

Appendix A  
Subsurface Exploration

The subsurface exploration at the site consisted of a total of 20 test boring locations (Borings B-1 to B-21; B-14 was not drilled) located as shown on Figures 2A thru 2K, Site and Boring Location Plan. The borings were drilled during the period from August 23 to September 18, 2017 by 7NT Drilling of Indianapolis, Indiana, under full-time technical supervision of AECOM. Test boring and ground surface elevations were estimated by the Topographic Survey provided by PCS Engineers of Avon, Indiana dated February 21, 2014. All elevations are referenced to NAVD88.

The test borings were performed using a CME-550 track-mounted drilling rig and were advanced by mud rotary drilling techniques. The borings were advanced to depths of 26 to 52 feet. Samples of the subsoils were recovered from the borings for identification and classification purposes by means of a 2-inch O.D. split-barrel sampler driven 18 inches by a 140-pound hammer freely falling 30 inches (the Standard Penetration Test, ASTM D 1586). The number of hammer blows required to drive the sampler during the interval from 6 to 18 inches, or fraction thereof, is reported on the test boring logs as the sampling resistance. Relatively undisturbed samples of fine-grained soils were obtained with a 3-inch O.D. thin-walled Shelby tube sampler in general accordance with ASTM D 1587.

An HQ-size rock core (2.5-inch diameter), typically 5 to 10 foot in length was obtained in the borings upon encountering bedrock. After coring, the Rock Quality Designation (RQD) was determined as the total length of all naturally segmented recovered rock core segments equal to or greater than 4 inches in length divided by the total length of the core run, expressed as a percentage. The RQD and the percent core recovery are presented on the boring log.

Where fine-grained materials were encountered, Pocket Penetrometer Resistance (PPR) readings were taken to obtain an indication of the unconfined compressive strength of the soils. These readings are shown on the test boring logs.

Four groundwater observation pipes (GOP's) were installed in boreholes (B-7, B-8, B-11, and B-15). The GOP's were installed with sand pack around a 10 feet screen and a bentonite plug above the sand pack.

At the completion of the test borings, the boreholes were grouted with a cement-bentonite grout. The test boring logs are presented on pages A-3 through A-32 of Appendix A. A "Key to Soil Symbols and Terms" used in this report is included on page A-2.

| Major Divisions  |  | Group symbols                                 | Typical names   | Laboratory classification criteria  |  | Particle Size | Sieve Size                             |  |
|--|--|---|---|---|--|---------------|--|--|
| Coarse-grained soils<br>(More than half of material is larger than No. 200 sieve size) | Gravels<br>(More than half of coarse fraction is larger than No. 4 sieve size)   | GW  | Well-graded gravels, gravel-sand mixture, little or no fines                        | Determine percentages of sand and gravel from grain-size curve. Depending on percentage of fines (fraction smaller than No. 200 sieve size), coarse-grained soils are classified as:<br>GW, GP, SW, SP<br>GM, GC, SM, SC<br>More than 5 per cent. . . . .<br>More than 12 per cent. . . . .<br>5 to 12 per cent. . . . .<br>Borderline cases requiring dual symbols** | $C_u = \frac{D_{60}}{D_{10}}$ greater than 4; $C_c = \frac{(D_{30})^2}{D_{10} \times D_{60}}$ between 1 and 3      | mm<br><0.074  | #200 To #40<br>#40 To #10<br>#10 To #4 |  |
|  |  | GP  | Poorly graded gravels, gravel-sand mixtures, little or no fines                     |   |  |               |  | Not meeting all gradation requirements for GW  |
|  | Sands<br>(More than half of coarse fraction is smaller than No. 4 sieve size)    | GM*   | Silty gravels, gravel-sand-silt mixtures  |   | Atterberg limits below "A" line or P.I. less than 4  |               |  | Above "A" line with P.I. between 4 and 7 are <i>borderline</i> cases requiring use of dual symbols                   |
|  |  | GC  |   |   | Clayey gravels, gravel-sand-clay mixtures  |               |  |  |
|  | Clean sands<br>(Little or no fines)  | SW  | Well-graded sands, gravelly sands, little or no fines                               |   | $C_u = \frac{D_{60}}{D_{10}}$ greater than 6; $C_c = \frac{(D_{30})^2}{D_{10} \times D_{60}}$ between 1 and 3      |               |  | $C_u = \frac{D_{60}}{D_{10}}$ greater than 4; $C_c = \frac{(D_{30})^2}{D_{10} \times D_{60}}$ between 1 and 3        |
|  |  | SP  | Poorly graded sands, gravelly sands, little or no fines                             |   |  |               |  |  |
|  | Sands with fines<br>(Appreciable amount of fines)                                | SM*   | Silty sands, sand-silt mixtures   |   | Atterberg limits below "A" line or P.I. less than 4  |               |  | Limits plotting in hatched zone with P.I. between 4 and 7 are <i>borderline</i> cases requiring use of dual symbols. |
|  |  | SC  |   |   | Clayey sands, sand-clay mixtures   |               |  |  |
|  | Fine-grained soils<br>(More than half of material is smaller than No. 200 sieve) | Silt and clays<br>(Liquid limit less than 50) | ML  |   | Inorganic silts and very fine sands, rock flour, silty or clayey fine sands or clayey silts with slight plasticity |               |  |  |
|  |  |   | CL  |   | Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays                  |               |  |  |
| OL   |  |   | Organic silts and organic silty clays of low plasticity                             |   |  |               |  |  |
| Silt and clays<br>(Liquid limit greater than 50)                                       |  | MH  | Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts |   |  |               |  |  |
|  |  | CH  | Inorganic clays of high plasticity, fat clays                                       |   |  |               |  |  |
| OH   | Organic clays of medium to high plasticity, organic silts                        |   |   |   |  |               |  |  |
| Highly organic soils   | PH   | Peat and other highly organic soils           |   |   |  |               |  |  |

### KEY TO SOIL SYMBOLS AND TERMS

Terms used in this report for describing soils according to their texture or grain size distribution are in accordance with the Unified Soil Classification System, as described in Technical Memorandum No. 3-357, Waterways Experiment Station, March 1953.

#### TERMS DESCRIBING CONSISTENCY OR CONDITION

COARSE GRAINED SOILS (major portion retained on No. 200 sieve): Includes (1) clean gravels and (2) silty or clayey gravels and sands. Condition is rated according to relative density<sup>(1)</sup> as determined by laboratory tests or standard penetration resistance tests.

| Descriptive Term | Relative Density |
|------------------|------------------|
| Very loose       | 0 to 15%         |
| Loose            | 15 to 35%        |
| Medium dense     | 35 to 65%        |
| Dense            | 65 to 85%        |
| Very dense       | 85 to 100%       |

FINE GRAINED SOILS (major portion passing No. 200 sieve): Includes (1) inorganic and organic silts and clays, (2) gravelly, sandy, or silty clays, and (3) clayey silts. Consistency is rated according to shearing strength, as indicated by penetrometer readings or by unconfined compression tests.

| Descriptive Term | Unconfined Compression Strength, tons/sq. ft. |
|------------------|---|
| Very soft        | less than 0.25                                |
| Soft             | 0.25 to 0.50                                  |
| Firm             | 0.50 to 1.00                                  |
| Stiff            | 1.00 to 2.00                                  |
| Very stiff       | 2.00 to 4.00                                  |
| Hard             | 4.00 and higher                               |

#### TEST AND SAMPLE IDENTIFICATION

- 15 — The number of blows (15) of a 140-pound hammer falling 30 inches used to drive a 2" O. D. split-barrel sampler for the last 12 inches of penetration.
- 50/2 — Number of blows (50) used to drive the split-barrel a certain number of inches (2).
- P — Thin-wall tube sample.
- P/250 — Thin-wall tube pushed hydraulically, using a certain pressure (250 psi) to push the last 6 inches.
- C<sub>p</sub> — Denison or Pitcher-Type — core-barrel sample.
- P<sub>s</sub> — Piston sample.
- A — Auger sample.
- BX — Rock cored with BX core barrel, which obtains a 1-5/8" diameter core.
- NX — Rock cored with NX core barrel, which obtains a 2-1/8" diameter core.
- 65% — Percentage (65) of rock core recovered.
- 20 — Rock Quality Designation (RQD)<sup>(2)</sup>
- VS — Vane Shear Test.
- Sample Recovered:
  - C — Consolidation and specific gravity tests.
  - D — Maximum & minimum density.
  - DS — Direct Shear test.
  - G — Specific gravity test.
  - K — Permeability test.
  - M — Mechanical (sieve or hydrometer) analysis.
  - T — Triaxial compression test.
  - U — Unconfined compression test.
  - W — Unit weight & natural moisture content.
  - X — Special tests performed — see Laboratory test results.
- Sample Not Recovered:
  - M — Mechanical (sieve or hydrometer) analysis.
  - T — Triaxial compression test.
  - U — Unconfined compression test.
  - W — Unit weight & natural moisture content.
  - X — Special tests performed — see Laboratory test results.

Laboratory Test Performed

\*Division of GM and SM groups into subdivisions of d and u are for roads and airfields only. Subdivision is based on Atterberg limits; suffix d used when L.L. is 28 or less and the P.I. is 6 or less; the suffix u used when L.L. is greater than 28.  
 \*\*Borderline classifications, used for soils possessing characteristics of two groups, are designated by combinations of group symbols. For example: GW-GC, well-graded gravel-sand mixture with clay binder.

<sup>(2)</sup>RQD =  $\sum \text{Core Segments} > 4 \text{ inches} \times 100$   
 Core Interval  
 Where Segmentation is Not Caused by Drilling Effects

<sup>(1)</sup>ASTM 2048-69

# LOG of BORING No. B- 1

DATE 8/28/17 SURFACE ELEVATION 710.5 LOCATION See Plate 2

| DEPTH, FT. | SAMPLES | SAMPLING RESISTANCE | SAMPLE TYPE | DESCRIPTION   | STRATUM ELEVATION | POCKET PENETROMETER (TSF) | WATER CONTENT, % | LIQUID LIMIT, % | PLASTIC LIMIT, % | OTHER TESTS |       |
|------------|---------|---------------------|-------------|---|-------------------|---------------------------|------------------|-----------------|------------------|-------------|-------|
| 0          |         |                     |             | Topsoil (approx. 6")  | 710.0             | 4.5                       |                  |                 |                  |             |       |
| 13         |         | 18                  | SS          | Stiff to very stiff dark brown clayey fine SAND with fine gravel    |                   | 4.5                       | 11.5             | 24              | 15               | M           |       |
| 5          |         | 7                   | .SS.        |   |                   | 4.5                       | 13.2             | 21              | 15               | M           |       |
| 11         |         | 11                  | SS          |   |                   | 701.5                     |                  |                 |                  |             |       |
| 10         |         | 11                  | .SS.        |   | (Fill)            |                           |                  |                 |                  |             |       |
| 11         |         | 11                  | SS          | Firm to very stiff gray and brownish gray silty CLAY with fine sand |                   | 4.5                       | 28.6             |                 |                  | M           |       |
| 8          |         | 8                   | SS          |   |                   | 4.5                       |                  |                 |                  |             |       |
| 15         |         | 9                   | .SS.        |   |                   |                           | 16.6             |                 |                  |             |       |
|            |         | P                   | P           |   |                   | 3.0                       |                  |                 |                  |             |       |
|            |         | P                   | P           |   |                   | 1.0                       | 39.3             | 59              | 25               |             | C T M |
| 20         |         | P                   | .P.         |   |                   |                           |                  |                 |                  |             |       |
|            |         | 1                   | SS          |   |                   | 0.3                       |                  |                 |                  |             |       |
| 25         |         | P                   | P           |   |                   | 4.0                       | 22.7             | 42              | 23               |             | T G M |
|            |         | P                   | P           |   |                   | 4.5                       |                  |                 |                  |             |       |
| 30         |         | 15                  | SS          |   |                   | 3.8                       |                  |                 |                  |             |       |
|            |         | P                   | P           |   | 4.5               |                           |                  |                 |                  |             |       |
|            |         | P                   | P           |   | 4.5               |                           |                  |                 |                  |             |       |
| 35         |         | 20                  | SS          |   | 4.5               |                           |                  |                 |                  |             |       |
|            |         | 15                  | SS          |   | 4.5               |                           |                  |                 |                  |             |       |
|            |         | 19                  | SS          |   | 4.5               |                           |                  |                 |                  |             |       |
| 40         |         | 11                  | SS          |   | 4.5               |                           |                  |                 |                  |             |       |
|            |         | 72/7"               | SS          | - coarse gravel-sized rock fragments in tip of spoon                | 667.3             | 4.5                       |                  |                 |                  |             |       |
|            |         | HQ                  | HQ          | Continued on Sheet 2 of 2   |                   |                           |                  |                 |                  | ROD         |       |

7/9/18 BORLOGR ROCKY RIPPLE BORING LOGS - FINAL.GPJ

Completion Depth: 48.5 ft. Water Depth: See ft., After \_\_\_\_\_ hrs.  
 Project No.: 60542771 Notes ft., After \_\_\_\_\_ hrs.  
 Project Name: Rocky Ripple Levee \_\_\_\_\_ ft., After \_\_\_\_\_ hrs.  
 Drilling Method: Mud Rotary \_\_\_\_\_ ft., After \_\_\_\_\_ hrs.



# LOG of BORING No. B- 1

DATE 8/28/17 SURFACE ELEVATION 710.5 LOCATION See Plate 2

| DEPTH, FT. | SAMPLES | SAMPLING RESISTANCE | SAMPLE TYPE | DESCRIPTION   | STRATUM ELEVATION | POCKET PENETROMETER (TSF) | WATER CONTENT, % | LIQUID LIMIT, % | PLASTIC LIMIT, % | OTHER TESTS    |  |
|------------|---------|---------------------|-------------|---|-------------------|---------------------------|------------------|-----------------|------------------|----------------|--|
| 45         |         | 100                 |             | Slightly weathered gray LIMESTONE, fractures inclined approximately 0 to 45 degrees from the horizontal, fracture spacing typically ranges from 1" to 12" inches.<br><br>(Bedrock)  |                   |                           |                  |                 |                  | 26             |  |
|            |         | HQ<br>100           | HQ          |   | 662.0             |                           | 0.3              |                 |                  | U<br>RQD<br>65 |  |
| 50         |         |                     |             | END OF BORING   |                   |                           |                  |                 |                  |                |  |
| 55         |         |                     |             | <p><b>Notes:</b></p> <ol style="list-style-type: none"> <li>1. Accurate groundwater level could not be obtained during drilling due to the drilling method.</li> <li>2. Casing refusal at 43.2 feet.</li> <li>3. Values under "Pocket Penetrometer" are pocket penetrometer resistance readings in tons per square foot, an indication of unconfined compressive strength of cohesive soils.</li> </ol> |                   |                           |                  |                 |                  |                |  |
| 60         |         |                     |             |   |                   |                           |                  |                 |                  |                |  |
| 65         |         |                     |             |   |                   |                           |                  |                 |                  |                |  |
| 70         |         |                     |             |   |                   |                           |                  |                 |                  |                |  |
| 75         |         |                     |             |   |                   |                           |                  |                 |                  |                |  |
| 80         |         |                     |             |   |                   |                           |                  |                 |                  |                |  |
| 85         |         |                     |             |   |                   |                           |                  |                 |                  |                |  |

7/9/18 BORLOGR ROCKY RIPPLE BORING LOGS - FINAL.GPJ

Completion Depth: 48.5 ft. Water Depth: See ft., After \_\_\_\_\_ hrs.  
 Project No.: 60542771 Notes ft., After \_\_\_\_\_ hrs.  
 Project Name: Rocky Ripple Levee \_\_\_\_\_ ft., After \_\_\_\_\_ hrs.  
 Drilling Method: Mud Rotary \_\_\_\_\_ ft., After \_\_\_\_\_ hrs.



