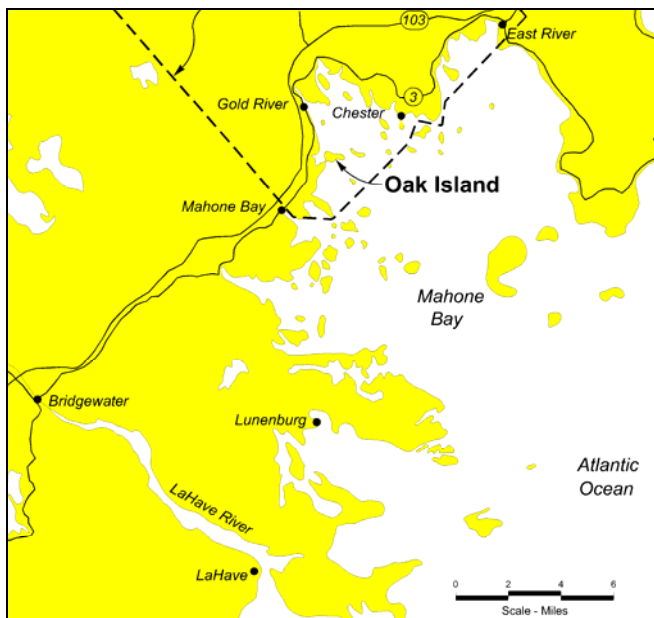
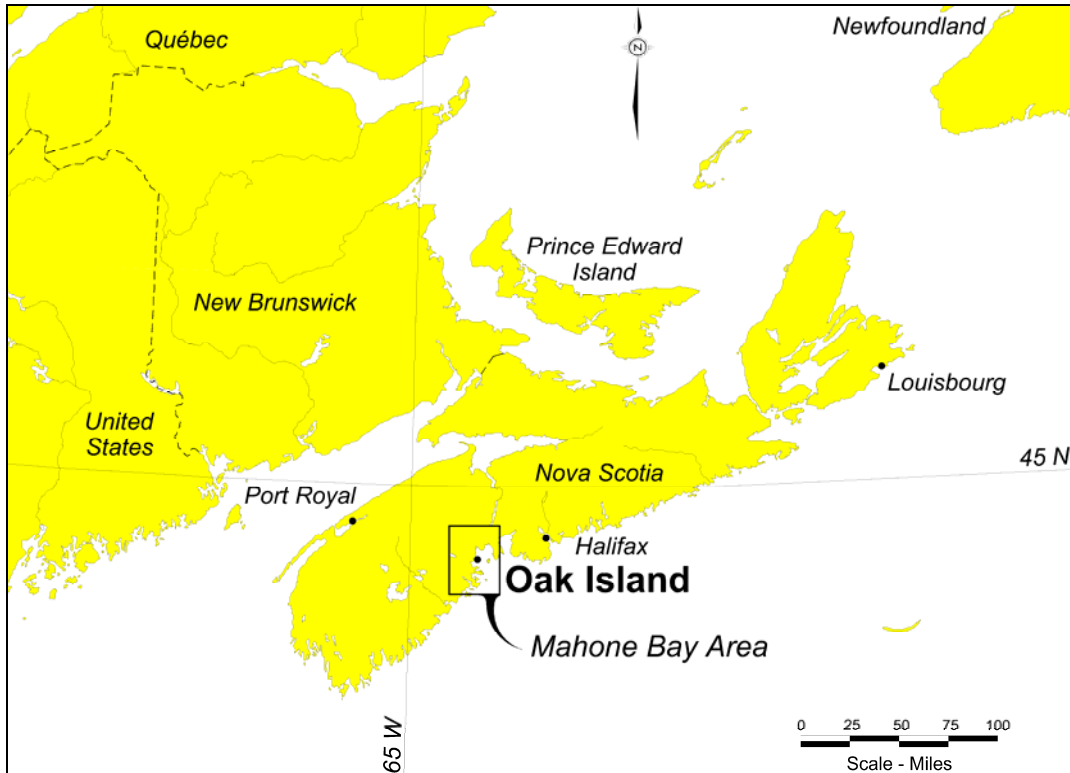


# THE MONEY PIT

## OAK ISLAND, NOVA SCOTIA

### SUMMARY OF GEOTECHNICAL AND ARCHAEOLOGICAL CONDITIONS AND THE 1967 BECKER DRILLING RESULTS



## TECHNICAL REPORT

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## 1. INTRODUCTION

Oak Island is located about 40 miles west-southwest of Halifax, Nova Scotia and is one of about 300 islands in Mahone Bay. The island is situated close to the western shore of Mahone Bay and is connected to the mainland by a 500 foot long causeway constructed in 1965. Oak Island has been the subject of an unsuccessful search for treasure over the past 210 years, although tantalizing clues have been found.

The main purpose of this report is to provide a summary of geotechnical conditions from a depth of 0 to 200 feet, and a summary of archaeological conditions encountered from a depth of about 155 to 200 feet, in the area of the Money Pit which has been the main focus for the treasure hunt. This summary applies to data collected since 1967 and is illustrated with scale drawings incorporating relevant geotechnical data and available archaeological information. The writer is not aware of a similar compilation of such information. Therefore, this report will be of use to researchers of the Oak Island mystery and parties interested in further investigation (or deep excavation) at the Money Pit.

Another purpose of this report is to better document the results of the Becker Drilling Program carried out at the Money Pit area in 1967. In this regard, there is no formal report on the Becker Drilling Program other than notes on the drilling results. Other recent drilling investigations are reasonably well documented in the relevant reports listed in the references.

It is assumed that the reader of this report already has an understanding of the general background to the Oak Island mystery and the various theories put forward to explain the mystery. Reference can be made to books such as *The Secret Treasure of Oak Island* by D'Arcy O'Connor (2004) or *Oak Island and Its Lost Treasure (Second Edition)* by Graham Harris and Les MacPhie (2005) for a detailed account of the Oak Island story.

## 2. BACKGROUND

The Money Pit at the east end of Oak Island was reportedly discovered in 1795. Early investigations at the Money Pit, carried out by Searchers from 1795 to 1966 (some 40 to 210 years ago), extended to depths of up to 165 feet below original ground surface (as explained later in section 3.2 this is equivalent to 155 feet below existing ground surface). This depth corresponds to the approximate contact between glacial till overburden and anhydrite bedrock in the area of the Money Pit. Therefore, the early

investigations were limited to the glacial till overburden and did not extend below the rock surface. These early investigations found man-made workings, artifacts and evidence suggestive of treasure but no recovery of treasure was reported. The evidence of treasure included inferred treasure chests at about 90 and 150 feet depth (below existing ground surface) based on drilling operations in 1849 and 1897, respectively. The inferred chests at 90 feet dropped some tens of feet during recovery attempts in 1861 due to collapse of the supporting platform. Subsequent shaft excavation to depths of up to 155 feet, such as the Chappell shaft in 1931 and the Hedden shaft in 1937, including lateral drilling from the shafts, found no evidence of the presumed treasure chests.

More recent investigations carried out at the Money Pit since 1967 provide the first evidence for the presence of man made workings in rock at a depth of about 190 to 200 feet below existing ground surface. Since previous Searchers did not excavate below 155 feet, the evidence of man-made workings at 190 to 200 feet depth can be reasonably attributed to the Original Depositors. Some of the more compelling evidence of these original workings was collected in the presence of individuals who are still involved in the project.

Figure 1 at the end of this report shows a plan view of Oak Island and Photo 1 is an air photo of the area taken in 1992. Figure 2 shows the main surface features at the east end of the island where the Money Pit is located. Photo 2 shows three of the main features at the east end of the island which are the Money Pit, Hole 10X and Smith's Cove. There is considerable historical and archaeological information available in each of these areas. However, the focus of this report is the Money Pit area.

### **3. SUMMARY OF GEOTECHNICAL CONDITIONS**

#### **3.1 General**

Geotechnical data in the area of the Money Pit has been obtained in four previous investigations:

1. Becker Drilling 1967
2. Warnock Hersey 1969
3. Golder Associates 1970/71
4. Oak Island Detection Program 1992/94

The locations of the Becker holes are shown on Figure 6 and these holes gave only general stratigraphy information. However, as discussed in Section 4, the Becker holes gave considerable archaeological information.

The results of the Becker Drilling Program are given in the Appendices to this report. Appendix A includes a copy of the notes recorded during the Becker Drilling Program. Appendix B includes an explanation of drilling procedures to facilitate interpretation of the Becker Drilling Program together with a tabulation of the drilling results. Appendix C includes a brochure for the Becker Drill.

The most relevant geotechnical data in the area of the Money Pit was recovered during the investigations by Warnock Hersey and Golder Associates. Some limited geotechnical information was obtained during the Oak Island Detection Program. The locations of the boreholes put down during these three investigations are shown on Figure 3.

Hole locations shown on the figures were determined by scaling to known features from plan drawings for the various investigations. In some cases dimensions were available for groups of holes. The hole locations were then plotted on a local grid referenced to the existing 6 inch diameter casing at Hole B24/W8. This location was arbitrarily assigned coordinates 1000 feet North and 4000 feet East. True north was determined with reference to a survey line established in 1999 by Ron Aston, a land surveyor from North Carolina. This survey line was set out from a bearing on the North Star. The hole locations and the true north orientation shown on the figures are considered to be reasonably accurate.

### **3.2 Stratigraphy at Money Pit**

The available data was used to develop detailed geotechnical sections as shown on Figures 4 and 5. The Becker Drilling results and the Oak Island Detection Program results are not shown on the sections since these holes gave only general stratigraphy information. On the other hand, the geotechnical investigations by Warnock Hersey and Golder Associates in the area of the Money Pit are well documented (Warnock Hersey 1969a and b; Golder 1971).

The depths referred to on the sections, and generally throughout this report, are with respect to existing ground surface in the area of the Money Pit for consistency with recent documentation over the past 40 years. Before the massive excavation carried out in 1966, ground surface in the immediate area of the Money Pit was about 10 feet higher than existing ground surface. Therefore, reported depths at the Money Pit prior to 1966 are about 10 feet greater than depths used in this report. The effects of the excavation

in 1966 resulted in the immediate Money Pit area being in a depression as illustrated on Photo 9. The sections on Figures 4 and 5 also refer to a Geodetic elevation scale. The local elevations for the Warnock Hersey and Golder holes were converted to approximate Geodetic elevation. The Becker holes and the detection holes were assumed to be at the same Geodetic elevation.

The subsurface profile at the Money Pit, beyond the previously disturbed zones, consists of about 155 feet of dense glacial till with boulders underlain by anhydrite bedrock. The till overburden consists of an upper low permeability clayey till with frequent boulders underlain by discontinuous fine grained interglacial deposits and a lower till layer which becomes more silty and sandy with depth. The anhydrite layer from about 155 to 200 feet has frequent soil infillings, some of which are associated with cavities or loose soil zones. This complex profile is considered to result from glacial action giving a geological condition consisting of either disturbed anhydrite bedrock with soil infillings or huge anhydrite boulders in a soil matrix. There are more frequent soil filled zones over the depth range of about 175 to 200 feet. In any event, from a geotechnical standpoint, this zone consists of broken anhydrite with soil infillings. Below about 200 feet the anhydrite bedrock is reasonably competent.

There has been considerable past disturbance to the overburden in the area of the Money Pit due to numerous shafts and the Dunfield excavation in 1966. Also there are numerous timbers and drill pipes remaining in the ground at the Money Pit.

The above stratigraphy description gives only a summary and reference should be made to the specific reports for details.

### **3.3 Oak Island Detection Program**

The Oak Island Detection Program involved drilling of five holes to about 250 feet depth at distances of about 20 to 40 feet from the center of the Money Pit area for the purpose of down hole and cross hole geophysical surveys. The locations of the five holes numbered 93-01 to 93-05 are shown on Figure 3 and are illustrated on Photo 8. These holes were advanced using rotary drilling techniques and a general description of the soil profile encountered is given in notes by Dan Blankenship (Oak Island Exploration 1993). The observations made during drilling suggested the presence of soil filled zones in the rock at about the same depth range as that defined in the more detailed sampling program carried out in the Warnock Hersey and Golder holes.

An important component of the detection drilling program was the measurement of lateral drift in the five detection holes and in Hole W8. These measurements were made in a permanent plastic casing installed in each of the five holes and in a steel casing

installed in Hole W8. The white casings installed in the detection holes can be seen in Photos 7, 8 and 9. The results of the lateral drift measurements are shown on Figure 7 as a plot in plan of the track of the hole. The holes were intended to be vertical but significant lateral drift occurred. Two of the five detection holes (93-03 and 93-05) were 17 and 15 feet out of plumb at depths of 260 and 225 feet respectively. The remaining three detection holes were less than six feet out of plumb at a depth of about 240 feet. Hole W8 had a lateral drift of 15 feet at a depth of 190 feet. It is difficult to avoid lateral drift when rotary drilling is used through the type of subsurface conditions and obstructions that occur in the area of the Money Pit. Three of the six holes measured had a lateral drift of 15 to 17 feet.

#### **4. SUMMARY OF ARCHAEOLOGICAL CONDITIONS**

Many archaeological discoveries have been made at Oak Island over the years. However, as discussed earlier, this report is focused on the key evidence and related interpretation of archaeological conditions defined below 155 feet depth in the area of the Money Pit during investigations since 1967.

Figure 7 shows a plan view of the exploration holes put down in the area of the Money Pit. The archaeological conditions at the Money Pit are illustrated on the sections on Figures 8 and 9. Part 1 of Figures 8 and 9 show the archaeological sections to scale from ground surface to a depth of some 240 feet. The holes are shown to follow the intended vertical or inclined direction of drilling. The lateral drift of these holes was not measured and thus the actual track of the holes is not known. The holes are closely spaced particularly as shown on Section D-D (Part 1) on Figure 9.

The key evidence from the individual holes where archaeological information was encountered is described below starting with the Becker Drilling Program. Commentary on the archaeological evidence is given in Section 5.

##### **4.1 Becker Drilling 1967**

This program was carried out between January and June 1967. The results of this drilling provided the first evidence of man-made workings within the rock at 190 to 200 feet depth and well below the maximum depth of about 155 feet reached by previous Searchers.

The Becker drilling program involved 49 holes, 40 of which were put down in the area of the Money Pit at the locations shown on Figure 6. Out of the 40 holes in the Money Pit area, 23 holes extended to greater depth (about 200 feet) and nine of these encountered



anomalies which have been classified as archaeological features. The various anomalies encountered in the nine holes are described below.

1. Hole B11

This hole was advanced to its full depth of 200 feet with Becker casing. Wood was encountered at 168 feet. Uniform clay (likely puddled clay - see Item 2 below) was encountered from 184 to 200 feet. Two oak buds were found embedded in a clay sample recovered from 196 feet depth. Since the hole was advanced with Becker casing, the depth of 196 feet recorded for the clay sample containing the oak buds is considered reliable.

2. Hole B13

This hole was advanced to its full depth of 202 feet with Becker casing. The hole is located four feet north of Hole B11 and encountered clay from 184 to 200 feet. Based on examination of recovered samples, the clay was found to contain coarser pebble sizes at regular intervals of about 18 inches. The clay was inferred to have been placed in 18-inch thick layers as "puddled clay". This is a man-made type of clay placed as a slurry and allowed to settle which explains the coarser sizes at the bottom of each layer. Although not normally used in present times, for many centuries this was a common method of placing clay to form a water seal.

3. Hole B14 (Inclined to Northeast)

This hole was inclined and was advanced to its full depth of 202 feet with Becker casing. Clay (likely puddled clay) was encountered from 184 to 200 feet.

4. Hole B17 (Inclined to Northeast)

This hole was inclined and was advanced for its full depth of 201 feet with Becker casing. Clay (likely puddled clay) was encountered from 176 to 198 feet. This clay layer was encountered in the same general area as in Hole B14.

5. Hole B21 (Inclined to Northeast)

This hole was inclined and was advanced to its full depth of 206 feet using Becker casing. At 176 feet depth, a piece of slightly crumpled brass foil was recovered. On first recovery, the brass had a bright shiny appearance and quickly turned a dark color due to oxidation. It appeared as if the brass had been torn from a larger piece of brass in the ground. A clay layer (puddled clay) was then encountered from 176 to 192 feet depth. This clay layer was encountered in the same area as in Holes B14 and B17. Stagnant water and evidence of a possible cavity were found from 200 to 206 feet depth.

The piece of brass was about three inches in size and it was apparent that the brass was distorted by the bit on the advancing casing. Considering the size and shape of the brass, it is possible that it was dragged downward by the drill bit on the Becker casing before it reported to the surface. The stratigraphy from 0 to 176 feet was defined as overburden and disturbed ground, therefore, the brass may have come from a higher level than 176 feet.

The brass was analyzed and was reported to contain much higher levels of impurities than found in modern brass. In the opinion of one expert, the brass may have been manufactured before the middle of the nineteenth century (Stelco 1970). Photo 12 shows the recovered piece of brass.

6. Hole B24

This hole encountered one of the more interesting conditions found during the Becker drilling program. The Becker casing was advanced to rock surface at a depth of 146 feet and the hole was advanced through rock from 160 to 192 feet using the tricone bit. At a depth of 192 feet, after penetrating 32 feet of continuous rock, a sequence of 4 inches of wood, 12 inches of clay, 4 inches of wood and then a six-foot cavity was found. Since the wall of the hole was in continuous rock from the bottom of the Becker casing to 192 feet depth, it is concluded that the wood sample came from 192 feet depth even though the tricone bit was used in this section of the hole. A sample of the wood from 192 feet depth was carbon dated to 1575, plus or minus 85 years. The hole was extended from 199 to 207 feet and rock was inferred over this depth but details were not reported.

