GEOLOGIC LOG OF MONITOR WELL NO. 9

PROJECT: Central Landfill
LOCATION: Palmer Alaska
CLIENT: Mat-Su Borough
DRILLED BY: Tester Drilling
LOGGED BY: Steve Rowland
DRILLER: Tim Tesler

BORING NO. 9
PAGE 1 of 2
ELEV. GRND 276.4
ELEV. COLLAR 279.98
TOTAL DEPTH 95.0
COORD. NORTH 2774550.4
COORD EAST 1780511.3

Boring Data

<table>
<thead>
<tr>
<th>Scale-ft</th>
<th>Sample Interval</th>
<th>Blows/ft</th>
<th>Misc Info</th>
<th>Well Record</th>
<th>USGS</th>
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<tr>
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</table>

Material Description

- ML: SILT & organic debris, brown, firm, moist

- GP.SP: Stratified sandy GRAVEL and gravelly SAND with occasional cobbles, brown to gray, very dense, dry.

- GP.GM: Coarse sandy GRAVEL with numerous cobbles and trace silt, brown, dense to very dense, moist to wet.

Groundwater encountered while drilling.
Flow tested with air at 3 to 5 gallons per minute.
Water level measured at 44.6 feet on 6/11/93 (Elor. 231.8)

- SP: Course fine SAND with occasional trace to some gravel, olive, moderately dense to loose, not to saturated

Yields 2 to 5 gpm below 50.0 feet.

continued on sheet 2

Sheet 1 of 2
fig B-1 by, SRF

Steve R. Rowland, P.E.
GEOLOGIC LOG OF MONITOR WELL NO. 9

PROJECT Central Landfill
LOCATION Palmer Alaska
CLIENT Mat-Su Borough
LOGGED BY Steve Rowland
ILLED BY Tester Drilling
DRILLER Tim Tester
BORING NO 9
ELEV GRND 276.4
ELEV COLLAR 279.98
PAGE 2 OF 2
TOTAL DEPTH 95.0
DATE BEGUN 3-25-93
DATE END 3-26-93
COORD NORTH 2774550.4
COORD EAST 1780511.3
EQUIP TYPE Drilltech D40K
DRILL METHOD Reverse Circ.

---

<table>
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<tr>
<th>Sample Interval</th>
<th>Visc Info</th>
<th>Wet</th>
<th>Record Log</th>
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<th>USCS</th>
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<td>LL-27 PI-5</td>
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<td>SP</td>
<td>70.0</td>
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<td></td>
<td>Coarse to fine SAND with occasional trace to some gravel, olive, moderately dense to loose, wet to saturated</td>
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<td>SC-SM</td>
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---

Stratified clayey fine SAND & Silty fine SAND, gray, dense, wet
Becomes dryer with depth and clay content increases.
Does not produce water.
Hydraulic conductivity: 3.37 x 10E-7 cm/sec

---

Total depth 95.0

---

Fig B-1 by SRR
GEOLOGIC LOG OF MONITOR WELL NO. II

PROJECT LOCATION
Central Landfill
Palmer Alaska

CLIENT
Mat-Su Borough

DRILLED BY
Tester Drilling

LOGGED BY
Steve Rowland
Tim Tester

BORING NO II
PAGE 1 of 2
DATE BEGUN 2-26-93
DATE END 2-26-93
EQUIP TYPE Drilletch D40K
DRILL METHOD Reverse Circ.

ELEV. GRND 278.3
ELEV. COLLAR 280.11
TOTAL DEPTH 115.25
COORD NORTH 2773136.9
COORD EAST 1778162.0

Material Description

Depth

ML  Silt & organic debris, brown, soft, moist  0.0
    Coarse sandy GRAVEL with numerous cobbles and occasional boulders, gray to brown, dense to very dense, dry

OP
Grungey SAND, olive dense, dry, occasional cobbles

SP  34.2

OP  37.0
Grungey SAND, olive dense, dry, occasional cobbles

OP  70.0
Grungey SAND, olive dense, dry, occasional cobbles, trace silt, brown, dense, dry to slightly moist
### GEOLeGIC LOG OF MONITOR WELL NO. II

<table>
<thead>
<tr>
<th>PROJECT</th>
<th>Central Landfill</th>
<th>BORING NO.</th>
<th>11</th>
<th>ELEV. GRND. 278.3</th>
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</thead>
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<td>PAGE</td>
<td>2</td>
<td>ELEV. COLLAR 280.11</td>
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<tr>
<td>CLIENT</td>
<td>Mat-Su Borough</td>
<td>DATE BEGUN</td>
<td>2-26-93</td>
<td>TOTAL DEPTH 115.25</td>
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<td>DRILLED BY</td>
<td>Tester Drilling</td>
<td>DATE END</td>
<td>2-26-93</td>
<td>COORD. NORTH 2773138.9</td>
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<td>LOGGED BY</td>
<td>Steve Rowland</td>
<td>EQUIP. TYPE</td>
<td>Drilltech D40K</td>
<td>COORD. EAST 1778162.0</td>
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<td>DRILLER</td>
<td>Tim Tester</td>
<td>DRILL METHOD</td>
<td>Reverse Circ.</td>
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<th>Scale (ft)</th>
<th>Vert. Sec Interval</th>
<th>Sample</th>
<th>Blows/f1 340/hr</th>
<th>Mech Info</th>
<th>Wet record</th>
<th>Graphic Log</th>
<th>USCS</th>
<th>Material Description</th>
<th>Depth</th>
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<td>128.5</td>
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<td></td>
<td>Sandy GRAVEL with trace silt, numerous cobbles and boulders, brown, dry to slightly moist</td>
<td>124.0</td>
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<td>128.0</td>
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<td></td>
<td></td>
<td>Gravelly lean CLAY, gray, very hard, moderately plastic, moist to wet</td>
<td>128.0</td>
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<tr>
<td>124.0</td>
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<td>Groundwater encountered while drilling. Not able to develop significant yield using air. Water level measured at 115.25 feet on 6/11/93 (ELEV. 163.05)</td>
<td>124.0</td>
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<td>100.0</td>
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<td>Sandy GRAVEL &amp; gravelly SAND, gray, very dense, dry</td>
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<td>103.0</td>
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<td>Fine to medium SAND, olive, dense, dry</td>
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<td>90.0</td>
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<td>Sandy GRAVEL with some silt, numerous cobbles, gray, dense, dry</td>
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<td>75.0</td>
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<td>Sandy GRAVEL with trace silt, numerous cobbles and boulders, brown, dense, dry to saturated below 115 feet</td>
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<td>Sand</td>
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**NOTE:** For additional information, refer to Geologic Log of Test Boring No. 2