# LOG of BORING No. B- 2

DATE 8/25/17 SURFACE ELEVATION 710.5 LOCATION See Plate 2

| DEPTH, FT. | SAMPLES | SAMPLING RESISTANCE | SAMPLE TYPE | DESCRIPTION   | STRATUM ELEVATION                   | POCKET PENETROMETER (TSF) | WATER CONTENT, % | LIQUID LIMIT, % | PLASTIC LIMIT, % | OTHER TESTS |
|------------|---------|---------------------|-------------|---|-------------------------------------|---------------------------|------------------|-----------------|------------------|-------------|
| 0          |         |                     |             | Topsoil (approx. 6")  | 710.0                               | 4.5                       |                  |                 |                  |             |
| 4          |         |                     | SS          | Interbedded layers of stiff to very stiff dark brown fine sandy SILT, trace fine gravel, trace organics and medium dense brown silty medium to fine SAND, trace fine gravel |                                     |                           |                  |                 |                  |             |
| 19         |         | SS                  |             |   |                                     |                           |                  |                 |                  |             |
| 5          |         | 17                  | SS          |   |                                     |                           |                  |                 |                  |             |
| 14         |         | SS                  |             |   |                                     |                           |                  |                 |                  |             |
| 2          |         |                     | SS          | (Fill)  | 700.5                               | 4.5                       |                  |                 |                  |             |
| 10         |         |                     | 6           | SS  | Medium dense brown clayey fine SAND | 4.5                       | 17.1             | 26              | 17               | M           |
| 6          |         | SS                  |             |   |                                     |                           |                  |                 |                  |             |
| 15         |         | 5                   | SS          |   |                                     |                           |                  |                 |                  |             |
| 8          |         | SS                  |             |   |                                     |                           |                  |                 |                  |             |
| 16         |         | SS                  |             |   |                                     |                           |                  |                 |                  |             |
| 74         |         | SS                  |             |   |                                     |                           |                  |                 |                  |             |
| 13         |         | SS                  |             |   |                                     | 13.4                      |                  |                 |                  | M           |
| 25         |         | 16                  | SS          | Medium dense to dense gray and brown coarse to fine SAND and coarse to fine GRAVEL, trace silt  |                                     |                           |                  |                 |                  |             |
| 23         |         | SS                  |             |   |                                     |                           |                  |                 |                  |             |
| 32         |         | SS                  |             |   |                                     |                           |                  |                 |                  |             |
| 57         |         | SS                  |             |   |                                     |                           |                  |                 |                  |             |
| 11         |         | SS                  |             |   |                                     |                           |                  |                 |                  |             |
| 35         |         | P                   | P           | Stiff to very stiff gray silty CLAY, trace sand and gravel  |                                     | 3.5                       | 20.8             | 41              | 23               | T M         |
|            |         | P                   | .P.         |   |                                     |                           |                  |                 |                  |             |
|            |         | P                   | P           |   |                                     |                           |                  |                 |                  |             |
| 40         |         | 20                  | SS          | Continued on Sheet 2 of 2   | 678.0                               | 4.5                       |                  |                 |                  |             |
|            |         | 16                  | SS          |   |                                     |                           |                  |                 |                  |             |
|            |         | 63/9"               | SS          |   |                                     |                           |                  |                 |                  |             |

7/9/18 BORLOGR ROCKY RIPPLE BORING LOGS - FINAL.GPJ

Completion Depth: 51.6 ft. Water Depth: See ft., After \_\_\_\_\_ hrs.  
 Project No.: 60542771 Notes ft., After \_\_\_\_\_ hrs.  
 Project Name: Rocky Ripple Levee ft., After \_\_\_\_\_ hrs.  
 Drilling Method: Mud Rotary ft., After \_\_\_\_\_ hrs.



# LOG of BORING No. B- 2

DATE 8/25/17 SURFACE ELEVATION 710.5 LOCATION See Plate 2

| DEPTH, FT. | SAMPLES | SAMPLING RESISTANCE | SAMPLE TYPE | DESCRIPTION   | STRATUM ELEVATION | POCKET PENETROMETER (TSF) | WATER CONTENT, % | LIQUID LIMIT, % | PLASTIC LIMIT, % | OTHER TESTS    |
|------------|---------|---------------------|-------------|---|-------------------|---------------------------|------------------|-----------------|------------------|----------------|
| 45         |         | HQ<br>100           | HQ          | Very dense gray decomposed rock friable to silty coarse to fine sandy coarse to fine GRAVEL-sized rock fragments<br>(Decomposed Rock)   | 665.2             |                           |                  |                 |                  | RQD<br>31      |
| 50         |         | HQ<br>100           | HQ          | Slightly weathered gray LIMESTONE, fractures inclined approximately 0 to 45 degrees from the horizontal, fracture spacing typically ranges from 1" to 12" inches.<br>(Bedrock)  | 658.9             |                           | 0.3              |                 |                  | U<br>RQD<br>88 |
| 55         |         |                     |             | END OF BORING   |                   |                           |                  |                 |                  |                |
| 60         |         |                     |             | <p><b>Notes:</b></p> <ol style="list-style-type: none"> <li>1. Boring offset 10 feet southeast of location shown on plans, due to overhead obstruction (tree limbs).</li> <li>2. Accurate groundwater level could not be obtained during drilling due to the drilling method.</li> <li>3. Casing refusal at 45.3 feet.</li> <li>4. Values under "Pocket Penetrometer" are pocket penetrometer resistance readings in tons per square foot, an indication of unconfined compressive strength of cohesive soils.</li> </ol> |                   |                           |                  |                 |                  |                |
| 65         |         |                     |             |   |                   |                           |                  |                 |                  |                |
| 70         |         |                     |             |   |                   |                           |                  |                 |                  |                |
| 75         |         |                     |             |   |                   |                           |                  |                 |                  |                |
| 80         |         |                     |             |   |                   |                           |                  |                 |                  |                |
| 85         |         |                     |             |   |                   |                           |                  |                 |                  |                |

7/9/18 BORLOGR ROCKY RIPPLE BORING LOGS - FINAL.GPJ

Completion Depth: 51.6 ft. Water Depth: See ft., After \_\_\_\_\_ hrs.  
 Project No.: 60542771 Notes ft., After \_\_\_\_\_ hrs.  
 Project Name: Rocky Ripple Levee \_\_\_\_\_ ft., After \_\_\_\_\_ hrs.  
 Drilling Method: Mud Rotary \_\_\_\_\_ ft., After \_\_\_\_\_ hrs.



# LOG of BORING No. B- 3

DATE 9/14/17 SURFACE ELEVATION 710.5 LOCATION See Plate 2

| DEPTH, FT. | SAMPLES | SAMPLING RESISTANCE | SAMPLE TYPE | DESCRIPTION   | STRATUM ELEVATION | POCKET PENETROMETER (TSF) | WATER CONTENT, % | LIQUID LIMIT, % | PLASTIC LIMIT, % | OTHER TESTS |
|------------|---------|---------------------|-------------|---|-------------------|---------------------------|------------------|-----------------|------------------|-------------|
| 0          |         |                     |             | Topsoil (approx. 5")  | 710.0             |                           |                  |                 |                  |             |
| 13         |         |                     | SS          | Medium dense to dense brown to dark brown clayey silty coarse to fine SAND with coarse to fine gravel               |                   |                           | 11.5             | 28              | 18               | M           |
| 19         |         |                     | SS          |   |                   |                           | 11.9             |                 |                  | M           |
| 5          |         |                     | SS          |   |                   |                           |                  |                 |                  |             |
| 15         |         |                     | SS          | (Fill)  | 702.5             |                           |                  |                 |                  |             |
| 13         |         |                     | SS          | Medium dense to dense brown silty medium to fine SAND   |                   |                           | 12.3             | 26              | 16               | M           |
| 10         |         |                     | SS          |   |                   |                           | 14.4             |                 |                  | M           |
| 15         |         |                     | SS          |   |                   | 697.3                     |                  |                 |                  |             |
| 17         |         |                     | SS          | Medium dense to dense brown coarse to fine SAND and coarse to fine GRAVEL, trace silt, cobbles                      |                   |                           |                  |                 |                  |             |
| 15         |         |                     | SS          |   |                   |                           | 9.0              |                 |                  | M           |
| 16         |         |                     | SS          |   |                   |                           |                  |                 |                  |             |
| 18         |         |                     | SS          |   |                   |                           |                  |                 |                  |             |
| 20         |         |                     | SS          |   |                   |                           |                  |                 |                  | M K         |
| 12         |         |                     | SS          |   |                   |                           |                  |                 |                  |             |
| 20         |         |                     | SS          |   | 686.5             |                           | 9.5              |                 |                  | M           |
| 18         |         |                     | SS          | Stiff to very stiff brownish gray to grayish brown silty CLAY   |                   | 4.5                       |                  |                 |                  |             |
| P          |         |                     | P           |   |                   | 4.5                       |                  |                 |                  |             |
| 12         |         |                     | SS          |   |                   |                           |                  |                 |                  |             |
| 30         |         |                     | P           |   |                   | 3.5-4.5                   | 29.4             | 42              | 22               | T K G M     |
| 16         |         |                     | SS          |   |                   | 3.8-4.3                   |                  |                 |                  |             |
| 35         |         |                     | SS          |   |                   | 4.5                       |                  |                 |                  |             |
| 10         |         |                     | SS          |   |                   |                           |                  |                 |                  |             |
| 89/9"      |         |                     | SS          |   | 673.8             | 4.5                       |                  |                 |                  |             |
| 50/1"      |         |                     | SS          | Very dense gray decomposed rock friable to silty coarse to fine SAND and coarse to fine GRAVEL-sized rock fragments | 671.9             |                           |                  |                 |                  |             |
| 40         |         | HQ<br>96            | HQ          | (Decomposed Rock)   |                   |                           |                  |                 |                  | RQD<br>46   |
|            |         |                     | HQ          | Slightly weathered gray LIMESTONE   |                   |                           |                  |                 |                  |             |
|            |         |                     | HQ          | Continued on Sheet 2 of 2   |                   |                           | 0.2              |                 |                  | U<br>RQD    |

7/9/18 BORLOGR ROCKY RIPPLE BORING LOGS - FINAL.GPJ

Completion Depth: 46.3 ft. Water Depth: See ft., After \_\_\_\_\_ hrs.  
 Project No.: 60542771 Notes ft., After \_\_\_\_\_ hrs.  
 Project Name: Rocky Ripple Levee ft., After \_\_\_\_\_ hrs.  
 Drilling Method: Mud Rotary ft., After \_\_\_\_\_ hrs.



# LOG of BORING No. B- 3

DATE 9/14/17 SURFACE ELEVATION 710.5 LOCATION See Plate 2

| DEPTH, FT. | SAMPLES | SAMPLING RESISTANCE | SAMPLE TYPE | DESCRIPTION  | STRATUM ELEVATION | POCKET PENETROMETER (TSF) | WATER CONTENT, % | LIQUID LIMIT, % | PLASTIC LIMIT, % | OTHER TESTS |
|------------|---------|---------------------|-------------|--|-------------------|---------------------------|------------------|-----------------|------------------|-------------|
| 45         |         | 92                  |             | Slightly weathered gray LIMESTONE, fractures inclined approximately 0 to 10 degrees from the horizontal, fracture spacing typically ranges from 1" to 24" inches.<br><span style="float: right;">(Bedrock)</span>  | 664.2             |                           |                  |                 |                  | 88          |
| 50         |         |                     |             | END OF BORING  |                   |                           |                  |                 |                  |             |
| 55         |         |                     |             | <p><b>Notes:</b></p> <ol style="list-style-type: none"> <li>1. Accurate groundwater level could not be obtained during drilling due to the drilling method.</li> <li>2. Drilling resistance (i.e. rig chatter) noted at approximately 4 to 5 feet and 36 to 38.6 feet, which may be indicative of gravel and/or cobbles.</li> <li>3. Casing refusal at 38.6 feet.</li> <li>4. Values under "Pocket Penetrometer" are pocket penetrometer resistance readings in tons per square foot, an indication of unconfined compressive strength of cohesive soils.</li> </ol> |                   |                           |                  |                 |                  |             |
| 60         |         |                     |             |  |                   |                           |                  |                 |                  |             |
| 65         |         |                     |             |  |                   |                           |                  |                 |                  |             |
| 70         |         |                     |             |  |                   |                           |                  |                 |                  |             |
| 75         |         |                     |             |  |                   |                           |                  |                 |                  |             |
| 80         |         |                     |             |  |                   |                           |                  |                 |                  |             |
| 85         |         |                     |             |  |                   |                           |                  |                 |                  |             |

7/9/18 BORLOGR ROCKY RIPPLE BORING LOGS - FINAL.GPJ

Completion Depth: 46.3 ft. Water Depth: See ft., After \_\_\_\_\_ hrs.  
 Project No.: 60542771 Notes ft., After \_\_\_\_\_ hrs.  
 Project Name: Rocky Ripple Levee \_\_\_\_\_ ft., After \_\_\_\_\_ hrs.  
 Drilling Method: Mud Rotary \_\_\_\_\_ ft., After \_\_\_\_\_ hrs.



# LOG of BORING No. B- 4

DATE 9/15/17 SURFACE ELEVATION 704.5 LOCATION See Plate 2

| DEPTH, FT.    | SAMPLES | SAMPLING RESISTANCE | SAMPLE TYPE | DESCRIPTION  | STRATUM ELEVATION | POCKET PENETROMETER (TSF) | WATER CONTENT, % | LIQUID LIMIT, % | PLASTIC LIMIT, % | OTHER TESTS |
|---------------|---------|---------------------|-------------|--|-------------------|---------------------------|------------------|-----------------|------------------|-------------|
| 0             |         |                     |             | Topsoil (approx. 4")   | 704.0             |                           |                  |                 |                  |             |
| 10            |         | 10                  | SS          | Medium dense to dense dark brown silty medium to fine SAND   |                   |                           | 5.0              | NP              | NP               | M           |
| 4             |         | 4                   | SS          |  |                   |                           |                  |                 |                  |             |
| 5             |         | 4                   | SS          |  |                   |                           |                  |                 |                  |             |
| 7             |         | 7                   | SS          |  |                   |                           |                  |                 |                  |             |
| 7             |         | 7                   | SS          |  |                   |                           |                  |                 |                  |             |
| 10            |         |                     |             |  | 694.5             |                           |                  |                 |                  |             |
| 11            |         | 11                  | SS          | Medium dense brown silty coarse to fine SAND with coarse to fine gravel  |                   |                           | 12.0             |                 |                  | M           |
| 11            |         | 11                  | SS          |  |                   |                           |                  |                 |                  |             |
| 15            |         | 8                   | SS          |  |                   |                           |                  |                 |                  |             |
| 12            |         | 12                  | .SS.        |  |                   |                           |                  |                 |                  |             |
| 12            |         | 12                  | SS          |  |                   |                           |                  |                 |                  |             |
| 20            |         |                     |             |  |                   |                           |                  |                 |                  |             |
| 13            |         | 13                  | SS          | - trace silt   |                   |                           | 13.5             |                 |                  | M           |
| 39            |         | 39                  | .SS.        |  |                   |                           |                  |                 |                  |             |
| 25            |         | 9                   | SS          |  |                   |                           |                  |                 |                  |             |
| 19            |         | 19                  | SS          |  |                   |                           |                  |                 |                  |             |
| 8             |         | 8                   | SS          |  |                   |                           |                  |                 |                  |             |
| 30            |         | P                   | P           | Stiff to very stiff grayish brown to brownish gray silty CLAY with fine sand   |                   |                           | 30.5             | 58              | 22               | M K T       |
| 10            |         | 10                  | SS          |  |                   |                           |                  |                 |                  |             |
| 35            |         | 30                  | SS          |  |                   |                           |                  |                 |                  |             |
| 19            |         | 19                  | SS          |  |                   |                           |                  |                 |                  |             |
| 50/5"         |         | 50/5"               | SS          |  |                   |                           |                  |                 |                  |             |
| 40            |         | 50/1"               | .SS.        | Very dense gray decomposed rock friable to silty coarse to fine SAND and coarse to fine GRAVEL-sized rock fragments<br><br>(Decomposed Rock) |                   |                           |                  |                 |                  |             |
|               |         |                     |             |  |                   |                           |                  |                 |                  |             |
| END OF BORING |         |                     |             |  |                   |                           |                  |                 |                  |             |

Continued on Sheet 2 of 2

Completion Depth: 39.0 ft. Water Depth: See ft., After \_\_\_\_\_ hrs.  
 Project No.: 60542771 Notes ft., After \_\_\_\_\_ hrs.  
 Project Name: Rocky Ripple Levee ft., After \_\_\_\_\_ hrs.  
 Drilling Method: Mud Rotary ft., After \_\_\_\_\_ hrs.

