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DEPARTMENT OF NATURAL RESOURCE DEVELOPMENT
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GEOLOGICAL SURVEY
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Information Pamphlet No. 12

SAND AND GRAVEL RESOURCES
IN HAND COUNTY, SOUTH DAKOTA

by

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Oahe Conservancy Sub-District,
South Dakota Department of Highways,
and Hand County

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INTRODUCTION

This pamphlet is one of a series of reports completed on the geology and hydrology of Hand County, South Dakota. The purpose of this report is to indicate areas in which to search for sources of aggregate material. The quality of the deposits encountered was not analyzed nor the quantity of available reserves measured. These would require a larger auger in order to get a more representative sample, prior knowledge of the material specifications for each intended use and more extensive drilling.

There are two other reports in this series. The first is a comprehensive publication entitled the "Geology and Water Resources of Hand and Hyde Counties, South Dakota." It contains the technical aspects of the study. It should be used in conjunction with this report as it defines and explains the distribution of earth materials in the County. It will also help answer questions of geologic and hydrologic interest.

The second report is an information pamphlet entitled "The Major Aquifers in Hand and Hyde Counties, South Dakota." It shows the areal distribution of major glacial aquifers and gives their expected yields and quality. It also discusses the bedrock aquifers and their yield and quality.

EXPLANATION OF TABLES

Table 1 is a list of test holes drilled in Hand County along with their locations. Most of them have been drilled by either the South Dakota Geological Survey or the United States Geological Survey. A few have been supplied by private drillers or the State Highway Department. Only that part of the log which indicates sand and/or gravel has been included in this table in order to reduce the amount of extraneous information.

Table 2 is a list of sand and gravel pits on file with the South Dakota Department of Highways. Where the information is available, it also includes the average thickness of the sand and/or gravel being removed, the average thickness of overburden and the type of material it contains. Average thickness values with a plus sign after them mean that the bottom of the pit is still in sand or gravel. In some cases the depth of the pit is determined by the water table and in others it is due to the predominance of sand.

EXPLANATION OF MAP

The map (illus.) shows the location of test holes, gravel pits, land marks, and the areas of good, fair and

poor probability of finding sand and gravel. Test holes are indicated by a filled circle (●), a filled triangle (▲) or an unfilled (○). The unfilled circle represents a location where no sand and/or gravel was encountered in the upper 25 feet of drilling. As such they are not numbered because they are not listed in the tables. The other two symbols refer to holes which did encounter sand and/or gravel in this interval. A filled circle represents 0-5 feet of overburden and a filled triangle 6-25 feet of overburden. The numbers beside each symbol refer to table 1 which lists the amount of sand and/or gravel present.

Gravel pits are designated by crossed pick and shovel (⌘). Those with numbers are listed in table 2 and have additional data on file with the District Highway Office of the South Dakota Department of Highways in Huron, South Dakota. No attempt has been made to differentiate the active from the inactive pits.

Using the test holes, gravel pit locations, topographic maps, air photos, and field observations, the County has been divided into three types of areas describing the probability of finding sand or gravel--good, fair, and poor. Each area designated as either good or fair has been assigned a roman numeral and is discussed in some detail below.

An area designated as "good" contains deposits that are generally (1) fairly thick--20 feet, (2) encompass a large area, and (3) are covered by little overburden--5 feet, or are very thick but less continuous laterally. Areas II and IV contain a great deal of sand whereas Areas I and VI yield abundant gravel. The sand and gravel in Area IX serves as an aquifer and has been developed for irrigation in several locations.

An area designated as "fair" contains deposits that are fairly thick but the distribution is less continuous and the thickness of the overburden is approximately 7 feet. Area III is composed primarily of fine sand which varies laterally in thickness. Area VII consists of material which was probably washed down off the higher ground to the west and is generally fine sand. Area VIII is on high ground and as a result of erosion is patchy.

An area designated as "poor" contains few sand and gravel pits. Some may be very productive but the deposits are localized and difficult to find without intensive exploration. A few possibilities for exploration would be the slopes of the Orient Hills, Ree Hills, and Wessington Hills.

**TABLE 1. List of Test Holes in Hand County, South Dakota,
Which Contain Sand and/or Gravel in the Upper 25 Feet**

Lithologic descriptions, as listed, have been condensed from data contained in driller's logs on file at the South Dakota Geological Survey office,

Vermillion, South Dakota, and contain only information which has been deemed most useful for this study.

| Test Hole No. | Location | Lithologic Description | From-to Feet |
|---------------|-----------------------|--|---|
| 1 | SW SW SW SW 36-117-70 | Sand and gravel | 17-55 |
| 2 | SE SE SE SW 31-117-69 | Sand, coarse with light-brown clay; saturated | 6-12 |
| 3 | SW SE SW SE 36-117-68 | Sand, coarse, to fine gravel; saturated Sand, medium to coarse with some fine gravel | 6-14 14-25 |
| 4 | SE SE SW SE 35-117-67 | Gravel, medium; dry, dirty, powdery Sand, very coarse; unoxidized, saturated, small granules Sand, coarse; unoxidized, saturated, very dirty | 1- 6 10-17 17-29 |
| 5 | SE SE SE SE 35-117-67 | Sand, yellow-brown with silt and clay | 4-12 |
| 6 | SW SW SW SW 36-117-67 | Sand and gravel, coarse | 22-33 |
| 7 | SW SW SE SW 36-117-67 | Gravel, coarse; dry, clean Sand, light-brown, coarse; clean Sand, dark-brown, coarse; saturated | 0-19 19-23 23-28 |
| 8 | NE SE SE NE 22-116-70 | Gravel and coarse sand; moist, clean | 0- 7 |
| 9 | NW NW SW SW 32-116-70 | Gravel, pea; clean Gravel, tan, and coarse sand; oxidized, dry, powdery Sand, light-brown, fine; oxidized, moist, well sorted, fairly clean Sand, dark-brown, medium, clayey; oxidized, saturated Sand, light-gray, medium, clayey; unoxidized, saturated | 3- 6 6-10 10-17 17-50 50-65 |
| 10 | NE NW SE SW 34-116-70 | Gravel, tan, medium, clayey; oxidized, dry, some small cobble, powdery Gravel, tan, medium; oxidized, dry, clean Gravel, tan, coarse; oxidized, dry, clean, hard drilling Sand, light-brown, fine; oxidized, saturated, slightly clayey, few large granules Sand, dark-gray, medium, very clayey; unoxidized, saturated, well-sorted | 0- 4 4- 6 6-10 10-16 18-62 |
| 11 | SW NE NW SE 34-116-70 | Gravel, tan, coarse, to coarse sand, very clayey; oxidized, dry, powdery Gravel, red-brown, coarse, to coarse sand, clayey; oxidized, moist Gravel, red-brown, coarse; oxidized, moist | 0- 4 4- 7 7-12 |
| 12 | NE NE NE NE 34-116-70 | Gravel, coarse; some sand | 0-25 |