7. Hole B25

This hole, located 17 feet northwest of Hole B24, was advanced to rock surface at a depth of 146 feet with Becker casing and the hole was advanced through rock from 146 to 191 feet depth using the tricone bit. At 191 feet, after penetrating 45 feet of continuous rock, a 7-foot cavity extending to 198 feet was encountered. A hard obstruction encountered at the base of the cavity could not be penetrated using the tricone bit. Core drilling of the obstruction was carried out using a diamond bit and it was inferred that a ½ inch thickness of iron was penetrated with the diamond drill bit. The inference for the presence of the iron was based on the unique sound of a diamond drill bit on metal and the breakthrough of the bit after a ½ inch penetration. The piece of drilled iron was not recovered and the hole could not be advanced through the iron obstruction.

8. Hole B33

This hole, located 7 feet south of Hole B24, was advanced to rock surface at 152

feet using Becker casing and the hole was advanced through rock from 152 to 190 feet depth using the tricone bit. Clay was found from 190 to 192 feet and then a layer of wood was encountered at 192 feet depth. The hole was then advanced through a partial cavity containing soil and fragments of what appeared to be crude lime mortar. Rock was encountered at 198 feet.

9. Hole B35

This hole was advanced to rock surface at 160 feet using Becker casing and was then advanced through rock from 160 to 181 feet using the tricone bit. At 181 feet, six to eight inches of wood was encountered followed by a partial cavity from 181 to 192 feet depth where charcoal and clinker were recovered during tricone drilling. An attempt was made to advance the Becker casing to the partial cavity, including down hole blasting, but this was unsuccessful and the hole was terminated.

#### **4.2 Warnock Hersey 1969**

The Warnock Hersey program involved drilling of six holes (W1, W2, W3, W4, W5 and W7) from May to August 1969 and three holes (W8, W9 and W10) in October and November 1969. Four of the nine holes (W1, W3, W6, and W10) were put down outside the immediate area of the Money Pit (see Figure 3). Five of the nine holes (W2, W5, W7, W8 and W9) were put down in the area of the Money Pit (see Figure 7).

The significant archaeological findings in the Warnock Hersey holes are as follows:

1. Hole W8

This hole was put down at the same location as Becker Hole B24 in an attempt to intersect the wood and cavity encountered from 192 to 199 feet in Hole B24. Hole W8 was advanced to 165 feet by rotary drilling and then a six-inch diameter steel casing was installed to this depth. The hole was then advanced by core drilling with a core barrel to 200.5 feet depth. Boulders were encountered from about 165 to 168 feet depth and then loose soil was encountered to 200.5 feet where the hole was terminated without reaching rock. Therefore, Hole W8 missed the interesting features found in Hole B24. The six-inch casing extending to 165 feet was left in Hole W8 and a plastic pipe was installed to the bottom of hole.

The inclination and orientation of Hole W8 was measured in 1993 in conjunction with the 1992/94 detection program referred to below, and this hole was found to be out of plumb to the north-northwest by about 15 feet at a depth of 190 feet (see Figure 7). The 6 inch steel casing at Hole W8 is still in place. It is recalled

that this is the same location as Becker hole B24. This location, identified as Hole B24/W8, can be seen in Photo 7.

2. Hole W9

This hole encountered wood from about 192 to 196 feet depth. Over this depth the hole was advanced using a six-inch diameter rotary drill bit attached to a 22 foot long and three-inch diameter core barrel. Although no core was recovered, a considerable amount of wood chips was returned to the surface. The drill may have run along the side of the wood or the drill may have penetrated solid wood. From 200 to 206 feet, a possible cavity was encountered. Stagnant water and traces of clay were returned to surface over this depth and there was very little resistance to advance of the tricone bit. The hole was extended from 206 to 219 feet, over which depth bedrock was encountered.

#### **4.3 Golder Associates 1970/71**

The Golder drilling program was carried out from March to June 1970 and their report was issued in April 1971. The program involved eight deep holes (G101 to G104 and G201 to G204), only two of which (G102 and G103) were put down in the immediate area of the Money Pit (see Figures 3 and 7 for hole locations).

One significant archaeological finding in the Money Pit area occurred in Hole G103 put down through the Hedden Shaft. At a depth of about 192 to 198 feet, two recovered split spoon soil samples subject to pollen count analysis indicated that the soil consisted mainly of recent soil from the surface (Ritchie 1971). This finding suggests that this zone consists of soil backfill placed by the Original Depositors.

#### **4.4 Oak Island Detection Program 1992/94**

The Oak Island Detection Program involved extensive state of the art down hole and cross hole geophysical studies carried out over the interval from 1992 to 1994. The drilling program and the geophysical studies did not reveal specific archaeological features.

## **5. COMMENTARY ON ARCHAEOLOGICAL EVIDENCE**

Based on the information and evidence described in Sections 3 and 4, the data plotted on Figures 6 to 10 and the summary of archaeological features on Figure 11, the following comments are made with respect to interpretation of the archaeological evidence.

### **5.1 Lateral Drift of Holes**

Interpretation of the archaeological evidence from adjacent holes, or groups of holes, has to take into consideration that the holes could have been subject to varying amounts of lateral drift. Since the lateral drift of the holes, except for Hole W8, was not measured, the sections on Figures 8 and 9 illustrate the holes as being perfectly linear in the direction in which the holes were started (mostly vertical with some inclined holes). However, it is known from lateral drift measurements made in 1993 that significant drift can occur during drilling such that the bottom of a 200-foot deep hole could be several to some 20 feet off the intended alignment in any direction. Therefore, considering the spacing of the holes at ground surface (generally 3 to 10 feet) with respect to the possible magnitude of lateral drift at 200 feet depth, it is certainly conceivable that the actual alignment of the holes results in a complex pattern of lines crossing over each other, particular at greater depth. For this reason, it is not possible to make an accurate interpretation of the plan arrangement of the various features defined at 200 feet depth in the holes.

The above discussion of lateral drift measurement in the exploration holes illustrates the importance of considering this issue during interpretation of previous drilling results and the necessity of making accurate lateral drift measurements for any future drilling programs.

### **5.2 Accuracy of Depth Measurements in Holes**

The accuracy of the depth at which archaeological features were encountered in adjacent holes, or groups of holes, is important for the purpose of defining lateral continuity or connection of such features. The ground surface elevation at the Becker holes was not measured although such measurements were made for the Warnock Hersey and Golder holes. The reported depths below existing ground surface in all holes are considered to be reasonably accurate with respect to the features defined in the holes since the depths are based on length of casing or drill rods. However, the effects of uneven ground surface and lateral drift would tend to introduce a possible difference in the depth at which, for example, the same horizontal feature was found in

adjacent Becker holes.

An estimate can be made of the possible difference in depth to the same horizontal feature in different holes. With respect to uneven ground, it is likely that the variation of ground elevation at hole locations in the immediate area of the Money Pit was no more than several feet. With respect to lateral drift, a recorded depth of 200 feet in a hole with a lateral drift of 20 feet would be equivalent to a true vertical depth of 199 feet. The above factors suggest that the same horizontal surface (such as wood or iron) could have been found in the Becker holes at apparently different depths of up to several feet. As such, depths are considered to be reasonably reliable with respect to interpretation of subsurface features.

### **5.3 Deep Rock Area**

One of the important conditions identified from the Becker drilling program is the presence of a soil filled depression below the bedrock surface in the immediate area of the Money Pit. This soil filled zone, or at least part of it, is considered to represent an archaeological feature consisting of soil backfill to a shaft excavation. In this area the bedrock occurs at a depth of about 200 feet compared to a depth of about 155 feet in the area surrounding the Money Pit. This trend can be identified on Figure 10, which shows holes distinguished by depth to bedrock. There is a clear trend of deeper rock in the area of the Chappell and Hedden shafts where the Money Pit is commonly considered to be located. A notable exception to this trend occurs at Holes W2 and W9 located on the south side of the Chappell shaft where deep rock was apparently encountered. However, since it has been recorded that the Chappell shaft encountered rock at 157 feet depth, it is likely that these two holes are inclined to the north toward the deep rock area.

Taking into account the above factors, there is considered to be good definition of the south and west boundaries between deep and shallow rock. The available data suggests that the centroid of the deep rock area is located about 10 feet north of Hole B24/W8 as shown on Figure 10. Also shown on this figure is the speculated plan configuration of the deep rock area assuming it to be circular in shape and 16 feet in diameter. The speculated location of the deep rock area is essentially coincidental with some estimates of the original Money Pit location. It is noted that Holes B30 and B40, which encountered deep rock, fall slightly outside the west limit of the speculated deep rock area. Again, this could be due to lateral drift of these holes toward the deep rock area. On the north and east sides of the deep rock area, there is little evidence to verify the assumed boundary.

#### **5.4 Wood, Iron and Cavities at 190 to 200 Feet Depth**

The wood and underlying cavity found in Holes B24 and B33 provide reasonably convincing evidence of the presence of a six-foot high chamber with timber roof support. Although wood was not encountered in Hole B25, a cavity was found at the same level as those in Holes B24 and B33 and iron was inferred at the base of the cavity, suggesting the presence of a chamber. The inferred iron found in Hole B25 suggests that the iron plate may form the cover of a pit below the floor of the chamber, which would be consistent with the presence of the possible cavity, and stagnant water zone, encountered from 200 to 206 feet depth in Holes B21 and W9. Also, evidence of wood was found in Hole W9 from 192 to 196 feet depth. As can be seen from examination of Sections C-C and D-D (Part 2) on Figures 8 and 9, these features were found within a very consistent depth range. Considering a 10 to 20 foot potential for lateral drift, and the likelihood that Hole W9 drifted north, it is possible that these five holes (B21, B24, B25, B33 and W9) may be close enough at 200 feet depth to have intersected the same chamber. However, a number of possible speculations with regard to size and number of chambers could be proposed. No evidence as to the contents of the chambers has yet been obtained.

It is noted that a chamber would not be expected at the location where Hole W8 terminated (see Figures 7 and 10). It is recalled that the lateral drift of this hole was measured and that wood and cavities were not encountered within the depth range of 190 to 200 feet.

#### **5.5 Puddled Clay**

Uniform clay with coarser pebbles at a spacing of 18 inches (puddled clay) was encountered in Hole B13 from 184 to 200 feet depth and similar clay was found in Holes B11, B14, B17 and B21. The presence of relatively soft clay with layers of pebbles is not consistent with the geological history of the site. If the clay were of natural origin, such layering would be highly unlikely for soil infilling of a depression in rock in the context of the glacial environment that would have prevailed at the time of overburden deposition more than 10,000 years ago. The layered condition of the clay, and the presence of artifacts embedded in the clay (see following section), is strong evidence to indicate that the clay is a man-made deposit. In Hole B21, the presence of a possible cavity and stagnant water below a man-made puddled clay is consistent with application of a clay seal over a chamber.

## **5.6 Artifacts**

Two oak buds were found embedded in recovered samples of the clay in Hole B11 at 196 feet depth. It is also likely that the piece of brass foil recovered from 176 feet depth or higher in Hole B21 was embedded in clay. A piece of blue and white china was found below 180 feet depth in Hole B24. Wood was found in several holes, iron was inferred in Hole B25 at 198 feet depth and pieces of charcoal and clinker were found in Hole B35 below 181 feet depth. Pieces of crude lime mortar (referred to as cement in the Oak Island context) were found in Hole B33 below the wood intersected at 192 feet depth. These artifacts are considered to be evidence of man-made workings in the lower reaches of the Money Pit.

## **6. CLOSURE**

This document has been compiled with the objective of providing information to parties interested in seeking the eventual solution to the Oak Island Mystery.

Les MacPhie



## REFERENCES

Becker Drilling (Alberta) Limited, 1967. *Drilling of 40 Holes put down in the Area of the Money Pit and 9 Other Holes, January to June 1967*. (The results of the drilling were recorded by Dan Blankenship, 1967, in the notes listed below.)

- Notes by Dan Blankenship on Drilling Done by Becker Starting January 1967 Holes B1 to B15, B15A and B16 to B48 (4 pages)
- Letter by Dan Blankenship in 1967 to The Cementation Company (Canada) Limited, Brief Results of Holes B1 to B15, B15A, B16 to B42 and B45 (3 pages)
- Notes by Dan Blankenship in 1967 on Selected Becker Holes (1 page)

Golder Associates, 1971. *Subsurface Investigation, The Oak Island Exploration, Oak Island, Nova Scotia*. Draft Report No. 69126 to Triton Alliance Ltd., Montreal, Quebec, April 28, 1971.

Oak Island Exploration Company, 1993. *Memorandum by Dan Blankenship, December 10, 1993*. (Note: Drilling Report for Five Holes Numbered 93-01 to 93-05 in Money Pit Area in Preparation for Detection Program.)

Ritchie, J. C., Professor of Biology, 1970. Report on Palynological Analyses of Four (4) Samples from The Oak Island Exploration. Dalhousie University Project 69126, May 25, 1970.

Stelco (The Steel Company of Canada), Hamilton, Ontario 1970. Letter Report to The Oak Island Exploration by Allan B. Dove, Senior Development Metallurgist, dated August 18, 1970.

Warnock Hersey International Limited, Dartmouth, Nova Scotia, 1969a. *Soils Investigation, Oak Island, Nova Scotia (Boreholes 1, 2, 3, and 6)*. Report No. 530-110 to Carr & Donald & Associates, Toronto, Ontario, July 31, 1969. (Note: The initial Report was followed by the five relevant documents listed below. These documents are appended to the Report.)

- Warnock Hersey International Limited, Dartmouth, Nova Scotia, 1969b. *Letter dated August 27, 1969*. (This letter transmitted the logs for Boreholes 5 and 7.)
- Warnock Hersey International Limited, Dartmouth, Nova Scotia, 1969c. *Letter dated October 22, 1969*. (This is a follow up description of varved strata encountered in the boreholes)

- Warnock Hersey International Limited, Dartmouth, Nova Scotia, 1969d. *Letter dated November 5, 1969.* (This letter transmitted the descriptive results of Boreholes 8, 9 and 10.)
- Blankenship, Dan, 1969. *Memorandum dated November 29, 1969.* (This memorandum gives descriptive results of Boreholes 8, 9 and 10.)
- Osler, John C., 1970. *Letter dated June 3, 1970.* (This document is a report on diamond consumption by Warnock Hersey.)

## **PHOTOS**

- Photo 1 Aerial photo of Oak Island and vicinity 1992
- Photo 2 Aerial view of east end of Oak Island 1986
- Photo 3 Causeway to Oak Island 1998
- Photo 4 South Shore looking west from flooded pit where former stone triangle was located 1998
- Photo 5 Smith's Cove looking east from Hole 10X area 1999
- Photo 6 Smith's Cove looking west-northwest toward Hole 10x at building 1998
- Photo 7 Money Pit (enclosed by fence) looking northeast toward Hole 10X 1998  
(Note six inch steel casing at Hole B24/W8)
- Photo 8 Money Pit (enclosed by fence) looking southwest 1998  
(Note five detection holes drilled in 1993)
- Photo 9 Money Pit (enclosed by fence) looking west toward Hole 10X 1998
- Photo 10 Les MacPhie (left) and Graham Harris at Money Pit 1998  
(Note six inch steel casing at Hole B24/W8 at lower left of photo)
- Photo 11 Becker Drill at Money Pit, remnants of Hedden Shaft at right 1967
- Photo 12 Piece of brass from 176 feet or higher in Hole B21



Photo 1 Aerial photo of Oak Island and vicinity 1992



Photo 2 Aerial view of east end of Oak Island 1986





Photo 3 Causeway to Oak Island 1998



Photo 4 South Shore looking west from flooded pit where former stone triangle was located 1998





Photo 5 Smith's Cove looking east from Hole 10X area 1999



Photo 6 Smith's Cove looking west-northwest toward Hole 10x at building 1998



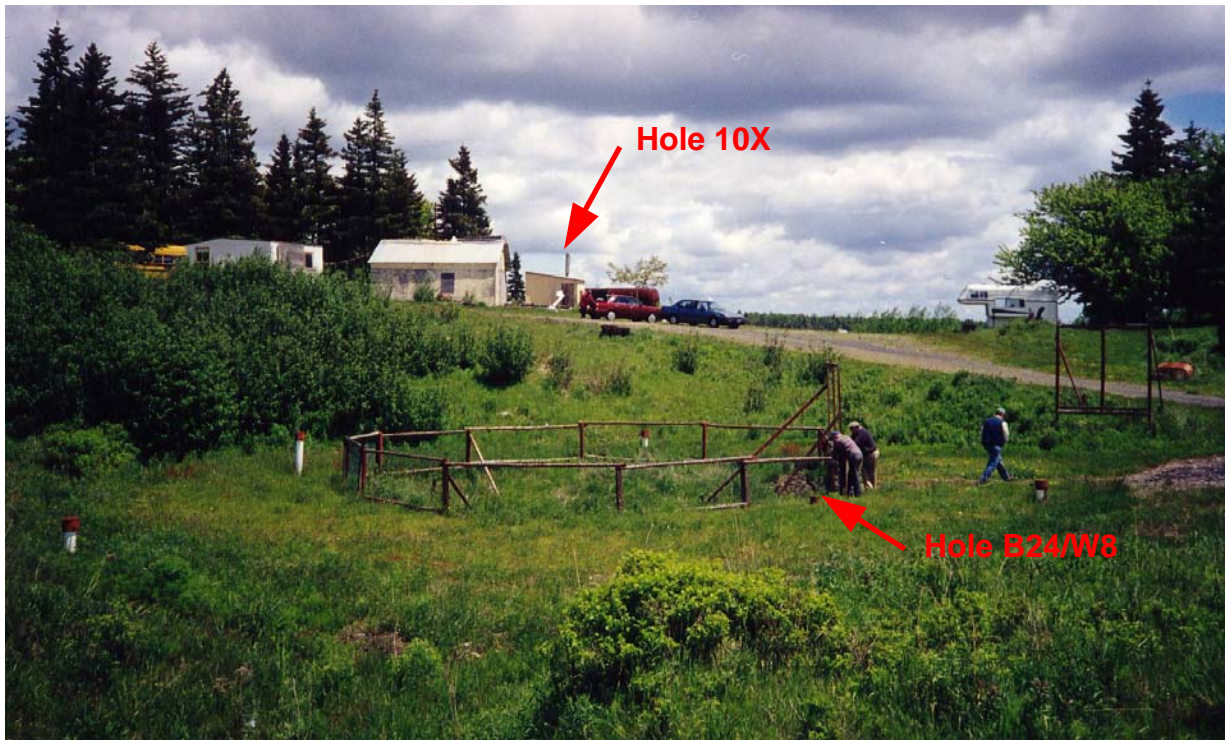


Photo 7 Money Pit (enclosed by fence) looking northeast toward Hole 10X 1998  
(Note six inch steel casing at Hole B24/W8)

