This Addendum is issued to modify, explain or correct the original Drawings and Specifications, and is hereby made a part of the Contract Documents. Please attach this Addendum to the Project Manual in your possession. Insert the number and issue date of this Addendum in the blank space provided on the Proposal Form.

PRE-BID MEETING:

1. Information
   a. The pre-bid meeting agenda is attached
   b. The pre-bid meeting sign-in sheet is attached
   c. The available soil boring data is attached
   d. It is anticipated that material borrowed from the proposed disposal site and virgin material borrowed from the east side of the lake will be acceptable for use as earthfill for bid items #5, #6, and #7. In the event that virgin material borrowed from the lake bed is used as earthfill, payment will be made for both excavation and earthfill.
   e. Measurement for bid item #4 EXCAVATION, MECHANICAL DREDGING and bid item #A1 ALTERNATE #1 – ADDITIONAL SEDIMENT REMOVAL will be made by a pre-construction and post-construction survey paid for by owner. The dredging limits will be adjusted accordingly so that the plan quantity of material is removed from the lake.
   f. Contractors are allowed perform soil tests prior to submitting a bid. Interested contractors shall coordinate with Jasper County Conservation Staff at 641-792-9780.
   g. Tree clearing must be complete prior to April 1, 2018. Some trees/stumps will be used as fish habitat, the rest should be burned/buried. Coordinate with DNR representative.
   h. The Bison in the pen at the storage basin will be relocated to a different park by Jasper County Conservation prior to construction.

2. Questions
   a. How was the soft sediment limits determined?
      i. The DNR performed a hydrographic survey of the lake in 2013 to map the top of sediment. Thirteen sediment probes were collected by Shive-Hattery to verify depths provided by DNR and to estimate sediment thickness. The method consisted of pushing a survey rod into the lake bottom and taking a measurement when the rod encountered a significant change in density. An estimated hardbottom surface was established using the probing data, historical aerial photography and theoretical channel profiles of historical drainages through this valley.
   b. Can the east side sediment be hauled over the dam?
i. It is not anticipated that the dam, or any of the eastern shoreline, will be used as a haul route. Areas outside of the lake bottom that are not specifically called out as haul routes need to be approved by the DNR prior to use. All disturbed areas above the normal pool elevation will need to be restored to pre-construction conditions.

c. What is the watershed of the sediment storage area?
   i. Approximately 50 acres.
PRE-BID MEETING

Lake Restoration
Mariposa Recreation Area
Jasper County, Iowa
Project No. 15-05-50-01

10:00 A.M. September 12, 2017

• Introduction
• Contract Information
  o Estimate of Probable Costs - $1,900,000
  o Proposal Guarantee Bond - $80,000
  o Bid Opening – 11:00 A.M., September 21, 2017, Wallace State Office Building Auditorium
  o NRC Meeting – October 12, 2017
  o Start Date – No Earlier Than November 1, 2017
  o Completion Date – September 15, 2018
  o Liquidated Damages - $800/day
• Brief Project Overview
• Lake Level
• Addenda
  o #1 – Pre-Bid Meeting Announcement
  o #2 - Pre-Bid Minutes
• Questions?
Manitoba Lake Restoration - Sign in
Sept. 12, 2017

Heath Delzell
Andy Jackson
Harley Johnson

Trina Collier
Dan Wilson
Leah Wilson

Luke Mount
Jason Kruse

Todd Roney
Chris Herbold

Town DNR
H. Johnson Services, LLC
H. Johnson Services LLC

Baekin Land Improvement Inc.
RW Excavating Solutions LLC
RW Excavating Solutions LLC

Shine-Hattery
Iowa DNR

S M Hentges & Sons
Herbold Conservation
MARIPOSA LAKE RESTORATION
SHIVE-HATTERY INC - JASPER COUNTY, IOWA

LEGEND

- APPROXIMATE BORING LOCATION

PROJECT SITE

GRANULAR TRAIL AND FISHING JETTY - SEE SHEET 0102
EMERGENCY SPILLWAY IMPROVEMENTS - SEE SHEET 203
DAM STABILIZATION PLAN - SEE SHEETS C201, C204, C202
PRINCIPAL SPILLWAY REPLACE SEE SHEET C202
CONSTRUCTION AC LIMIT TRUCK TRAFFIC

LAKE BOTTOM DREDGING AND GRADING - SEE SHEETS C201 - C204
FOREBAY DAM STABILIZATION SEE SHEETS C208 - C208

CONSTRUCTION STAGING AREA

INSTALL 12'0" LF OF FENCE

REMOVE AND DISPOSE OF 17'0" LF OF EXISTING FENCE
Field Exploration Description

Boring Locations and Elevations
Borings performed along the existing dam and forebay embankment, and in proposed project component areas based on plans provided by Shive-Hattery, Inc. The approximate latitude and longitude of the planned boring locations were obtained from a GIS system, and locations laid out in the field by Terracon personnel with a handheld GPS device (roughly accurate to the nearest 10 feet +/-) spillway were selected and laid out in the field by Terracon’s engineer. The drill crew measured the approximate relief between borings using a level and rod, and used the ground surface at the top of embankments or lake water level (surface was at elevation of intake pipes) as reference elevations which were indicated on topographic plans provided. The coordinates of the borings and ground surface elevations (rounded to the nearest ½ foot) are indicated on the boring logs. A Boring Location Diagram indicating the approximate boring locations are included as Exhibit A-1.

Drilling and Sampling Methods
The borings were drilled with an ATV track-mounted rotary drill rig. The borings were advanced was using continuous-flight hollow-stem and solid stem augers. Representative samples were obtained using thin-walled tube and split-barrel sampling procedures. In the thin-walled tube sampling procedure, a thin-walled, seamless steel tube with a sharp cutting edge is pushed hydraulically into the ground to obtain relatively undisturbed samples of cohesive or moderately cohesive soils. In the split-barrel sampling procedure, a standard 2-inch (outside diameter) split-barrel sampling spoon is driven into the ground with an automatic 140-pound hammer falling a distance of 30 inches. The number of blows required to advance the sampling spoon the last 12 inches of a normal 18-inch penetration is recorded as the standard penetration resistance value (N). These “N” values are indicated on the boring logs at the depths of occurrence.