| Test Hole No. | Location | Lithologic Description | From-to Feet |
|---------------|-----------------------|---|--|
| 13 | SE NW 17-116-68 | Sand, well-graded | 15-17 |
| 14 | SE NE NE NE 12-116-68 | Sand and gravel; silty toward top, clay layers from 26 to 28 feet | 7-33 |
| 15 | SE SE SE NE 13-116-68 | Sand, dark-brown, coarse to fine, silty | 4-10 |
| 16 | SE SE SE NE 34-116-68 | Gravel, very coarse; dry, pebbles to 1 inch diameter Sand, medium; dry, clean Sand, very fine; very hard drilling, abandoned hole | 0-6 6-25 25-29 |
| 17 | SE SE SE SE 34-116-68 | Gravel, coarse, very clayey; dry, powdery Sand, medium; dry, granules, dirty | 0-8 8-16 |
| 18 | NW SE NE NE 30-116-67 | Gravel; dry Gravel; saturated | 5-6 6-12 |
| 19 | SW NW 20-116-67 | Sand (outwash) Sand, clayey (outwash) | 10-13 13-15 |
| 20 | NW SW SW SW 17-116-67 | Sand, coarse, and blue clay streaks | 20-26 |
| 21 | NE NW NE NE 2-116-67 | Sand, tan, medium, clayey, pebbly; oxidized, dry, powdery Gravel, pea; dry Sand, tan, medium; oxidized, dry, some small pebbles, fairly clean Sand, light-brown, coarse; oxidized, saturated, clean Sand, brown, coarse, pebbly; oxidized, saturated, clean Sand, brown, clayey, pebbly; oxidized, saturated Sand, gray, medium; unoxidized, saturated, dirty | 1-4 4-5 5-10 10-16 16-20 20-26 26-30 |
| 22 | NW NW NW NW 1-116-67 | Sand, medium, clayey, silty; sticky Gravel | 0-17 17-20 |
| 23 | NE NW NW NW 1-116-67 | Sand, grayish-green, coarse, clayey; unoxidized, saturated Sand, light-gray, very coarse; unoxidized, saturated, few medium pebbles Gravel, light-gray, medium, to fine sand; unoxidized, saturated Sand, light-gray, medium; unoxidized, saturated, very well packed Sand, fine; unoxidized, saturated, some shale pebbles, well packed | 13-18 18-21 21-25 25-30 30-34 |
| 24 | SE SE NE SE 12-116-67 | Sand, very fine Gravel Gravel and medium to coarse sand | 0-2 2-5 13-18 |
| 25 | NE NE SE SE 12-116-67 | Gravel, clayey | 0-4 |
| 26 | NE SE SE SE 12-116-67 | Sand, silty Sand, coarse and gravel, clayey | 2-4 4-8 |
| 27 | NE NE SE SE 13-116-67 | Sand, coarse; dry, dirty, some granules | 0-3 |

| Test Hole No. | Location | Lithologic Description | From-to Feet |
|---------------|-----------------------|--|--|
| 28 | SE SE SE NE 24-116-67 | Sand, fine; unoxidized Sand, fine; unoxidized Cobble | 22-23 24-25 25-26 |
| 29 | NE SE 28-116-67 | Sand, clayey (outwash) Sand; abandoned in sand | 7-13 13-18 |
| 30 | SW SE SE SW 32-116-67 | Sand, medium to coarse and gravel | 3-14 |
| 31 | NE NE SE NE 25-116-67 | Sand, coarse; saturated, clean Sand, coarse; unoxidized, saturated, dirty | 10-17 17-23 |
| 32 | SW SW SE SE 25-116-67 | Sand, light-brown, very fine; oxidized, moist, fairly clean | 6-11 |
| 33 | SE SE SE SE 25-116-67 | Sand, very fine Sand, very coarse; some gravel streaks, tighter drilling at 50 feet | 2- 8 24-67 |
| 34 | NW SW SW SW 31-116-66 | Sand, light-brown, medium, clayey; oxidized, moist, some large granules Sand, light-brown, medium, clayey; oxidized, saturated | 11-16 19-22 |
| 35 | SE SW SE SE 29-116-66 | Sand, very coarse and gravel | 7-22 |
| 36 | NE NE SE SE 6-115-70 | Sand, light-brown, fine; oxidized, moist, well sorted, fairly clean Sand, dark-brown, fine, clayey; oxidized, moist, well sorted | 4-12 12-16 |
| 37 | SE SW SW SE 4-115-70 | Gravel, tan, medium, and coarse sand; oxidized, dry, slightly dirty, powdery | 0- 4 |
| 38 | NW NW NW SW 3-115-70 | Gravel, fine, very clayey; oxidized, saturated Gravel, fine to medium, very clayey; unoxidized, saturated Sand, coarse; unoxidized, saturated, very dirty Gravel, medium; unoxidized, saturated, dirty Sand, very coarse; saturated, some granules, fairly clean Gravel, coarse; saturated, abandoned in gravel | 17-21 21-26 26-32 32-58 58-63 63-79 |
| 39 | NE NW NE NW 3-115-70 | Gravel, tan, medium, clayey, abundant cobbles; oxidized, dry, powdery Gravel, light-brown, fine, and medium sand, clayey; oxidized, moist, some small pebbles Gravel, dark-brown, medium, to medium sand, very clayey; oxidized, moist, some large granules | 1- 6 6-13 13-15 |
| 40 | NW NW NE NE 3-115-70 | Gravel, tan, medium, to coarse sand, abundant medium to large pebbles; oxidized, dry, powdery Gravel, light-brown, medium, to coarse sand, abundant medium pebbles; oxidized, moist | 0- 5 5-17 |

| Test Hole No. | Location | Lithologic Description | From-to Feet |
|---------------|-----------------------|--|--------------|
| | | Gravel, reddish-brown, medium, to coarse sand, abundant medium pebbles; oxidized, saturated, slightly clayey | 17-31 |
| | | Gravel, dark-brown, medium, to coarse sand, abundant medium pebbles, clayey; oxidized | 31-46 |
| | | Gravel, light-gray, medium, to coarse sand; unoxidized, saturated | 46-66 |
| 41 | NE SE SW NE 3-115-70 | Gravel, medium; moist fairly clean | 0- 1 |
| | | Gravel, medium; saturated, clean | 1-11 |
| | | Gravel, coarse; saturated, clean | 11-21 |
| | | Gravel, medium; unoxidized, saturated, very clean | 21-33 |
| | | Gravel, fine to medium; saturated, very clean | 33-65 |
| 42 | NE NE SE SE 3-115-70 | Gravel, very coarse; dry, fairly clean | 2- 7 |
| | | Gravel, dark brown, coarse; moist, little clay | 7-18 |
| | | Gravel, dark-brown, coarse, clayey; saturated | 18-22 |
| | | Gravel, very coarse, abundant 1/2 to 3-inch diameter material; saturated, very clean, no fines | 22-31 |
| 43 | NE NE SE NE 10-115-70 | Sand, coarse; oxidized, saturated, dirty | 12-14 |
| | | Sand, fine to coarse; unoxidized, saturated, very dirty | 14-25 |
| 44 | SW SW SE SW 8-115-68 | Sand, very coarse and gravel | 7-12 |
| 45 | SE SE SE SE 15-115-68 | Sand, fine and silt; some clay | 4- 5 |
| | | Sand, fine and silt; some clay | 9-10 |
| 46 | NW NE NW NW 23-115-68 | Sand, medium to coarse; oxidized | 10-13 |
| | | Sand, fine to medium, silty; some clay, laminated | 13-15 |
| | | Sand and fine gravel; oxidized, few fines, poorly sorted | 15-19 |
| 47 | SE SE SW SW 13-115-68 | Sand, coarse; moist, clean, some granules | 0-16 |
| | | Sand, coarse; saturated, granules, dirty | 22-34 |
| 48 | NW NW NW NW 35-115-68 | Sand, coarse to very coarse and gravel; saturated at 8 feet | 0-38 |
| 49 | NW NW NW NW 21-115-67 | Sand and silt; oxidized, inter-layered with till | 6-15 |
| 50 | SE SE SW SE 16-115-67 | Sand and silt, very clayey; poorly sorted, very sandy till? | 3-12 |
| | | Sand, fine to medium; some silt, little clay | 12-20 |
| 51 | NW NW NW NW 22-115-67 | Sand, silty; some clay, humic | 0- 2 |
| | | Sand, fine to medium; oxidized, some silt | 2-14 |
| | | Sand, fine to coarse; oxidized to 17 feet, some silt | 15-20 |