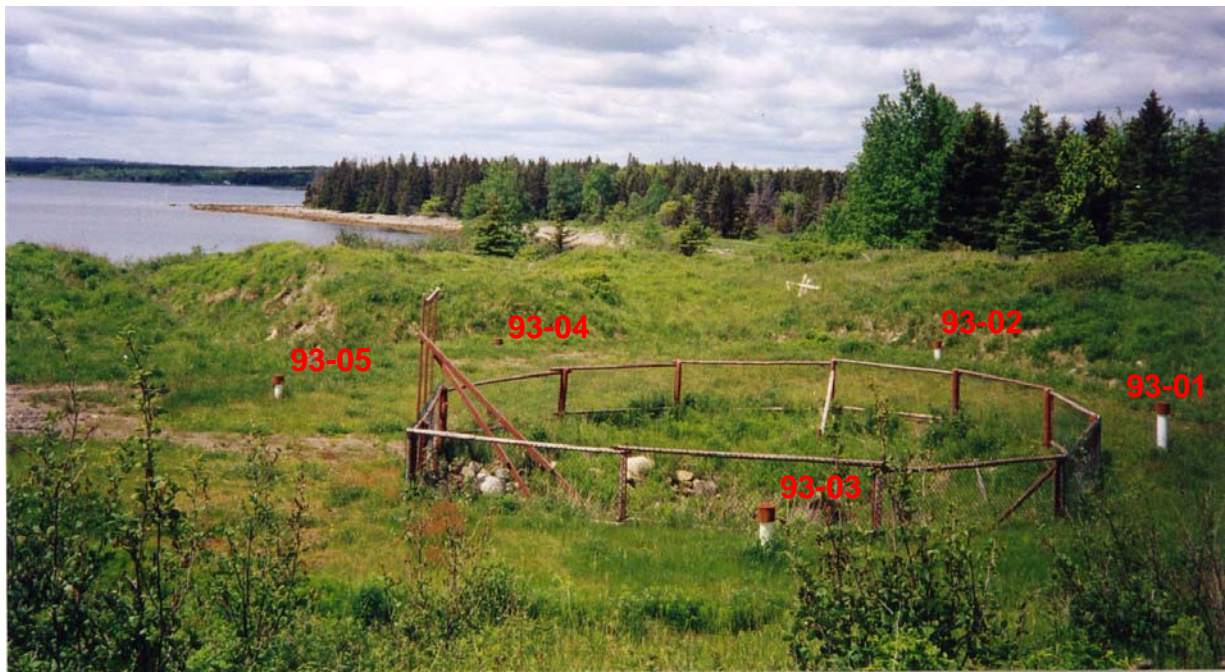


Photo 8 Money Pit (enclosed by fence) looking southwest 1998  
(Note five detection holes drilled in 1993)





Photo 9 Money Pit (enclosed by fence) looking west 1998



Photo 10 Les MacPhie (left) and Graham Harris at Money Pit 1998  
(Note six inch steel casing at Hole B24/W8 at lower left of photo)





Photo 11 Becker Drill at Money Pit, remnants of Hedden Shaft at right 1967

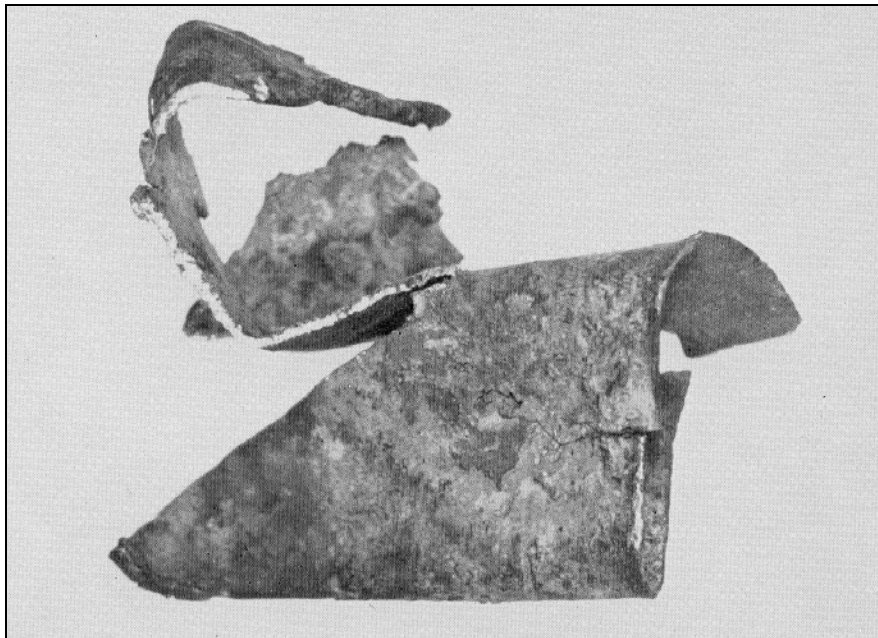
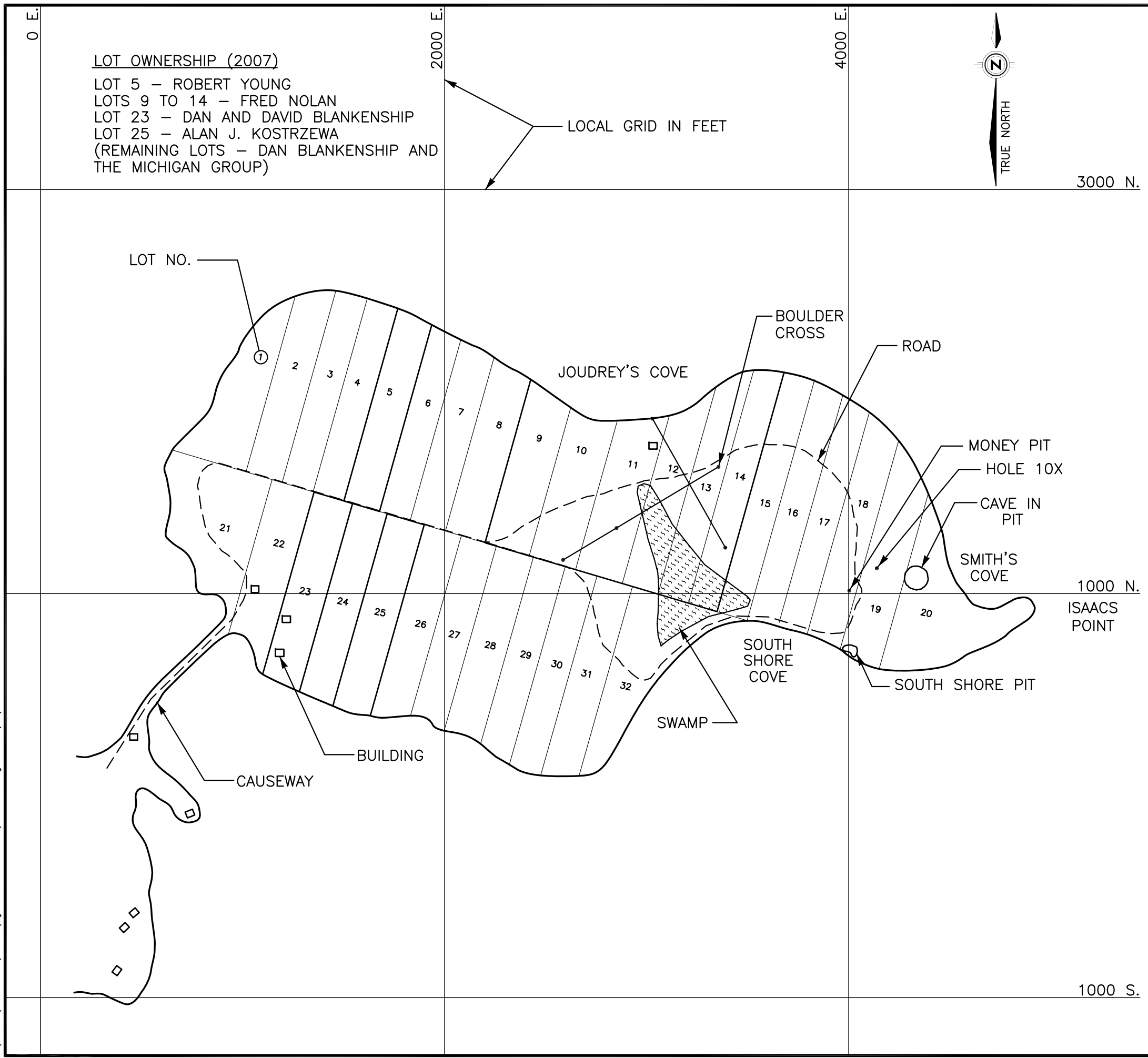


Photo 12 Piece of brass from 176 feet or higher in Hole B21

## **FIGURES**

- Figure 1 Plan of Oak Island
- Figure 2 Plan of Money Pit and Smith's Cove
- Figure 3 Plan of Exploration Holes at Money Pit and 10X
- Figure 4 Geotechnical Section A-A through Money Pit and 10X
- Figure 5 Geotechnical Section B-B through Money Pit and Dunfield Excavation
- Figure 6 Plan of Becker Holes at Money Pit
- Figure 7 Plan of Exploration Holes at Money Pit
- Figure 8 Archaeological Section C-C at Money Pit
- Figure 9 Archaeological Section D-D at Money Pit
- Figure 10 Plan of Holes Showing Depth to Rock at Money Pit
- Figure 11 Plan of Significant Archaeological Features at Money Pit



## NOTES

1. THE BOUNDARIES OF THE LOTS ARE APPROXIMATE.
2. THE LOCAL GRID IS REFERENCED TO THE EXISTING 6 INCH DIAMETER STEEL CASING AT HOLE B24/W8 BESIDE THE MONEY PIT. THIS POINT HAS BEEN ASSIGNED COORDINATES 1000 N AND 4000 E.

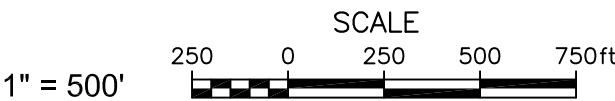
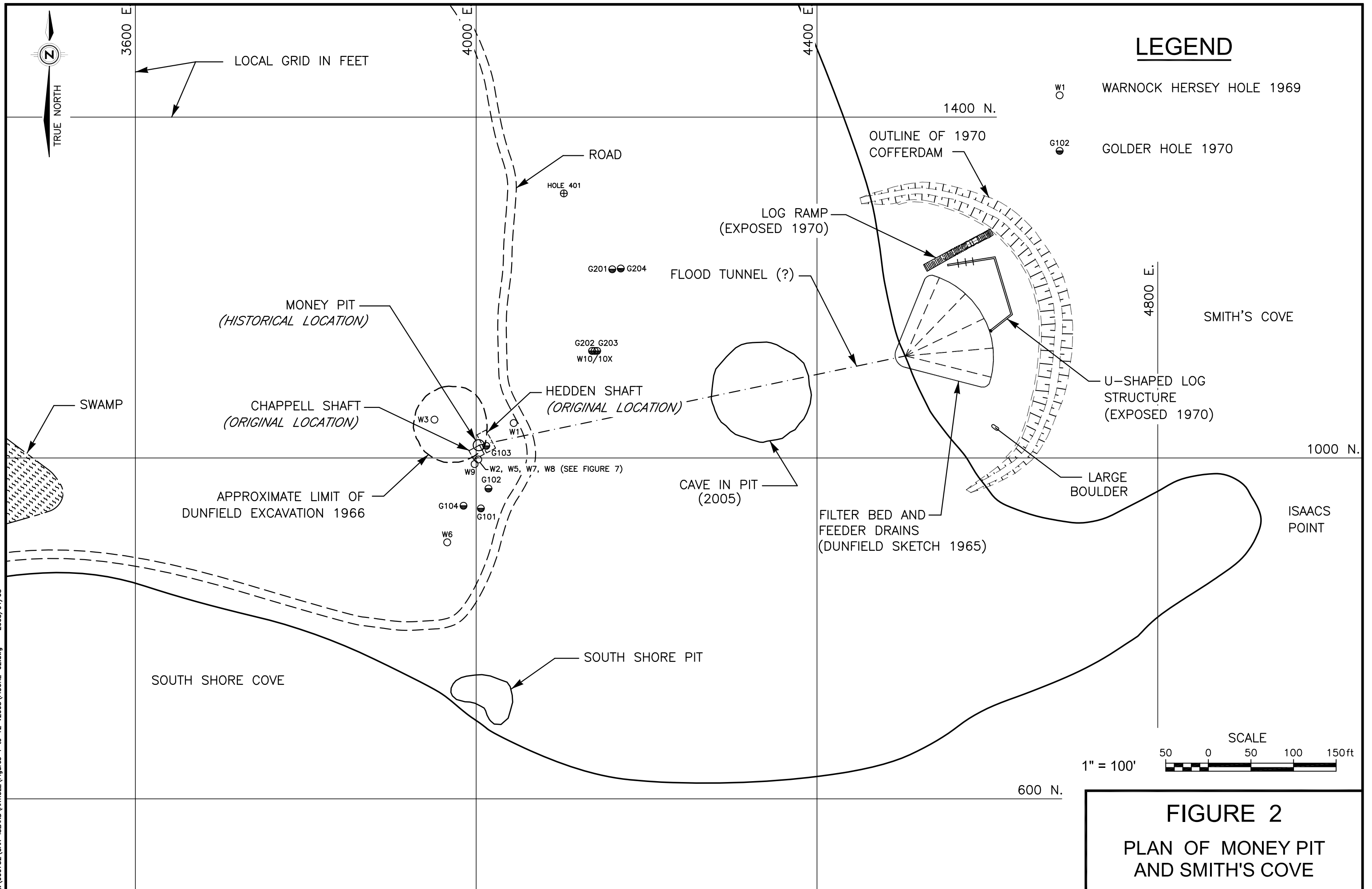
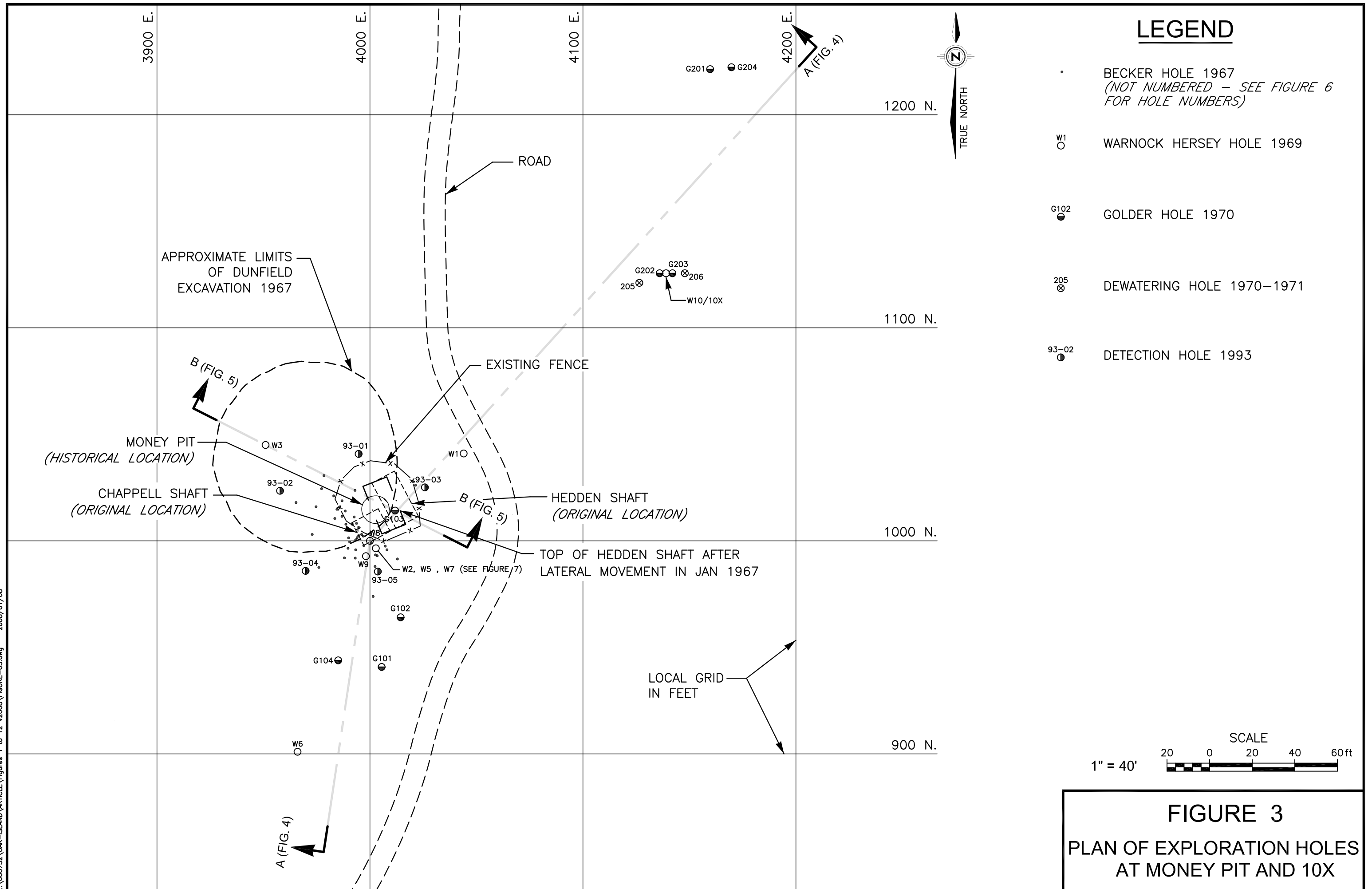
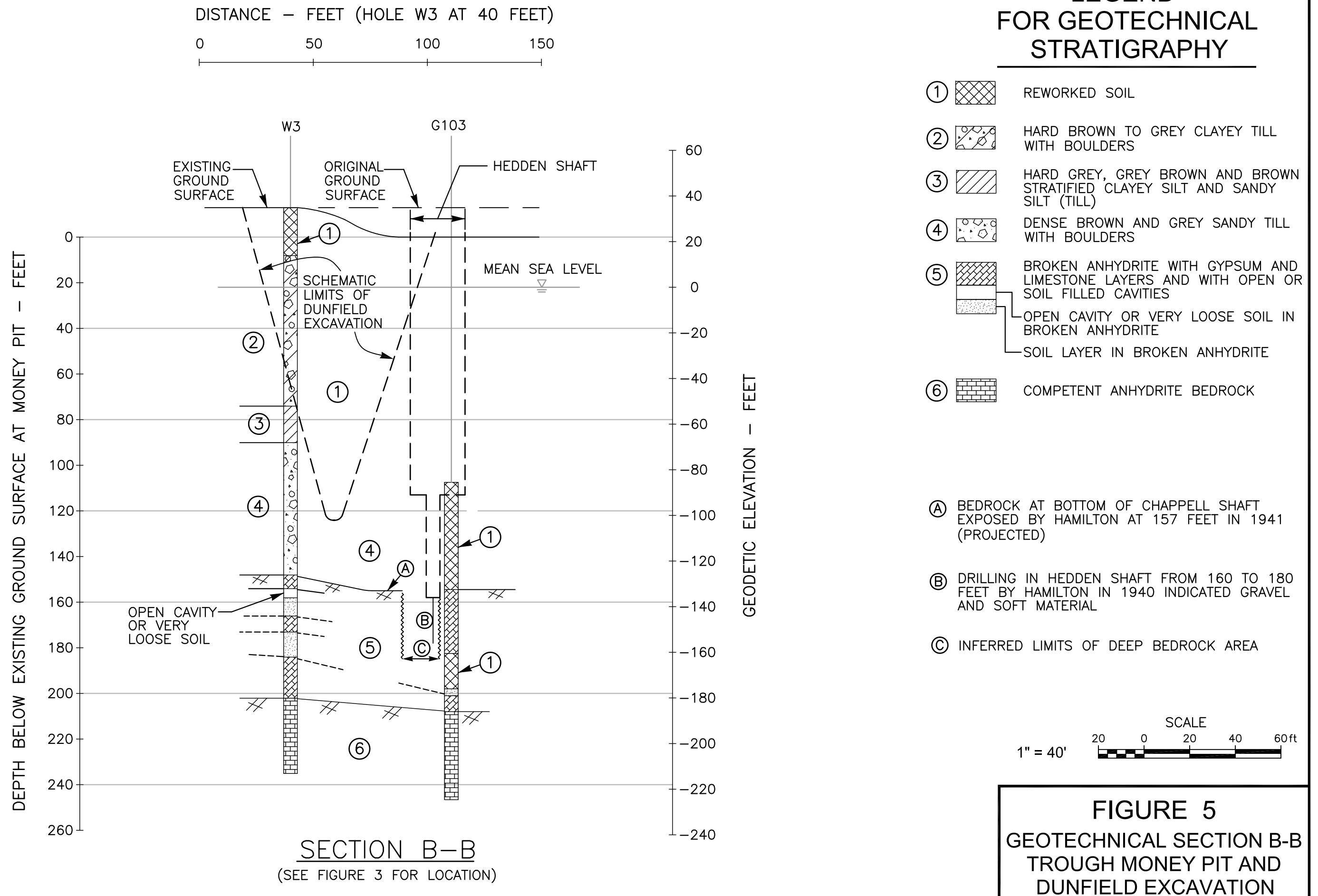