Bulk samples of embankment fill materials and soils from borings in planned excavation areas were obtained from auger cuttings at various depth intervals in select borings.

The samples were tagged for identification, sealed to reduce moisture loss, and transported to the laboratory for testing and classification.

The drill crew prepared a field log of each boring. These logs included visual classifications of the materials encountered during drilling as well as the driller’s interpretation of the subsurface conditions between samples. The boring logs included with this report represent an interpretation of the field logs and include modifications based on laboratory observation and testing of the samples.
**BORING LOG NO. 1**

**PROJECT:** Mariposa Lake Restoration

**SITE:** N 67th Avenue E

**Vicinity of Newton, Iowa**

**CLIENT:** Shive-Hattery, Inc

---

**LOCATION**

Latitude: 41.77711°  Longitude: -92.96166°

Surface Elev.: 901 (FL)

---

**GRAPHIC LOG**

- **Approx. 2’ Root Zone**
  - **FILL - MIX OF LEAN CLAY & SANDY LEAN CLAY**
    - Brown with gray and dark brown
  - Predominantly dark brown LEAN CLAY in Sample 4

- **FILL - LEAN CLAY**
  - With sand, dark brown with brown

- **POSSIBLE FILL - LEAN CLAY (CL)**
  - Trace sand, dark gray/black with gray, medium stiff

- **LEAN CLAY (CL)**
  - Dark gray, stiff

- **SANDY LEAN CLAY (CL)**
  - Gray and olive gray with brown, soft

- **SANDY LEAN CLAY (CL)**
  - Brown with gray, stiff

- **SANDY LEAN CLAY (CL)**
  - Trace gravel, gray, very stiff

- **Boring Terminated at 40.5 Feet**

---

**FIELD TEST RESULTS**

- **RECOVERY (In.)**
- **SAMPLE ID**
- **DEPTH (FL)**
- **ELEVATION (FL)**
- **WATER LEVEL OBSERVATIONS**
- **DEPTH (Ft.)**
- **LOCATION**
  - Latitude: 41.77711°  Longitude: -92.96166°
  - Surface Elev.: 901 (FL)

---

**WATER LEVEL OBSERVATIONS**

None Observed While Drilling

- **31.5’ on 4/7/2017**

---

**Notes:**

- **Advancement Method:** Hollow Stem Auger
- **Abandonment Method:** Backfilled with cement-bentonite grout upon completion.
- **Additional Information:** See Exhibit B for description of laboratory procedures and additional data (if any). See Appendix C for explanation of symbols and abbreviations.

---

**Drill Rig:** 977

**Driller:** SZ

**Project No.:** 08175050

**Exhibit:** A-3
### BORING LOG NO. 2

**PROJECT:** Mariposa Lake Restoration  
**SITE:** N 67th Avenue E  
**Vicinity of Newton, Iowa**  
**CLIENT:** Shive-Hattery, Inc

**LOCATION**  
See Exhibit A-1  
Latitude: 41.77678°  
Longitude: -92.96207°  
Surface Elev.: 901 (FL)

**DEPTH**  
ELEVATION (FL)

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<th>Elevation</th>
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<tr>
<td>33.0</td>
<td>866</td>
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<tr>
<td>40.5</td>
<td>860.5</td>
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**UNCONFINED COMPRESSIVE STRENGTH (psf)**

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<thead>
<tr>
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<th>Strength</th>
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<tbody>
<tr>
<td>6</td>
<td>2500 (HP)</td>
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<tr>
<td>6</td>
<td>1500 (HP)</td>
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<tr>
<td>16</td>
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<tr>
<td>11</td>
<td>4000 (HP)</td>
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<td>9</td>
<td>3000 (HP)</td>
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<td>7</td>
<td>4500 (HP)</td>
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<td>9</td>
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<td>9</td>
<td>3500 (HP)</td>
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<td>11</td>
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<tr>
<td>18</td>
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<td>5</td>
<td>500 (HP)</td>
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<tr>
<td>18</td>
<td>7500 (HP)</td>
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**FIELD TEST RESULTS**

<table>
<thead>
<tr>
<th>Sample Type</th>
<th>Recovery (h)</th>
<th>Sample ID</th>
<th>Water Content (%)</th>
<th>Dry Unit Weight (pcf)</th>
<th>Atterberg Limits</th>
<th>Percent fines</th>
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</thead>
<tbody>
<tr>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
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</table>

**Notes:**

- **Advancement Method:** Hollow Stem Auger  
- **Abandonment Method:** Backfilled with cement-bentonite grout upon completion.

- **Stratification lines are approximate. In-situ, the transition may be gradual.**

**FIELD TEST RESULTS**

- **Recovery (In.):**
  - 6
  - 16
  - 11
  - 9
  - 7
  - 18
  - 8
  - 11
  - 12

**WATER LEVEL OBSERVATIONS**

- **29' While Sampling**
- **11.5' on 4/7/2017**
### Boring Log No. 3

**Project:** Mariposa Lake Restoration  
**Client:** Shive-Hattery, Inc  
**Site:** N 67th Avenue E  
**Vicinity of Newton, Iowa**

