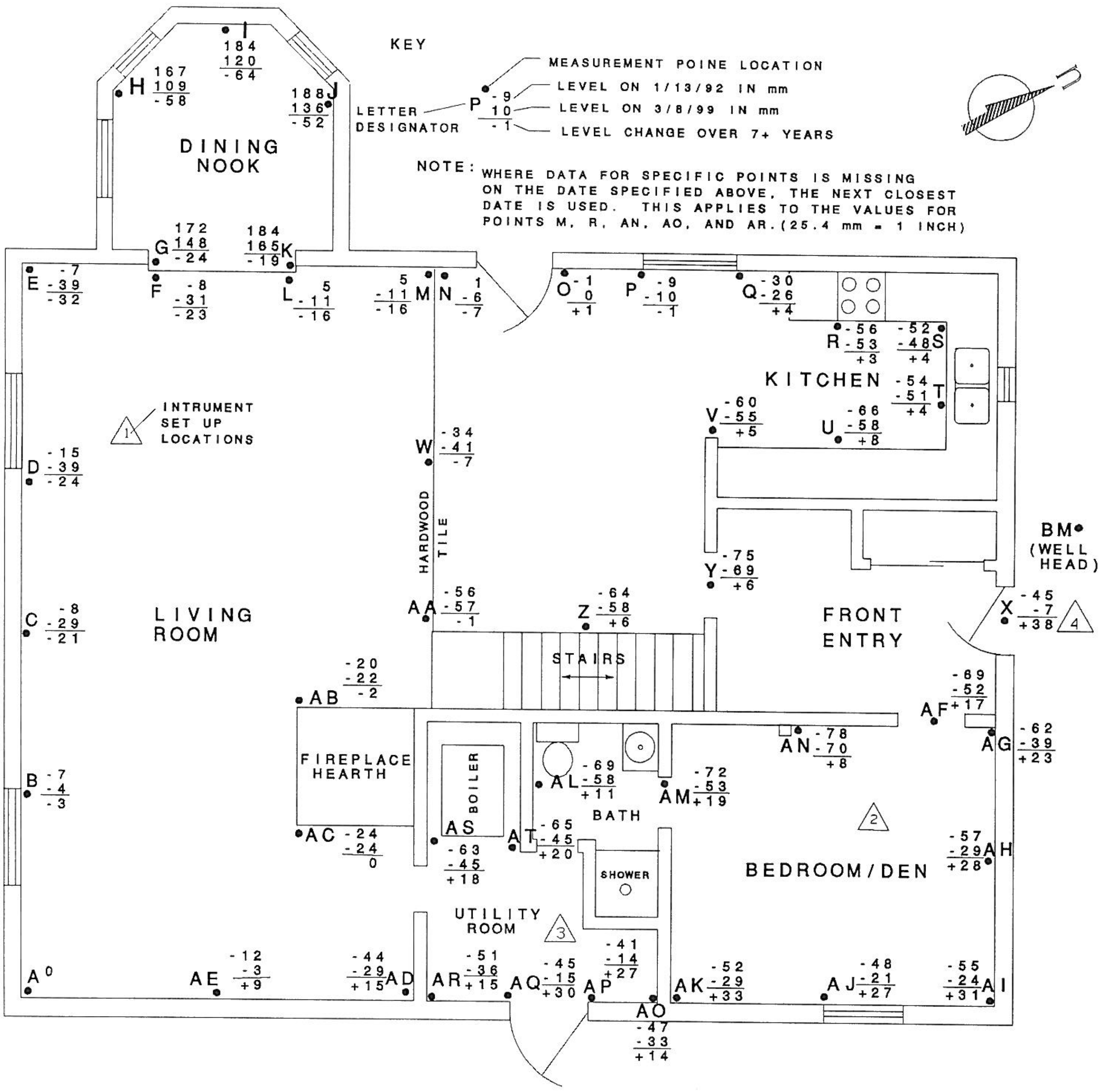


Figure 12 - String 2 @ 12.5, 13, 14 & 16 ft Depths



NOTE: WHERE DATA FOR SPECIFIC POINTS IS MISSING ON THE DATE SPECIFIED ABOVE, THE NEXT CLOSEST DATE IS USED. THIS APPLIES TO THE VALUES FOR POINTS M, R, AN, AO, AND AR. (25.4 mm = 1 INCH)

FIGURE 13-ELEV. CHANGES (mm) OF GROUND FLOOR OVER 7 YEARS

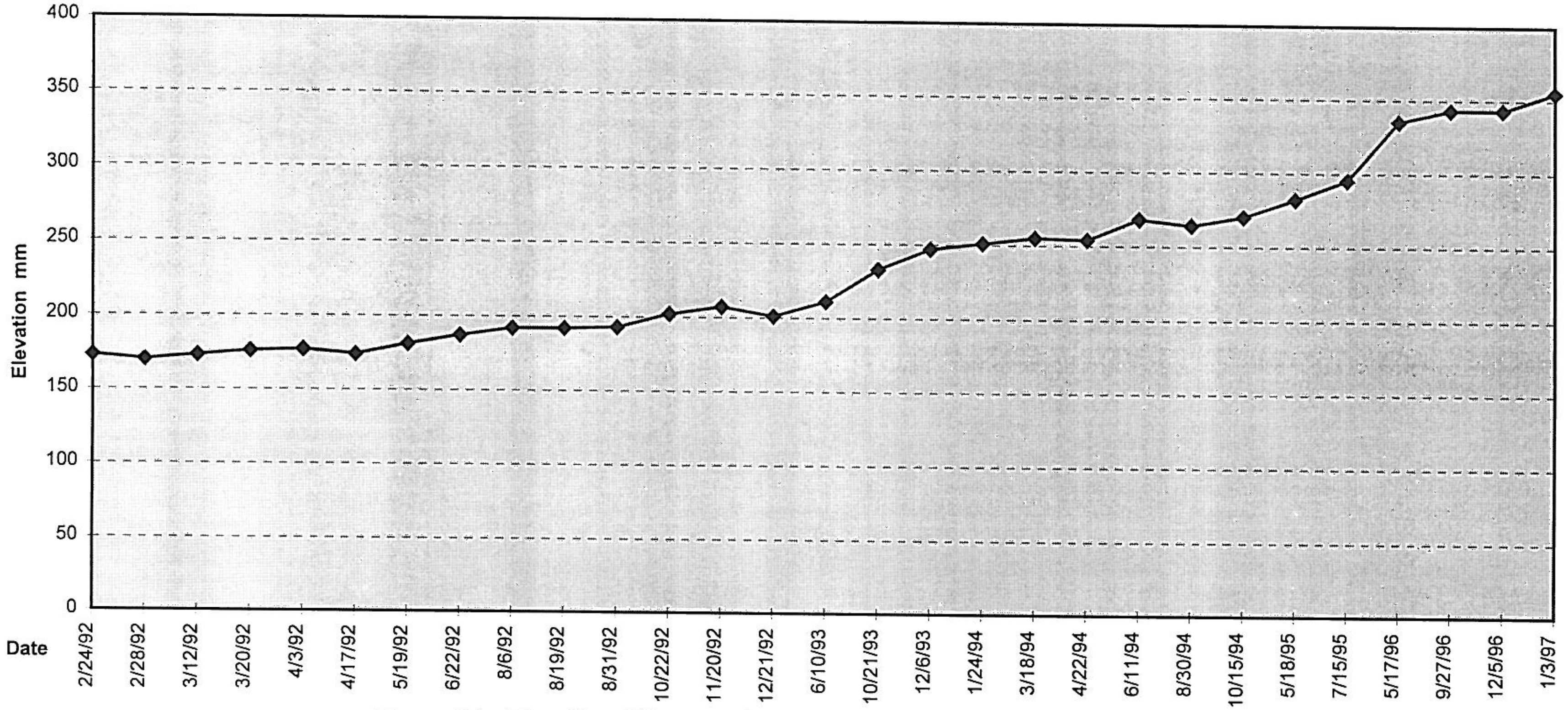


Figure 14 - Elevation difference between Well Casing Top and Point "A"

as the outlying soils thaw from the more intense effect of the sun on this exposure.

The crawl space cooling may keep the permafrost healthy under the house, but it cannot have much effect very far outside the confines of the crawl space. However, if the overall site is subsiding, the magnitude is small, on the order of less than 5 mm per year. If this situation exists, it suggests that the crawl space forced-cooling system is performing even better than is indicated by the level measurements discussed above, since some or perhaps even most of the elevation change noted in the level changes of the ground floor is due to outside subsidence of the ground and not subsidence of the permafrost under the house.

Conclusions

The forced cooling system for the crawl space protects the permafrost beneath the house and limits subsidence to manageable values, at worst, and virtually eliminates it at best. It is the least expensive method for stabilizing permafrost for a house that has a crawl space, or for one with a basement that can be kept at outside temperatures. The forced cooling system lends itself toward homeowner/handyman installation. It requires little specialized expertise and few if any specialized tools. Likewise if the cooling system is installed by a professional contractor, the cost of the installation and components will be low enough to fit nearly any homeowner's budget.

Permafrost levels under the house actually rose during the eight years that the system has operated. The temperature of the soil in the crawl space dropped at all levels, making the permafrost less susceptible to outside seasonal weather extremes. Frost heaving either did not occur during the freezing of active layer soils, or it was small enough to be manageable. There was no wracking of the structural frame and no door or window sticking problems, nor did any cracks form in the wallboard in the house during the entire period of the experiment.

The structure's foundation may still be affected by general overall thawing in the vicinity of the building, and the forced cooling system as it was designed for this experiment will not protect the permafrost in the local vicinity. It may be possible to extend the effective area of protection by other means such as a cooling grid that extends outside of the confines of the crawl space, but that was beyond the scope of this experiment. Nevertheless, permafrost in the surrounding area will always affect ancillary systems such as roads, septic systems, wells, outbuildings etc. These items must be protected or at least the effects on them must be considered whenever building in permafrost.

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Appendix

Bore Hole Logs

SOIL DESCRIPTION

SURFACE ELEVATION:

BROWN SILT W ORGANICS.
CLAYEY IN PLACES.
DARKER BROWN WITH DEPTH

GRAY BROWN SILT Nbn

CLEAR ICE

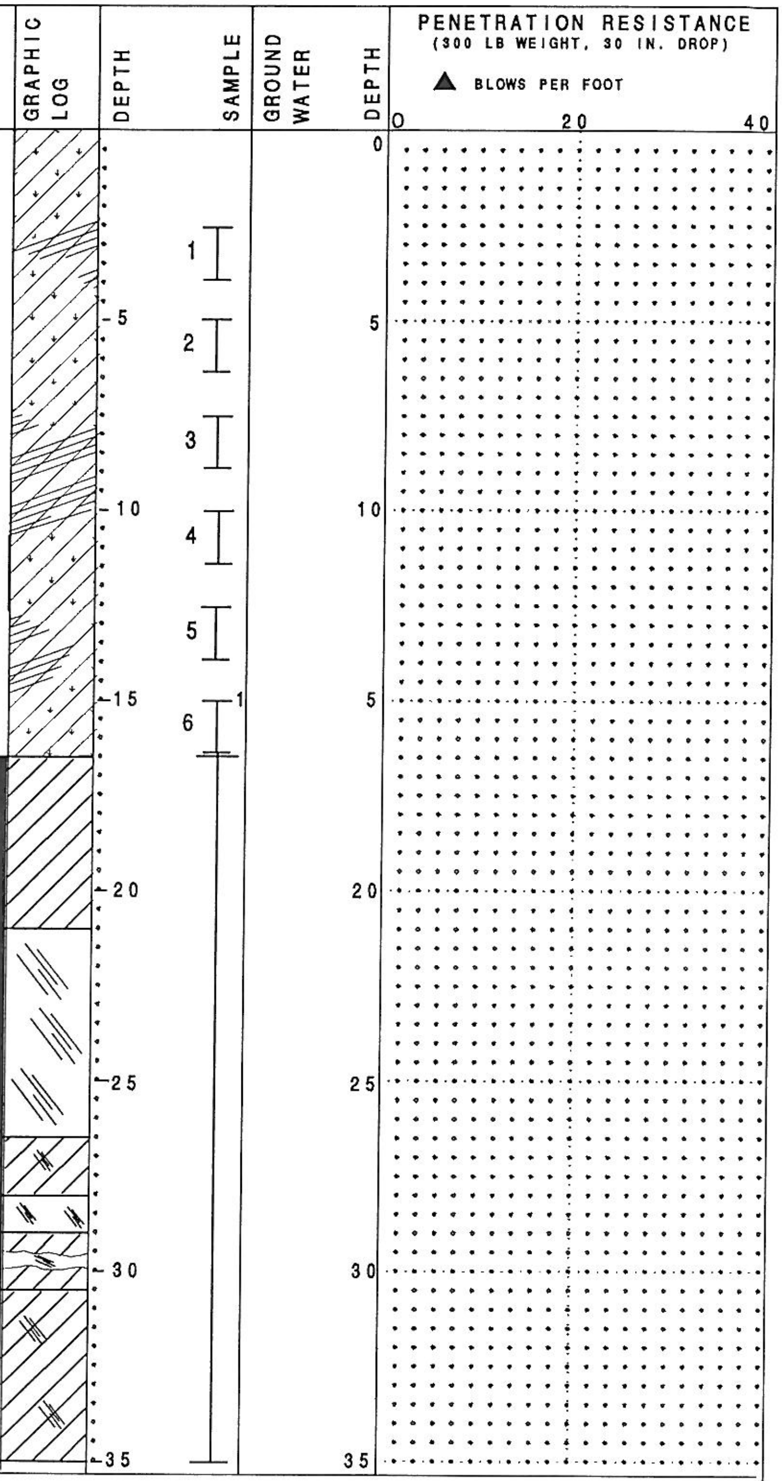
SILT AND ICE

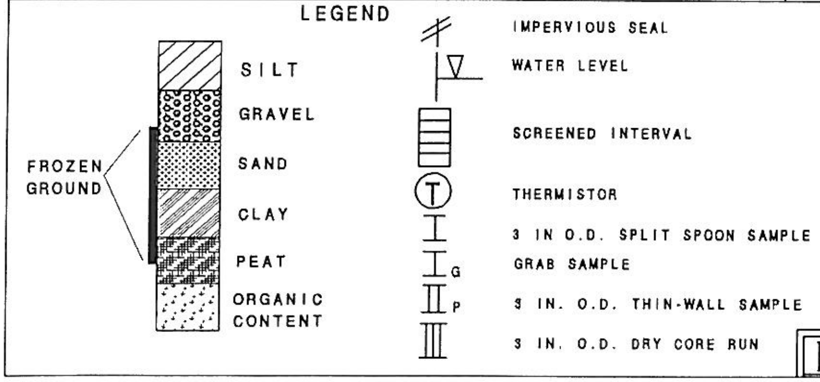
ICE

BROWN SILT W/ ICE LENSES

BROWN SILT AND ICE

BOH @ 35 FT.



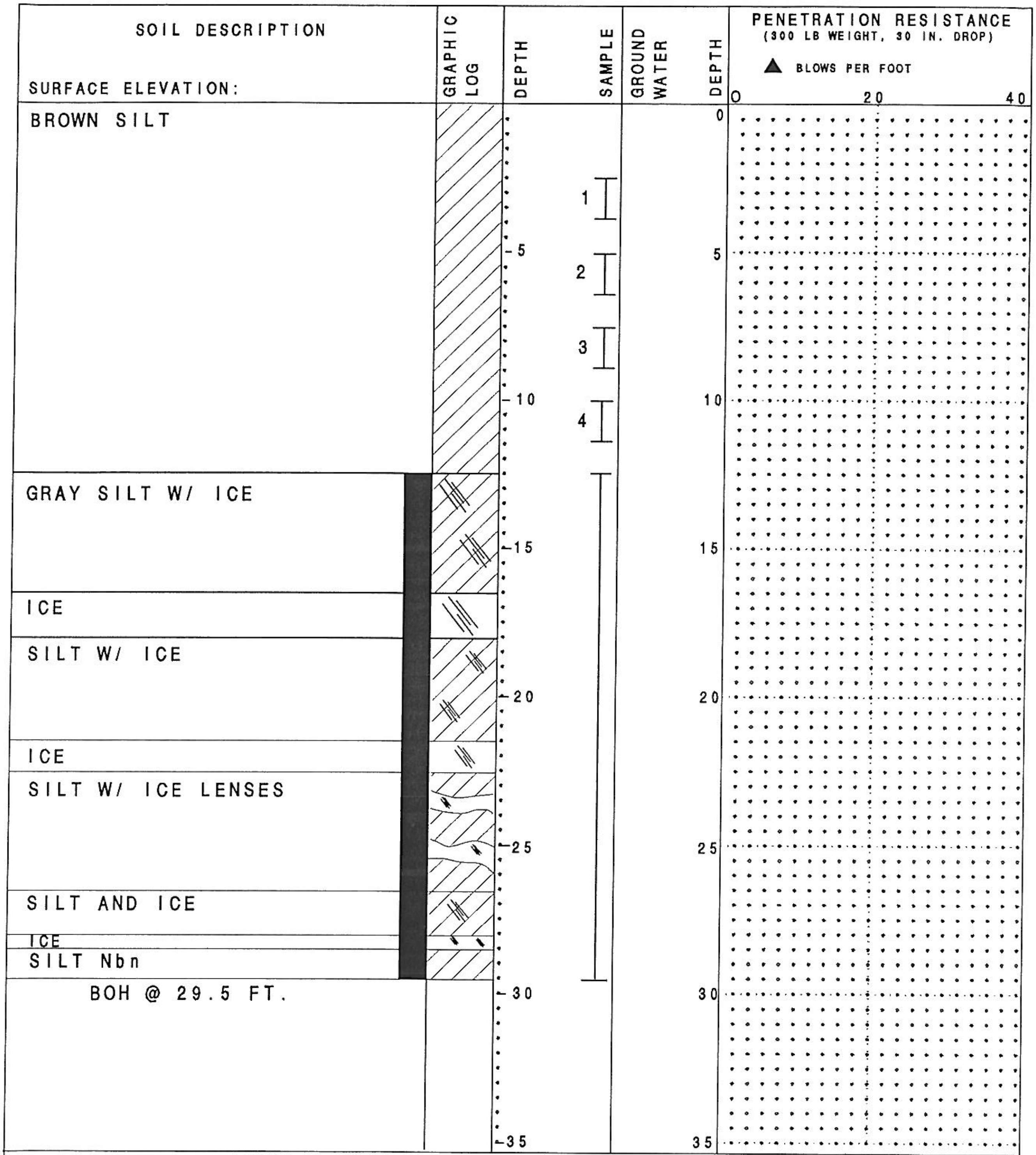


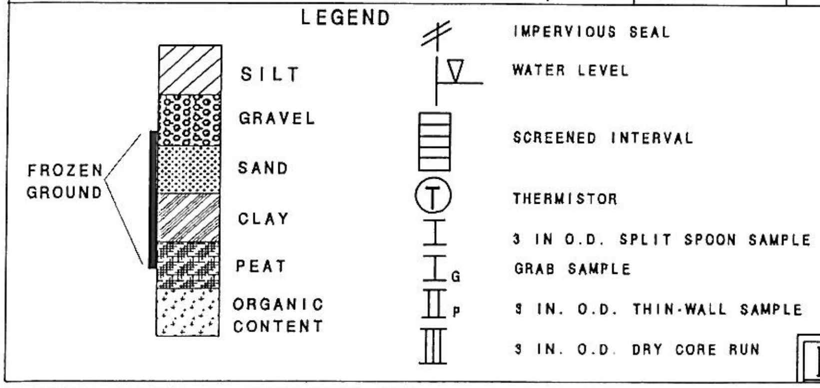
● % WATER CONTENT

BORING LOG

NAME: 1.5 MI. BALLAINE RD.
BORE HOLE#1
LOCATION: 6'W & 6'N OF NW DOOR
PAGE: ONE OF ONE
DATE: AUGUST 1991

PERMAFROST TECHNOLOGY FOUNDATION





● % WATER CONTENT

BORING LOG

NAME: 1.5 MI. BALLAINE RD.
BORE HOLE-2

LOCATION: 6'S & 1'E OF SE DOOR

PAGE: ONE OF ONE

DATE: AUGUST 1991

PERMAFROST TECHNOLOGY FOUNDATION

5X@PJL EOJ NAME = "MSJOB 3"

Level Measurements

Ballaine Level Data

Operator : TM, TK

	Previous Elevation	New Reading	New Elevation	Elevation Difference
Date			6/25/91	
A (1)*			0	0
B (1)			-7	-7
D (1)			-73	-73
E (1)			-99	-99
F (1)			-106	-106
G (1)			75	75
H (1)			87	87
I (1)			65	65
J(1)			65	65
K (1)			77	77
L (1)			-102	-102
M (1)			-119	-119
N (1)			-132	-132
O (1)			-145	-145
P (1)			-176	-176
Q (1)			-222	-222
T (1)			-347	-347
W (1)			-134	-134
X (1)			-236	-236
X (2)**			\	\
Y (1)			N/A	N/A
AA (1)			-127	-127
AD (1)			-73	-73
AE (1)			-5	-5
AF (2)			-194	-194
AG (2)			-214	-214
AH (2)			-194	-194
AI (2)			-178	-178
AJ (2)			-134	-134
AK (2)			-113	-113

X(1) - X(2)= N/A

* Point "A (1)" should be the first point measured in the house. This point then becomes the datum from which all other points are referenced.