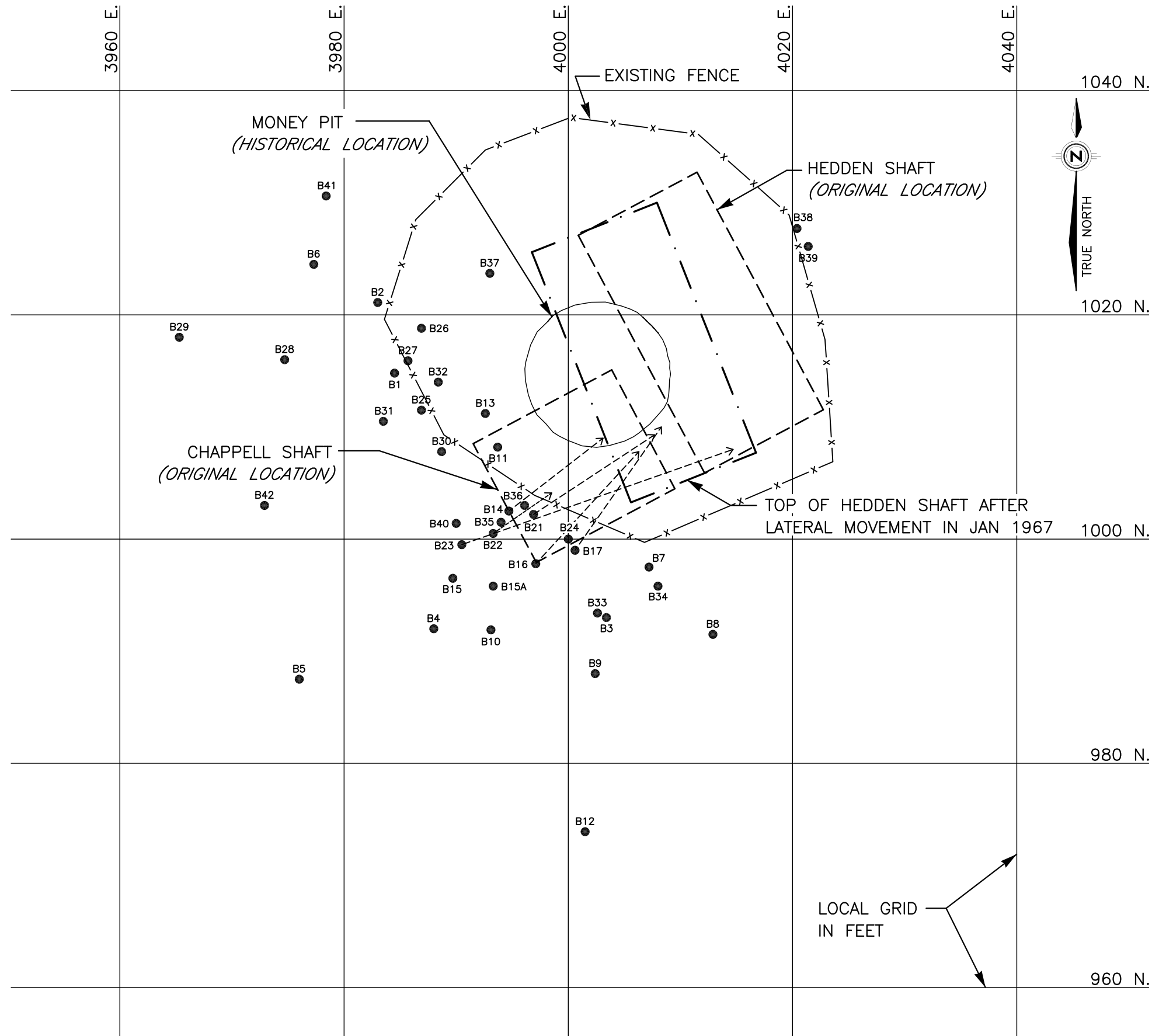
FIGURE 1  
PLAN OF OAK ISLAND









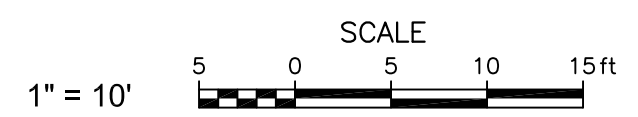


## LEGEND

- B6  
BECKER HOLE 1967  
(DRILLING WAS STARTED VERTICAL)  
(34 HOLES NUMBERED B1 to B13, B15, B15A  
AND B24 to B42)
- ↗ B21  
BECKER HOLE 1967 – INCLINED (NOTE 1)  
(DRILLING WAS STARTED INCLINED)  
(6 HOLES NUMBERED B14, B16, B17, B21,  
B22 and B23 AT STARTING INCLINATIONS  
OF 5", 9", 6.5", 6", 6" [ASSUMED] AND  
12" PER 8 FEET RESPECTIVELY)

## NOTES

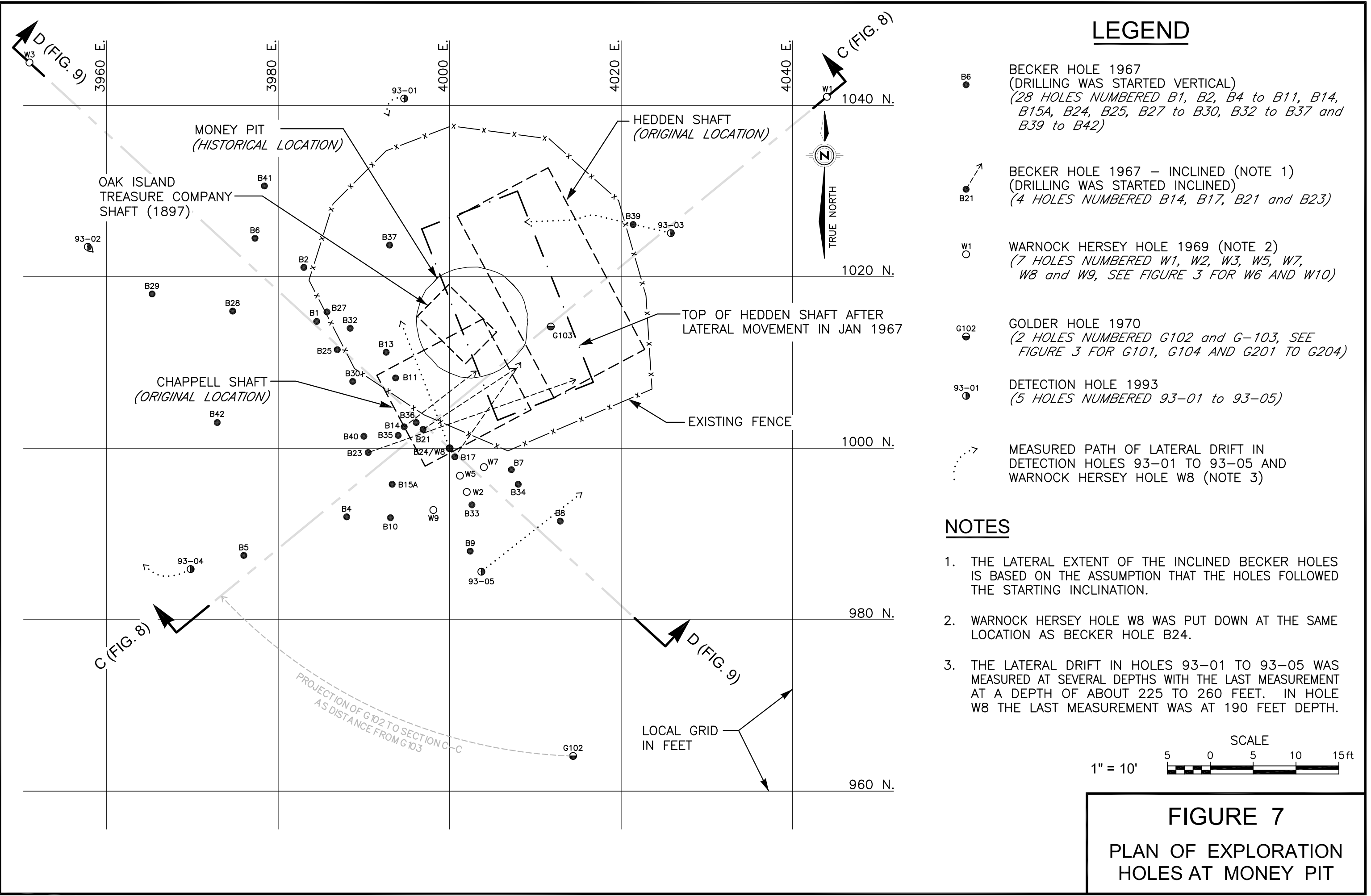
1. THE LATERAL EXTENT OF THE INCLINED BECKER HOLES SHOWN IN PLAN IS BASED ON THE ASSUMPTION THAT THE HOLES FOLLOWED THE STARTING INCLINATION.
2. BECKER HOLE NUMBERS B3, B12, B15, B26, B31 AND B38 (VERTICAL) AND HOLES B16 AND B22 (INCLINED) WERE LOST AT SHALLOW DEPTH. THESE HOLES ARE SHOWN ON THIS FIGURE BUT ARE NOT SHOWN ON FIGURE 7.
3. BECKER HOLE NUMBERS B18, B19, B20 AND B43 TO B48 WERE DRILLED IN 1967 BUT ARE NOT RELEVANT TO THE INVESTIGATION AT THE MONEY PIT. THESE HOLES ARE NOT SHOWN ON THIS FIGURE.

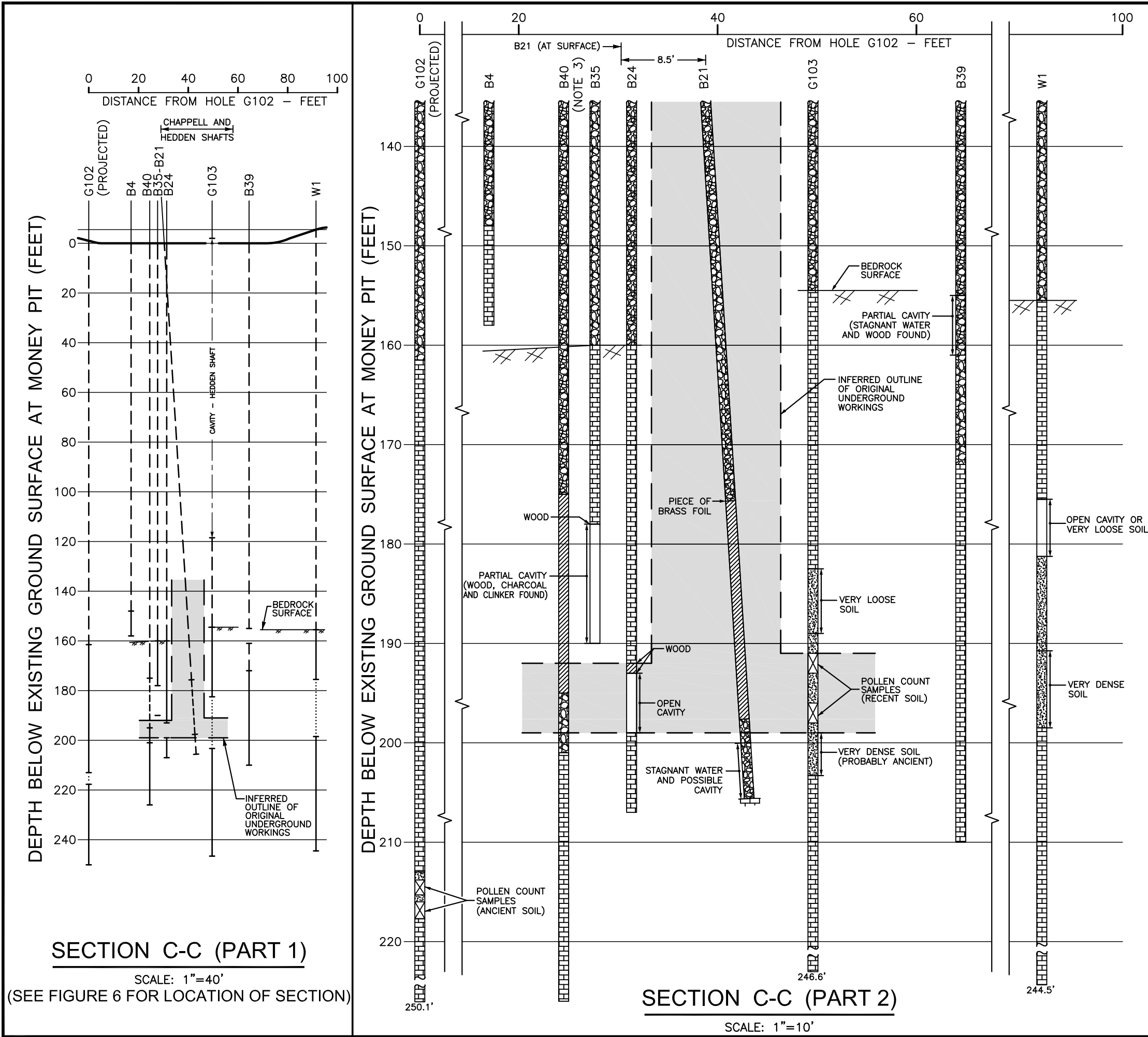


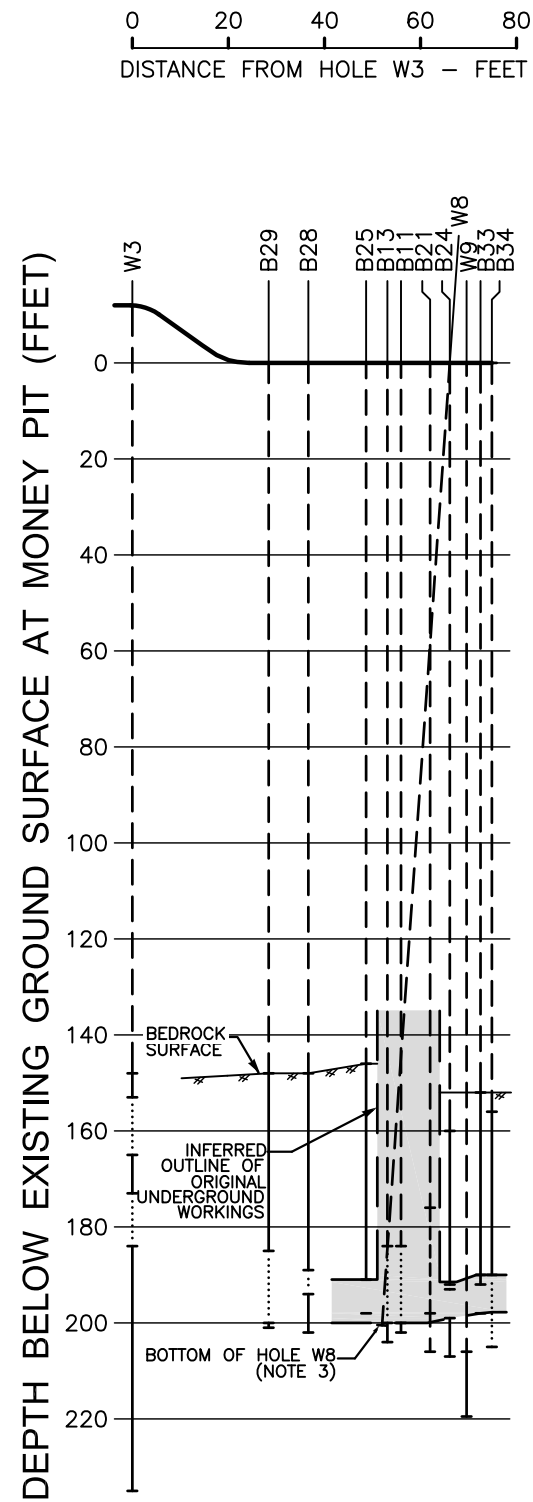
**FIGURE 6**  
**PLAN OF BECKER HOLES**  
**AT MONEY PIT**