7/9/18 BORLOGR ROCKY RIPPLE BORING LOGS - FINAL.GPJ





# LOG of BORING No. B- 5

DATE 9/15/17 SURFACE ELEVATION 705.0 LOCATION See Plate 2

| DEPTH, FT. | SAMPLES        | SAMPLING RESISTANCE | SAMPLE TYPE | DESCRIPTION  | STRATUM ELEVATION | POCKET PENETROMETER (TSF) | WATER CONTENT, % | LIQUID LIMIT, % | PLASTIC LIMIT, % | OTHER TESTS |
|------------|----------------|---------------------|-------------|--|-------------------|---------------------------|------------------|-----------------|------------------|-------------|
| 0          |                |                     |             | Topsoil (approx. 4")   | 704.5             |                           |                  |                 |                  |             |
| 10         |                |                     | SS          | Medium dense to dense brown silty medium to fine SAND  |                   |                           |                  |                 |                  |             |
| 4          |                |                     | SS          |  |                   |                           |                  |                 |                  |             |
| 5          |                |                     | 6 SS        |  | 13.9              |                           |                  |                 |                  | M           |
| 7          |                |                     | 7 SS        |  |                   |                           |                  |                 |                  |             |
| 7          |                |                     | 7 SS        |  |                   |                           |                  |                 |                  |             |
| 10         |                |                     | 10 SS       | - becoming coarse to fine SAND, trace silt, fine gravel  |                   |                           | 9.8              |                 |                  | M           |
| 12         |                |                     | 12 SS       |  |                   |                           |                  |                 |                  |             |
| 15         |                |                     |             |  | 688.0             |                           |                  |                 |                  |             |
| 14         |                |                     | 14 SS       | Firm to stiff gray silty CLAY, trace medium to fine sand   |                   |                           |                  |                 |                  |             |
| 20         |                |                     | 9 SS        |  | 680.5             | 1.8-3.0                   | 22.5             | 49              | 20               | M           |
| 25         |                |                     | 42 SS       | Dense to very dense gray silty coarse to fine SAND and coarse to fine GRAVEL, trace cobbles  | 676.0             |                           | 9.8              |                 |                  | M           |
| 30         |                |                     | 17 SS       | Stiff to very stiff gray silty CLAY with fine sand   | 671.5             | 4.5                       |                  |                 |                  |             |
| 35         | 50/5"<br>50/1" |                     | SS<br>SS    | Very dense gray decomposed rock friable to silty coarse to fine SAND and coarse to fine GRAVEL-sized rock fragments<br><br>(Decomposed Rock) | 670.0             |                           |                  |                 |                  |             |
| 40         |                |                     |             |  |                   |                           |                  |                 |                  |             |

Continued on Sheet 2 of 2

Completion Depth: 35.0 ft. Water Depth: See ft., After \_\_\_\_\_ hrs.  
 Project No.: 60542771 Notes ft., After \_\_\_\_\_ hrs.  
 Project Name: Rocky Ripple Levee \_\_\_\_\_ ft., After \_\_\_\_\_ hrs.  
 Drilling Method: Mud Rotary \_\_\_\_\_ ft., After \_\_\_\_\_ hrs.

7/9/18 BORLOGR ROCKY RIPPLE BORING LOGS - FINAL.GPJ



# LOG of BORING No. B- 5

DATE 9/15/17 SURFACE ELEVATION 705.0 LOCATION See Plate 2

| DEPTH, FT. | SAMPLES | SAMPLING RESISTANCE | SAMPLE TYPE | DESCRIPTION   | STRATUM ELEVATION | POCKET PENETROMETER (TSF) | WATER CONTENT, % | LIQUID LIMIT, % | PLASTIC LIMIT, % | OTHER TESTS |
|------------|---------|---------------------|-------------|---|-------------------|---------------------------|------------------|-----------------|------------------|-------------|
| 45         |         |                     |             | <p><b>Notes:</b></p> <ol style="list-style-type: none"> <li>1. Accurate groundwater level could not be obtained during drilling due to the drilling method.</li> <li>2. Drilling resistance (i.e. rig chatter) noted at approximately 14 to 16 feet, 29 to 30 feet, and 33 to 35 feet which may be indicative of gravel and/or cobbles.</li> <li>3. Casing refusal at 35.0 feet.</li> <li>4. Values under "Pocket Penetrometer" are pocket penetrometer resistance readings in tons per square foot, an indication of unconfined compressive strength of cohesive soils.</li> </ol> |                   |                           |                  |                 |                  |             |
| 50         |         |                     |             |   |                   |                           |                  |                 |                  |             |
| 55         |         |                     |             |   |                   |                           |                  |                 |                  |             |
| 60         |         |                     |             |   |                   |                           |                  |                 |                  |             |
| 65         |         |                     |             |   |                   |                           |                  |                 |                  |             |
| 70         |         |                     |             |   |                   |                           |                  |                 |                  |             |
| 75         |         |                     |             |   |                   |                           |                  |                 |                  |             |
| 80         |         |                     |             |   |                   |                           |                  |                 |                  |             |
| 85         |         |                     |             |   |                   |                           |                  |                 |                  |             |

7/9/18 BORLOGR ROCKY RIPPLE BORING LOGS - FINAL.GPJ

Completion Depth: 35.0 ft. Water Depth: See ft., After \_\_\_\_\_ hrs.  
 Project No.: 60542771 Notes ft., After \_\_\_\_\_ hrs.  
 Project Name: Rocky Ripple Levee \_\_\_\_\_ ft., After \_\_\_\_\_ hrs.  
 Drilling Method: Mud Rotary \_\_\_\_\_ ft., After \_\_\_\_\_ hrs.



# LOG of BORING No. B- 5A

DATE 9/18/17 SURFACE ELEVATION 710.5 LOCATION See Plate 2

| DEPTH, FT. | SAMPLES | SAMPLING RESISTANCE | SAMPLE TYPE                      | DESCRIPTION  | STRATUM ELEVATION | POCKET PENETROMETER (TSF) | WATER CONTENT, % | LIQUID LIMIT, % | PLASTIC LIMIT, % | OTHER TESTS |
|------------|---------|---------------------|----------------------------------|--|-------------------|---------------------------|------------------|-----------------|------------------|-------------|
| 0          |         |                     | AU                               | Topsoil (approx. 6")   | 710.0             |                           |                  |                 |                  |             |
| 5          |         |                     | AU<br>AU<br>AU<br>AU<br>AU<br>AU | Medium dense brown fine sandy SILT/ silty fine SAND, trace fine gravel<br><br>(Fill)   | 704.3             |                           |                  |                 |                  |             |
| 6.2        |         |                     |                                  | END OF BORING  |                   |                           |                  |                 |                  |             |
| 10         |         |                     |                                  | <p><b>Notes:</b></p> <p>1. Test boring advanced by hand auger. Boring terminated at 6.2 feet due to tool refusal.</p> <p>2. Accurate groundwater level could not be obtained during drilling due to the drilling method.</p> |                   |                           |                  |                 |                  |             |
| 15         |         |                     |                                  |  |                   |                           |                  |                 |                  |             |
| 20         |         |                     |                                  |  |                   |                           |                  |                 |                  |             |
| 25         |         |                     |                                  |  |                   |                           |                  |                 |                  |             |
| 30         |         |                     |                                  |  |                   |                           |                  |                 |                  |             |
| 35         |         |                     |                                  |  |                   |                           |                  |                 |                  |             |
| 40         |         |                     |                                  |  |                   |                           |                  |                 |                  |             |

7/9/18 BORLOGR ROCKY RIPPLE BORING LOGS - FINAL.GPJ

Completion Depth: 6.2 ft. Water Depth: See ft., After \_\_\_\_\_ hrs.  
 Project No.: 60542771 Notes ft., After \_\_\_\_\_ hrs.  
 Project Name: Rocky Ripple Levee \_\_\_\_\_ ft., After \_\_\_\_\_ hrs.  
 Drilling Method: Hand Auger \_\_\_\_\_ ft., After \_\_\_\_\_ hrs.



# LOG of BORING No. B- 6

DATE 8/24/17 SURFACE ELEVATION 704.0 LOCATION See Plate 2

| DEPTH, FT. | SAMPLES | SAMPLING RESISTANCE | SAMPLE TYPE | DESCRIPTION   | STRATUM ELEVATION | POCKET PENETROMETER (TSF) | WATER CONTENT, % | LIQUID LIMIT, % | PLASTIC LIMIT, % | OTHER TESTS |       |
|------------|---------|---------------------|-------------|---|-------------------|---------------------------|------------------|-----------------|------------------|-------------|-------|
| 0          |         |                     |             | Topsoil (approx. 6")  | 703.5             |                           |                  |                 |                  |             |       |
| 6          |         | 10                  | SS          | Medium dense to dense brown silty medium to fine SAND   |                   |                           | 10.0             | 24              | 19               | M           |       |
| 9          |         | 6                   | SS          |   |                   |                           | 7.3              | NP              | NP               | M           |       |
| 4          |         | 9                   | SS          |   |                   |                           | 12.6             |                 |                  | M           |       |
| 10         |         | 4                   | SS          |   |                   |                           | 693.5            |                 |                  |             |       |
| 18         |         | 9                   | SS          | Medium dense to dense gray and brown silty coarse to fine SAND and coarse to fine GRAVEL<br><br><b>Notes:</b><br>1. Boring offset 6 feet north of location shown on plans, due to overhead obstruction (tree limbs).<br>2. Groundwater observed at approximately 13 feet below ground surface during drilling.<br>3. Running sands encountered from 14 feet to 18 feet.<br>4. Auger refusal at 35.9 feet.<br>5. Values under "Pocket Penetrometer" are pocket penetrometer resistance readings in tons per square foot, an indication of unconfined compressive strength of cohesive soils. |                   |                           | 8.6              |                 |                  | M           |       |
| 17         |         | 18                  | SS          |   |                   |                           | 10.6             |                 |                  |             |       |
| 11         |         | 11                  | SS          |   |                   |                           | 15.3             |                 |                  | M           |       |
| 4          |         | 52                  | SS          |   |                   |                           | 4.5              |                 |                  |             |       |
| 7          |         | 7                   | SS          |   |                   |                           | 21.2             |                 |                  |             |       |
| 25         |         | 5                   | SS          | 678.8   | 4.5               |                           |                  |                 |                  |             |       |
| 12         |         | 12                  | SS          | Stiff to very stiff grayish brown to brownish gray silty CLAY, trace medium to fine sand, fine gravel   |                   |                           | 4.0              |                 |                  |             |       |
| P          |         | P                   | P           |   |                   |                           | 3.0              | 26.7            | 58               | 25          | M K T |
| 14         |         | 14                  | SS          |   |                   |                           | 3.5-4.3          |                 |                  |             |       |
| 14         |         | 14                  | SS          | 4.5   |                   |                           |                  |                 |                  |             |       |
| 35         |         | 134/10"             | SS          | 668.5   | 4.5               |                           |                  |                 |                  |             |       |
|            |         |                     |             | 668.1   |                   |                           |                  |                 |                  |             |       |
|            |         |                     |             | Very dense gray decomposed rock friable to coarse to fine sandy coarse to fine GRAVEL-sized rock fragments (Decomposed Rock)  |                   |                           |                  |                 |                  |             |       |
|            |         |                     |             | END OF BORING   |                   |                           |                  |                 |                  |             |       |

7/9/18 BORLOGR ROCKY RIPPLE BORING LOGS - FINAL.GPJ

Completion Depth: 35.7 ft. Water Depth: See ft., After \_\_\_\_\_ hrs.  
 Project No.: 60542771 Notes ft., After \_\_\_\_\_ hrs.  
 Project Name: Rocky Ripple Levee \_\_\_\_\_ ft., After \_\_\_\_\_ hrs.  
 Drilling Method: Hollow-Stem Augers \_\_\_\_\_ ft., After \_\_\_\_\_ hrs.

**LOG of BORING No. B- 7**

DATE 9/5/17 SURFACE ELEVATION 710.5 LOCATION See Plate 2

| DEPTH, FT. | SAMPLES | SAMPLING RESISTANCE | SAMPLE TYPE | DESCRIPTION  | STRATUM ELEVATION | POCKET PENETROMETER (TSF) | WATER CONTENT, % | LIQUID LIMIT, % | PLASTIC LIMIT, % | OTHER TESTS |
|------------|---------|---------------------|-------------|--|-------------------|---------------------------|------------------|-----------------|------------------|-------------|
| 0          |         |                     |             | Topsoil (approx. 6")   | 710.0             | 4.5                       |                  |                 |                  |             |
| 8          |         | 17                  | SS          | Stiff to very stiff brown silty CLAY, trace medium to fine sand, trace fine gravel   | 707.8             |                           |                  |                 |                  |             |
|            |         |                     |             | (Fill)   |                   |                           |                  |                 |                  |             |
| 5          |         |                     | P           | Loose to medium dense brown silty medium to fine SAND, trace organics  |                   | 0.3                       | 24.5             | 26              | 17               | M K T       |
| 4          |         |                     | SS          |  |                   | 1.5                       |                  |                 |                  |             |
| 4          |         |                     | SS          |  |                   |                           | 16.3             |                 |                  | M           |
| 10         |         |                     | SS          |  | 698.0             |                           |                  |                 |                  |             |
| 6          |         |                     | SS          | Firm to stiff gray sandy silty CLAY/ clayey SILT   | 696.5             | 3.5                       |                  |                 |                  |             |
| 15         |         |                     | P           | Medium dense to dense brown coarse to fine GRAVEL with coarse to fine sand, trace silt   |                   |                           |                  |                 |                  |             |
| 1          |         |                     | SS          |  |                   |                           | 23.9             |                 |                  | M           |
| 24         |         |                     | SS          |  |                   |                           | 11.0             |                 |                  | M           |
| 20         |         |                     | SS          |  | 688.5             |                           |                  |                 |                  |             |
| 8          |         |                     | SS          | Interbedded layers of stiff to very stiff gray and brown fine sandy SILT, trace fine gravel, organics, and medium dense brown silty medium to fine SAND, trace fine gravel |                   | 4.5                       |                  |                 |                  |             |
| 18         |         |                     | SS          |  |                   | 3.8                       | 19.0             | 25              | 16               | M           |
| 12         |         |                     | SS          |  |                   |                           | 21.2             | 18              | 13               | M           |
| 37         |         |                     | SS          |  |                   |                           |                  |                 |                  |             |
| 27         |         |                     | SS          |  |                   |                           | 17.1             | NP              | NP               | M           |
| 24         |         |                     | SS          |  | 676.5             |                           |                  |                 |                  |             |
| 35         |         |                     | SS          | Stiff to very stiff grayish brown silty CLAY, trace sand, trace gravel   |                   | 4.3                       | 9.9              | 56              | 23               | M           |
|            |         |                     | P           |  |                   | 4.0                       |                  |                 |                  |             |
| 14         |         |                     | SS          |  |                   | 4.5                       |                  |                 |                  |             |
| 40         |         | 65/10"              | SS          |  | 669.2             | 4.0                       |                  |                 |                  |             |
|            |         |                     | HQ          | Slightly weathered gray LIMESTONE  |                   |                           | 0.2              |                 |                  | U           |

Continued on Sheet 2 of 2

Completion Depth: 46.3 ft. Water Depth: See ft., After \_\_\_\_\_ hrs.  
 Project No.: 60542771 Notes ft., After \_\_\_\_\_ hrs.  
 Project Name: Rocky Ripple Levee ft., After \_\_\_\_\_ hrs.  
 Drilling Method: Mud Rotary ft., After \_\_\_\_\_ hrs.