| Test Hole No. | Location | Lithologic Description | From-to Feet |
|---------------|-----------------------|---|----------------------------------|
| | | Sand, fine to medium; unoxidized, some silt | 20-24 |
| 52 | NW NW NW NE 22-115-67 | Sand, fine to medium, silty; oxidized Silt with fine sand; oxidized, some clay Sand, fine, silty; oxidized Sand, fine to medium; some silt | 12-14 14-15 16-20 20-21 |
| 53 | SE SE SE SE 2-115-67 | Sand, silty (outwash) | 7-12 |
| 54 | NW NW NW NW 24-115-67 | Sand, fine to medium and silt Silt and fine sand; oxidized, inter-layered with till Sand, fine to very fine; oxidized, some silt | 4- 5 5- 8 8-10 |
| 55 | SE SE SE SW 13-115-67 | Silt and fine sand; oxidized, some clay Sand and pebbles, very clayey; unoxidized, well graded (till?) Sand, medium; well sorted, very little fines | 18-20 24-28 28-40 |
| 56 | NE NE NE NE 24-115-67 | Sand, medium to coarse, silty, clayey; oxidized (till?) | 22-25 |
| 57 | NE NW NE NW 34-115-67 | Sand, very fine Sand, very fine, silty Sand, very fine, silty, clayey, gravelly | 3- 6 13-22 22-30 |
| 58 | NW NE NW NW 34-115-67 | Sand, coarse, silty; sticky | 20-34 |
| 59 | SW SE SE SW 36-115-67 | Sand, medium to very coarse and gravel | 3- 8 |
| 60 | NW NW SW NW 31-115-66 | Sand, very coarse, to fine gravel | 13-30 |
| 61 | NE NE NE NE 19-115-66 | Sand, silty | 4-10 |
| 62 | NE SW NE SE 20-115-66 | Silt and fine sand Silt and fine to very fine sand; oxidized Silt and fine sand; oxidized, some clay, laminated | 0- 5 5- 8 15-17 |
| 63 | NW NW NW NW 21-115-66 | Sand, fine to medium, small pebbles; oxidized, some clay (reworked till?) | 14-17 |
| 64 | NE NE NE NE 21-115-66 | Sand, fine to medium; oxidized, some silt, clay and small pebbles (till?) | 11-14 |
| 65 | NE NE NE NE 2-115-66 | Sand, fine; oxidized, some silt and medium sand | 16-20 |
| 66 | SE SE NE NE 14-115-66 | Sand, medium and gravel, silty | 4-30 |
| 67 | NW NW 14-115-66 | Sand | 12-18 |
| 68 | NW NW NW NW 23-115-66 | Silt and very fine sand; oxidized, some clay, few scattered pebbles | 0- 4 |
| 69 | SE NE NE NE 24-115-66 | Sand, fine to medium Sand and gravel; well graded, lignite in upper 6 inches | 5- 9 10-20 |

| Test Hole No | Location | Lithologic Description | From to Feet |
|--------------|-----------------------|---|--------------|
| | | Gravel, medium, very silty and clayey; some fine sand | 20-30 |
| 70 | NE NE NE NE 28 115 66 | Gravel, coarse; stopped in gravel | 3-12 |
| 71 | NW NW NW NW 2 114-70 | Sand and gravel | 25-30 |
| 72 | SE SE NE SE 10 114-68 | Sand, coarse; dry, clean | 0-24 |
| | | Sand, coarse; moist, clean | 24-29 |
| | | Sand, green brown, coarse; saturated, fairly clean | 29-36 |
| | | Sand, coarse; unoxidized, saturated, clean | 36-48 |
| 73 | ? 27-114-68 | Sand and gravel | 0-40 |
| 74 | NW NW 8-114 67 | Sand, medium; saturated at 8 feet | 2-10 |
| | | Gravel and very coarse sand; clean | 10-30 |
| 75 | NE NE NW NW 8 114 67 | Sand, fine to medium; oxidized | 0-6 |
| 76 | SE SW SE SE 5-114 67 | Sand, tan, very fine, moist, clean | 0-8 |
| | | Sand, very fine, clayey; moist | 8-13 |
| | | Sand, fine to medium; saturated, clean, hard packed | 13-18 |
| | | Sand, dark brown, medium; saturated, dirty | 18-22 |
| | | Sand, medium, very clayey; unoxidized, saturated | 22-35 |
| | | Sand, medium, very clayey; unoxidized, saturated, very hard, abandoned | 35-77 |
| 77a | SE NW NW NW 15-114 67 | Sand, fine | 10-12 |
| 77b | NW NW NW NW 15-114-67 | Sand, fine, silty | 2-5 |
| | | Sand, coarse to medium; slightly silty | 15-27 |
| | | Sand, medium, clayey | 27-32 |
| 78 | SW SW SE SE 16-114-67 | Sand, fine to coarse; oxidized, some gravel | 5-15 |
| | | Gravel; unoxidized, some clay | 15-20 |
| | | Sand, medium; unoxidized, some fine and coarse sand | 20-30 |
| | | Sand, fine to coarse; unoxidized, some clay and silt lenses | 30-35 |
| 79 | SW SW SW SE 16-114 67 | Sand, silty, clayey, pebbly; oxidized | 8-10 |
| | | Sand, medium; oxidized | 10-11 |
| | | Sand, fine to coarse, gravelly; unoxidized, some silt and clay | 15-25 |
| | | Sand, coarse; unoxidized | 25-30 |
| 80 | SE SE SW SW 16-114 67 | Sand, fine, silty, clayey; unoxidized | 15-30 |
| | | Sand, fine; unoxidized, some silt | 30-41 |
| | | Sand, fine to coarse; unoxidized, some silt and clay lenses, some carbonized wood | 41-52 |
| 81 | SW SW SW SW 16-114 67 | Sand, medium; some silt and clay (till?) | 0-5 |
| 82 | SW SW SW SW 17-114 67 | Sand and clay (topsoil) | 0-2 |
| | | Sand, fine to medium; oxidized, some silt | 2-10 |
| 83 | NE 19-114-67 | Gravel | 20-23 |