** Point "X" is the common point used to correlate data from all points to point "A (1)".

Ballaine Level Data

Operator : TM, TK

	Previous Elevation	New Reading	New Elevation	Elevation Difference
Date	6/25/91	N/A	8/19/91	2 Months
A (1)*	0		0	0
B (1)	-7		-40	-33
D (1)	-73		-106	-33
E (1)	-99		-132	-33
F (1)	-106		-137	-31
G (1)	75		38	-37
H (1)	87		32	-55
I (1)	65		31	-34
J(1)	65		31	-34
K (1)	77		42	-35
L (1)	-102		-134	-32
M (1)	-119		-147	-28
N (1)	-132		-162	-30
O (1)	-145		-179	-34
P (1)	-176		-206	-30
Q (1)	-222		-244	-22
T (1)	-347		-301	46
W (1)	-134		-169	-35
X (1)	-236		-265	-29
X (2)**	\		\	\
Y (1)	N/A		N/A	N/A
AA (1)	-127		-160	-33
AD (1)	-73		-100	-27
AE (1)	-5		-37	-32
AF (2)	-194		-243	-49
AG (2)	-214		-244	-30
AH (2)	-194		-223	-29
AI (2)	-178		-206	-28
AJ (2)	-134		-163	-29
AK (2)	-113		-144	-31

X(1) - X(2)= 0

* Point "A (1)" should be the first point measured in the house. This point then becomes the datum from which all other points are referenced.

** Point "X" is the common point used to correlate data from all points to point "A (1)".

Ballaine Level Data

Operator : Mark, DLB

	Previous Elevation	New Reading	New Elevation	Elevation Difference
Date	8/19/91	11/19/91	11/19/91	3 Months
A (1)*	0	385	0	0
B (1)	-40	384	-1	39
D (1)	-106	375	-10	96
E (1)	-132	382	-3	129
F (1)	-137	382	-3	134
G (1)	38	563	178	140
H (1)	32	566	181	149
I (1)	31	579	194	163
J(1)	31	586	201	170
K (1)	42	575	190	148
L (1)	-134	399	14	148
M (1)	-147	402	17	164
N (1)	-162	390	5	167
O (1)	-179	394	9	188
P (1)	-206	384	-1	205
Q (1)	-244	366	-19	225
T (1)	-301	343	-42	259
W (1)	-169	363	-22	147
X (1)	-265	354	-31	234
X (2)**	\		\	\
Y (1)	N/A	N/A	N/A	N/A
AA (1)	-160	341	-44	116
AD (1)	-100	355	-30	70
AE (1)	-37	377	-8	29
AF (2)	-243	324	-35	208
AG (2)	-244	334	-25	219
AH (2)	-223	336	-23	200
AI (2)	-206	334	-25	181
AJ (2)	-163	340	-19	144
AK (2)	-144	334	-25	119

X(1) - X(2)= N/A

* Point "A (1)" should be the first point measured in the house. This point then becomes the datum from which all other points are referenced.

** Point "X" is the common point used to correlate data from all points to point "A (1)".

Ballaine Level Data

Operator : Yuan, Zhang

	Previous Elevation	New Reading	New Elevation	Elevation Difference
Date	2/13/92	2/24/92	2/24/92	
A (1)*	0	483	0	0
B (1)	-4	480	-3	1
B (3)**	\	522	\	\
C (1)	-8	476	-7	1
D (1)	-15	468	-15	0
E (1)	-7	476	-7	0
F (1)	-8	475	-8	0
G (1)	172	656	173	1
H (1)	167	649	166	-1
I (1)	184	666	183	-1
J (1)	188	672	189	1
K (1)	184	667	184	0
L (1)	5	489	6	1
M (1)	5	488	5	0
N (1)	1	485	2	1
O (1)	-1	485	2	3
P (1)	-9	474	-9	0
Q (1)	-30	454	-29	1
R (1)	N/A	429	-54	N/A
S (1)	-52	432	-51	1
T (1)	-54	429	-54	0
U (1)	-66	418	-65	1
V (1)	-60	425	-58	2
W (1)	-34	448	-35	-1
X (1)	-45	434	-49	-4
X (2)**	\	520	\	\
X (4)***	N/A	507	\	N/A
Y (1)	-75	408	-75	0
Z (1)	-64	418	-65	-1
AA (1)	-56	426	-57	-1
AB (1)	-20	465	-18	2
AC (1)	-24	460	-23	1
AD (1)	-44	442	-41	3
AE (1)	-12	472	-11	1
AF (2)	-69	499	-70	-1
AG (2)	-62	506	-63	-1
AH (2)	-57	514	-55	2
AI (2)	-55	513	-56	-1
AJ (2)	-48	522	-47	1
AK (2)	-52	516	-53	-1

	Previous Elevation	New Reading	New Elevation	Elevation Difference
AL (3)	-69	455	-70	-1
AM (2)	-72	498	-71	1
AN (2)	-78	491	-78	0
AO (3)	-47	477	-48	-1
AP (3)	-41	483	-42	-1
AQ (3)	-45	480	-45	0
AR (3)	-51	474	-51	0
AS (3)	-63	460	-65	-2
AT (3)	-65	460	-65	0

BM (4)***		729	173	

B(1) - B(3)= -42
X(1) - X(2)= -86
X(2) - x(4)= 13
X(1) - X(2) +   X(2) - X(4)= -73

* Point "A (1)" should be the first point measured in the house. This point then becomes the datum from which all other points are referenced.

** Points "B" & "X" are the common points used to correlate data from all points to point "A (1)".

***BM (4) is the outside bench mark reference point. This point along with point X (4) will determine the amount the house is moving relative to the well head.

Ballaine Level Data

Operator : Eric, Zhang

	Previous Elevation^1	New Reading	New Elevation^2	Elevation Difference
Date	2/24/92	2/28/92	2/28/92	
A (1)*	0	270	0	0
B (1)	-3	266	-4	-1
B (3)**	\	328	\	\
C (1)	-7	262	-8	-1
D (1)	-15	254	-16	-1
E (1)	-7	262	-8	-1
F (1)	-8	262	-8	0
G (1)	173	440	170	-3
H (1)	166	439	169	3
I (1)	183	455	185	2
J (1)	189	460	190	1
K (1)	184	452	182	-2
L (1)	6	274	4	-2
M (1)	5	273	3	-2
N (1)	2	271	1	-1
O (1)	2	274	4	2
P (1)	-9	260	-10	-1
Q (1)	-29	241	-29	0
R (1)	-54	214	-56	-2
S (1)	-51	219	-51	0
T (1)	-54	215	-55	-1
U (1)	-65	205	-65	0
V (1)	-58	209	-61	-3
W (1)	-35	235	-35	0
X (1)	-49	224	-46	3
X (2)**	\	289	\	\
X (4)***	\	279	\	\
Y (1)	-75	195	-75	0
Z (1)	-65	206	-64	1
AA (1)	-57	212	-58	-1
AB (1)	-18	249	-21	-3
AC (1)	-23	246	-24	-1
AD (1)	-41	235	-35	6
AE (1)	-11	256	-14	-3
AF (2)	-70	265	-70	0
AG (2)	-63	273	-62	1
AH (2)	-55	277	-58	-3
AI (2)	-56	279	-56	0
AJ (2)	-47	285	-50	-3
AK (2)	-53	281	-54	-1

	Previous Elevation	New Reading	New Elevation	Elevation Difference
AL (2)	-70	268	-67	3
AM (2)	-71	266	-69	2
AN (2)	-78	256	-79	-1
AO (3)	-48	284	-48	0
AP (3)	-42	291	-41	1
AQ (3)	-45	288	-44	1
AR (3)	-51	281	-51	0
AS (3)	-65	269	-63	2
AT (3)	-65	268	-64	1

BM (4)***	173	495	170	-3

B(1) - B(3)= -62

X(1) - X(2)= -65

X(2) - x(4)= 10

X(1) - X(2) + X(2) - X(4)= -55

* Point "A (1)" should be the first point measured in the house. This point then becomes the datum from which all other points are referenced.

** Points "B" & "X" are the common points used to correlate data from all points to point "A (1)".

***BM (4) is the outside bench mark reference point. This point along with point X (4) will determine the amount the house is moving relative to the well head.

^1 There was a snow load of approx. 35 psf on the roof for this measurement.

^2 This measurement was taken immediately after the removal of the snow load from the roof.

Ballaine Level Data

Operator : Yuan, Zhang

	Previous Elevation	New Reading	New Elevation	Elevation Difference
Date	2/28/92	3/12/92	3/12/92	2 weeks
A (1)*	0	301	0	0
B (1)	-4	298	-3	1
C (1)	-8	294	-7	1
D (1)	-16	286	-15	1
E (1)	-8	293	-8	0
F (1)	-8	293	-8	0
G (1)	170	474	173	3
H (1)	169	471	170	1
I (1)	185	488	187	2
J (1)	190	491	190	0
K (1)	182	486	185	3
L (1)	4	307	6	2
M (1)	3	304	3	0
N (1)	1	302	1	0
O (1)	4	302	1	-3
P (1)	-10	291	-10	0
Q (1)	-29	271	-30	-1
R (1)	-56	245	-56	0
S (1)	-51	250	-51	0
T (1)	-55	246	-55	0
U (1)	-65	236	-65	0
V (1)	-61	243	-58	3
W (1)	-35	268	-33	2
X (1)	-46	251	-50	-4
Y (1)	-75	227	-74	1
Z (1)	-64	239	-62	2
AA (1)	-58	246	-55	3
AB (1)	-21	282	-19	2
AC (1)	-24	279	-22	2
AD (1)	-35	260	-41	-6
AE (1)	-14	290	-11	3
X (2)**	\	322	\	\
AF (2)	-70	302	-70	0
AG (2)	-62	308	-64	-2
AH (2)	-58	314	-58	0
AI (2)	-56	314	-58	-2
AJ (2)	-50	322	-50	0
AK (2)	-54	318	-54	0
AL (2)	-67	304	-68	-1
AM (2)	-69	301	-71	-2

	Previous Elevation	New Reading	New Elevation	Elevation Difference
AN (2)	-79	293	-79	0
B (3)**	\	337	\	\
AO (3)	-48	296	-44	4
AP (3)	-41	301	-39	2
AQ (3)	-44	298	-42	2
AR (3)	-51	292	-48	3
AS (3)	-63	280	-60	3
AT (3)	-64	279	-61	3
X (4)***	\	305	\	\
BM (4)***	170	528	173	3

B(1) - B(3)= -39
X(1) - X(2)= -71
X(2) - x(4)= 17
X(1) - X(2) +   X(2) - X(4)= -54

* Point "A (1)" should be the first point measured in the house. This point then becomes the datum from which all other points are referenced.

** Points "B" & "X" are the common points used to correlate data from all points to point "A (1)".

***BM (4) is the outside bench mark reference point. This point along with point X (4) will determine the amount the house (point A (1)) is moving relative to the well head.

Ballaine Level Data

Operator : zhang/ma

	Previous Elevation^1	New Reading	New Elevation^1	Elevation Difference
Date	8/6/92	8/19/92	8/19/92	(mm)
A (1)*	0	569	0	0
B (1)	-5	568	-1	4
C (1)	-11	558	-11	0
D (1)	-19	549	-20	-1
E (1)	-12	557	-12	0
F (1)	-13	555	-14	-1
G (1)	167	737	168	1
H (1)	166	734	165	-1
I (1)	180	744	175	-5
J (1)	183	748	179	-4
K (1)	177	746	177	0
L (1)	-3	566	-3	0
M (1)	-2	564	-5	-3
N (1)	-4	565	-4	0
O (1)	-4	561	-8	-4
P (1)	-18	550	-19	-1
Q (1)	-36	529	-40	-4
R (1)	-66	503	-66	0
S (1)	-63	505	-64	-1
T (1)	-67	502	-67	0
U (1)	-77	491	-78	-1
V (1)	-69	501	-68	1
W (1)	-44	528	-41	3
X (1)	-53	517	-52	1
Y (1)	-86	486	-83	3
Z (1)	-70	498	-71	-1
AA (1)	-60	510	-59	1
AB (1)	-25	546	-23	2
AC (1)	-26	542	-27	-1
AD (1)	-45	524	-45	0
AE (1)	-9	558	-11	-2
X (2)**	\	572	\	\
AF (2)	-78	548	-76	2
AG (2)	-72	556	-68	4
AH (2)	-64	562	-62	2
AI (2)	-65	563	-61	4
AJ (2)	-54	573	-51	3
AK (2)	-56	573	-51	5
AL (2)	-74	554	-70	4
AM (2)	-77	551	-73	4

	Previous Elevation	New Reading	New Elevation	Elevation Difference
AN (2)	-87	541	-83	4
B (3)**	\	608	\	\
AO (3)	-51	560	-49	2
AP (3)	-42	562	-47	-5
AQ (3)	-45	565	-44	1
AR (3)	-50	560	-49	1
AS (3)	-64	548	-61	3
AT (3)	-66	544	-65	1
X (4)***	\	634	\	\
BM (4)***	192	878	192	0

	B(1) - B(3)= -40
	X(1) - X(2)= -55
	X(2) - x(4)= -62
X(1) - X(2)	X(2) - X(4)= -117

* Point "A (1)" should be the first point measured in the house. This point then becomes the datum from which all other points are referenced.

** Points "B" & "X" are the common points used to correlate data from all points to point "A (1)".

***BM (4) is the outside bench mark reference point. This point along with point X (4) will determine the amount the house (point A (1)) is moving relative to the well head.

^1 Elevation in mm

Ballaine Level Data

Operator : Yuan, Ma

	Previous Elevation^1	New Reading	New Elevation^1	Elevation Difference
Date	10/22/92	11/20/92	11/20/92	(mm)
A (1)*	0	748	0	0
B (1)	-4	744	-4	0
C (1)	-8	738	-10	-2
D (1)	-15	733	-15	0
E (1)	-8	740	-8	0
F (1)	-9	739	-9	0
G (1)	173	920	172	-1
H (1)	166	911	163	-3
I (1)	172	918	170	-2
J (1)	174	923	175	1
K (1)	181	928	180	-1
L (1)	-1	748	0	1
M (1)	0	749	1	1
N (1)	-4	748	0	4
O (1)	-5	746	-2	3
P (1)	-16	732	-16	0
Q (1)	-32	713	-35	-3
R (1)	-63	684	-64	-1
S (1)	-60	687	-61	-1
T (1)	-66	684	-64	2
U (1)	-77	671	-77	0
V (1)	-67	681	-67	0
W (1)	-40	712	-36	4
X (1)	-52	699	-49	3
Y (1)	-87	661	-87	0
Z (1)	-71	677	-71	0
AA (1)	-62	687	-61	1
AB (1)	-23	725	-23	0
AC (1)	-26	722	-26	0
AD (1)	-43	705	-43	0
AE (1)	-12	735	-13	-1
X (2)**	\	759	\	\
AF (2)	-77	735	-73	4
AG (2)	-68	744	-64	4
AH (2)	#N/A	747	-61	#N/A
AI (2)	-64	749	-59	5
AJ (2)	-51	761	-47	4
AK (2)	-48	764	-44	4
AL (2)	-72	737	-71	1
AM (2)	-72	738	-70	2

	Previous Elevation	New Reading	New Elevation	Elevation Difference
AN (2)	-80	731	-77	3
B (3)**	\	788	\	\
AO (3)	-53	739	-53	0
AP (3)	-47	745	-47	0
AQ (3)	-50	743	-49	1
AR (3)	-54	738	-54	0
AS (3)	-69	723	-69	0
AT (3)	-71	720	-72	-1
X (4)***	\	1094	\	\
BM (4)***	202	1350	207	5
NAIL (4)		851	-292	-292

	B(1) - B(3)= -44
	X(1) - X(2)= -60
	X(2) - x(4)= -335
X(1) - X(2)	X(2) - X(4)= -395

* Point "A (1)" should be the first point measured in the house. This point then becomes the datum from which all other points are referenced.

** Points "B" & "X" are the common points used to correlate data from all points to point "A (1)".

***BM (4) is the outside bench mark reference point. This point along with point X (4) will determine the amount the house (point A (1)) is moving relative to the well head.

^1 Elevation in mm

Ballaine Level Data

Operator : Zhang, Ma

	Previous Elevation^1	New Reading	New Elevation^1	Elevation Difference
Date	2/12/93	4/2/93	4/2/93	(mm)
A (1)*	0	400	0	0
B (1)	-3	395	-5	-2
C (1)	-9	390	-10	-1
D (1)	-17	382	-18	-1
E (1)	-10	389	-11	-1
F (1)	-11	387	-13	-2
G (1)	169	568	168	-1
H (1)	161	564	164	3
I (1)	168	565	165	-3
J (1)	172	569	169	-3
K (1)	177	577	177	0
L (1)	0	398	-2	-2
M (1)	0	397	-3	-3
N (1)	-5	394	-6	-1
O (1)	-6	393	-7	-1
P (1)	-15	380	-20	-5
Q (1)	-37	361	-39	-2
R (1)	-63	335	-65	-2
S (1)	-60	338	-62	-2
T (1)	-64	333	-67	-3
U (1)	-77	325	-75	2
V (1)	-67	334	-66	1
W (1)	-41	359	-41	0
X (1)	-54	345	-55	-1
Y (1)	-87	313	-87	0
Z (1)	-70	328	-72	-2
AA (1)	-57	339	-61	-4
AB (1)	-24	377	-23	1
AC (1)	-27	373	-27	0
AD (1)	-32	362	-38	-6
AE (1)	-12	389	-11	1
X (2)**	\	402	\	\
AF (2)	-73	379	-78	-5
AG (2)	-63	386	-71	-8
AH (2)	-66	386	-71	-5
AI (2)	-58	392	-65	-7
AJ (2)	-30	403	-54	-24
AK (2)	#N/A	405	-52	#N/A
AL (2)	-71	380	-77	-6
AM (2)	-71	380	-77	-6

	Previous Elevation	New Reading	New Elevation	Elevation Difference
AN (2)	-76	371	-86	-10
B (3)**	\	438	\	\
AO (3)	#N/A	392	-51	#N/A
AP (3)	-44	392	-51	-7
AQ (3)	-45	394	-49	-4
AR (3)	-51	390	-53	-2
AS (3)	-67	375	-68	-1
AT (3)	-69	372	-71	-2
X (4)***	\	504	\	\
BM (4)***	#N/A		-559	#N/A
NAIL (4)	#N/A	290	-269	#N/A

	B(1) - B(3)= -43
	X(1) - X(2)= -57
	X(2) - x(4)= -102
X(1) - X(2)	X(2) - X(4)= -159

* Point "A (1)" should be the first point measured in the house. This point then becomes the datum from which all other points are referenced.

** Points "B" & "X" are the common points used to correlate data from all points to point "A (1)".

***BM (4) is the outside bench mark reference point. This point along with point X (4) will determine the amount the house (point A (1)) is moving relative to the well head.

^1 Elevation in mm

Ballaine Level Data

Operator : ma/jim

	Previous Elevation^1	New Reading	New Elevation^1	Elevation Difference
Date	6/10/93	10/21/93	10/21/93	(mm)
A (1)*	0	555	0	0
B (1)	-5	554	-1	4
C (1)	-10	551	-4	6
D (1)	-18	543	-12	6
E (1)	-11	552	-3	8
F (1)	-13	550	-5	8
G (1)	169	731	176	7
H (1)	157	715	160	3
I (1)	163	722	167	4
J (1)	467	728	173	-294
K (1)	179	741	186	7
L (1)	-2	560	5	7
M (1)	-3	559	4	7
N (1)	-7	556	1	8
O (1)	-7	555	0	7
P (1)	-19	543	-12	7
Q (1)	-37	524	-31	6
R (1)	-64	498	-57	7
S (1)	-63	499	-56	7
T (1)	-69	494	-61	8
U (1)	-77	484	-71	6
V (1)	-67	494	-61	6
W (1)	-41	518	-37	4
X (1)	-57	506	-49	8
Y (1)	-82	478	-77	5
Z (1)	-72	488	-67	5
AA (1)	-60	500	-55	5
AB (1)	-24	534	-21	3
AC (1)	-26	533	-22	4
AD (1)	-43	516	-39	4
AE (1)	-11	544	-11	0
X (2)**	\	509	\	\
AF (2)	-80	482	-76	4
AG (2)	-74	490	-68	6
AH (2)	-71	490	-68	3
AI (2)	-65	493	-65	0
AJ (2)	-55	506	-52	3
AK (2)	-52	511	-47	5
AL (2)	-77	484	-74	3
AM (2)	-78	485	-73	5

	Previous Elevation	New Reading	New Elevation	Elevation Difference
AN (2)	-86	477	-81	5
B (3)**	\	552	\	\
AO (3)	-53	504	-49	4
AP (3)	-47	509	-44	3
AQ (3)	-47	507	-46	1
AR (3)	-54	502	-51	3
AS (3)	-68	488	-65	3
AT (3)	-71	484	-69	2
X (4)***	\	583	\	\
BM (4)***	211	865	233	22
NAIL (4)		580	-52	-52

	B(1) - B(3)= 2
	X(1) - X(2)= -3
	X(2) - x(4)= -74
X(1) - X(2)	X(2) - X(4)= -77

* Point "A (1)" should be the first point measured in the house. This point then becomes the datum from which all other points are referenced.

** Points "B" & "X" are the common points used to correlate data from all points to point "A (1)".

***BM (4) is the outside bench mark reference point. This point along with point X (4) will determine the amount the house (point A (1)) is moving relative to the well head.