7/9/18 BORLOGR ROCKY RIPPLE BORING LOGS - FINAL.GPJ



# LOG of BORING No. B- 7

DATE 9/5/17 SURFACE ELEVATION 710.5 LOCATION See Plate 2

| DEPTH, FT. | SAMPLES       | SAMPLING RESISTANCE | SAMPLE TYPE | DESCRIPTION   | STRATUM ELEVATION | POCKET PENETROMETER (TSF) | WATER CONTENT, % | LIQUID LIMIT, % | PLASTIC LIMIT, % | OTHER TESTS |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |  |  |  |  |  |  |
|------------|---------------|---------------------|-------------|---|-------------------|---------------------------|------------------|-----------------|------------------|-------------|-----------|------|-----------|-----------|------|-----------|-----------|------|-----------|-----------|------|-----------|-----------|------|-----------|-----------|------|-----------|-----------|------|-----------|-----------|------|-----------|--|--|--|--|--|--|
| 45         |               | 100                 |             | Slightly weathered gray LIMESTONE, fractures inclined approximately 0 to 10 degrees from the horizontal, fracture spacing typically ranges from 1" to 6" inches.<br><span style="float: right;">(Bedrock)</span>  | 664.2             |                           |                  |                 |                  | 43          |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |  |  |  |  |  |  |
| 50         |               |                     |             | END OF BORING   |                   |                           |                  |                 |                  |             |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |  |  |  |  |  |  |
|            |               |                     |             | <p><b>Notes:</b></p> <p>1. Casing refusal at 41.3 feet.</p> <p>2. Values under "Pocket Penetrometer" are pocket penetrometer resistance readings in tons per square foot, an indication of unconfined compressive strength of cohesive soils.</p> <p>3. Two-inch diameter PVC groundwater observation point was installed to a depth of 36.6 ft below the existing ground surface with the bottom 10 ft screened.</p> <table style="margin-left: 20px; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;">Date</th> <th style="text-align: left;">GW Depth (ft)</th> <th style="text-align: left;">GW Elev (ft)</th> </tr> </thead> <tbody> <tr><td>9/06/2017</td><td>17.3</td><td>693.2 +/-</td></tr> <tr><td>9/07/2017</td><td>17.2</td><td>693.3 +/-</td></tr> <tr><td>9/11/2017</td><td>17.3</td><td>693.2 +/-</td></tr> <tr><td>9/12/2017</td><td>17.4</td><td>693.1 +/-</td></tr> <tr><td>9/13/2017</td><td>17.5</td><td>693.0 +/-</td></tr> <tr><td>9/14/2017</td><td>17.5</td><td>693.0 +/-</td></tr> <tr><td>9/15/2017</td><td>17.5</td><td>693.0 +/-</td></tr> <tr><td>9/18/2017</td><td>17.7</td><td>692.8 +/-</td></tr> <tr><td>9/19/2017</td><td>17.8</td><td>692.7 +/-</td></tr> </tbody> </table> | Date              | GW Depth (ft)             | GW Elev (ft)     | 9/06/2017       | 17.3             | 693.2 +/-   | 9/07/2017 | 17.2 | 693.3 +/- | 9/11/2017 | 17.3 | 693.2 +/- | 9/12/2017 | 17.4 | 693.1 +/- | 9/13/2017 | 17.5 | 693.0 +/- | 9/14/2017 | 17.5 | 693.0 +/- | 9/15/2017 | 17.5 | 693.0 +/- | 9/18/2017 | 17.7 | 692.8 +/- | 9/19/2017 | 17.8 | 692.7 +/- |  |  |  |  |  |  |
| Date       | GW Depth (ft) | GW Elev (ft)        |             |   |                   |                           |                  |                 |                  |             |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |  |  |  |  |  |  |
| 9/06/2017  | 17.3          | 693.2 +/-           |             |   |                   |                           |                  |                 |                  |             |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |  |  |  |  |  |  |
| 9/07/2017  | 17.2          | 693.3 +/-           |             |   |                   |                           |                  |                 |                  |             |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |  |  |  |  |  |  |
| 9/11/2017  | 17.3          | 693.2 +/-           |             |   |                   |                           |                  |                 |                  |             |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |  |  |  |  |  |  |
| 9/12/2017  | 17.4          | 693.1 +/-           |             |   |                   |                           |                  |                 |                  |             |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |  |  |  |  |  |  |
| 9/13/2017  | 17.5          | 693.0 +/-           |             |   |                   |                           |                  |                 |                  |             |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |  |  |  |  |  |  |
| 9/14/2017  | 17.5          | 693.0 +/-           |             |   |                   |                           |                  |                 |                  |             |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |  |  |  |  |  |  |
| 9/15/2017  | 17.5          | 693.0 +/-           |             |   |                   |                           |                  |                 |                  |             |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |  |  |  |  |  |  |
| 9/18/2017  | 17.7          | 692.8 +/-           |             |   |                   |                           |                  |                 |                  |             |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |  |  |  |  |  |  |
| 9/19/2017  | 17.8          | 692.7 +/-           |             |   |                   |                           |                  |                 |                  |             |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |  |  |  |  |  |  |
| 55         |               |                     |             |   |                   |                           |                  |                 |                  |             |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |  |  |  |  |  |  |
| 60         |               |                     |             |   |                   |                           |                  |                 |                  |             |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |  |  |  |  |  |  |
| 65         |               |                     |             |   |                   |                           |                  |                 |                  |             |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |  |  |  |  |  |  |
| 70         |               |                     |             |   |                   |                           |                  |                 |                  |             |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |  |  |  |  |  |  |
| 75         |               |                     |             |   |                   |                           |                  |                 |                  |             |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |  |  |  |  |  |  |
| 80         |               |                     |             |   |                   |                           |                  |                 |                  |             |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |  |  |  |  |  |  |
| 85         |               |                     |             |   |                   |                           |                  |                 |                  |             |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |  |  |  |  |  |  |

7/9/18 BORLOGR ROCKY RIPPLE BORING LOGS - FINAL.GPJ

Completion Depth: 46.3 ft. Water Depth: See ft., After \_\_\_\_\_ hrs.  
 Project No.: 60542771 Notes ft., After \_\_\_\_\_ hrs.  
 Project Name: Rocky Ripple Levee \_\_\_\_\_ ft., After \_\_\_\_\_ hrs.  
 Drilling Method: Mud Rotary \_\_\_\_\_ ft., After \_\_\_\_\_ hrs.



# LOG of BORING No. B- 8

DATE 8/30/17 SURFACE ELEVATION 711.5 LOCATION See Plate 2

| DEPTH, FT. | SAMPLES | SAMPLING RESISTANCE | SAMPLE TYPE | DESCRIPTION  | STRATUM ELEVATION | POCKET PENETROMETER (TSF) | WATER CONTENT, % | LIQUID LIMIT, % | PLASTIC LIMIT, % | OTHER TESTS |     |
|------------|---------|---------------------|-------------|--|-------------------|---------------------------|------------------|-----------------|------------------|-------------|-----|
| 0          |         |                     |             | Topsoil (approx. 6")   | 711.0             | 4.5                       |                  |                 |                  |             |     |
| 19         |         |                     | SS          | Medium dense to very dense brown clayey coarse to fine SAND, trace fine gravel, organics             | 711.0             | 4.5                       | 9.9              | 23              | 14               | M           |     |
| 17         |         |                     | SS          |  |                   | 4.5                       |                  |                 |                  |             |     |
| 5          |         |                     | SS          |  |                   | 4.5                       |                  |                 |                  |             |     |
| 10         |         |                     | SS          |  |                   | 4.5                       | 13.5             | 25              | 16               | M           |     |
| 10         |         |                     | P           | (Fill)   | 701.5             | 2.5                       | 18.6             | 50              | 23               | M K T       |     |
| 10         |         |                     | SS          | Soft to stiff brown to brownish gray coarse to fine sandy silty CLAY/ clayey SAND, trace fine gravel | 701.5             | 3.5                       |                  |                 |                  |             |     |
| 10         |         |                     | P           |  |                   | 1.5                       | 26.4             | 26              | 14               | M T         |     |
| 15         |         |                     | WOR         |  |                   | SS                        |                  | 27.2            | 35               | 17          | M   |
| 15         |         |                     | P           | .P.  |                   |                           |                  |                 |                  |             |     |
| 20         |         |                     | WOH         | .SS.   |                   |                           |                  |                 |                  |             |     |
| 20         |         |                     | P           | .P.  |                   | 0.3                       |                  |                 |                  |             |     |
| 25         |         |                     | SS          | -becoming brown silty CLAY with fine gravel  | 701.5             | 0.3                       |                  |                 |                  |             |     |
| 25         |         |                     | P           |  |                   | P                         | 0.3              | 23.8            | 44               | 22          | M T |
| 25         |         |                     | SS          |  |                   |                           |                  |                 |                  |             |     |
| 30         |         |                     | SS          |  |                   |                           |                  |                 |                  |             |     |
| 30         |         |                     | SS          |  |                   | 1.8                       | 27.1             | 47              | 24               | M           |     |
| 35         |         |                     | SS          |  |                   | 2.3                       |                  |                 |                  |             |     |
| 35         |         |                     | SS          |  |                   | 2.3                       |                  |                 |                  |             |     |
| 35         |         |                     | P           | P  |                   | 3.5                       |                  |                 |                  |             |     |
| 40         |         |                     | SS          | -with gravel-sized weathered limestone   | 671.5             | 4.0                       |                  |                 |                  |             |     |
| 40         |         | 50/1"               | SS          | END OF BORING  |                   |                           |                  |                 |                  |             |     |

Continued on Sheet 2 of 2

Completion Depth: 40.0 ft. Water Depth: See ft., After \_\_\_\_\_ hrs.  
 Project No.: 60542771 Notes ft., After \_\_\_\_\_ hrs.  
 Project Name: Rocky Ripple Levee \_\_\_\_\_ ft., After \_\_\_\_\_ hrs.  
 Drilling Method: Mud Rotary \_\_\_\_\_ ft., After \_\_\_\_\_ hrs.

7/9/18 BORLOGR ROCKY RIPPLE BORING LOGS - FINAL.GPJ



# LOG of BORING No. B- 8

DATE 8/30/17 SURFACE ELEVATION 711.5 LOCATION See Plate 2

| DEPTH, FT. | SAMPLES       | SAMPLING RESISTANCE | SAMPLE TYPE | DESCRIPTION  | STRATUM ELEVATION | POCKET PENETROMETER (TSF) | WATER CONTENT, % | LIQUID LIMIT, % | PLASTIC LIMIT, % | OTHER TESTS |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |  |  |  |  |  |  |  |
|------------|---------------|---------------------|-------------|--|-------------------|---------------------------|------------------|-----------------|------------------|-------------|-----------|------|-----------|-----------|------|-----------|-----------|------|-----------|-----------|------|-----------|-----------|------|-----------|-----------|------|-----------|-----------|------|-----------|-----------|------|-----------|-----------|------|-----------|-----------|------|-----------|--|--|--|--|--|--|--|
| 45         |               |                     |             | <p><b>Notes:</b></p> <p>1. Casing refusal at 40.0 feet.</p> <p>2. Values under "Pocket Penetrometer" are pocket penetrometer resistance readings in tons per square foot, an indication of unconfined compressive strength of cohesive soils.</p> <p>3. Two-inch diameter PVC groundwater observation point was installed to a depth of 31.3 ft below the existing ground surface with the bottom 10 ft screened.</p> <table style="margin-left: 20px;"> <thead> <tr> <th>Date</th> <th>GW Depth (ft)</th> <th>GW Elev (ft)</th> </tr> </thead> <tbody> <tr><td>8/31/2017</td><td>20.2</td><td>691.3 +/-</td></tr> <tr><td>9/05/2017</td><td>20.1</td><td>691.4 +/-</td></tr> <tr><td>9/06/2017</td><td>19.7</td><td>691.8 +/-</td></tr> <tr><td>9/07/2017</td><td>20.0</td><td>691.5 +/-</td></tr> <tr><td>9/11/2017</td><td>20.1</td><td>691.4 +/-</td></tr> <tr><td>9/12/2017</td><td>20.1</td><td>691.4 +/-</td></tr> <tr><td>9/13/2017</td><td>20.0</td><td>691.5 +/-</td></tr> <tr><td>9/14/2017</td><td>20.0</td><td>691.5 +/-</td></tr> <tr><td>9/15/2017</td><td>20.0</td><td>691.5 +/-</td></tr> <tr><td>9/18/2017</td><td>20.2</td><td>691.3 +/-</td></tr> <tr><td>9/19/2017</td><td>20.2</td><td>691.3 +/-</td></tr> </tbody> </table> | Date              | GW Depth (ft)             | GW Elev (ft)     | 8/31/2017       | 20.2             | 691.3 +/-   | 9/05/2017 | 20.1 | 691.4 +/- | 9/06/2017 | 19.7 | 691.8 +/- | 9/07/2017 | 20.0 | 691.5 +/- | 9/11/2017 | 20.1 | 691.4 +/- | 9/12/2017 | 20.1 | 691.4 +/- | 9/13/2017 | 20.0 | 691.5 +/- | 9/14/2017 | 20.0 | 691.5 +/- | 9/15/2017 | 20.0 | 691.5 +/- | 9/18/2017 | 20.2 | 691.3 +/- | 9/19/2017 | 20.2 | 691.3 +/- |  |  |  |  |  |  |  |
| Date       | GW Depth (ft) | GW Elev (ft)        |             |  |                   |                           |                  |                 |                  |             |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |  |  |  |  |  |  |  |
| 8/31/2017  | 20.2          | 691.3 +/-           |             |  |                   |                           |                  |                 |                  |             |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |  |  |  |  |  |  |  |
| 9/05/2017  | 20.1          | 691.4 +/-           |             |  |                   |                           |                  |                 |                  |             |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |  |  |  |  |  |  |  |
| 9/06/2017  | 19.7          | 691.8 +/-           |             |  |                   |                           |                  |                 |                  |             |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |  |  |  |  |  |  |  |
| 9/07/2017  | 20.0          | 691.5 +/-           |             |  |                   |                           |                  |                 |                  |             |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |  |  |  |  |  |  |  |
| 9/11/2017  | 20.1          | 691.4 +/-           |             |  |                   |                           |                  |                 |                  |             |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |  |  |  |  |  |  |  |
| 9/12/2017  | 20.1          | 691.4 +/-           |             |  |                   |                           |                  |                 |                  |             |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |  |  |  |  |  |  |  |
| 9/13/2017  | 20.0          | 691.5 +/-           |             |  |                   |                           |                  |                 |                  |             |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |  |  |  |  |  |  |  |
| 9/14/2017  | 20.0          | 691.5 +/-           |             |  |                   |                           |                  |                 |                  |             |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |  |  |  |  |  |  |  |
| 9/15/2017  | 20.0          | 691.5 +/-           |             |  |                   |                           |                  |                 |                  |             |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |  |  |  |  |  |  |  |
| 9/18/2017  | 20.2          | 691.3 +/-           |             |  |                   |                           |                  |                 |                  |             |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |  |  |  |  |  |  |  |
| 9/19/2017  | 20.2          | 691.3 +/-           |             |  |                   |                           |                  |                 |                  |             |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |  |  |  |  |  |  |  |
| 50         |               |                     |             |  |                   |                           |                  |                 |                  |             |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |  |  |  |  |  |  |  |
| 55         |               |                     |             |  |                   |                           |                  |                 |                  |             |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |  |  |  |  |  |  |  |
| 60         |               |                     |             |  |                   |                           |                  |                 |                  |             |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |  |  |  |  |  |  |  |
| 65         |               |                     |             |  |                   |                           |                  |                 |                  |             |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |  |  |  |  |  |  |  |
| 70         |               |                     |             |  |                   |                           |                  |                 |                  |             |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |  |  |  |  |  |  |  |
| 75         |               |                     |             |  |                   |                           |                  |                 |                  |             |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |  |  |  |  |  |  |  |
| 80         |               |                     |             |  |                   |                           |                  |                 |                  |             |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |  |  |  |  |  |  |  |
| 85         |               |                     |             |  |                   |                           |                  |                 |                  |             |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |  |  |  |  |  |  |  |

7/9/18 BORLOGR ROCKY RIPPLE BORING LOGS - FINAL.GPJ

Completion Depth: 40.0 ft. Water Depth: See ft., After \_\_\_\_\_ hrs.  
 Project No.: 60542771 Notes ft., After \_\_\_\_\_ hrs.  
 Project Name: Rocky Ripple Levee \_\_\_\_\_ ft., After \_\_\_\_\_ hrs.  
 Drilling Method: Mud Rotary \_\_\_\_\_ ft., After \_\_\_\_\_ hrs.