<table>
<thead>
<tr>
<th>Depth (Ft.)</th>
<th>WATER LEVEL OBSERVATIONS</th>
<th>FIELD TEST RESULTS</th>
<th>UNCONFINED COMPRESSION STRESS (psf)</th>
<th>PERCENT FINES</th>
<th>ATTERTBERG LIMITS</th>
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<tbody>
<tr>
<td>0.0</td>
<td>Approx. 3&quot; Root Zone</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.0</td>
<td>LEAN CLAY (CL), with organics and occasional root hairs, dark gray/black, soft</td>
<td>18 1-1-1 N=2 500 (HP)</td>
<td>1 39</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8.77</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.0</td>
<td>LEAN CLAY (CL), trace sand, dark gray/black, soft becoming dark gray with gray</td>
<td>9 2500 (HP)</td>
<td>2 880 36 83</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11.0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8.69</td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>15.0</td>
<td>LEAN CLAY (CL), with sand, gray with brown, soft</td>
<td>13 500 (HP)</td>
<td>3 680 34 86 43-19-24 92</td>
<td></td>
<td></td>
</tr>
<tr>
<td>18.0</td>
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<tr>
<td>8.62</td>
<td></td>
<td></td>
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<tr>
<td>20.0</td>
<td>CLAYEY SAND (SC), fine to medium grained, dark brown, very loose to loose</td>
<td>18 1-1-1 N=2 500 (HP)</td>
<td>5 29</td>
<td></td>
<td></td>
</tr>
<tr>
<td>20.5</td>
<td>Boring Terminated at 20.5 Feet</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td>859.5</td>
<td></td>
<td></td>
<td></td>
<td></td>
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</table>

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

---

**Advancement Method:** Power Auger  
**Abandonment Method:** Boring backfilled with bentonite chips.

---

**Water Level Observations**

- 1' While Drilling  
- 1' on 4/7/2017

---

**Notes:**

- See Exhibit A-2 for description of field procedures.  
- See Appendix B for description of laboratory procedures and additional data (if any).  
- See Appendix C for explanation of symbols and abbreviations.
### BORING LOG NO. 4

**PROJECT:** Mariposa Lake Restoration  
**CLIENT:** Shive-Hattery, Inc

**SITE:** N 67th Avenue E  
Vicinity of Newton, Iowa

**LOCATION**  
See Exhibit A-1  
Latitude: 41.77672°  
Longitude: -92.96185°  
Surface Elev.: 880.5 (ft.)

**DEPTH (FT.)**

<table>
<thead>
<tr>
<th>Depth (ft.)</th>
<th>Elevation (ft.)</th>
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</thead>
<tbody>
<tr>
<td>2.0</td>
<td>876.5</td>
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<tr>
<td>4.0</td>
<td>875.5</td>
</tr>
<tr>
<td>7.0</td>
<td>873.5</td>
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<tr>
<td>11.0</td>
<td>869.5</td>
</tr>
<tr>
<td>14.0</td>
<td>863.5</td>
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**FIELD TEST RESULTS**

<table>
<thead>
<tr>
<th>Sample Type</th>
<th>Recovery (h)</th>
<th>Sample ID</th>
<th>Unconfined Compressive Strength (psf)</th>
<th>Percent Water Content</th>
<th>Percent Fine</th>
<th>Drilling Weight (lbs)</th>
<th>Atterberg Limits</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-1-1</td>
<td>4</td>
<td>1</td>
<td>500 (HP)</td>
<td>2</td>
<td>34</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1-1-2</td>
<td>8</td>
<td>2</td>
<td>2500 (HP)</td>
<td>2</td>
<td>28</td>
<td></td>
<td></td>
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<tr>
<td>1-2-4</td>
<td>10</td>
<td>2</td>
<td>2500 (HP)</td>
<td>3</td>
<td>850</td>
<td>34</td>
<td>88</td>
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<tr>
<td>1-2-4</td>
<td>12</td>
<td>3</td>
<td>1500 (HP)</td>
<td>4</td>
<td>840</td>
<td>34</td>
<td>85</td>
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<td>1-1-2</td>
<td>18</td>
<td>5</td>
<td>1500 (HP)</td>
<td></td>
<td>6</td>
<td>480</td>
<td>26</td>
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**Notes:**  
Hammer Type: Automatic  
Stratification lines are approximate. In-situ, the transition may be gradual.

**Advancement Method:** Power Auger  
**Abandonment Method:** Boring backfilled with bentonite chips.

**WATER LEVEL OBSERVATIONS**

- 2' While Drilling
- 1' on 4/7/2017

**Drill Rig:** 977  
**Driller:** SZ  
**Project No.: 08175050**  
**Exhibit:** A-3
## WATER LEVEL OBSERVATIONS

<table>
<thead>
<tr>
<th>Depth (Ft.)</th>
<th>Location</th>
<th>Latitude: 41.77814°</th>
<th>Longitude: -92.96597°</th>
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<td>28.5</td>
<td>While Drilling</td>
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<td></td>
</tr>
<tr>
<td>30.5</td>
<td>5.5' on 4/7/2017</td>
<td></td>
<td></td>
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</table>

## Advancement Method
- Power Auger

## Abandonment Method
- Boring backfilled with bentonite chips.

## Notes
- See Exhibit A-2 for description of field procedures.
- See Appendix B for description of laboratory procedures and additional data (if any).
- See Appendix C for explanation of symbols and abbreviations.
Approx. 4" Root Zone
LEAN CLAY (CL), partly organic and occasional root hairs, dark gray/black, soft to stiff

LEAN CLAY (CL), trace sand, brown gray, medium stiff

LEAN CLAY (CL), trace sand, gray, soft

LEAN CLAY (CL), with sand, gray and olive gray, soft

LEAN CLAY (CL), trace gravel, occasional sand lenses, brown gray and olive gray, stiff to very stiff

SANDY LEAN CLAY (CL), trace gravel, occasional root hairs, dark gray/black, soft to stiff

Boring Terminated at 20.5 Feet

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

PROJECT: Mariposa Lake Restoration

SITE: N 67th Avenue E
Vicinity of Newton, Iowa

LOCATION
Latitude: 41.77801° Longitude: -92.96813°
Approximate Surface Elev: 914 (FL) +/-

CLIENT: Shive-Hattery, Inc

Note: Project No.: 08175050
Driller: SZ
Drill Rig: 977
Boring Started: 4/7/2017
Boring Completed: 4/7/2017

See Exhibit A-2 for description of field procedures
See Appendix B for description of laboratory procedures and additional data (if any).
See Appendix C for explanation of symbols and abbreviations.