^1 Elevation in mm

Ballaine Level Data

Operator : sandy/ma

	Previous Elevation^1	New Reading	New Elevation^1	Elevation Difference
Date	1/24/94	3/18/94	3/18/94	(mm)
A (1)*	0	424	0	0
B (1)	-4	422	-2	2
C (1)	-8	415	-9	-1
D (1)	-16	407	-17	-1
E (1)	-8	414	-10	-2
F (1)	-9	415	-9	0
G (1)	173	597	173	0
H (1)	154	577	153	-1
I (1)	171	583	159	-12
J (1)	183	593	169	-14
K (1)	#N/A	605	181	#N/A
L (1)	4	428	4	0
M (1)	3	421	-3	-6
N (1)	2	421	-3	-5
O (1)	4	427	3	-1
P (1)	-10	414	-10	0
Q (1)	-25	399	-25	0
R (1)	-55	368	-56	-1
S (1)	-55	370	-54	1
T (1)	-58	364	-60	-2
U (1)	-69	354	-70	-1
V (1)	-60	366	-58	2
W (1)	-36	385	-39	-3
X (1)	-44	383	-41	3
Y (1)	-80	350	-74	6
Z (1)	-65	358	-66	-1
AA (1)	-55	366	-58	-3
AB (1)	-20	405	-19	1
AC (1)	-22	403	-21	1
AD (1)	-35	387	-37	-2
AE (1)	-10	414	-10	0
X (2)**	\	467	\	\
AF (2)	-71	439	-69	2
AG (2)	-62	447	-61	1
AH (2)	-61	449	-59	2
AI (2)	-57	453	-55	2
AJ (2)	-47	462	-46	1
AK (2)	-42	468	-40	2
AL (2)	-71	439	-69	2
AM (2)	-69	439	-69	0

	Previous Elevation	New Reading	New Elevation	Elevation Difference
AN (2)	-73	436	-72	1
B (3)**	\	451	\	\
AO (3)	-46	408	-45	1
AP (3)	-41	416	-37	4
AQ (3)	-44	413	-40	4
AR (3)	-49	406	-47	2
AS (3)	-64	389	-64	0
AT (3)	-67	385	-68	-1
X (4)***	\	512	\	\
BM (4)***	251	808	255	4
NAIL (4)	#N/A	295	-258	#N/A

	B(1) - B(3)= -29
	X(1) - X(2)= -84
	X(2) - x(4)= -45
X(1) - X(2)	X(2) - X(4)= -129

* Point "A (1)" should be the first point measured in the house. This point then becomes the datum from which all other points are referenced.

** Points "B" & "X" are the common points used to correlate data from all points to point "A (1)".

***BM (4) is the outside bench mark reference point. This point along with point X (4) will determine the amount the house (point A (1)) is moving relative to the well head.

^1 Elevation in mm

Ballaine Level Data

Operator : fu,wang'

	Previous Elevation^1	New Reading	New Elevation^1	Elevation Difference
Date	6/11/94	8/30/94	8/30/94	(mm)
A (1)*	0	689	0	0
B (1)	-3	684	-5	-2
C (1)	-9	678	-11	-2
D (1)	-17	670	-19	-2
E (1)	-13	675	-14	-1
F (1)	-10	675	-14	-4
G (1)	173	855	166	-7
H (1)	151	836	147	-4
I (1)	159	840	151	-8
J (1)	168	850	161	-7
K (1)	181	866	177	-4
L (1)	4	687	-2	-6
M (1)	3	681	-8	-11
N (1)	5	680	-9	-14
O (1)	4	686	-3	-7
P (1)	-9	673	-16	-7
Q (1)	-27	660	-29	-2
R (1)	-60	625	-64	-4
S (1)	-55	629	-60	-5
T (1)	-62	625	-64	-2
U (1)	-70	616	-73	-3
V (1)	-64	625	-64	0
W (1)	-38	649	-40	-2
X (1)	-40	644	-45	-5
Y (1)	-80	609	-80	0
Z (1)	-65	620	-69	-4
AA (1)	-61	630	-59	2
AB (1)	-20	665	-24	-4
AC (1)	-24	663	-26	-2
AD (1)	-35	650	-39	-4
AE (1)	-11	680	-9	2
X (2)**	\	671	\	\
AF (2)	-65	645	-71	-6
AG (2)	-56	650	-66	-10
AH (2)	-53	654	-62	-9
AI (2)	-49	660	-56	-7
AJ (2)	-36	669	-47	-11
AK (2)	#N/A	676	-40	#N/A
AL (2)	-62	649	-67	-5
AM (2)	-60	648	-68	-8

	Previous Elevation	New Reading	New Elevation	Elevation Difference
AN (2)	-67	641	-75	-8
B (3)**	\	715	\	\
AO (3)	-46	673	-47	-1
AP (3)	-40	678	-42	-2
AQ (3)	-40	674	-46	-6
AR (3)	-48	669	-51	-3
AS (3)	-63	656	-64	-1
AT (3)	-65	655	-65	0
X (4)***	\	909	\	\
BM (4)***	268	1218	264	-4
NAIL (4)			-954	-954

	B(1) - B(3)= -31
	X(1) - X(2)= -27
	X(2) - x(4)= -238
X(1) - X(2)	X(2) - X(4)= -265

* Point "A (1)" should be the first point measured in the house. This point then becomes the datum from which all other points are referenced.

** Points "B" & "X" are the common points used to correlate data from all points to point "A (1)".

***BM (4) is the outside bench mark reference point. This point along with point X (4) will determine the amount the house (point A (1)) is moving relative to the well head.

^1 Elevation in mm

Ballaine Level Data

Operator : fu,wang'

	Previous Elevation^1	New Reading	New Elevation^1	Elevation Difference
Date	8/30/94	10/15/94	10/15/94	(mm)
A (1)*	0	570	0	0
B (1)	-5	562	-8	-3
C (1)	-11	556	-14	-3
D (1)	-19	548	-22	-3
E (1)	-14	547	-23	-9
F (1)	-14	548	-22	-8
G (1)	166	733	163	-3
H (1)	147	714	144	-3
I (1)	151	716	146	-5
J (1)	161	718	148	-13
K (1)	177	740	170	-7
L (1)	-2	569	-1	1
M (1)	-8	560	-10	-2
N (1)	-9	563	-7	2
O (1)	-3	560	-10	-7
P (1)	-16	554	-16	0
Q (1)	-29	528	-42	-13
R (1)	-64	506	-64	0
S (1)	-60	510	-60	0
T (1)	-64	510	-60	4
U (1)	-73	495	-75	-2
V (1)	-64	503	-67	-3
W (1)	-40	527	-43	-3
X (1)	-45	520	-50	-5
Y (1)	-80	480	-90	-10
Z (1)	-69	500	-70	-1
AA (1)	-59	510	-60	-1
AB (1)	-24	543	-27	-3
AC (1)	-26	542	-28	-2
AD (1)	-39	535	-35	4
AE (1)	-9	550	-20	-11
X (2)**	\	580	\	\
AF (2)	-71	550	-80	-9
AG (2)	-66	557	-73	-7
AH (2)	-62	560	-70	-8
AI (2)	-56	561	-69	-13
AJ (2)	-47	575	-55	-8
AK (2)	-40	580	-50	-10
AL (2)	-67	553	-77	-10
AM (2)	-68	559	-71	-3

	Previous Elevation	New Reading	New Elevation	Elevation Difference
AN (2)	-75	545	-85	-10
B (3)**	\	600	\	\
AO (3)	-47	558	-50	-3
AP (3)	-42	563	-45	-3
AQ (3)	-46	558	-50	-4
AR (3)	-51	553	-55	-4
AS (3)	-64	541	-67	-3
AT (3)	-65	538	-70	-5
X (4)***	\	744	\	\
BM (4)***	264	1064	270	6
NAIL (4)			-794	-794

	B(1) - B(3)= -38
	X(1) - X(2)= -60
	X(2) - x(4)= -164
X(1) - X(2)	X(2) - X(4)= -224

* Point "A (1)" should be the first point measured in the house. This point then becomes the datum from which all other points are referenced.

** Points "B" & "X" are the common points used to correlate data from all points to point "A (1)".

***BM (4) is the outside bench mark reference point. This point along with point X (4) will determine the amount the house (point A (1)) is moving relative to the well head.

^1 Elevation in mm

Ballaine Level Data

Operator : fu/michael'

	Previous Elevation^1	New Reading	New Elevation^1	Elevation Difference
Date	10/15/94	5/18/95	5/18/95	(mm)
A (1)*	0	553	0	0
B (1)	-8	549	-4	4
C (1)	-14	539	-14	0
D (1)	-22	529	-24	-2
E (1)	-23	533	-20	3
F (1)	-22	536	-17	5
G (1)	163	693	140	-23
H (1)	144	699	146	2
I (1)	146	700	147	1
J (1)	148	712	159	11
K (1)	170	722	169	-1
L (1)	-1	550	-3	-2
M (1)	-10	555	2	12
N (1)	-7	552	-1	6
O (1)	-10	554	1	11
P (1)	-16	542	-11	5
Q (1)	-42	526	-27	15
R (1)	-64	496	-57	7
S (1)	-60	502	-51	9
T (1)	-60	499	-54	6
U (1)	-75	487	-66	9
V (1)	-67	494	-59	8
W (1)	-43	515	-38	5
X (1)	-50	509	-44	6
Y (1)	-90	479	-74	16
Z (1)	-70	490	-63	7
AA (1)	-60	501	-52	8
AB (1)	-27	532	-21	6
AC (1)	-28	530	-23	5
AD (1)	-35	527	-26	9
AE (1)	-20	546	-7	13
X (2)**	\	561	\	\
AF (2)	-80	540	-65	15
AG (2)	-73	550	-55	18
AH (2)	-70	557	-48	22
AI (2)	-69	559	-46	23
AJ (2)	-55	568	-37	18
AK (2)	-50	562	-43	7
AL (2)	-77	540	-65	12
AM (2)	-71	546	-59	12

	Previous Elevation	New Reading	New Elevation	Elevation Difference
AN (2)	-85	532	-73	12
B (3)**	\	585	\	\
AO (3)	-50	553	-36	14
AP (3)	-45	558	-31	14
AQ (3)	-50	554	-35	15
AR (3)	-55	546	-43	12
AS (3)	-67	531	-58	9
AT (3)	-70	529	-60	10
X (4)***	\	745	\	\
BM (4)***	270	1071	282	12
NAIL (4)			-789	-789

B(1) - B(3)= -36
X(1) - X(2)= -52
X(2) - x(4)= -184
X(1) - X(2) + X(2) - X(4)= -236

* Point "A (1)" should be the first point measured in the house. This point then becomes the datum from which all other points are referenced.

** Points "B" & "X" are the common points used to correlate data from all points to point "A (1)".

***BM (4) is the outside bench mark reference point. This point along with point X (4) will determine the amount the house (point A (1)) is moving relative to the well head.

^1 Elevation in mm

Ballaine Level Data

Operator : tom/danielle

	Previous Elevation^1	New Reading	New Elevation^1	Elevation Difference
Date	2/8/96	5/7/96	5/7/96	(mm)
A (1)*	0	527	0	0
B (1)	-12	516	-11	1
C (1)	-21	505	-22	-1
D (1)	-34	492	-35	-1
E (1)	-32	495	-32	0
F (1)	-27	500	-27	0
G (1)	153	680	153	0
H (1)	123	648	121	-2
I (1)	130	659	132	2
J (1)	149	676	149	0
K (1)	171	697	170	-1
L (1)	-8	517	-10	-2
M (1)	-2	525	-2	0
N (1)	-7	521	-6	1
O (1)	2	523	-4	-6
P (1)	-13	513	-14	-1
Q (1)	-36	493	-34	2
R (1)	-59	462	-65	-6
S (1)	-57	470	-57	0
T (1)	-59	466	-61	-2
U (1)	-71	456	-71	0
V (1)	-63	461	-66	-3
W (1)	-42	484	-43	-1
X (1)	-47	482	-45	2
Y (1)	-76	447	-80	-4
Z (1)	-64	462	-65	-1
AA (1)	-57	470	-57	0
AB (1)	-23	503	-24	-1
AC (1)	-23	502	-25	-2
AD (1)	-29	495	-32	-3
AE (1)	-6	520	-7	-1
X (2)**	\	524	\	\
AF (2)	-63	506	-63	0
AG (2)	-53	512	-57	-4
AH (2)	-47	523	-46	1
AI (2)	-41	524	-45	-4
AJ (2)	-35	532	-37	-2
AK (2)	-37	533	-36	1
AL (2)	-63	505	-64	-1
AM (2)	-56	509	-60	-4

	Previous Elevation	New Reading	New Elevation	Elevation Difference
AN (2)	-67	497	-72	-5
B (3)**	\	525	\	\
AO (3)	-40	497	-39	1
AP (3)	-34	506	-30	4
AQ (3)	-36	504	-32	4
AR (3)	-42	496	-40	2
AS (3)	-61	479	-57	4
AT (3)	-64	475	-61	3
X (4)***	\	761	\	\
BM (4)***	329	1141	335	6
NAIL (4)			-806	-806

	B(1) - B(3)= -9
	X(1) - X(2)= -42
	X(2) - x(4)= -237
X(1) - X(2)	X(2) - X(4)= -279

* Point "A (1)" should be the first point measured in the house. This point then becomes the datum from which all other points are referenced.

** Points "B" & "X" are the common points used to correlate data from all points to point "A (1)".

***BM (4) is the outside bench mark reference point. This point along with point X (4) will determine the amount the house (point A (1)) is moving relative to the well head.

^1 Elevation in mm

Ballaine Level Data

Operator : sl/bo

	Previous Elevation^1	New Reading	New Elevation^1	Elevation Difference
Date	5/7/96	9/27/96	9/27/96	(mm)
A (1)*	0	461	0	0
B (1)	-11	453	-8	3
C (1)	-22	441	-20	2
D (1)	-35	430	-31	4
E (1)	-32	429	-32	0
F (1)	-27	435	-26	1
G (1)	153	615	154	1
H (1)	121	586	125	4
I (1)	132	593	132	0
J (1)	149	610	149	0
K (1)	170	632	171	1
L (1)	-10	452	-9	1
M (1)	-2	458	-3	-1
N (1)	-6	456	-5	1
O (1)	-4	458	-3	1
P (1)	-14	446	-15	-1
Q (1)	-34	425	-36	-2
R (1)	-65	400	-61	4
S (1)	-57	401	-60	-3
T (1)	-61	398	-63	-2
U (1)	-71	388	-73	-2
V (1)	-66	395	-66	0
W (1)	-43	419	-42	1
X (1)	-45	410	-51	-6
Y (1)	-80	410	-51	29
Z (1)	-65	398	-63	2
AA (1)	-57	401	-60	-3
AB (1)	-24	437	-24	0
AC (1)	-25	438	-23	2
AD (1)	-32	429	-32	0
AE (1)	-7	456	-5	2
X (2)**	\	438	\	\
AF (2)	-63	416	-73	-10
AG (2)	-57	428	-61	-4
AH (2)	-46	445	-44	2
AI (2)	-45	442	-47	-2
AJ (2)	-37	450	-39	-2
AK (2)	-36	449	-40	-4
AL (2)	-64	423	-66	-2
AM (2)	-60	424	-65	-5

	Previous Elevation	New Reading	New Elevation	Elevation Difference
AN (2)	-72	411	-78	-6
B (3)**	\	442	\	\
AO (3)	-39	413	-37	2
AP (3)	-30	420	-30	0
AQ (3)	-32	416	-34	-2
AR (3)	-40	413	-37	3
AS (3)	-57	392	-58	-1
AT (3)	-61	391	-59	2
X (4)***	\	660	\	\
BM (4)***	335	1054	343	8
NAIL (4)			-711	-711

	B(1) - B(3)= 11
	X(1) - X(2)= -28
	X(2) - x(4)= -222
X(1) - X(2)	X(2) - X(4)= -250

* Point "A (1)" should be the first point measured in the house. This point then becomes the datum from which all other points are referenced.

** Points "B" & "X" are the common points used to correlate data from all points to point "A (1)".

***BM (4) is the outside bench mark reference point. This point along with point X (4) will determine the amount the house (point A (1)) is moving relative to the well head.

^1 Elevation in mm

Ballaine Level Data

Operator : sara/b-o

	Previous Elevation^1	New Reading	New Elevation^1	Elevation Difference
Date	12/5/96	1/30/97	1/30/97	(mm)
A (1)*	0	402	0	0
B (1)	-11	391	-11	0
C (1)	-22	379	-23	-1
D (1)	-35	366	-36	-1
E (1)	-34	366	-36	-2
F (1)	-29	371	-31	-2
G (1)	150	549	147	-3
H (1)	120	519	117	-3
I (1)	129	534	132	3
J (1)	148	550	148	0
K (1)	167	569	167	0
L (1)	-11	391	-11	0
M (1)	-8	395	-7	1
N (1)	-10	393	-9	1
O (1)	-8	395	-7	1
P (1)	-19	383	-19	0
Q (1)	-41	362	-40	1
R (1)	-66	336	-66	0
S (1)	-64	341	-61	3
T (1)	-66	337	-65	1
U (1)	-76	325	-77	-1
V (1)	-68	332	-70	-2
W (1)	-47	355	-47	0
X (1)	-55	354	-48	7
Y (1)	-56	322	-80	-24
Z (1)	-68	334	-68	0
AA (1)	-62	340	-62	0
AB (1)	-26	378	-24	2
AC (1)	-25	375	-27	-2
AD (1)	-34	363	-39	-5
AE (1)	-6	394	-8	-2
X (2)**	\	392	\	\
AF (2)	-71	371	-69	2
AG (2)	-62	378	-62	0
AH (2)	-53	387	-53	0
AI (2)	-46	390	-50	-4
AJ (2)	-40	401	-39	1
AK (2)	-42	399	-41	1
AL (2)	-69	371	-69	0
AM (2)	-66	373	-67	-1

	Previous Elevation	New Reading	New Elevation	Elevation Difference
AN (2)	-76	364	-76	0
B (3)**	\	408	\	\
AO (3)	-43	380	-39	4
AP (3)	-33	388	-31	2
AQ (3)	-37	384	-35	2
AR (3)	-41	380	-39	2
AS (3)	-63	359	-60	3
AT (3)	-65	355	-64	1
X (4)***	\	519	\	\
BM (4)***	343	922	355	12
NAIL (4)			-567	-567

	B(1) - B(3)= -17
	X(1) - X(2)= -38
	X(2) - x(4)= -127
X(1) - X(2)	X(2) - X(4)= -165

* Point "A (1)" should be the first point measured in the house. This point then becomes the datum from which all other points are referenced.

** Points "B" & "X" are the common points used to correlate data from all points to point "A (1)".

***BM (4) is the outside bench mark reference point. This point along with point X (4) will determine the amount the house (point A (1)) is moving relative to the well head.

^1 Elevation in mm

Ballaine Level Data
Operator: T. & R. McFadden

	Previous Elevation	New reading	New Elevation	Elevation Difference
Date	1/30/97	8/13/98		
A (1)*	0	723	0	0
B (1)	-11	712	-11	0
C (1)	-23	702	-21	2
D(1)	-36	689	-34	2
E (1)	-36	689	-34	2
F (1)	-31	694	-29	2
G (1)	147	868	145	-2
H (1)	117		#VALUE!	#VALUE!
I (1)	132	845	122	-10
J (1)	148	862	139	-9
K (1)	167	883	160	-7
L (1)	-11	710	-13	-2
M (1)	-7	712	-11	-4
N (1)	-9	712	-11	-2
O (1)	-7	721	-2	5
P (1)	-19	708	-15	4
Q (1)	-40	689	-34	6
R (1)	-66	664	-59	7
S (1)	-61	667	-56	5
T (1)	-65	664	-59	6
U (1)	-77	653	-70	7
V (1)	-70	660	-63	7
W (1)	-47	676	-47	0
X (1)	-48	683	-40	8
Y(1)	-80	649	-74	6
Z (1)	-68	660	-63	5
AA (1)	-62	664	-59	3
AB (1)	-24	700	-23	1
AC (1)	-27	700	-23	4
AD (1)	-39	694	-29	10
AE (1)	-8	718	-5	3
X (2)**	\	662	\	\
AF (2)	-69	643	-59	10
AG (2)	-62	651	-51	11
AH (2)	-53	660	-42	11
AI (2)	-50	664	-38	\
AJ (2)	-39	672	-30	9
AK (2)	-41	669	-33	\
AL (2)	-69	639	-63	6
AM (2)	-67	642	-60	7

AN (2)	-76	632	-70	6
B (3)**	\	703	\	\
AO (3)	-39	681	-33	6
AP (3)	-31	689	-25	6
AQ (3)	-35		#VALUE!	#VALUE!
AR (3)	-39	678	-36	3
AS (3)	-60	659	-55	5
AT (3)	-64	656	-58	6
X (4)***	\		\	\
BM (4)	355		#VALUE!	#VALUE!
NAIL (4)				#VALUE!

B(1)-B(3)=	9
X (1)-X(2)=	21
X(2)-X(4)=	#VALUE!
X(1)-X(2)+X(2)-X(4)=	#VALUE!