Z:\000752\OAK-ISLAND\ARTICLE\Figures 1 to 12 V2008\FIGURE-07.dwg 2008/01/08



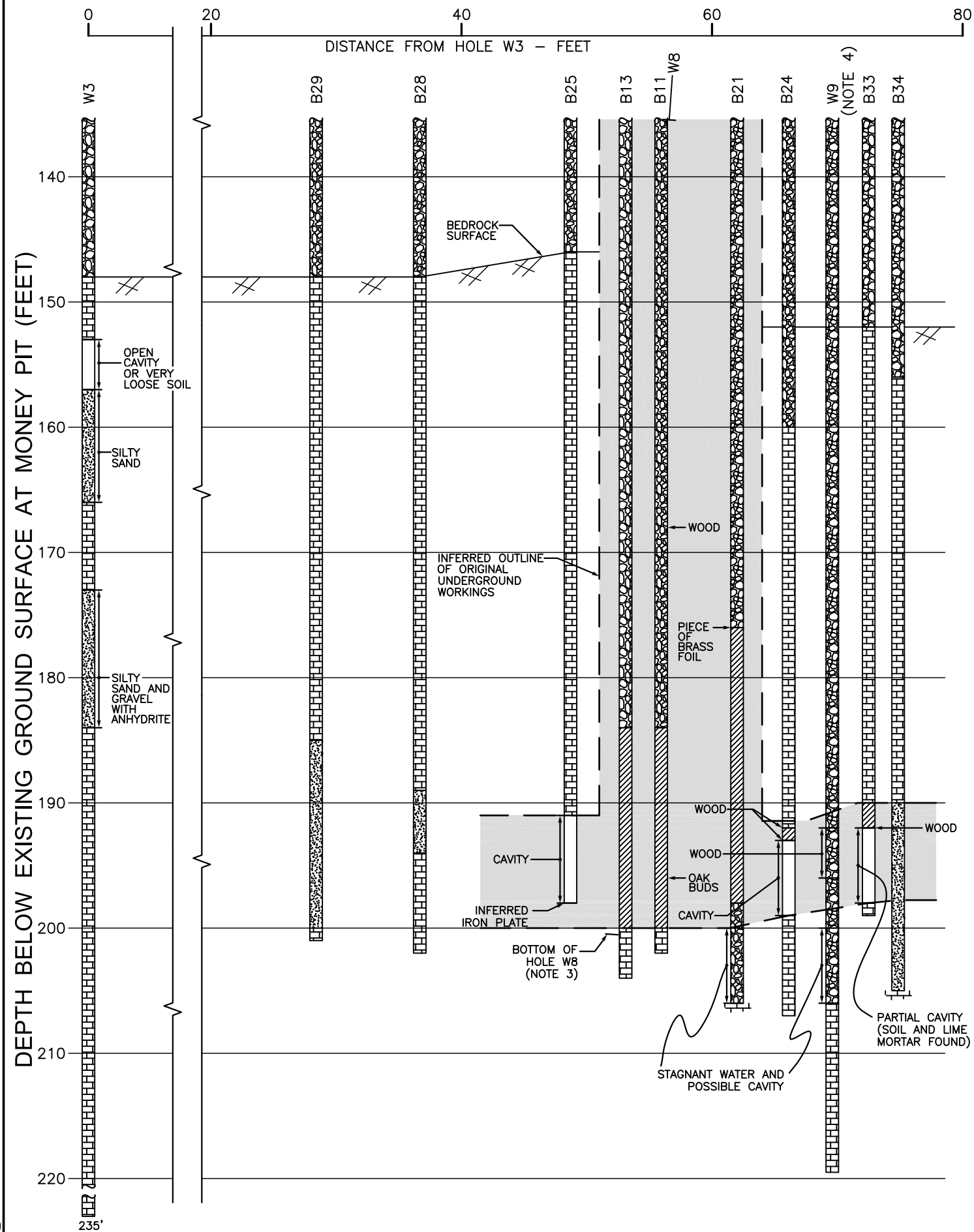




SECTION D-D (PART 1)

SCALE: 1"=40'

(SEE FIGURE 7 FOR LOCATION OF SECTION)



SECTION D-D (PART 2)

SCALE: 1"=10'

## LEGEND FOR SIMPLIFIED STRATIGRAPHY

SECTION D-D  
PART 1  
(SCALE: 1"=40')

- GLACIAL TILL OVERBURDEN AND DISTURBED GROUND
- ROCK (MAINLY ANHYDRITE)
- SOIL FILLED CAVITY IN ROCK
- OPEN CAVITY OR VERY LOOSE SOIL IN ROCK
- CLAY (PUDDLED CLAY)

SECTION D-D  
PART 2  
(SCALE: 1"=10')

- GLACIAL TILL OVERBURDEN AND DISTURBED GROUND
- ROCK (MAINLY ANHYDRITE)
- SOIL FILLED CAVITY IN ROCK
- OPEN CAVITY OR VERY LOOSE SOIL IN ROCK
- CLAY (PUDDLED CLAY)

## NOTES

- THE SUBSURFACE STRATIGRAPHY IS SIMPLIFIED AND ONLY THE MAJOR UNITS ARE SHOWN.
- THE HOLES (EXCEPT FOR HOLE W8) ARE SHOWN ALONG THEIR INTENDED ALIGNMENT AND DO NOT REFLECT SIGNIFICANT LATERAL DRIFT WHICH MAY HAVE OCCURRED.
- THE LOCATION AT THE BOTTOM OF HOLE W8 WAS ESTABLISHED BY LATERAL DRIFT MEASUREMENT. THE STRATIGRAPHY IN HOLE W8 WAS MAINLY GLACIAL TILL OVERBURDEN AND DISTURBED GROUND.
- THE ACTUAL LOCATION OF HOLE W9 IS LIKELY WITHIN THE INFERRED OUTLINE OF ORIGINAL WORKINGS DUE TO A STRATIGRAPHY SIMILAR TO THAT OF HOLE B21.

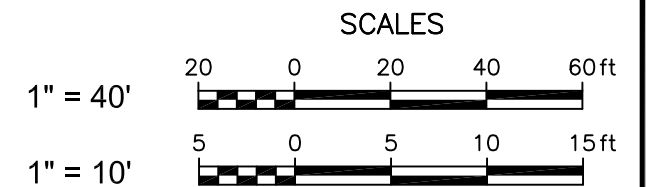
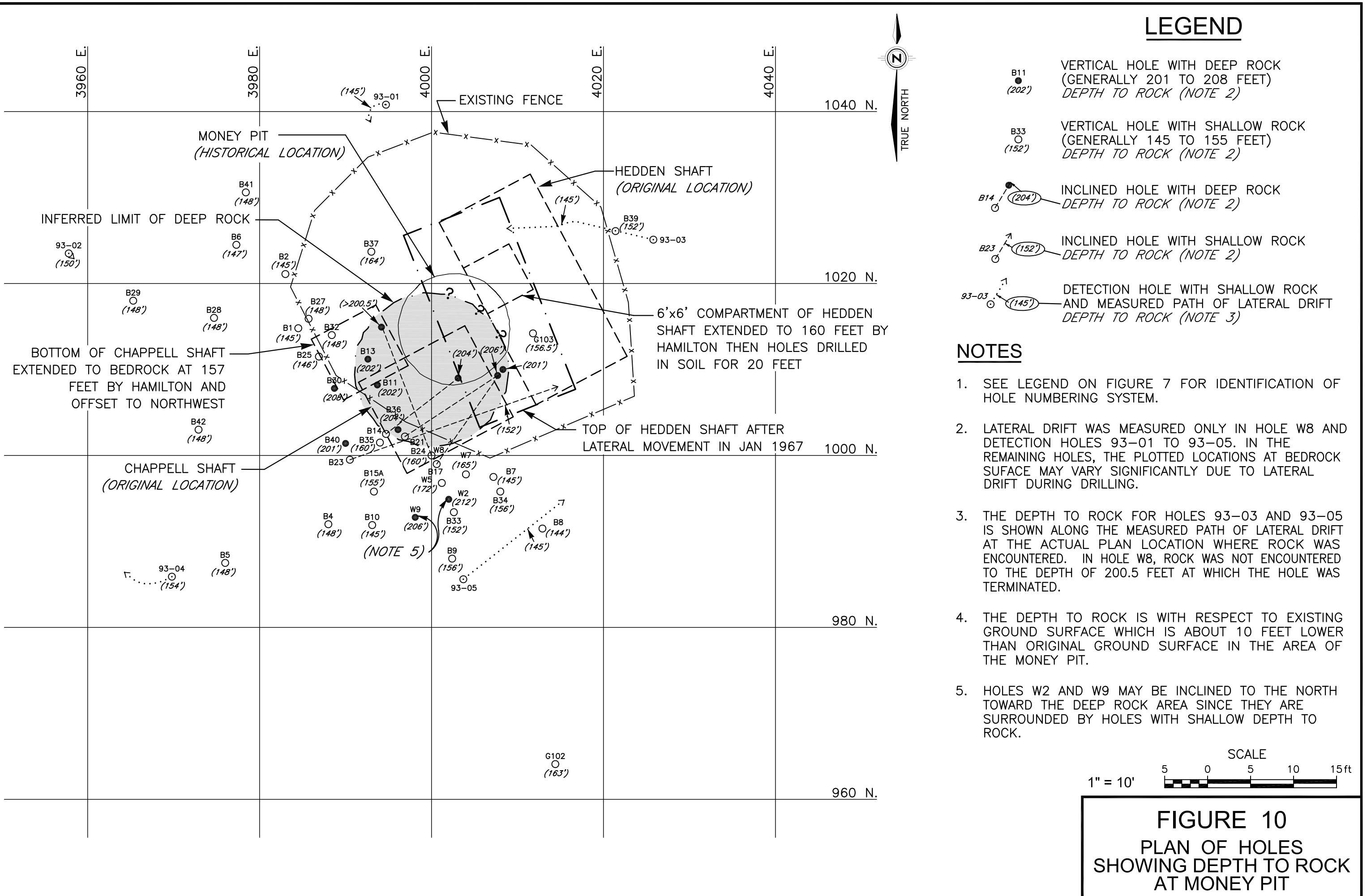
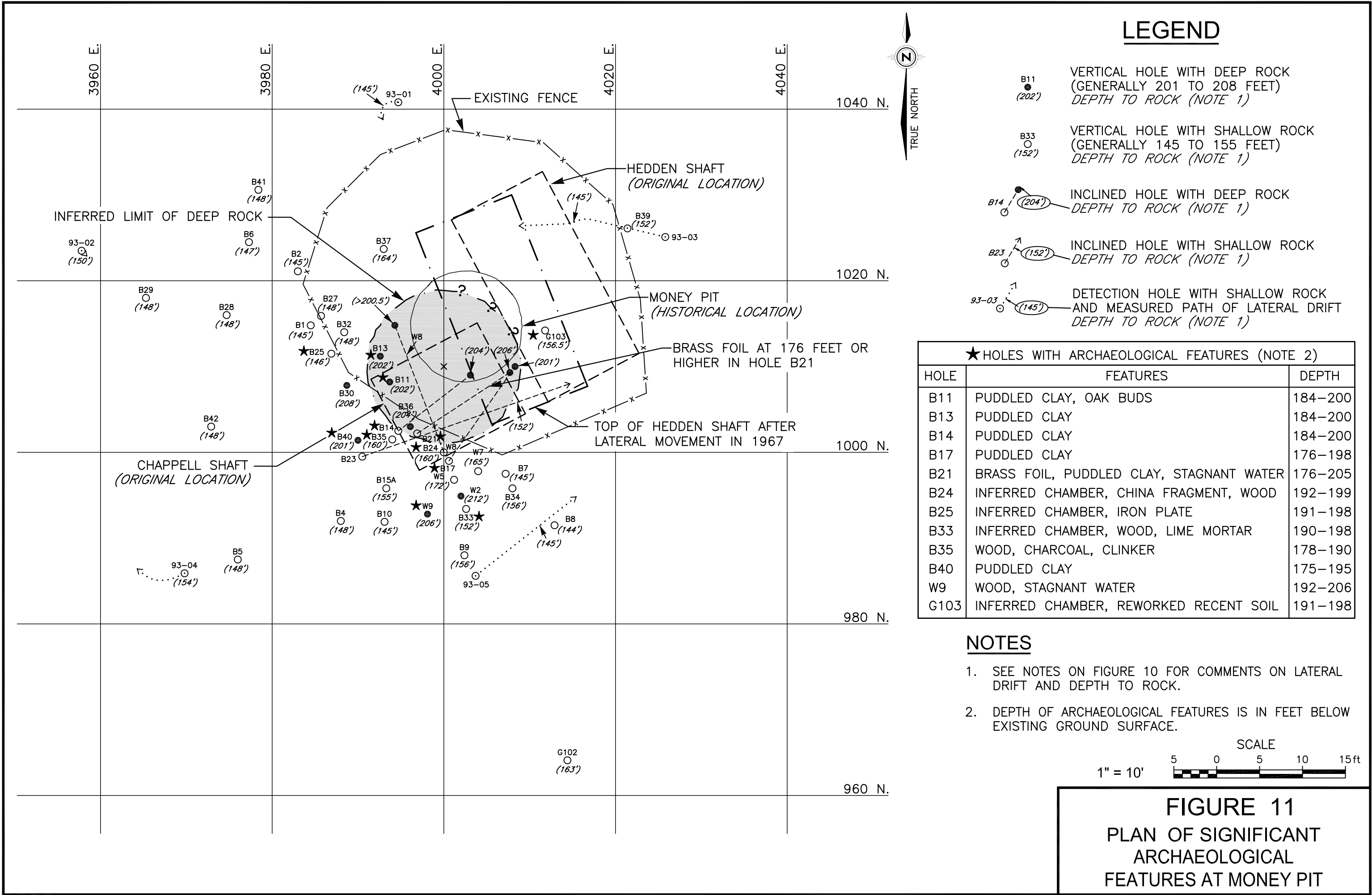


FIGURE 9  
ARCHAEOLOGICAL SECTION D-D  
AT MONEY PIT





## **APPENDIX A**

### **APPENDIX A**

#### **NOTES BY DAN BLANKENSHIP ON BECKER DRILLING PROGRAM**

	<b>PAGE</b>
1. Notes by Dan Blankenship Drilling Done by Becker Starting January 1967 Holes B1 to B15, B15A and B16 to B48	A1 to A4
2. Letter by Dan Blankenship in 1967 to The Cementation Company (Canada) Limited Brief Results of Holes B1 to B15, B15A, B16 to B42 and B45	A-5 to A-7
3. Notes by Dan Blankenship in 1967 on Selected Becker Holes	A-8

- Hole #1 Disturbed thru 145'. Hit wood chips at 136'. No appreciative amount of water. Started rotary drill at 145' thru 165' solid gypsum for 20'.
- Hole #2 Disturbed thru 160'. Considerable amount of water and wood chips at 120 - 128'. Changed to coring equipment at 160' had trouble getting water to diamond cutting edge and penetration very poor, in fact 1st core was only about 8" long, of solid gypsum, 2nd core, not much better.
- Hole #3 Disturbed most of the way at least to 148'. Considerable amount of fine sand and gravel below this to 156'. Had much trouble trying to maintain return and had to resort to raising and lowering 5½" casing trying to unclog end. When casing was finally pulled, last 24' was plugged up with sand very tight and took much hammering to free same.
- Hole #4 Disturbed to at least 136' with evidence of wood thru this depth. Hit solid gypsum at 158'.
- Hole #5 Disturbed to at least 128'. Considerable amount of wet clay below this to 148' at which depth was gypsum. Much water just above gypsum.
- Hole #6 Disturbed to 128'. Not much water until 144'. Blue and red clay from 128' to 144'. Some coarse gravel with water around 144' to 147'. Gypsum bedrock 147'.
- Hole #7 Disturbed to about 136'. Not much water until after 136', Clay and gravel to 145'. Limestone bedrock 145 with considerable amount of water.
- Hole #8 Disturbed to about 120' without much water. Started hitting limestone at 128' and progressed thru hard and soft spots with some clay to 144'. Not too much water. Hard limestone at 144'.
- Hole #9 Disturbed to about 120'. Clay and haripan to 133', limestone mixed earth and clay to 152'. Sand and gravel 152 to 156'. Gypsum bedrock 156'. Large amount of water between 152' - 156'.
- Hole #10 Disturbed to 120'. Considerable amount of water from 98' - 102'. Wood (~~gypsum~~) spruce and hemlock) 104' - 110'. Sand (pure) 112' - 114'. Limestone 145'.
- \* Hole #11 Disturbed to about 168' and man deposited to 200'. Much wood to about 168' (very old). Some gravel and sand 168' - 176'. Tight clay without any water from 184' to 200'. (In this clay at about the 195' level was found 2 small oak buds). Gypsum bedrock 200'.
- Hole #12 This hole was started over an obviously filled shaft and due to large boulders encountered was discontinued at 136'.
- \* Hole #13 Disturbed to 160' and man deposited to 200'. Not much water until 176' where it was plentiful to about 192'. Puddled clay (in layers) from 184' to 200'. Solid gypsum at 202'.
- + Hole #14 Disturbed to 168', hard gypsum to 176' and then easy again to 200'. Much water from 128' to 136'. Black stagnant water from 144' to 152'. Hit cavity or very soft from 184' to 200'. Gypsum bedrock at 202'. "A" rods were put inside 5½" casing down to the bottom or 202' one evening and the next morning when we tried to drill discovered rods were plugged up solid with 60' of sand and so we had to haul them out and unplug them before we could continue.
- Angle:  
5" to 8'0"
- Hole #15 Normal ~~amount of water for this location~~ disturbed earth to 144' where casing was broken and hole discontinued. Normal amount of water for this location.
- + Hole #15"A" Disturbed to about 144'. Started drilling inside casing at 155'. Hit a cavity at 180' - 181'6" with much sand and water. Total depth 196'.
- Hole #16 Disturbed to 144'. Normal amount of water and normal earth for this location (all disturbed). Actually lost hole at 144' on account of broken casing.
- Angle:  
9" to 8'0"
- \* Hole #17 Disturbed to about 160'. Very soft or cavity 138' - 144'6". Bit plugged from 160' - 176'. Clay 176' - 198' in chunks (no water present).
- Angle:  
6½" to 8'0"

Holes # 18 - 19 - 20 Holes # 18 - 19 - 20 not relevant.