| Test Hole No. | Location | Lithologic Description | From to Feet |
|---------------|-----------------------|--|---|
| 84 | SW SW SW SW 18-114-67 | Silt and fine sand; oxidized | 2-16 |
| 85 | SE SE SE SE 21-114-67 | Sand, coarse and gravel, clayey | 2-9 |
| 86 | NE NE NE NE 24-114-67 | Silt and fine sand; unoxidized at 14 feet, some clay | 0-15 |
| 87 | NW NW NW NW 35-114-67 | Sand, fine Gravel | 13-20 20-30 |
| 88 | NW SW SW SW 27-114-67 | Sand, very fine, clayey Sand, coarse and gravel Sand, silty, clayey; sticky Sand, gray, medium; well sorted | 0-13 13-30 30-55 55-70 |
| 89 | SW SW SW NW 35-114-67 | Sand, fine to medium Sand, fine, clayey; sticky | 2-8 20-23 |
| 90 | NE SE NW NW 8-114-66 | Sand, fine; stopped in sand | 10-42 |
| 91 | SE SE SE NE 4-114-66 | Sand, coarse to very coarse; saturated Gravel; saturated | 8-17 17-20 |
| 92 | NE SE NE NE 9-114-66 | Sand, medium Gravel Sand, medium Gravel | 10-20 20-24 24-35 35-40 |
| 93 | NW NW SW SW 10-114-66 | Sand, very fine, silty; dry Gravel and very coarse sand, silty Sand, medium to coarse Sand, medium, silty; sticky | 2-8 8-10 15-26 26-47 |
| 94 | NW SW SW NW 17-114-66 | Sand, fine, silty; sticky Sand, very fine Sand, very fine, silty, clayey; firm | 5-13 13-30 30-36 |
| 95 | SE 17-114-66 | Sand, coarse; changing to blue clay Sand, fine to coarse; streaks of lignite Sand, coarse, blue clay; lignite Sand, fine, blue clay; lignite Sand, fine, blue clay | 22-40 40-42 42-62 62-82 82-92 |
| 96 | SW SW SW SW 16-114-66 | Silt, clayey; oxidized, some sand | 0-4 |
| 97 | SE NE NE NE 13-114-66 | Sand, fine to medium Sand, coarse and fine gravel | 0-7 7-45 |
| 98 | NE NE NE NE 35-114-66 | Sand, fine to medium; oxidized, some silt | 5-15 |
| 99 | SE SE SE SW 18-114-65 | Sand, fine; oxidized | 0-8 |
| 100 | SW SW SW SW 33-113-69 | Sand | 16-17 |
| 101 | SE SE SE NE 6-113-68 | Gravel and very coarse sand | 8-13 |
| 102 | NW NW SW 4-113-68 | Sand | 25-50 |
| 103 | SW SW SW NW 1-113-68 | Sand, fine Gravel and very coarse sand, silty; coarse gravel at 15 feet | 2-10 10-22 |
| 104 | SW SW SW SE 36-113-68 | Sand, fine | 5-10 |

| Test Hole No. | Location | Lithologic Description | From-to Feet |
|---------------|-----------------------|---|--|
| 105 | SE SW SW SE 2-113-67 | Sand, brownish-gray, very fine; saturated, very dirty Sand, fine; unoxidized, saturated, some coarse particles, very dirty | 19-28 28-31 |
| 106a | SW SW NW NW 1-113-67 | Sand, medium; saturated, dirty Sand, medium; oxidized, saturated, dirty Gravel; saturated, unknown size Gravel, medium, clayey; unoxidized, saturated, dirty | 14-23 23-27 27-31 31-37 |
| 106b | SW SW NW NW 1-113-67 | Sand, fine, silty; sticky Sand and gravel Gravel | 20-33 33-37 37-40 |
| 107 | SW SW SW NW 1-113-67 | Sand, medium and gravel; dry Sand, very coarse, very clayey Sand, clayey (till?) Gravel, clayey Sand, clayey | 0-5 5-12 18-23 23-30 30-45 |
| 108 | SE SE SE SW 1-113-67 | Sand, coarse; saturated, some granules, clean Sand, very coarse; saturated, some large granules, clean | 12-18 18-28 |
| 109 | SW SW NW 8-113-66 | Gravel | 10-20 |
| 110 | NW SW NW SW 8-113-66 | Gravel, coarse; dry, clean Gravel, clayey; oxidized, moist Gravel, very coarse; oxidized, saturated, dirty | 0-7 7-9 16-29 |
| 111 | NE SE NE NE 8-113-66 | Sand, coarse; unoxidized, saturated, dirty | 6-24 |
| 112 | NW SW SW NW 9-113-66 | Sand, brown, very fine; saturated, shale pebbles | 11-24 |
| 113 | NW SW SW SW 11-113-66 | Sand, light-brown, medium, very clayey; oxidized, well sorted Sand, light-gray, coarse, very clayey; unoxidized, well sorted Gravel, pea; saturated, clean Gravel, light-gray, medium, to coarse sand; unoxidized, saturated | 21-27 27-42 42-43 43-52 |
| 114 | SE SE SE SE 12-113-66 | Sand, dark-brown, fine to very fine, clayey; saturated Gravel, fine to medium, and coarse to medium sand; clean Sand, medium to very coarse; clean to 27 feet, clayey below 27 feet | 8-15 15-25 25-45 |
| 115 | SW SW NW NW 21-113-66 | Sand, medium; saturated, dirty Sand, coarse; saturated, fairly clean, some granules | 4-9 9-19 |
| 116a | SW SW SW SW 31-113-66 | Sand, medium; moist, fairly clean Sand, coarse; saturated, dirty Sand, coarse, clayey; oxidized, moist Gravel; saturated, dirty, fine granules Sand, very fine, pebbly; unoxidized, saturated, dirty | 1-6 6-10 10-13 13-28 28-40 |

| Test Hole No. | Location | Lithologic Description | From-to Feet |
|---------------|-----------------------|--|---|
| 116b | SW SW SW SW 31-113-66 | Sand and clay layers; abandoned in sand | 0-20 |
| 117 | NW SW NW SW 32-113-66 | Gravel, very coarse; saturated, clean Sand, light brown, coarse; oxidized, saturated, fairly clean Sand, dark brown, medium to coarse, clayey; oxidized, saturated Gravel, brownish gray, fine, to medium sand, clayey; oxidized, saturated Sand, light gray, fine, very clayey; unoxidized, saturated | 11-13 13-17 17-19 21-32 32-35 |
| 118 | SE SW SW SE 32-113-66 | Sand, fine to medium; some silt and clay | 0-2 |
| 119 | SW SW SW SW 33-113-66 | Sand, coarse to medium; oxidized, clay stringers from 17 to 18 feet | 12-20 |
| 120 | SW SW SW SW 34-113-66 | Sand, fine; oxidized | 10-21 |
| 121 | SW SW SW SE 34-113-66 | Sand, silty, clayey Gravel | 3-4 10-11 |
| 122 | NW NW SW NW 19-113-65 | Sand, fine to medium; oxidized, dirty, sticky Sand, fine to medium; unoxidized, saturated, fairly clean | 7-14 14-22 |
| 123 | SW SW SW SW 4-112-69 | Gravel | 21-24 |
| 124 | SW NE NE 3-112-68 | Sand, brown; some clay | 0-16 |
| 125 | SE SE SE 3-112-68 | Sand, buff, coarse; loose | 0-8 |
| 126 | SW SW SW NW 33-112-68 | Sand, light brown, clayey; oxidized, saturated | 12-13 |
| 127 | NE NE NW NE 3-112-67 | Sand, medium to coarse and fine gravel Sand, fine; some silt | 25-32 32-35 |
| 128 | SW SW NW SW 1-112-67 | Sand, medium to coarse; moist, dirty Sand, coarse, clayey; unoxidized, saturated | 4-6 18-23 |
| 129 | SE SE SE NE 10-112-67 | Sand, coarse, pebbly; dry, dirty Gravel, medium; saturated, clean Gravel, coarse, clayey; unoxidized, saturated Sand, coarse; unoxidized, saturated, dirty | 1-7 7-11 11-17 17-21 |
| 130 | SE SW SW SE 10-112-67 | Sand, medium; dry, clean | 4-9 |
| 131 | SE SE SE SE 32-112-67 | Sand, brown | 0-5 |
| 132 | SW SW NW NW 3-112-66 | Gravel, medium; dry, fairly clean Sand, medium; oxidized, moist, clean Sand, light gray, medium; unoxidized, saturated, clean Sand, medium; unoxidized, saturated, slightly clayey | 1-6 6-14 14-20 20-46 |
| 133 | NW NW NE NW 3-112-66 | Sand, light brown, coarse, clayey; oxidized, saturated | 5-7 |