Abandonment Method:
Boring backfilled with bentonite chips.

Notes:

FIELD TEST RESULTS
SAMPLE ID: 1
UNCONFINED COMPRESSION STRENGTH (psi)
SAMPLE ID: 4
DRY UNIT WEIGHT (pcf)
SAMPLE ID: 11
PERCENT FINES

WATER LEVEL OBSERVATIONS

WATER LEVEL OBSERVATIONS

6.5' While Drilling
2' After Drilling
PROJECT: Mariposa Lake Restoration

SITE: N 67th Avenue E
Vicinity of Newton, Iowa

CLIENT: Shive-Hattery, Inc

LOCATION See Exhibit A-1
Latitude: 41.77842° Longitude: -92.6857°
Approximate Surface Elev: 914 (FL) +/-

DEPTH
ELEVATION (FL)

Approx. 4" Root Zone
LEAN TO FAT CLAY (CL/CH), partly organic
and occasional root hairs, dark gray/black, soft

10 0-1-2
N=3
500 (HP)

8 500 (HP)

11 500 (HP)

6 500 (HP)

LEAN CLAY (CL), trace sand, dark gray, soft

LEAN CLAY (CL), with sand, gray and olive
gray, medium stiff
becoming gray with brown

8 2-2-2
N=4
1000 (HP)

16 2-2-2
N=4
3000 (HP)

SANDY LEAN CLAY (CL), gray, stiff to very
stiff

16 5-7-9
N=16
5500 (HP)

Boring Terminated at 20.5 Feet

UNCONFINED COMPRRESSIVE STRENGTH (psf)

PERCENT FINES

SANDY LEAN CLAY (CL)

Boring Terminated at 20.5 Feet

WATER LEVEL OBSERVATIONS

Water at Surface While Drilling

Notes:

Advancement Method:
Power Auger

Abandonment Method:
Boring backfilled with bentonite chips.

See Exhibit A-2 for description of field procedures.
See Appendix B for description of laboratory procedures and additional data (if any).
See Appendix C for explanation of symbols and abbreviations.

HAMMER TYPE: Automatic

Boring Started: 4/7/2017
Boring Completed: 4/7/2017

Drill Rig: 977
Driller: SZ
Project No.: 08175050
Exhibit: A-5
**BORING LOG NO. 8**

**PROJECT:** Mariposa Lake Restoration  
**CLIENT:** Shive-Hattery, Inc

**SITE:** N 67th Avenue E  
Vicinity of Newton, Iowa

### GRAPHIC LOG

**LOCATION** See Exhibit A-1

Latitude: 41.77813°  
Longitude: -92.96931°

Approximate Surface Elev: 924 (FL) +/-

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<th>ELEVATION (FL)</th>
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<td>5</td>
<td>913.5 +/-</td>
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<td>10.5</td>
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### WATER LEVEL OBSERVATIONS

**DEPTH (Ft.)**  
**LOCATION**  
Latitude: 41.77813°    Longitude: -92.96931°

**ELEVATION (Ft.)**

- Approx. 3" Root Zone
  - SANDY LEAN CLAY (CL), trace gravel, brown with gray, medium stiff to stiff
  - becoming stiff to very stiff
  - becoming gray brown with gray

- Boring Terminated at 10.5 Feet

### FIELD TEST RESULTS

<table>
<thead>
<tr>
<th>WATER LEVEL OBSERVATIONS</th>
<th>SAMPLE TYPE</th>
<th>RECOVERY (h.)</th>
<th>FIELD TEST RESULTS</th>
<th>SAMPLE ID</th>
<th>UNCONFINED COMPRESSION STRENGTH (PSI)</th>
<th>WATER CONTENT (%)</th>
<th>DRY UNITS WEIGHT</th>
<th>LL-PL-PI</th>
<th>PERCENT FINES</th>
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<td>2500 (HP)</td>
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<td>2-3-4</td>
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<td>5000 (HP)</td>
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### Notes:

- Advancement Method: Power Auger
- Abandonment Method: Boring backfilled with bentonite chips.
- Hammer Type: Automatic

- See Exhibit A-2 for description of field procedures.
- See Appendix B for description of laboratory procedures and additional data (if any).
- See Appendix C for explanation of symbols and abbreviations.

- Project No.: 08175050
- Exhibit: A-5

**CLIENT:** Shive-Hattery, Inc

**PROJECT:** Mariposa Lake Restoration

**SITE:** N 67th Avenue E  
Vicinity of Newton, Iowa

**FIELD TEST RESULTS**

<table>
<thead>
<tr>
<th>WATER LEVEL OBSERVATIONS</th>
<th>SAMPLE TYPE</th>
<th>RECOVERY (h.)</th>
<th>FIELD TEST RESULTS</th>
<th>SAMPLE ID</th>
<th>UNCONFINED COMPRESSION STRENGTH (PSI)</th>
<th>WATER CONTENT (%)</th>
<th>DRY UNITS WEIGHT</th>
<th>LL-PL-PI</th>
<th>PERCENT FINES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Approx. 3&quot; Root Zone</td>
<td>2-2-2</td>
<td>1</td>
<td>2500 (HP)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>2-3-4</td>
<td>2</td>
<td>5000 (HP)</td>
<td></td>
<td>34-16-18</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>3-4-7</td>
<td>3</td>
<td>6500 (HP)</td>
<td></td>
<td>17</td>
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<td></td>
<td></td>
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<tr>
<td></td>
<td>4-5-9</td>
<td>4</td>
<td>7000 (HP)</td>
<td></td>
<td>19</td>
<td></td>
<td></td>
<td></td>
<td></td>
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</table>

### WATER LEVEL OBSERVATIONS

- Approx. 3" Root Zone
  - SANDY LEAN CLAY (CL), trace gravel, brown with gray, medium stiff to stiff
  - becoming stiff to very stiff
  - becoming gray brown with gray

- Boring Terminated at 10.5 Feet

- Approx. Surface Elev: 924 (Ft.) +/-

- Hammer Type: Automatic

- Advancement Method: Power Auger
- Abandonment Method: Boring backfilled with bentonite chips.