# LOG of BORING No. B- 9

DATE 8/30/17 SURFACE ELEVATION 700.0 LOCATION See Plate 2

| DEPTH, FT. | SAMPLES | SAMPLING RESISTANCE | SAMPLE TYPE | DESCRIPTION  | STRATUM ELEVATION | POCKET PENETROMETER (TSF) | WATER CONTENT, % | LIQUID LIMIT, % | PLASTIC LIMIT, % | OTHER TESTS |          |
|------------|---------|---------------------|-------------|--|-------------------|---------------------------|------------------|-----------------|------------------|-------------|----------|
| 0          |         |                     |             | Topsoil (approx. 5")   | 699.5             | 4.5                       |                  |                 |                  |             |          |
|            |         | 10                  | SS          | Stiff to very stiff brown sandy silty CLAY/ clayey SILT, trace fine gravel   |                   | 2.8                       | 12.7             | 24              | 17               | M K T       |          |
|            | P       | P                   |             |  |                   |                           |                  |                 |                  |             |          |
| 5          |         | 3                   | .SS.        |  |                   |                           |                  |                 |                  |             |          |
|            |         |                     |             | Medium dense brown coarse to fine SAND and coarse to fine GRAVEL, trace silt   | 692.8             |                           |                  |                 |                  |             |          |
|            |         | 5                   | SS          |  |                   |                           |                  |                 |                  |             |          |
| 10         |         | 13                  | SS          |  |                   |                           |                  | 3.6             |                  |             | M        |
|            |         | 13                  | .SS.        |  |                   |                           |                  |                 |                  |             |          |
|            |         | 10                  | SS          |  |                   |                           |                  |                 |                  |             |          |
| 15         |         | 11                  | .SS.        |  |                   |                           | 7.2              |                 |                  | M           |          |
|            |         | 6                   | SS          | Firm to stiff brown silty CLAY/ clayey SILT, trace fine gravel   | 682.7             | 4.0                       |                  |                 |                  |             |          |
|            |         | P                   | .P.         |  |                   | 681.3                     |                  |                 |                  |             |          |
| 20         |         |                     |             | Medium dense brown silty medium to fine SAND   | 679.2             |                           |                  |                 |                  |             |          |
|            |         | 15                  | SS          |  |                   | 4.5                       | 11.8             | 19              | 12               | M           |          |
|            |         | 12                  | .SS.        | Firm to stiff grayish brown to gray medium to fine sandy silty CLAY, trace fine gravel   |                   |                           |                  |                 |                  |             |          |
| 25         |         | 7                   | SS          |  |                   |                           | 4.0              | 30.2            | 57               | 25          | M        |
|            |         | P                   | .P.         |  |                   |                           |                  |                 |                  |             |          |
|            |         | 67/7"               | SS          | - with gravel-sized limestone fragments in tip of spoon  | 670.6             |                           |                  |                 |                  |             |          |
| 30         |         | HQ 100              | HQ          | Slightly weathered gray LIMESTONE, fractures inclined approximately 0 to 45 degrees from the horizontal, fracture spacing typically ranges from 1" to 8" inches. |                   |                           |                  |                 |                  | RQD 0       |          |
|            |         | HQ 100              | HQ          |  |                   |                           |                  | 0.3             |                  |             | U RQD 55 |
| 35         |         |                     |             | (Bedrock)  | 664.3             |                           |                  |                 |                  |             |          |
|            |         |                     |             | END OF BORING  |                   |                           |                  |                 |                  |             |          |

Continued on Sheet 2 of 2

Completion Depth: 35.7 ft. Water Depth: See ft., After \_\_\_\_\_ hrs.  
 Project No.: 60542771 Notes ft., After \_\_\_\_\_ hrs.  
 Project Name: Rocky Ripple Levee \_\_\_\_\_ ft., After \_\_\_\_\_ hrs.  
 Drilling Method: Mud Rotary \_\_\_\_\_ ft., After \_\_\_\_\_ hrs.

7/9/18 BORLOGR ROCKY RIPPLE BORING LOGS - FINAL.GPJ



# LOG of BORING No. B-10

DATE 9/11/17 SURFACE ELEVATION 710.5 LOCATION See Plate 2

| DEPTH, FT. | SAMPLES | SAMPLING RESISTANCE | SAMPLE TYPE | DESCRIPTION  | STRATUM ELEVATION | POCKET PENETROMETER (TSF) | WATER CONTENT, % | LIQUID LIMIT, % | PLASTIC LIMIT, % | OTHER TESTS |
|------------|---------|---------------------|-------------|--|-------------------|---------------------------|------------------|-----------------|------------------|-------------|
| 0          |         |                     |             | Topsoil (approx. 5")   | 710.0             | 4.0                       |                  |                 |                  |             |
| 5          |         |                     |             | Firm to stiff brown sandy silty CLAY, trace fine gravel interbedded with medium dense silty SAND, trace organics |                   | 4.5                       |                  |                 |                  |             |
| 18         |         |                     |             |  |                   | 4.0                       |                  |                 |                  |             |
| 4          |         |                     |             |  |                   | 4.5                       | 23.4             | 26              | 16               | M K T       |
| 10         |         |                     |             | (Fill)   | 700.5             |                           |                  |                 |                  |             |
| 15         |         |                     |             | Loose to medium dense brown medium to fine sandy SILT/ silty SAND  |                   | 3.5                       | 17.5             | NP              | NP               | M           |
| 7          |         |                     |             |  |                   | 4.0                       | 14.2             | NP              | NP               | M           |
| 5          |         |                     |             |  |                   | 4.3                       | 21.6             | NP              | NP               | M K         |
| 20         |         |                     |             |  |                   | 3.5                       | 20.3             | NP              | NP               |             |
| 2          |         |                     |             |  |                   | 690.5                     |                  |                 |                  |             |
| 25         |         |                     |             | Medium dense to dense coarse to fine SAND and coarse to fine GRAVEL, trace silt                                  |                   |                           | 8.7              |                 |                  | M           |
| 15         |         |                     |             |  |                   |                           |                  |                 |                  |             |
| 25         |         |                     |             | .SS.   |                   |                           | 19.5             |                 |                  | M           |
| 30         |         |                     |             | Stiff to very stiff grayish brown to gray silty CLAY   |                   |                           |                  |                 |                  |             |
| 13         |         |                     |             |  |                   | 683.3                     |                  |                 |                  |             |
| 8          |         |                     |             |  |                   |                           | 2.8              |                 |                  |             |
| 7          |         |                     |             |  |                   |                           | 3.0              | 29.2            | 56               | 24          |
| 35         |         |                     |             | P  |                   |                           |                  |                 |                  |             |
| 12         |         |                     |             | SS   |                   |                           |                  |                 |                  |             |
| 78/5"      |         |                     |             | SS   |                   |                           |                  |                 |                  |             |
| 40         |         |                     |             | HQ   |                   |                           |                  |                 |                  | RQD 41      |
| 100        |         |                     |             | HQ   |                   |                           |                  |                 |                  |             |
|            |         |                     |             | HQ   |                   |                           | 0.2              |                 |                  | U ROD       |

Completion Depth: 46.2 ft. Water Depth: See ft., After \_\_\_\_\_ hrs.  
 Project No.: 60542771 Notes ft., After \_\_\_\_\_ hrs.  
 Project Name: Rocky Ripple Levee ft., After \_\_\_\_\_ hrs.  
 Drilling Method: Mud Rotary ft., After \_\_\_\_\_ hrs.

7/9/18 BORLOGR ROCKY RIPPLE BORING LOGS - FINAL.GPJ

# LOG of BORING No. B-10

DATE 9/11/17 SURFACE ELEVATION 710.5 LOCATION See Plate 2

| DEPTH, FT. | SAMPLES | SAMPLING RESISTANCE | SAMPLE TYPE | DESCRIPTION  | STRATUM ELEVATION | POCKET PENETROMETER (TSF) | WATER CONTENT, % | LIQUID LIMIT, % | PLASTIC LIMIT, % | OTHER TESTS |
|------------|---------|---------------------|-------------|--|-------------------|---------------------------|------------------|-----------------|------------------|-------------|
| 45         |         |                     |             | Slightly weathered gray LIMESTONE, fractures inclined approximately 0 to 45 degrees from the horizontal, fracture spacing typically ranges from 1" to 8" inches.<br><span style="float: right;">(Bedrock)</span>   | 664.3             |                           |                  |                 |                  | 93          |
| 50         |         |                     |             | END OF BORING  |                   |                           |                  |                 |                  |             |
| 55         |         |                     |             | <p><b>Notes:</b></p> <ol style="list-style-type: none"> <li>1. Boring offset 5 feet southwest of location shown on plans, due to overhead obstruction (tree limbs).</li> <li>2. Accurate groundwater level could not be obtained during drilling due to the drilling method.</li> <li>3. Casing refusal at 36.9 feet.</li> <li>4. Values under "Pocket Penetrometer" are pocket penetrometer resistance readings in tons per square foot, an indication of unconfined compressive strength of cohesive soils.</li> </ol> |                   |                           |                  |                 |                  |             |
| 60         |         |                     |             |  |                   |                           |                  |                 |                  |             |
| 65         |         |                     |             |  |                   |                           |                  |                 |                  |             |
| 70         |         |                     |             |  |                   |                           |                  |                 |                  |             |
| 75         |         |                     |             |  |                   |                           |                  |                 |                  |             |
| 80         |         |                     |             |  |                   |                           |                  |                 |                  |             |
| 85         |         |                     |             |  |                   |                           |                  |                 |                  |             |

7/9/18 BORLOGR ROCKY RIPPLE BORING LOGS - FINAL.GPJ

Completion Depth: 46.2 ft. Water Depth: See ft., After \_\_\_\_\_ hrs.  
 Project No.: 60542771 Notes ft., After \_\_\_\_\_ hrs.  
 Project Name: Rocky Ripple Levee \_\_\_\_\_ ft., After \_\_\_\_\_ hrs.  
 Drilling Method: Mud Rotary \_\_\_\_\_ ft., After \_\_\_\_\_ hrs.



# LOG of BORING No. B-11

DATE 8/29/17 SURFACE ELEVATION 711.5 LOCATION See Plate 2

| DEPTH, FT. | SAMPLES | SAMPLING RESISTANCE | SAMPLE TYPE | DESCRIPTION  | STRATUM ELEVATION | POCKET PENETROMETER (TSF) | WATER CONTENT, % | LIQUID LIMIT, % | PLASTIC LIMIT, % | OTHER TESTS |
|------------|---------|---------------------|-------------|--|-------------------|---------------------------|------------------|-----------------|------------------|-------------|
| 0          |         |                     |             | Topsoil (approx. 6")   | 711.0             | 4.5                       |                  |                 |                  |             |
|            |         | 8                   | SS          |  |                   |                           |                  |                 |                  |             |
|            |         | P                   | P           | Stiff brown sandy silty CLAY, trace fine gravel<br>- becoming with black medium dense coarse to fine |                   |                           | 20.2             | 27              | 16               | M T         |
| 5          |         | 19                  | SS          | GRAVEL-sized slag fragments  |                   |                           |                  |                 |                  |             |
|            |         | 14                  | SS          |  |                   |                           |                  |                 |                  |             |
|            |         |                     |             | (Fill)   | 703.0             |                           |                  |                 |                  |             |
| 10         |         | 5                   | SS          |  |                   |                           |                  |                 |                  |             |
|            |         | 5                   | SS          | Medium dense brown silty fine SAND/ fine sandy SILT  |                   | 3.0                       |                  |                 |                  |             |
|            |         | 10                  | SS          |  |                   |                           |                  |                 |                  |             |
| 15         |         | 5                   | SS          |  |                   |                           |                  |                 |                  |             |
|            |         | P                   | P           | - becoming medium dense to dense brown silty coarse to   |                   |                           | 12.1             | NP              | NP               | M           |
|            |         | 11                  | SS          | fine SAND with fine gravel   |                   |                           |                  |                 |                  |             |
| 20         |         | 18                  | SS          |  |                   |                           | 8.5              | NP              | NP               | M           |
|            |         | 15                  | SS          |  |                   |                           | 14.6             |                 |                  | M           |
| 25         |         | 16                  | SS          |  |                   |                           |                  |                 |                  |             |
|            |         | 17                  | SS          |  |                   |                           |                  |                 |                  |             |
|            |         |                     |             |  | 683.0             |                           |                  |                 |                  |             |
| 30         |         | 11                  | SS          | Stiff to very stiff grayish brown to gray silty CLAY, trace  |                   | 4.5                       |                  |                 |                  |             |
|            |         | P                   | P           | organics   |                   | 4.5                       |                  |                 |                  |             |
|            |         | 125                 | SS          |  | 678.7             | 4.5                       |                  |                 |                  |             |
| 35         |         | 87                  | SS          | Very dense gray decomposed rock friable to silty coarse to   |                   |                           |                  |                 |                  |             |
|            |         | 50/0"               | SS          | fine SAND and coarse to fine GRAVEL-sized rock   |                   |                           |                  |                 |                  |             |
|            |         |                     |             | (Decomposed Rock)  | 675.5             |                           |                  |                 |                  |             |
|            |         |                     |             | END OF BORING  |                   |                           |                  |                 |                  |             |

Continued on Sheet 2 of 2

Completion Depth: 36.0 ft. Water Depth: See ft., After \_\_\_\_\_ hrs.  
 Project No.: 60542771 Notes ft., After \_\_\_\_\_ hrs.  
 Project Name: Rocky Ripple Levee \_\_\_\_\_ ft., After \_\_\_\_\_ hrs.  
 Drilling Method: Mud Rotary \_\_\_\_\_ ft., After \_\_\_\_\_ hrs.