MW No. II was drilled within 10 feet of TB No. 2.
### MATERIAL DESCRIPTION

<table>
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<tr>
<th>Approx. Elevation:</th>
<th>Depth Ft.</th>
<th>Symbol</th>
<th>Samples</th>
<th>Ground Water Depth Ft.</th>
<th>Penetration Resistance (140 lb. weight, 30” drop)</th>
<th>Blows per foot</th>
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<tbody>
<tr>
<td>Gray, Poorly Graded Gravel with Sand (GP); dry</td>
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<td>Gray to brown, Poorly Graded Gravel with Sand (GP); dry</td>
<td>10.0</td>
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<td>Brown, Poorly Graded Sand with Gravel (SP); dry</td>
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### LEGEND

- * Sample not recovered
- 3" O.D. Split Spoon Sample

- Ground Water Level At Time Of Drilling
- Static Water Level

- Solid Casing, Sand Pack
- Solid Casing and Annular Seal
- Slotted Section, Filter Sand
- Solid Casing, Cuttings Backfill

### NOTES

1. The stratification lines represent the approximate boundaries between soil types, and the transition may be gradual.
2. The discussion in the text of this report is necessary for a proper understanding of the nature of subsurface materials.
3. Water level, if indicated above, is for the date specified and may vary.
4. USC letter symbol based on visual classification.

---

LOG OF BORING MW-15R

Central Landfill
Matanuska-Susitna Borough
Palmer, Alaska

July 2017

32-1-17685-207

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

FIG. 2
Sheet 1 of 3
### MATERIAL DESCRIPTION

<table>
<thead>
<tr>
<th>Approx. Elevation</th>
<th>Depth, Ft.</th>
<th>Symbol</th>
<th>Samples</th>
<th>Ground Water Depth, Ft.</th>
<th>Penetration Resistance (140 lb. weight, 30&quot; drop)</th>
<th>Blows per foot</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brown, Poorly Graded Gravel with Sand (GP); dry</td>
<td>100.0</td>
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<tr>
<td>Very dense, brown, Poorly Graded Gravel with Silt and Sand (GP-GM); moist</td>
<td>110.0</td>
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<td>S1</td>
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<td>Medium dense, brown, Poorly Graded Gravel with Sand (SP); dry</td>
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<td>Medium dense, brown, Poorly Graded Sand (SP); moist to wet</td>
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<td>Very dense, gray, Poorly Graded Gravel with Sand (GP); wet</td>
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<td>Bottom of Boring</td>
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Boring Completed 11/15/2016

### LEGEND

- * Sample not recovered
- 3" O.D. Split Spoon Sample
- Ground Water Level At Time Of Drilling
- Static Water Level
- Solid Casing, Sand Pack
- Solid Casing and Annular Seal
- Slotted Section, Filter Sand
- Solid Casing, Cuttings Backfill

### NOTES

1. The stratification lines represent the approximate boundaries between soil types, and the transition may be gradual.
2. The discussion in the text of this report is necessary for a proper understanding of the nature of subsurface materials.
3. Water level, if indicated above, is for the date specified and may vary.
4. USC letter symbol based on visual classification.
Casing Description
Top of Casing (TOC) (Approximately 2.86 feet above ground surface)

Backfill Description
Top of Protective Casing (Approximately 3.1 feet above ground surface and 0.54 foot in diameter. Casing embedded in cement.)

1.0 ft.
8-12 Filter Sand

Hydrated Bentonite Chips

2.5-inch diameter, Schedule 80 PVC well casing

90.0 ft.
Slough
100.0 ft.
Bentonite Chips
111.5 ft.
8-12 Filter Sand
115.0 ft.

2.5-inch diameter, 0.020 slotted Schedule 80 PVC well screen

End Cap
135.0 ft.
135.4 ft.
136.5 ft.
Slough

LEGEND

\[\text{\textbullet} \quad \text{Groundwater Level ATD}\]

\[\text{\textbullet} \quad \text{Static Groundwater Level}\]

NOTE: All joints use threaded connections.
GEOLOGIC LOG OF MONITOR WELL NO. 16

PROJECT
Location
CLIENT
DRILLED BY
LOGGED BY
DRILLER

Central Landfill
Palmer Alaska
Mat-Su Borough
Tester Drilling
Steve Rowland
Tim Tester

BORING NO 16
PAGE 1 of 4
DATE BEGUN 3-13-93
DATE END 3-19-93
EQUIP TYPE Drilech D40K
DRILL METHOD Reverse Circ.