- See Exhibit A-2 for description of field procedures.
- See Appendix B for description of laboratory procedures and additional data (if any).
- See Appendix C for explanation of symbols and abbreviations.

- Project No.: 08175050
- Exhibit: A-5

**ADVANCEMENT METHOD:** Power Auger

**ABANDONMENT METHOD:** Boring backfilled with bentonite chips.

### WATER LEVEL OBSERVATIONS

- Approx. 3" Root Zone
  - SANDY LEAN CLAY (CL), trace gravel, brown with gray, medium stiff to stiff
  - becoming stiff to very stiff
  - becoming gray brown with gray

- Boring Terminated at 10.5 Feet

- Approx. Surface Elev: 924 (Ft.) +/-

- Hammer Type: Automatic

- Advancement Method: Power Auger
- Abandonment Method: Boring backfilled with bentonite chips.

- See Exhibit A-2 for description of field procedures.
- See Appendix B for description of laboratory procedures and additional data (if any).
- See Appendix C for explanation of symbols and abbreviations.

- Project No.: 08175050
- Exhibit: A-5
**BORING LOG NO. 9**

**PROJECT:** Mariposa Lake Restoration  
**SITE:** N 67th Avenue E  
**Vicinity of Newton, Iowa**  
**CLIENT:** Shive-Hattery, Inc

<table>
<thead>
<tr>
<th>Location</th>
<th>Latitude: 41.77894°</th>
<th>Longitude: -92.96959°</th>
</tr>
</thead>
<tbody>
<tr>
<td>Depth</td>
<td>3.0</td>
<td>922 +/-</td>
</tr>
<tr>
<td>Sample</td>
<td>18</td>
<td>Field Test Results</td>
</tr>
<tr>
<td>2-2-3</td>
<td>1</td>
<td>33</td>
</tr>
<tr>
<td>N=5</td>
<td>1500 (HP)</td>
<td></td>
</tr>
<tr>
<td>Elevation (FL)</td>
<td>5</td>
<td>10</td>
</tr>
<tr>
<td>Sample</td>
<td>18</td>
<td>Field Test Results</td>
</tr>
<tr>
<td>2-4-4</td>
<td>2</td>
<td>27</td>
</tr>
<tr>
<td>N=8</td>
<td>3000 (HP)</td>
<td></td>
</tr>
<tr>
<td>Elevation (FL)</td>
<td>10</td>
<td>15</td>
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<tr>
<td>Sample</td>
<td>18</td>
<td>Field Test Results</td>
</tr>
<tr>
<td>1-2-2</td>
<td>3</td>
<td>28</td>
</tr>
<tr>
<td>N=4</td>
<td>1500 (HP)</td>
<td></td>
</tr>
<tr>
<td>Elevation (FL)</td>
<td>20</td>
<td>26</td>
</tr>
<tr>
<td>Sample</td>
<td>18</td>
<td>Field Test Results</td>
</tr>
<tr>
<td>2-3-4</td>
<td>4</td>
<td>26</td>
</tr>
<tr>
<td>N=7</td>
<td>2000 (HP)</td>
<td></td>
</tr>
</tbody>
</table>

Approx. 3" Root Zone  
- **LEAN CLAY (CL)**, dark gray, medium stiff  
- **LEAN CLAY (CL)**, trace sand, dark brown to brown gray, stiff to medium stiff  
- Becoming gray with brown  

Boring Terminated at 10.5 Feet

**Notes:**  
- Advancement Method: Power Auger  
- Abandonment Method: Boring backfilled with bentonite chips  
- Hammer Type: Automatic  
- Stratification lines are approximate. In-situ, the transition may be gradual.

**WATER LEVEL OBSERVATIONS**  
None Observed During or After Drilling

**Advancement Method:** Power Auger  
**Abandonment Method:** Boring backfilled with bentonite chips  
**Hammer Type:** Automatic

**Notes:**

- Project No.: 08175050  
- Exhibit: A-5  
- Drill Rig: 977  
- Driller: SZ  
- Boring Started: 4/6/2017  
- Boring Completed: 4/6/2017
**BORING LOG NO. 10**

**PROJECT:** Mariposa Lake Restoration  
**SITE:** N 67th Avenue E  
Vicinity of Newton, Iowa  
**CLIENT:** Shive-Hattery, Inc

<table>
<thead>
<tr>
<th>DEPTH (FL)</th>
<th>ELEVATION (FL)</th>
<th>WATER LEVEL OBSERVATIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-1-2</td>
<td>891.5</td>
<td>Approx. 3&quot; Root Zone</td>
</tr>
<tr>
<td>18</td>
<td>1-2-1</td>
<td>SANDY LEAN CLAY (CL), trace gravel, brown with gray, soft</td>
</tr>
<tr>
<td>18</td>
<td>1-1-1</td>
<td>SAND (SP), fine to medium grained, brown, very loose to loose</td>
</tr>
<tr>
<td>18</td>
<td>1-12-14</td>
<td>Boring Terminated at 15.5 Feet</td>
</tr>
<tr>
<td>6</td>
<td>1-1-2</td>
<td>SAND (SP), trace gravel, fine to coarse grained, brown, medium dense</td>
</tr>
<tr>
<td>5</td>
<td>1-2-1</td>
<td>0-1-2 N=3 500 (HP)</td>
</tr>
<tr>
<td>10</td>
<td>1-1-1</td>
<td>1-2-1 N=3 500 (HP)</td>
</tr>
<tr>
<td>15.5</td>
<td>1-12-14</td>
<td>1-12-14 N=26</td>
</tr>
</tbody>
</table>