7/9/18 BORLOGR ROCKY RIPPLE BORING LOGS - FINAL.GPJ



# LOG of BORING No. B-11

DATE 8/29/17 SURFACE ELEVATION 711.5 LOCATION See Plate 2

| DEPTH, FT. | SAMPLES       | SAMPLING RESISTANCE | SAMPLE TYPE | DESCRIPTION  | STRATUM ELEVATION | POCKET PENETROMETER (TSF) | WATER CONTENT, % | LIQUID LIMIT, % | PLASTIC LIMIT, % | OTHER TESTS |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |  |  |  |  |  |  |  |
|------------|---------------|---------------------|-------------|--|-------------------|---------------------------|------------------|-----------------|------------------|-------------|-----------|------|-----------|-----------|------|-----------|-----------|------|-----------|-----------|------|-----------|-----------|------|-----------|-----------|------|-----------|-----------|------|-----------|-----------|------|-----------|-----------|------|-----------|-----------|------|-----------|--|--|--|--|--|--|--|
| 45         |               |                     |             | <p><b>Notes:</b></p> <p>1. Casing refusal at 36 feet.</p> <p>2. Values under "Pocket Penetrometer" are pocket penetrometer resistance readings in tons per square foot, an indication of unconfined compressive strength of cohesive soils.</p> <p>3. Two-inch diameter PVC groundwater observation point was installed to a depth of 31.0 ft below the existing ground surface with the bottom 10 ft screened.</p> <table style="margin-left: 20px;"> <thead> <tr> <th>Date</th> <th>GW Depth (ft)</th> <th>GW Elev (ft)</th> </tr> </thead> <tbody> <tr><td>8/31/2017</td><td>20.1</td><td>691.4 +/-</td></tr> <tr><td>9/05/2017</td><td>20.5</td><td>691.0 +/-</td></tr> <tr><td>9/06/2017</td><td>20.1</td><td>691.4 +/-</td></tr> <tr><td>9/07/2017</td><td>20.2</td><td>691.3 +/-</td></tr> <tr><td>9/11/2017</td><td>20.5</td><td>691.0 +/-</td></tr> <tr><td>9/12/2017</td><td>20.1</td><td>691.4 +/-</td></tr> <tr><td>9/13/2017</td><td>20.1</td><td>691.4 +/-</td></tr> <tr><td>9/14/2017</td><td>20.1</td><td>691.4 +/-</td></tr> <tr><td>9/15/2017</td><td>20.1</td><td>691.4 +/-</td></tr> <tr><td>9/18/2017</td><td>20.2</td><td>691.3 +/-</td></tr> <tr><td>9/19/2017</td><td>20.2</td><td>691.3 +/-</td></tr> </tbody> </table> | Date              | GW Depth (ft)             | GW Elev (ft)     | 8/31/2017       | 20.1             | 691.4 +/-   | 9/05/2017 | 20.5 | 691.0 +/- | 9/06/2017 | 20.1 | 691.4 +/- | 9/07/2017 | 20.2 | 691.3 +/- | 9/11/2017 | 20.5 | 691.0 +/- | 9/12/2017 | 20.1 | 691.4 +/- | 9/13/2017 | 20.1 | 691.4 +/- | 9/14/2017 | 20.1 | 691.4 +/- | 9/15/2017 | 20.1 | 691.4 +/- | 9/18/2017 | 20.2 | 691.3 +/- | 9/19/2017 | 20.2 | 691.3 +/- |  |  |  |  |  |  |  |
| Date       | GW Depth (ft) | GW Elev (ft)        |             |  |                   |                           |                  |                 |                  |             |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |  |  |  |  |  |  |  |
| 8/31/2017  | 20.1          | 691.4 +/-           |             |  |                   |                           |                  |                 |                  |             |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |  |  |  |  |  |  |  |
| 9/05/2017  | 20.5          | 691.0 +/-           |             |  |                   |                           |                  |                 |                  |             |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |  |  |  |  |  |  |  |
| 9/06/2017  | 20.1          | 691.4 +/-           |             |  |                   |                           |                  |                 |                  |             |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |  |  |  |  |  |  |  |
| 9/07/2017  | 20.2          | 691.3 +/-           |             |  |                   |                           |                  |                 |                  |             |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |  |  |  |  |  |  |  |
| 9/11/2017  | 20.5          | 691.0 +/-           |             |  |                   |                           |                  |                 |                  |             |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |  |  |  |  |  |  |  |
| 9/12/2017  | 20.1          | 691.4 +/-           |             |  |                   |                           |                  |                 |                  |             |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |  |  |  |  |  |  |  |
| 9/13/2017  | 20.1          | 691.4 +/-           |             |  |                   |                           |                  |                 |                  |             |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |  |  |  |  |  |  |  |
| 9/14/2017  | 20.1          | 691.4 +/-           |             |  |                   |                           |                  |                 |                  |             |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |  |  |  |  |  |  |  |
| 9/15/2017  | 20.1          | 691.4 +/-           |             |  |                   |                           |                  |                 |                  |             |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |  |  |  |  |  |  |  |
| 9/18/2017  | 20.2          | 691.3 +/-           |             |  |                   |                           |                  |                 |                  |             |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |  |  |  |  |  |  |  |
| 9/19/2017  | 20.2          | 691.3 +/-           |             |  |                   |                           |                  |                 |                  |             |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |  |  |  |  |  |  |  |
| 50         |               |                     |             |  |                   |                           |                  |                 |                  |             |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |  |  |  |  |  |  |  |
| 55         |               |                     |             |  |                   |                           |                  |                 |                  |             |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |  |  |  |  |  |  |  |
| 60         |               |                     |             |  |                   |                           |                  |                 |                  |             |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |  |  |  |  |  |  |  |
| 65         |               |                     |             |  |                   |                           |                  |                 |                  |             |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |  |  |  |  |  |  |  |
| 70         |               |                     |             |  |                   |                           |                  |                 |                  |             |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |  |  |  |  |  |  |  |
| 75         |               |                     |             |  |                   |                           |                  |                 |                  |             |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |  |  |  |  |  |  |  |
| 80         |               |                     |             |  |                   |                           |                  |                 |                  |             |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |  |  |  |  |  |  |  |
| 85         |               |                     |             |  |                   |                           |                  |                 |                  |             |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |           |      |           |  |  |  |  |  |  |  |

7/9/18 BORLOGR ROCKY RIPPLE BORING LOGS - FINAL.GPJ

Completion Depth: 36.0 ft. Water Depth: See ft., After \_\_\_\_\_ hrs.  
 Project No.: 60542771 Notes ft., After \_\_\_\_\_ hrs.  
 Project Name: Rocky Ripple Levee \_\_\_\_\_ ft., After \_\_\_\_\_ hrs.  
 Drilling Method: Mud Rotary \_\_\_\_\_ ft., After \_\_\_\_\_ hrs.



# LOG of BORING No. B-12

DATE 8/29/17 SURFACE ELEVATION 704.5 LOCATION See Plate 2

| DEPTH, FT. | SAMPLES | SAMPLING RESISTANCE | SAMPLE TYPE | DESCRIPTION  | STRATUM ELEVATION | POCKET PENETROMETER (TSF) | WATER CONTENT, % | LIQUID LIMIT, % | PLASTIC LIMIT, % | OTHER TESTS      |
|------------|---------|---------------------|-------------|--|-------------------|---------------------------|------------------|-----------------|------------------|------------------|
| 0          |         |                     | WOH SS      | Topsoil (approx. 6")   | 704.0             |                           |                  |                 |                  |                  |
|            |         | P                   | P           | Firm to stiff brown fine sandy silty CLAY, trace fine gravel   |                   |                           | 15.8             | 26              | 16               | M T              |
| 5          |         | 5                   | SS          |  |                   |                           | 23.0             | 37              | 19               | M                |
|            |         | P                   | P           |  | 697.5             |                           | 25.1             | 24              | 17               | M T              |
|            |         | 5                   | SS          | Medium dense brown coarse to fine SAND with fine gravel, trace silt  |                   |                           | 22.1             | NP              | NP               |                  |
| 10         |         | 4                   | SS          |  |                   |                           | 17.0             |                 |                  | M                |
|            |         | 14                  | SS          |  |                   |                           |                  |                 |                  |                  |
| 15         |         | 12                  | SS          |  | 689.0             |                           |                  |                 |                  |                  |
|            |         | 9                   | SS          | Firm to stiff grayish brown to gray silty CLAY   |                   |                           |                  |                 |                  |                  |
|            |         | P                   | P           |  |                   |                           | 27.2             | 55              | 25               | C T<br>G M       |
| 20         |         | 11                  | SS          |  |                   |                           |                  |                 |                  |                  |
|            |         | 14                  | SS          |  |                   |                           |                  |                 |                  |                  |
| 25         |         | P                   | P           |  |                   |                           |                  |                 |                  |                  |
|            |         | 79/5"               | SS          |  | 678.7             |                           |                  |                 |                  | RQD<br>0         |
|            |         | HQ                  | HQ          | Slightly weathered gray LIMESTONE, fractures inclined approximately 0 to 15 degrees from the horizontal, fracture spacing typically ranges from 1" to 18" inches.  |                   |                           | 0.3              |                 |                  | U<br>RQD<br>64.5 |
| 30         |         | HQ                  | HQ          | (Bedrock)  | 673.5             |                           |                  |                 |                  |                  |
|            |         |                     |             | END OF BORING  |                   |                           |                  |                 |                  |                  |
|            |         |                     |             | <b>Notes:</b><br>1. Accurate groundwater level could not be obtained during drilling due to the drilling method.<br>2. Drilling resistance (i.e. rig chatter) noted at approximately 25 to 26 feet, which may be indicative of gravel and/or cobbles.<br>3. Casing refusal at 26 feet. |                   |                           |                  |                 |                  |                  |
| 35         |         |                     |             |  |                   |                           |                  |                 |                  |                  |
| 40         |         |                     |             |  |                   |                           |                  |                 |                  |                  |

7/9/18 BORLOGR ROCKY RIPPLE BORING LOGS - FINAL.GPJ

Completion Depth: 31.0 ft. Water Depth: See ft., After \_\_\_\_\_ hrs.  
 Project No.: 60542771 Notes ft., After \_\_\_\_\_ hrs.  
 Project Name: Rocky Ripple Levee \_\_\_\_\_ ft., After \_\_\_\_\_ hrs.  
 Drilling Method: Mud Rotary \_\_\_\_\_ ft., After \_\_\_\_\_ hrs.

# LOG of BORING No. B-13

DATE 9/14/17 SURFACE ELEVATION 711.5 LOCATION See Plate 2

| DEPTH, FT. | SAMPLES | SAMPLING RESISTANCE | SAMPLE TYPE | DESCRIPTION   | STRATUM ELEVATION | POCKET PENETROMETER (TSF) | WATER CONTENT, % | LIQUID LIMIT, % | PLASTIC LIMIT, % | OTHER TESTS |
|------------|---------|---------------------|-------------|---|-------------------|---------------------------|------------------|-----------------|------------------|-------------|
| 0          |         |                     |             | Topsoil ( Approx. 4")   | 711.0             |                           |                  |                 |                  |             |
| 9          |         | 9                   | SS          | Stiff to very stiff brown fine sandy CLAY   |                   |                           | 8.2              | NP              | NP               | M           |
| 5          |         | 9                   | SS          |   |                   | 4.5                       |                  |                 |                  |             |
| 9          |         | 9                   | SS          |   |                   | 4.5                       | 16.9             |                 |                  | M           |
| 6          |         | 6                   | SS          | (Fill)  | 702.2             |                           |                  |                 |                  |             |
| 10         |         | 6                   | SS          | Medium dense brown silty medium to fine SAND  |                   |                           | 14.8             | 21              | 16               | M           |
| 23         |         | 23                  | SS          |   | 698.5             |                           |                  |                 |                  |             |
| 15         |         | 41                  | SS          | Dense to very dense brown coarse to fine SAND and coarse to fine GRAVEL, trace silt   |                   |                           | 4.3              |                 |                  | M           |
| 49         |         | 49                  | SS          |   |                   |                           |                  |                 |                  |             |
| 22         |         | 22                  | SS          |   | 691.5             |                           | 6.0              |                 |                  | M           |
| 20         |         | 61                  | SS          | Dense to very dense gray silty fine SAND with clay lenses throughout  |                   |                           |                  |                 |                  |             |
| 43         |         | 43                  | SS          |   |                   | 4.5                       |                  |                 |                  |             |
| 25         |         | 24                  | SS          |   |                   | 4.5                       | 27.3             | 43              | 19               |             |
| 34         |         | 34                  | SS          |   |                   | 2.5-3.0                   |                  |                 |                  |             |
| 7          |         | 7                   | SS          |   |                   |                           |                  |                 |                  |             |
| 30         |         | P                   | P           |   |                   | 4.5                       |                  |                 |                  |             |
| 49         |         | 49                  | SS          |   | 679.5             |                           |                  |                 |                  |             |
| 65/9"      |         | 65/9"               | SS          | Very dense gray decomposed rock friable to silty coarse to fine SAND with gravel-sized rock fragments   | 677.4             |                           |                  |                 |                  |             |
| 50/1"      |         | 50/1"               | SS          | (Decomposed Rock)   |                   |                           |                  |                 |                  |             |
| 35         |         |                     |             | END OF BORING   |                   |                           |                  |                 |                  |             |
|            |         |                     |             | <b>Notes:</b><br>1. Accurate groundwater level could not be obtained during drilling due to the drilling method.<br>2. Casing refusal at 34.0 feet.<br>3. Values under "Pocket Penetrometer" are pocket penetrometer resistance readings in tons per square foot, an indication of unconfined compressive strength of cohesive soils. |                   |                           |                  |                 |                  |             |

7/9/18 BORLOGR ROCKY RIPPLE BORING LOGS - FINAL.GPJ

Completion Depth: 34.1 ft. Water Depth: See ft., After \_\_\_\_\_ hrs.  
 Project No.: 60542771 Notes ft., After \_\_\_\_\_ hrs.  
 Project Name: Rocky Ripple Levee \_\_\_\_\_ ft., After \_\_\_\_\_ hrs.  
 Drilling Method: Mud Rotary \_\_\_\_\_ ft., After \_\_\_\_\_ hrs.