ELEV. GRND. 279.9
ELEV. COLLAR 282.88
TOTAL DEPTH 278.0
COORD. NORTH 2772035.8
COORD. EAST 1779015.9

---

Material Description

<table>
<thead>
<tr>
<th>Depth</th>
<th>Description</th>
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<tbody>
<tr>
<td>0.0</td>
<td>Silt, brown-tan, firm, dry</td>
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<tr>
<td>2.5</td>
<td>Stratified coarse sandy GRAVEL with numerous cobbles and gravely SAND brown to gray, very dense, dry</td>
</tr>
</tbody>
</table>

---

Steve R Rowland, P.E.

---

fig. B-8 by SRR
GEOLOGIC LOG OF MONITOR WELL NO. 16

PROJECT: Central Landfill
LOCATION: Palmer, Alaska
CLIENT: Mat-Su Borough
DRILLED BY: Tester Drilling
LOGGED BY: Steve Rowland
DRILLER: Tim Tester
BORING NO.: 16
PAGE: 2 of 4
ELEV. GRND.: 279.9
ELEV. COLLAR: 282.88
DATE BEGUN: 3-13-93
TOTAL DEPTH: 278.0
DATE END: 3-19-93
COORD. NORTH: 2772035.8
EQUIP. TYPE: Driltech D40K
COORD EAST: 1779015.9
DRILL METHOD: Reverse Circ.

Material Description

Depth

70.0

GP, SP
Stratified coarse sandy GRAVEL with numerous cobbles and gravelly SAND
braun to grey, very dense, dry

80.0

GP-GH
Sandy GRAVEL with numerous cobbles & trace silt, braun, dense, dry

110.0

SP
Fine to medium SAND, olive, moderately dense, dry to slightly
moist becoming moist below 123 feet.

Static water level record at 122.0 feet on 3/19/93 thru 3/22/93
for lower confined aquifer prior to being sealed off with grout.

120.0

SP
Groundwater encountered while drilling.
Yields greater than 20 gpm
Water level measured at 128.5 feet on 6/16/93 (ELEV. 154.40)
Water level measured at 130.0 feet on 3/25/93
Gravelly SAND, olive, dense, saturated

128.0

GP
Sandy GRAVEL with numerous cobbles, brown, dense, saturated

138.0

continued on sheet 3

Fig B-8

by SRR

Steve R. Rowland, P.E.
**GEOLOGIC LOG OF MONTOR WELL NO. 16**

**PROJECT**
Central Landfill

**LOCATION**
Palmer Alaska

**CLIENT**
Mat-Su Borough

**DRILLED BY**
Tester Drilling

**LOGGED BY**
Steve Rowland

**DRILLER**
Tim Tester

**BORING NO**
16

**PAGE**
3 of 4

**DATE BEGUN**
3-13-93

**DATE END**
3-19-93

**EQUIP. TYPE**
Driltech D40K

**DRILL METHOD**
Reverse Circ.

**ELEV. GRND.**
279.9

**ELEV. COLLAR**
282.88

**TOTAL DEPTH**
278.0

**COORD. NORTH**
2772035.8

**COORD. EAST**
1779015.9

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<th>Depth</th>
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<td>Stratified coarse sandy GRAVEL with numerous cobbles and gravelly SAND brown to gray, very dense, dry</td>
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<tr>
<td>162.0</td>
<td>Fine to medium SAND with occasional trace silt &amp; gravel, brown, dense, saturated</td>
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<td>182.0</td>
<td>Stratified gravelly SAND &amp; sandy GRAVEL with trace silt, brown, dense, saturated</td>
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<tr>
<td>195.0</td>
<td>Clayey GRAVEL &amp; clayey SAND, gray, very dense, wet to dry below 205 feet</td>
</tr>
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---

Fig. B-8 by SRR

Steve R. Rowland, P.E.
GEOLOGIC LOG OF MONITOR WELL NO. 16

PROJECT LOCATION
Central Landfill, Palmer, Alaska

CLIENT
Mat-Su Borough

DRILLED BY
Testor Drilling

LOGGED BY
Steve Rowland, Tim Tester

BORING NO
16

ELEV GRND
279.9

PAGE
4 of 4

ELEV COLLAR
282.88

DATE BEGUN
3-13-93

TOTAL DEPTH
276.0

DATE END
3-19-93

COORD NORTH
2772035.8

EQUIP TYPE
Driltech D40K

COORD EAST
1779015.9

DRILL METHOD
Reverse Circ.

Material Description

SC.GC
Clayey GRAVEL & clayey SAND, gray, very dense, wet to dry
below 203 feet.

223.0

ML
Silty GRAVEL with some sand, gray, very dense, dry to moist
Hydraulic conductivity: 1.45 10E -4 cm/sec

240.0

SP
Fine to coarse SAND with occasional trace silt, olive, dense, saturated
Extreme sand heave while drilling.
Yields in excess of 30 gpm mixed sand and water during test
flow with air.

278.0

SP-SM
Gravely SAND, olive, dense, saturated
Yields greater than 30 gpm.

278.0

total depth

fig B-8 by SRR
GEOLOGIC LOG OF MONITOR WELL NO. 17

PROJECT Central Landfill
LOCATION Palmer, Alaska
CLIENT Mat-Su Borough
DRILLED BY Tester Drilling
LOGGED BY Steve Rowland
DRILLER Tim Tester
BORING NO 17
ELEV. GRND. 224.0
ELEV. COLLAR 226.56
PAGE 1 of 2
DATE BEGUN 3-8-93
TOTAL DEPTH 136.0
DATE END 3-10-93
COORD. NORTH 2772056.1
EQUIP. TYPE Driltech D40K
COORD. EAST 1780382.5
DRILL METHOD Reverse Circ.