**FIELD TEST RESULTS**

<table>
<thead>
<tr>
<th>SAMPLE ID</th>
<th>UNCONFINED COMPRESSIVE STRENGTH (psf)</th>
<th>WET UNIT WEIGHT (pcf)</th>
<th>PERCENT FINES</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>17</td>
<td>891.5</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>18</td>
<td>891.5</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>23</td>
<td>891.5</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>25</td>
<td>891.5</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>13</td>
<td>891.5</td>
<td></td>
</tr>
</tbody>
</table>

**UNCONFINED COMPRESSIVE STRENGTH (psf)**

**WATER LEVEL OBSERVATIONS**

- **DEPTH (Ft.)**
- **LOCATION**
  - Latitude: 41.78009°
  - Longitude: -92.96352°
- **ELEVATION (FL)**
  - Surface Elev.: 898 (FL)

**Notes:**
- Advancement Method: Power Auger
- Abandonment Method: Boring backfilled with bentonite chips.
- Hammer Type: Automatic
- Boring Started: 4/7/2017
- Boring Completed: 4/7/2017
- Drill Rig: 977
- Driller: SZ
- Project No.: 08175050
- Exhibit: A-6

**See Exhibit A-1 for description of field procedures.**

**See Exhibit A-2 for description of laboratory procedures and additional data (if any).**

**See Appendix C for explanation of symbols and abbreviations.**
APPENDIX B
LABORATORY PROCEDURES
Laboratory Testing

The samples were classified in the laboratory based on visual observation, texture, plasticity, and the laboratory testing described above. The descriptions of the soils indicated on the boring log are in general accordance with the General Notes in Appendix D and the Unified Soil Classification System (USCS). A brief summary of the USCS is included in Appendix D.

In the laboratory, moisture content tests were performed on the recovered samples. The dry unit weight and unconfined compressive strength of intact, thin-walled tube samples were determined. Hand penetrometer tests were also performed to estimate the consistency of select cohesive samples. The results of these laboratory tests are shown on the boring logs in Appendix A at their corresponding sample depths.

The following laboratory tests were also performed to aid in classifying the soils and shale bedrock, and evaluating their engineering properties:

- Atterberg limits tests - 8 samples
- Hydrometer grain size analysis - 6 samples (results in Exhibit B-2)
- Standard Proctor tests - 4 samples (results in Exhibit B-3)

Atterberg limits tests are used to classify fine-grained soils, and were performed on select samples to provide an indication of other engineering parameters (e.g., effective stress friction angles) utilizing published empirical correlations. The results of the Atterberg limit and grain size tests are summarized in the report and presented on the boring logs and Exhibit B-2.
MOISTURE-DENSITY RELATIONSHIP
ASTM D698/D1557

TEST RESULTS
Maximum Dry Density 104.0 PCF
Optimum Water Content 18.8 %

Source of Material
Boring 1 & 2 @ 1 - 16 feet
Mix of LEAN CLAY & SANDY
LEAN CLAY, dark gray, dark brown and brown

Test Method
ASTM D698 Method A

Remarks:

LABORATORY TESTS ARE NOT VALID IF SEPARATED FROM ORIGINAL REPORT.

PROJECT: Mariposa Lake Restoration
PROJECT NUMBER: 08175050

SITE: N 67th Avenue E
Vicinity of Newton, Iowa

CLIENT: Shive-Hattery, Inc

EXHIBIT: B-3
Source of Material:
Boring 8 @ 1 - 7 feet
SANDY LEAN CLAY, brown with gray

Test Method:
ASTM D698 Method A

Remarks:

ATTERBERG LIMITS

<table>
<thead>
<tr>
<th>LL</th>
<th>PL</th>
<th>PI</th>
</tr>
</thead>
<tbody>
<tr>
<td>34</td>
<td>16</td>
<td>18</td>
</tr>
</tbody>
</table>

TEST RESULTS

Maximum Dry Density: 113.4 PCF
Optimum Water Content: 12.7 %

DRY DENSITY, pcF
WATER CONTENT, %

PROJECT: Mariposa Lake Restoration
SITE: N 67th Avenue E
Vicinity of Newton, Iowa

CLIENT: Shive-Hattery, Inc

EXHIBIT: B-3
MOISTURE-DENSITY RELATIONSHIP
ASTM D698/D1557

Source of Material
Boring 9 @ 1 - 7 feet

Description of Material
LEAN CLAY, dark gray and dark brown

Remarks:

Test Method
ASTM D698 Method A

TEST RESULTS

Maximum Dry Density
99.8 PCF

Optimum Water Content
21.3 %
APPENDIX D
SUPPORTING DOCUMENTS
# GENERAL NOTES

## DESCRIPTION OF SYMBOLS AND ABBREVIATIONS

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Auger</td>
<td>Soil sampling method that uses a cylindrical tube to extract soil samples.</td>
</tr>
<tr>
<td>Split Spoon</td>
<td>Soil sampling method that uses a conical tube to extract soil samples.</td>
</tr>
<tr>
<td>Shelby Tube</td>
<td>Soil sampling method that uses a cylindrical tube to extract soil samples.</td>
</tr>
<tr>
<td>Macro Core</td>
<td>Soil sampling method that uses a core barrel to extract soil samples.</td>
</tr>
<tr>
<td>Ring Sampler</td>
<td>Soil sampling method that uses a cylindrical tube to extract soil samples.</td>
</tr>
<tr>
<td>Rock Core</td>
<td>Soil sampling method that uses a core barrel to extract soil samples.</td>
</tr>
<tr>
<td>Grab Sample</td>
<td>Soil sampling method that uses a cylindrical tube to extract soil samples.</td>
</tr>
<tr>
<td>No Recovery</td>
<td>Soil sampling method that uses a cylindrical tube to extract soil samples.</td>
</tr>
<tr>
<td>Water Initially Encountered</td>
<td>Water level indicated on the soil boring logs are the levels measured in the borehole at the times indicated. Groundwater level variations will occur over time. In low permeability soils, accurate determination of groundwater levels is not possible with short term water level observations.</td>
</tr>
<tr>
<td>Water Level After a Specified Period of Time</td>
<td>Water level indicated on the soil boring logs are the levels measured in the borehole at the times indicated. Groundwater level variations will occur over time. In low permeability soils, accurate determination of groundwater levels is not possible with short term water level observations.</td>
</tr>
<tr>
<td>Hand Penetrometer (HP)</td>
<td>Soil sampling method that uses a cylindrical tube to extract soil samples.</td>
</tr>
<tr>
<td>Torvane (T)</td>
<td>Soil sampling method that uses a cylindrical tube to extract soil samples.</td>
</tr>
<tr>
<td>Standard Penetration Test (blows per foot) (b/f)</td>
<td>Soil sampling method that uses a cylindrical tube to extract soil samples.</td>
</tr>
<tr>
<td>Photo-Ionization Detector (PID)</td>
<td>Soil sampling method that uses a cylindrical tube to extract soil samples.</td>
</tr>
<tr>
<td>Organic Vapor Analyzer (OVA)</td>
<td>Soil sampling method that uses a cylindrical tube to extract soil samples.</td>
</tr>
</tbody>
</table>