Ballaine Level Data
Operator: T&R McFadden

	Previous Elevation	New reading	New Elevation	Elevation Difference
Date	8/13/98	3/8/99	3/8/99	
A (1)*	0	681	0	0
B (1)	-11	674	-7	4
C (1)	-21	652	-29	-8
D(1)	-34	642	-39	-5
E (1)	-34	642	-39	-5
F (1)	-29	650	-31	-2
G (1)	145	827	146	1
H (1)	117	790	109	-8
I (1)	122	801	120	-2
J (1)	139	817	136	-3
K (1)	160	846	165	5
L (1)	-13	670	-11	2
M (1)	-11		#VALUE!	#VALUE!
N (1)	-11	675	-6	5
O (1)	-2	681	0	2
P (1)	-15	671	-10	5
Q (1)	-34	655	-26	8
R (1)	-59	628	-53	6
S (1)	-56	633	-48	8
T (1)	-59	630	-51	8
U (1)	-70	623	-58	12
V (1)	-63	626	-55	8
W (1)	-47	640	-41	6
X (1)	-40	674	-7	33
Y(1)	-74	612	-69	5
Z (1)	-63	623	-58	5
AA (1)	-59	624	-57	2
AB (1)	-23	659	-22	1
AC (1)	-23	657	-24	-1
AD (1)	-29	652	-29	0
AE (1)	-5	678	-3	2
X (2)**	\	665	\	\
AF (2)	-59	620	-52	7
AG (2)	-51	633	-39	12
AH (2)	-42	643	-29	13
AI (2)	-38	648	-24	\
AJ (2)	-30	651	-21	9
AK (2)	-33	643	-29	\
AL (2)	-63	614	-58	5
AM (2)	-60	619	-53	7

AN (2)	-70		#VALUE!	#VALUE!
B (3)**	\	635	\	\
AO (3)	-33		#VALUE!	#VALUE!
AP (3)	-25	628	-14	11
AQ (3)	-35	627	-15	20
AR (3)	-36		#VALUE!	#VALUE!
AS (3)	-55	597	-45	10
AT (3)	-58	597	-45	13
X (4)***	\	782	\	\
BM (4)	355	191	-598	-953
NAIL (4)				#VALUE!

B(1)-B(3)=	39
X (1)-X(2)=	9
X(2)-X(4)=	-117
X(1)-X(2)+X(2)-X(4)=	-108

Temperature Measurements

Ballaine Thermistor Temperture Log

Operator T& R MCFADDEN
Date: 3/11/99

		String #1			String #2			String # 3	
Therm #	Depth (ft)	R (avg)	Temp (C)	Depth (ft)	R (avg)	Temp (C)	Depth (ft)	R (avg)	Temp (C)
1	0	28552	-10.590	0	29290	-11.057	0	22976	-6.558
2	4	22048	-5.781	4	20801	-4.677	0.5	21661	-5.446
3	8	16505	-0.214	8	16464	-0.166	1	21061	-4.913
4	12	16488	-0.194	10	16358	-0.039	1.5	20262	-4.177
5	14	16440	-0.137	11	16373	-0.057	2	19383	-3.329
6	15	16477	-0.181	12		#NUM!	4	16719	-0.466
7	16	16516	-0.227	12.5	16391	-0.079	8	16477	-0.181
8	16.5	16474	-0.178	13	16317	0.010	12	16434	-0.130
9	17	16517	-0.229	14	16338	-0.015	13	16524	-0.237
10	18	16552	-0.270	16	16442	-0.140	13.5	16548	-0.265
11	25	16581	-0.304	20	16598	-0.324	14	16554	-0.272
12	34	16601	-0.328	30	16625	-0.356	14.5		#NUM!

0

		String #4			String # 5			String # 6	
Therm #	Depth (ft)	R (avg)	Temp (C)	Depth (ft)	R (avg)	Temp (C)	Depth (ft)	R (avg)	Temp (C)
1	0	22866	-6.468	0	21861	-5.620	0	21072	-4.923
2	1	21018	-4.875	1	20216	-4.134	2	17924	-1.820
3	2	19841	-3.776	2	18755	-2.695	4	16685	-0.426
4	4	16677	-0.417	4	16493	-0.200	6	16522	-0.235
5	6	16489	-0.195	6	16471	-0.174	8	16480	-0.185
6	8	16437	-0.134	8	16411	-0.103	9	16519	-0.231
7	10		#NUM!	10	16450	-0.149	10	16473	-0.176
8	12	16503	-0.212	12	16411	-0.103	11		#NUM!
9	14	16502	-0.211	13	16503	-0.212	11.5	16514	-0.225
10	15	16538	-0.253	13.5	16518	-0.230	12	16512	-0.223
11	16		#NUM!	14	16503	-0.212	12.5	16480	-0.185
12	16.5	16559	-0.278	14.5	16422	-0.116	13	16455	-0.155

	String # 7	
Depth (ft)	R (avg)	Temp (C)
AO1	23355	-6.865
AU2	24830	-8.010
AU3	24016	-7.388
AU4	24130	-7.477
AU5	24080	-7.438
AU6	24476	-7.742
AU7	24016	-7.388
		#NUM!
		#NUM!
		#NUM!
		#NUM!
		#NUM!

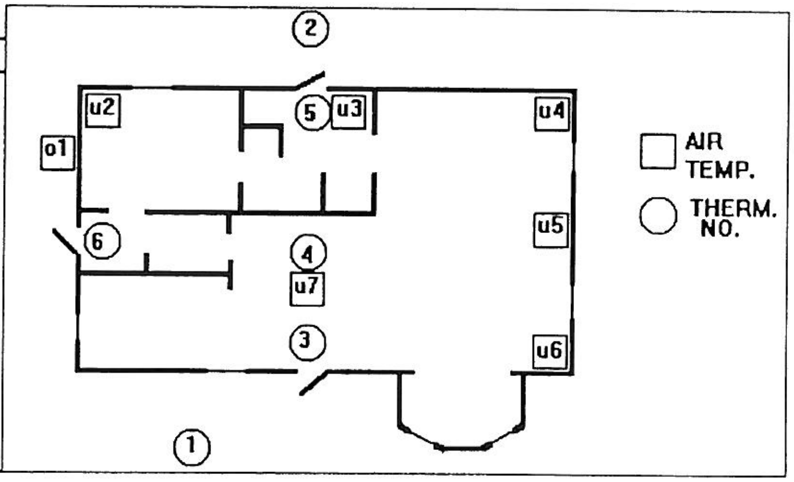
BA Thermistor Temperature Log

Operator : Ruth
Date : 2/13/97

Therm #	String #1			String #2			String #3		
	Depth (ft)	R (avg)	Temp (C)	Depth (ft)	R (avg)	Temp (C)	Depth (ft)	R (avg)	Temp (C)
1	0	21747	-5.521	0	21269	-5.1	0	20090	-4.014
2	4	18717	-2.656	4	17449	-1.299	0.5	19243	-3.189
3	8	16469	-0.172	8	16406	-0.097	1	18986	-2.931
4	12	16453	-0.153	10	16347	-0.026	1.5	18582	-2.517
5	14	16419	-0.112	11	16367	-0.05	2	18228	-2.145
6	15	16461	-0.162	12	#N/A	#N/A	4	16776	-0.533
7	16	16506	-0.216	12.5	16398	-0.087	8	16445	-0.143
8	16.5	16468	-0.171	13	16340	-0.018	12	16426	-0.121
9	17	16511	-0.222	14	16377	-0.062	13	16518	-0.23
10	18	16551	-0.269	16	16477	-0.181	13.5	16547	-0.264
11	25	16591	-0.316	20	16614	-0.343	14	16548	-0.265
12	34	16606	-0.334	30	16630	-0.362	14.5	#N/A	#N/A

Therm #	String #4			String #5			String #6		
	Depth (ft)	R (avg)	Temp (C)	Depth (ft)	R (avg)	Temp (C)	Depth (ft)	R (avg)	Temp (C)
1	0	20494	-4.394	0	19440	-3.385	0	19006	-2.951
2	1	19113	-3.059	1	18581	-2.516	2	17389	-1.232
3	2	18672	-2.61	2	17954	-1.852	4	16588	-0.313
4	4	17026	-0.821	4	16596	-0.322	6	16474	-0.178
5	6	#N/A	#N/A	6	16440	-0.137	8	16458	-0.159
6	8	16394	-0.082	8	16384	-0.07	9	#N/A	#N/A
7	10	#N/A	#N/A	10	16421	-0.115	10	16446	-0.144
8	12	16483	-0.188	12	16398	-0.087	11	#N/A	#N/A
9	14	16482	-0.187	13	16491	-0.198	11.5	16493	-0.2
10	15	16529	-0.243	13.5	16507	-0.217	12	16495	-0.203
11	16	#N/A	#N/A	14	16492	-0.199	12.5	16462	-0.163
12	16.5	#N/A	#N/A	14.5	#N/A	#N/A	13	16449	-0.148

Therm #	String #7		
	Depth (ft)	R (avg)	Temp (C)
1	AO1	31712	-12.501
2	AU2	22474	-6.142
3	AU3	22004	-5.743
4	AU4	21974	-5.718
5	AU5	22060	-5.791
6	AU6	22156	-5.873
7	AU7	22019	-5.756
8			
9			
10			
11			
12			



BA Thermistor Temperature Log

Operator : Sara/bo
Date : 12/5/96

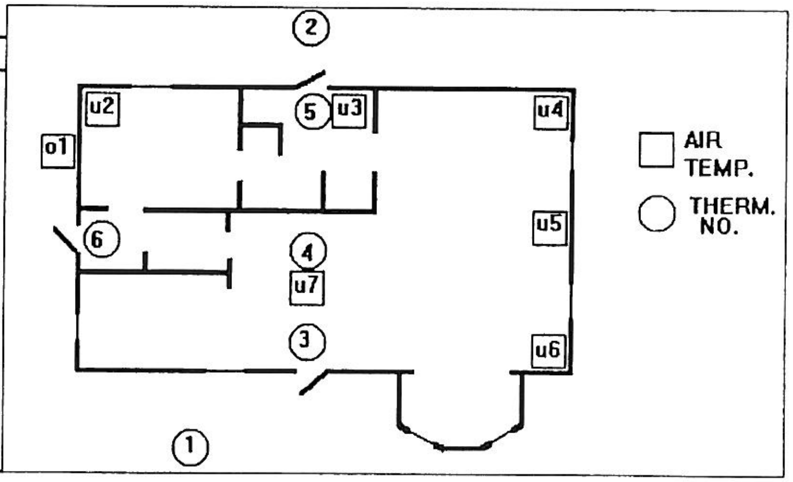
out of order since 05 94

	String #1			String #2			String #3		
Therm #	Depth (ft)	R (avg)	Temp (C)	Depth (ft)	R (avg)	Temp (C)	Depth (ft)	R (avg)	Temp (C)
1	0	21089	-4.939	0	21657	-5.443	0	20077	-4.002
2	4	16478	-0.182	4	16437	-0.134	0.5	17878	-1.77
3	8	16463	-0.165	8	16157	0.203	1	17128	-0.938
4	12	16476	-0.18	10	16128	0.238	1.5	16491	-0.198
5	14	16441	-0.138	11	16180	0.175	2	16413	-0.105
6	15	16480	-0.185	12	#N/A	#N/A	4	16447	-0.146
7	16	16515	-0.226	12.5	16273	0.063	8	16457	-0.157
8	16.5	16470	-0.173	13	16238	0.105	12	16430	-0.125
9	17	16511	-0.222	14	16318	0.009	13	16526	-0.239
10	18	16551	-0.269	16	16478	-0.182	13.5	16556	-0.275
11	25	16605	-0.333	20	16614	-0.343	14	16542	-0.258
12	34	16606	-0.334	30	16629	-0.361	14.5	#N/A	#N/A

out of order since 07 95

	String #4			String #5			String #6		
Therm #	Depth (ft)	R (avg)	Temp (C)	Depth (ft)	R (avg)	Temp (C)	Depth (ft)	R (avg)	Temp (C)
1	0	22202	-5.912	0	19085	-3.031	0	18720	-2.659
2	1	17365	-1.205	1	17077	-0.88	2	16488	-0.194
3	2	16527	-0.24	2	16514	-0.225	4	16533	-0.248
4	4	16465	-0.167	4	16448	-0.147	6	16468	-0.171
5	6	16442	-0.14	6	16413	-0.105	8	16453	-0.153
6	8	16410	-0.101	8	16355	-0.036	9	16491	-0.198
7	10	#N/A	#N/A	10	16407	-0.098	10	16443	-0.141
8	12	16494	-0.201	12	16386	-0.073	11	#N/A	#N/A
9	14	16487	-0.193	13	16486	-0.192	11.5	16491	-0.198
10	15	16530	-0.244	13.5	16501	-0.21	12	16494	-0.201
11	16	16333	-0.009	14	16488	-0.194	12.5	16463	-0.165
12	16.5	16551	-0.269	14.5	16407	-0.098	13	#N/A	#N/A

	String #7		
Therm #	Depth (ft)	R (avg)	Temp (C)
1	AO1	#N/A	#N/A
2	AU2	27009	-9.569
3	AU3	25718	-8.663
4	AU4	25596	-8.575
5	AU5	26149	-8.971
6	AU6	26108	-8.942
7	AU7	25693	-8.645
8			
9			
10			
11			
12			



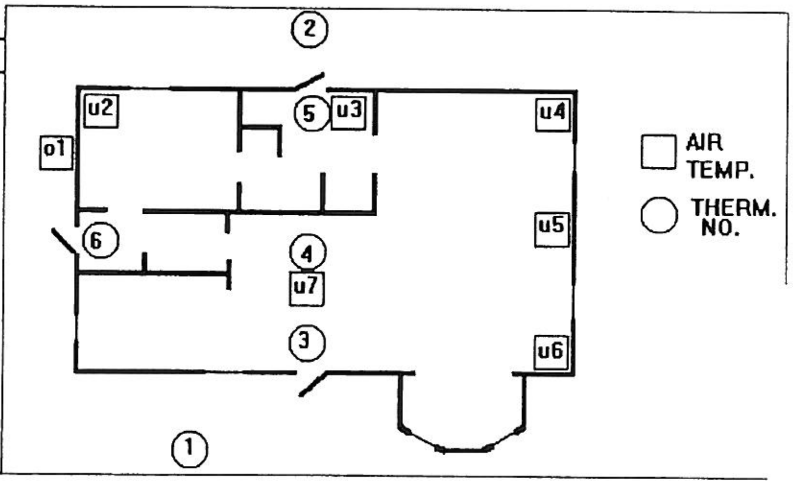
BA Thermistor Temperature Log

Operator : Sara/B-O
Date : 11/7/96

	String #1			String #2			String #3		
Therm #	Depth (ft)	R (avg)	Temp (C)	Depth (ft)	R (avg)	Temp (C)	Depth (ft)	R (avg)	Temp (C)
1	0	17492	-1.347	0	18523	-2.455	0	17573	-1.436
2	4	16420	-0.113	4	16211	0.138	0.5	16659	-0.396
3	8	16470	-0.173	8	15795	0.648	1	16490	-0.197
4	12	16473	-0.176	10	15840	0.592	1.5	16387	-0.074
5	14	16424	-0.118	11	15950	0.456	2	16389	-0.076
6	15	16491	-0.198	12	#N/A	#N/A	4	16454	-0.154
7	16	16509	-0.219	12.5	16134	0.231	8	16471	-0.174
8	16.5	16432	-0.128	13	16129	0.237	12	16431	-0.126
9	17	16515	-0.226	14	16267	0.07	13	16527	-0.24
10	18	16552	-0.27	16	16485	-0.191	13.5	16553	-0.271
11	25	16585	-0.309	20	16616	-0.346	14	16530	-0.244
12	34	16605	-0.333	30	16628	-0.36	14.5	16445	-0.143

	String #4			String #5			String #6		
Therm #	Depth (ft)	R (avg)	Temp (C)	Depth (ft)	R (avg)	Temp (C)	Depth (ft)	R (avg)	Temp (C)
1	0	18505	-2.437	0	17025	-0.82	0	16860	-0.63
2	1	16473	-0.176	1	16444	-0.142	2	16481	-0.186
3	2	16486	-0.192	2	16492	-0.199	4	16537	-0.252
4	4	16470	-0.173	4	16453	-0.153	6	16481	-0.186
5	6	16441	-0.138	6	16400	-0.09	8	16455	-0.155
6	8	16413	-0.105	8	16342	-0.02	9	16492	-0.199
7	10	#N/A	#N/A	10	16402	-0.092	10	16444	-0.142
8	12	16495	-0.203	12	16387	-0.074	11	16721	-0.469
9	14	16488	-0.194	13	16486	-0.192	11.5	16498	-0.206
10	15	16533	-0.248	13.5	16503	-0.212	12	16494	-0.201
11	16	16627	-0.358	14	16489	-0.195	12.5	16467	-0.169
12	16.5	16551	-0.269	14.5	16406	-0.097	13	16446	-0.144

	String #7		
Therm #	Depth (ft)	R (avg)	Temp (C)
1	AO1	29717	-11.321
2	AU2	20323	-4.234
3	AU3	19793	-3.73
4	AU4	19747	-3.685
5	AU5	19990	-3.919
6	AU6	19995	-3.924
7	AU7	19847	-3.782
8			
9			
10			
11			
12			



BA Thermistor Temperature Log

Operator : berglin
Date : 3/20/96

		String #1			String #2			String #3	
Therm #	Depth (ft)	R (avg)	Temp (C)	Depth (ft)	R (avg)	Temp (C)	Depth (ft)	R (avg)	Temp (C)
1	0	#N/A	#N/A	0	#N/A	#N/A	0	#N/A	#N/A
2	4	19406	-3.351	4	#N/A	#N/A	0.5	17966	-1.865
3	8	16482	-0.187	8	16467	-0.169	1	17975	-1.875
4	12	16440	-0.137	10	16379	-0.064	1.5	17718	-1.596
5	14	16405	-0.095	11	#N/A	#N/A	2	17904	-1.798
6	15	16455	-0.155	12	#N/A	#N/A	4	30982	-12.079
7	16	16500	-0.208	12.5	16421	-0.115	8	16421	-0.115
8	16.5	16464	-0.166	13	16364	-0.046	12	16420	-0.113
9	17	16552	-0.27	14	16388	-0.075	13	16402	-0.092
10	18	16571	-0.292	16	16491	-0.198	13.5	16520	-0.232
11	25	16597	-0.323	20	16628	-0.36	14	16509	-0.219
12	34	16610	-0.338	30	#N/A	#N/A	14.5	16431	-0.126

		String #4			String #5			String #6	
Therm #	Depth (ft)	R (avg)	Temp (C)	Depth (ft)	R (avg)	Temp (C)	Depth (ft)	R (avg)	Temp (C)
1	0	#N/A	#N/A	0	#N/A	#N/A	0	#N/A	#N/A
2	1	17908	-1.803	1	17548	-1.409	2	17377	-1.219
3	2	17830	-1.718	2	17300	-1.132	4	16731	-0.48
4	4	16961	-0.747	4	16492	-0.199	6	16482	-0.187
5	6	16440	-0.137	6	16434	-0.13	8	16449	-0.148
6	8	16365	-0.048	8	16368	-0.051	9	16494	-0.201
7	10	#N/A	#N/A	10	16411	-0.103	10	16454	-0.154
8	12	16482	-0.187	12	16395	-0.084	11	#N/A	#N/A
9	14	16465	-0.167	13	16482	-0.187	11.5	16489	-0.195
10	15	16523	-0.236	13.5	16501	-0.21	12	16494	-0.201
11	16	16318	0.009	14	16499	-0.207	12.5	16461	-0.162
12	16.5	16550	-0.268	14.5	16408	-0.099	13	16440	-0.137

		String #7	
Therm #	Depth (ft)	R (avg)	Temp (C)
1	AO1	#N/A	#N/A
2	AU2	#N/A	#N/A
3	AU3	#N/A	#N/A
4	AU4	#N/A	#N/A
5	AU5	#N/A	#N/A
6	AU6	#N/A	#N/A
7	AU7	#N/A	#N/A
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9			
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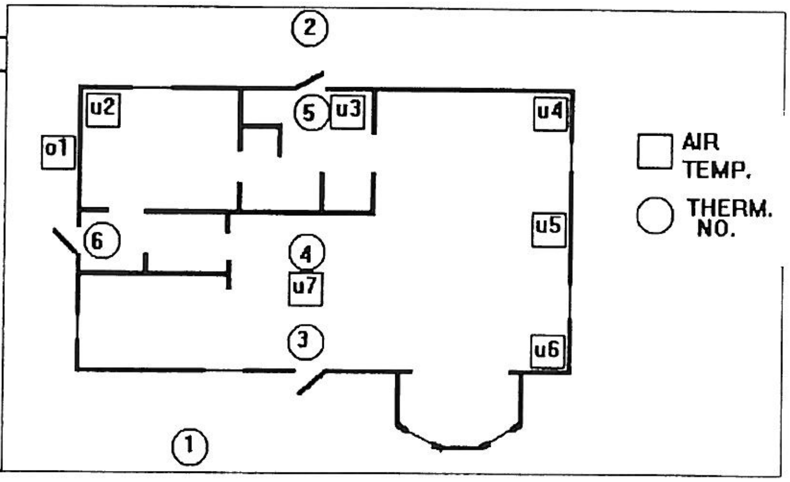
12			