Material Description

- **ML**: SILT, brown-tan, firm, dry

- **GP-SP**: Stratified coarse sandy GRAVEL with numerous cobbles and gravelly SAND brown to gray, very dense, dry

- **GP**: Coarse sandy GRAVEL with numerous cobbles. A occasional trace of silts. gray to tan, very dense, dry to saturated below 87 feet

---

Steve R. Rowland, P.E.
**GEOLOGIC LOG OF MONITOR WELL NO. 17**

**PROJECT** Central Landfill  
**LOCATION** Palmer Alaska  
**CLIENT** Mat-Su Borough  
**DRILLED BY** Tester Drilling  
**LOGGED BY** Steve Rowland  
**DRILLER** Tim Tester  
**BORING NO.** 17  
**PAGE** 2 of 2  
**ELEV. GRND.** 224.0  
**ELEV. COLLAR** 226.56  
**DATE BEGUN** 3-6-93  
**DATE END** 3-10-93  
**TOTAL DEPTH** 136.0  
**COORD. NORTH** 2772056.1  
**COORD. EAST** 1780382.5  
**EQUIP. TYPE** Driltech D40K  
**DRILL METHOD** Reverse Circ.

<table>
<thead>
<tr>
<th>Scale</th>
<th>Vert. Sec</th>
<th>Sample Interval</th>
<th>Blows/ft</th>
<th>Misc Info</th>
<th>Wet record</th>
<th>U.S.C.S.</th>
<th>Graphic Log</th>
<th>Material Description</th>
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</tr>
<tr>
<td>90</td>
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<td></td>
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<tr>
<td>100</td>
<td></td>
<td></td>
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<tr>
<td>110</td>
<td>3</td>
<td></td>
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<tr>
<td>120</td>
<td></td>
<td></td>
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<tr>
<td>130</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>140</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>136</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| 136   |           |                 |          |           |            |          | GP-GM       | Coarse sandy GRAVEL with numerous cobbles & occasional trace silt, gray to tan, very dense, dry to saturated below 87 feet.  
|       |           |                 |          |           |            |          |             |                       |
|       |           |                 |          |           |            |          |             | Groundwater encountered while drilling.  
Yields greater than 10 gpm at 100 feet below ground surface.  
Water level measured at 87.7 feet on 6/11/93 (ELEV. 136.52) |
|       |           |                 |          |           |            |          | SP          | Medium to coarse SAND, olive, dense, saturated |
|       |           |                 |          |           |            |          |             |                       |
|       |           |                 |          |           |            |          | GP          | Coarse sandy GRAVEL with numerous cobbles, gray, dense, saturated  
GC      | 133.0     |                 |          |           |            |          |             | Clayey GRAVEL, gray, very dense, saturated to moist  
No groundwater production below 133.0 feet.  
136.0   | 136.0     |                 |          |           |            |          |             |                       |

**Fin R-9  by CDP**
<table>
<thead>
<tr>
<th>MATERIAL DESCRIPTION</th>
<th>Depth, Ft.</th>
<th>Symbol</th>
<th>Samples</th>
<th>Ground Water Depth, Ft.</th>
<th>Penetration Resistance (340 lb. weight, 30&quot; drop)</th>
<th>Blows per foot</th>
</tr>
</thead>
<tbody>
<tr>
<td>Medium to light brown, slightly silty, sandy GRAVEL; damp; GW-GM</td>
<td>52.0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Light brown, slightly gravelly, silty SAND; damp</td>
<td>70.0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hard, gray SILT; moist</td>
<td>72.0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Bottom of Boring**
Boring Completed 10/19/2000

**LEGEND**
- * Sample Not Recovered
- H 2" O.D. Split Spoon Sample
- III 3" O.D. Split Spoon Sample
- K K Surface Seal
- T T Solid Casing and Annular Sealant
- F F Well Screen and Filter Sand
- S S Cuttings Backfill
- Y Y Ground Water Level At Time of Drilling
- Y Y Static Ground Water Level

**NOTES**
1. The stratification lines represent the approximate boundaries between soil types, and the transition may be gradual.
2. The discussion in the text of this report is necessary for a proper understanding of the nature of subsurface materials.
3. Water level, if indicated above, is for the date expected and may vary.
4. USC letter symbol based on visual classification.

Central Landfill
Palmer, Alaska

**LOG OF BORING NO. B19**
November 2000 Y-G185-11

Fig. 3
Casing Description

Top of Casing (TOC) (Approximately 2 feet above ground surface)

2.5-inch diameter, Schedule 40 PVC well casing

End Cap

Central Landfill
Palmer, Alaska

MONITORING WELL MW-19
CONSTRUCTION DETAIL
November 2000 Y-6185-11

LEGEND

Ground Water Level At Time of Drilling
Static Ground Water Level

Note: All joints used threaded connections
MATERIAL DESCRIPTION

Elevation: GPS 230 ft.