| Test Hole No. | Location | Lithologic Description | From-to Feet |
|---------------|-----------------------|---|--------------|
| | | Gravel, light-brown, medium, to coarse sand, clayey; oxidized, saturated | 7-15 |
| | | Gravel, light-gray, medium, to coarse sand, clayey; unoxidized, saturated | 15-22 |
| | | Gravel, light gray, fine, to coarse sand, clayey; unoxidized, saturated | 22-30 |
| | | Gravel, light gray, medium; unoxidized, saturated, slightly clayey | 30-52 |
| 134a | SW SE SE SE 3-112-66 | Sand, light-brown, fine; oxidized, saturated, clean | 3-5 |
| | | Sand, dark-brown, fine, clayey; oxidized, saturated, few large granules | 5-12 |
| | | Sand, dark-gray, fine, very clayey; unoxidized, saturated, few large granules | 12-15 |
| | | Sand, light-gray, fine, very clayey; unoxidized, saturated | 15-27 |
| | | Sand, light-gray, coarse, clayey; unoxidized, saturated | 27-37 |
| | | Sand, light-gray, pebbly, clayey; unoxidized, saturated | 37-40 |
| | | Sand, light-gray, coarse, clayey; unoxidized, saturated | 40-45 |
| | | Sand, light-gray, medium to coarse, clayey; unoxidized, saturated | 45-64 |
| 134b | SW SE SE SE 3-112-66 | Gravel, brown; saturated | 6-36 |
| | | Gravel, large rocks; abandoned in gravel | 36-41 |
| 135 | NE NE NE SE 11-112-66 | Gravel, medium; unoxidized, saturated, very dirty | 12-22 |
| 136 | NE NW NE NW 14-112-66 | Gravel, light-gray, medium, to coarse sand, clayey; unoxidized, saturated | 10-16 |
| | | Gravel, light gray, and fine to coarse sand, clayey; unoxidized, saturated | 16-22 |
| 137 | NE SE NE 14-112-66 | Sand and gravel, brown | 0-6 |
| | | Sand, medium and gravel; saturated at 16 feet, abandoned in sand | 6-26 |
| 138 | NW NW SW SW 13-112-66 | Sand and gravel, brown | 0-6 |
| | | Sand, brown becoming gray, fine; saturated | 6-11 |
| | | Sand, gray, fine; clay layers | 11-21 |
| 139 | SW NW SW SW 13-112-66 | Gravel, coarse; oxidized, dry, dirty | 1-3 |
| | | Sand, fine; moist, clean | 3-5 |
| | | Sand, fine to medium; moist, clean | 5-11 |
| | | Sand, medium to coarse; saturated, clean | 11-16 |
| | | Sand, medium to coarse; unoxidized, saturated | 16-22 |
| 140 | NW NW NW SW 24-112-66 | Gravel, coarse; saturated | 16-17 |
| 141 | NW NW SW NE 24-112-66 | Gravel, coarse; saturated, clean | 1-3 |
| | | Gravel, coarse; saturated, dirty | 3-13 |
| | | Gravel, dark-brown, medium; saturated, fairly clean | 13-16 |
| | | Gravel, medium; unoxidized, saturated, fairly clean | 16-23 |

| Test Hole No. | Location | Lithologic Description | From-to Feet |
|---------------|-----------------------|--|--------------|
| | | Gravel, fine; unoxidized, saturated, dirty | 23-29 |
| | | Sand, fine; unoxidized, saturated | 29-49 |
| 142 | NE NE SW NE 24-112-66 | Gravel, coarse; dry, dirty, powdery | 1- 4 |
| | | Gravel and coarse sand; dry, clean | 4-18 |
| | | Gravel, coarse, very silty; oxidized, moist | 18-26 |
| | | Sand, fine; oxidized, saturated | 26-30 |
| 143 | SE SE SE NE 24-112-66 | Gravel, light-brown, medium, to coarse sand; oxidized, saturated, dirty | 4-10 |
| | | Gravel, light-brown, medium; oxidized, saturated, dirty | 10-26 |
| | | Gravel, light-gray, medium, clayey; unoxidized, saturated | 26-35 |
| 144 | SW SW SW SE 24-112-66 | Sand, coarse; unoxidized, saturated, dirty | 17-21 |
| 145 | SW SW SE SE 24-112-66 | Gravel, medium; dry, dirty | 0-10 |
| | | Gravel; saturated, fairly clean | 10-22 |
| | | Sand, very coarse; unoxidized, saturated, fairly clean | 22-36 |
| | | Gravel, cobbly, unknown size, hard drilling | 36-49 |
| 146 | NE NE NE NE 25-112-66 | Gravel, black, coarse to fine, sandy, silty | 0- 3 |
| | | Sand, brown, medium; gravelly from 3 to 7 feet, very well sorted from 7 to 12 feet | 3-15 |
| | | Sand, gray, medium, clayey | 15-17 |
| | | Sand, gray, fine to very fine, very clayey; slightly gravelly from 27 to 32 feet | 17-40 |
| 147 | NE NE SE NE 25-112-66 | Gravel, tan, medium, to coarse sand, abundant medium pebbles; oxidized, dry | 0- 5 |
| | | Gravel, light-brown, medium, to coarse sand; oxidized, moist, clean | 5-10 |
| | | Gravel, reddish-brown, medium, to coarse sand; oxidized, saturated | 10-17 |
| | | Sand, light-brown, coarse; oxidized, saturated, dirty | 17-23 |
| | | Gravel, light gray, clayey; unoxidized, saturated, some small pebbles | 23-26 |
| 148 | SE SE SE SW 35-112-66 | Gravel, light-brown, fine, to coarse sand; oxidized, saturated, dirty | 6-11 |
| | | Gravel, light-brown, sandy; oxidized, saturated, dirty | 11-17 |
| 149 | NE NE SE SE 35-112-66 | Gravel, light-brown, fine; oxidized, some fine to medium pebbles, dirty | 1- 5 |
| | | Gravel, light-brown, medium, pebbly; oxidized, moist, dirty | 5- 7 |
| 150 | SW SW SE SW 36-112-66 | Sand, gray, coarse; unoxidized, saturated, fairly clean | 6-19 |
| | | Sand, dark-gray, medium; unoxidized, saturated, fairly clean | 19-27 |