BA Thermistor Temperature Log

Operator : fu
Date : 12/3/95

	String #1			String #2			String #3		
Therm #	Depth (ft)	R (avg)	Temp (C)	Depth (ft)	R (avg)	Temp (C)	Depth (ft)	R (avg)	Temp (C)
1	0	#N/A	#N/A	0	#N/A	#N/A	0	#N/A	#N/A
2	4	#N/A	#N/A	4	16528	-0.242	0.5	18590	-2.525
3	8	15728	0.732	8	15391	1.159	1	17329	-1.165
4	12	15690	0.779	10	15419	1.123	1.5	17330	-1.166
5	14	16018	0.373	11	15574	0.926	2	16412	-0.104
6	15	16238	0.105	12	#N/A	#N/A	4	16417	-0.11
7	16	16440	-0.137	12.5	15874	0.55	8	16319	0.007
8	16.5	16434	-0.13	13	15915	0.499	12	16353	-0.033
9	17	16504	-0.213	14	16145	0.218	13	16460	-0.161
10	18	16550	-0.268	16	16490	-0.197	13.5	16491	-0.198
11	25	16593	-0.318	20	16618	-0.348	14	16498	-0.206
12	34	16603	-0.33	30	16628	-0.36	14.5	16420	-0.113

	String #4			String #5			String #6		
Therm #	Depth (ft)	R (avg)	Temp (C)	Depth (ft)	R (avg)	Temp (C)	Depth (ft)	R (avg)	Temp (C)
1	0	#N/A	#N/A	0	#N/A	#N/A	0	#N/A	#N/A
2	1	18148	-2.06	1	16810	-0.572	2	#N/A	#N/A
3	2	16568	-0.289	2	16426	-0.121	4	#N/A	#N/A
4	4	16450	-0.149	4	16165	0.193	6	#N/A	#N/A
5	6	16402	-0.092	6	16064	0.316	8	#N/A	#N/A
6	8	16348	-0.027	8	16043	0.342	9	#N/A	#N/A
7	10	#N/A	#N/A	10	16187	0.167	10	#N/A	#N/A
8	12	16466	-0.168	12	16270	0.066	11	#N/A	#N/A
9	14	16462	-0.163	13	16425	-0.119	11.5	#N/A	#N/A
10	15	16513	-0.224	13.5	16452	-0.151	12	#N/A	#N/A
11	16	16313	0.015	14	16465	-0.167	12.5	#N/A	#N/A
12	16.5	16536	-0.251	14.5	16390	-0.078	13	#N/A	#N/A

	String #7		
Therm #	Depth (ft)	R (avg)	Temp (C)
1	AO1	#N/A	#N/A
2	AU2	#N/A	#N/A
3	AU3	#N/A	#N/A
4	AU4	#N/A	#N/A
5	AU5	#N/A	#N/A
6	AU6	#N/A	#N/A
7	AU7	#N/A	#N/A
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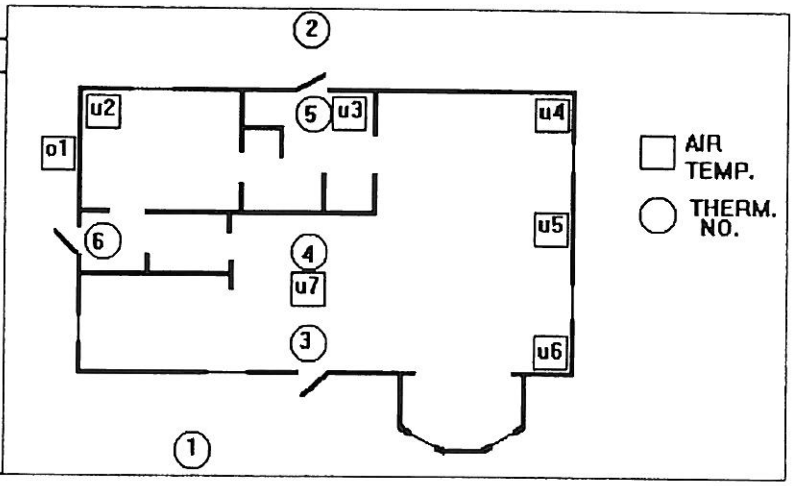
12			



BA Thermistor Temperature Log

Operator : ma
Date : 5/15/95

		String #1			String #2			String #3	
Therm #	Depth (ft)	R (avg)	Temp (C)	Depth (ft)	R (avg)	Temp (C)	Depth (ft)	R (avg)	Temp (C)
1	0	#N/A	#N/A	0	#N/A	#N/A	0	#N/A	#N/A
2	4	16593	-0.318	4	16383	-0.069	0.5	16266	0.071
3	8	16416	-0.109	8	16386	-0.073	1	16525	-0.238
4	12	16460	-0.161	10	16382	-0.068	1.5	16495	-0.203
5	14	16448	-0.147	11	16418	-0.111	2	16516	-0.227
6	15	16484	-0.19	12	#N/A	#N/A	4	16459	-0.16
7	16	16522	-0.235	12.5	16473	-0.176	8	16431	-0.126
8	16.5	16479	-0.184	13	16415	-0.107	12	16379	-0.064
9	17	16525	-0.238	14	16433	-0.129	13	16457	-0.157
10	18	16568	-0.289	16	16511	-0.222	13.5	16485	-0.191
11	25	#N/A	#N/A	20	#N/A	#N/A	14	#N/A	#N/A
12	34	#N/A	#N/A	30	#N/A	#N/A	14.5	#N/A	#N/A

		String #4			String #5			String #6	
Therm #	Depth (ft)	R (avg)	Temp (C)	Depth (ft)	R (avg)	Temp (C)	Depth (ft)	R (avg)	Temp (C)
1	0	#N/A	#N/A	0	#N/A	#N/A	0	#N/A	#N/A
2	1	61525	-24.05	1	16513	-0.224	2	16731	-0.48
3	2	16677	-0.417	2	16614	-0.343	4	16817	-0.58
4	4	16516	-0.227	4	16441	-0.138	6	16503	-0.212
5	6	16393	-0.081	6	16436	-0.132	8	16426	-0.121
6	8	16348	-0.027	8	16392	-0.08	9	16460	-0.161
7	10	#N/A	#N/A	10	16451	-0.15	10	16415	-0.107
8	12	16463	-0.165	12	16406	-0.097	11	#N/A	#N/A
9	14	16460	-0.161	13	16494	-0.201	11.5	16468	-0.171
10	15	16514	-0.225	13.5	16504	-0.213	12	16477	-0.181
11	16	#N/A	#N/A	14	#N/A	#N/A	12.5	#N/A	#N/A
12	16.5	#N/A	#N/A	14.5	#N/A	#N/A	13	#N/A	#N/A

		String #7	
Therm #	Depth (ft)	R (avg)	Temp (C)
1	AO1	#N/A	#N/A
2	AU2	13381	3.944
3	AU3	13464	3.82
4	AU4	13161	4.277
5	AU5	13260	4.127
6	AU6	13219	4.189
7	AU7	13585	3.641
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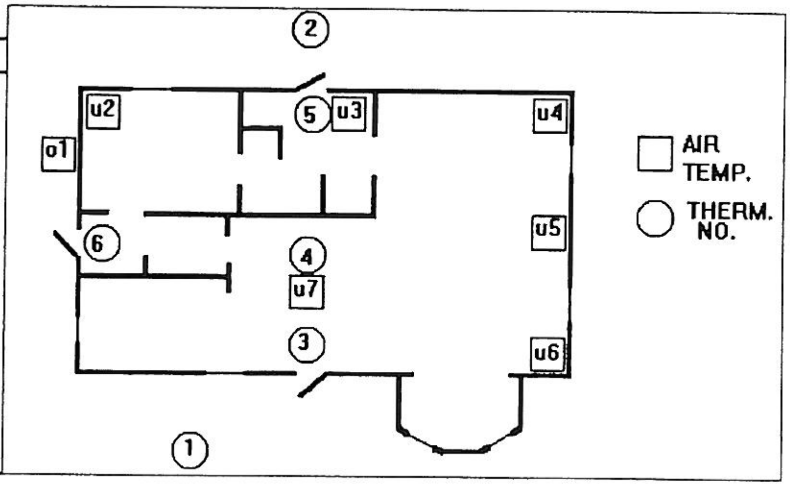

BA Thermistor Temperature Log

Operator : ma
Date : 5/18/94

Therm #	String #1			String #2			String #3		
	Depth (ft)	R (avg)	Temp (C)	Depth (ft)	R (avg)	Temp (C)	Depth (ft)	R (avg)	Temp (C)
1	0	12600	5.156	0	9190	11.668	0	15520	0.994
2	4	16705	-0.45	4	16640	-0.374	0.5	16340	-0.018
3	8	16440	-0.137	8	16480	-0.185	1	16560	-0.279
4	12	#N/A	#N/A	10	16425	-0.119	1.5	16505	-0.214
5	14	16435	-0.131	11	16450	-0.149	2	16510	-0.22
6	15	16470	-0.173	12	16415	-0.107	4	16430	-0.125
7	16	16525	-0.238	12.5	16495	-0.203	8	16415	-0.107
8	16.5	16490	-0.197	13	16430	-0.125	12	16370	-0.054
9	17	16530	-0.244	14	16445	-0.143	13	16450	-0.149
10	18	16580	-0.303	16	16525	-0.238	13.5	16485	-0.191
11	25	16610	-0.338	20	16640	-0.374	14	16500	-0.208
12	34	16620	-0.35	30	16640	-0.374	14.5	16430	-0.125

Therm #	String #4			String #5			String #6		
	Depth (ft)	R (avg)	Temp (C)	Depth (ft)	R (avg)	Temp (C)	Depth (ft)	R (avg)	Temp (C)
1	0	14960	1.72	0	16055	0.327	0	16400	-0.09
2	1	16550	-0.268	1	16530	-0.244	2	16450	-0.149
3	2	16635	-0.368	2	16590	-0.315	4	16430	-0.125
4	4	16430	-0.125	4	16420	-0.113	6	16355	-0.036
5	6	16330	-0.006	6	16420	-0.113	8	16380	-0.066
6	8	16285	0.048	8	16370	-0.054	9	16430	-0.125
7	10	16300	0.03	10	16435	-0.131	10	16400	-0.09
8	12	16440	-0.137	12	16390	-0.078	11	16490	-0.197
9	14	16440	-0.137	13	16475	-0.179	11.5	16460	-0.161
10	15	16500	-0.208	13.5	16490	-0.197	12	16470	-0.173
11	16	16300	0.03	14	16480	-0.185	12.5	16450	-0.149
12	16.5	16540	-0.256	14.5	16400	-0.09	13	16440	-0.137

Therm #	String #7		
	Depth (ft)	R (avg)	Temp (C)
1	AO1	6985	17.546
2	AU2	13150	4.294
3	AU3	13530	3.722
4	AU4	13280	4.096
5	AU5	13420	3.886
6	AU6	13205	4.21
7	AU7	13790	3.341
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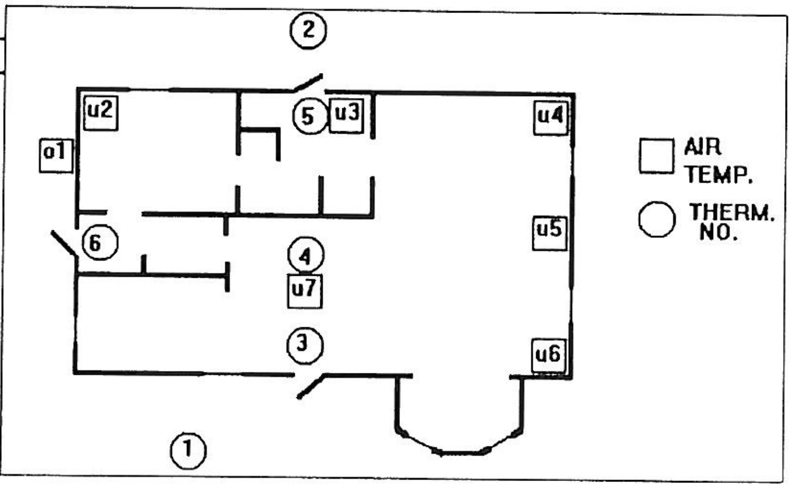

BA Thermistor Temperature Log

Operator : ma
Date : 11/23/93

	String #1			String #2			String #3		
Therm #	Depth (ft)	R (avg)	Temp (C)	Depth (ft)	R (avg)	Temp (C)	Depth (ft)	R (avg)	Temp (C)
1	0	17600	-1.466	0	18370	-2.295	0	17290	-1.121
2	4	15915	0.499	4	16020	0.37	0.5	16580	-0.303
3	8	15520	0.994	8	15370	1.186	1	16440	-0.137
4	12	15750	0.704	10	15620	0.867	1.5	16240	0.103
5	14	16110	0.26	11	15790	0.654	2	16315	0.012
6	15	16430	-0.125	12	15970	0.432	4	16070	0.309
7	16	16510	-0.22	12.5	16235	0.109	8	15990	0.407
8	16.5	16480	-0.185	13	16330	-0.006	12	16200	0.151
9	17	16520	-0.232	14	16435	-0.131	13	16340	-0.018
10	18	16580	-0.303	16	16590	-0.315	13.5	16495	-0.203
11	25	16860	-0.63	20	16805	-0.566	14	16530	-0.244
12	34	16910	-0.688	30	16620	-0.35	14.5	16420	-0.113

	String #4			String #5			String #6		
Therm #	Depth (ft)	R (avg)	Temp (C)	Depth (ft)	R (avg)	Temp (C)	Depth (ft)	R (avg)	Temp (C)
1	0	17890	-1.783	0	16820	-0.584	0	16510	-0.22
2	1	16405	-0.095	1	16260	0.078	2	15795	0.648
3	2	16460	-0.161	2	16070	0.309	4	15690	0.779
4	4	16100	0.272	4	15740	0.717	6	15750	0.704
5	6	15740	0.717	6	15610	0.88	8	15910	0.506
6	8	15860	0.567	8	15810	0.629	9	16080	0.297
7	10	16010	0.382	10	16200	0.151	10	16420	-0.113
8	12	16440	-0.137	12	16160	0.199	11	16400	-0.09
9	14	16490	-0.197	13	16340	-0.018	11.5	16240	0.103
10	15	16810	-0.572	13.5	16450	-0.149	12	16440	-0.137
11	16	16550	-0.268	14	16490	-0.197	12.5	16625	-0.356
12	16.5	16680	-0.421	14.5	16385	-0.072	13	16390	-0.078

	String #7		
Therm #	Depth (ft)	R (avg)	Temp (C)
1	AO1	24435	-7.711
2	AU2	19245	-3.191
3	AU3	18650	-2.587
4	AU4	18560	-2.494
5	AU5	18920	-2.864
6	AU6	18810	-2.752
7	AU7	18780	-2.721
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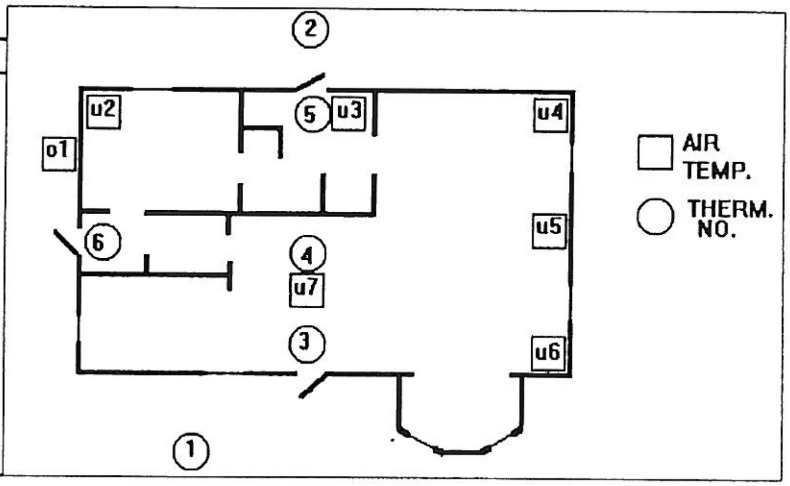
12			



BA Thermistor Temperature Log

Operator : zhang
Date : 6/8/93

		String #1			String #2			String #3	
Therm #	Depth (ft)	R (avg)	Temp (C)	Depth (ft)	R (avg)	Temp (C)	Depth (ft)	R (avg)	Temp (C)
1	0	#N/A	#N/A	0	8930	12.273	0	14980	1.694
2	4	16240	0.103	4	12460	5.382	0.5	15950	0.456
3	8	16440	-0.137	8	16260	0.078	1	16420	-0.113
4	12	16480	-0.185	10	16405	-0.095	1.5	16420	-0.113
5	14	16470	-0.173	11	16470	-0.173	2	16435	-0.131
6	15	16500	-0.208	12	#N/A	#N/A	4	16430	-0.125
7	16	16540	-0.256	12.5	16520	-0.232	8	16440	-0.137
8	16.5	16500	-0.208	13	16460	-0.161	12	16390	-0.078
9	17	16550	-0.268	14	16485	-0.191	13	16480	-0.185
10	18	16580	-0.303	16	16545	-0.262	13.5	16510	-0.22
11	25	16610	-0.338	20	16650	-0.385	14	16510	-0.22
12	34	16620	-0.35	30	16650	-0.385	14.5	16435	-0.131

		String #4			String #5			String #6	
Therm #	Depth (ft)	R (avg)	Temp (C)	Depth (ft)	R (avg)	Temp (C)	Depth (ft)	R (avg)	Temp (C)
1	0	14260	2.672	0	15410	1.134	0	16330	-0.006
2	1	16390	-0.078	1	16445	-0.143	2	16425	-0.119
3	2	16565	-0.285	2	16540	-0.256	4	16390	-0.078
4	4	16410	-0.101	4	16410	-0.101	6	16320	0.006
5	6	16350	-0.03	6	16420	-0.113	8	16355	-0.036
6	8	16350	-0.03	8	16390	-0.078	9	16410	-0.101
7	10	16350	-0.03	10	16460	-0.161	10	16395	-0.084
8	12	16470	-0.173	12	16410	-0.101	11	#N/A	#N/A
9	14	16460	-0.161	13	16495	-0.203	11.5	#N/A	#N/A
10	15	16505	-0.214	13.5	16500	-0.208	12	16460	-0.161
11	16	16315	0.012	14	16490	-0.197	12.5	16445	-0.143
12	16.5	16550	-0.268	14.5	16400	-0.09	13	16440	-0.137

		String #7	
Therm #	Depth (ft)	R (avg)	Temp (C)
1	AO1	6300	19.812
2	AU2	12945	4.611
3	AU3	13090	4.386
4	AU4	12745	4.925
5	AU5	12930	4.634
6	AU6	12535	5.261
7	AU7	13210	4.203
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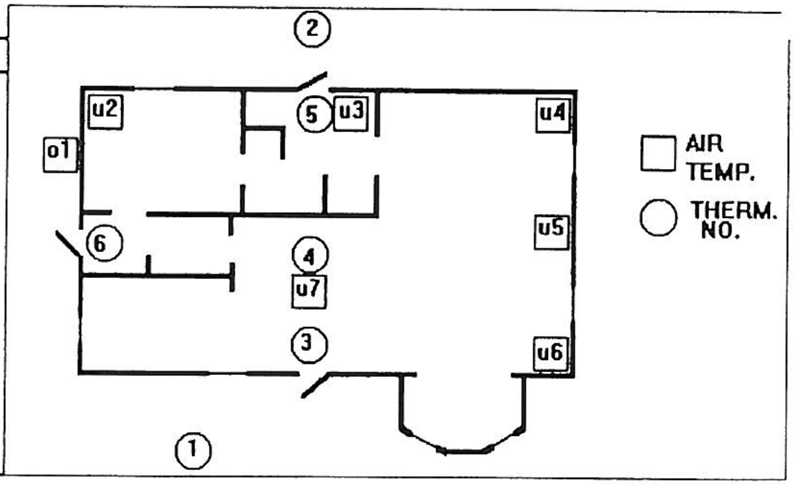

BA Thermistor Temperature Log

Operator : Eric
Date : 2/9/93

Therm #	String #1			String #2			String #3		
	Depth (ft)	R (avg)	Temp (C)	Depth (ft)	R (avg)	Temp (C)	Depth (ft)	R (avg)	Temp (C)
1	0	21270	-5.101	0	19865	-3.799	0	20600	-4.493
2	4	16755	-0.508	4	16490	-0.197	0.5	18575	-2.509
3	8	16390	-0.078	8	16415	-0.107	1	17940	-1.837
4	12	16445	-0.143	10	16375	-0.06	1.5	17220	-1.042
5	14	16445	-0.143	11	16430	-0.125	2	16685	-0.426
6	15	16490	-0.197	12	16375	-0.06	4	16390	-0.078
7	16	16535	-0.25	12.5	16490	-0.197	8	16385	-0.072
8	16.5	16480	-0.185	13	16445	-0.143	12	16375	-0.06
9	17	16525	-0.238	14	16475	-0.179	13	16460	-0.161
10	18	16570	-0.291	16	16535	-0.25	13.5	16485	-0.191
11	25	16595	-0.321	20	16625	-0.356	14	16495	-0.203
12	34	16600	-0.327	30	16635	-0.368	14.5	16415	-0.107