<table>
<thead>
<tr>
<th>Depth, Ft.</th>
<th>Symbol</th>
<th>Samples</th>
<th>Ground Water Depth, Ft.</th>
<th>Penetration Resistance (340 lb. weight, 30&quot; drop)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brown, gravelly, silty SAND; frozen</td>
<td>2.5</td>
<td></td>
<td></td>
<td>▲ Blows per foot</td>
</tr>
<tr>
<td>Medium dense, lt. brown, silty, sandy coarse GRAVEL, with cobbles, trace clay; moist</td>
<td>25.0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dense to very dense, lt. brown silty, sandy subrounded GRAVEL, trace cobbles; moist</td>
<td>39.5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Medium dense, brown, slightly gravelly, silty fine SAND; trace cobbles; moist</td>
<td>43.0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Medium dense, lt. brown, slightly silty fine SAND; moist, occasional gravelly lenses</td>
<td>65.0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Medium dense to very dense, mixed brown, subrounded gravelly SAND; moist</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

CONTINUED NEXT PAGE

LEGEND

- Sample not recovered
- 3" O.D. Split Spoon Sample
- Static Water Level
- Solid Casing, Sand Pack
- Solid Casing and Annular Seal
- Slotted Section, Filter Sand
- Solid Casing, Cuttings Backfill

NOTES

1. The stratification lines represent the approximate boundaries between soil types, and the transition may be gradual.
2. The discussion in the text of this report is necessary for a proper understanding of the nature of subsurface materials.
3. Water level, if indicated above, is for the date specified and may vary.
4. USC letter symbol based on visual classification.

Central Landfill
Palmer, Alaska

LOG OF BORING 20

May 2006

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

Fig. 1
Sheet 1 of 2
**MATERIAL DESCRIPTION**

Elevation: GPS 230 ft

<table>
<thead>
<tr>
<th>Depth, Ft</th>
<th>Symbol</th>
<th>Samples</th>
</tr>
</thead>
<tbody>
<tr>
<td>79.1</td>
<td>85</td>
<td>III</td>
</tr>
<tr>
<td>80.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>96.0</td>
<td>96</td>
<td>III</td>
</tr>
<tr>
<td>108.0</td>
<td>97</td>
<td>III</td>
</tr>
<tr>
<td>131.0</td>
<td>98</td>
<td>III</td>
</tr>
<tr>
<td>137.5</td>
<td>99</td>
<td>III</td>
</tr>
</tbody>
</table>

**Penetration Resistance** (340 lb. weight, 30” drop)

▲ Blows per foot

**LEGEND**

- Sample not recovered
- III 3” O.D. Split Spoon Sample
- Static Water Level
- Solid Casing, Sand Pack
- Solid Casing and Annular Seal
- Slotted Section, Filter Sand
- Solid Casing, Cuttings Backfill

**NOTES**

1. The stratification lines represent the approximate boundaries between soil types, and the transition may be gradual.
2. The discussion in the text of this report is necessary for a proper understanding of the nature of the subsurface materials.
3. Water level, if indicated above, is for the date specified and may vary.
4. USC letter symbol based on visual classification.

**Bottom of Boring**

Boring Completed 3/30/06

---

Central Landfill
Palmer, Alaska

**LOG OF BORING 20**

May 2006 32-1-16721-021

**Fig. 1**

Sheet 2 of 2
Casing Description

Top of Casing (TOC)
(Approximately 3 feet above ground surface)

Backfill Description

Top of Protective Casing
(Approximately 3.3 feet above ground surface and 0.5 feet in diameter)

Slough

End of 6" dia. steel casing

110.5 Ft.

121.0 Ft.

118.1 Ft.

4-inch diameter, 0.020 slotted Schedule 40 PVC well screen

136.0 Ft.

137.4 Ft.

Hydrated Bentonite Chips

20-40 Filter Sand

LEGEND

 Groundwater Level ATD
 Static Groundwater Level

NOTE: All joints use threaded connections.
MATERIAL DESCRIPTION

Elevation: GPS 197 ft.

Depth, Ft. | Symbol | Samples | Ground Water Depth, Ft. | Penetration Resistance (340 lb. weight, 30" drop) ▲ Blows per foot
---|---|---|---|---
31 | III | | 0 | 25 | 50 | 75 | 100
32 | III | | 36.5 | 36.5 | 39.6 | | |
33 | III | | 54.0 | 55.0 | 59.5 | | |

Very dense, cobbly, sandy GRAVEL; moist
Medium dense, mixed brown and green, subrounded gravelly coarse SAND; moist
Mixed brown and green, slightly gravelly to gravelly coarse SAND, with lenses of lt. brown, medium to fine SAND, trace silt; moist
Medium dense, mixed brown and green, subrounded gravelly coarse SAND; wet

Brown, medium to fine SAND; wet; heaving

Bottom of Boring
Boring Completed 4/4/06

LEGEND

- Sample not recovered
III 3" O.D. Split Spoon Sample

Static Water Level
Solid Casing, Sand Pack
Solid Casing and Annular Seal
Slotted Section, Filter Sand
Solid Casing, Cuttings Backfill

NOTES

1. The stratification lines represent the approximate boundaries between soil types, and the transition may be gradual.
2. The discussion in the text of this report is necessary for a proper understanding of the nature of subsurface materials.
3. Water level, if indicated above, is for the date specified and may vary.
4. USC letter symbol based on visual classification.
Casing Description

Top of Casing (TOC)
(Approximately 3 feet above ground surface)

Dry Quick Grout placed around steel casing while drilling for outer seal

4-inch diameter, Schedule 40 PVC well casing

End of 6" dia. steel casing

Legend:

Groundwater Level ATD
Static Groundwater Level

Backfill Description

Top of Protective Casing
(Approximately 3.5 feet above ground surface and 0.5 feet in diameter)

1.5Ft.

1.5Ft.

Hydrated Bentonite Chips

5.2Ft.