## DESCRIPTIVE SOIL CLASSIFICATION

Soil classification is based on the Unified Soil Classification System. Coarse Grained Soils have more than 50% of their dry weight retained on a #200 sieve; their principal descriptors are: boulders, cobbles, gravel or sand. Fine Grained Soils have less than 50% of their dry weight retained on a #200 sieve; they are principally described as clays if they are plastic, and silts if they are slightly plastic or non-plastic. Major constituents may be added as modifiers and minor constituents may be added according to the relative proportions based on grain size. In addition to gradation, coarse-grained soils are defined on the basis of their in-place relative density and fine-grained soils on the basis of their consistency.

## LOCATION AND ELEVATION NOTES

Unless otherwise noted, Latitude and Longitude are approximately determined using a hand-held GPS device. The accuracy of such devices is variable. Surface elevation data annotated with +/- indicates that no actual topographical survey was conducted to confirm the surface elevation. Instead, the surface elevation was approximately determined from topographic maps of the area.

## RELATIVE DENSITY OF COARSE-GRAINED SOILS

(More than 50% retained on No. 200 sieve.)
Density determined by Standard Penetration Resistance, including gravels, sands and silts.

<table>
<thead>
<tr>
<th>STRENGTH TERMS</th>
<th>Descriptive Term (Density)</th>
<th>Standard Penetration or N-Value Blows/Fl.</th>
<th>Ring Sampler Blows/Fl.</th>
<th>Descriptive Term (Consistency)</th>
<th>Unconfined Compressive Strength, psi</th>
<th>Standard Penetration or N-Value Blows/Fl.</th>
<th>Ring Sampler Blows/Fl.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very Loose</td>
<td>0 - 3</td>
<td>0 - 6</td>
<td>0 - 6</td>
<td>Very Soft</td>
<td>less than 500</td>
<td>0 - 1</td>
<td>&lt; 3</td>
</tr>
<tr>
<td>Loose</td>
<td>4 - 9</td>
<td>7 - 18</td>
<td>7 - 18</td>
<td>Soft</td>
<td>500 to 1,000</td>
<td>2 - 4</td>
<td>3 - 4</td>
</tr>
<tr>
<td>Medium Dense</td>
<td>10 - 29</td>
<td>19 - 58</td>
<td>19 - 58</td>
<td>Medium-Soft</td>
<td>1,000 to 2,000</td>
<td>4 - 8</td>
<td>5 - 9</td>
</tr>
<tr>
<td>Dense</td>
<td>30 - 50</td>
<td>59 - 96</td>
<td>59 - 96</td>
<td>Stiff</td>
<td>2,000 to 4,000</td>
<td>8 - 15</td>
<td>10 - 18</td>
</tr>
<tr>
<td>Very Dense</td>
<td>&gt; 50</td>
<td>&gt; 99</td>
<td>&gt; 99</td>
<td>Very Stiff</td>
<td>4,000 to 8,000</td>
<td>15 - 30</td>
<td>19 - 42</td>
</tr>
<tr>
<td>Hard</td>
<td></td>
<td></td>
<td></td>
<td>Hard</td>
<td>&gt; 8,000</td>
<td>&gt; 30</td>
<td>&gt; 42</td>
</tr>
</tbody>
</table>

## CONSISTENCY OF FINE-GRAINED SOILS

(50% or more passing the No. 200 sieve.)
Consistency determined by laboratory shear strength testing, field visual-manual procedures or standard penetration resistance.

<table>
<thead>
<tr>
<th>CONSISTENCY OF FINE-GRAINED SOILS</th>
<th>Descriptive Term (Consistency)</th>
<th>Unconfined Compressive Strength, psi</th>
<th>Standard Penetration or N-Value Blows/Fl.</th>
<th>Ring Sampler Blows/Fl.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trace</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>With</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Modifier</td>
<td></td>
<td></td>
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</table>

## RELATIVE PROPORTIONS OF SAND AND GRAVEL

Descriptive Term(s) of other constituents: Percent of Dry Weight

<table>
<thead>
<tr>
<th>Descriptive Term(s) of other constituents</th>
<th>Percent of Dry Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trace</td>
<td>&lt; 15</td>
</tr>
<tr>
<td>With</td>
<td>15 - 29</td>
</tr>
<tr>
<td>Modifier</td>
<td>&gt; 30</td>
</tr>
</tbody>
</table>

## GRAIN SIZE TERMINOLOGY

<table>
<thead>
<tr>
<th>Major Component of Sample</th>
<th>Particle Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Boulders</td>
<td>Over 12 in. (300 mm)</td>
</tr>
<tr>
<td>Cobbles</td>
<td>12 in. to 3 in. (300 mm to 75 mm)</td>
</tr>
<tr>
<td>Gravel</td>
<td>3 in. to #4 sieve (75 mm to 4.75 mm)</td>
</tr>
<tr>
<td>Sand</td>
<td>#4 to #200 sieve (4.75 mm to 0.075 mm)</td>
</tr>
<tr>
<td>Silt or Clay</td>
<td>Passing #200 sieve (0.075 mm)</td>
</tr>
</tbody>
</table>