Therm #	String #4			String #5			String #6		
	Depth (ft)	R (avg)	Temp (C)	Depth (ft)	R (avg)	Temp (C)	Depth (ft)	R (avg)	Temp (C)
1	0	23085	-6.647	0	19200	-3.146	0	18860	-2.803
2	1	18085	-1.993	1	17520	-1.378	2	16430	-0.125
3	2	16960	-0.746	2	16550	-0.268	4	16395	-0.084
4	4	16335	-0.012	4	16350	-0.03	6	16315	0.012
5	6	16245	0.097	6	16335	-0.012	8	16360	-0.042
6	8	16220	0.127	8	16300	0.03	9	16420	-0.113
7	10	16265	0.072	10	16390	-0.078	10	16395	-0.084
8	12	16395	-0.084	12	16360	-0.042	11	16475	-0.179
9	14	16405	-0.095	13	16465	-0.167	11.5	16440	-0.137
10	15	16470	-0.173	13.5	16460	-0.161	12	16480	-0.185
11	16	16280	0.054	14	16455	-0.155	12.5	16440	-0.137
12	16.5	16525	-0.238	14.5	16380	-0.066	13	16430	-0.125

Therm #	String #7		
	Depth (ft)	R (avg)	Temp (C)
1	AO1	40340	-16.796
2	AU2	25820	-8.737
3	AU3	24695	-7.908
4	AU4	24645	-7.871
5	AU5	25405	-8.436
6	AU6	24445	-7.719
7	AU7	24410	-7.692
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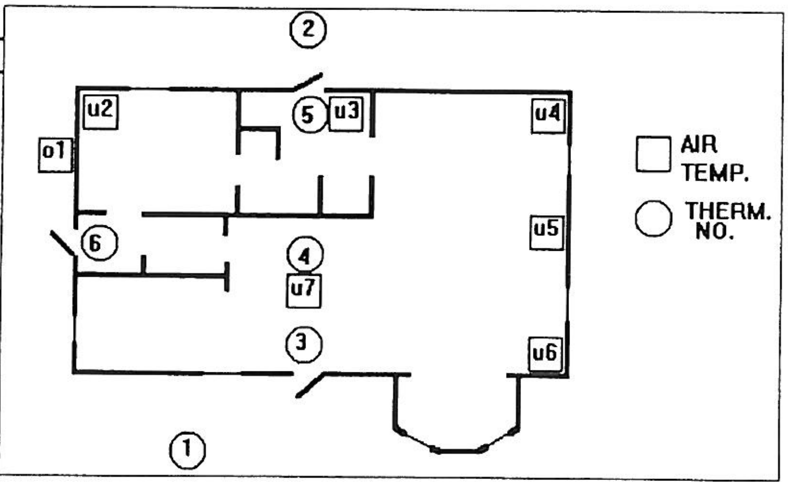

BA Thermistor Temperature Log

Operator : Eric
Date : 11/17/92

		String #1			String #2			String #3	
Therm #	Depth (ft)	R (avg)	Temp (C)	Depth (ft)	R (avg)	Temp (C)	Depth (ft)	R (avg)	Temp (C)
1	0	19180	-3.126	0	19720	-3.659	0	17245	-1.07
2	4	16240	0.103	4	16135	0.23	0.5	16525	-0.238
3	8	16040	0.346	8	15835	0.598	1	16460	-0.161
4	12	16110	0.26	10	15980	0.419	1.5	16325	0
5	14	16340	-0.018	11	16150	0.212	2	16280	0.054
6	15	16470	-0.173	12	16250	0.09	4	16180	0.175
7	16	16535	-0.25	12.5	16430	-0.125	8	16180	0.175
8	16.5	16490	-0.197	13	16425	-0.119	12	16295	0.036
9	17	16520	-0.232	14	16480	-0.185	13	16410	-0.101
10	18	16565	-0.285	16	16530	-0.244	13.5	16455	-0.155
11	25	16600	-0.327	20	16630	-0.362	14	16470	-0.173
12	34	16860	-0.63	30	16630	-0.362	14.5	16410	-0.101

		String #4			String #5			String #6	
Therm #	Depth (ft)	R (avg)	Temp (C)	Depth (ft)	R (avg)	Temp (C)	Depth (ft)	R (avg)	Temp (C)
1	0	17965	-1.864	0	16775	-0.532	0	16645	-0.38
2	1	16425	-0.119	1	16340	-0.018	2	16255	0.084
3	2	16340	-0.018	2	16220	0.127	4	16240	0.103
4	4	16095	0.278	4	15935	0.475	6	16200	0.151
5	6	15990	0.407	6	15855	0.574	8	16275	0.06
6	8	16470	-0.173	8	15910	0.506	9	16345	-0.024
7	10	16070	0.309	10	16120	0.248	10	16340	-0.018
8	12	16260	0.078	12	16225	0.121	11	16710	-0.456
9	14	16340	-0.018	13	16385	-0.072	11.5	16420	-0.113
10	15	16430	-0.125	13.5	16435	-0.131	12	16430	-0.125
11	16	16260	0.078	14	16660	-0.397	12.5	16425	-0.119
12	16.5	16510	-0.22	14.5	16370	-0.054	13	16425	-0.119

		String #7	
Therm #	Depth (ft)	R (avg)	Temp (C)
1	AO1	40570	-16.896
2	AU2	19075	-3.021
3	AU3	18835	-2.777
4	AU4	19270	-3.216
5	AU5	19360	-3.306
6	AU6	19075	-3.021
7	AU7	18595	-2.53
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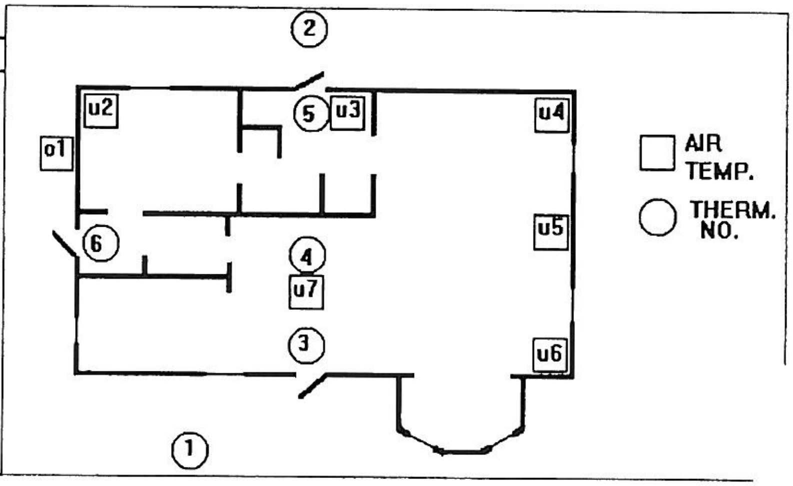

BA Thermistor Temperature Log

Operator : zhang
Date : 8/27/92

	String #1			String #2			String #3		
Therm #	Depth (ft)	R (avg)	Temp (C)	Depth (ft)	R (avg)	Temp (C)	Depth (ft)	R (avg)	Temp (C)
1	0	10095	9.703	0	9400	11.193	0	11030	7.87
2	4	11710	6.645	4	10095	9.703	0.5	12165	5.868
3	8	14580	2.23	8	13260	4.127	1	13070	4.417
4	12	16090	0.285	10	14845	1.873	1.5	13825	3.29
5	14	16400	-0.09	11	15590	0.905	2	14635	2.156
6	15	16500	-0.208	12	#N/A	#N/A	4	16270	0.066
7	16	16545	-0.262	12.5	#N/A	#N/A	8	16390	-0.078
8	16.5	16500	-0.208	13	16470	-0.173	12	16375	-0.06
9	17	16535	-0.25	14	16495	-0.203	13	16450	-0.149
10	18	16560	-0.279	16	16540	-0.256	13.5	16480	-0.185
11	25	16610	-0.338	20	16640	-0.374	14	16480	-0.185
12	34	16605	-0.333	30	16630	-0.362	14.5	16415	-0.107

	String #4			String #5			String #6		
Therm #	Depth (ft)	R (avg)	Temp (C)	Depth (ft)	R (avg)	Temp (C)	Depth (ft)	R (avg)	Temp (C)
1	0	11040	7.852	0	11350	7.283	0	13050	4.448
2	1	12800	4.838	1	12850	4.759	2	16370	-0.054
3	2	14190	2.77	2	14755	1.994	4	16450	-0.149
4	4	16315	0.012	4	15990	0.407	6	16375	-0.06
5	6	16320	0.006	6	16095	0.278	8	16395	-0.084
6	8	16355	-0.036	8	16210	0.139	9	16435	-0.131
7	10	16350	-0.03	10	16375	-0.06	10	16395	-0.084
8	12	16470	-0.173	12	16365	-0.048	11	16485	-0.191
9	14	16440	-0.137	13	16460	-0.161	11.5	16450	-0.149
10	15	16485	-0.191	13.5	16470	-0.173	12	16455	-0.155
11	16	16290	0.042	14	16460	-0.161	12.5	16445	-0.143
12	16.5	16525	-0.238	14.5	16385	-0.072	13	16435	-0.131

	String #7		
Therm #	Depth (ft)	R (avg)	Temp (C)
1	AO1	9290	11.44
2	AU2	10515	8.857
3	AU3	10550	8.788
4	AU4	10560	8.769
5	AU5	10605	8.681
6	AU6	10715	8.468
7	AU7	10820	8.266
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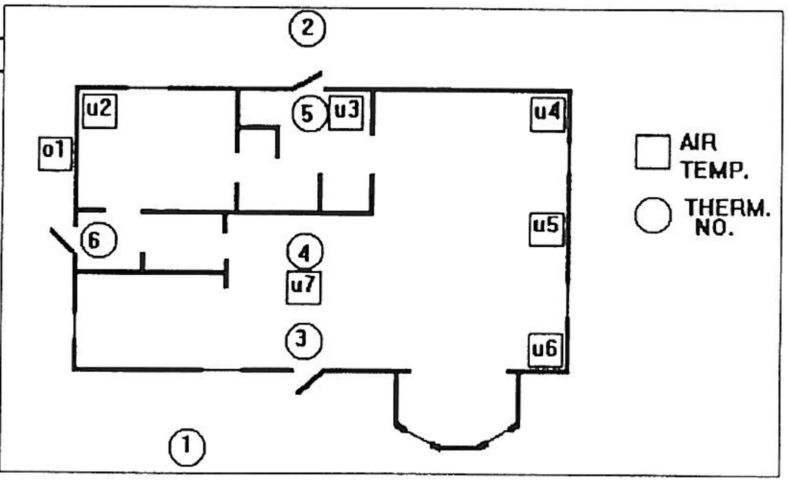

BA Thermistor Temperature Log

Operator : Yuan
Date : 5/14/92

		String #1			String #2			String #3	
Therm #	Depth (ft)	R (avg)	Temp (C)	Depth (ft)	R (avg)	Temp (C)	Depth (ft)	R (avg)	Temp (C)
1	0	11600	6.837	0	9250	11.531	0	15725	0.736
2	4	16605	-0.333	4	16575	-0.297	0.5	16380	-0.066
3	8	16435	-0.131	8	16470	-0.173	1	16560	-0.279
4	12	16455	-0.155	10	16435	-0.131	1.5	16500	-0.208
5	14	16450	-0.149	11	16475	-0.179	2	16490	-0.197
6	15	16505	-0.214	12	16430	-0.125	4	16420	-0.113
7	16	16545	-0.262	12.5	16535	-0.25	8	16400	-0.09
8	16.5	16510	-0.22	13	16490	-0.197	12	16380	-0.066
9	17	16540	-0.256	14	16500	-0.208	13	16460	-0.161
10	18	16570	-0.291	16	16555	-0.274	13.5	16530	-0.244
11	25	16600	-0.327	20	16650	-0.385	14	16480	-0.185
12	34	16610	-0.338	30	16640	-0.374	14.5	16410	-0.101

		String #4			String #5			String #6	
Therm #	Depth (ft)	R (avg)	Temp (C)	Depth (ft)	R (avg)	Temp (C)	Depth (ft)	R (avg)	Temp (C)
1	0	15445	1.09	0	16360	-0.042	0	16365	-0.048
2	1	16565	-0.285	1	16580	-0.303	2	16430	-0.125
3	2	16620	-0.35	2	16600	-0.327	4	16440	-0.137
4	4	16400	-0.09	4	16400	-0.09	6	16370	-0.054
5	6	16335	-0.012	6	16385	-0.072	8	16380	-0.066
6	8	16320	0.006	8	16390	-0.078	9	16420	-0.113
7	10	16285	0.048	10	16415	-0.107	10	16410	-0.101
8	12	16415	-0.107	12	16380	-0.066	11	16470	-0.173
9	14	16420	-0.113	13	16465	-0.167	11.5	16445	-0.143
10	15	16470	-0.173	13.5	16475	-0.179	12	16440	-0.137
11	16	16290	0.042	14	16465	-0.167	12.5	16435	-0.131
12	16.5	16530	-0.244	14.5	16385	-0.072	13	16430	-0.125

		String #7	
Therm #	Depth (ft)	R (avg)	Temp (C)
1	AO1	9725	10.481
2	AU2	14090	2.911
3	AU3	14385	2.498
4	AU4	14360	2.533
5	AU5	14150	2.826
6	AU6	14215	2.735
7	AU7	14570	2.244
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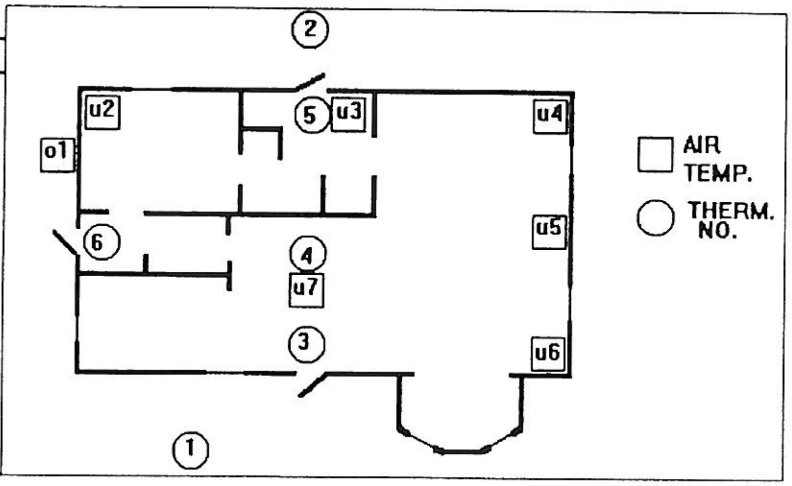
12			



BA Thermistor Temperature Log

Operator :
Date : 1/22/92

		String #1			String #2			String #3	
Therm #	Depth (ft)	R (avg)	Temp (C)	Depth (ft)	R (avg)	Temp (C)	Depth (ft)	R (avg)	Temp (C
1	0	27841.3	-10.128	0	25992	-8.86	0	21124.5	-4.971
2	4	16611.9	-0.341	4	16457	-0.157	0.5	17838.5	-1.727
3	8	16260.9	0.077	8	16367	-0.05	1	16995	-0.786
4	12	16335.5	-0.012	10	16357	-0.038	1.5	16464.5	-0.166
5	14	16409	-0.1	11	16419	-0.112	2	16327	-0.002
6	15	16484.5	-0.19	12	16394.5	-0.083	4	16169	0.188
7	16	16543	-0.259	12.5	16501	-0.21	8	16057	0.325
8	16.5	16493.5	-0.201	13	16469	-0.172	12	16183	0.172
9	17	16533.5	-0.248	14	16495.5	-0.203	13	16330	-0.006
10	18	16559	-0.278	16	16538	-0.253	13.5	16387.5	-0.075
11	25	16584	-0.308	20	16631	-0.363	14	16409.5	-0.101
12	34	16603.5	-0.331	30	16618.5	-0.348	14.5	16359.5	-0.041

		String #4			String #5			String #6	
Therm #	Depth (ft)	R (avg)	Temp (C)	Depth (ft)	R (avg)	Temp (C)	Depth (ft)	R (avg)	Temp (C)
1	0	21298	-5.126	0	18890.5	-2.834	0	#N/A	#N/A
2	1	17020.5	-0.815	1	16842.5	-0.61	2	#N/A	#N/A
3	2	16445	-0.143	2	16424.5	-0.119	4	#N/A	#N/A
4	4	16051	0.332	4	16137	0.227	6	#N/A	#N/A
5	6	15815	0.623	6	16054.5	0.328	8	#N/A	#N/A
6	8	15745	0.711	8	16019	0.371	9	#N/A	#N/A
7	10	15736	0.722	10	16150	0.212	10	#N/A	#N/A
8	12	15941	0.467	12	16205	0.145	11	#N/A	#N/A
9	14	16099.5	0.273	13	16351	-0.031	11.5	#N/A	#N/A
10	15	16236.5	0.107	13.5	16393.5	-0.082	12	#N/A	#N/A
11	16	16153	0.208	14	16417	-0.11	12.5	#N/A	#N/A
12	16.5	16414	-0.106	14.5	16351	-0.031	13	#N/A	#N/A

		String #7	
Therm #	Depth (ft)	R (avg)	Temp (C)
1	AO1	#DIV/0!	#DIV/0!
2	AU2	#DIV/0!	#DIV/0!
3	AU3	#DIV/0!	#DIV/0!
4	AU4	#DIV/0!	#DIV/0!
5	AU5	#DIV/0!	#DIV/0!
6	AU6	#DIV/0!	#DIV/0!
7	AU7	#DIV/0!	#DIV/0!
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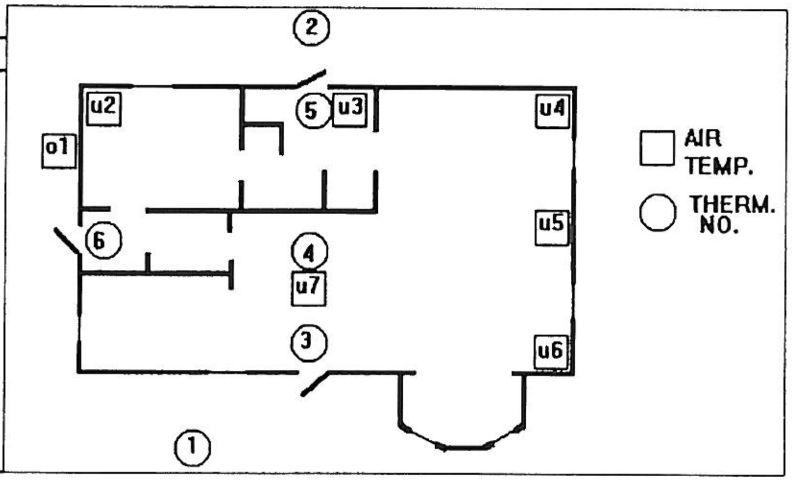
12			



BA Thermistor Temperature Log

Operator : DLB
Date : 11/27/91

	String #1			String #2			String #3		
Therm #	Depth (ft)	R (avg)	Temp (C)	Depth (ft)	R (avg)	Temp (C)	Depth (ft)	R (avg)	Temp (C)
1	0	#N/A	#N/A	0	26112	-8.945	0	#N/A	#N/A
2	4	16276	0.059	4	16077	0.3	0.5	#N/A	#N/A
3	8	15508	1.009	8	15776	0.672	1	#N/A	#N/A
4	12	15879	0.544	10	15998	0.397	1.5	#N/A	#N/A
5	14	16290	0.042	11	16213	0.135	2	#N/A	#N/A
6	15	16483	-0.188	12	16346	-0.025	4	#N/A	#N/A
7	16	16539	-0.255	12.5	16493	-0.2	8	#N/A	#N/A
8	16.5	16486	-0.192	13	16467	-0.169	12	#N/A	#N/A
9	17	16531	-0.245	14	16495	-0.203	13	#N/A	#N/A
10	18	16557	-0.276	16	16534	-0.249	13.5	#N/A	#N/A
11	25	16578	-0.301	20	16627	-0.358	14	#N/A	#N/A
12	34	16604	-0.331	30	16616	-0.346	14.5	#N/A	#N/A

	String #4			String #5			String #6		
Therm #	Depth (ft)	R (avg)	Temp (C)	Depth (ft)	R (avg)	Temp (C)	Depth (ft)	R (avg)	Temp (C)
1	0	#N/A	#N/A	0	16502	-0.211	0	#N/A	#N/A
2	1	#N/A	#N/A	1	16303	0.027	2	#N/A	#N/A
3	2	#N/A	#N/A	2	15990	0.407	4	#N/A	#N/A
4	4	#N/A	#N/A	4	15329	1.238	6	#N/A	#N/A
5	6	#N/A	#N/A	6	15135	1.49	8	#N/A	#N/A
6	8	#N/A	#N/A	8	15212	1.39	9	#N/A	#N/A
7	10	#N/A	#N/A	10	15555	0.95	10	#N/A	#N/A
8	12	#N/A	#N/A	12	15879	0.544	11	#N/A	#N/A
9	14	#N/A	#N/A	13	16151	0.21	11.5	#N/A	#N/A
10	15	#N/A	#N/A	13.5	16265	0.072	12	#N/A	#N/A
11	16	#N/A	#N/A	14	16356	-0.037	12.5	#N/A	#N/A
12	16.5	#N/A	#N/A	14.5	16332	-0.008	13	#N/A	#N/A

	String #7		
Therm #	Depth (ft)	R (avg)	Temp (C)
1	AO1	#DIV/0!	#DIV/0!
2	AU2	#DIV/0!	#DIV/0!
3	AU3	#DIV/0!	#DIV/0!
4	AU4	#DIV/0!	#DIV/0!
5	AU5	#DIV/0!	#DIV/0!
6	AU6	#DIV/0!	#DIV/0!
7	AU7	#DIV/0!	#DIV/0!
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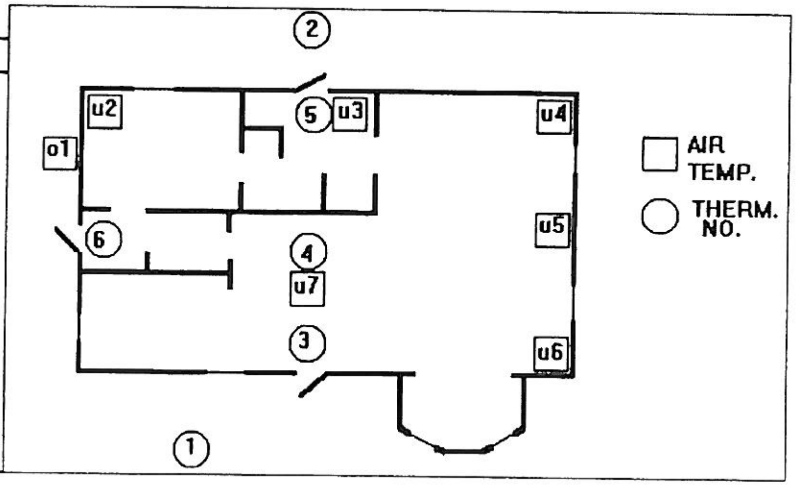


Engineering Reports

STUTZMANN ENGINEERING ASSOC., INC.
P.O. BOX 1429
FAIRBANKS, ALASKA 99707
(907) 452-4094

December 19, 1988

Coldwell Banker
105 Adak Avenue
Fairbanks, Alaska 99701

Attn: Tom Hovenden

Re: AHFC #25046 (Glidden)
Lot 3, Block 5, Musk Ox Sub.
1½ Mile Ballaine Road, Fairbanks

Gentlemen:

As requested, we investigated the subject dwelling for apparent structural inadequacies on October 11, 1988. This report presents the findings of our investigation and recommends solutions to problems.