5.2Ft.

Slough

Slough

46.5Ft.

46.5Ft.

Hydrated Bentonite Chips

50.2Ft.

50.2Ft.

4-inch diameter, 0.020 slotted Schedule 40 PVC well screen

20-40 Filter Sand

End Cap

NOTE: All joints use threaded connections.
MATERIAL DESCRIPTION

Gray COBBLES; moist to dry

Boulder at 62 feet

Gray, slightly sandy GRAVEL; moist

Gray, slightly silty, sandy GRAVEL; moist to wet

Gray SILT; moist to wet

Bottom of Boring
Boring Completed 11/28/07

LEGEND

- Sample Not Recovered

Gravel Sample

Surface Seal

Solid Casing and Annular Seal

Well Casing and Filter Sand

Cuttings Backfill

Ground Water Level At Time Of Drilling

Static Water Level

Penetration Resistance
(340 lb. weight, 30° drop)

△ Blows per foot

NOTES

1. The stratification lines represent the approximate boundaries between soil types, and the transition may be gradual.
2. The discussion in this report is necessary for a proper understanding of the nature of subsurface materials.
3. Water level, if indicated above, is for the date specified and may vary.
4. USC letter symbol based on visual classification.
## MATERIAL DESCRIPTION

<table>
<thead>
<tr>
<th>Approx. Elevation</th>
<th>Depth, Ft.</th>
<th>Symbol</th>
<th>Samples</th>
<th>Ground Water Depth, Ft.</th>
<th>Penetration Resistance (300 lb. weight, 30&quot; drop)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brown, Poorly Graded Sand with Silt (SP-SM), moist</td>
<td>5.0</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Brown, Poorly Graded Gravel with Silt and Sand (GP-GM), moist</td>
<td>10.0</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Brown, Poorly Graded Gravel with Sand (GP), moist</td>
<td>30.0</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Brown, Poorly Graded Sand with Gravel (SP), moist</td>
<td>35.0</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Brown, Poorly Graded Sand with Silt and Gravel (SP-SM), moist to wet</td>
<td>55.0</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Brown, Well-Graded Sand (SW), wet</td>
<td>60.0</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dense to very dense, gray to brown, Silty Sand (SM), wet</td>
<td>65.0</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bottom of Boring</td>
<td>70.0</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Boring Completed 5/30/17</td>
<td>77.0</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### LEGEND
- * Sample not recovered
- ▾ 3" O.D. Split Spoon Sample
- ▾ Grab Sample
- ▾ Ground Water Level At Time Of Drilling
- ‣ Static Water Level
- ▶ Solid Casing, Sand Pack
- ▶ Solid Casing and Annular Seal
- ▶ Slotted Section, Filter Sand
- ▶ Solid Casing, Cuttings Backfill

### NOTES
1. The stratification lines represent the approximate boundaries between soil types, and the transition may be gradual.
2. The discussion in the text of this report is necessary for a proper understanding of the nature of subsurface materials.
3. Water level, if indicated above, is for the date specified and may vary.
4. USC letter symbol based on visual classification.

---

Central Landfill  
Matanuska-Susitna Borough  
Palmer, Alaska

LOG OF BORING CLF-23  
March 2018  
32-1-17685-304
Casing Description

Top of Casing (TOC)
(Approximately 3.4 feet above ground surface)

2.5-inch diameter, Schedule 80 PVC well casing

Top of Protective Casing
(Approximately 3.7 feet above ground surface and 0.5 foot in diameter. Casing embedded in cement.)

Backfill Description

1.5 ft Portland Cement

Hydrated Bentonite Chips

49.3 ft

65.0 ft

8-12 Filter Sand

75.0 ft

75.2 ft

End Cap

LEGEND

Groundwater Level ATD
Static Groundwater Level

NOTE: All joints use threaded connections.
MATERIAL DESCRIPTION

Elevation: 285 Ft.

Medium dense, brown, Sand with Silt and Gravel (SP); frozen to moist

Cobble layer 3 inches thick at approximately 11.7 feet below ground surface

Bottom of Boring
Boring Completed 12/16/13

LEGEND

• Sample not recovered
Ⅲ 3" O.D. Split Spoon Sample
□ Frozen
□□□ Solid Casing, Sand Pack
□□ Solid Casing and Annular Seal
□□□ Slotted Section, Filter Sand
□□□ Solid Casing, Cuttings Backfill

NOTES

1. The stratification lines represent the approximate boundaries between soil types, and the transition may be gradual.
2. The discussion in the text of this report is necessary for a proper understanding of the nature of subsurface materials.
3. Water level, if indicated above, is for the date specified and may vary.
4. USC letter symbol based on visual classification.

Central Landfill
Palmer, Alaska

LOG OF BORING GP-1

February 2014

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants
FIG. 2-1
### Material Description

**Elevation:** 291 Ft.

**Depth, Ft.:**

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Samples</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Penetration Resistance**

(340 lb. weight, 30" drop)

▲ Blows per foot

**Ground Water**

Depth, Ft.