| Test Hole No. | Location | Lithologic Description | From to Feet |
|---------------|-----------------------|--|--------------|
| | | Sand, dark-gray, fine, clayey; unoxidized, saturated | 27-36 |
| 151 | SE SE SE SW 36-112-66 | Gravel, tan, fine; oxidized, dry, dirty | 0- 1 |
| | | Sand, tan, medium; oxidized, dry, fairly clean, few small granules | 1- 3 |
| | | Sand, light-brown, medium; oxidized, moist, fairly clean, few small granules | 3- 5 |
| | | Gravel, light-brown, fine, sandy; oxidized, moist, slightly dirty | 5-11 |
| | | Gravel, dark-brown, fine, pebbly; oxidized, saturated, dirty to very dirty | 11-37 |
| | | Gravel, dark-brown, medium, very pebbly; oxidized, saturated, very dirty | 37-39 |
| | | Gravel, light-gray, fine, to coarse sand, pebbly; unoxidized, saturated, fairly dirty | 39-45 |
| 152 | NE NE NE SE 36-112-66 | Gravel, dark-brown, coarse, clayey; oxidized, moist | 0- 1 |
| | | Gravel, dark-brown, coarse, clayey; oxidized, saturated | 5- 9 |
| | | Gravel, dark-gray, fine, to coarse sand; unoxidized, saturated, dirty | 9-15 |
| 153 | NE NE SE SE 36-112-66 | Sand, coarse; dry, very clean | 0- 4 |
| | | Gravel, red-brown, coarse, pebbly; oxidized, dry, slightly dirty | 4-10 |
| | | Gravel, coarse, pebbly; moist, clean | 10-20 |
| | | Sand, dark-brown, coarse; oxidized, saturated, dirty, abandoned in sand | 20-34 |
| 154 | SE SE SE SE 36-112-66 | Sand, reddish-gray, limey | 3- 5 |
| | | Sand, red and gray | 5-10 |
| | | Sand, reddish-brown, gravelly | 18-22 |
| 155 | SW SW SW NW 7-112-65 | Sand, light-brown, fine, silty, clayey; easy drilling | 19-21 |
| | | Sand, medium-gray, fine, silty, clayey; easy drilling from 26 to 33 feet, harder drilling from 33 to 39 feet | 26-39 |
| 156 | SE NW NW SE 20-111-70 | Gravel, rocky | 0- 3 |
| | | Sand and gravel, fewer rocks, abandoned | 3-15 |
| 157 | SW SE SW SW 14-111-70 | Sand, brown, rocky | 0- 3 |
| | | Sand, brown | 3- 9 |
| | | Gravel, brown, rocky, abandoned | 9-13 |
| 158 | SE NW NW NW 23-111-70 | Gravel, rocky | 0- 4 |
| | | Sand, coarse | 4- 7 |
| 159 | SW SW NW SW 27-111-70 | Sand, dark-brown; saturated | 5-18 |
| 160 | SW SW SW SW 11-111-68 | Sand, medium; dirty | 0- 1 |
| 161 | SW SW SW SW 24-111-68 | Sand, light-brown, medium, clayey; oxidized, saturated, some coarse sand | 16-21 |
| 162 | SE SE SE SW 27-111-68 | Sand, fine; oxidized, dry, well sorted | 0- 1 |

| Test Hole No. | Location | Lithologic Description | From-to Feet |
|---------------|-----------------------|---|---------------------------------|
| 163 | NE NE NE NE 33-111-68 | Gravel, tan, coarse, clayey; oxidized, dry | 0-4 |
| 164 | NW NW NE NW 19-111-67 | Sand, light-brown, coarse, clayey; oxidized, saturated, abundant large granules Sand, light brown, coarse; oxidized, saturated, slightly clayey; some large granules | 17-21 21-23 |
| 165 | NE NE SE NE 9-111-66 | Sand, tan, very fine; oxidized, dry, clean Sand, tan, very fine; oxidized, moist; clean Sand, dark brown, very fine, clayey; oxidized, moist Sand, dark-brown, very fine, clayey; oxidized, saturated | 0-5 5-11 11-15 15-22 |
| 166 | NE NW NW NW 11-111-66 | Gravel, fine; dry, fairly clean | 1-6 |
| 167 | SW SW NW SW 2-111-66 | Gravel, light brown, fine, clayey; oxidized, some medium granules | 6-7 |
| 168 | NE NE NE NE 2-111-66 | Sand, fine to medium, clayey; oxidized, saturated Sand, fine to medium; saturated, clean Sand, medium to coarse; unoxidized, saturated, dirty Sand, fine; unoxidized, saturated, fairly clean, abandoned in sand | 6-13 13-16 16-21 21-59 |
| 169 | SW SW SE SE 13-111-66 | Sand, tan, fine; oxidized, some small pebbles | 0-5 |
| 170 | NE NW NW NE 23-111-66 | Gravel, medium; dry, very dirty | 0-7 |
| 171 | SE NE NE SE 23-111-66 | Gravel, light brown, fine; oxidized, moist, clean, some large granules Gravel, dark-brown, clayey; oxidized, moist, some large granules | 3-9 9-10 |
| 172 | NE SE SE SE 23-111-66 | Gravel, coarse; dry, fairly clean | 0-8 |
| 173 | SW SW SW SW 31-111-65 | Gravel and sand; oxidized | 4-17 |
| 174 | SE SE SE SE 36-110-69 | Sand and gravel, brown Sand and gravel | 2-14 25-32 |
| 175 | NW NW NW NW 6-110-68 | Sand, brown | 1-3 |
| 176 | SW SW SW SW 15-110-67 | Sand, coarse | 7-12 |
| 177 | SE NW SE SW 14-110-67 | Sand, coarse, gravelly; saturated, little silt and clay, poorly graded, dense | 16-17 |
| 178 | NW SE NW SW 13-110-67 | Sand, medium to fine, silty; saturated, little clay, dense Gravel, medium to fine, sandy; dense Sand, medium to fine, silty, clayey; very dense | 13-24 25-26 26-34 |
| 179 | SE SW SE SW 13-110-67 | Gravel, tan, sandy; oxidized, dry | 0-2 |

| Test Hole No. | Location | Lithologic Description | From to Feet |
|---------------|-----------------------|---|--|
| 180 | SE SE SE SW 24-110-67 | Sand, coarse, clayey; oxidized, saturated, dirty | 18-22 |
| 181 | SE SE SE SW 19-110-66 | Gravel, coarse; fairly clean Gravel, clayey; oxidized, saturated Gravel, red-brown, coarse; oxidized, saturated, dirty Gravel, brown, coarse; saturated, dirty Gravel, medium to fine; unoxidized, saturated, dirty | 0- 7 7- 9 9-20 20-26 26-39 |
| 182 | SE SW SW SE 19-110-66 | Sand, red-brown; oxidized, saturated | 17-21 |
| 183 | NW NW SW NW 20-110-66 | Gravel, dark-brown, coarse, pebbly; oxidized, moist Gravel, cobbly; difficult drilling Gravel, cobbly; saturated, difficult drilling | 0- 4 4- 7 9-10 |
| 184 | NW NW NW NW 4-110-66 | Sand and gravel, medium to coarse | 17-28 |
| 185 | SW NE NW SE 2-110-66 | Silt and fine sand; hard Sand, medium to fine; saturated, little silt, dense Sand, fine and silt; saturated, dense | 5-10 10-21 21-26 |
| 186 | SW NW SE NW 14-110-66 | Sand, medium; dry, dirty | 0- 6 |
| 187 | SW SW SW NW 13-110-66 | Gravel, dark-brown, pebbly; oxidized, saturated, dirty | 13-14 |
| 188 | SW SW SW SW 18-110-65 | Sand, brown, medium to fine; clean, little very fine and coarse sand mixed in 8 to 12 feet, few thin beds of sandy, gravelly clay 12 to 14 feet Sand, brown, fine to coarse, very clayey to slightly clayey; some fine gravel, few thin beds of sandy, gravelly clay | 5-14 14-17 |
| 189 | SE SE SE SW 31-109-70 | Sand and gravel, gravel up to 1 inch, subrounded to subangular; some silt and very fine sand, little or no clay, poorly graded, dirty Sand, fine to medium; some silt and very fine sand, little clay, slightly clayey | 9-15 15-19 |
| 190 | SW NE SE NW 32-109-70 | Sand and gravel; fairly clean, well graded | 12-16 |
| 191 | SE SE SE SE 29-109-70 | Sand, fine to coarse, clayey; some fine gravel | 23-30 |
| 192 | NE SE SW SW 28-109-70 | Sand, fine to coarse and fine gravel | 6- 8 |
| 193 | SW SE NW SE 28-109-70 | Sand; some silt and fine gravel; well graded Sand and gravel, very silty and clayey, subrounded to subangular; maximum size over 2 inches | 8- 9 9-12 |