## RELATIVE PROPORTIONS OF FINES

<table>
<thead>
<tr>
<th>Descriptive Term(s) of other constituents</th>
<th>Percent of Dry Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trace</td>
<td>&lt; 5</td>
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<tr>
<td>With</td>
<td>5 - 12</td>
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<td>Modifier</td>
<td>&gt; 12</td>
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## PLASTICITY DESCRIPTION

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<thead>
<tr>
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<th>Plasticity Index</th>
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<tbody>
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<td>Non-plastic</td>
<td>0</td>
</tr>
<tr>
<td>Low</td>
<td>1 - 10</td>
</tr>
<tr>
<td>Medium</td>
<td>11 - 30</td>
</tr>
<tr>
<td>High</td>
<td>&gt; 30</td>
</tr>
</tbody>
</table>
### UNIFIED SOIL CLASSIFICATION SYSTEM

#### Criteria for Assigning Group Symbols and Group Names Using Laboratory Tests

<table>
<thead>
<tr>
<th>Coarse Grained Soils: More than 50% retained on No. 200 sieve</th>
<th>Soil Classification</th>
<th>Group Symbol</th>
<th>Group Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gravels: More than 50% of coarse fraction retained on No. 4 sieve</td>
<td>Clean Gravels:</td>
<td>Cu ≥ 4 and 1 ≤ Cc ≤ 3</td>
<td>GW</td>
</tr>
<tr>
<td></td>
<td>Less than 5% fines</td>
<td>Cu &lt; 4 and/or 1 &gt; Cc &gt; 3</td>
<td>GP</td>
</tr>
<tr>
<td></td>
<td>Gravels with Fines: More than 12% fines</td>
<td>Fines classify as ML or MH</td>
<td>GM</td>
</tr>
<tr>
<td>Sands: 50% or more of coarse fraction passes No. 4 sieve</td>
<td>Clean Sands:</td>
<td>Cu ≥ 6 and 1 ≤ Cc ≤ 3</td>
<td>SW</td>
</tr>
<tr>
<td></td>
<td>Less than 5% fines</td>
<td>Cu &lt; 6 and/or 1 &gt; Cc &gt; 3</td>
<td>SP</td>
</tr>
<tr>
<td></td>
<td>Sands with Fines: More than 12% fines</td>
<td>Fines classify as ML or MH</td>
<td>SM</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Fines classify as CL or CH</td>
<td>SC</td>
</tr>
<tr>
<td>Fine-Grained Soils: 50% or more passes the No. 200 sieve</td>
<td>Silts and Clays: Liquid limit less than 50</td>
<td>PI &gt; 7 and plots on or above “A” line</td>
<td>CL</td>
</tr>
<tr>
<td></td>
<td></td>
<td>PI &lt; 4 or plots below “A” line</td>
<td>ML</td>
</tr>
<tr>
<td></td>
<td>Inorganic: Liquid limit - oven dried</td>
<td>&lt; 0.75</td>
<td>OL</td>
</tr>
<tr>
<td></td>
<td>Organic: Liquid limit - not dried</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Silts and Clays: Liquid limit 50 or more</td>
<td>PI plots on or above “A” line</td>
<td>CH</td>
</tr>
<tr>
<td></td>
<td>Inorganic:</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Organic:</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Liquid limit - oven dried</td>
<td>&lt; 0.75</td>
<td>OH</td>
</tr>
<tr>
<td></td>
<td>Liquid limit - not dried</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Highly organic soils: Primarily organic matter, dark in color, and organic odor</td>
<td>PI plots on or above “A” line</td>
<td>CH</td>
<td>Fat clay</td>
</tr>
<tr>
<td></td>
<td>Organic:</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Organic:</td>
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</tbody>
</table>

A Based on the material passing the 3-inch (75-mm) sieve
B If field sample contained cobbles or boulders, or both, add “with cobbles or boulders, or both” to group name.
C Gravels with 5 to 12% fines require dual symbols: GW-GM well-graded gravel with silt, GW-GC well-graded gravel with clay, GP-GM poorly graded gravel with silt, GP-GC poorly graded gravel with clay.
D Sands with 5 to 12% fines require dual symbols: SW-SM well-graded sand with silt, SW-SC well-graded sand with clay, SP-SM poorly graded sand with silt, SP-SC poorly graded sand with clay.
E \( Cu = D_{60}/D_{10} \)
F If soil contains ≥ 15% sand, add “with sand” to group name.
G If fines classify as ML, use dual symbol GC-GM, or SC-SM.

**For classification of fine-grained soils and fine-grained fraction of coarse-grained soils**

- Equation of “A” - line
  - Horizontal at PI=4 to LL=25.5.
  - then PI=0.73 (LL-20)
- Equation of “U” - line
  - Vertical at LL=16 to PI=7.
  - then PI=0.9 (LL-8)

- CL - ML
- ML or OL
- CH or OH
- MH or OH

- If fines are organic, add “with organic fines” to group name.
- If soil contains ≥ 15% gravel, add “with gravel” to group name.
- If Atterberg limits plot in shaded area, soil is a CL-ML, silty clay.
- If soil contains 15 to 29% plus No. 200, add “with sand” or “with gravel,” whichever is predominant.
- If soil contains 30% plus No. 200 predominantly sand, add “sandy” to group name.
- If soil contains ≥ 30% plus No. 200, predominantly gravel, add “gravelly” to group name.
- If PI ≥ 4 and plots on or above “A” line.
- PI < 4 or plots below “A” line.
- PI plots on or above “A” line.
- PI plots below “A” line.

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**Exhibit D-2**