<table>
<thead>
<tr>
<th>0</th>
<th>25</th>
<th>50</th>
<th>75</th>
<th>100</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- **Medium dense, dark brown to brown, Sand with Silt and Gravel (SP-SM); frozen to moist; trace organics**

- **Medium dense to very dense, brown to light brown, Sand with Gravel (SP); moist; trace cobbles**

- **Very dense to dense, brown, Sand with Silt (SP-SM); moist to wet; few cobbles**

**Bottom of Boring**

Boring Completed 12/9/13

---

### Legend

- * Sample not recovered
- I 3" O.D. Split Spoon Sample
- ▲ Frozen

- Solid Casing, Sand Pack
- Solid Casing and Annular Seal
- Slotted Section, Filter Sand
- Solid Casing, Cuttings Backfill

### Notes

1. The stratification lines represent the approximate boundaries between soil types, and the transition may be gradual.
2. The discussion in the text of this report is necessary for a proper understanding of the nature of subsurface materials.
3. Water level, if indicated above, is for the date specified and may vary.
4. USC letter symbol based on visual classification.

---

### Log of Boring GP-2

Central Landfill
Palmer, Alaska

February 2014

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants
FIG. 2-2
<table>
<thead>
<tr>
<th>Depth, Ft.</th>
<th>Symbol</th>
<th>Material Description</th>
<th>Ground Water Depth, Ft.</th>
<th>Penetration Resistance (340 lb. weight, 30° drop)</th>
</tr>
</thead>
<tbody>
<tr>
<td>6.0</td>
<td>S1</td>
<td>Medium dense, brown, Silt with Sand (SP-SM); frozen to moist, trace organics</td>
<td></td>
<td>▲ Blows per foot</td>
</tr>
<tr>
<td>22.0</td>
<td>S2</td>
<td>Medium dense, brown, Sand with Gravel (SP); moist; trace cobbles</td>
<td></td>
<td>Refusal after 1 foot</td>
</tr>
<tr>
<td>25.0</td>
<td>S3</td>
<td>Very dense, brown, Sand with Silt and Gravel (SP-SM); moist; few cobbles</td>
<td></td>
<td>Refusal after 1 foot</td>
</tr>
<tr>
<td>56.0</td>
<td>S12</td>
<td>Medium dense, brown, Sand with Silt (SP-SM); moist to wet</td>
<td></td>
<td>Refusal after 1 foot</td>
</tr>
</tbody>
</table>

**Bottom of Boring**
Boring Completed 12/11/13

---

**LEGEND**
- * Sample not recovered
- □ 3" O.D. Split Spoon Sample
- Solid Casing, Sand Pack
- Solid Casing and Annular Seal
- Solid Casing, Cuttings Backfill
- Frozen
- Slotted Section, Filter Sand

**NOTES**
1. The stratification lines represent the approximate boundaries between soil types, and the transition may be gradual.
2. The discussion in the text of this report is necessary for a proper understanding of the nature of subsurface materials.
3. Water level, if indicated above, is for the date specified and may vary.
4. USC letter symbol based on visual classification.

---

**LOG OF BORING GP-3**

Central Landfill
Palmer, Alaska

February 2014  32-1-17594-006

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

FIG. 2-3
**MATERIAL DESCRIPTION**

Elevation: 268 Ft.

- **Loose, dark brown to brown, Sand with Silt (SP-SM); frozen to moist; trace gravel and organics**

- **Medium dense, brown, Sand with Gravel (SP); moist**

- **Cobble layer at 22 feet below ground surface**

- **Brown, Sand with Gravel (SP); moist; trace cobbles**

- **Cobble layer**

- **Brown, Silt with Sand (ML); moist to wet; trace gravel**

**Bottom of Boring**

Boring Completed 12/12/13

---

**LEGEND**

- *: Sample not recovered
- ⬇️: Ground Water Level At Time Of Drilling
- III: 3" O.D. Split Spoon Sample
- ■: Solid Casing, Sand Pack
- Î: Solid Casing and Annular Seal
- ⊙: Slotted Section, Filter Sand
- ☰: Solid Casing, Cuttings Backfill

**NOTES**

1. The stratification lines represent the approximate boundaries between soil types, and the transition may be gradual.
2. The discussion in the text of this report is necessary for a proper understanding of the nature of subsurface materials.
3. Water level, if indicated above, is for the date specified and may vary.
4. USC letter symbol based on visual classification.

**LOG OF BORING GP-4**

February 2014

Central Landfill
Palmer, Alaska

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

FIG. 2-4
MATERIAL DESCRIPTION

Elevation: 255 Ft.

Medium dense, brown, Silt with Sand (ML); frozen to moist; trace organics

Medium dense, brown, Sand with Gravel (SP); moist to wet

Bottom of Boring
Boring Completed 12/13/13

LEGEND

- Sample not recovered
- 3" O.D. Split Spoon Sample

Ground Water Level At Time Of Drilling

- Solid Casing, Sand Pack
- Solid Casing and Annular Seal
- Slotted Section, Filter Sand
- Solid Casing, Cuttings Backfill

NOTES

1. The stratification lines represent the approximate boundaries between soil types, and the transition may be gradual.
2. The discussion in the text of this report is necessary for a proper understanding of the nature of subsurface materials.
3. Water level, if indicated above, is for the date specified and may vary.
4. USC letter symbol based on visual classification.

Central Landfill
Palmer, Alaska

LOG OF BORING GP-5

February 2014

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

FIG. 2-5
Loose to medium dense, dark brown to brown, Silt with Sand (ML); frozen to moist

Medium dense to very dense, brown, Sand with Gravel (SP); moist; trace cobbles

Dense to very dense, brown, Gravel with Sand (GP); moist to wet; trace cobbles

Cobble layer
Dense, brown, Sand with Gravel (SP); moist

Bottom of Boring
Boring Completed 12/13/13

LEGEND

* Sample not recovered
II 3" O.D. Split Spoon Sample

- Solid Casing, Sand Pack
- Solid Casing and Annular Seal
- Slotted Section, Filter Sand
- Solid Casing, Cuttings Backfill

NOTES
1. The stratification lines represent the approximate boundaries between soil types, and the transition may be gradual.
2. The discussion in the text of this report is necessary for a proper understanding of the nature of subsurface materials.
3. Water level, if indicated above, is for the date specified and may vary.
4. USC letter symbol based on visual classification.