- \* Hole #21 Disturbed all the way to 206'. Good recovery thru-out. Much water from 125' down to 184'. Piece of brass at 176'. Clay 184' - 200'. Black stagnant water 200' - 206' (possible cavity). Gypsum 206'.  
Angle:  
6" to 8"0"
- Hole #22 Disturbed to 160'. Pipe broke at 136' so return is not reliable. Lost hole.  
Angle:  
Hole #23 Hole was plugged most of the way, but think earth was disturbed to about 160'. drilled with rotary from 160' to 205' mostly in gypsum.  
Angle:  
12" to 8"0"
- Hole #24 Disturbed to about 160'. Used rotary from 160' - 207'. Gypsum bedrock at 160' and continued thru solid gypsum to 192' at which point we hit wood, a layer of clay and wood again and below that a cavity of at least 6'. The water return in this hole was very good with much small pieces of wood and pine needles thru-out.
- Hole #25 Disturbed to about 130'. Not much water until 130'. Hard going from 130' to 148' where we started with rotary. Gypsum to 191'6". Cavity 191'6" - 197'6". Definitely hit iron metal at bottom of cavity, this was proved by collecting water and letting settle after which we put magnet in bottom, and also by coring. We cored for about 1/2 hour and only penetrated 1/2", we lost this sample at top of hole and never recovered same.
- Hole # 26 Disturbed to about 179'. Casing broke and we lost hole.
- Hole # 27 Hit gypsum bedrock at 146'. Used rotary to 170' hit 12' cavity at 170'. Cored gypsum below cavity to 182'. Used rotary for 20', hit soft spot for 14'. Decided to get 5 1/2" casing, all the way down dynamited and pounded casing all the way to 204'. Much clay and about 1' gravel and broken cement with aggregate) stone. Tried to get camera down but sand kept rising up to 155'. ~~pounded to 142'. Drilled to 170'. Cavity or soft spot 182'. 3' gypsum 185'. 14' cavity or clay 199'. 3' gypsum 202'. 2' core 204'.~~
- Hole # 28 Pounded casing to 148'. Rotary to 190'. 104' - 136' blue clay. 128' - 145' brown clay. 146' - 189' dry white gypsum. 189' - 190' one foot water and sand. 190' - 194' four foot pure clay. 194' - 202' gypsum.
- Hole #29 112' wood. 116' - 128' hard pounding, brown marl with rocks. 128' water. 136' very hard pounding. Started rotary at 148'. 185' - 195' lots of water and darker material. 200' very soft with lots of water in 6' soft spot at bottom was sand, limestone mixed with gypsum.
- \* Hole #30 Disturbed to bottom of Chappell Shaft. 168' - 176' limestone, gypsum small amount clay. 176' - 184' brown clay, blue clay, gravel, limestone, not much water. 192' big pieces gypsum, sandstone mixed gravel with not much water to 200'. Sloppy clay to 208'. Gypsum bedrock 208'.
- Hole #31 Drove casing to 190'. All through overburden. Discovered casing broken at 166'
- Hole #32 Drove casing to 148' and hit gypsum. Drilled to 203' not much water, all gypsum to 193', changed color and was in cement, limestone and clay at 196' thru 200'.
- \* Hole #33 Pounded casing to 152' hit gypsum. Drilled to 190'. At 184' soft for 2', hard for 2', soft for 2'. Hit clay before wood and wood was 192' (apparently top of tunnel and clay was for water proofing. Just below wood was plenty of water with gravel, cement, sand, limestone, etc. Cored for 1' and it was gypsum.
- Hole #34 Pounded to 156' into gypsum. Drilled to 205'. Absolutely dry to 190'. Broke thru gypsum this depth and hit limestone, small amount cement and very small amount red clay with much water and sand which had quartz and granite in it. Gypsum bedrock 205'.
- \* Hole #35 Drove casing to 160', and hit gypsum. Drilled to 178' and hit soft spot for 3' At 181' 6" to 8" wood, from 178' to 192' good return. (differend dinds of wood, charcoal, small pieces clinkers from hot fire. Decided to drive rock-bit down for positive return 18'. Took rock-bit to Chester and had hardened edge put on. Very hard pounding made 4' by 11:45. Blasted 2 times and driving was very hard. Broke casing. Worked on pulling casing. Hit void below wood for 12' with much water.
- Hole 36 Had much trouble in aligning hole. Pulled out and relocated 3 or 4 times. Went through old shaft and at 144' was mucky clay. Bit stayed plugged from 152' to 176'. Pulled back to 152' and unplugged. 152' beach gravel and stones. 168' water and limestone chips. 176' no return. 178' pure clay started and continued to 187'. 187'-194' broken up pcs. limestone with little pieces clay.



- Hole # 36 187' to 204' limestone, gravel with water. 204' - 207' gypsum.
- Hole #37 120' - 128' fairly hard. Bit of water, sandstone up to 136'. 136' - 144' limestone, grey mucky clay soft going, bit of old wood. 152' soft grey clay, different kinds of stone, including granite and beach stones and gravel with some wood. ~~158'~~ same. 160' - 168' out of clay at 164' into hard limestone. 168' - 176' limestone and rock, fairly easy going. 176' - 184' hard limestone 180' four foot clay, cement, gravel and limestone. 184' - 192' sand, gypsum, red clay considerable amount of water in this hole. 192' - 200' limestone, sand, gravel much water with gypsum bedrock 199'.
- Hole #38 Had all kinds of trouble in getting straight hole and moved numerous times and finally drove to 136' and still broke casing at 104'. Gave up in this location.
- Hole #39 Pounded with casing to 152' and even though still in overburden changed to rotary because pounding was too hard and was afraid of breaking more casing. Switched to rotary and drilled to 155' where we hit cavity without a question. Drill went down without turning with air on and just its own weight. Brought up much black stinking water with small pieces wood, pine needles, black clay and red clay. All the clay was in tiny pieces about 1/8" diam. no rock and a little sand. Apparently is a tunnel about 6' high, without cribbing in limestone. Some pieces limestone brought up were very black on one side (caused by still water). Purpose of tunnel 162' + 7' or 169' from surface is a mystery. Wheather tunnel was filled ~~we~~ purposely or not with water isn't clear. Pulled rotary rods and changed to pounding and went to 172'. When pounding became too hard changed to rotary and went to 210'. All limestone. No more evidence of wood or clay below 161'.
- Hole #40 Pounded casing all the way to 201'. Hit gypsum 167' (soft). Solid clay from 175' to 195'. 195' to 200' broken pieces cement limestone, gravel, etc. Gypsum at 201'. Changed to rotary and went to 226' solid gypsum.
- Hole #41 Pounded casing to 148'. Drilled to 200'. from 148' to 175' dry gypsum. 175' to 197' limestone with water. Hit gypsum again at 197' and went to 200'. Pulled out.
- Hole #42 Pounded to 148' and still in limestone. Changed to rotary. Most of air going into Heddon Shaft with very poor return and drill kept plugging up. Hit soft spot for about 9'. (Still had to turn drill in order to penetrate) Tremendous amount of water came up with sand and gravel and rods kept plugging up. Don estimates 2 yds. or more of sand came up with water. Quite possible we hit water course. Normal drilling to 169' of limestone. Soft spot or cavity to 178'. Back to normal. Drilling at that point. Most of our air going into Heddon Shaft and very poor return. Drilled to 202'. Pulled casing and it was broken at 120'. This could also be the reason why so much air went into Heddon Shaft. Had to add two 25 ton jacks when fishing tool was put in. Very good indication that bottom of casing was badly bent.

Holes # 43, ~~44~~ 48 All "virgin" soil at new location 185' from "Heddon Shaft"

Hole #43 Very hard pounding to 144'. Tried drilling ahead but didn't seem to be much. Drilled to 185' and hit water course (salt). Hole kept caving in and had lots of trouble keeping rods clear. Had to add jacks in order to pull out. In 2 hours only managed to pull out 7' to 8'. Decided to use "Magigel" in order to seal off water. Drove casing down again and it took over 1 hour. Proving casing was badly bent and that we made new hole. This was confirmed when we started with rotary again. We succeeded in sealing off salt water and drilled again to 180'. Rods were plugged so we pulled rods and cleared same. We later pumped 1200 gal. mud and water into hole but never got our return. Decided to pull off hole because of cost. Couldn't put camera down because of mud. Moved 47' away. Hit 4' cavity at 172'.  
0 to 10' - yellow overburden.  
10' to 50' - blue hard pan with many stones and consisting mostly of clay.  
50' to 101' - Softer layer of blue clay without too many stones. Clay could be worked by hand. Quite moist but not wet.  
101' to 144' - Mostly blue hard pan.  
144' to 166' - Dry gypsum.  
166' to 172' - Great amount of water (salt) with sand and gravel and limestone (easy drilling)  
Drilled to 200'. Limestone. Above hole dry to 166'.

Hole #44 Pounded to 120' with very hard pounding. Decided not to go any further because casing was badly bent. Pulled and broke casing in doing so. Dry Hole.

NOTE:

The mud which we had used in hole #43 about 47' away at a depth of 179' was on the bottom of the casing. (6 lengths) even though this meant that this material had to move 47' horizontally and from 170' to 120'. Which meant it also had to go through 22' of gypsum and 22' of hard "virgin" soil. This in my opinion is quite impossible unless there is an artificial water course or connection.

Shaft

Near Heddon

Hole #45 Pounded to 144' and drilled to 210'. Very hard pounding. West of Heddon Shaft 52'. All appeared to be "virgin" and typical, more or less dry hole. Overburden to 162 and then gypsum to 210'.

Hole #46 Broke casing.

Hole #47 This hole was started 5" per 8' out of plum. It hit previously drilled hole at about 80' and took right off in same. Stopped at 140'. No good to us.

Hole #48 Moved back to other location 185' away. Pounded to 136' and drilled to 205'. Used dynamite extensively in this hole in order to try and get straight hole. Not successful as casing still went out of plum.

Holes #1 thru didn't prove too much or bring up anything of significance with the exception that it did prove that the average bedrock depth was from 144' to 160'.

Holes #11 went to 202' without hitting any solid rock, ledge, gypsum etc. We never had to resort to the rotary drill, and pounded all the way easily. From 184' to 202' which is 18' was nothing except solid clay, without any stone what so ever. However, we did find small oak buds at 196' which was 12' below the solid clay. This clay is impervious to water and cannot be made columnable. The oak buds being as light as paper could not have gotten there thru any normal or natural action.

Hole #13 was about 4' away from #11 and brought up the same results.

Hole #14 was evidently right on the edge of the original pit because we hit 4' of solid gypsum at 172' and then continued to 204' with the 5 1/2" casing.

Hole #15A hit flood tunnel at 180' of about 18" high (this lines up with suspected flood tunnel to West).

Hole #16 hit cement with aggregate at 135' (apparently same thing that Chappell's father drilled thru in 1897 when he brought up pieces of parchment) add to our measurement of 135', 10' (which we had bulldozed) 8' which according to James W. Lewis the area has subsided since 1897 and 1' allowing for deflection of hole which was 9" in each 8' out of plumb. All of these measurements and allowances bring us to 154' which was depth at which parchment was found. Incidentally this is the only spot where anything of a solid nature was found above 144'. In this hole, after passing thru cement we hit limestone that was pitted by the action of the water, showing that the cement was harder than the natural limestone and was in a solid state.

Hole #17 was also an angle hole of 6 1/2" free plug, which ended up in deep spot. In this hole we apparently hit edge of cement container, because casing dropped from 138' to 144' 6" and we didn't get any return.

Hole #21 brought up small piece of laminated brass at 185', original face measurement. This depth is justified by the fact that original "decay" dropped from about 98' to lower depth, and most of the solid clay water coal started at about 184' to 186'.

Hole #24 was very important. It proved for the first time without any question two important facts. The first being that somebody had placed wood at 202' deep. This was the first positive proof we had that they had worked this deep. Finding a layer of wood, about a foot of clay and then another layer of wood, proved the use of clay as a water sealer. The presence of a 6' tunnel at this depth was a major break-thru. Hole #33 was about 8' away and confirmed the wood and tunnel. Incidentally, these holes line up perfectly to the south where I found the hidden shaft last year.

Hole #24 was very important because we drilled thru iron at about 198' 6". We cored this iron which was about 1/2" thick, and the sound was unmistakable. Four or five of us heard the loud "clunk" when it fell out of the bit as we were pulling the last 6' and hit the water. This hole was never finished satisfactory. One of the mistakes made was using a split spoon which was 1/2" larger than the core barrel. This also made a loud squeal when it finally seated itself in the hole made by the diamond core barrel, but being smooth could not cut through the iron.

With the exception of Hole #33 there wasn't too much of importance until Hole #35 was put down. In this hole we hit gypsum bedrock at 160' and had to change to the rotary. After drilling thru 18' of gypsum to 178' we hit a layer of wood, (very rotten) and then a void of 12' with plenty of water in which we found different kinds of old wood, charcoal, small pieces of clinkers (from hot fire) etc. In trying to blast and pound thru this 18' of gypsum, we lost the hole when the casing broke and never did succeed in getting a positive return. This hole was all the more amazing when you analyze the results of #36 and #40 holes. These two straddled #35, no more than 3' 6" each way and came up with altogether different material. In fact both of these holes were pounded down to below 200' with the 5 1/2" casing, and neither of them hit the 18' of gypsum.

Hole #39 hit a cavity at 155' of about 6' high. The water in this was black, stinking and stagnant. This coincided with my later finding that a walk-in tunnel existed in this location.

Hole #42 was also apparently in a water tunnel at 169'. The volume of water was terrific and much sand came up with same, which we found to hold true in almost all the areas of which we thought a water tunnel existed.

Holes #45 - 46 were not too significant

Holes #43-44 and 48 were placed in new different location.

DRILLING IN VICINITY OF "MONEY PIT" (1967)

1967

The Cementation Company (Canada) Limited  
120 Railroad Street P.O.Box 9  
Brampton, Ontario, Canada

Att: Mr. Wm. T.C. Gillespie

- Hole #1  
Soft fill until 144 Feet. Gypsum to 165 Feet
- Hole #2  
Soft fill until 45 feet. 145 feet to 160 feet gypsum
- Hole #3  
Fill until 145 feet. Gypsum to 156 Feet
- Hole #4  
Distrubed to 141 feet. Gypsum bedrock to 158 feet.
- Hole #5  
Distrubed to 147 feet. Gypsum at 148 feet
- Hole #6  
Distrubed to 128 feet. Gypsum bedrock 147 feet.
- Hole #7  
Distrubed to 120 feet. Bedrock of sandstone and limestone at 145 feet.
- Hole #8  
Distrubed to 120 feet. Bedrock of limestone at 144 feet.
- Hole #9  
Distrubed to 144 feet. Bedrock of gypsum at 156 feet.
- Hole #10  
Distrubed to 120 feet. Bedrock of limestone 145 feet
- Hole #11  
Drilling went quickly. Hit heavy water from 98' to 102', light water next 16'. Great amount wood from 104' to 110' about 2' sand at 112' and maybe more. Much wood from 120' to 128'. Easy going to 192'. A lot of wood to 168', much gravel and sand. Hit clay at 184', very soft blue and tan down to 202'. Last 2' into gypsum.
- Hole #12  
Put down thru solid boulders, very hard going. Bent up pipe. Hit a lot of water about 120'. Pulled out of this hole.
- Hole #13  
From 120' to 128' little wood, no water. Up to 136' small pieces of wood, little clay, no water. At 144' slivers of wood and clay. At 152' slivers of wood, gravel, sand a little cement pieces. At 160' big pieces wood, lot of gravel, wood object at 154' quite solid until broken thru. 168' solid for a while at 162' ended up fast, small pieces wood, gravel and gypsum. 176' very sloppy, clay with water. 184' good recovery, clay about  $\frac{1}{2}$  way down. 192' sloppy, easy. 200' clay, sand and gravel. 202' solid gypsum.
- Hole #14  
120' lots of water, wood. 136' water and wood. 144' black stagnant water. 152' black stagnant water, old slivers of wood, harder. 160' water, small pieces of wood, big rock, some gypsum. 168' coarse sand and gravel and fine sand. 172' hard going in gypsum and continued to 176' when drilling became normal. 184' hit cavity or super soft at 180' to 192', no return from 184' to 200'. 204' gypsum bedrock.
- Hole #15  
128' wood and sloppy. 136' brown and blue clay, small pieces stone, slate, sandstone and cement. 130' hard sandstone and hard slate, dry. 144' sandstone and slate. 144' to 150' much water, slate, sandstone.

ago 2 Cont.