# LOG of BORING No. B-15

DATE 9/6/17 SURFACE ELEVATION 712.5 LOCATION See Plate 2

| DEPTH, FT.                                 | SAMPLES | SAMPLING RESISTANCE | SAMPLE TYPE | DESCRIPTION  | STRATUM ELEVATION | POCKET PENETROMETER (TSF) | WATER CONTENT, % | LIQUID LIMIT, % | PLASTIC LIMIT, % | OTHER TESTS |
|--|---------|---------------------|-------------|--|-------------------|---------------------------|------------------|-----------------|------------------|-------------|
| 0  |         |                     |             | Topsoil (approx. 4")   | 712.0             | 4.3                       |                  |                 |                  |             |
|  |         | 10                  | SS          | Firm to stiff brown fine sandy silty CLAY/ clayey SILT   | 710.5             |                           |                  |                 |                  |             |
|  |         |                     | P           | Medium dense brown silty medium to fine SAND, trace fine gravel  | 708.7             |                           |                  |                 |                  |             |
| 5  |         | 10                  | SS          | Firm to stiff dark brown fine sandy silty CLAY, trace fine gravel  |                   | 4.5                       | 19.4             | 32              | 15               | M           |
|  |         | 10                  | SS          |  |                   |                           |                  |                 |                  |             |
|  |         | 5                   | SS          | (Fill)   | 702.5             | 3.5                       |                  |                 |                  |             |
| 10   |         | 35                  | SS          | Dense to very dense brown coarse to fine SAND and coarse to fine GRAVEL, trace silt  |                   |                           | 5.3              |                 |                  | M           |
|  |         | 38                  | SS          |  |                   |                           |                  |                 |                  |             |
| 15   |         | 30                  | SS          |  |                   |                           |                  |                 |                  |             |
|  |         | 20                  | SS          |  |                   |                           | 9.0              |                 |                  | M           |
| 20   |         | 24                  | SS          |  |                   |                           |                  |                 |                  |             |
|  |         | 25                  | SS          |  |                   |                           |                  |                 |                  |             |
| 25   |         | 19                  | SS          |  |                   |                           | 8.6              |                 |                  | M           |
|  |         | 26                  | SS          |  |                   |                           |                  |                 |                  |             |
|  |         | 18                  | SS          |  |                   |                           |                  |                 |                  |             |
|  |         | 11                  | SS          |  | 683.5             |                           |                  |                 |                  |             |
| 30   |         | P                   | P           | Firm to stiff gray silty CLAY with interbedded layers of highly weathered limestone  |                   | 3.0                       |                  |                 |                  |             |
|  |         | 6                   | SS          |  |                   |                           | 3.0              | 25.4            | 104              | 22          |
|  |         | 37                  | SS          |  |                   | 1.0                       |                  |                 |                  |             |
| 35   |         | 2                   | SS          |  |                   | 0.8                       |                  |                 |                  |             |
|  |         | 50                  | SS          |  | 674.5             | 0.5                       |                  |                 |                  |             |
| 40   |         | 50/1"               | SS          | Very dense gray decomposed rock friable to silty coarse to fine SAND and coarse to fine GRAVEL-sized rock fragments<br><br>(Decomposed Rock) | 673.4             |                           |                  |                 |                  |             |
| END OF BORING<br>Continued on Sheet 2 of 2 |         |                     |             |  |                   |                           |                  |                 |                  |             |

7/9/18 BORLOGR ROCKY RIPPLE BORING LOGS - FINAL.GPJ

Completion Depth: 39.0 ft. Water Depth: See ft., After \_\_\_\_\_ hrs.  
 Project No.: 60542771 Notes ft., After \_\_\_\_\_ hrs.  
 Project Name: Rocky Ripple Levee ft., After \_\_\_\_\_ hrs.  
 Drilling Method: Mud Rotary ft., After \_\_\_\_\_ hrs.





# LOG of BORING No. B-16

DATE 9/6/17 SURFACE ELEVATION 701.5 LOCATION See Plate 2

| DEPTH, FT. | SAMPLES  | SAMPLING RESISTANCE | SAMPLE TYPE | DESCRIPTION  | STRATUM ELEVATION | POCKET PENETROMETER (TSF) | WATER CONTENT, % | LIQUID LIMIT, % | PLASTIC LIMIT, % | OTHER TESTS |
|------------|----------|---------------------|-------------|--|-------------------|---------------------------|------------------|-----------------|------------------|-------------|
| 0          |          |                     |             |  |                   |                           |                  |                 |                  |             |
| 5          |          | 5                   | SS          | Firm brown silty CLAY with medium to fine sand, trace organics   | 699.2             | 4.5                       |                  |                 |                  |             |
| 4          |          | 4                   | SS          | Medium dense brown silty fine SAND, trace organics (roots)   | 696.8             |                           | 16.2             | 29              | 19               | M           |
| 5          |          | 5                   | SS          | Firm to stiff brown sandy silty CLAY, trace organics (roots)   | 694.5             | 2.5                       |                  |                 |                  |             |
|            |          | P                   | P           |  |                   |                           | 42.2             | 59              | 27               | M T         |
| 12         |          |                     | SS          | Medium dense brown coarse to fine SAND and coarse to fine GRAVEL, trace silt   |                   |                           | 11.1             |                 |                  | M           |
| 14         |          |                     | SS          |  |                   |                           |                  |                 |                  |             |
| 15         |          |                     | SS          |  | 687.5             |                           | 7.2              |                 |                  | M           |
| 15         | 54/5" HQ | 100                 | HQ          | Stiff gray silty CLAY, trace fine sand   | 687.1             |                           |                  |                 |                  | RQD 50      |
| 20         | HQ       | 100                 | HQ          | Slightly weathered gray LIMESTONE, fractures inclined approximately 0 to 15 degrees from the horizontal, fracture spacing typically ranges from 1" to 8" inches.   |                   |                           |                  |                 |                  | RQD 53      |
| 25         | HQ       | 100                 | HQ          | (Bedrock)  | 675.8             |                           | 0.2              |                 |                  | U RQD 94    |
|            |          |                     |             | END OF BORING  |                   |                           |                  |                 |                  |             |
| 30         |          |                     |             | <b>Notes:</b><br>1. Boring offset 5 feet southwest of location shown on plans, due to overhead obstruction (tree limbs).<br>2. Accurate groundwater level could not be obtained during drilling due to the drilling method.<br>3. Casing refusal at 14.4 feet.<br>4. Values under "Pocket Penetrometer" are pocket penetrometer resistance readings in tons per square foot, an indication of unconfined compressive strength of cohesive soils. |                   |                           |                  |                 |                  |             |
| 35         |          |                     |             |  |                   |                           |                  |                 |                  |             |
| 40         |          |                     |             |  |                   |                           |                  |                 |                  |             |

7/9/18 BORLOGR ROCKY RIPPLE BORING LOGS - FINAL.GPJ

Completion Depth: 25.7 ft. Water Depth: See ft., After \_\_\_\_\_ hrs.  
 Project No.: 60542771 Notes ft., After \_\_\_\_\_ hrs.  
 Project Name: Rocky Ripple Levee \_\_\_\_\_ ft., After \_\_\_\_\_ hrs.  
 Drilling Method: Mud Rotary \_\_\_\_\_ ft., After \_\_\_\_\_ hrs.



# LOG of BORING No. B-17

DATE 9/7/17 SURFACE ELEVATION 713.5 LOCATION See Plate 2

| DEPTH, FT. | SAMPLES | SAMPLING RESISTANCE | SAMPLE TYPE | DESCRIPTION   | STRATUM ELEVATION | POCKET PENETROMETER (TSF) | WATER CONTENT, % | LIQUID LIMIT, % | PLASTIC LIMIT, % | OTHER TESTS |           |
|------------|---------|---------------------|-------------|---|-------------------|---------------------------|------------------|-----------------|------------------|-------------|-----------|
| 0          |         | 24                  | SS          | Topsoil (approx. 3")  | 713.0             | 4.5                       |                  |                 |                  |             |           |
| 5          |         | 16                  | SS          | Stiff to very stiff brown sandy silty CLAY, trace fine gravel with layers of silty sand   |                   | 4.0                       | 11.8             | NP              | NP               | M           |           |
|            |         | 12                  | SS          |   |                   |                           |                  |                 |                  |             |           |
|            |         | 10                  | SS          |   |                   |                           | 4.5              | 11.3            | 22               | 16          | M         |
| 10         |         | 27                  | SS          | (Fill)  | 704.5             |                           |                  |                 |                  |             |           |
| 15         |         | 15                  | SS          | Medium dense to dense brown coarse to fine SAND with coarse to fine gravel, trace silt<br><br><b>Notes:</b><br>1. Accurate groundwater level could not be obtained during drilling due to the drilling method.<br>2. Casing refusal at 30.6 feet.<br>3. Values under "Pocket Penetrometer" are pocket penetrometer resistance readings in tons per square foot, an indication of unconfined compressive strength of cohesive soils. |                   |                           | 13.6             |                 |                  | M           |           |
|            |         | 32                  | SS          |   |                   |                           |                  |                 |                  |             |           |
|            |         | 31                  | SS          |   |                   |                           |                  | 7.3             |                  |             | M         |
|            |         | 29                  | SS          |   |                   |                           |                  |                 |                  |             |           |
|            |         | 13                  | SS          |   |                   |                           |                  |                 |                  |             |           |
|            |         | 17                  | SS          |   |                   |                           |                  | 9.6             |                  |             | M         |
| 20         |         | 19                  | SS          |   | 689.9             | 4.5                       |                  |                 |                  |             |           |
| 25         |         | 10                  | SS          | Stiff to very stiff grayish brown silty CLAY with fine sand   |                   |                           | 26.8             | 27              | 12               | M           |           |
|            |         | P                   | P           |   |                   | 3.5                       |                  |                 |                  |             |           |
|            |         | 21                  | SS          | -with fine gravel   |                   | 3.0                       |                  |                 |                  |             |           |
| 30         |         | 50/0"               | SS          |   | 682.9             | 3.0                       |                  |                 |                  |             |           |
|            |         | HQ 100              | HQ          | Slightly weathered gray LIMESTONE, fractures inclined approximately 0 to 45 degrees from the horizontal, fracture spacing typically ranges from 1" to 6" inches.  |                   |                           |                  |                 |                  | RQD 100     |           |
|            |         | HQ 80               | HQ          |   |                   |                           |                  |                 |                  |             | RQD 61    |
| 35         |         | HQ 100              | HQ          |   |                   |                           |                  | 0.4             |                  |             | U RQD 100 |
| 40         |         |                     |             | (Bedrock)   | 672.2             |                           |                  |                 |                  |             |           |
|            |         |                     |             | END OF BORING   |                   |                           |                  |                 |                  |             |           |

7/9/18 BORLOGR ROCKY RIPPLE BORING LOGS - FINAL.GPJ

Completion Depth: 41.3 ft. Water Depth: See ft., After \_\_\_\_\_ hrs.  
 Project No.: 60542771 Notes ft., After \_\_\_\_\_ hrs.  
 Project Name: Rocky Ripple Levee \_\_\_\_\_ ft., After \_\_\_\_\_ hrs.  
 Drilling Method: Mud Rotary \_\_\_\_\_ ft., After \_\_\_\_\_ hrs.

# LOG of BORING No. B-18

DATE 8/23/17 SURFACE ELEVATION \_\_\_\_\_ LOCATION See Plate 2

| DEPTH, FT. | SAMPLES | SAMPLING RESISTANCE | SAMPLE TYPE | DESCRIPTION  | STRATUM ELEVATION | POCKET PENETROMETER (TSF) | WATER CONTENT, % | LIQUID LIMIT, % | PLASTIC LIMIT, % | OTHER TESTS    |   |
|------------|---------|---------------------|-------------|--|-------------------|---------------------------|------------------|-----------------|------------------|----------------|---|
| 0          |         |                     |             | Topsoil (approx. 9")   |                   | 2.0                       |                  |                 |                  |                |   |
| 17         |         |                     | SS          |  |                   |                           |                  |                 |                  |                |   |
| 14         |         |                     | SS          | Stiff to very stiff dark brown silty CLAY, trace medium to fine sand   |                   | 4.5                       | 5.0              | 29              | 19               | M              |   |
| 5          |         |                     | SS          | (Fill)   |                   | 4.5                       |                  |                 |                  |                |   |
| 26         |         |                     | SS          | Medium dense to dense brown coarse to fine SAND with coarse to fine gravel, trace silt   |                   |                           |                  |                 |                  |                |   |
| 33         |         |                     | SS          |  |                   |                           | 3.9              |                 |                  | M              |   |
| 10         |         |                     | SS          |  |                   |                           |                  |                 |                  |                |   |
| 20         |         |                     | SS          |  |                   |                           |                  |                 |                  |                |   |
| 19         |         |                     | SS          | <b>Notes:</b><br>1. Groundwater observed at approximately 14 feet below ground surface during drilling.<br>2. Running sands encountered from 16 feet to 27 feet.<br>3. Auger refusal at 30.3 feet.<br>4. Values under "Pocket Penetrometer" are pocket penetrometer resistance readings in tons per square foot, an indication of unconfined compressive strength of cohesive soils. |                   |                           |                  |                 |                  |                |   |
| 15         |         |                     | SS          |  |                   |                           |                  | 11.3            |                  |                | M |
| 15         |         |                     | SS          |  |                   |                           |                  |                 |                  |                |   |
| 17         |         |                     | SS          |  |                   |                           |                  |                 |                  |                |   |
| 12         |         |                     | SS          |  |                   |                           |                  |                 |                  |                | M |
| 25         |         |                     | SS          |  |                   |                           |                  |                 |                  |                |   |
| 16         |         |                     | SS          |  |                   |                           |                  |                 |                  |                |   |
| 32         |         |                     | SS          | - becoming clayey medium to fine SAND  |                   |                           |                  |                 |                  |                |   |
| 13         |         |                     | SS          |  |                   | 4.5                       |                  |                 |                  |                |   |
| 26         |         |                     | SS          | Very stiff dark gray silty CLAY/ clayey SILT with coarse to fine gravel  |                   | 4.5                       |                  |                 |                  |                |   |
| 30         |         |                     |             |  |                   |                           |                  |                 |                  |                |   |
| HQ<br>53   |         |                     | HQ          | Slightly weathered gray LIMESTONE, fractures inclined approximately 0 to 45 degrees from the horizontal, fracture spacing typically ranges from 1" to 12" inches.  |                   |                           |                  |                 |                  | RQD<br>13      |   |
| 35         |         |                     | HQ          | - 31.8'-32.2 ft possible void  |                   |                           | 0.2              |                 |                  | U<br>RQD<br>63 |   |
|            |         |                     |             | (Bedrock)  |                   |                           |                  |                 |                  |                |   |
|            |         |                     |             | END OF BORING  |                   |                           |                  |                 |                  |                |   |
| 40         |         |                     |             |  |                   |                           |                  |                 |                  |                |   |

7/9/18 BORLOGR ROCKY RIPPLE BORING LOGS - FINAL.GPJ

Completion Depth: 37.8 ft. Water Depth: See ft., After \_\_\_\_\_ hrs.  
 Project No.: 60542771 Notes ft., After \_\_\_\_\_ hrs.  
 Project Name: Rocky Ripple Levee \_\_\_\_\_ ft., After \_\_\_\_\_ hrs.  
 Drilling Method: Hollow-Stem Augers \_\_\_\_\_ ft., After \_\_\_\_\_ hrs.