| Test Hole No. | Location | Lithologic Description | From-to Feet |
|---------------|-----------------------|--|-------------------------------|
| 194 | NW NW NW SW 27-109-70 | Sand, fine to medium, silty, clayey Sand, fine to medium, fairly clean Sand, fine to medium; some clay, abandoned in sand | 18-20 20-25 25-31 |
| 195 | SW NW NE SE 24 109-70 | Sand, fine to coarse and gravel, sub-rounded to subangular, silty, clayey; saturated Gravel, very clayey; saturated | 7-14 14-16 |
| 196 | NE NE NE NE 7-109-69 | Gravel | 0-4 |
| 197 | SE SE SE SE 10 109-69 | Sand, coarse and fine gravel, clayey; moist, hard | 5-7 |
| 198 | NW NW NE NE 15-109-69 | Sand, coarse; some fine gravel, little silt and clay, poorly graded Sand, medium to fine, silty; saturated, little clay, poorly graded, hard | 7-9 10-12 |
| 199 | SE SW SW NE 16 109-69 | Silt and fine to medium sand; small amount of clay | 9-14 |
| 200 | NW SW SW SE 17-109-69 | Sand, fine; interbedded with thin layers of silt and clay, hard to very hard, abandoned in sand | 12-21 |
| 201 | NW NW NW NW 20-109-69 | Gravel, coarse, sandy; little clay, dense Sand; little or no silt and clay, well graded | 2-10 10-18 |
| 202 | SW SW SE SE 24 109-69 | Sand, very coarse and gravel; dry | 3-15 |
| 203 | NE NW NW NE 8 109-68 | Gravel, rocky Gravel and sand; calcareous cement, abandoned | 2-10 10-20 |
| 204 | NW NW NW NW 9 109-68 | Gravel and sand; oxidized, some clay Gravel and sand, calcareous cement, abandoned | 7-9 9-14 |
| 205 | NE NW NE NW 9 109-68 | Gravel, rocky Gravel, pea | 2-16 16-18 |
| 206 | SE SE SE SE 10-109-68 | Sand, yellow-brown and red, medium to coarse Gravel, red-brown | 0-3 3-8 |
| 207 | SE SE SE SE 22-109-68 | Sand, brown, fine to medium | 0-3 |
| 208 | SW SW SW SW 35-109-68 | Sand and gravel; rock at 14 feet | 1-14 |
| 209 | NW SW SE NW 7-109-67 | Gravel, light-brown, medium, to coarse sand, abundant medium pebbles; oxidized, moist, dirty Gravel, light-brown, fine, to coarse sand; oxidized, moist, fairly dirty Gravel, light-brown, fine, to coarse sand, abundant small pebbles; oxidized, moist, fairly dirty Gravel, dark-brown, fine, to coarse sand, abundant small pebbles; oxidized, saturated, dirty | 2-7 7-16 16-25 25-40 |

| Test Hole No. | Location | Lithologic Description | From-to Feet |
|---------------|-----------------------|---|--|
| | | Gravel, light gray, fine; unoxidized, saturated, very dirty | 40-52 |
| 210 | SW NW NE SW 5-109-67 | Gravel, light-brown to brown, coarse; moist, fairly clean Gravel, gray-brown, coarse; saturated at 17 feet, dirty | 3-9 9-27 |
| 211 | NW NW SE SE 5-109-67 | Sand, light-brown, coarse, pebbly; oxidized, saturated, fairly clean Sand, dark-brown, abundant large granules; oxidized, saturated, dirty Gravel, dark-brown, fine, to medium sand; oxidized, saturated, dirty Gravel, reddish-brown, fine, to medium sand, abundant small pebbles; oxidized, saturated Gravel, light-gray, medium, to medium sand; unoxidized, saturated, dirty | 1-8 8-12 12-27 27-45 45-50 |
| 212 | NE SW SW SW 4-109-67 | Gravel, light red-brown, very coarse, abundant 1/2- to 1-inch pebbles | 4-11 |
| 213 | NW NE NE NW 9-109-67 | Rocks within 1 foot on three attempts | 0-1 |
| 214 | SE SW SW NW 8-109-67 | Gravel, light-brown, fine, to coarse sand; oxidized, dry, very dirty Gravel, light-brown, fine, to coarse sand; oxidized, moist, very dirty Gravel, light brown, fine, to coarse sand; oxidized, saturated, very dirty Gravel, light-gray, medium, to coarse sand; unoxidized, saturated, very dirty | 5-10 10-15 15-30 30-39 |
| 215 | SW SW SW SW 35-109-67 | Sand, brown; dirty | 2-6 |
| 216 | SE SE SE SE 32-109-66 | Gravel, medium to coarse | 10-11 |
| 217 | SE SE SE SE 34-109-66 | Gravel | 9-11 |
| 218 | SE SE SE SE 12-109-66 | Gravel, medium-brown, fine, silty; becomes clayey by 3 feet | 0-5 |
| 219 | SW SW SW SW 19-109-65 | Sand, medium-brown, very fine, to silt, clayey Sand, yellowish-brown to medium-brown, coarse, rocky, silty; saturated, somewhat clayey Gravel, medium-brown, fine, to medium sand, silty; somewhat clayey | 4-6 8-12 12-27 |
| 220 | SW SW SW SW 31-109-65 | Gravel; oxidized (terrace) Sand, coarse and fine gravel | 0-17 19-33 |

TABLE 2. List of sand and gravel pits in Hand County, South Dakota, which are on file at the District Office, South Dakota Department of Highways, Huron, South Dakota.

| Pit No | Owner and Address | Description | Type | Average Depth in Feet | Average Depth of Stripping in Feet |
|--------|--|-------------------|--------|-----------------------|------------------------------------|
| 1 | Martinmaas, Gerald J. and Efrieda T. — Rockham | N½ SE¼ 33-116-70 | Gravel | 1.8 | 9.1+ |
| 2 | Halt, Clarence — Orient | SE¼ NE¼ 33-116-70 | Gravel | 3.0 | 13.5 |
| 3 | | NE¼ 4-116-69 | Sand | | |
| 4 | Morris, Scott — Rockham | SE¼ NE¼ 2-116-68 | Gravel | | |
| 5 | Morris, Mrs. Alma — Redfield | SE¼ 2-116-68 | Gravel | | |
| 6 | Morris, Walter — Orient | SW¼ 1-116-68 | Gravel | 2.4 | 7.7 |
| 7 | Morris, Clayton — Rockham | NW¼ 1-116-68 | Gravel | | |
| 8 | Sanger, Walter — Rockham | NE¼ 4-116-67 | Filler | | |
| 9 | Levtzow, Lyle — Rockham | SW¼ 2-116-67 | Sand | 3.4 | 6.6+ |
| 10 | Sanger, W. M. — Rockham | SE¼ 22-116-67 | Gravel | | |
| 11 | Jackson, Mabel and Sanger, William — Rockham | SE¼ NW¼ 26-116-67 | Gravel | 1.2 | 8.4 |
| 12 | Sanger, Daelyn — Rockham | NE¼ SW¼ 26-116-67 | Gravel | 1.9 | 7.4 |
| 13 | Atrey, Clifford — Orient | NE¼ SE¼ 9-115-70 | Gravel | | |
| 14 | Gasper, J. W. — Orient | NE¼ 10-115-68 | Gravel | | |
| 15 | Hargens, Geo., Sr — Milder | SW¼ 26-115-68 | Gravel | | |
| 16 | Haberling, Kathrine — Milder | NW¼ 35-115-68 | Gravel | | |