Hole 15-A

136' disturbed soil, 4 kinds of clay, slate, cement. Much water to 120' a little up to 128' and more below 144' gravel, slate, clay, very hard going. Limestone bedrock at 196'.

Hole #16

112' to 120' clay, sloppy, large amount of wood. Sand, gravel, lime sandstone, cement about 135'. 144' coarse sand, slate, soil in sloppy condition. Broke bit at 144'.

Hole #17 150' to 158' easy with no water return from 160' to 176'. 176' to 198' good return with clay in chunks. Gypsum 201'.

Hole # 21

Disturbed 176' to 184' sand, gravel, wood, clay. 184' to 192' clay. 192' to 200' cement, water. 200' to 206' fairly hard for 2', easy for 3' tight for 1' and 8" in gypsum bedrock.

Hole #22

Hard at 130'. 130' to 134' easier Broke casing.

Hole #23

104' no return. Used rotary from 152'. Limestone and slate with possible cement. Bedrock of limestone 205'.

Hole # 24

Disturbed to 112'. Hit wood at 192'. 207' gypsum bedrock. (6ft void with much water just below wood.) Apparently tunnel)

Hole #25

120' to 128' hard going. small amount of clay, cement rock. 136' to 144' hard formation, hard and soft limestone. 144' to 152' very hard. Gypsum at 146'. 172' to 175' softer. Struck void 7' high at 191'. Apparently metal underneath. Hole not finish satisfactory.

Hole #27

Soft spot at 182'. Gypsum at 185'. Clay at 199'. Gypsum at 202.

Hole #28

104' to 136' blue clay. 128' to 145' brown clay. 145' to 189' dry white gypsum. 189' to 190' water and sand. 190' to 194' clay. 194' to 202' gypsum.

Hole #29

112' wood. 116' to 128' hard pounding, brown marl with rocks. 128' water. 136' very hard pounding. 185' to 195' lots of water. 200' very soft, lots of water, sand, limestone, gypsum. Bedrock of gypsum at 201'.

Hole #30

Disturbed. 168' to 176' limestone, gypsum, some clay. 176' to 184' brown clay, blue clay, gravel, limestone, not much water. 192' gypsum, sandstone mixed with gravel, not much water. 200' sloppy clay, 208' gypsum bedrock.

Hole #32

149' gypsum. 196' cement, limestone and clay. Limestone bedrock at 200'.

Hole #33

152' gypsum. 192' clay, wood, water with gravel, cement, sand, limestone. Gypsum bedrock at 198'.

Hole #34

156' gypsum, dry to 190'. Hit limestone, cement and clay with much water and sand. Gypsum bedrock at 205'.

Hole #35

160' gypsum. 178' soft spot. 181' wood. 12' void under wood. Hole not finished satisfactorily.

Hole # 36

144' murky clay. 152' beach gravel and stones. 168' water and limestone chips. 178' clay. 187' limestone, clay. 187' to 207' gypsum.

Hole # 37

120' to 128' fairly hard bit of water, sandstone. 136' to 144' limestone clay, bit of wood, soft going. 160' to 168' out of clay into hard limestone at 164'. 168' to 176' limestone and rock, easy going. 176' to 184' hard limestone. 180' clay, cement, gravel and limestone. 184' to 192' sand, gypsum, red clay, lots of water. 192' to 200' limestone, sand, gravel, much water with gypsum bedrock 199'.

Hole # 39

152' water with wood, pine needles, black clay and red clay. 6' void at 155' with large amount of water. Limestone bedrock below to 210'.

Hole # 40

Gypsum at 167'. Clay from 175' to 195'. 195' to 200' cement, limestone, gravel. Gypsum at 201'.

Hole #41

148' to 175' dry gypsum. 175' to 197' limestone with water. Gypsum at 197'.

Hole # 42

148' limestone. Soft spot for 9'. Water with sand and gravel and rocks. Normal drilling to 169' of limestone. Soft spot to 178'. Gypsum bedrock at 202'.

Hole #43

Very hard to 144'. Gypsum 162' to 210'.

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Daniel C. Blankenship

Copy to:  
Mr. David Tobias

**APPENDIX B**

**SUMMARY OF BECKER DRILLING PROCEDURES AND DATA**

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B2 Data from Drilling Program	B-2
Table B1 Summary of Becker Holes by Group	B-4
Table B2 Summary of Becker Drilling Data	B-5

## **Appendix B**

### **Summary of Becker Drilling Procedures and Data**

#### **B1 Drilling Procedures**

An understanding of the drilling procedures is essential for a proper evaluation of the subsurface stratigraphy, the various archaeological features encountered and the depth from which samples or artifacts were recovered in the Becker holes. The Becker drilling program involved three separate drilling procedures identified as Becker drilling, tricone drilling and core drilling. These procedures are described below.

##### **Becker Drilling Procedure**

The Becker drilling procedure was used to advance the holes through soil and highly fractured rock but could not be used in solid rock. The Becker drilling procedure used in 1967 is illustrated on the four-page brochure included in Appendix C. The procedure for the Oak Island program involved the following steps:

1. The double wall casing, equipped with a specially designed pilot bit, was advanced by percussion (driving with a pile hammer).
2. Compressed air was forced down the annular space of the double wall casing and returned to the surface through the hole in the inside casing.
3. The sample entered the three inch diameter opening of the pilot bit and was carried to the surface with the stream of air going up the inside casing.
4. The sample was recovered at surface in a container.

There is essentially no doubt about the depth at which samples were recovered using this drilling procedure. They were recovered at or just above the depth of the pilot bit at the time the sample reports to the surface since the travel time of the sample in the inside casing is measured in seconds. The recovered sample was disturbed by the process of entering the pilot bit and being "jetted up" to the surface. However, it was observed that some of the clay samples were recovered essentially as a continuous core allowing the stratification to be determined. The maximum particle or sample size that could be recovered was three inches, this being the inside diameter of the bit and the inside casing.

##### **Tricone Drilling Procedure**

The tricone drilling procedure was used when the double wall Becker casing could not be advanced and this typically occurred when solid rock was encountered. In these circumstances the Becker casing was left in place, the hydraulic rotary head was positioned over the hole and the hole was advanced using a  $2\frac{7}{8}$  inch diameter



tricone bit that fits inside the casing. The steps in the drilling and sampling procedure using the tricone bit were:

1. The tricone bit was advanced (ahead of the Becker casing) by rotation using a single string of rods.
2. Compressed air was forced down the central hole in the rods and returned through the annular space around the drill rods (it is noted that the annular space is formed by the wall of the hole in the uncased section and by the Becker casing in the cased section).
3. The cuttings from the bit were carried to surface in the stream of air flowing through the annular space.
4. The samples were collected in a container at the surface.

The samples were recovered in the form of cuttings of the material being penetrated and thus the samples were highly disturbed. The Becker casing is not usually advanced with the tricone bit. Therefore, the depth from which samples are recovered has to be carefully evaluated since material from the exposed wall of the hole could be reporting to surface with the material at the tricone bit. In some instances, the Becker casing was advanced after drilling ahead using the tricone bit.

#### Core Drilling Procedure

The core drilling procedure was used occasionally to recover rock samples and in one instance to core through an inferred iron plate. This procedure involves advancing a diamond impregnated drill bit by rotary action in conjunction with water circulation for cooling. Usually a core of the material being penetrated is recovered.

### **B2 Data from Drilling Program**

The Becker drilling program involved 40 holes in the area of the Money Pit and nine holes outside the Money Pit area. The 49 Becker holes have been classified in seven groups as indicated on Table B1. A summary of the Becker drilling data for each of the 49 holes is given on Table B2. As indicated in the notes at the end of Table B2, the data is somewhat generalized and approximate. In this regard, the description of findings and drilling procedures summarized on Table B2 are based on notes in Appendix A recorded by Dan Blankenship. Some of the recorded information is contradictory in detail and the most representative data has been transcribed to this table.

The locations of the 40 Becker holes in the Money Pit area are shown on Figure 6 in the main report. The first 10 holes, numbered B1 to B10, were put down to rock surface at about 145 to 155 feet depth. After deep overburden (200 feet) was encountered in the next Hole B11, most of the remaining holes were put down to about 200 feet. Out of the 40

holes, 34 were started vertical and six were started at an inclination ranging from about 1 in 8 to 1 in 19. Eight of the 40 holes, including two inclined holes, were terminated at shallow depth due to drilling problems and bedrock surface was not defined in these holes. It is observed from the summary on Table B1 that a total of 23 holes extended to greater depth in the Money Pit area, consisting of the 19 holes in Group 3 and the four holes in Group 5.

The inclined Becker holes were directed toward the northeast to investigate conditions below the Hedden shaft. The Hedden shaft was still open at that time and the heavy Becker drill could not be safely supported on a temporary platform over the shaft.

**Table B1**  
**Summary of Becker Holes by Group**

Group Description	No. of Holes in Group	Range of Hole Depth (Feet)	Hole Numbers
<u>Group 1</u> Vertical Holes to Shallow Depth	9	144 to 165	B1, B2 and B4 to B10
<u>Group 2</u> Vertical Holes to Shallow Depth Lost Before Rock Defined	1	156	B3
<u>Group 3</u> Vertical Holes to Greater Depth	19	192 to 226	B11, B13, B15A, B24 B25, B27 to B30, B32 to B37 and B39 to B42
<u>Group 4</u> Vertical Holes to Greater Depth Lost Before Rock Defined	5	136 to 190	B13, B15, B26, B31, B38, B45 and B46
<u>Group 5</u> Inclined Holes to Greater Depth	4	201 to 206	B14, B17, B21 and B23
<u>Group 6</u> Inclined Holes to Greater Depth Lost Before Rock Defined	2	136 to 144	B16 and B22
<u>Group 7</u> Holes Outside Money Pit Area (See Note)	9	----	B18, B19, B20 and B43 to B48
Total	49	----	
Range	----	136 to 226	B1 to B15, B15A and B16 to B48
<p>Note:</p> <p>The location of Holes B18, B19 and B20 is not known. Holes B43, B44 and B48 are located in an area about 180 feet northeast of the Money Pit. There is some uncertainty in the location of Holes B45, B46, and B47. These holes are assumed to be located about 50 feet west of the Money Pit but could be in the Money Pit area.</p>			

**Table B2**  
**Summary of Becker Drilling Data**

Hole No.	Depth (Feet)	Description of Findings and Drilling Procedures
B1	0 to 145	Overburden/disturbed ground, advance with Becker casing.
	145 to 165	Solid rock, rotary drilling with tricone bit.
B2	0 to 145	Overburden/disturbed ground, advance with Becker casing
	145 to 160	Rock, core drilling with diamond bit, very poor recovery.
B3	0 to 156	Overburden/disturbed ground, advance with Becker casing, trouble with air return and 24 feet sand in casing when casing was pulled out, rock not defined.
B4	0 to 148	Overburden/disturbed ground, advance with Becker casing.
	148 to 158	Rock, drilling procedures not recorded.
B5	0 to 148	Overburden/disturbed ground, advance with Becker casing.
	at 148	Rock
B6	0 to 147	Overburden/disturbed ground, advance with Becker casing.
	at 147	Rock
B7	0 to 145	Overburden/disturbed ground, advance with Becker casing.
	at 145	Rock
B8	0 to 144	Overburden/disturbed ground, advance with Becker casing.
	at 144	Rock
B9	0 to 156	Overburden/disturbed ground, advance with Becker casing.
	at 156	Rock
B10	0 to 145	Overburden/disturbed ground, advance with Becker casing.
	at 145	Rock
B11	0 to 184	Overburden/disturbed ground, advance with Becker casing.
	at 168	Wood, very old.
	184 to 200	Clay (probably puddled clay), advance with Becker casing.
	at 196	Two oak buds found embedded in clay.
	200 to 202	Rock, drilling procedures not recorded.
B12	0 to 136	Overburden/disturbed ground, advance with Becker casing, hole discontinued due to large boulders at 136 feet, rock not defined.
B13	0 to 184	Overburden/disturbed ground, advance with Becker casing.
	184 to 200	Clay in layers (puddled clay), good recovery to 192 feet, advance with Becker casing.
	200 to 202	Rock, drilling procedures not recorded.
B14	0 to 172	Overburden/disturbed ground, advance with Becker casing.
	172 to 176	Broken rock or boulders, advance with Becker casing.
	176 to 202	Overburden/disturbed ground, very soft from 184 to 200 feet, advance with Becker casing.
	202 to 204	Rock, drilling procedures not recorded.
B15	0 to 152	Overburden/disturbed ground, advance with Becker casing, hole discontinued due to broken casing, rock not defined.

**Table B2**  
**Summary of Becker Drilling Data (Continued)**

Hole No.	Depth (Feet)	Description of Findings and Drilling Procedures
B15A	0 to 155	Overburden/disturbed ground, advance with Becker casing.
	155 to 196	Overburden/disturbed ground, advance with tricone bit.
	at 196	Rock
B16	0 to 144	Overburden/disturbed ground, advance with Becker casing, hole discontinued due to broken casing.
B17	0 to 176	Overburden/disturbed ground, advance with Becker casing.
	176 to 198	Clay (probably puddled clay), advance with Becker casing.
	198 to 201	No data, assume overburden/disturbed ground and advance with Becker casing.
	at 201	Rock
B18	----	No data, hole reported as not relevant.
B19	----	No data, hole reported as not relevant.
B20	----	No data, hole reported as not relevant.
B21	0 to 176	Overburden/disturbed ground, advance with Becker casing.
	at 176	Piece of slightly crumpled brass foil.
	176 to 198	Clay (probably puddled clay), advance with Becker casing.
	198 to 206	Overburden/disturbed ground, advance with Becker casing, evidence of stagnant water and possible cavity from 200 to 206.
	at 206	Rock
B22	0 to 136	Overburden/disturbed ground, advance with Becker casing, hole discontinued due to broken casing, rock not defined.
B23	0 to 152	Overburden/disturbed ground, advance with Becker casing.
	152 to 203	Rock, rotary drilling with tricone bit.
B24	0 to 160	Overburden/disturbed ground, advance with Becker casing.
	160 to 192	Rock, rotary drilling with tricone bit.
	at 192	Wood, approximately four inches, rotary drilling with tricone bit.
	192 to 193	Clay, rotary drilling with tricone bit.
	at 193	Wood, approximately four inches, rotary drilling with tricone bit.
	193 to 199	Cavity, tricone bit dropped under weight of rods.
	199 to 207	No data, assumed rock and rotary drilling with tricone bit.
B25	0 to 146	Overburden/disturbed ground, advance with Becker casing.
	146 to 191	Rock, rotary drilling with tricone bit.
	191 to 198	Cavity, tricone bit dropped with air on and weight of rods.
	at 198	One-half inch of iron inferred from core drilling with diamond bit, hole could not be advanced beyond inferred iron.
B26	0 to 179	Overburden/disturbed ground, advance with Becker casing, hole discontinued due to broken casing.