GENERAL INFORMATION

The original building was a one story log house. A wood frame, four bedrooms, one bath, second story addition and an 8'x8' addition to the first floor was added at a later date. Portions of the building , especially parts of the additions, appear to be well constructed. I suspect this is an owner built house.

The house is located on the North slope of the hills surrounding the Fairbanks area (see attached photographs).

STRUCTURAL DEFICIENCIES AND RECOMMENDED MODIFICATIONS

Structural deficiencies were noted in the following areas:

1. Foundation and subsurface soils conditions.
2. 8" log purlins in the cathedral ceiling.
3. First floor TJM floor joists.
4. Second story glulam support beams .
5. Point load columns required.
6. Roof trusses.

FOUNDATION AND SUBSURFACE SOILS

The subsurface soils investigation consisted of drilling two test holes. As shown on the attached drill logs, underlying permafrost exists at depths of 5 and 9 feet below the surface. Both holes were found to have layers of pure ice. Drill Hole No. 2 had a 7.5 foot thick layer of pure ice at a depth of 19.5 feet to 27 feet.

Currently the N.E. corner of the house is 8 inches lower than the S.W. corner (See the attached floor plan showing floor elevations).

The foundation consists of a standard concrete footing and a 42 inch concrete foundation wall. There is an insulated crawl space. The West foundation wall (downhill side) is exposed and not below grade as would normally be required to prevent seasonal frost heave.

First of all, having a fairly good sized structure built on top of layers of pure ice is simply not a good idea. The reason for this is not necessarily due to the construction of buildings on ice and permafrost soils, but, more importantly, has to do with the geographical location of the Fairbanks area and the type of foundation constructed. Fairbanks lies within a zone of intermittent and unstable permafrost soils where once original conditions are changed, it is difficult to prevent the permafrost from thawing. Properly designed foundations for permafrost conditions can help significantly in stabilizing the permafrost and the building.

Aerial photography indicates the original log building was moved onto the existing concrete foundation from a site about 100 feet away. This took place some time after 1982. This is important because the heat input from building has had less than six years to have an effect on the thawing of the permafrost at the current location.

It is very possible the underlying permafrost and ice wedges will melt within the next 30 years. The differential settlement resulting from the aforementioned thawing would result in significant damage to the house.

It is not clear why the floor is currently out of level by 8 inches because there is no visible evidence of differential settlement, i.e., cracks in the sheet rock or foundation, nor do the drill logs indicate that this amount of settlement should have occurred thus far.

There are two solutions to the poor soil and foundation problems and they are both expensive.

1. Change the foundation to a piling foundation. This would involve moving the house adjacent to or nearby to a location where piling had been installed. Approximate costs are as follows:

a.	13 - 60 foot piles @ $25/ft.	$19.500.00
b.	Exploratory drilling next to or nearby for piling foundation location.	$ 1,500.00

c.	Move house (existing truss joist makes it difficult to move)	$ 6,000.00
d.	Support beams and labor for new piling foundation	5,000.00
e.	Earthwork, insulate floor, reconnect and insulate utilities	4,000.00
f.	Miscellaneous	30,000.00
		$39,000.00

2. Move the building to another more suitable building site. Approximate costs are as follows:

a.	1 acres lot	$15,000.00
b.	well and septic system	11,000.00
c.	moving costs	10,000.00
d.	Earthwork, new foundation, electrical hook-up	8,000.00
e.	Miscellaneous	2,000.00
		$46,000.00

These cost estimates are approximate and are only provided to show what the range and the relative cost differences might be for the proposed new foundations.

LOG PURLINS

The three existing 8" log purlins supporting the cathedral ceiling are over stressed and should be replaced with three 5-1/8"x9" glulam beams. Temporary roof supports need to be installed while the log purlins are being removed and replaced.

TJM FLOOR JOISTS

The first floor truss joists are adequate except at points where loads are transferred from the second story and the second story roof addition. This means the truss joists at these locations are over stressed and need to have their spans reduced. Refer to Item No. 5 of this report.

GLULAM CEILING SUPPORT BEAMS

There are two glulam beams supporting the first story ceiling. They are over stressed for a 29 foot span. The spans for these beams need to be reduced by adding support columns at load points. Refer to Item No. 5 of this report.

POINT LOAD COLUMNS

There are two locations where columns will need to be installed to transfer the loads from the second story roof and floor loads down to a foundation in the crawl space. These columns would reduce the spans of the glulam beams in the first floor ceiling and first floor truss joists.

These columns would need to be 6"x6s" or 4"x 10s" placed underneath and supporting the glulams. The locations would be as noted and shown on the attached floor plan. The columns would be supported by a piling below the floor. The existing truss floor joists at these locations would have to be separated to install the column and then rehung on the column. This would reduce the loads and spans of the truss joists at these locations, which is necessary.

Note on the attached floor plan drawing that the floor elevations indicate the floor is sagging at these load point locations.

ROOF TRUSSES

The roof trusses were inspected and were found to have structural deficiencies. The cop chord is over stressed and the plywood gussets are insufficiently connected. The attached drawing of the truss indicates the repairs that are necessary.

CONCLUSION

The most serious problem affecting this house is the subsurface soils conditions. The foundation which is not properly designed for the subsurface conditions is the second item of concern.

If a piling foundation were to be installed, more details would need to be provided to the contractor by the engineer.

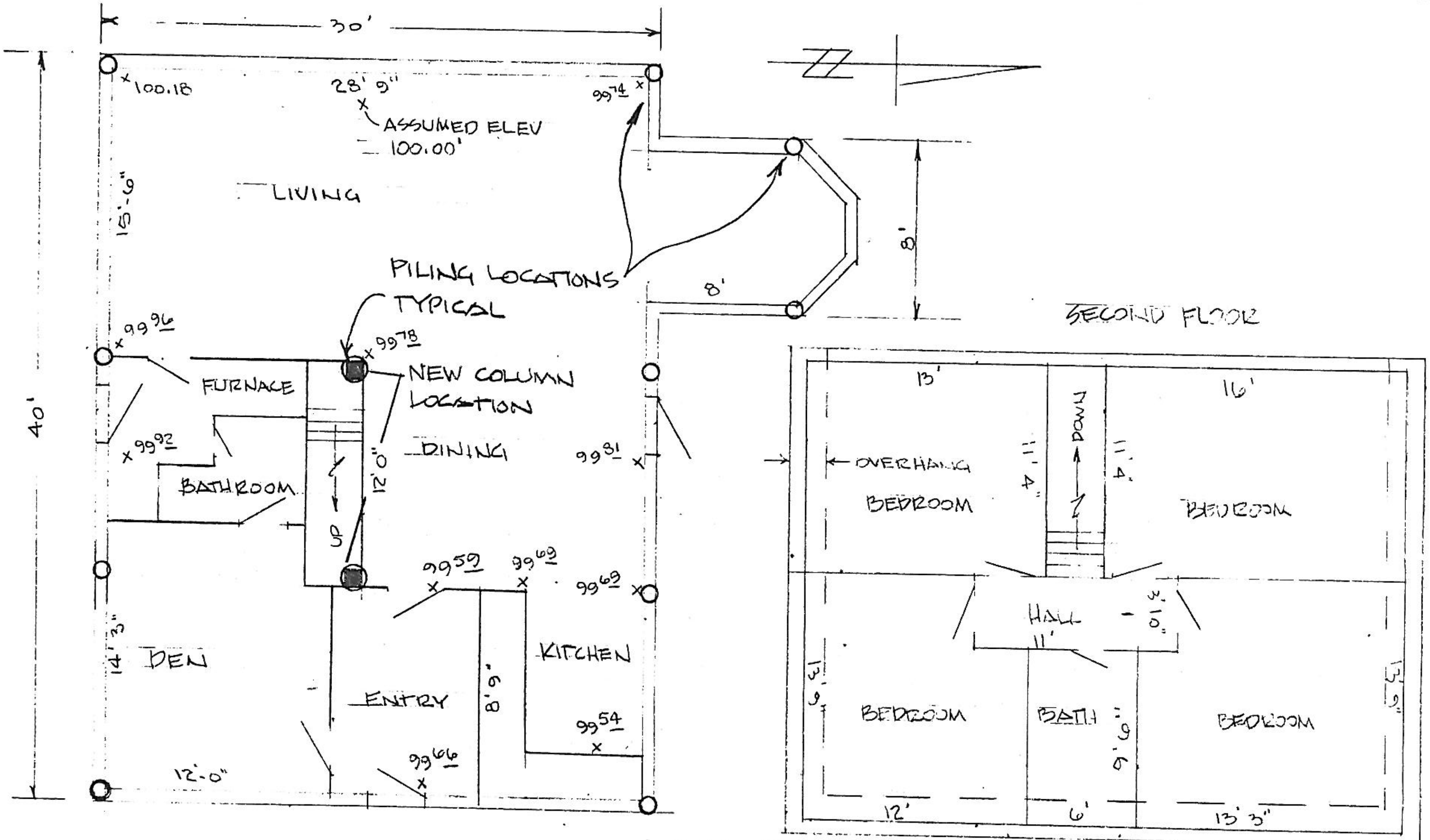
On site inspection of the repairs by an engineer at several stages of the construction will be required to insure that the intent of structural repairs are made satisfactorily.

Our recommendations are based on problems which were readily apparent during the inspection. Hidden structural defects or deficiencies which may exist and have not manifested themselves through some movement or failure were likely to not have been identified with the inspection. This report is not meant to address the adequacy of the remainder of the building.

Very truly yours,

STUTZMANN ENGINEERING ASSOC., INC.

Scott Wortman, P.E.
Enc.
43/7



2 STORY HOUSE - 1ST FLOOR 8" LOG
2ND FLOOR WOOD FRAME CONSTRUCTION
NOTE; N.E. CORNER IS 8" LOWER
THAN THE S.W. CORNER.

AHFC 25046 (GLIDDEN) 1½ MILE BALLAINE RD.
LOT 3 BLK 5 MUSK OX SUBD.

SCALE: 1/8" = 1'
DATE: 10/11/88
APPROVED BY:
DRAWN BY SEW
REVISED

FLOOR PLAN

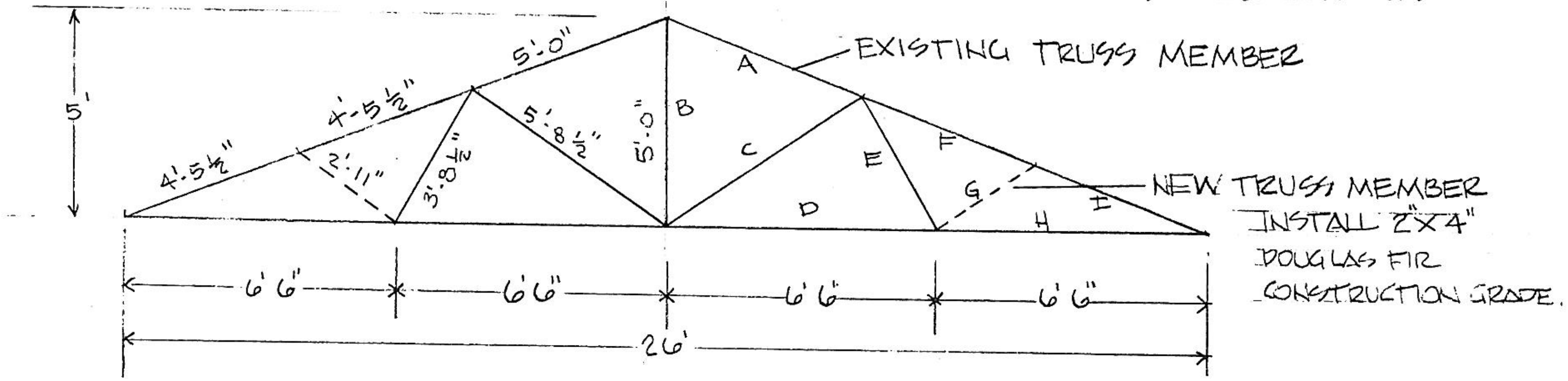
STUTZMANN ENG. ASSOC.

DRAWING NUMBER

*TRUSS GUSSET NAILING REQUIREMENTS

MEMBER	NAILS REQ'D
A	10
B	10
C	10
D	44
E	10
F	10
G	8
H	52
I	56

* NAILS REQD AT EACH END OF TRUSS MEMBER 8d NAILS. 1/2 THE NAILS IN ONE SIDE 1/2 IN THE OTHER



NOTE:

1. FIELD VERIFY TRUSS DIMENSIONS

AHFC 25046 (GLIDDEN) 1 1/4 MI. BALLAINE RD.
LOT 3 BLK 5 MUSK OX SUBD.

SCALE: NTS
DATE: 10/11/88
APPROVED BY:
DRAWN BY SEW
REVISED

ROOF TRUSS

STUTZMANN ENG. ASSOC.
DRAWING NUMBER

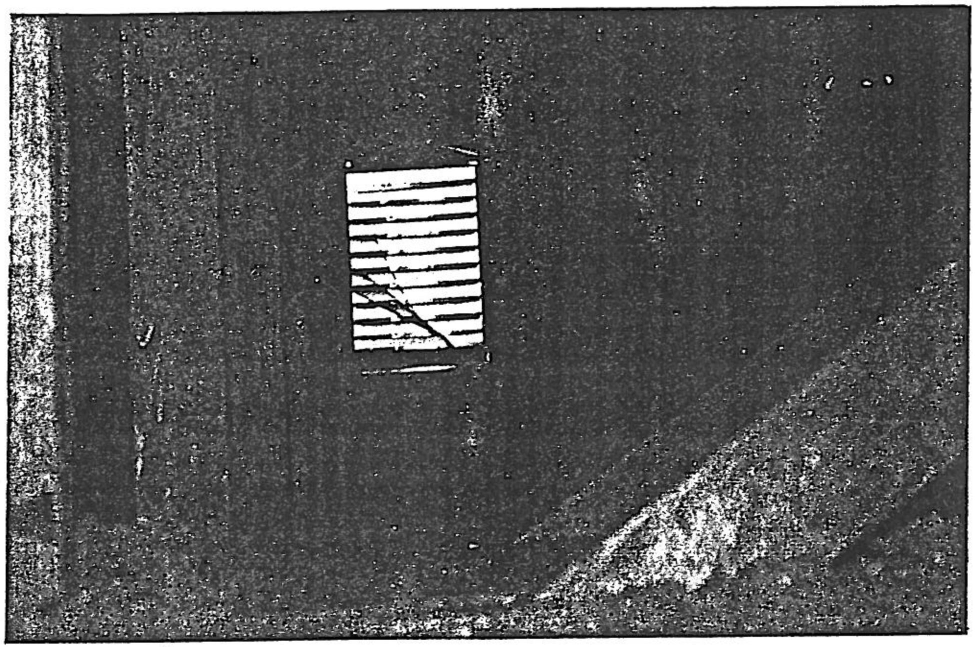


PHOTO #1: ROOF TRUSSES.

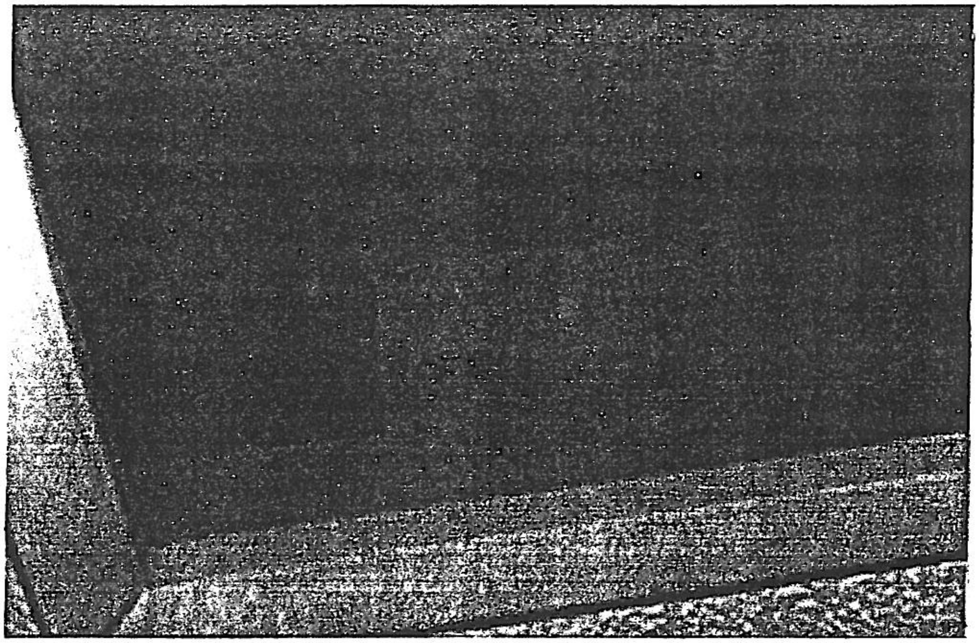


PHOTO #2: ROOF TRUSS GUSSETS INADEQUATELY CONNECTED (INSUFFICIENT NAILING).

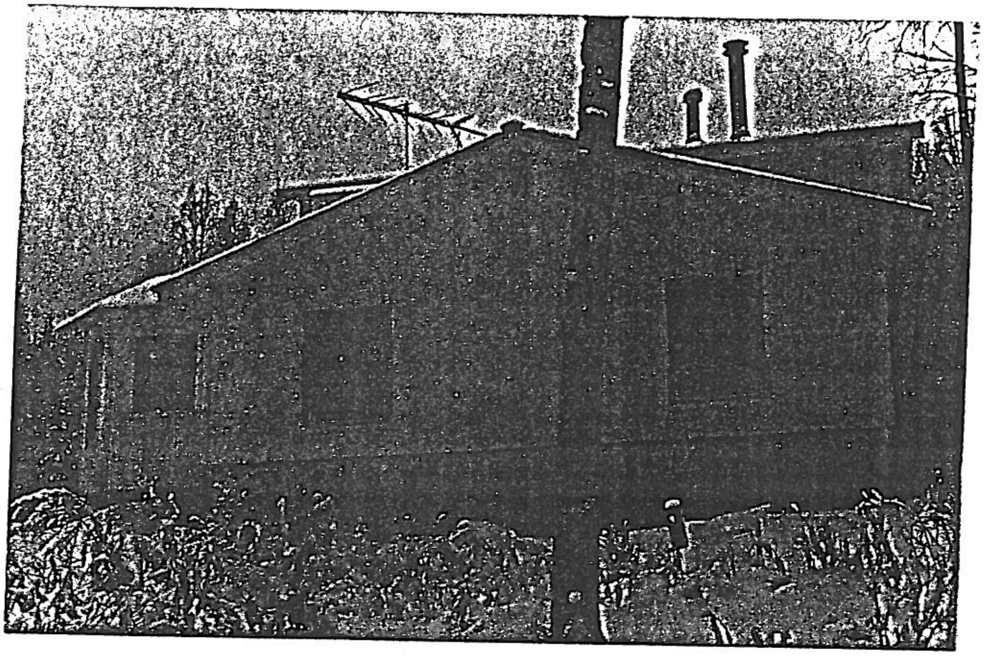


PHOTO #3: LOOKING EAST AT THE WEST WALL OF THE BUILDING. NOTE: LOG PURLINS, CRAWL SPACE ENTRANCE AND FOUNDATION WALL.