# LOG of BORING No. B-19

DATE 8/24/17 SURFACE ELEVATION \_\_\_\_\_ LOCATION See Plate 2

| DEPTH, FT. | SAMPLES | SAMPLING RESISTANCE | SAMPLE TYPE | DESCRIPTION  | STRATUM ELEVATION | POCKET PENETROMETER (TSF) | WATER CONTENT, % | LIQUID LIMIT, % | PLASTIC LIMIT, % | OTHER TESTS |  |
|------------|---------|---------------------|-------------|--|-------------------|---------------------------|------------------|-----------------|------------------|-------------|--|
| 0          |         |                     |             | Topsoil (approx. 6")   |                   | 4.5                       |                  |                 |                  |             |  |
| 20         |         |                     | SS          | Very stiff dark brown silty CLAY, trace coarse to fine sand, trace fine gravel   |                   | 4.5                       |                  |                 |                  |             |  |
| 16         |         |                     | SS          | Medium dense to very dense light brown to dark brown coarse to fine SAND and coarse to fine GRAVEL, trace silt   |                   | 4.5                       |                  |                 |                  |             |  |
| 5          |         |                     | 13          |  | SS                |                           | 4.5              |                 |                  |             |  |
| 34         |         |                     | SS          |  |                   |                           | 3.0              | NP              | NP               | M           |  |
| 39         |         |                     | SS          |  |                   |                           |                  |                 |                  |             |  |
| 10         |         |                     | 35          |  | SS                |                           |                  |                 |                  |             |  |
| 15         |         |                     | 15          |  | SS                |                           | 12.2             | NP              | NP               | M           |  |
| 15         |         |                     | 21          |  | SS                |                           |                  |                 |                  |             |  |
| 1          |         |                     | 1           |  | SS                |                           | 14.0             |                 |                  |             |  |
| 20         |         |                     | 11          |  | SS                |                           |                  |                 |                  |             |  |
| 7          |         |                     | 7           |  | SS                |                           | 5.5              |                 |                  | M           |  |
| 22         |         |                     | 22          | SS   |                   | 4.5                       |                  |                 |                  |             |  |
| 25         |         | 58/5"               | SS          | Very dense brown to dark gray decomposed rock friable to silty coarse to fine SAND and coarse to fine GRAVEL-sized rock fragments<br>(Decomposed Rock)   |                   | 4.5                       |                  |                 |                  |             |  |
| 50/1"      |         | SS                  |             |  |                   |                           | 4.5              |                 |                  |             |  |
|            |         |                     |             | END OF BORING  |                   |                           |                  |                 |                  |             |  |
|            |         |                     |             | <p><b>Notes:</b></p> <ol style="list-style-type: none"> <li>1. Groundwater observed at approximately 12.5 feet below ground surface during drilling.</li> <li>2. Running sands encountered from 14 feet to 24 feet.</li> <li>3. Auger refusal at 25.8 feet.</li> <li>4. Values under "Pocket Penetrometer" are pocket penetrometer resistance readings in tons per square foot, an indication of unconfined compressive strength of cohesive soils.</li> </ol> |                   |                           |                  |                 |                  |             |  |
| 30         |         |                     |             |  |                   |                           |                  |                 |                  |             |  |
| 35         |         |                     |             |  |                   |                           |                  |                 |                  |             |  |
| 40         |         |                     |             |  |                   |                           |                  |                 |                  |             |  |

7/9/18 BORLOGR ROCKY RIPPLE BORING LOGS - FINAL.GPJ

Completion Depth: 25.8 ft. Water Depth: See ft., After \_\_\_\_\_ hrs.  
 Project No.: 60542771 Notes ft., After \_\_\_\_\_ hrs.  
 Project Name: Rocky Ripple Levee \_\_\_\_\_ ft., After \_\_\_\_\_ hrs.  
 Drilling Method: Hollow-Stem Augers \_\_\_\_\_ ft., After \_\_\_\_\_ hrs.

# LOG of BORING No. B-20A

DATE 9/13/17 SURFACE ELEVATION 715.0 LOCATION See Plate 2

| DEPTH, FT. | SAMPLES | SAMPLING RESISTANCE | SAMPLE TYPE | DESCRIPTION  | STRATUM ELEVATION   | POCKET PENETROMETER (TSF)        | WATER CONTENT, % | LIQUID LIMIT, % | PLASTIC LIMIT, % | OTHER TESTS |           |
|------------|---------|---------------------|-------------|--|---|----------------------------------|------------------|-----------------|------------------|-------------|-----------|
| 0          |         |                     |             | Topsoil (approx. 4")   | 714.5   |                                  |                  |                 |                  |             |           |
| 23         |         |                     | SS          | Dense to very dense brown silty coarse to fine SAND, trace fine gravel       |   |                                  | 8.4              | 26              | 16               | M<br>DS     |           |
| 18         |         |                     | SS          |  |   |                                  |                  |                 |                  |             |           |
| 5          |         |                     | 26          |  | SS  |                                  |                  | 5.5             |                  |             | M<br>DS   |
| 18         |         |                     | SS          |  |   |                                  |                  |                 |                  |             |           |
| 15         |         |                     | SS          |  | (Fill)  | 706.0                            |                  |                 |                  |             | M<br>DS   |
| 10         |         |                     |             | Medium dense to dense brown coarse to fine SAND with fine gravel, trace silt |   |                                  |                  |                 |                  |             |           |
| 14         |         |                     | SS          |  |   |                                  |                  |                 |                  |             |           |
| 23         |         |                     | SS          |  |   |                                  |                  | 6.3             |                  |             | M         |
| 15         |         |                     | 25          |  | SS  |                                  |                  |                 |                  |             |           |
|            |         |                     | 23          |  | .SS.  |                                  |                  |                 |                  |             |           |
|            |         |                     | 13          |  | SS  |                                  |                  | 12.3            |                  |             |           |
| 20         |         |                     | 18          |  | SS  |                                  |                  |                 |                  |             |           |
|            |         |                     | 14          |  | SS  |                                  |                  | 10.4            |                  |             | M         |
| 25         |         |                     | 15          |  | SS  |                                  |                  |                 |                  |             |           |
|            |         |                     | 21          |  | SS  | - becoming fine SAND, trace silt |                  |                 | 21.6             |             | M         |
| 30         |         |                     | 9           | SS   |   |                                  |                  |                 |                  |             |           |
|            |         |                     | 7           | SS   |   |                                  |                  |                 |                  |             |           |
|            |         |                     |             |  | 683.0   |                                  |                  |                 |                  |             |           |
|            |         |                     | 18          | SS   | Very dense brown silty coarse to fine SAND with coarse to fine gravel   |                                  |                  |                 |                  |             |           |
| 35         |         |                     | 55/8"       | .SS.   |   |                                  |                  |                 |                  |             |           |
|            |         |                     | 50/1"       | .SS.   |   |                                  |                  |                 |                  |             |           |
|            |         |                     | HQ          | HQ   | Slightly weathered gray LIMESTONE, fractures inclined approximately 0 to 45 degrees from the horizontal, fracture spacing typically ranges from 1" to 14" inches. |                                  |                  |                 |                  | RQD<br>50   |           |
|            |         |                     | 100         | HQ   |   |                                  |                  |                 |                  |             |           |
|            |         |                     | HQ          | HQ   |   |                                  |                  |                 |                  |             | RQD<br>48 |
| 40         |         |                     | 80          |  |   |                                  |                  |                 |                  |             |           |
|            |         |                     | HQ          | HQ   | Continued on Sheet 2 of 2   |                                  |                  |                 |                  | RQD<br>32   |           |
|            |         |                     | 46          |  |   |                                  |                  |                 |                  |             |           |

7/9/18 BORLOGR ROCKY RIPPLE BORING LOGS - FINAL.GPJ

Completion Depth: 51.3 ft. Water Depth: See ft., After \_\_\_\_\_ hrs.  
 Project No.: 60542771 Notes ft., After \_\_\_\_\_ hrs.  
 Project Name: Rocky Ripple Levee \_\_\_\_\_ ft., After \_\_\_\_\_ hrs.  
 Drilling Method: Mud Rotary \_\_\_\_\_ ft., After \_\_\_\_\_ hrs.



# LOG of BORING No. B-20A

DATE 9/13/17 SURFACE ELEVATION 715.0 LOCATION See Plate 2

| DEPTH, FT. | SAMPLES  | SAMPLING RESISTANCE | SAMPLE TYPE | DESCRIPTION   | STRATUM ELEVATION | POCKET PENETROMETER (TSF) | WATER CONTENT, % | LIQUID LIMIT, % | PLASTIC LIMIT, % | OTHER TESTS    |
|------------|----------|---------------------|-------------|---|-------------------|---------------------------|------------------|-----------------|------------------|----------------|
| 45         |          |                     |             |   |                   |                           |                  |                 |                  |                |
| 50         | HQ<br>94 |                     | HQ          | Slightly weathered gray LIMESTONE, fractures inclined approximately 0 to 45 degrees from the horizontal, fracture spacing typically ranges from 1" to 14" inches.<br><br>(Bedrock)  | 663.7             |                           | 0.4              |                 |                  | U<br>RQD<br>84 |
| 55         |          |                     |             | END OF BORING   |                   |                           |                  |                 |                  |                |
| 60         |          |                     |             | <b>Notes:</b><br>1. Boring offset 40 feet northeast of location shown on plans, due to underground obstruction (reinforced concrete pipe).<br>2. Accurate groundwater level could not be obtained during drilling due to the drilling method.<br>3. Drilling resistance (i.e. rig chatter) noted at approximately 34.5 to 35.2 feet, which may be indicative of gravel and/or cobbles.<br>4. Casing refusal at 35.2 feet.<br>5. Loss of water return noted at approximately 41 feet during rock coring. Driller advanced casing from 35.2 feet to 46.3 feet to seal off fractured rock. |                   |                           |                  |                 |                  |                |
| 65         |          |                     |             |   |                   |                           |                  |                 |                  |                |
| 70         |          |                     |             |   |                   |                           |                  |                 |                  |                |
| 75         |          |                     |             |   |                   |                           |                  |                 |                  |                |
| 80         |          |                     |             |   |                   |                           |                  |                 |                  |                |
| 85         |          |                     |             |   |                   |                           |                  |                 |                  |                |

7/9/18 BORLOGR ROCKY RIPPLE BORING LOGS - FINAL.GPJ

Completion Depth: 51.3 ft. Water Depth: See ft., After \_\_\_\_\_ hrs.  
 Project No.: 60542771 Notes ft., After \_\_\_\_\_ hrs.  
 Project Name: Rocky Ripple Levee \_\_\_\_\_ ft., After \_\_\_\_\_ hrs.  
 Drilling Method: Mud Rotary \_\_\_\_\_ ft., After \_\_\_\_\_ hrs.

# LOG of BORING No. B-21

DATE 9/12/17 SURFACE ELEVATION 714.5 LOCATION See Plate 2

| DEPTH, FT. | SAMPLES | SAMPLING RESISTANCE | SAMPLE TYPE | DESCRIPTION  | STRATUM ELEVATION | POCKET PENETROMETER (TSF) | WATER CONTENT, % | LIQUID LIMIT, % | PLASTIC LIMIT, % | OTHER TESTS |       |   |
|------------|---------|---------------------|-------------|--|-------------------|---------------------------|------------------|-----------------|------------------|-------------|-------|---|
| 0          |         |                     |             | Topsoil (approx. 4")   | 714.0             |                           |                  |                 |                  |             |       |   |
| 8          |         | 10                  | SS          | Medium dense to dense brown silty coarse to fine SAND with fine gravel                 |                   |                           | 9.0              | 28              | 17               | M           |       |   |
| 5          |         | 3                   | SS          |  |                   |                           |                  | 12.4            |                  |             |       | M |
|            |         | 2                   | .SS.        |  |                   |                           | (Fill)           | 706.5           |                  |             |       |   |
| 10         |         | 4                   | SS          | Firm gray silty CLAY, trace fine sand  |                   |                           | 1.0-1.8          |                 |                  |             |       |   |
|            |         | P                   | P           |  |                   |                           | 1.5              | 31.5            | 61               | 23          | T G M |   |
| 15         |         | 2                   | SS          |  |                   |                           | 0.3-0.8          |                 |                  |             |       |   |
|            |         | 2                   | SS          |  |                   |                           | 0.3-0.8          | 21.0            | 23               | 16          |       |   |
|            |         | WOH                 | SS          |  |                   |                           | 0.3-0.5          |                 |                  |             |       |   |
| 20         |         | P                   | P           |  | 695.0             |                           |                  |                 |                  |             |       |   |
|            |         | 13                  | SS          | Medium dense to dense brown coarse to fine SAND with coarse to fine gravel, trace silt |                   |                           |                  |                 |                  |             |       |   |
|            |         | 26                  | SS          |  |                   |                           |                  |                 |                  |             |       |   |
| 25         |         | 17                  | SS          |  |                   |                           |                  |                 | 14.0             |             |       | M |
|            |         | 24                  | SS          |  |                   |                           |                  |                 |                  |             |       |   |
|            |         | 22                  | .SS.        |  |                   |                           |                  |                 |                  |             |       |   |
| 30         |         | 13                  | SS          |  |                   |                           | 9.4              |                 |                  | M           |       |   |
|            |         | 16                  | .SS.        |  |                   |                           |                  |                 |                  |             |       |   |
| 35         |         | 27                  | .SS.        |  |                   |                           |                  |                 |                  |             |       |   |
|            |         | 14                  | SS          |  |                   |                           | 9.0              |                 |                  | M           |       |   |
| 40         |         | 25                  | SS          |  |                   |                           |                  |                 |                  |             |       |   |
|            |         | 25                  | SS          | - gray silty CLAY seam observed from approx. 41.8 to 42.3 ft                           |                   |                           | 4.0              |                 |                  |             |       |   |
|            |         | 11                  | SS          |  |                   |                           | 2.0-2.5          |                 |                  |             |       |   |
|            |         | 50/1"               | SS          | Continued on Sheet 2 of 2  |                   |                           |                  |                 |                  |             |       |   |

7/9/18 BORLOGR ROCKY RIPPLE BORING LOGS - FINAL.GPJ

Completion Depth: 51.3 ft. Water Depth: See ft., After \_\_\_\_\_ hrs.  
 Project No.: 60542771 Notes: \_\_\_\_\_ ft., After \_\_\_\_\_ hrs.  
 Project Name: Rocky Ripple Levee \_\_\_\_\_ ft., After \_\_\_\_\_ hrs.  
 Drilling Method: Mud Rotary \_\_\_\_\_ ft., After \_\_\_\_\_ hrs.



# LOG of BORING No. B-21

DATE 9/12/17 SURFACE ELEVATION 714.5 LOCATION See Plate 2

| DEPTH, FT. | SAMPLES | SAMPLING RESISTANCE | SAMPLE TYPE | DESCRIPTION  | STRATUM ELEVATION | POCKET PENETROMETER (TSF) | WATER CONTENT, % | LIQUID LIMIT, % | PLASTIC LIMIT, % | OTHER TESTS                  |
|------------|---------|---------------------|-------------|--|-------------------|---------------------------|------------------|-----------------|------------------|------------------------------|
| 45         |         | HQ<br>100           | HQ          | Slightly weathered gray LIMESTONE, fractures inclined approximately 0 to 45 degrees from the horizontal, fracture spacing typically ranges from 1" to 14" inches.<br><br>(Bedrock)   | 669.0             |                           | 0.3              |                 |                  | RQD<br>100<br>U<br>RQD<br>94 |
| 50         |         | HQ<br>100           | HQ          |  | 663.2             |                           |                  |                 |                  |                              |
|            |         |                     |             | END OF BORING  |                   |                           |                  |                 |                  |                              |
| 55         |         |                     |             | <p><b>Notes:</b></p> <ol style="list-style-type: none"> <li>1. Boring offset 15 feet southwest of location shown on plans, due to canal tow path.</li> <li>2. Accurate groundwater level could not be obtained during drilling due to the drilling method.</li> <li>3. Casing refusal at 45.5 feet.</li> <li>4. Values under "Pocket Penetrometer" are pocket penetrometer resistance readings in tons per square foot, an indication of unconfined compressive strength of cohesive soils.</li> </ol> |                   |                           |                  |                 |                  |                              |
| 60         |         |                     |             |  |                   |                           |                  |                 |                  |                              |
| 65         |         |                     |             |  |                   |                           |                  |                 |                  |                              |
| 70         |         |                     |             |  |                   |                           |                  |                 |                  |                              |
| 75         |         |                     |             |  |                   |                           |                  |                 |                  |                              |
| 80         |         |                     |             |  |                   |                           |                  |                 |                  |                              |
| 85         |         |                     |             |  |                   |                           |                  |                 |                  |                              |
|            |         |                     |             |  |                   |                           |                  |                 |                  |                              |
|            |         |                     |             |  |                   |                           |                  |                 |                  |                              |
|            |         |                     |             |  |                   |                           |                  |                 |                  |                              |

7/9/18 BORLOGR ROCKY RIPPLE BORING LOGS - FINAL.GPJ

Completion Depth: 51.3 ft. Water Depth: See ft., After \_\_\_\_\_ hrs.  
 Project No.: 60542771 Notes ft., After \_\_\_\_\_ hrs.  
 Project Name: Rocky Ripple Levee \_\_\_\_\_ ft., After \_\_\_\_\_ hrs.  
 Drilling Method: Mud Rotary \_\_\_\_\_ ft., After \_\_\_\_\_ hrs.