**Table B2**  
**Summary of Becker Drilling Data (Continued)**

Hole No.	Depth (Feet)	Description of Findings and Drilling Procedures
B27	0 to 148	Overburden/disturbed ground, advance with Becker casing.
	148 to 170	Rock, rotary drilling with tricone bit followed by advance of Becker casing with assistance of down hole blasting.
	170 to 182	Assumed soil filled zone in rock based on low resistance to drilling with tricone bit, Becker casing advanced.
	182 to 186	Rock, drilling with tricone bit followed by advance of Becker casing with assistance of down hole blasting.
	186 to 200	Assumed soil filled zone in rock based on low resistance to drilling with tricone bit, Becker casing advanced.
	200 to 204	Rock, assumed drilling with tricone bit followed by advance of Becker casing.
B28	0 to 148	Overburden/disturbed ground, advance with Becker casing.
	148 to 189	Rock, rotary drilling with tricone bit.
	189 to 194	Soil filled zone in rock, rotary drilling with tricone bit.
	194 to 202	Rock, rotary drilling with tricone bit.
B29	0 to 148	Overburden/disturbed ground, advance with Becker casing.
	148 to 185	Rock, rotary drilling with tricone bit.
	185 to 200	Soil filled zone in rock, rotary drilling with tricone bit.
	200 to 201	Rock, rotary drilling with tricone bit.
B30	0 to 168	Overburden/disturbed ground, advance with Becker casing.
	168 to 176	Broken rock or boulders, advance with Becker casing.
	176 to 208	Overburden/disturbed ground, clay from 176 to 184 feet, advance with Becker casing.
	at 208	Rock
B31	0 to 190	Overburden/disturbed ground, advance with Becker casing, hole discontinued due to broken casing, rock not defined.
B32	0 to 148	Overburden/disturbed ground, advance with Becker casing.
	148 to 196	Rock, rotary drilling with tricone bit.
	196 to 200	Soil filled zone in rock, rotary drilling with tricone bit.
	200 to 203	Rock, rotary drilling with tricone bit.
B33	0 to 152	Overburden/disturbed ground, advance with Becker casing.
	152 to 190	Rock, rotary drilling with tricone bit.
	190 to 192	Clay, rotary drilling with tricone bit.
	at 192	Wood, rotary drilling with tricone bit.
	192 to 198	Partial cavity with soil and lime mortar, rotary drilling with tricone bit.
	198 to 199	Rock, core drilling with diamond bit.
B34	0 to 156	Overburden/disturbed ground, advance with Becker casing.
	156 to 190	Rock, rotary drilling with tricone bit.
	190 to 205	Soil filled zone in rock, rotary drilling with tricone bit.
	at 205	Rock

**Table B2**  
**Summary of Becker Drilling Data (Continued)**

Hole No.	Depth (Feet)	Description of Findings and Drilling Procedures
B35	0 to 160	Overburden/disturbed ground, advance with Becker casing.
	160 to 178	Rock, rotary drilling with tricone bit.
	at 178	Wood, six to eight inches thick, very rotten, rotary drilling with tricone bit.
	178 to 190	Partial cavity with old wood, charcoal and clinker in cuttings returned during rotary drilling with tricone bit. Tried to advance Becker casing by blasting and driving but hole discontinued due to broken casing.
B36	0 to 204	Overburden/disturbed ground, clay from 178 to 187 feet, advance with Becker casing.
	204 to 207	Rock, drilling procedure not reported.
B37	0 to 164	Overburden/disturbed ground, advance with Becker casing.
	164 to 184	Rock, rotary drilling with tricone bit.
	184 to 199	Soil filled zone in rock, rotary drilling with tricone bit.
	199 to 200	Rock, rotary drilling with tricone bit.
B38	0 to 136	Overburden/disturbed ground, advance with Becker casing, hole discontinued due to broken casing, rock not defined.
B39	0 to 152	Overburden/disturbed ground, advance with Becker casing.
	152 to 155	Overburden/disturbed ground, rotary drilling with tricone bit.
	155 to 161	Partial cavity, tricone bit dropped with air on and weight of rods, evidence of stagnant water, wood and red clay.
	161 to 172	Overburden/disturbed ground, no evidence of wood or clay, advance with Becker casing.
	172 to 210	Rock, rotary drilling with tricone bit.
B40	0 to 175	Overburden/disturbed ground, clay from 175 to 195 feet, advance with Becker casing.
	175 to 195	Clay (not classified), advance with Becker casing.
	195 to 201	Overburden/disturbed ground, advance with Becker casing.
	201 to 226	Rock, rotary drilling with tricone bit.
B41	0 to 148	Overburden/disturbed ground, advance with Becker casing.
	148 to 200	Rock, rotary drilling with tricone bit.
B42	0 to 148	Overburden/disturbed ground, advance with Becker casing.
	148 to 158	Overburden/disturbed ground, considerable sand and water in return, rotary drilling with tricone bit.
	158 to 169	Rock, rotary drilling with tricone bit.
	169 to 178	Assumed soil filled zone in rock based on low resistance to drilling with tricone bit.
	178 to 202	Rock, rotary drilling with tricone bit.
B43	----	Hole not relevant, located about 180 feet northeast of Money Pit.
B44	----	Hole not relevant, located about 180 feet northeast of Money Pit.



**Table B2**  
**Summary of Becker Drilling Data (Continued)**

Hole No.	Depth (Feet)	Description of Findings and Drilling Procedures
B45	0 to 162	Overburden/disturbed ground, advance with Becker casing to 144 feet and drilling with tricone to 162 feet.
	162 to 210	Rock, rotary drilling with tricone bit. Note: This hole is assumed to be located about 50 feet west of the Money Pit but may be located near the Money Pit at coordinates 1006.2 feet north and 3994.6 east.
B46	0 to 109	Overburden/disturbed ground, advance with Becker casing, hole discontinued due to broken casing, rock not defined. Note: This hole is assumed to be located about 50 feet west of the Money Pit but may be located near the Money Pit at coordinates 1007.8 feet north and 3991.7 east.
B47	0 to 140	Overburden/disturbed ground, advance with Becker casing, hole discontinued due to following previously drilled hole, rock not defined. Note: This hole is assumed to be located about 50 feet west of the Money Pit but the actual location has not been reported.
B48	----	Hole not relevant, located about 180 feet northeast of Money Pit.
Notes: 1. The description of findings and drilling procedures are based on notes recorded by Dan Blankenship. Some of the recorded information is contradictory in detail and the most representative data has been transcribed to this table. 2. The data and descriptions are abbreviated with more emphasis on conditions below 155 feet depth. 3. Holes B1 to B15, B15A and B16 to B20 were carried out between January 19 and March 22, 1967. Holes B21 to B48 were carried out between mid-May and mid-August, 1967.		

**APPENDIX C**

**APPENDIX C**

**BROCHURE FOR BECKER DRILL USED IN 1967**

(4 Pages)

# THE becker HAMMER UNIT FOR OVERBURDEN DRILLING

Penetration rates of up to 100 ft. per hour  
in gravel, sand and boulder formations

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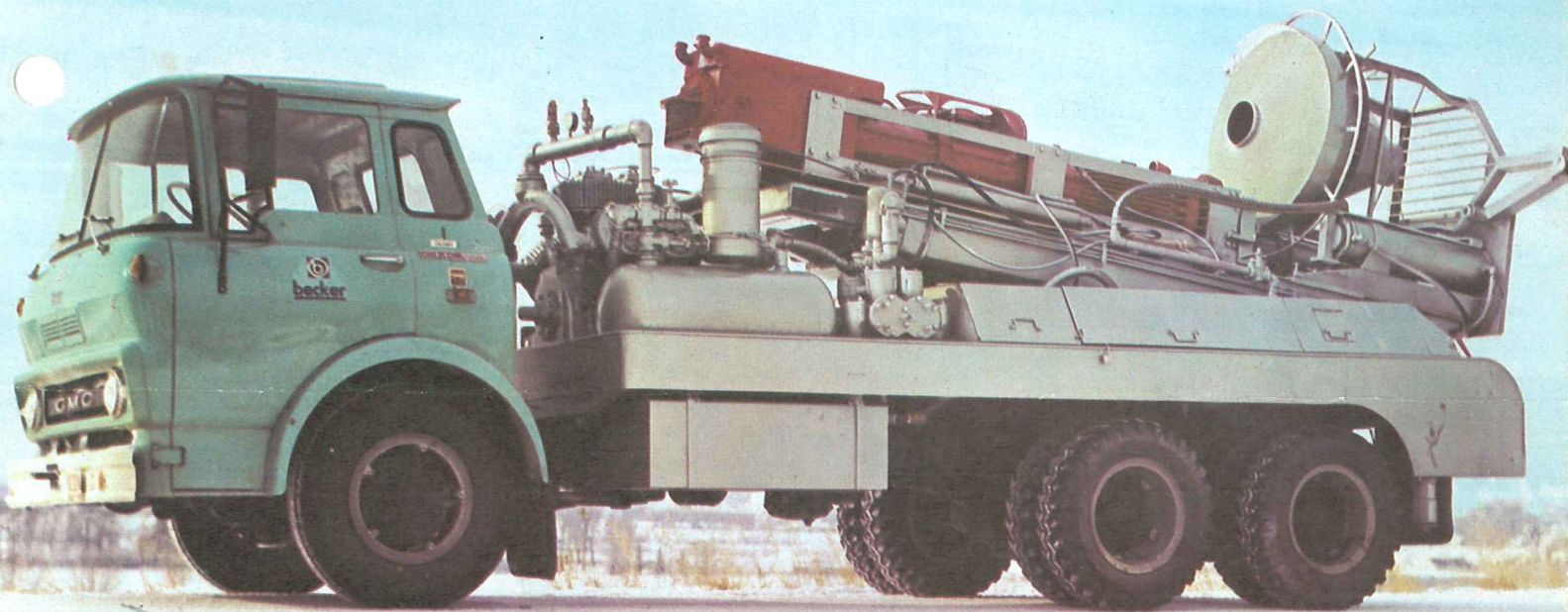
*Mr David Tobias,*

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*J. F. Short*



MODEL BDT 250



**becker**

## BECKER DRILLING (ALBERTA) LTD.

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# becker

## Hammer Drill for OVERBURDEN DRILLING

### General

Now even the most difficult overburden drilling can be accomplished easily and economically with the new **BECKER** Hammer Drill.

Designed for drilling in gravel, sand and boulder formations, this rugged unit achieves penetration rates up to 100 feet per hour and provides a continuous core. For soil sampling, close to 100% recovery can be achieved.

For dry sampling, air is generally used as the drilling fluid. However, water or a combination of air and water can be used where desired. Because the drill stem is clear at all times, casing or explosives can be set before the drill stem is withdrawn.

### How it works

As a double-walled drill stem fitted with a specially designed pilot bit is driven into the overburden by a diesel hammer, the

drilling fluid is pumped down the outer annulus and then 'jetted up' up the centre carrying the penetrated material to the surface. This continuous core recovery permits accurate sampling of the formation and pinpoints any water formations. Large boulders are quickly broken up by the percussion effect on the bit and forced to the surface.

As the centre of the drill stem is always clear and the bit always remains on the bottom of the hole, Penetrometer, Shelby or Split-Spoon tests can be taken at any desired intervals. Where bedrock core samples are required, a compact hydraulic rotary head swings into place and 'A' rod, conventional core barrel and a 2 15/16" bit are employed to penetrate hard rock formations at depths up to 500 feet.

### Where it works

The **BECKER** Hammer Drill has proven its reliability and ver-

satility on a wide variety of projects throughout Canada and abroad.

Units are currently operating in placer investigations, gravel bed evaluations, soil sampling on proposed damsites, setting grout nipples and casings, water well drilling and sampling copper slag and waste rock dumps.

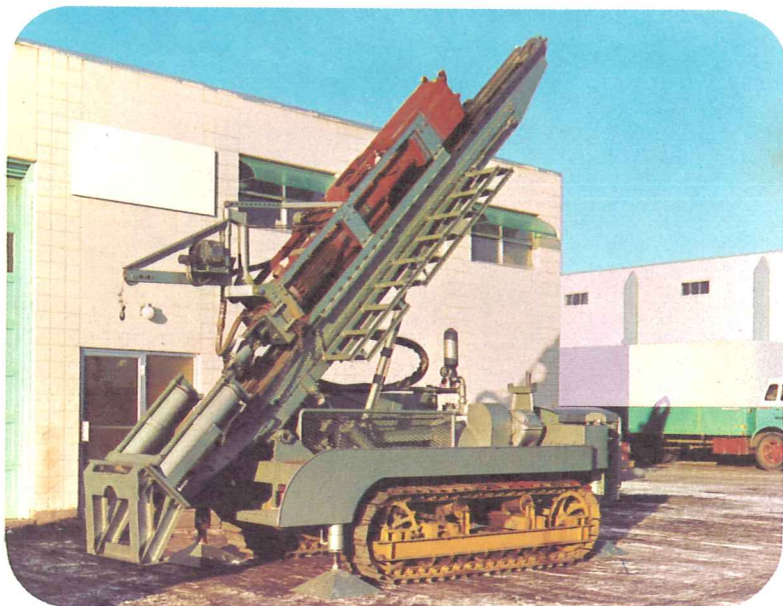
In addition, because of the unit's ability to operate at angles up to 45° it is now being used in the construction industry to drill tie back holes in overburden and pilot holes for the placing of piles in overburden and rock fills.

### Contract and leasing arrangements

The **BECKER** Hammer Drills are available for lease with or without personnel or for contract on a per month, foot or hourly basis. Invitations to bid, either alone or in conjunction with another drilling contractor are invited.

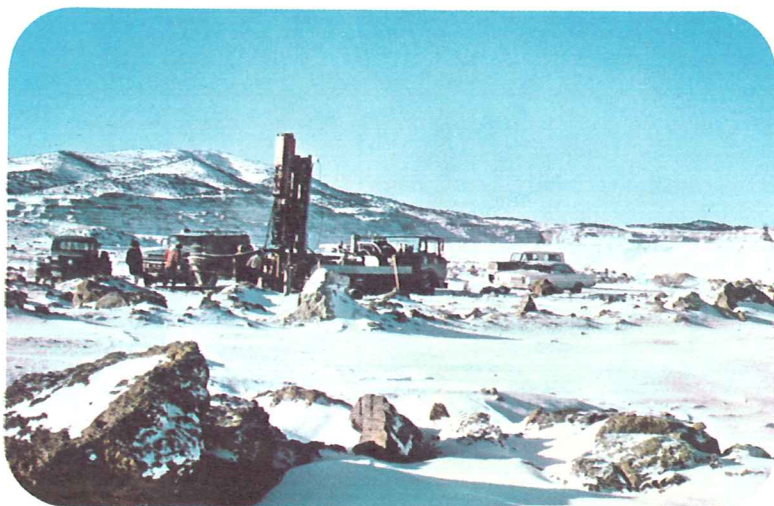


A barge mounted BECKER HAMMER DRILL under lease to Union Ore Corporation is engaged in off-shore placer investigations in Thailand. Up to 70' of ocean floor deposits are being penetrated through 95' of water yielding core recoveries of not less than 85%. Average ocean floor footage drilled is 3,500 feet per month.



This track mounted unit was assembled to drill holes at a 45° angle to the vertical. Working in Montreal it was called on to penetrate up to 180 feet of overburden and then drill 25 feet into the bedrock. "Tieback" anchors were grouted into the bedrock to support the foundation walls at the Palace of Justice project.

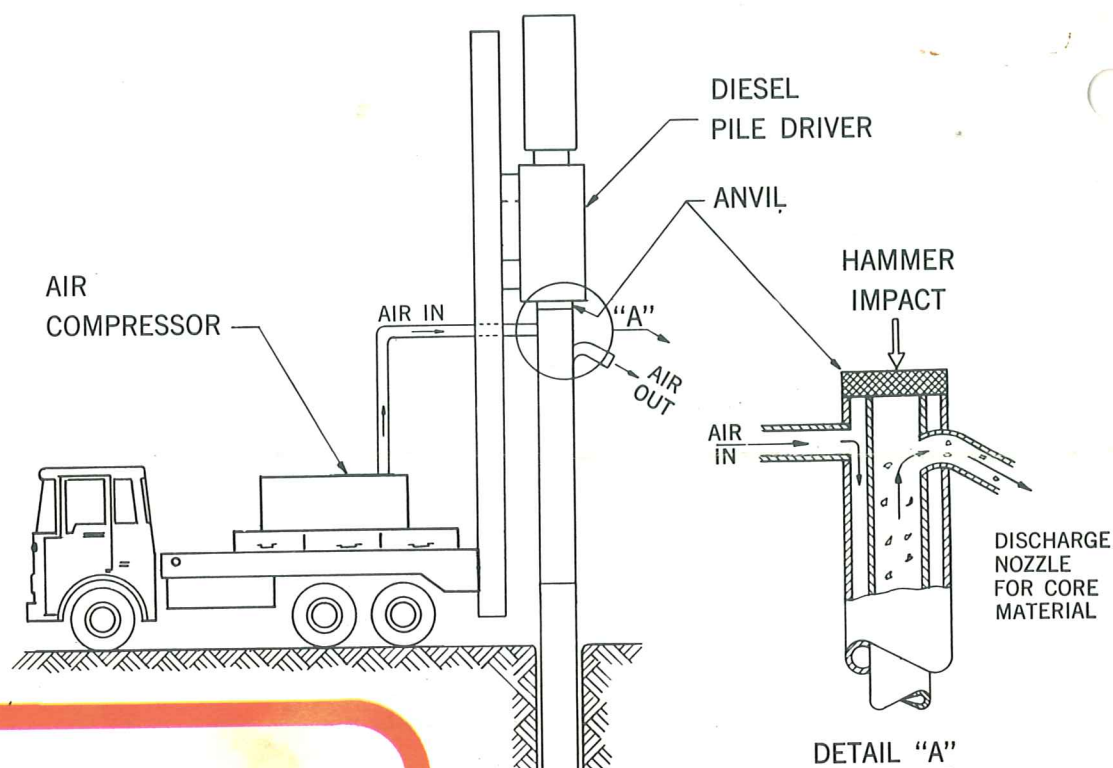
The ability to drill by both the percussion and rotary methods was incorporated into this one unit for this project. Over 50,000' of angle drilling was completed by Becker Units.



Heavy duty truck mounted BECKER HAMMER DRILLS are sampling copper ore dumps in Nevada and New Mexico. Continuous, dry, uncontaminated cores are being recovered from depths up to 250'. Average footage drilled and sampled by each drill is 22' per field hour.

Drilling in gravel, sand and boulder formations for the Seismic Exploration Industry can be carried out very economically as no drilling mud or expensive rock or finger bits are required. Penetration rates of up to 100' per hour can be consistently achieved.





### GENERAL SPECIFICATIONS

Usual mount .....	Tandem axle truck
Alternate mount .....	Barge, sled, etc.
Gross weight of hammer unit mounted on a tandem axle truck .....	30,000 lbs.
Length .....	26 ft.
Width .....	8 ft.
Tallest point of mast with hammer in transport position .....	80 inches
Tallest point of mast in transport position when mounted on a tandem axle truck .....	125 inches
Weight of ram only .....	1760 lbs.
Strokes per minute .....	98
Energy rating .....	8,000 ft. lbs. p.s.i.
Standard hole diameter .....	5½" o.d.
Core diameter .....	3" i.d.
Core sample accuracy .....	80 to 100%
Penetration depths: with 5½" o.d. drive pipe .....	Up to 250 ft.
with 2 15/16" tool using hydraulic rotary head .....	Up to 550 ft.
Controls .....	All hydraulic
Pulling cylinder capacity .....	100 tons

OTHER MODELS OF BECKER OVERBURDEN DRILLS ARE AVAILABLE FOR THE DRILLING OF HOLES UP TO A DIAMETER OF 18" TO PROVIDE CORE DIAMETERS UP TO 16".

DETAILS AVAILABLE UPON REQUEST



**becker**

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