Central Landfill
Palmer, Alaska

LOG OF BORING GP-6

February 2014
32-1-17594-006
**Casing Description**

Top of Casing (TOC)  
(Approximately 2.5 feet above ground surface)

2-inch diameter, Schedule 40 PVC well casing

Top of Protective Casing  
(Approximately 3 feet above ground surface and 0.8 feet in diameter)

Drill cuttings

Hydrated Bentonite Chips

Pea Gravel

End Cap

Legend

△ Groundwater Level ATD

NOTE: All joints use threaded connections.

**Backfill Description**

Central Landfill  
Palmer, Alaska

MONITORING WELL GP-1  
CONSTRUCTION DETAIL

February 2014  
32-1-17594-006
**Casing Description**

- **Top of Casing (TOC)** (Approximately 2.5 feet above ground surface)

2-inch diameter, Schedule 40 PVC well casing

- **Top of Protective Casing** (Approximately 3 feet above ground surface and 0.8 feet in diameter)

- **Drill Cuttings**
- **Hydrated Bentonite Chips**
- **Pea Gravel**

2-inch diameter, 0.040 slotted Schedule 40 PVC well screen

- **End Cap**
- **50.0Ft.**
- **50.3Ft.**
- **57.0Ft.**

**Legend**

♀ Groundwater Level ATD

**NOTE:** All joints use threaded connections.

---

**Central Landfill**
Palmer, Alaska

**Monitoring Well GP-2**
Construction Detail

February 2014

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

Fig. 2-8
Casing Description

Top of Casing (TOC)
(Approximately 2.5 feet above ground surface)

2-inch diameter, Schedule 40 PVC well casing

Top of Protective Casing
(Approximately 3 feet above ground surface and 0.8 feet in diameter)

2-inch diameter, 0.040 slotted Schedule 40 PVC well screen

Drill Cuttings

Hydrated Bentonite Chips

Pea Gravel

End Cap – 60.0 Ft

60.0 Ft

60.3 Ft

Backfill Description

Legend

 الاثنين Groundwater Level ATD

Note: All joints use threaded connections.
Casing Description

Top of Casing (TOC)
(Approximately 2.5 feet above ground surface)

2-inch diameter, Schedule 40 PVC well casing

5.0 ft.

10.0 ft.

2-inch diameter, 0.040 slotted Schedule 40 PVC well screen

9.0 ft.

Hydrated Bentonite Chips

Drill Cuttings

Top of Protective Casing
(Approximately 3 feet above ground surface and 0.8 feet in diameter)

Pea Gravel

End Cap
30.0 ft.

30.3 ft.

LEGEND

Groundwater Level ATD

NOTE: All joints use threaded connections.

Central Landfill
Palmer, Alaska

MONITORING WELL GP-4
CONSTRUCTION DETAIL

February 2014 32-1-17594-006

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

Fig. 2-10
Casing Description

Top of Casing (TOC)
(Approximately 2.5 feet above ground surface)

2-inch diameter, Schedule 40 PVC well casing

Backfill Description

Top of Protective Casing
(Approximately 3 feet above ground surface and 0.8 feet in diameter)

Drill Cuttings

5.0 Ft.

Hydrated Bentonite Chips

9.0 Ft.

Pea Gravel

End Cap

40.0 Ft.

40.3 Ft.

LEGEND

♀ Groundwater Level ATD

NOTE: All joints use threaded connections.
### MATERIAL DESCRIPTION

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<th>Depth, Ft</th>
<th>Symbol</th>
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<th>Ground Water Depth, Ft</th>
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<tr>
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<td>s3</td>
<td>100</td>
</tr>
</tbody>
</table>

- **Loose, brown, Silt with Sand (ML); frozen to moist; trace organics**
- **Medium dense, brown, Silt with Sand and Gravel (ML); moist**
- **Very dense, gray and brown, Silty Gravel (GM); moist**

**Bottom of Boring**

**Boring Completed 12/3/15**

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**LEGEND**

- Sample not recovered
- 3" O.D. Split Spoon Sample
- Solid Casing, Pea Gravel Pack
- Solid Casing and Annular Seal
- Slotted Section, Pea Gravel Pack
- Solid Casing, Cuttings Backfill

**NOTES**

1. The stratification lines represent the approximate boundaries between soil types, and the transition may be gradual.
2. The discussion in the text of this report is necessary for a proper understanding of the nature of subsurface materials.
3. Water level, if indicated above, is for the date specified and may vary.
4. USC letter symbol based on visual classification.

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**Central Landfill**

**Palmer, Alaska**

**LOG OF BORING GP-5R**

**January 2016**

2016, 32-1-17769

**SHANNON & WILSON, INC.**

**Geotechnical and Environmental Consultants**

**Fig. 2-1**
**Casing Description**

Top of Casing (TOC)
(Approximately 2.5 feet above ground surface)

2-inch diameter, Schedule 40 PVC well casing

**Backfill Description**

Top of Protective Casing
(Approximately 3 feet above ground surface and 0.8 feet in diameter)

Drill Cuttings

Hydrated Bentonite Chips

Pea Gravel

End Cap

**Legend**

♀ Groundwater Level ATD

**Note:** All joints use threaded connections.