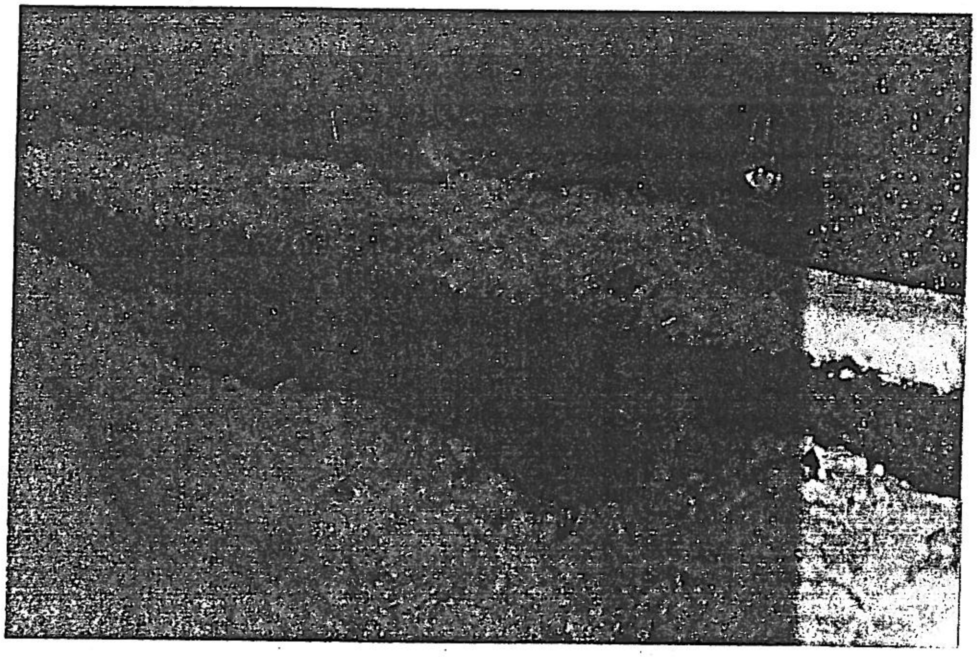


PHOTO #4: CRAWL SPACE ENTRANCE, FOOTING, FOUNDATION WALL. WEST SIDE OF BUILDING. NOTE FOOTINGS ARE ONLY PARTIALLY SUPPORTED BY SUBGRADE. POSSIBLE DRAINAGE PROBLEM IN THIS AREA?

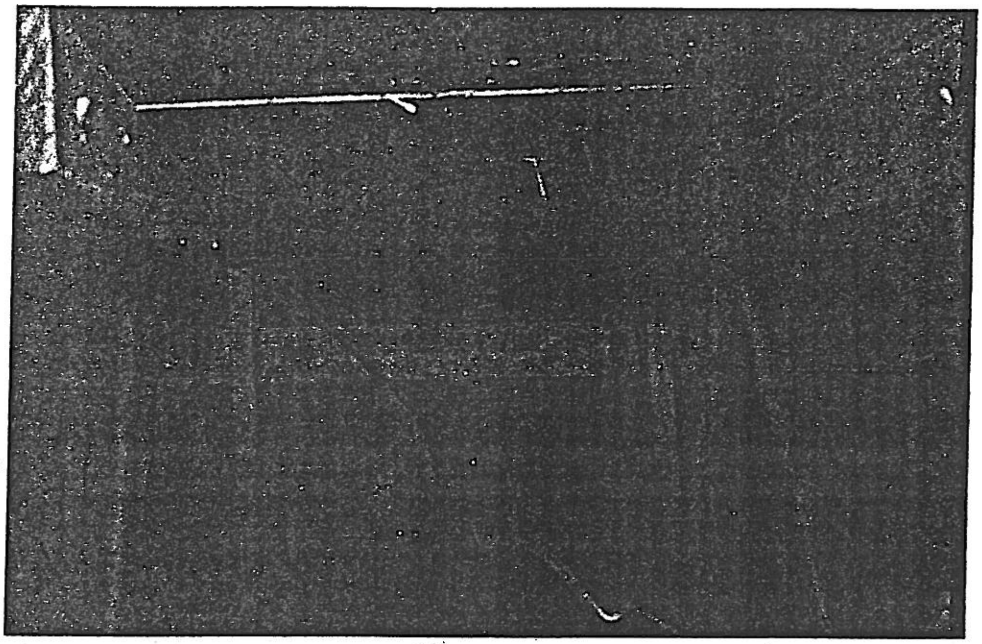


PHOTO #5: NOTE SHIM ON TOP OF THE TOP CHORD OF THE TRUSS TO THE RIGHT.

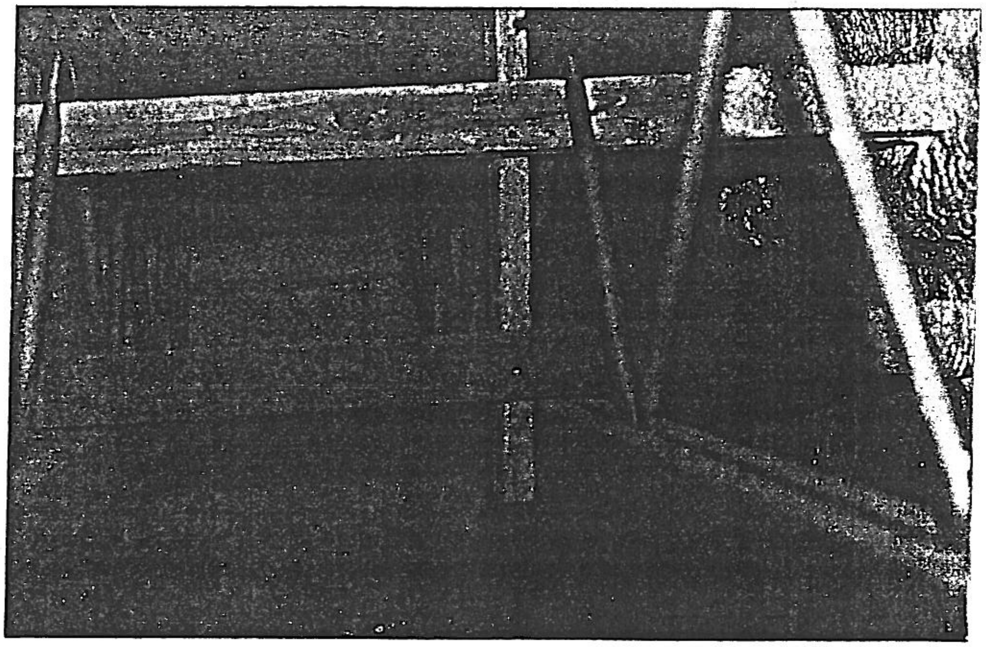


PHOTO #6: PICTURE SHOWS FLOOR TRUSSES AND INSULATED FOUNDATION WALL INSIDE THE CRAWL SPACE.

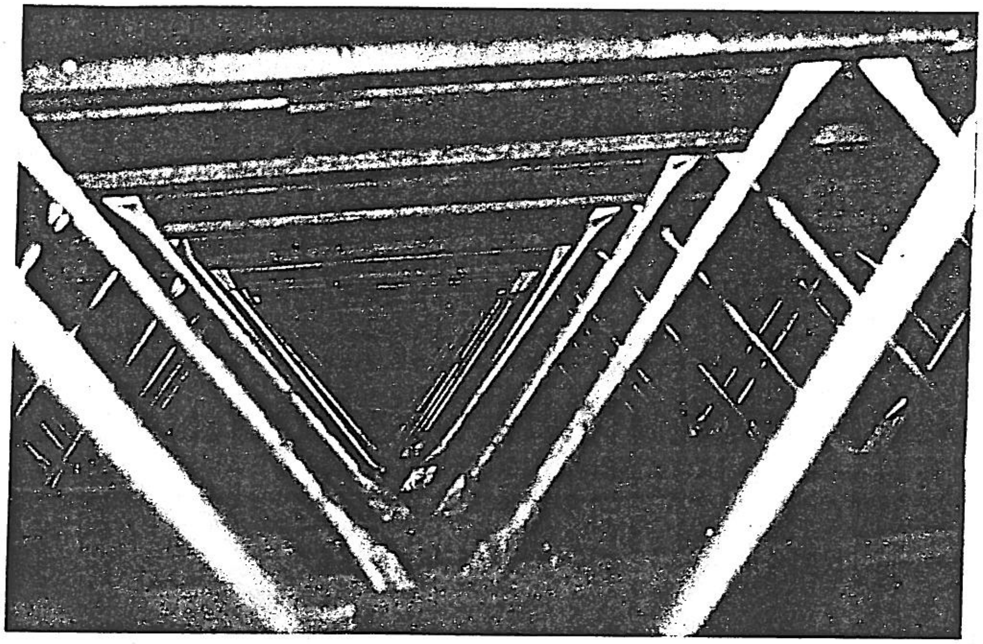


PHOTO #7: FLOOR TRUSSES LOOKING EAST SHOWING TOP AND BOTTOM CHORDS.

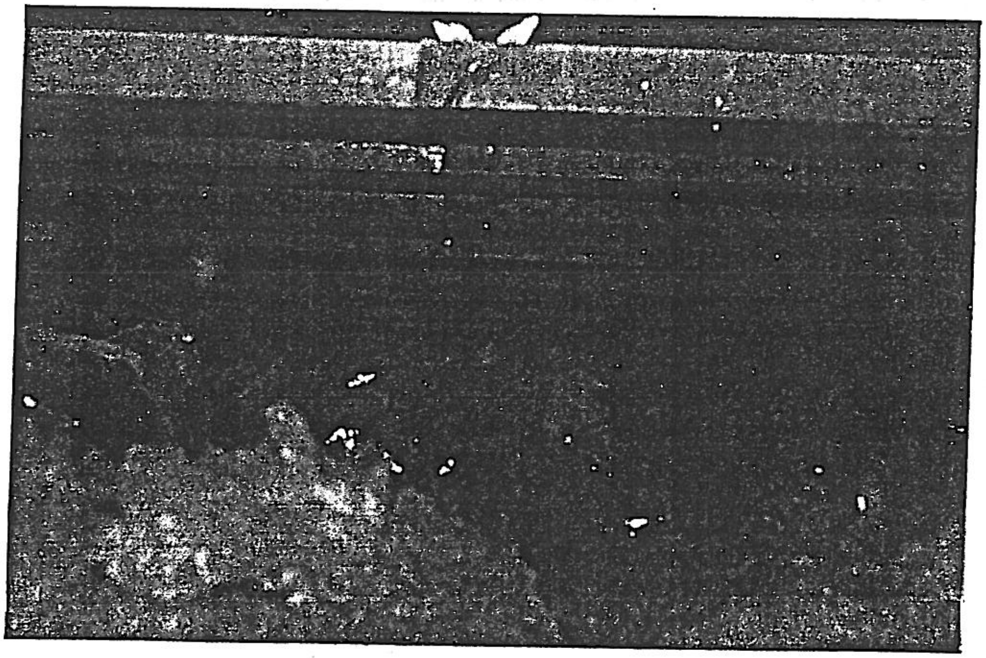


PHOTO #8: BOTTOM CHORD OF FLOOR TRUSSES SHOWING INSULATION LYING ON TOP OF VISQUEEN WHICH IS COVERING THE GROUND IN THE CRAWL SPACE.

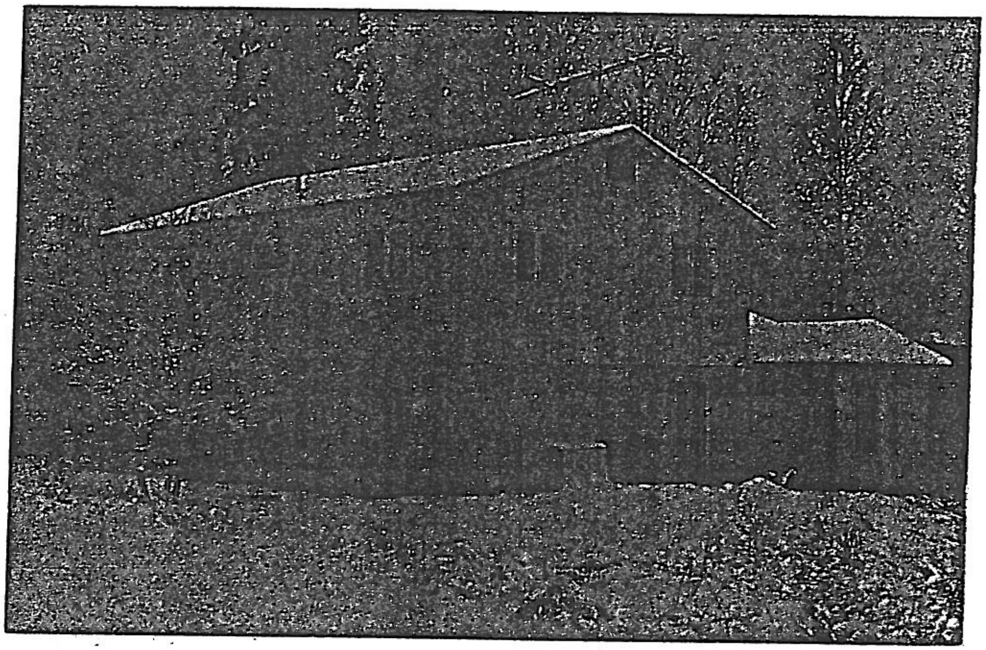


PHOTO #9: LOOKING SOUTHWEST.

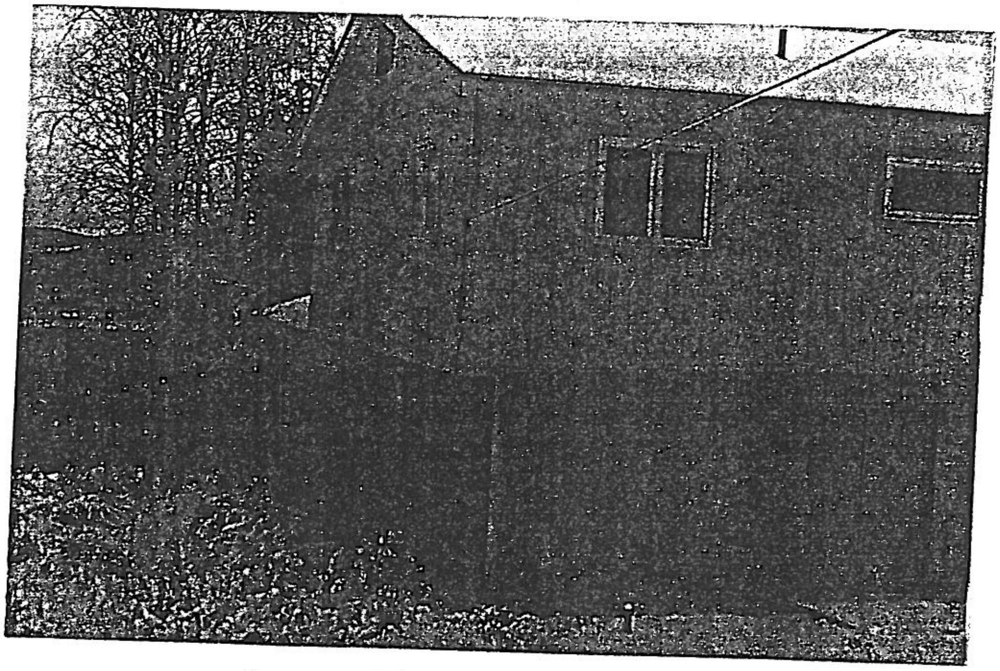


PHOTO #10: LOOKING NORTHWEST.

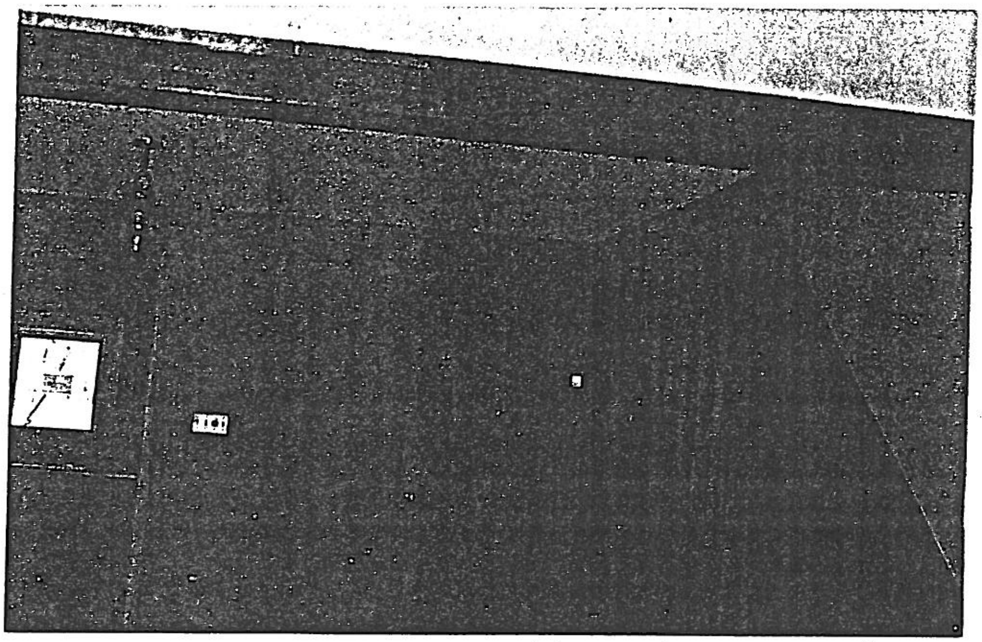


PHOTO #11: LOOKING EAST INTO KITCHEN. NOTE TWO GLULAM BEAMS.

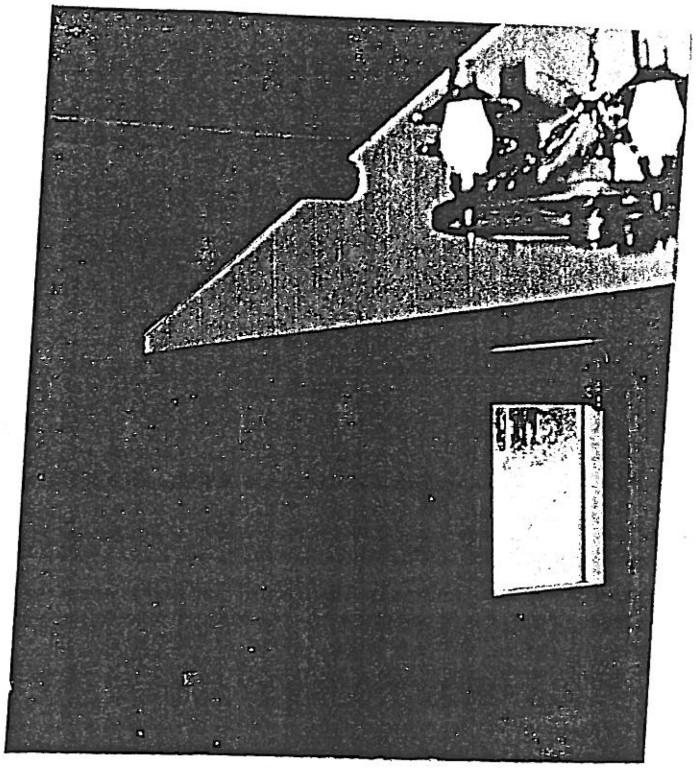


PHOTO #12: LOOKING N.E. FROM THE LIVING ROOM. NOTE LOG WALLS, LOG PURLIN AND GLULAM BEAM.

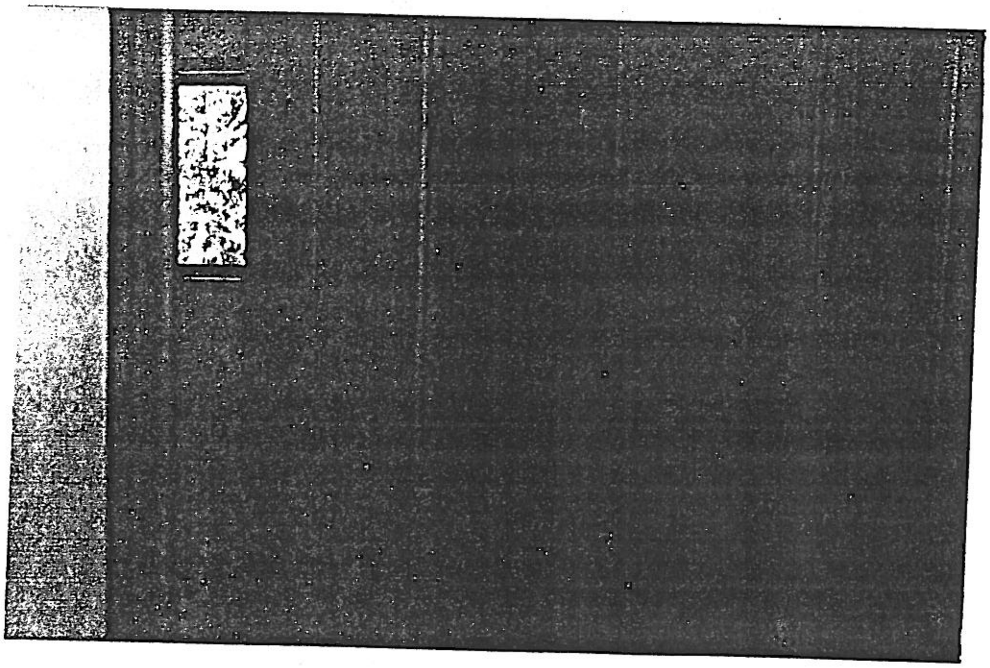


PHOTO #13: PICTURE TAKEN IN THE UPSTAIRS HALLWAY LOOKING NORTH.