| | | | | | |
|----|-------------------------------------|-------------------|---------------|-----|------|
| 17 | Morris, Clayton — Rockham | SW¼ 9-115-67 | Gravel | 1.9 | 8.3 |
| 18 | Roach, Robert W. — Rockham | SW¼ NW¼ 15-115-67 | Gravel | 1.1 | 7.7 |
| 19 | Roach, Robert W. — Rockham | SE¼ 15-115-67 | Gravel | 2.3 | 7.8 |
| 20 | Anderson, Russell — Rockham | NE¼ SW¼ 31-115-66 | Gravel | 3.1 | 5.7+ |
| 21 | Anderson, Algert — Redfield | NE¼ 24-115-66 | Gravel | | |
| 22 | Anderson Algert — Redfield | SE¼ 13-115-66 | Sand & Gravel | | |
| 23 | Bushfield, Harlan, Jr. — Miller | SE¼ 33-114-68 | Gravel | | |
| 24 | Hanks, Russell and Mildred — Miller | NE¼ SE¼ 10-114-68 | Sand & Filler | | |
| 25 | Croll, Leslie — Miller | NW¼ 11-114-68 | Sand & Filler | | |
| 26 | Williams, Percy — Miller | SW¼ 2-114-68 | Sand & Filler | 2.5 | 5.2 |
| 27 | Moos, Eugene — Miller | SE¼ 12-114-68 | Gravel | | |
| 28 | Scherr, Ruby — Miller | SW¼ 3-113-69 | Gravel | 1.7 | 4.2 |
| 29 | Wagner, Catherine | SE¼ 3-113-69 | Gravel | 1.5 | 5.5 |
| 30 | Howard, Ira — Miller | SW¼ 1-113-69 | Gravel | 1.7 | 5.2 |
| 31 | Conkey Stanley — St. Lawrence | NE¼ 7-113-66 | Gravel | | |
| 32 | | NW¼ 28-112-70 | Gravel | | |
| 33 | Gaver, W. L. | NE¼ 13-112-68 | Gravel | | |
| 34 | McGirr, Wm. — Wessington | SW¼ NW¼ 13-112-66 | Gravel | | |
| 35 | McGirr, Wm. — Wessington | NE¼ 13-112-66 | Gravel | | |
| 36 | Joy, J. W. — St. Lawrence | SW¼ 13-112-66 | Gravel | 2.0 | 9.1+ |

Table 2 - continued.

| Pit No. | Owner and Address | Description | Type | Average Depth in Feet | Average Depth of Stripping in Feet |
|---------|--|-------------------|--------|--------------------------|--|
| 37 | Lakner, Stanley — Wessington | NE¼ 24-112-66 | Gravel | 1.8 | 6.1+ |
| 38 | Clarke, Ralph — Aberdeen | SE¼ NE¼ 24-112-66 | Gravel | | |
| 39 | Clarke, Ralph — Aberdeen | NE¼ SE¼ 24-112-66 | Gravel | | |
| 40 | Halsey, Mrs. Roy — Huron and Clarke, Ralph — Aberdeen | SE¼ SE¼ 24-112-66 | Gravel | 1.5 | 7.0 |
| 41 | Weills, Marvin | NE¼ 25-112-66 | Gravel | | |
| 42 | Bowden, Harold — Highmore | NE¼ 18-111-70 | Gravel | 2.5 | 14.3+ |
| 43 | Fawcett, Ed — Ree Heights | NW¼ 2-111-70 | Gravel | | |
| 44 | Henson, Robert — Ree Heights | NW¼ 23-111-70 | Gravel | 2.1 | 17.0+ |
| 45 | Henson, Ronald — Ree Heights | SE¼ 22-111-70 | Gravel | | |
| 46 | Fawcett, Leonard — Ree Heights | SW¼ 21-111-70 | Gravel | 1.5 | 11.2+ |
| 47 | Fawcett, Leonard — Ree Heights | NW¼ 28-111-70 | Gravel | 1.0 | 10.0+ |
| 48 | Henson, Ronald — Ree Heights | NW¼ 35-111-70 | Gravel | | |
| 49 | Collins, Vern — Miller | SW¼ 25-111-70 | Gravel | 2.5 | 10.8+ |
| 50 | Stevens, Gene and Wanda — Miller | SW¼ 26-111-69 | Gravel | 2.8 | 8.8+ |
| 51 | | SW¼ 16-111-67 | Gravel | | |
| 52 | Harvey, Clyde | SW¼ 28-110-70 | Gravel | | |
| 53 | Palmer, O. G. — Vayland | SW¼ 12-110-67 | Gravel | | |
| 54 | Noyes, E. W. — Wessington | NE¼ 27-110-66 | Gravel | 1.2 | 8.7+ |
| 55 | Fischer, Calvin — Wessington | SE¼ 34-110-66 | Gravel | 2 | 7+ |

| | | | | | |
|----|--------------------------------|---------------|--------|-----|-----|
| 56 | Hand County | NW¼ 9-109-68 | Gravel | 2.5 | 12 |
| 57 | Ufen, Jack — Miller | SE¼ 10-109-68 | Sand | 2.3 | 3.6 |
| 58 | Dearborn, R. F. — Miller | NE¼ 15-109-68 | Gravel | | |
| 59 | Pangburn, Robert — Corning, IA | NW¼ 14-109-68 | Gravel | 1.8 | 6.1 |
| 60 | Waltman, Leslie — Miller | NE¼ 8-109-67 | Gravel | | |

 Good probability of finding sand or gravel deposits

 Fair probability of finding sand or gravel deposits

 Poor probability of finding sand or gravel deposits

Roman numerals I through XII designate areas described in the text

162 • Test hole containing sand or gravel in upper 25 feet with 0 to 5 feet of overburden. Number refers to Table 1.

177 ▲ Test hole containing sand or gravel in upper 25 feet with 6 to 25 feet of overburden. Number refers to Table 1.

○ Test hole containing no sand or gravel in upper 25 feet

155 ✕ Gravel pit, those with a number are listed in Table 2

 Approximate boundary



Index map of South Dakota showing location of Hand County



| | | | | | |
|----|----|----|----|----|----|
| 6 | 5 | 4 | 3 | 2 | 1 |
| 7 | 8 | 9 | 10 | 11 | 12 |
| 18 | 17 | 16 | 15 | 14 | 13 |
| 19 | 20 | 21 | 22 | 23 | 24 |
| 30 | 29 | 28 | 27 | 26 | 25 |
| 31 | 32 | 33 | 34 | 35 | 36 |

Sectionized township

Map showing test holes, gravel pits, and sand and gravel deposits in Hand County

